

# THE CITY OF LEDUC ENGINEERING DESIGN STANDARDS

December 2024



Disclaimer: These municipal engineering standards are subject to periodic update by the Director of Engineering and Environment. The most current version of these standards will be posted to the City of Leduc's website at [www.leduc.ca](http://www.leduc.ca). Users of these standards for work in Leduc are required to download the latest version prior to proceeding with project design.



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# PART I: ENGINEERING DESIGN STANDARDS



# 1 INTENT AND USE OF THE DESIGN STANDARDS

## 1.1 APPLICATION OF THESE DESIGN STANDARDS

This document has been prepared to guide the designer employed on behalf of the development industry in the design of municipal improvements and systems that will meet the requirements of the City of Leduc. All work performed within the City of Leduc shall be carried out in accordance with the latest issue of the "City of Leduc Engineering Design Standards". Landscaping design will follow **City of Leduc Minimum Landscape Design & Construction Standards**. All development and construction issues not addressed within these specifications shall fall under the scope of the current "City of Edmonton Standard Specifications" unless otherwise specified. With preference always given to the intent and amendments described herein, this document must be read in conjunction with the following Design Standards for the City of Edmonton and EPCOR:

### **Volume 2: Complete Streets Design and Construction Standards**

#### Complete Streets Design Standards

- Applicable Version: October 2021

### **Volume 3: Drainage (EPCOR)**

#### Volume 3-01: Development Planning Procedure and Framework

- Applicable Version: December 2021

#### Volume 3-02: Stormwater Management and Design Manual

- Applicable Version: February 2022

#### Volume 3-03: Design Guidelines

- Applicable Version: February 2022

#### Volume 3-04: Pump Station and Forcemain Design Guidelines

- Applicable Version: February 2022

#### Volume 3-05: Drawing Requirements, Approvals, and Asset Acceptance/Transfer

- Applicable Version: February 2022

#### Volume 3-06: Construction Specifications and Standard Drawings

- Applicable Version: December 2021

### **Volume 4: Water**

#### Design and Construction Standards

- Applicable Version: April 2021

### **Volume 8: Manual for Pavement Marking Design**

#### Pavement Marking Guidelines

- Applicable Version: February 2022



Standards from the City of Edmonton and EPCOR could be updated from time-to-time creating conflicts between the versions listed above or these amendments. If this occurs, the most recent version from the City of Edmonton and EPCOR should be used unless specifically exempted.

This document is intended to fulfil the following needs:

- 1.1.1 To encourage conformance of development and servicing proposals to the land development approval process and the applicable statutory, engineering and administrative requirements as projects progress from planning through concept and design stages. These processes and requirements are in place to ensure that Developers provide municipal improvements and systems that are acceptable to the City for operation and maintenance.
- 1.1.2 To provide a consolidated statement of City policies and expectations regarding the standard of municipal improvements required.
- 1.1.3 To promote consistency and quality in the standard of municipal improvements provided throughout the City.
- 1.1.4 To ensure that the municipal improvements and systems as designed will be robust and perform reliably in all circumstances and upon acceptance by the City, subject the public to normal, reasonable and tolerable responsibilities and costs for maintenance and operation.
- 1.1.5 To identify those design criteria that the City considers to be the minimum standards acceptable for typical conditions.
- 1.1.6 To identify the City's preference and requirements when there are alternative technical options available to address a particular servicing issue.
- 1.1.7 To outline for Developers and Consultants the various stages of system planning and design, levels of analyses required and procedures to be followed to obtain approval of conceptual, preliminary and detail design for their municipal improvement proposals.

## 1.2 DEFINITIONS AND INTERPRETATION OF TERMS

Reference to the City of Edmonton, specific City of Edmonton departments, EPCOR or other nonapplicable institutions within the City of Edmonton will mean the City of Leduc. If the specification is unclear with regards to applicable internal and external stakeholders or terminology, contact the City of Leduc for clarification.

For the purposes of interpretation of the Design Standards the following definitions shall apply:

- 1.2.1 The **City** may refer to, as appropriate to the context, the City of Leduc as a corporate body, or a City-owned corporation. Throughout this document, references to the City department may refer to or include, where applicable, a City-owned corporation.
- 1.2.2 The **Consultant** or **Consulting Engineer** refers to the professional Engineer or technologist responsible for the preparation of designs, reports, studies, engineering drawings and associated documents and the execution and implementation of such designs, normally on behalf of a Developer. The Consultant must hold a valid permit to practice within the Province of Alberta and be registered as an engineer in good standing with APEGA, or a Professional Technologist with ASET.





- 1.2.3 The **Developer** refers to the proponent of a land development proposal, or the Owner as defined in a Development Agreement. Requirements of the Developer stated in these standards may, where appropriate, be referred to a consultant, contractor or other agent acting on the Developer's behalf.
- 1.2.4 The **Engineer** refers to the City of Leduc Director of Engineering or those with written delegated authority.

### 1.3 USE OF THESE DESIGN STANDARDS

- 1.3.1 These standards set out the minimum requirements to be satisfied in the planning and design of municipal improvements within the City of Leduc. The standards are to be utilized as a reference document for planners, designers and engineers engaged in work in the City or preparation of engineering drawings and associated reports that will be subject to the approval of the City.
- 1.3.2 The performance standards and the detailed requirements defined in these standards shall apply to the preparation of engineering drawings and the execution of projects by Developers under the terms of Development Agreements with the City.
- 1.3.3 These standards shall not be considered a rigid requirement and Consultants are encouraged to continuously seek new and better solutions. Where conditions dictate and good engineering practice requires, higher standards than those indicated shall be incorporated into the design. It shall be the Developer's responsibility to develop the subdivision or property in accordance with standards, which conform to good engineering and construction practices, and as approved by the City of Leduc.
- 1.3.4 When using these standards and specifications, the Developer and the Consultant remain fully responsible for the design and construction of municipal improvements according to good engineering standards that address the specific needs and site conditions of their project. Without limiting that broad and general obligation, these standards and specifications shall be the minimum requirement. The Consultant must be satisfied of the applicability of the design criteria in these standards to the project at hand and apply more stringent criteria where appropriate.
- 1.3.5 The Engineer's approval covers only compliance with these standards and is not a warranty of the design of the work. Further, the City expressly disclaims any responsibility for the suitability of the drawings or the designs to a particular site but requires the Consultant to assume full responsibility in this regard.

### 1.4 CHANGES FROM THE DESIGN STANDARDS AND ITEMS NOT COVERED

#### 1.4.1 Revision of Standards by the Engineer

- .1 These standards have been established based on an assessment of current and future needs and the knowledge available to the date of their preparation. The City recognises that many of the criteria and design parameters contained in the standards may require review and re-evaluation over time based on new or improved knowledge. The City will monitor and evaluate the performance of existing municipal improvements and systems, and this may identify the need to revise the content of this document. Certain issues relating to municipal improvement requirements are not addressed within these standards and further



innovations in design may identify the need for new standards. While these situations may often be addressed on a case by case basis through the application of good engineering practice, establishment of new standards may be necessary to ensure that the issues are addressed consistently for future applications. In consideration of these needs, the Engineer reserves the right to alter or revise the standards from time to time. Incorporation of such revisions into the standards will be coordinated through the Engineer, providing reasonable notice to the development industry.

#### **1.4.2 Proposals from the Developer**

- .1 If the Developer wishes to apply methods which differ from a standard or specification in this document, or if these standards or specifications do not cover a subject of concern to a specific design, or if the Developer proposes to use materials not approved in this document, then the responsibility shall be upon the Developer to justify the proposal or resolve the concern to the satisfaction of the City. The concern shall be the subject of a report that the Developer shall have prepared by a professional engineer and signed, sealed and submitted to the City for review.
- .2 The report shall present the alternatives for resolution of the concern and shall make a recommendation on the proposed standard or material to be used, with justifications in terms of implementation feasibility and economic, engineering, environmental, operational and maintenance criteria.
- .3 Notwithstanding the review of this report by the Engineer and the acceptance by the Engineer of the alternatives recommended in the report, the Developer and the Consultant remain fully responsible for the design and construction of the municipal improvements according to good engineering practice adequate to address the specific needs and site conditions.

### **1.5 FINAL DECISION ON DESIGN STANDARDS**

- 1.5.1 The City reserves the right to the final decision regarding the interpretation of the intent of these standards and the acceptability of changes from the standards proposed by the Developer. Interpretations and approvals will be given by the Engineer. If deemed necessary, the Engineer may revise or amend the requirements. Such interpretations and approvals shall represent the Engineer's concurrence with the design basis and performance targets associated with the design and shall not be interpreted as a warranty as to the accuracy or completeness of design reports and engineering drawings. This remains the responsibility of the professional engineers authoring the documents.

### **1.6 STATUTORY REQUIREMENTS FOR APPROVALS BY OTHER AUTHORITIES**

- 1.6.1 It shall be a responsibility of the Consultant undertaking a development project to be aware of the statutory requirements governing such works and for compliance with those requirements. The Consultant shall obtain or arrange for all approvals from the authorities having jurisdiction.
- 1.6.2 Where these standards refer to bylaws, acts, regulations and standards, this shall mean the most recent edition or amendment of the referenced document.



- 1.6.3 Where due to amendment of statutory requirements, conflicts or inconsistencies with this standard arise, the Consultant shall be responsible for satisfaction of the more stringent requirement and shall notify the Engineer of the issue.

## 1.7 EASEMENT AND RESTRICTIVE COVENANTS

- 1.7.1 The Developer shall be responsible for providing or obtaining all necessary easements to protect municipal improvements not located within a public road right-of-way or utility lot.
- 1.7.2 The Developer shall prepare any required right-of-way plans. Upon written request from the City, the Developer shall prepare easement and restrictive covenant documents according to the standard City formats, with special provisions as required, naming the City as the Grantee. Once easements and restrictive covenant documents have been fully executed, the Developer shall have them registered at the Land Titles Office and provide one duplicate original copy of the registered document to the City of Leduc. Similarly, the Developer shall be responsible for registering all right-of-way plans at the Land Titles Office.
- 1.7.3 All permanent easements shall be registered prior to application for a construction completion certificate.
- 1.7.4 Temporary construction easements shall normally be registered in favour of the Developer, unless otherwise required by the City. Temporary construction easements may be required to be registered prior to C.C.C. issuance at the discretion of the City.
- 1.7.5 Utility lots required to accommodate the placement of either 1, 2 or 3 municipal underground services shall have a width of 6 m, 6 m or 8 m respectively, plus an additional 1.5 m wide easement on each side.
- 1.7.6 Utility lots will be required to include a sidewalk or a multiway connection at the discretion of the City.

## 1.8 PIPELINE, RAILWAY AND POWER TRANSMISSION LINE CROSSINGS

### 1.8.1 Crossing Agreement Requirement

- .1 Where a crossing of gas, oil, power transmission lines, or railway is required by a Developer in the process of servicing land, the Developer shall be responsible for obtaining and coordinating all aspects of the crossing agreement.
- .2 The Developer shall prepare and submit plans to the proper authorities and obtain the necessary permissions to enter upon, cross over, or construct under or over any gas, oil, or power transmission lines or railways.
- .3 Where the conditions or provisions of the agreement include long term commitments or obligations beyond the development build-out schedule, the City shall be provided with an opportunity to review and approve to ensure compliance with any other franchise or master agreements.
- .4 The Developer shall comply with all terms and conditions of the crossing agreement.



### **1.8.2 Transfer of Crossing Agreement to the City**

- .1 Prior to application for a construction completion certificate for a municipal improvement, the Developer shall apply to the City and the company to have all applicable crossing agreements transferred to the City's name. A construction completion certificate will not be issued until the crossing agreement is transferred to the City.

## **1.9 LAND REQUIREMENTS**

### **1.9.1 Land Acquisition**

- .1 The Developer is responsible to acquire any land required to accommodate the proposed municipal improvements. The land required by the City to service the development must be registered into road right-of-way, utility right-of-way, or public utility lot via road plan and/or subdivision plan.





## 2 COMPLETE STREETS DESIGN

### 2.1 INTERSECTIONS

**Append Complete Streets Design Standards 3.6 Intersections with:**

**Table 2.1** Minimum Curb Cut Requirements

Main Road	Intersecting ad	Cutoff Requirements <sup>1</sup>
Arterial	Arterial	15 m x 15 m corner
Arterial	Collector	15 m x 15 m corner
Collector	Collector	10 m corner
Collector	Local	6 m corner
Local	Local	6 m corner
Local	Lane	4 m corner
Lane	Lane	4 m corner
Commercial Access	Arterial	6 m corner

NOTES:

ROW at intersections shall depend on final intersection configuration requirements.

1. ROW for roundabouts shall depend on the ultimate inscribed circle diameter, sidewalk/trail alignments, and any applicable boulevard requirements.

**Append Complete Streets Design Standards 3.6.10 Intersection Spacing, Driveways, & Access Management with:**

Private residential driveways will not be allowed onto collector roadways or onto roadways that will be a collector in a future development

**Delete and Replace Complete Streets Design Standard 3.6.11 Emergency Access with:**

<https://www.leduc.ca/fire-department-access-standard>

### 2.2 SIDEWALKS

**Delete and Replace Complete Streets Design Standard 3.1.3.1 Design Users & Vehicles for Walking and Wheeling with:**

All sidewalks in the City of Leduc shall be designed to a minimum clear width of 1.5 m.



## 2.3 COMPLETE STREETS APPENDICES AMENDMENTS

### Appendix C – Summary of Geometric Design Standards

Classification	Design Speed (km/hr)	Centreline Curve Radii (m) <sup>1</sup>	Super Elevation	Horizontal curve lengths (m) <sup>1</sup>	Max. Gradient (%) <sup>2</sup>	Min. Gradient (%) <sup>3</sup>	Min. Tangent Section Lengths (m)	Min. Intersection Spacing (m)
<b>Local</b>								
Residential Local	50	90	No	60	8	0.6	30	60
Industrial Local	50	90	No	60	8	0.6	60	60
Residential Service Road	50	90	No	60	8	0.6	30	60
Industrial Service Road	50	90	No	60	8	0.6	30	60
<b>Collector</b>								
2-Lane Residential Collector	60	120	No	60	8	0.6	60	60
> 2-Lane Residential Collector	60	130 <sup>4</sup>	Optional	60	8	0.6	60	60
4 Lane Collector	60	130 <sup>4</sup>	Optional	60	8	0.6	60	200
<b>Arterial</b>								
4/5-Lane Undivided Arterial	70	130 <sup>4</sup>	Yes <sup>5</sup>	TAC GDG	6	0.6	TAC GDG	400
4-Lane Divided Arterial	70	130 <sup>4</sup>	Yes <sup>5</sup>	TAC GDG	6	0.6	TAC GDG	400
6-Lane Divided Arterial	70	130 <sup>4</sup>	Yes <sup>5</sup>	TAC GDG	6	0.6	TAC GDG	800
<b>Walkways &amp; Bikeways</b>								
Walkways	N/A	N/A	N/A	N/A	5	0.6	N/A	N/A
<b>Alleys</b>								
Residential Alleys	N/A	N/A	N/A	N/A	10	0.8	N/A	N/A
Commercial Alleys	N/A	N/A	N/A	N/A	10	0.8	N/A	N/A
<b>Rural Roads</b>								
Rural Local or Collector	70	230	Yes <sup>5</sup>	TAC GDG	6	N/A	TAC GDG	200
<b>Temporary Roads</b>								
Access/Detour Road	N/A	90	No	60	8	N/A	30	N/A

NOTES:

- Larger curve radii and lengths should be used wherever possible
- Dependent on topography and access locations may restrict sightlines accordingly. Wherever possible, maximum gradients should be kept to under 5% to provide accessibility to the widest range of street users.
- Minimum gradient on curb radii < 20 m shall be 0.8%.
- Preferred curve radius is 500 m.
- For superelevation, refer to Section 3.2.6.2 of the City of Edmonton Complete Streets Design and Construction Standards.
- Arterial corridors (existing and proposed) access should be limited to collector roadways only.



### Appendix E – Sidewalk, Walkway, And Pathway Requirements

Facility	Location	Monolithic or Separate	Material	Width (m)
Sidewalk	Local	Monolithic	Concrete	1.5
Sidewalk/Walkway	Local/Collector/Arterial or Walkway Lot	Separate	Concrete	1.5
Sidewalk	Adjacent to School Site	Monolithic	Concrete	2.0
Sidewalk	Arterial <sup>1</sup>	Separate	Concrete	1.5
Multiway	Emergency Access, Utility Lot, Walkway Lot (10 m in width)	Separate	Asphalt	3.0
Multiway	SWMF or Utility Lot (other than 10 m in width)	Separate	Asphalt	3.0
Multiway	Collector and Arterial	Separate	Asphalt	3.0

NOTES:

- Monolithic sidewalks along arterial streets are permitted only as a last resort in constrained situations where no other measures are possible to construct a separate walk and require approval from the City. Minimum width is 2.0m

### Appendix F – List of Design Tables

**Table 3.1 contained in Appendix F – List of Design Tables of Complete Streets Design Standards shall be revised as follows:**

Horizontal Operating Envelope for Person Walking with Child / Person Walking with Service Animal / Two People Walking / Two Wheelchair Users Passing shall be **1.50**.

**Table 3.5 contained in Appendix F – List of Design Tables of Complete Streets Design Standards shall be replaced with the following:**

Recommended Range for Design Speed		
Description	Lower Limit	Upper Limit
Multiways	10 km/hr	30 km/hr

**Tables 3.6A and 3.6B contained in Appendix F – List of Design Tables of Complete Streets Design Standards shall be replaced with the following table:**

Lane Widths <sup>1,2</sup>	Recommended Range		City of Leduc Target Value
	Lower Limit	Upper Limit	
Standard Travel Curbside Lane (non-transit, non-truck route) <sup>3</sup>	3.25	3.75	3.50
Standard Travel Lane (non-transit, non-truck route)	3.00	3.50	3.25
Transit Route Curbside Lane	3.55	3.75	3.75
Transit Route Lane	3.30	3.50	3.50
Truck Route Curbside Lane	3.55	3.95	3.85
Truck Route Lane	3.30	3.70	3.60
Parking Lane	2.35	2.65	2.55

NOTES:

- Dimensions are for through and turning lanes. Turning lanes are typically at the lower end of the recommended ranges, as these movements are completed at lower Operating Speeds.
- Dimensions are measured to face of curb for curbside lanes.
- For local streets, alleys shared streets, and pedestrian-only streets, a combined single drive lane with yield operation for both directions can be provided. This shared lane must be a minimum of 4.1 metres wide. For local streets, the minimum Travelled Way width shall be 8.0 m to accommodate required offsets for underground utilities and emergency response access, which may require parking restrictions. Service roads have a minimum Travelled Way width of 6.0 m due to the presence of an adjacent street. The designer must also consider the impacts of underground utilities, as well as winter design and operations when selecting Travelled Way widths.  
Parking lanes for large trucks in industrial areas shall be 3.10 m to face of curb for collector and local roadways.



**Table 3.10 contained in Appendix F – List of Design Tables of Complete Streets Design Standards shall be revised as follows:**

- The Recommended Lower Limit for Width, bike path, bidirectional is revised to **3.0 m**
- The Recommended Upper Limit for Width, bike path, bidirectional is revised to **3.6 m**

**Table 3.19 contained in Appendix F – List of Design Tables of Complete Streets Design Standards shall be disregarded.**

Developers are to use the values referenced in the drawings included in this document. In constrained retrofit locations, the minimum width of the Pedestrian Through Zone can be reduced to 1.5 m measured from the face of curb to back of sidewalk for monowalk or edge to edge for separated sidewalks. Monolithic sidewalks are not recommended along arterial streets. Where monolithic sidewalks cannot be avoided due to site constraints at the discretion of the City, the sidewalk width must be increased by a minimum of 0.5 metres.

**Append Appendix F with Table 3.31:**

**Table 3.31** Separation Distance Guideline for a Proposed Access

Road Being Accessed	Minimum Separation from Nearest Exist or Planned Traffic Signal
Divided Arterial	250 metres up to 4 lanes
	400 metres more than 4 lanes
Undivided Arterial, access signalized	250 metres up to 5 lanes
	400 metres more than 5 lanes
Undivided Arterial, access non-signalized	100 metres

## 2.4 COMPLETE STREETS DRAWINGS

**2.3.1 Standard Drawings Section 2000-Cross Sections:** The drawings contained within Part II: Typical Drawings in this document are to be used in place of all drawings in the City of Edmonton Complete Streets SECTION 2000 – Cross-Sections.





### 3 COMPLETE STREETS CONSTRUCTION

#### 3.1 SECTION 1.0: GENERAL

**Append Complete Streets Design Standards Section 3.2.9.2 of “Road Structural Design” with:**

**Table 3.1: Minimum Pavement Structure Requirements**

Road Classification	Minimum Road Structure Requirements **		
	Cement Stabilized Subgrade	Granular Base Course	Asphaltic Concrete (Intermediate/Final)
Backlanes/Alleys*	13 kg/m <sup>2</sup> , mixed 150 mm deep	250 mm	110 mm / 0 mm
Local Residential	13 kg/m <sup>2</sup> , mixed 150 mm deep	250 mm	65 mm / 45 mm
Local Industrial/Commercial	13 kg/m <sup>2</sup> , mixed 150 mm deep	250 mm	75 mm / 60 mm
Collector	13 kg/m <sup>2</sup> , mixed 150 mm deep	300 mm	100 mm / 65 mm
Arterial	13 kg/m <sup>2</sup> , mixed 150 mm deep	300 mm	130 mm / 70 mm
Multiways*	13 kg/m <sup>2</sup> , mixed 150 mm deep	250 mm	80 mm / 0 mm

\*No final lift, all asphalt installed prior to construction completion.

\*\* Lift thickness must meet the minimum and maximum thicknesses defined in the standards.

**Append Complete Streets Construction Specifications Section 3.1 Trench Backfill with:**

Utility cuts excavated with shoring or trench boxes will be backfilled with Type 4 backfill.

**Delete and Replace Complete Streets Construction Specifications 7.1.1.4 Strength Tests with:**

For standard strength tests, either 150mm x 300mm cylinders, 125mm x 250mm cylinders or 100mm x 200mm may be used.



## 4 DRAINAGE DESIGN STANDARDS

### 4.1 SANITARY SEWER - POLICY, GOALS AND OBJECTIVES

**Append Volume 3-01: Development Planning Procedure and Framework Section 7.0 “Sanitary Sewer – Policy, Goals and Objectives” with:**

#### 7.6 Alberta Capital Region Wastewater Commission Integration

If a connection is proposed to the Alberta Capital Region Wastewater Commission (ACRWC) system, all Commission requirements and criteria must be met.

### 4.2 SANITARY SEWER DESIGN CRITERIA

**Delete and Replace Volume 3-03: Design Guidelines Section 1.1.1 of “Estimating Sanitary Flows” with:**

#### 1.1.1 Residential sanitary flow (population-generated)

The peak population-generated sanitary sewage flow for a residential population shall be determined by the following formula:

$$Q_{PDW} = \frac{G \times P \times PF}{86400}$$

- where:  $Q_{PDW}$  = the peak dry weather flow rate (L/s)  
 and:  $G$  = the per capita daily sewage flow generation  
 300 L/day/person  
 and:  $P$  = the design contributing population  
 and:  $PF$  = a "peaking factor" determined as follows:

The peaking factor (PF) shall be the larger of 1.5 or :

$$PF = 2.6P_{pf}^{-0.1}$$

- where:  $P_{pf}$  = the design contributing population in 1,000's

**Delete and replace Volume 3-03: Design Guidelines Section 1.6.1 of “Extraneous Flow Allowance – All Land Uses” with:**

#### 1.6.1 General Inflow/Infiltration Allowance

A general allowance of 0.20 L/s/ha must be applied for residential uses; and 0.25 L/s/ha for commercial, industrial and institutional uses, irrespective of land use classification, to account for wet-weather inflow to manholes not located in street sags and for infiltration into pipes and manholes.

**Delete and replace Volume 3-03: Design Guidelines Section 1.6.2 of “Extraneous Flow Allowance – All Land Uses” with:**

#### 1.6.2 Inflow Allowance – Manholes in Sag Locations

Manholes will not be permitted within sag locations.



**Delete and replace Volume 3-03: Design Guidelines Table 1.3 of Section 1.13 “Tables of Sanitary Design Factors” with:**

**Table 1.3: Population Generation Factors (Residential Only)**

Land Use Description	(Net) Units/Hectare <sup>1</sup>	People/Unit <sup>2</sup>	(Net) People/Hectare
Single Detached	27.8	3.46 <sup>3</sup>	96
Low Density Infill	30.6	2.81	86
Planned Lot	42.0	3.46	145
Low Density Re-development	46.0	2.52	116
Semi-Detached	30.6	3.32	102
Row Housing	42.0	3.17	133
Medium Density Multiple	80.0	3.17	254
Low Rise Apartment	125.0	2.04	255
Medium Rise Apartment	225.0	2.17	488
High Rise Apartment	325.0	1.89	614

Notes:

1. Units/Net Hectare derived from City of Edmonton Bylaw 5996, June 1, 1987 (Maximum Permitted).
2. People/Unit as estimated by the Planning and Building Department, PRISM Report on Residential Densities in Edmonton, May 1983.
3. People/Unit generally confirmed by the Planning and Building Department Report, Suburban Housing and Mix Density, June 1988.

**Delete and replace Volume 3-03: Design Guidelines Table 1.4 of Section 1.13 “Tables of Sanitary Design Factors” with:**

**Table 1.4: Commercial/Institutional and Industrial Sanitary Flow Generation Factors on the Basis of General Land Use**

Description	Average flow generation m <sup>3</sup> /Ha/day (Based on Gross Area)	Average flow generation m <sup>3</sup> /Ha/day (Based on Net Area) <sup>1</sup>
Neighbourhood/Highway Commercial <sup>2</sup>	68	85
Large Shopping Centres <sup>2</sup>	64	80
Business/Office Parks <sup>2</sup>	86	108
Light Industrial <sup>2</sup>	57	71
Medium Industrial <sup>3</sup>	48	60
Heavy Industrial <sup>3</sup>	43	54

<sup>1</sup> Net Area assumed 80% of Gross Area.

<sup>2</sup> Where discretionary use for apartment housing and hotels is anticipated, flow generation is to be determined based on population and maybe additive to other use generation.

<sup>3</sup> For high water consumption industries, a special study is required.



### 4.3 STORM DRAINAGE SYSTEM - POLICY, GOALS AND OBJECTIVES

**Delete and replace Volume 3-01: Development Planning Procedure and Framework Section 8.3.1.ii of “Minor System” with:**

- ii. Ponding of water to a depth no greater than 150 mm at depressions in the 1:5 year 4 hour and at drainage inlets is allowed. Water from the road drainage must be contained within the road right-of-way and is not allowed to extend on to adjacent private property;

**Delete and replace Volume 3-01: Development Planning Procedure and Framework Section 8.5.1.ii of “Major System” with:**

- ii. The maximum water surface level of surface flows and ponding in streets is below the lowest anticipated landscape grade or opening at any adjacent buildings, with a freeboard provision generally in the order of 300 mm with a minimum of 150 mm. Water from the road drainage must be contained within the road right-of-way and is not allowed to extend on to adjacent property.

**Delete and replace Volume 3-01: Development Planning Procedure and Framework Section 8.5.1.iii of “Major System” with:**

- iii. Depths of flow and ponding are less than 300 mm in roadways and other public rights-of-way. Roadway ponding should be minimized in a way that prevents encroachment on private property and ensure best practices to minimize flooding on private property.

**Delete and replace Volume 3-01: Development Planning Procedure and Framework Section 8.5.2.iv of “Major System” with:**

- iv. The performance of each storage facility design is to be verified by computer simulation of its response, considering the outflow rate as limited by control elements or downstream conditions, to the most critical of any of the design rainfall events from the following listing:
  - 1:100 year, 24 h synthetic design event based on the Huff distribution;
  - 1:100 year, 4 h synthetic design event based on the Chicago distribution;
  - The July 10 - 11, 1978 storm event;
  - IDF curves from Edmonton Municipal Airport 1914 – 1995 years of record.

**Delete and replace Volume 3-01: Development Planning Procedure and Framework Section 8.5.4 of “Major System” with:**

Where there is no possibility of an emergency overland overflow from a stormwater management facility, there must be adequate pipe capacity on the discharge from the pond to handle flows expected that exceed the volume of the design storm, or the designer must consult with the City of Leduc to determine an acceptable level of freeboard.





**Append Volume 3-01: Development Planning Procedure and Framework with:**

A development setback from all Creeks within the boundary of the City of Leduc based on a minimum distance for the property line from top of bank of 15 m. If this is to reduced developer can utilize a qualified fluvial morphologist to complete a meander belt assessment utilizing the mapping approach. This procedure is to be applied to all unsubdivided land.

If a multiway is desired to be included in this 15m setback the developer must complete the following during predevelopment planning. Determine is a modified structure is required above the minimum standard for the conditions, provide a slope stability assessment and determine if any retaining wall structures are required to ensure adequate slopes are maintained. Provide multiway cross section in relation to the creek.

**4.4 STORMWATER RUNOFF ANALYSIS**

**Delete and replace Volume 3-02: Stormwater Management and Design Manual Section 1.4.8 of “Rational Method” with:**

**1.4.8 Intensity-frequency-duration (IDF) curves**

Rainfall IDF curves for the City of Leduc as noted in Volume 3-01: Development Planning Procedure and Framework Section 8.5.2.iv above.

**Delete and replace Volume 3-02: Stormwater Management and Design Manual Section 2.0 of “TABLES OF RUNOFF AND RAINFALL INFORMATION” with:**

- Table 2.2: Storm Runoff Coefficients and Imperviousness According to Land Use
- Table 2.3: Design Inlet Time (minutes) with Respect to Catchment Imperviousness and Size
- Table 2.4: IDF Curves – Intensity Table
- Table 2.6: IDF Parameters
- Table 2.7: Chicago Distribution (modified): 4-Hr Design Storm Data (mm/hr)
- Table 2.8: Huff Distribution
- Table 2.10: Recorded Storm of July 10 and 11, 1978

**Delete and replace Volume 3-02: Stormwater Management and Design Manual Sections 2.2 – 2.7 and 2.9 with:**

**2.2 Table 2.2: Storm Runoff Coefficients and Imperviousness According to Land Use**

Land Use	Runoff Coefficient "C"	Imperviousness "Imp" (%)
Grassed Areas, Parks	0.10	10 - 30
Single Detached Dwelling	0.55	40 - 60
Duplex, Triplex, Townhouse Dwelling	0.60	40 - 60
Apartment Dwelling	0.65	50 - 100
Industrial	0.60	50 - 100
Neighbourhood Commercial	0.70	50 - 100
Large Commercial	0.90	50 - 100
Pavement, Roof Areas	0.95	90 - 100



**2.3 Table 2.3: Design Inlet Time (minutes) with Respect to Catchment Imperviousness and Size**

<b>Imperviousness (%) Catchment Area (A)</b>	<b>30</b>	<b>50</b>	<b>&gt;70</b>
A = 8 ha or less	8	8	5
8 ha < A < 40 ha	9.2	9.2	6
A = 40 ha or more	10.4	10.4	7.25



2.4 Table 2.4: IDF Curves – Intensity Table

Edmonton Municipal Airport - IDF Period: 1914-1995  
Maximum Years of Record = 63  
IDF Intensity (mm/hr)

Time				Return Frequency			
Minutes	Hours	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
1		120.0	182.0	223.1	274.9	312.8	350.2
2		97.1	146.6	179.3	220.6	251.1	281.1
3		82.8	124.6	152.3	187.2	213.0	238.4
4		72.9	109.4	133.6	164.1	186.7	209.0
5		65.5	98.2	119.8	147.1	167.3	187.3
6		59.8	89.5	109.1	133.9	152.3	170.5
7		55.2	82.5	100.6	123.3	140.2	157.0
8		51.4	76.7	93.5	114.6	130.3	145.9
9		48.2	71.9	87.6	107.3	122.0	136.6
10		45.5	67.7	82.5	101.1	114.9	128.6
11		43.1	64.2	78.1	95.7	108.8	121.8
12		41.0	61.0	74.3	91.0	103.4	115.7
13		39.2	58.3	70.9	86.8	98.7	110.4
14		37.5	55.8	67.9	83.1	94.4	105.7
15	0.25	36.0	53.5	65.1	79.8	90.6	101.4
16		34.7	51.5	62.7	76.7	87.2	97.5
17		33.5	49.7	60.4	74.0	84.0	94.0
18		32.4	48.0	58.4	71.5	81.2	90.8
19		31.3	46.5	56.5	69.1	78.5	87.9
20		30.4	45.1	54.8	67.0	76.1	85.1
21		29.5	43.7	53.2	65.0	73.9	82.6
22		28.7	42.5	51.7	63.2	71.8	80.3
23		27.9	41.4	50.3	61.5	69.8	78.1
24		27.2	40.3	49.0	59.9	68.0	76.1
25		26.6	39.3	47.8	58.4	66.3	74.2
26		25.9	38.4	46.6	57.0	64.7	72.4
27		25.3	37.5	45.5	55.7	63.2	70.7
28		24.8	36.7	44.5	54.4	61.8	69.1
29		24.3	35.9	43.6	53.2	60.4	67.6
30	0.5	23.8	35.1	42.6	52.1	59.2	66.2
31		23.3	34.4	41.8	51.1	58.0	64.8
32		22.8	33.7	41.0	50.1	56.8	63.5
33		22.4	33.1	40.2	49.1	55.7	62.3
34		22.0	32.5	39.4	48.2	54.7	61.1
35		21.6	31.9	38.7	47.3	53.7	60.0
36		21.2	31.3	38.0	46.5	52.7	59.0
37		20.9	30.8	37.4	45.7	51.8	58.0
38		20.5	30.3	36.8	44.9	51.0	57.0
39		20.2	29.8	36.2	44.2	50.1	56.0
40		19.9	29.3	35.6	43.5	49.3	55.2
41		19.6	28.9	35.0	42.8	48.6	54.3
42		19.3	28.4	34.5	42.1	47.8	53.5
43		19.0	28.0	34.0	41.5	47.1	52.7
44		18.7	27.6	33.5	40.9	46.4	51.9
45	0.75	18.5	27.2	33.0	40.3	45.8	51.2
46		18.2	26.9	32.6	39.8	45.1	50.4
47		18.0	26.5	32.1	39.2	44.5	49.8
48		17.7	26.1	31.7	38.7	43.9	49.1
49		17.5	25.8	31.3	38.2	43.3	48.4
50		17.3	25.5	30.9	37.7	42.8	47.8
51		17.1	25.2	30.5	37.2	42.2	47.2



Time				Return Frequency			
Minutes	Hours	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
52		16.9	24.9	30.1	36.8	41.7	46.6
53		16.7	24.6	29.8	36.3	41.2	46.1
54		16.5	24.3	29.4	35.9	40.7	45.5
55		16.3	24.0	29.1	35.5	40.2	45.0
56		16.1	23.7	28.7	35.1	39.8	44.5
57		15.9	23.4	28.4	34.7	39.3	44.0
58		15.8	23.2	28.1	34.3	38.9	43.5
59		15.6	22.9	27.8	33.9	38.5	43.0
60	1	15.4	22.7	27.5	33.6	38.1	42.5
61		15.3	22.5	27.2	33.2	37.7	42.1
62		15.1	22.2	26.9	32.9	37.3	41.6
63		15.0	22.0	26.6	32.5	36.9	41.2
64		14.8	21.8	26.4	32.2	36.5	40.8
65		14.7	21.6	26.1	31.9	36.1	40.4
66		14.5	21.3	25.9	31.6	35.8	40.0
67		14.4	21.1	25.6	31.3	35.4	39.6
68		14.3	20.9	25.4	31.0	35.1	39.2
69		14.1	20.8	25.1	30.7	34.8	38.9
70		14.0	20.6	24.9	30.4	34.5	38.5
71		13.9	20.4	24.7	30.1	34.1	38.2
72		13.8	20.2	24.5	29.8	33.8	37.8
73		13.6	20.0	24.2	29.6	33.5	37.5
74		13.5	19.8	24.0	29.3	33.2	37.1
75	1.25	13.4	19.7	23.8	29.1	33.0	36.8
76		13.3	19.5	23.6	28.8	32.7	36.5
77		13.2	19.3	23.4	28.6	32.4	36.2
78		13.1	19.2	23.2	28.3	32.1	35.9
79		13.0	19.0	23.0	28.1	31.9	35.6
80		12.9	18.9	22.9	27.9	31.6	35.3
81		12.8	18.7	22.7	27.7	31.4	35.0
82		12.7	18.6	22.5	27.4	31.1	34.8
83		12.6	18.4	22.3	27.2	30.9	34.5
84		12.5	18.3	22.1	27.0	30.6	34.2
85		12.4	18.2	22.0	26.8	30.4	34.0
86		12.3	18.0	21.8	26.6	30.2	33.7
87		12.2	17.9	21.7	26.4	29.9	33.4
88		12.1	17.8	21.5	26.2	29.7	33.2
89		12.0	17.6	21.3	26.0	29.5	33.0
90	1.5	11.9	17.5	21.2	25.8	29.3	32.7
120	2	9.94	14.5	17.6	21.4	24.3	27.1
180	3	7.67	11.2	13.5	16.5	18.6	20.8
240	4	6.37	9.28	11.2	13.6	15.4	17.2
300	5	5.52	8.03	9.69	11.8	13.3	14.9
360	6	4.91	7.13	8.60	10.5	11.8	13.2
420	7	4.45	6.45	7.77	9.45	10.7	11.9
480	8	4.08	5.91	7.12	8.66	9.79	10.9
540	9	3.78	5.48	6.60	8.02	9.06	10.1
600	10	3.53	5.11	6.16	7.48	8.45	9.42
660	11	3.32	4.80	5.78	7.03	7.94	8.85
720	12	3.14	4.54	5.46	6.64	7.50	8.36
780	13	2.98	4.31	5.18	6.30	7.11	7.93
840	14	2.84	4.10	4.94	6.00	6.77	7.55
900	15	2.72	3.92	4.72	5.73	6.47	7.21
960	16	2.61	3.76	4.52	5.49	6.20	6.91
1020	17	2.51	3.62	4.35	5.28	5.96	6.64
1080	18	2.42	3.48	4.19	5.08	5.74	6.39
1140	19	2.34	3.36	4.04	4.91	5.54	6.17



Time				Return Frequency			
Minutes	Hours	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
1200	20	2.26	3.25	3.91	4.74	5.35	5.96
1260	21	2.19	3.15	3.79	4.59	5.18	5.77
1320	22	2.12	3.06	3.67	4.45	5.03	5.60
1380	23	2.06	2.97	3.57	4.33	4.88	5.44
1440	24	2.01	2.89	3.47	4.21	4.75	5.29

2.5 Table 2.6: IDF Parameters

Rate=a(t+c) <sup>b</sup>	Return Frequency						
Parameters	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	200-yr
a (t in min)	221.36	335.26	410.76	506.20	577.02	647.33	717.40
b	-0.647	-0.654	-0.656	-0.659	-0.660	-0.661	-0.662
c (min)	1.571	1.542	1.533	1.526	1.523	1.520	1.528

2.6 Table 2.7: Chicago Distribution (modified): 4-Hr Design Storm Data (mm/hr)

Edmonton Municipal Airport - IDF Period: 1914-1995  
Maximum Years of Record = 63  
Chicago Type Distribution - Design Storm (5-Minute Increment)

Time (min)	Return Frequency						
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	200-yr
0	1.15	1.64	1.97	2.38	2.69	2.99	3.29
5	2.38	3.4	4.07	4.92	5.55	6.18	6.8
10	2.49	3.55	4.26	5.15	5.81	6.47	7.12
15	2.61	3.73	4.48	5.41	6.11	6.8	7.48
20	2.75	3.94	4.72	5.71	6.44	7.17	7.9
25	2.92	4.17	5	6.05	6.83	7.61	8.38
30	3.1	4.45	5.33	6.45	7.28	8.11	8.93
35	3.33	4.77	5.72	6.93	7.82	8.71	9.59
40	3.6	5.16	6.19	7.5	8.47	9.43	10.4
45	3.93	5.64	6.78	8.21	9.27	10.3	11.4
50	4.36	6.26	7.52	9.12	10.3	11.5	12.6
55	4.29	7.09	8.52	10.3	11.7	13	14.3
60	5.73	8.26	9.93	12	13.6	15.2	16.7
65	6.98	10.1	12.1	14.7	16.7	18.6	20.5
70	9.31	13.5	16.3	19.8	22.4	25	27.5
75	16.1	23.6	28.5	34.7	39.3	43.9	48.5
80	45.6	68.1	82.9	102	116	129	143
85	45.6	68.1	82.9	102	116	129	143
90	15.2	22.2	26.8	32.6	37	41.3	45.5
95	11.3	16.4	19.8	24.1	27.2	30.4	33.5
100	9.2	13.3	16.1	19.5	22.1	24.6	27.2
105	7.87	11.4	13.7	16.7	18.9	21	23.2
110	6.94	10	12.1	14.7	16.6	18.5	20.4
115	6.25	9.02	10.9	13.2	14.9	16.6	18.3
120	5.71	8.24	9.91	12	13.6	15.1	16.7
125	5.28	7.6	9.14	11.1	12.5	14	15.4
130	4.92	7.08	8.5	10.3	11.6	13	14.3
135	4.61	6.63	7.97	9.7	10.9	12.2	13.4
140	4.35	6.26	7.52	9.11	10.3	11.5	12.6
145	4.13	5.93	7.12	8.62	9.74	10.8	12
150	3.93	5.64	6.77	8.2	9.26	10.3	11.4
155	3.75	5.38	6.46	7.83	8.84	9.84	10.8
160	3.6	5.16	6.19	7.5	8.46	9.42	10.4



Time (min)	Return Frequency						
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	200-yr
165	3.45	4.95	5.94	7.2	8.12	9.05	9.96
170	3.33	4.77	5.72	6.92	7.82	8.7	9.59
175	3.21	4.6	5.52	6.68	7.54	8.39	9.24
180	3.1	4.44	5.33	6.45	7.28	8.11	8.93
185	3.01	4.3	5.16	6.24	7.05	7.84	8.64
190	2.91	4.17	5	6.05	6.83	7.6	8.37
195	2.83	4.05	4.86	5.87	6.63	7.38	8.13
200	2.75	3.94	4.72	5.71	6.44	7.17	7.9
205	2.68	3.83	4.59	5.55	6.27	6.98	7.68
210	2.61	3.73	4.47	5.41	6.11	6.8	7.48
215	2.55	3.64	4.36	5.28	5.95	6.63	7.3
220	2.49	3.55	4.26	5.15	5.81	6.47	7.12
225	2.43	3.47	4.16	5.03	5.68	6.32	6.95
230	2.38	3.39	4.07	4.92	5.55	6.17	6.8
235	2.33	3.32	3.98	4.81	5.43	6.04	6.65
240	1.15	1.64	1.96	2.37	2.67	2.97	3.27

2.7 Table 2.8: Huff Distribution

Design Storm for SWMF Drawdown Analysis Only  
Edmonton Municipal Airport - IDF Period: 1914-1995  
Maximum Years of Record = 63  
Storm Duration = 24 hours  
Return Frequency = 100-yr  
Huff Distribution (First-Quartile 50% Probability), mm/hr

Time (minutes)	Intensity (mm/hr)	Time (minutes)	Intensity (mm/hr)	Time (minutes)	Intensity (mm/hr)
0	0	495	5.91	975	1.74
15	0.945	510	5.53	990	1.72
30	1.89	525	5.33	1005	1.7
45	2.83	540	5.13	1020	1.68
60	3.78	555	4.93	1035	1.65
75	5.04	570	4.72	1050	1.63
90	7.56	585	4.53	1065	1.61
105	10	600	4.33	1080	1.59
120	12.6	615	4.13	1095	1.56
135	15.1	630	3.94	1110	1.54
150	16.8	645	3.74	1125	1.52
165	17.3	660	3.57	1140	1.5
180	17.7	675	3.39	1155	1.47
195	18.2	690	3.22	1170	1.42
210	18.6	705	3.05	1185	1.36
225	18.3	720	2.88	1200	1.31
240	17.6	735	2.78	1215	1.25
255	16.8	750	2.68	1230	1.21
270	16	765	2.59	1245	1.18
285	15.3	780	2.49	1260	1.15
300	14.5	795	2.39	1275	1.12
315	13.7	810	2.28	1290	1.09
330	12.8	825	2.18	1305	1.05
345	12	840	2.08	1320	1.01
360	11.2	855	1.97	1335	0.963
375	10.6	870	1.9	1350	0.918



Time (minutes)	Intensity (mm/hr)		Time (minutes)	Intensity (mm/hr)		Time (minutes)	Intensity (mm/hr)
390	9.88		885	1.88		1365	0.873
405	9.2		900	1.85		1380	0.828
420	8.53		915	1.83		1395	0.783
435	7.89		930	1.8		1410	0.738
450	7.39		945	1.78		1425	0.693
465	6.9		960	1.76		1440	0.648
480	6.41		-	-		-	-

2.9 Table 2.10: Recorded Storm of July 10 and 11, 1978

Edmonton Municipal Airport Rain Gauge

Time (minutes)	Intensity (mm/hr)		Time (minutes)	Intensity (mm/hr)		Time (minutes)	Intensity (mm/hr)		Time (minutes)	Intensity (mm/hr)
0	0		165	7.2		330	0		495	0
5	0		170	2.4		335	0		500	0
10	7.2		175	0		340	0		505	0
15	24		180	2.4		345	21.6		510	0
20	21.6		185	2.4		350	79.2		515	0
25	2.4		190	4.8		355	74.4		520	0
30	0		195	28.8		360	21.6		525	0
35	0		200	9.6		365	0		530	0
40	0		205	2.4		370	0		535	0
45	0		210	0		375	0		540	0
50	0		215	0		380	0		545	0
55	0		220	0		385	0		550	0
60	0		225	0		390	0		555	0
65	0		230	0		395	0		560	0
70	0		235	0		400	0		565	0
75	0		240	0		405	0		570	0
80	0		245	0		410	0		575	0
85	0		250	0		415	0		580	0
90	0		255	0		420	0		585	0
95	0		260	0		425	0		590	0
100	0		265	0		430	0		595	0
105	0		270	0		435	0		600	0
110	0		275	0		440	0		605	0
115	0		280	0		445	0		610	0
120	0		285	0		450	0		615	0
125	0		290	0		455	0		620	0
130	0		295	0		460	0		625	0
135	38.4		300	0		465	0		630	0
140	14.4		305	0		470	0		635	0
145	4.8		310	0		475	0		640	0
150	4.8		315	0		480	0		645	0
155	4.8		320	0		485	0		650	0
160	19.2		325	0		490	0		655	0
660	0		825	2.4		990	7.2		1155	0
665	0		830	24		995	14.4		1160	0
670	0		835	14.4		1000	9.6		1165	2.4
675	2.4		840	9.6		1005	9.6		1170	0
680	0		845	38.4		1010	4.8		1175	0
685	0		850	21.6		1015	2.4		1180	2.4
690	0		855	12		1020	4.8		1185	0
695	0		860	43.2		1025	4.8		1190	0
700	0		865	4.8		1030	4.8		1195	0
705	0		870	9.6		1035	9.6		1200	0



Time (minutes)	Intensity (mm/hr)		Time (minutes)	Intensity (mm/hr)		Time (minutes)	Intensity (mm/hr)		Time (minutes)	Intensity (mm/hr)
710	0		875	9.6		1040	4.8		1205	0
715	0		880	21.6		1045	2.4		1210	0
720	0		885	16.8		1050	2.4		1215	0
725	0		890	43.2		1055	4.8		1220	4.8
730	0		895	7.2		1060	0		1225	2.4
735	0		900	2.4		1065	2.4			
740	0		905	21.6		1070	0			
745	0		910	14.4		1075	0			
750	0		915	36		1080	4.8			
755	0		920	72		1085	9.6			
760	0		925	40.8		1090	2.4			
765	2.4		930	105.6		1095	2.4			
770	9.6		935	88.8		1100	0			
775	19.2		940	55.2		1105	0			
780	12		945	33.6		1110	0			
785	9.6		950	26.4		1115	0			
790	12		955	28.8		1120	0			
795	19.2		960	9.6		1125	0			
800	14.4		965	16.8		1130	0			
805	9.6		970	48		1135	0			
810	16.8		975	33.6		1140	0			
815	9.6		980	16.8		1145	4.8			
820	2.4		985	4.8		1150	7.2			

NOTE: Time starts at the beginning of the storm.

## 4.5 MINOR CONVEYANCE SYSTEM DESIGN

**Delete and replace Volume 3-03: Design Guidelines Section 2.4.4 of “Drainage of Roadways and Other Public Rights-of-Way - Minor System” with:**

### 2.4.4 Ponding at Sags

The depth of ponding at roadway sag locations and depressions is not to exceed 150 mm in the 1:5 year, 4 hour design storm. Ponding in any storm should not reach the rim elevation of any sanitary manholes located within or near the sags. Inlet capacity provisions for the 1:5 year, 4 hour storm must consider the entire contributing area that may drain to the design location. At sag locations, the determination of the required capacity must account for flow that may bypass inlets at upstream sloped gutter (flow by) locations.

## 4.6 STORMWATER MANAGEMENT FACILITY DESIGN

**Append Volume 3-02: Stormwater Management and Design Manual Section 4.1.4 “Staged construction - standards for interim facilities” with:**

An interim facility required as a part of a staged development shall be fully managed and maintained by the Developer, and an FAC will not be issued. However, if an interim facility is required to accommodate a development until the City’s infrastructure associated with their master plan is brought to ultimate (longer term interim facility), the City will take over operation at CCC and a FAC will be issued once maintenance requirements are met.





**Append Volume 3-02: Stormwater Management and Design Manual Section 4.1.5 “Storage alternatives” with:**

The alternatives listed in 4.1.5 are to be used in accordance with the EIA stormwater management guidelines.

**Append Volume 3-02: Stormwater Management and Design Manual Section 4.1.5.ii “Constructed wetlands” with:**

Large scale Stormwater Management Facilities shall be classified as either "natural wetlands" or "constructed wetlands", depending on whether the installation is intended to permanently retain water or temporarily store peak flows. The use and designs of constructed wetlands or combined wet pond – constructed wetlands for stormwater management must be reviewed on a site-specific basis to integrate well with existing environmental factors.

**Delete and replace Volume 3-02: Stormwater Management and Design Manual Section 4.3 with:**

**4.3 Emergency Overflow Provisions**

An emergency overflow spillway is to be incorporated in the facility design. The designer is to identify the probable frequency of operation of the emergency spillway. Where provision of an emergency spillway or overflow route is found to be unfeasible, the designer shall consult with the City of Leduc to determine the acceptable level of freeboard.

**Delete and replace Volume 3-02: Stormwater Management and Design Manual Section 4.5.1 with:**

**4.5.1 Signage for Safety**

Stormwater management facilities shall include mounting provisions for adequate signage to warn of anticipated water level fluctuations, and markers indicating the design high water level. Warning signs will be provided and installed by the Developer prior to construction completion.

**Append Volume 3-02: Stormwater Management and Design Manual Section 4.11 “Landscaping Requirements” with:**

This Section 4.12 will only apply to landscaping of constructed wetlands.

**Append Volume 3-02: Stormwater Management and Design Manual Section 4.12.22 of “Design Details for Constructed Wetlands” with:**

- iii. Fencing will be required for lots that back onto or have a common property line with the pond PUL, and at the discretion of the City.

**4.7 LOT GRADING AND SURFACE DRAINAGE DESIGN**

**Amend Volume 3-02: Stormwater Management and Design Manual Section 6.0 “Lot Grading and Surface Drainage Design” with:**

Larger industrial lots may be permitted a minimum slope of 1.0%.



## 4.8 SEWERS, APPURTENANCES AND STRUCTURES

### **Append Volume 3-03: Design Guidelines Section 3.2.3.ii of “General Sewer Materials Requirements” with:**

- PVC pipe is preferred in sanitary applications for corrosion resistance.

### **Append Volume 3-03: Design Guidelines Section 3.4.2 of “Sewer Service Connection Arrangement” with:**

- iv. If the design does not require a storm main, a sump pump collection mainline must be installed in an alignment where the storm main would have run if it was required. The sump pump collection mainline will collect sump pump discharge from lots on both sides of the street.

### **Delete and replace Volume 3-03: Design Guidelines Section 3.6.3.iii of “Manholes, Junctions and Bends” with:**

- iii. Sanitary manholes are to be located away from roadway sags and low areas where surface runoff might pond.

### **Append Volume 3-03: Design Guidelines Section 3.6 of “Manholes, Junctions and Bends” with:**

#### **3.6.7 Manhole covers**

- i. F-90 type sealed floating frame and covers should be avoided unless absolutely necessary.
- ii. F-80 type floating frame and covers must have a cover with only a single lifting hole.

### **Delete and replace Volume 3-03: Design Guidelines Section 3.10.iii of “Drop Manholes” with:**

- iii. This Section 3.10.iii has been intentionally left blank.

### **Delete and replace Volume 3-03: Design Guidelines Section 3.10.iv of “Drop Manholes” with:**

- iv. Drop manholes are to be accomplished by smooth transition. Refer to 3.11.1 below.

### **Append Volume 3-03: Design Guidelines Section 3.11.1 of “Design Criteria for Drop Manholes” with:**

- Inlet connections must have a pluggable maintenance / inspection hole that is accessible from inside the manhole. This should be constructed by incorporating a wye or tee-wye to begin the ramp into the drop manhole.

### **Append Volume 3-03: Design Guidelines Section 3.13.1 of “Culverts” with:**

Provide culvert sizing details on the plan profile and grading plan. Indicate design flow, inlet or outlet control, catchment area, flow velocity, assumed Manning's 'n' and design storm for all culverts.

Culvert installation details for the City of Leduc are in Part II: Typical Drawings of this document.



## 4.9 PROJECT ACCEPTANCE

**Delete and replace Volume 3-05: Drawing Requirements, Approvals and Asset Acceptance/Transfer Section 3.3.5 of “Inspection and Testing of Sewers”, paragraph 1 with:**

As it is not feasible to conduct leakage tests at FAC, acceptance shall be based on visual acceptance criteria based on the results of the CCTV inspections. The CCTV inspections shall be reviewed for any infiltration type defect.



## 5 DRAINAGE CONSTRUCTION STANDARDS

### 5.1 VOLUME 3-06: CONSTRUCTION SPECIFICATIONS SECTION 14 – SEWER SERVICES

**Append Volume 3-06: Construction Specifications Section 14.3.4 of “Installation” with:**

- .14 Where a deep trunk sewer greater than or equal to 600mm diameter, a shallower, parallel, 250 to 300 mm sanitary main shall be used for service connections to avoid risers.

### 5.2 VOLUME 3-06: CONSTRUCTION SPECIFICATIONS SECTION 23 – INSPECTION OF SEWERS

**Delete and replace Volume 3-06: Construction Specifications Section 23.2.2.1 of “CCTV INSPECTION REPORTS” with:**

- .1 A digital video shall be provided, accompanied by an inspection report. It shall be a record of the exact location of each leak or fault discovered by the television - e.g. open joints, broken, cracked, deformed or collapsed pipe, presence of grease, roots, debris, accumulation, obstruction, infiltration, water depth variations and other points of significance. The reference location for distance measurements shall be the centreline of the launch manhole (chainage 0+00). If the inspection includes an intermediate manhole, the chainage shall be reset to 0+00 in the centre of the intermediate manhole.

**Delete and replace Volume 3-06: Construction Specifications Section 23.3.5 with:**

#### **23.3.5 Work During Non-Peak Hours**

Should the area being inspected be anticipated to have peak flow periods during normal working hours, the option to convert to night shifts for inspection procedures may be exercised by mutual agreement between the Contractor and the City. The Contractor shall comply with the requirements of the City of Leduc Community Standards Bylaw, as amended.

<https://www.leduc.ca/government/city-leduc-bylaws>



## 6 WATER DISTRIBUTION SYSTEMS DESIGN

### 6.1 SUBMISSION AND APPROVAL OF ENGINEERING DRAWINGS AND DOCUMENTS

**Delete and replace Volume 4 – Water Section 1.4.2.1 with:**

1.4.2.1 The City may require a hydraulic network analysis (HNA) for servicing developments. The designer shall incorporate the City's water main sizing into the service area and ensure branch water mains meet fire flow and peak day demands.

### 6.2 WATER MAINS

**Delete and replace Volume 4 – Water Section 1.6.2.1 of “Depth” with:**

1.6.2.1 All mains shall be installed to a minimum depth of 2.70 metres of cover from top of pipe to final finished grade.

**Delete and replace Volume 4 – Water Section 1.6.2.4 of “Depth” with:**

1.6.2.4 The internal spindle shall extend within 300 mm of the finished final surface and shall include a rock disc. Valve boxes shall be of sufficient length to provide for vertical adjustments of 300 mm in either direction.

**Append Volume 4 – Water Section 1.6.4.6 “Dead-ends” with:**

1.6.4.6 A maximum of 150 residential lots may be serviced on a temporary basis from a single water feed. Completion of the looped system shall be made within two years of the date of installation of the initial single water feed, unless otherwise approved by the Engineer.

### 6.3 FIRE HYDRANTS

**Delete and replace Volume 4 – Water Section 4.2.1 of “Products” with:**

4.2.1.10 Hydrant Pumper connection shall have a Storz adapter.

**Delete and replace Volume 4 – Water Section 1.7.1.8 of “Location and Spacing” with:**

1.7.1.8 Hydrant bodies shall be painted in accordance with the following:

- 1.7.1.8.1 Primer shall be Benjamin Moore Retardo White Primer or approved equivalent.
- 1.7.1.8.2 An intermediate yellow paint coat shall be applied. Paint shall be General Paint #17-204 Hi-Vis yellow, Glidden Spread Gloss Alkyd Enamel 969 yellow, or approved equivalent.
- 1.7.1.8.3 One coat of General Paint #17-204 Hi-Vis yellow, Glidden Spread Gloss Alkyd Enamel 969 yellow or approved equivalent shall be applied. As heavy a coat of paint as possible (to slump point) shall be applied.



1.7.1.8.4 Hydrant domes and steamer caps shall be painted with Glidden Spread Gloss Alkyd Enamel or approved equivalent and colored as follows:

Colour	To Be Used for:
Red (EnviroGuard 15-101)	Hydrants connected to water mains that are 100 – 150 mm in diameter.
Green (EnviroGuard 15-104)	Hydrants connected to water mains that are greater than 150 mm in diameter, but not exceeding 300 mm diameter.
Blue (EnviroGuard 15-105)	Hydrants connected to water mains that are greater than 300 mm, but not exceeding 600 mm in diameter.

## 6.4 WATER SERVICES

**Delete and replace Volume 4 – Water Section 1.9.1.2 of “General” with:**

1.9.1.2 Water services must also comply with the requirements of the City of Leduc "THE WATER BYLAW" and all applicable bylaws as amended.

## 6.5 HYDRAULIC NETWORK ANALYSIS (HNA)

**Delete and replace Volume 4 – Water Section 1.12 with:**

### 1.12. HYDRAULIC NETWORK ANALYSIS (HNA)

#### 1.12.1 General

The designer will confirm the sizing of the interim and ultimate design by HNA. All major trunk or supply water main sizing to be provided by Leduc. Designs must incorporate Leduc water main sizes for subdivision development. Leduc may require full HNA modelling and report to confirm a satisfactory level of water service is provided by the proposed water main design.

The assessment shall meet the requirements of the most recently published EPCOR HNA Handbook. The analysis shall report the systems pressures and pipe velocities during ADD, MDD, PHD, MDD +115L/s Fire Flow and MDD+227L/s Fire Flow. Interim staging of water mains shall be hydraulically assessed to meet City interim single feed requirements for development staging that exceeds 2 years. During fire analysis, a manual fire flow shall be placed at various nodes throughout the proposed water distribution system and system residual pressures and pipe flow velocities shall be reported. The number of manual fire flow assessments shall be accepted by the City of Leduc, and at a minimum at the governing node locations anticipated to yield the most conservative results for the system, testing residential, multi-residential, and non-residential locations.

#### 1.12.2 Standards and guidelines

In addition to the applicable standards and guidelines used in the preparation of hydraulic network analyses, the following parameters also apply:



<b>Parameter</b>	<b>Value</b>
Maximum Pressure (distribution System)	570 kPa
Maximum Allowable Pressure (for Services)	570 kPa
Fire Flow - Single Family (low density - single detached, duplex, triplex, fourplex, townhouse)	115 L/s
Fire Flow – Medium/High Density Residential Industrial/Commercial/Institutional	227 L/s
Average Day Demand - Residential	250 L/person/d
Average Day Demand - Commercial	22,500 L/Ha/d
Average Day Demand - Industrial/Institutional	11,000 L/Ha/d
Peaking Factor - Maximum Day Demand	1.8
Peaking Factor - Peak Hour Demand	3.0



## 7 WATER DISTRIBUTION SYSTEMS CONSTRUCTION

### 7.1 VOLUME 4 – WATER SECTION 2 – WATER MAINS

**Delete and replace Volume 4 – Water Section 2.1.1 of “GENERAL” with:**

#### 2.1.1 SCOPE

This section covers material and installation requirements for water mains and associated fittings and appurtenances for the following pipe materials:

- Polyvinyl Chloride (PVC);
- Fusible Polyvinyl Chloride (FPVC);\*
- Polyethylene (PE); \*
- High Density Polyethylene (HDPE); and \*
- Steel.

*\* Note: Project-specific approval is required for the use of this material.*

Trench and backfill shall be undertaken in accordance with Volume 2: Complete Streets Design and Construction Standards, Section 3.1 – Trench Backfill. Utility cut restoration shall be undertaken in accordance with Volume 2: Complete Streets Design and Construction Standards, Section 3.2 – Utility Cut Restoration. Fillcrete backfill shall be undertaken in accordance with Volume 2: Complete Streets Design and Construction Standards, Section 7.11 – Fillcrete. Pipe bedding shall be undertaken in accordance with Volume 4: Water, Section 6 – Pipe Bedding.

**Delete and replace Volume 4 – Water Section 2.2.1.5 of “WATER MAIN PIPE”:**

2.2.1.5 Ductile Iron (DI) Pipe is not permitted in the City of Leduc.

**Delete and replace Volume 4 – Water Section 2.2.5.2 of “COUPLINGS AND SPECIAL FITTINGS” with:**

#### 2.2.5.2 Bolted-Sleeve Couplings

- Do not use unless specifically identified on drawings.
- Conform to AWWA C219, or as specified in the approved list of materials.
- Bodies to be carbon steel and shall be provided for all couplings whose nominal diameter is greater than 300 mm.
- Bodies shall have fusion-bonded epoxy coating to either AWWA C213 or AWWA C550.
- Unless otherwise specified nuts and bolts to be Type 304 stainless steel with threads treated to prevent binding.
- Suitable for use with a 1035 kPa (150 psi) working pressure. Centre sleeve or body shall have a minimum thickness of 6 mm (1/4").





## 7.2 VOLUME 4 – WATER SECTION 3 – WATER VALVES

**Delete and replace Volume 4 – Water Section 3.2.1.1.11 of “GATE VALVES” with:**

- .11 Provide Type A (Slide Type) valve casing set with CVB top nut. No road risers or sleeve inserts will be allowed.

**Delete and replace Volume 4 – Water Section 3.2.1.1.12 of “GATE VALVES” with:**

- .12 Provide Type A (Slide Type) middle extension for valves with depths in excess of 3.0 meters from top of operating nut to surface grade of valve box.

**Delete and replace Volume 4 – Water Section 3.2.1.2.8 of “GATE VALVES” with:**

- .8 Where required, provide Type A (Slide type) valve casing.

**Delete and replace Volume 4 – Water Section 3.2.2 with:**

**3.2.2 BUTTERFLY VALVES**

Butterfly valves are not permitted.

## 7.3 VOLUME 4 – WATER SECTION 4 – HYDRANTS

**Delete and replace Volume 4 – Water Section 4.2.1.17 of “FIRE HYDRANTS” with:**

**4.2.1.17 External Paint**

- 4.2.1.17.1 Hydrant bodies shall be painted in accordance with the following:
  - Primer shall be Benjamin Moore Retardo White Primer or approved equivalent.
  - An intermediate yellow paint coat shall be applied. Paint shall be General Paint#17-204 Hi-Vis yellow, Glidden Spread Gloss Alkyd Enamel 969 yellow, or approved equivalent.
  - One coat of General Paint #17-204 Hi-Vis yellow, Glidden Spread Gloss Alkyd Enamel 969 yellow or approved equivalent shall be applied. As heavy a coat of paint as possible (to slump point) shall be applied.
- 4.2.1.17.2 Hydrant domes and steamer caps shall be painted with Glidden Spread Gloss Alkyd Enamel or approved equivalent and colored as follows:

Colour	To Be Used for:
Red (EnviroGuard 15-101)	Hydrants connected to water mains that are 100 – 150 mm in diameter.
Green (EnviroGuard 15-104)	Hydrants connected to water mains that are greater than 150 mm in diameter, but not exceeding 300 mm diameter.
Blue (EnviroGuard 15-105)	Hydrants connected to water mains that are greater than 300 mm, but not exceeding 600 mm in diameter.



- 4.2.1.17.3 Hydrant numbers to be painted on the back of hydrant in black or safety blue at least 300 mm above the ground flange, preferably directly behind the 4.5" pumper cap. Font to be 50 mm Arial. The City will provide the hydrant numbering schema.
- 4.2.1.17.4 The Location of a hydrant control valve is to be marked on a hydrant, showing distance of the control valve from a hydrant in meters (e.g. 2.5). Markings to be in direct alignment with the valve. The Control valve location number is to be marked at 250 mm above ground flange or higher, font to be 50mm Arial.
- 4.2.1.17.5 Hydrant drain port to be pre-sealed(plugged) rather than free draining

## 7.4 VOLUME 4 – WATER SECTION 5 – WATER SERVICES

### **Append Volume 4 – Water Section 5.1.3.1 of “STANDARDS” with:**

- .10 CSA B137.5 - Cross-linked Polyethylene (PEX) Tubing Systems for Pressure Applications
- .11 AWWA C904 - Cross-Linked Polyethylene (PEX) Pressure Pipe, ½ In. (12mm) Through 3 In. (76mm), for Water Service

### **Delete and replace Volume 4 – Water Section 5.2.7.1 of “SERVICE RODS” with:**

- 5.2.7.1 Operating rods for 20 mm, 25 mm and 50 mm curb cocks shall be Type 304 stainless steel. The rod will be welded to a stainless steel clevis. Refer to Drawing WA-005-003 and WA-005-004.

### **Append Volume 4 – Water Section 5.3.2.11 of “WATER SERVICES” with:**

- .1 Where no hydraulic network model pressures are available, the minimum size of service to single-family dwellings is 20mm diameter. Where the length exceeds 20m, the service shall be increased to 25mm diameter.

## 7.5 VOLUME 4 – WATER SECTION 8 – ACCEPTANCE TESTING

### **Delete and replace Volume 4 – Water Section 8.4.5.1.1 of “PROCEDURE FOR HYDROSTATIC TESTING”:**

- .1 **DUCTILE IRON**  
Ductile iron is not permitted in the City of Leduc.

## 7.6 VOLUME 4 – WATER SECTION 11 – PRODUCT APPROVAL PROCEDURES

### **Delete and replace Volume 4 – Water Section 11.3.5 - Table 11.28 of “Approved Product List” with:**



**Table 11.28: Fire Hydrants**

Manufacturer	Model/Type	Size (mm)	Remarks
American AVK	2708 Nostalgic	150	AWWA C502
Canada Valve (Mueller)	Darling - Century	150	AWWA C502
McCavity (Clow)	Brigadier (M67)	150	AWWA C502

## 7.7 VOLUME 4 – WATER SECTION 12 – WATER METERS

Volume 4 – Water Section 12 is not used in the City of Leduc.

## 7.8 DETAIL DRAWINGS

### Delete Drawings:

Drawing WA-003-014 “450 mm To 750 mm Direct Bury Butterfly Valve with Air Vents”

Drawing WA-005-004 “Service Box Detail for 20mm, 25mm Water Service (One Piece Casing)”

Drawing WA-005-006 “Service Box Detail for 40mm, 50mm Water Service (One Piece Casing)”

### Modify Drawings:

Drawings WA-003-012 and WA-003-013 “Automatic Air Valve Chamber Detail”: Chambers are required to be smaller irrigation valve box style unless approved by the City of Leduc.

Drawing WA-012-001 “Specifications for Meter Settings Without Fire Protection System”: City of Leduc does not require a backflow preventer as depicted. Delete the backflow preventer from the typical system.



## 8 ELECTRIC POWER SERVICE

### 8.1 GENERAL

- 8.1.1 Power services to be installed by the power company shall be underground.
- 8.1.2 The City of Leduc endorses and encourages the use of multiparty trenching provided the franchise utilities requirements are met

### 8.2 RIGHTS-OF-WAY

- 8.2.1 Where required, the Developer shall provide rights-of-way and easements of sufficient size and location to satisfy the power company.
- 8.2.2 All easements shall be registered in the name of the City of Leduc.

### 8.3 INSTALLATION

- 8.3.1 The Developer and the power company shall determine the method and by whom the trenches for power cables shall be dug.
- 8.3.2 Utility trenches shall be backfilled with compacted material in strict accordance with the requirements of the surface structure.
- 8.3.3 The Developer shall coordinate the location of power service boxes and transformers to ensure that they do not end up in driveways or interfere with other utilities.
- 8.3.4 Minimum depth of cover for all buried power facilities shall be 1000 mm from finished design grade.

### 8.4 COSTS

- 8.4.1 Any capital contribution that the utility company may charge for the installation of electrical power services shall be paid by the Developer.



## 9 COMMUNICATION SERVICE

### 9.1 GENERAL

- 9.1.1 Communication services to be installed by the utility owner shall be underground.
- 9.1.2 The City of Leduc endorses and encourages the use of multiparty trenching provided the franchise utilities requirements are met

### 9.2 RIGHTS-OF-WAY

- 9.2.1 Where required, the Developer shall provide rights-of-way and easements of sufficient size and location to satisfy the utility owner.
- 9.2.2 All easements shall be registered in the name of the City of Leduc.

### 9.3 INSTALLATION

- 9.3.1 The Developer and the telephone company shall determine the method and by whom the trenches for cables shall be dug.
- 9.3.2 Utility trenches shall be backfilled with compacted material in strict accordance with the requirements of the surface structure.
- 9.3.3 The Developer shall coordinate the location of service boxes to ensure that they do not end up in driveways or interfere with other utilities.
- 9.3.4 Minimum depth of cover for all buried communication facilities shall be 1000 mm from finished design grade.

### 9.4 COSTS

- 9.4.1 Any capital contribution that the utility company may charge for the installation of services shall be paid by the Developer.



## 10 GAS SERVICE

### 10.1 RIGHTS-OF-WAY

- 10.1.1 Where required, the Developer shall provide rights-of-way and easements of sufficient size and location to satisfy the gas company.
- 10.1.2 All easements shall be registered in the name of the City of Leduc.
- 10.1.3 The City of Leduc endorses and encourages the use of multiparty trenching provided the franchise utilities requirements are met

### 10.2 INSTALLATION

- 10.2.1 The Developer and the gas company shall determine the method and by whom the trenches for gas lines shall be dug.
- 10.2.2 Utility trenches shall be backfilled with compacted material in strict accordance with the requirements of the surface structure.
- 10.2.3 The Developer shall coordinate the location of gas services to ensure that they do not interfere with other utilities.
- 10.2.4 Gas distribution at the front of the lots shall only be permitted in exceptional circumstances, and written confirmation of the City's approval for gas service at the front of the lots shall be obtained prior to submission of the detailed drawings for approval.
- 10.2.5 Where gas distribution is installed at the front of lots, gas service to individual lots shall be installed such that the gas meter can be placed at the side or the rear of the dwelling. Where gas meters are placed at the side of the dwelling unit, the gas meter shall be placed on the side of the dwelling opposite the driveway. Gas meters shall not be permitted at the front of the dwelling unit.
- 10.2.6 Minimum depth of cover for all buried gas facilities shall be 1000 mm from finished design grade.

### 10.3 COSTS

- 10.3.1 Any capital contribution that the utility company may charge for the installation of gas services shall be paid by the Developer.



## 11 STREET LIGHTING

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### 11.1 GENERAL

11.1.1 Street lighting will follow the requirements of FortisAlberta. As such, street lighting will be designed according to the Illuminating Engineering Society of North America's (IESNA) recommended practice, and where applicable, to the standards of the Transportation Association of Canada (TAC) in conjunction with FortisAlberta.



## 12 TRAFFIC CONTROL DEVICES AND SIGNS

### 12.1 GENERAL

12.1.1 Traffic control devices and signs design and construction will follow:

- The City of Edmonton Complete Streets Design and Construction Standards
- Manual for Uniform Traffic Control Devices for Canada (MUTCD-C), TAC

12.1.2 Crosswalks that are not located within controlled intersections will require a pedestrian activated flashing light. The detail for this system is shown in Typical Drawings on Dwg. No. 2-18.

12.1.3 Raised crosswalks are to be applied to all collectors adjacent to schools or parks in consultation with the City





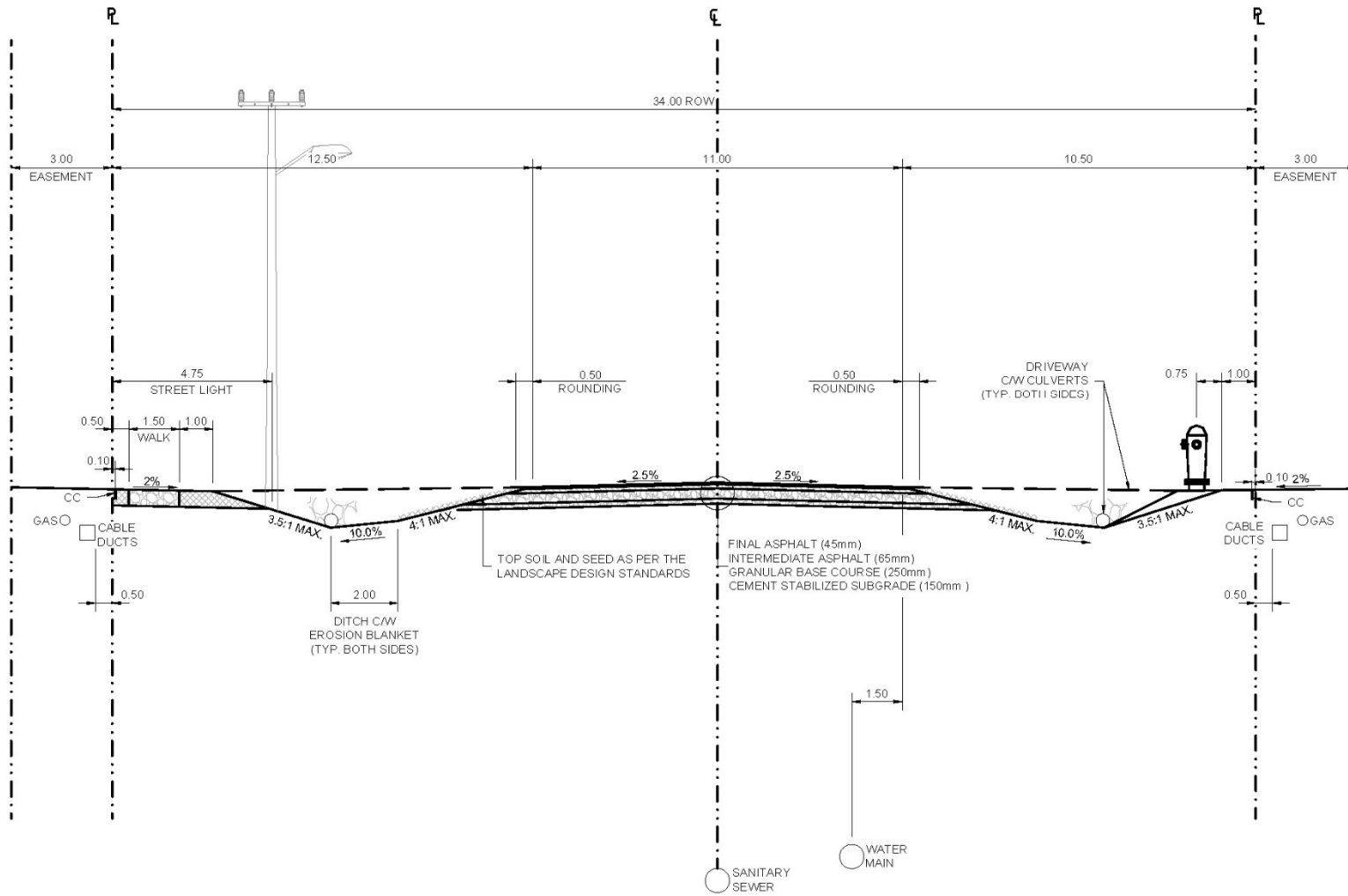
## PART II: TYPICAL DRAWINGS

**Note:**


The following drawings are typical to the City of Leduc. In the event of conflicts between the standards, details or drawings of the City of Edmonton and Part II of these standards, these standards will prevail. The Developer should seek the ultimate requirements from the Engineer if not completely clear.

NOTES:

1. WATER TO BE ON OPPOSITE SIDE OF MAIN POWER.
2. PIPE SIZES AND DEPTH VARIES.
3. LANDSCAPING MUST NOT COVER POLE BASE.
4. DEPTH OF MAIN POWER, TELEPHONES AND CABLE T.V. TRENCH TO BE MINIMUM 1.10m.
5. DEPTH OF GAS TRENCH TO BE MINIMUM 1.10m WITHIN ROAD ROW.
6. REQUIRE A MINIMUM OF 0.30m VERTICAL SEPARATION BETWEEN POWER AND GAS.
7. SERVICE BOX FOR POWER, TELEPHONE AND CABLE T.V. TO STRADDLE SIDE-YARD PROPERTY LINE.
8. LID AND NATURALIZATION BMPs TO BE EXPLORED FOR ALL DITCH APPLICATIONS.
9. HYDRANT TO BE INSTALLED ON WATERMAIN SIDE. HYDRANT PAD REQUIRED IN ACCORDANCE WITH CITY SPECIFICATIONS.
10. TRANSFORMERS TO BE PLACED ON CASE BY CASE BASIS.
11. RURAL CROSS SECTION ONLY ALLOWED IN SPECIFIED INDUSTRIAL/COMMERCIAL AREAS.

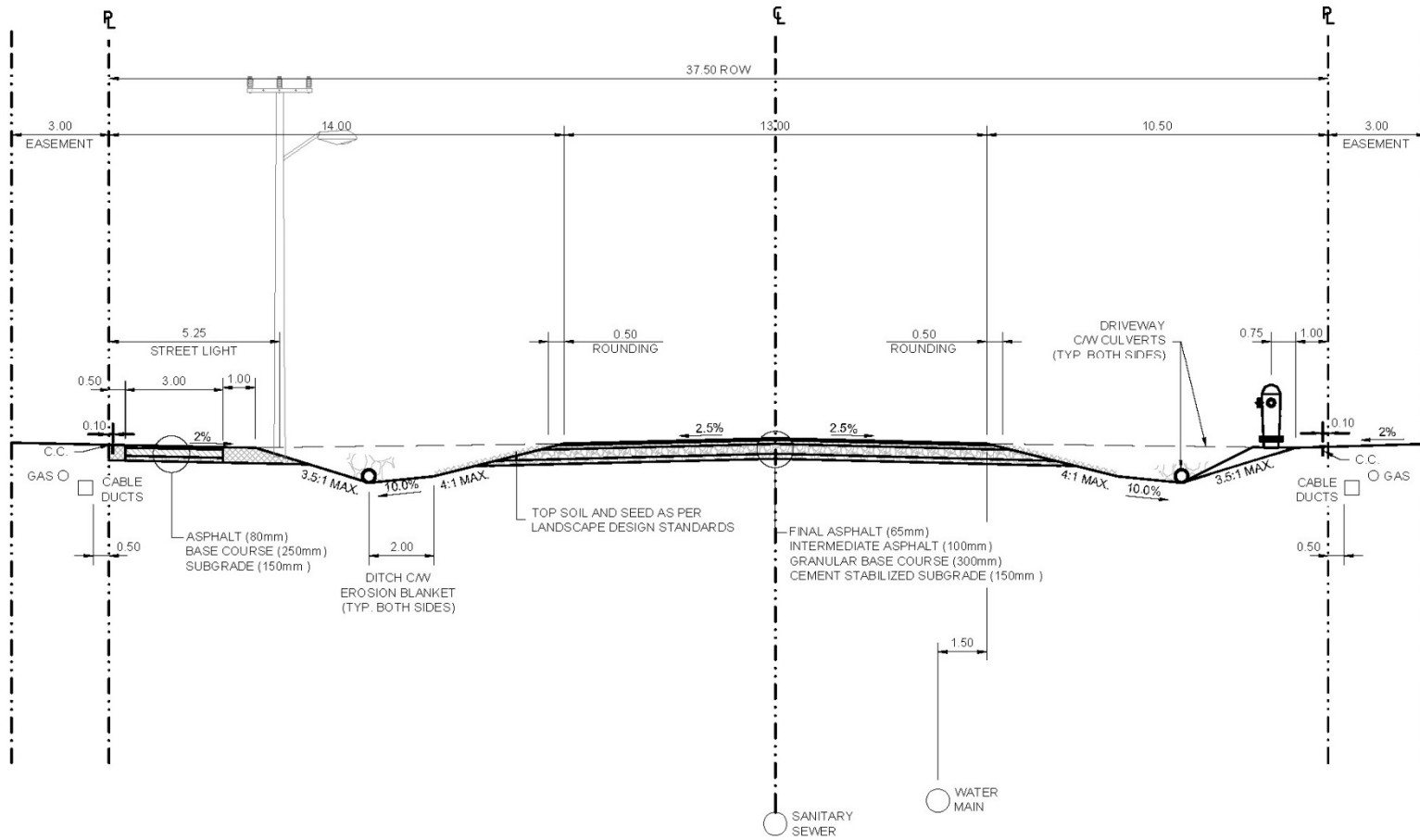


ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED

	RURAL 2 LANE LOCAL - 34.0 ROW		DWG. NO. 2-1
	Date: 2022-04-12	Scale: N.T.S	

NOTES:

1. WATER TO BE ON OPPOSITE SIDE OF MAIN POWER.
2. PIPE SIZES AND DEPTH VARIES.
3. LANDSCAPING MUST NOT COVER POLE BASE.
4. DEPTH OF MAIN POWER, TELEPHONES AND CABLE T.V. TRENCH TO BE MINIMUM 1.10m.
5. DEPTH OF GAS TRENCH TO BE MINIMUM 1.10m WITHIN ROAD ROW.
6. REQUIRE A MINIMUM OF 0.30m VERTICAL SEPARATION BETWEEN POWER AND GAS.
7. SERVICE BOX FOR POWER, TELEPHONE AND CABLE T.V. TO STRADDLE SIDE-YARD PROPERTY LINE.
8. LID AND NATURALIZATION BMP'S TO BE EXPLORED FOR ALL DITCH APPLICATIONS.
9. HYDRANT TO BE INSTALLED ON WATERMAIN SIDE. HYDRANT PAD REQUIRED IN ACCORDANCE WITH CITY SPECIFICATIONS.
10. TRANSFORMERS TO BE PLACED ON CASE BY CASE BASIS.
11. RURAL CROSS SECTION ONLY ALLOWED IN SPECIFIED INDUSTRIAL/COMMERCIAL AREAS.



ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED

RURAL 2 LANE COLLECTOR - 37.5M ROW



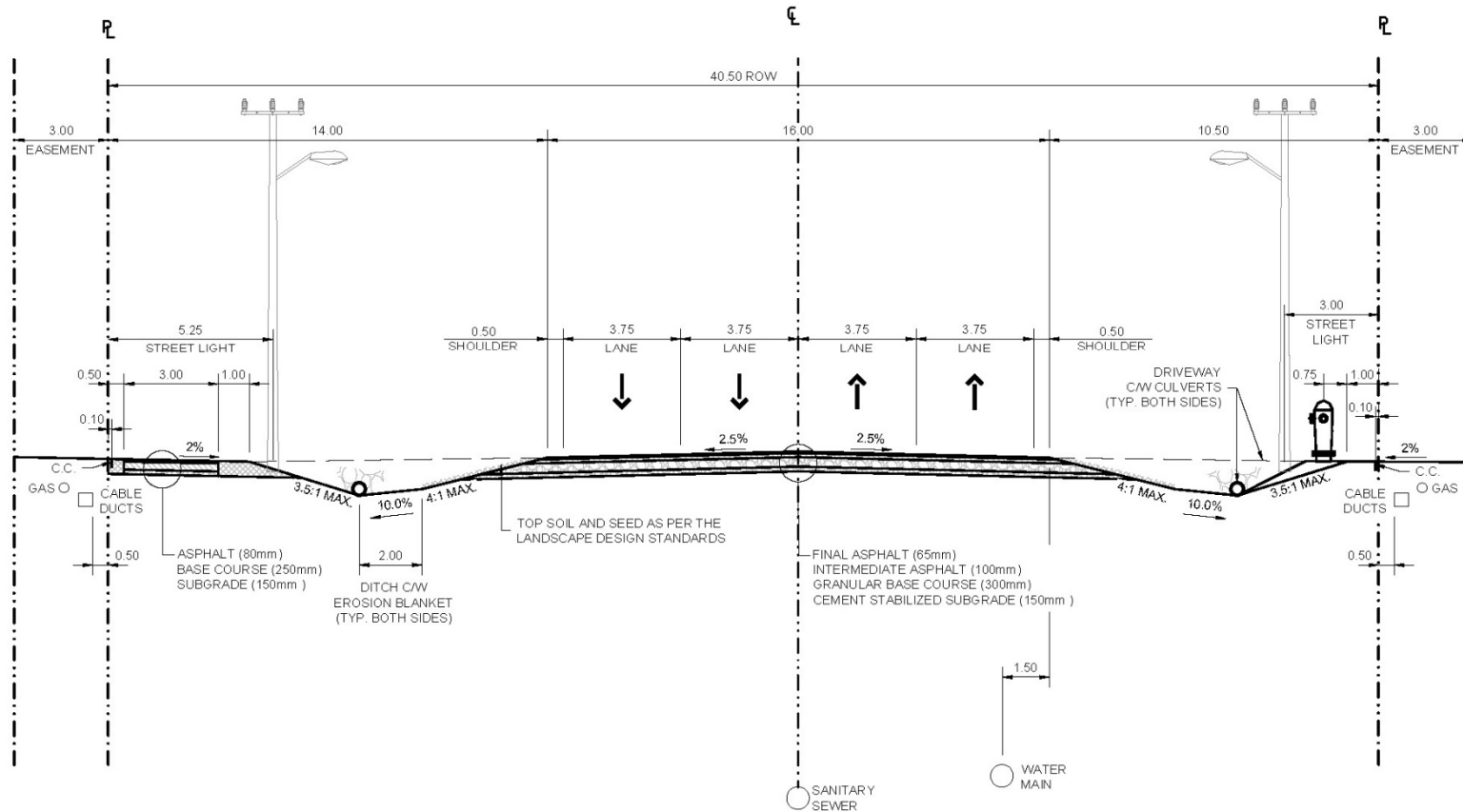
Date: 2022-04-12

Scale: N.T.S

DWG. NO.  
2-2

NOTES:

1. WATER TO BE ON OPPOSITE SIDE OF MAIN POWER.
2. PIPE SIZES AND DEPTH VARIES.
3. LANDSCAPING MUST NOT COVER POLE BASE.
4. DEPTH OF MAIN POWER, TELEPHONES AND CABLE T.V. TRENCH TO BE MINIMUM 1.10m.
5. DEPTH OF GAS TRENCH TO BE MINIMUM 1.10m WITHIN ROAD ROW.
6. REQUIRE A MINIMUM OF 0.30m VERTICAL SEPARATION BETWEEN POWER AND GAS.
7. SERVICE BOX FOR POWER, TELEPHONE AND CABLE T.V. TO STRADDLE SIDE-YARD PROPERTY LINE.
8. LID AND NATURALIZATION BMP'S TO BE EXPLORED FOR ALL DITCH APPLICATIONS.
9. HYDRANT TO BE INSTALLED ON WATERMAIN SIDE. HYDRANT PAD REQUIRED IN ACCORDANCE WITH CITY SPECIFICATIONS.
10. TRANSFORMERS TO BE PLACED ON CASE BY CASE BASIS.
11. RURAL CROSS SECTION ONLY ALLOWED IN SPECIFIED INDUSTRIAL/COMMERCIAL AREAS.



ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED

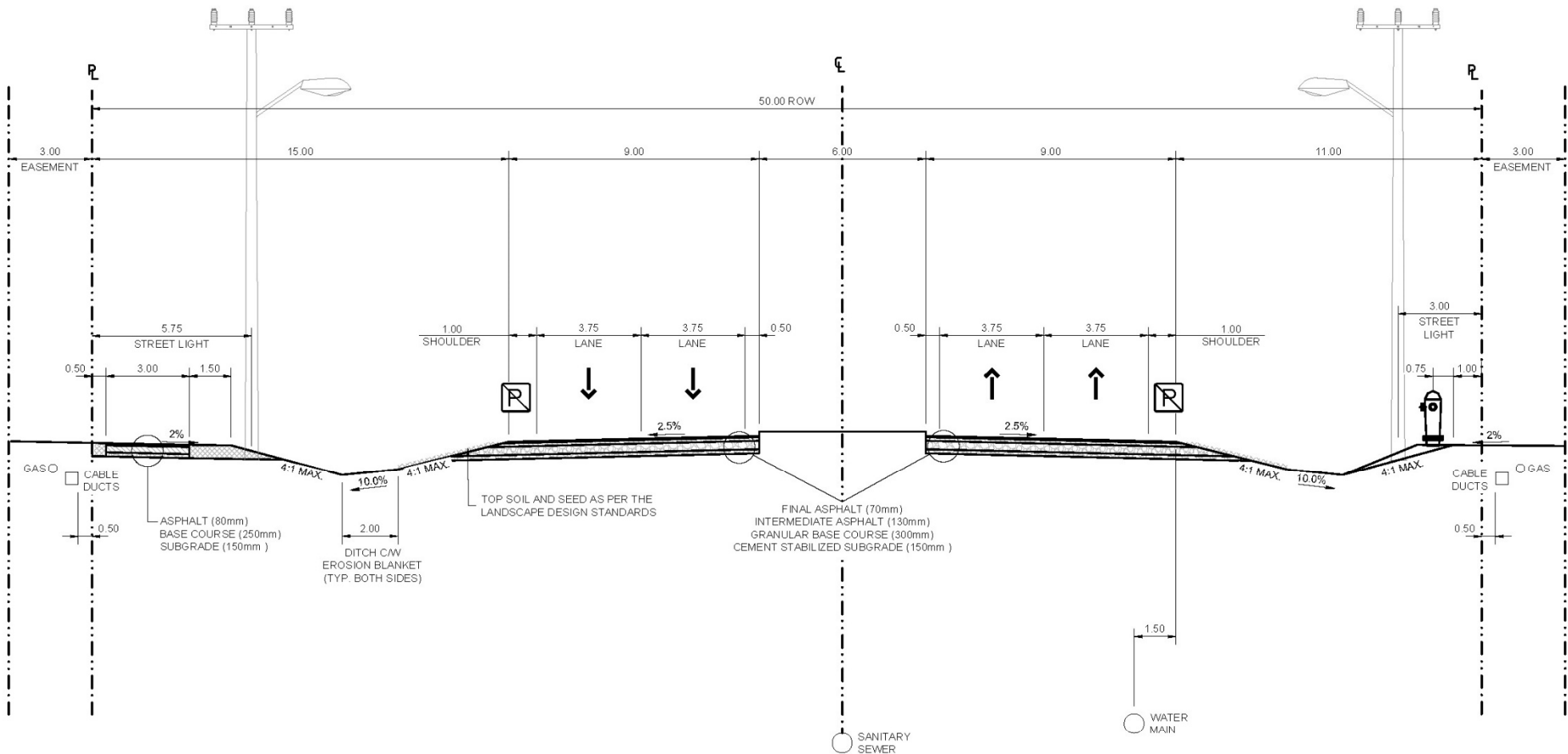
## RURAL 4 LANE COLLECTOR - 40.5M ROW



Date: 2022-04-12

Scale: N.T.S

DWG. NO.  
2-3



NOTES:

1. WATER TO BE ON OPPOSITE SIDE OF MAIN POWER.
2. PIPE SIZES AND DEPTH VARIES.
3. LANDSCAPING MUST NOT COVER POLE BASE.
4. DEPTH OF MAIN POWER, TELEPHONES AND CABLE T.V. TRENCH TO BE MINIMUM 1.10m.
5. DEPTH OF GAS TRENCH TO BE MINIMUM 1.10m WITHIN ROAD ROW.
6. REQUIRE A MINIMUM OF 0.30m VERTICAL SEPARATION BETWEEN POWER AND GAS.
7. SERVICE BOX FOR POWER, TELEPHONE AND CABLE T.V. TO STRADDLE SIDE-YARD PROPERTY LINE.
8. LID AND NATURALIZATION BMP'S TO BE EXPLORED FOR ALL DITCH APPLICATIONS.
9. HYDRANT TO BE INSTALLED ON WATERMAIN SIDE. HYDRANT PAD REQUIRED IN ACCORDANCE WITH CITY SPECIFICATIONS.
10. TRANSFORMERS TO BE PLACED ON CASE BY CASE BASIS.
11. RURAL CROSS SECTION ONLY ALLOWED IN SPECIFIED INDUSTRIAL/COMMERCIAL AREAS.
12. CENTRE MEDIAN DESIGN TO BE DETERMINED ON A CASE-BY-CASE BASIS.
13. ADDITIONAL CONDUIT TO BE INSTALLED FOR CITY COMMUNICATIONS ON ARTERIALS.

**ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED**

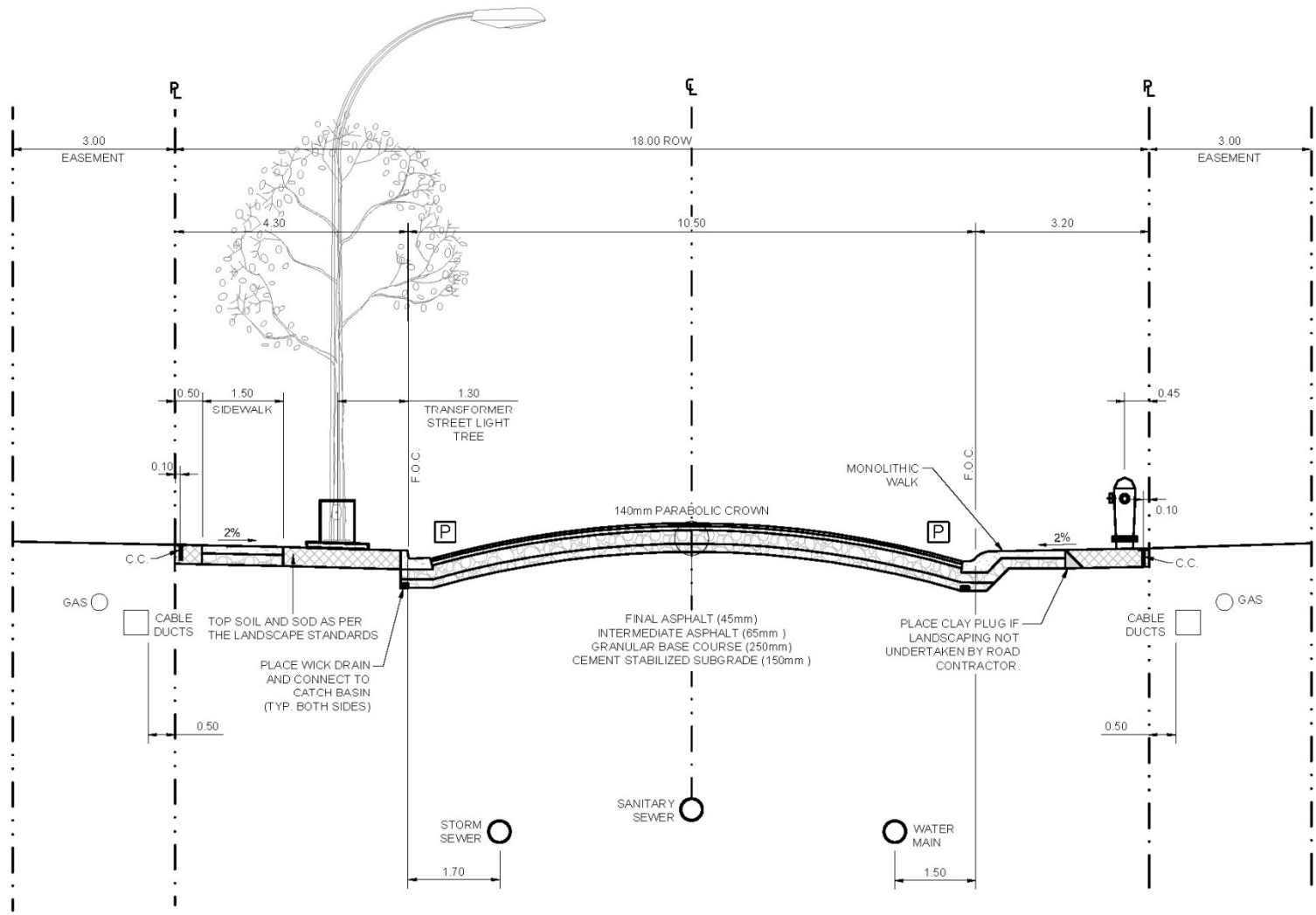


**RURAL 4 LANE DIVIDED ARTERIAL - 50.0M ROW**

Date: 2022-04-12

Scale: N.T.S

**DWG. NO.  
2-4**



- NOTES:
1. WATER TO BE ON OPPOSITE SIDE OF MAIN POWER.
  2. PIPE SIZES AND DEPTH VARY.
  3. LANDSCAPING MUST NOT COVER POLE BASE.
  4. DEPTH OF MAIN POWER, TELEPHONES AND CABLE T.V. TRENCH TO BE MINIMUM 1.10m.
  5. DEPTH OF GAS TRENCH TO BE MINIMUM 1.10m WITHIN ROAD ROW.
  6. REQUIRE A MINIMUM OF 0.30m VERTICAL SEPARATION BETWEEN POWER AND GAS.
  7. SERVICE BOX FOR POWER, TELEPHONE AND CABLE T.V. TO STRADDLE SIDE-YARD PROPERTY LINE.
  8. PLACE CLAY PLUG IF LANDSCAPING NOT UNDERTAKEN BY ROAD CONTRACTOR.
  9. MONOWALK WIDTH TO BE MINIMUM 1.50m.
  10. MONOLITHIC SIDEWALK CURB AND GUTTER ON BOTH SIDES UNLESS OTHERWISE SPECIFIED.
  11. CROWNS ARE MEASURED FROM LIP OF GUTTER.
  12. STREETLIGHT CABLE CAN BE INSTALLED AT THE SAME ALIGNMENT AS POWER AND COMMUNICATIONS.
  13. ADDITIONAL EASEMENT MAY BE REQUIRED FOR POWER STREET FURNITURE.

ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED

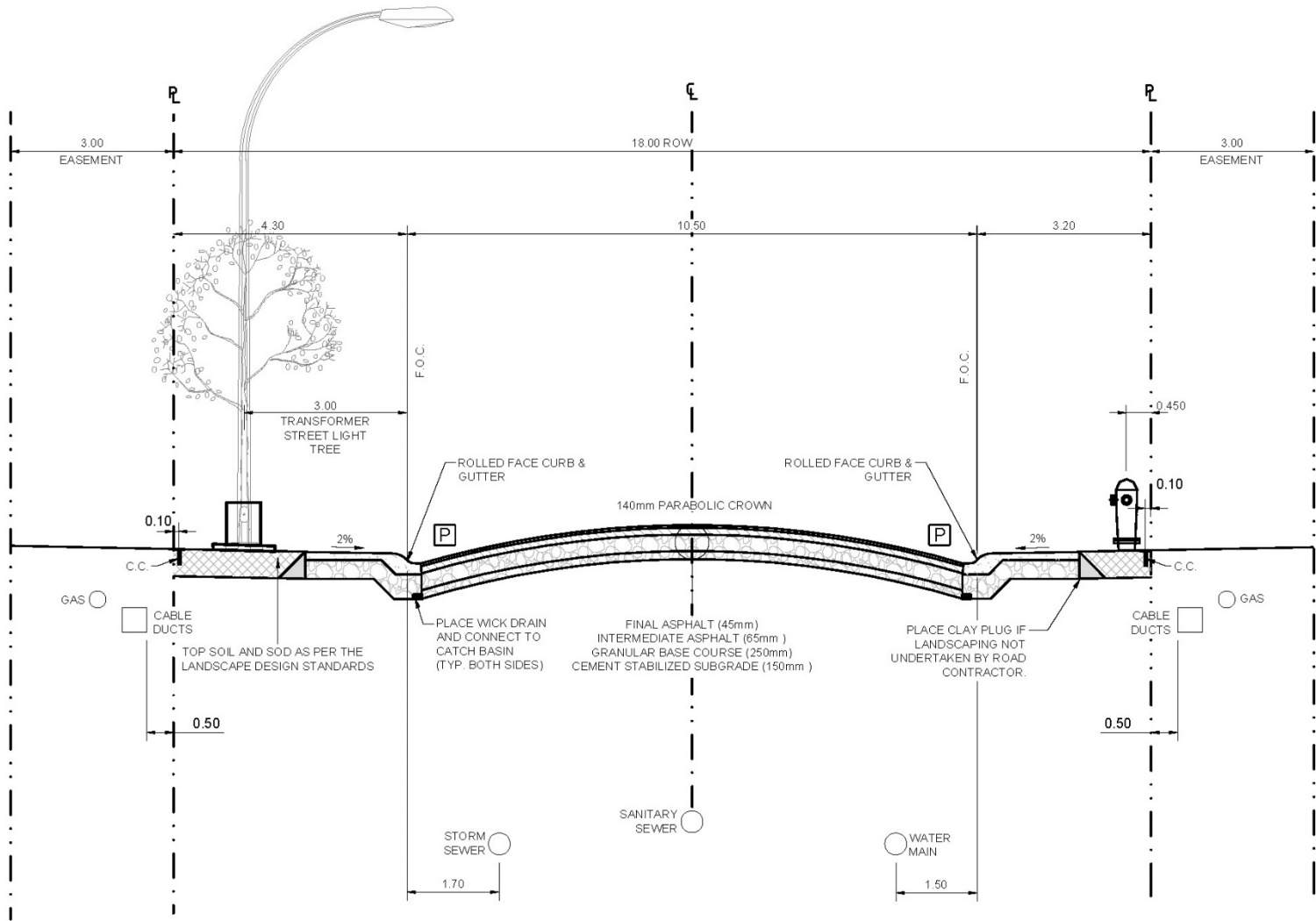


URBAN 2 LANE LOCAL - 18M ROW  
RESIDENTIAL HYBRID SIDEWALK

Date: 2022-04-12

Scale: N.T.S

DWG. NO.  
2-5



- NOTES:
1. WATER TO BE ON OPPOSITE SIDE OF MAIN POWER.
  2. PIPE SIZES AND DEPTH VARY.
  3. LANDSCAPING MUST NOT COVER POLE BASE.
  4. DEPTH OF MAIN POWER, TELEPHONES AND CABLE T.V. TRENCH TO BE MINIMUM 1.10m.
  5. DEPTH OF GAS TRENCH TO BE MINIMUM 1.10m WITHIN ROAD ROW.
  6. REQUIRE A MINIMUM OF 0.30m VERTICAL SEPARATION BETWEEN POWER AND GAS.
  7. SERVICE BOX FOR POWER, TELEPHONE AND CABLE T.V. TO STRADDLE SIDE-YARD PROPERTY LINE.
  8. PLACE CLAY PLUG IF LANDSCAPING NOT UNDERTAKEN BY ROAD CONTRACTOR.
  9. MONOWALK WIDTH TO BE MINIMUM 1.50m.
  10. MONOLITHIC SIDEWALK CURB AND GUTTER ON BOTH SIDES UNLESS OTHERWISE SPECIFIED.
  11. CROWNS ARE MEASURED FROM LIP OF GUTTER.
  12. STREETLIGHT CABLE CAN BE INSTALLED AT THE SAME ALIGNMENT AS POWER AND COMMUNICATIONS.
  13. ADDITIONAL EASEMENT MAY BE REQUIRED FOR POWER STREET FURNITURE.

**ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED**

**URBAN 2 LANE LOCAL - 18M ROW - RESIDENTIAL MONOWALK**



Date: 2022-04-12

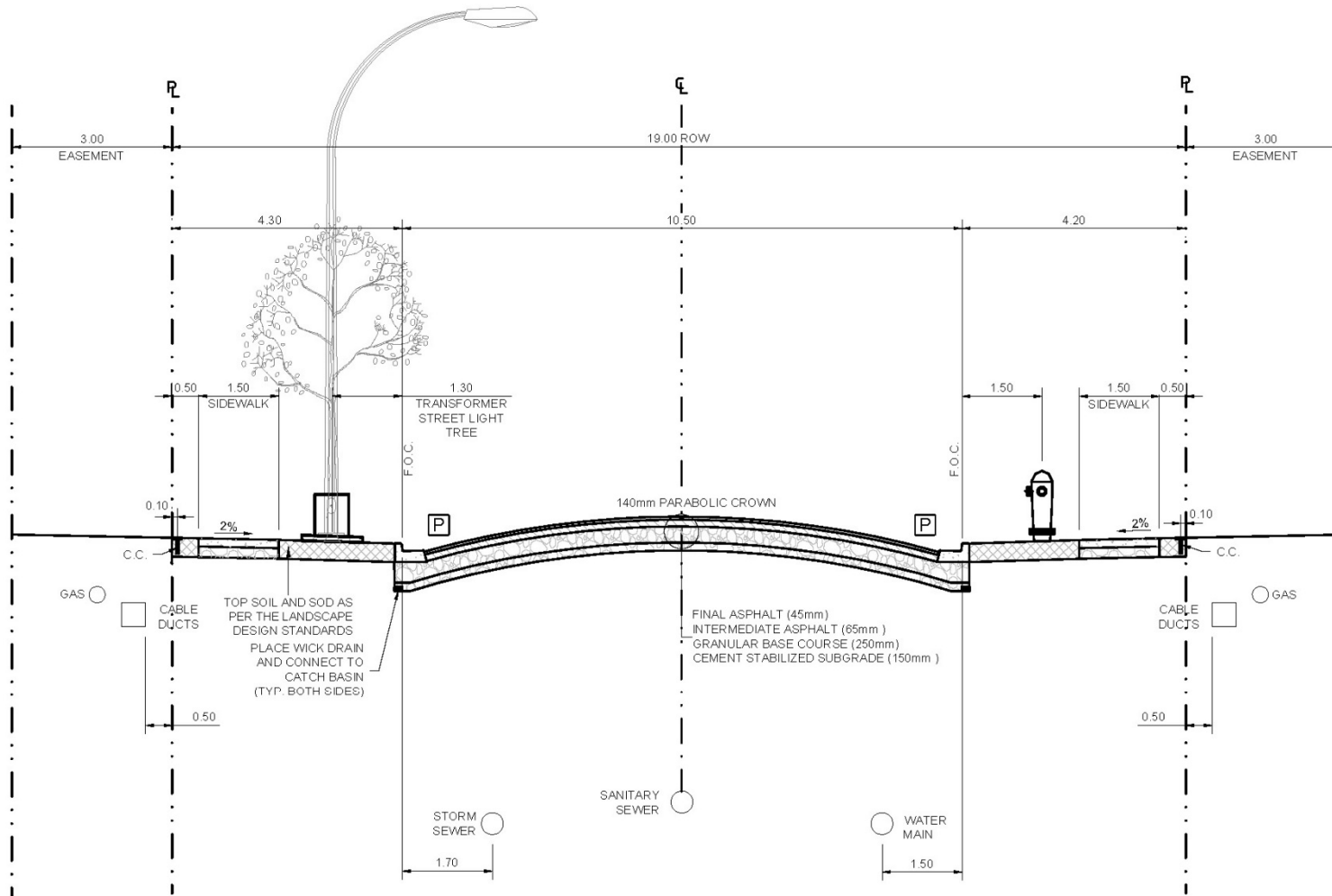
Scale: N.T.S

**DWG. NO.  
2-6**



NOTES:

1. WATER TO BE ON OPPOSITE SIDE OF MAIN POWER.
2. PIPE SIZES AND DEPTH VARY.
3. LANDSCAPING MUST NOT COVER POLE BASE.
4. DEPTH OF MAIN POWER, TELEPHONES AND CABLE T.V. TRENCH TO BE MINIMUM 1.10m.
5. DEPTH OF GAS TRENCH TO BE MINIMUM 1.10m WITHIN ROAD ROW.
6. REQUIRE A MINIMUM OF 0.30m VERTICAL SEPARATION BETWEEN POWER AND GAS.
7. SERVICE BOX FOR POWER, TELEPHONE AND CABLE T.V. TO STRADDLE SIDE-YARD PROPERTY LINE.
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9. MONOWALK WIDTH TO BE MINIMUM 1.50m.
10. MONOLITHIC SIDEWALK CURB AND GUTTER ON BOTH SIDES UNLESS OTHERWISE SPECIFIED.
11. CROWNS ARE MEASURED FROM LIP OF GUTTER.
12. STREETLIGHT CABLE CAN BE INSTALLED AT THE SAME ALIGNMENT AS POWER AND COMMUNICATIONS.
13. ADDITIONAL EASEMENT MAY BE REQUIRED FOR POWER STREET FURNITURE.



**ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED**

**URBAN 2 LANE LOCAL - 19M ROW - RESIDENTIAL SEPARATE SIDEWALK**



Date: 2022-04-12

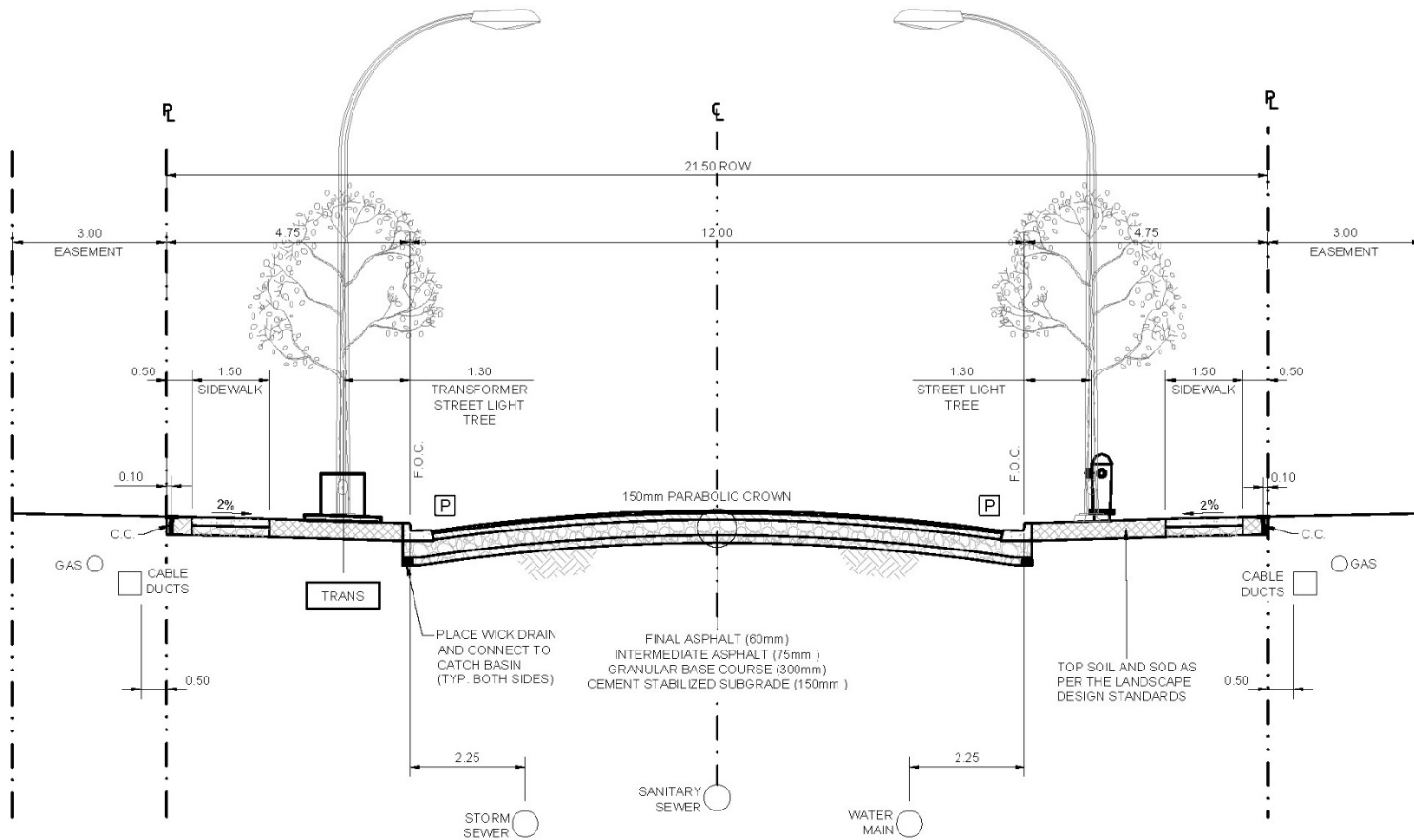
Scale: N.T.S

**DWG. NO.  
2-7**



NOTES:

1. WATER TO BE ON OPPOSITE SIDE OF MAIN POWER.
2. PIPE SIZES AND DEPTH VARY.
3. LANDSCAPING MUST NOT COVER POLE BASE.
4. DEPTH OF MAIN POWER, TELEPHONES AND CABLE T.V. TRENCH TO BE MINIMUM 1.10m.
5. DEPTH OF GAS TRENCH TO BE MINIMUM 1.10m WITHIN ROAD ROW.
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8. PLACE CLAY PLUG IF LANDSCAPING NOT UNDERTAKEN BY ROAD CONTRACTOR.
9. MONOWALK WIDTH TO BE MINIMUM 1.50m.
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11. CROWNS ARE MEASURED FROM LIP OF GUTTER.
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13. ADDITIONAL EASEMENT MAY BE REQUIRED FOR POWER STREET FURNITURE.



**ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED**

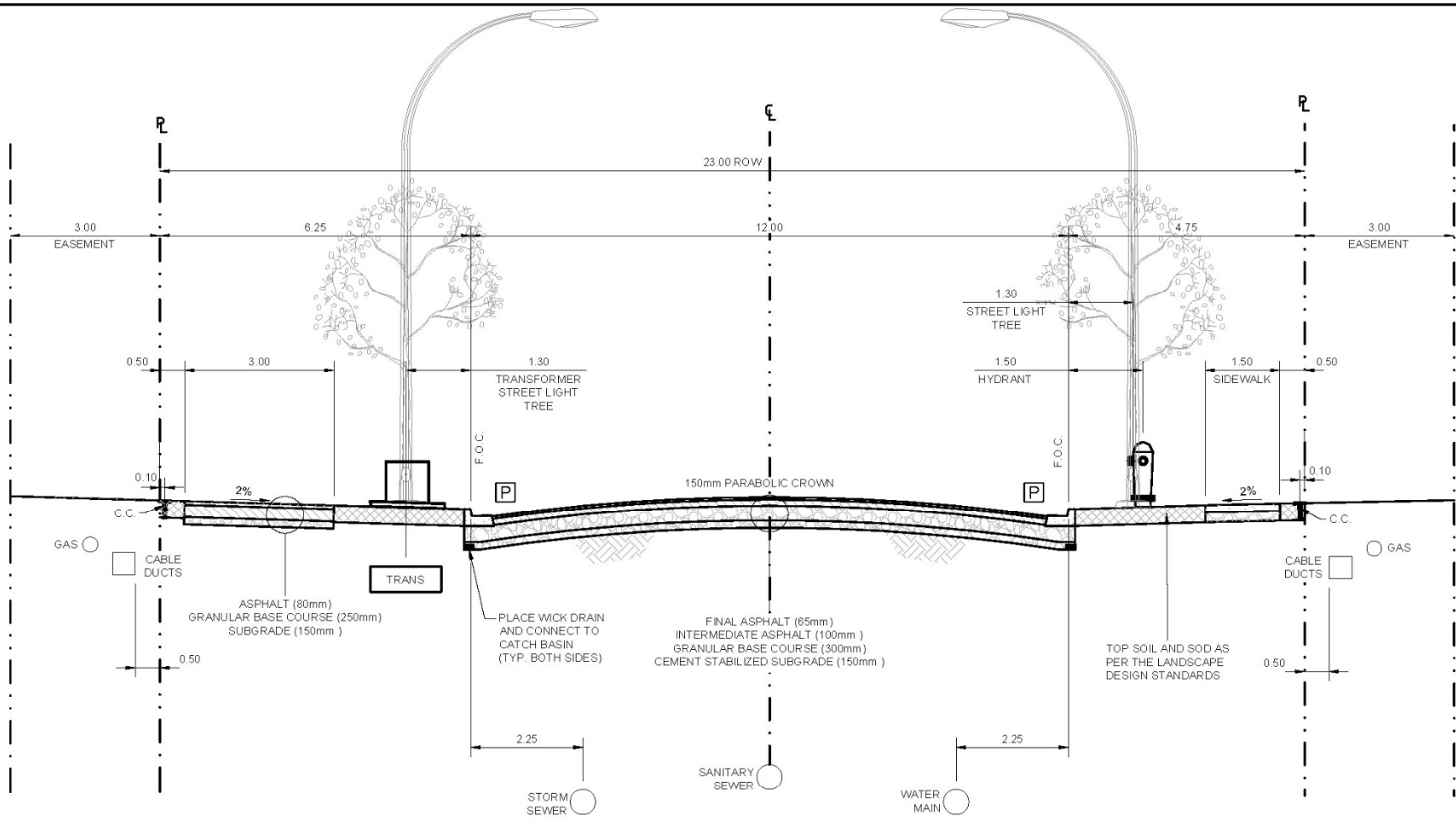
**URBAN 2 LANE LOCAL - 21.5M ROW INDUSTRIAL / COMMERCIAL**



Date: 2022-04-12

Scale: N.T.S

**DWG. NO.  
2-8**



NOTES:

1. WATER TO BE ON OPPOSITE SIDE OF MAIN POWER.
2. PIPE SIZES AND DEPTH VARY.
3. LANDSCAPING MUST NOT COVER POLE BASE.
4. DEPTH OF MAIN POWER, TELEPHONES AND CABLE T.V. TRENCH TO BE MINIMUM 1.10m.
5. DEPTH OF GAS TRENCH TO BE MINIMUM 1.10m WITHIN ROAD ROW.
6. REQUIRE A MINIMUM OF 0.30m VERTICAL SEPARATION BETWEEN POWER AND GAS.
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8. PLACE CLAY PLUG IF LANDSCAPING NOT UNDERTAKEN BY ROAD CONTRACTOR.
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10. MONOLITHIC SIDEWALK CURB AND GUTTER ON BOTH SIDES UNLESS OTHERWISE SPECIFIED.
11. CROWNS ARE MEASURED FROM LIP OF GUTTER.
12. STREETLIGHT CABLE CAN BE INSTALLED AT THE SAME ALIGNMENT AS POWER AND COMMUNICATIONS.
13. ADDITIONAL EASEMENT MAY BE REQUIRED FOR POWER STREET FURNITURE.

**ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED**

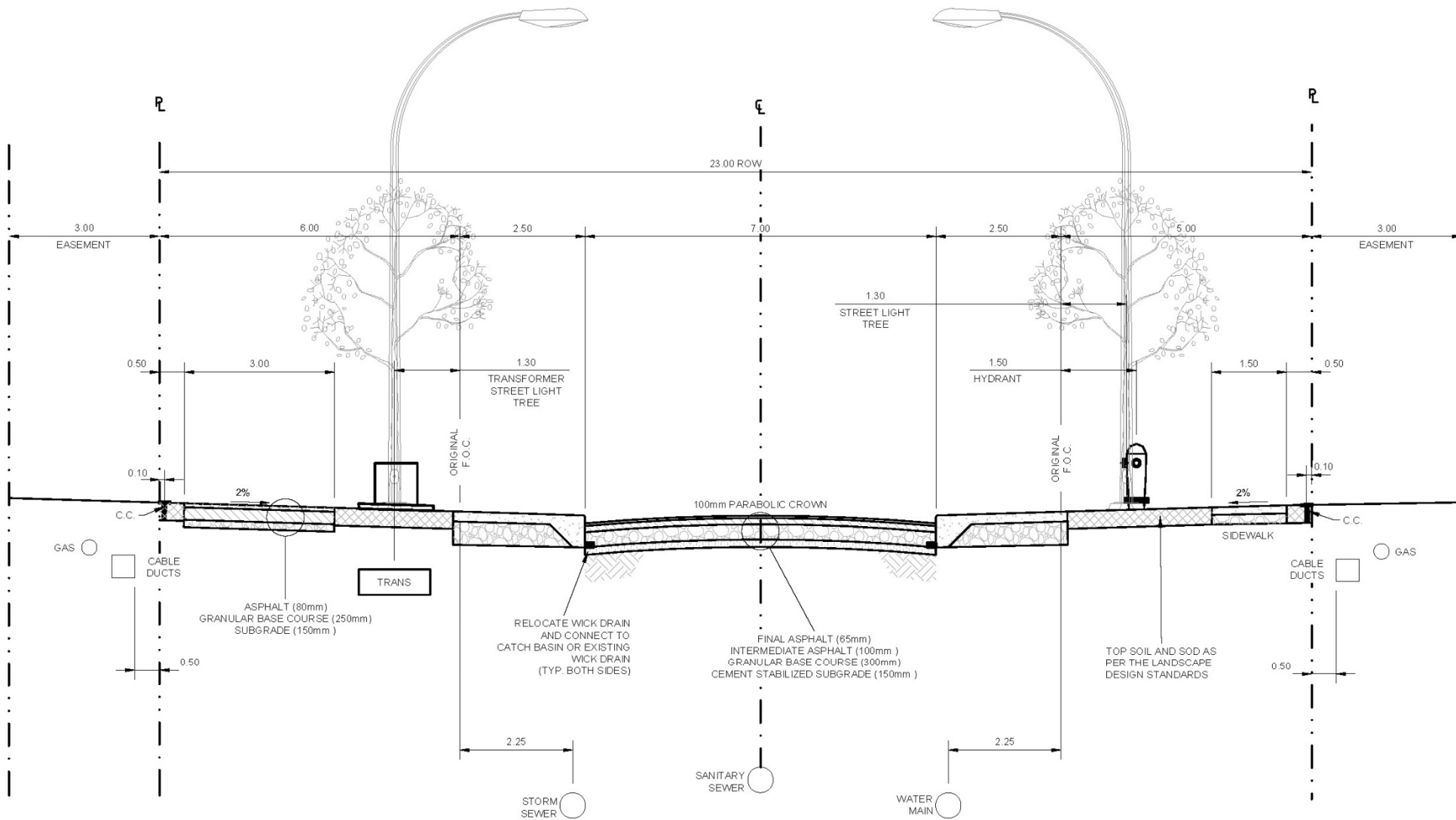
**URBAN 2 LANE COLLECTOR - 23M ROW**



Date: 2022-04-12

Scale: N.T.S

**DWG. NO.  
2-9**



NOTES:

- 1 THE INTENT OF THIS DETAIL IS TO SHOW A TYPICAL SPOT MODIFICATION TO PROMOTE TRAFFIC CALMING OF A TYPICAL URBAN 2 LANE COLLECTOR (23M ROW) AS DETAILED ON DWG. 2-9.

**ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED**

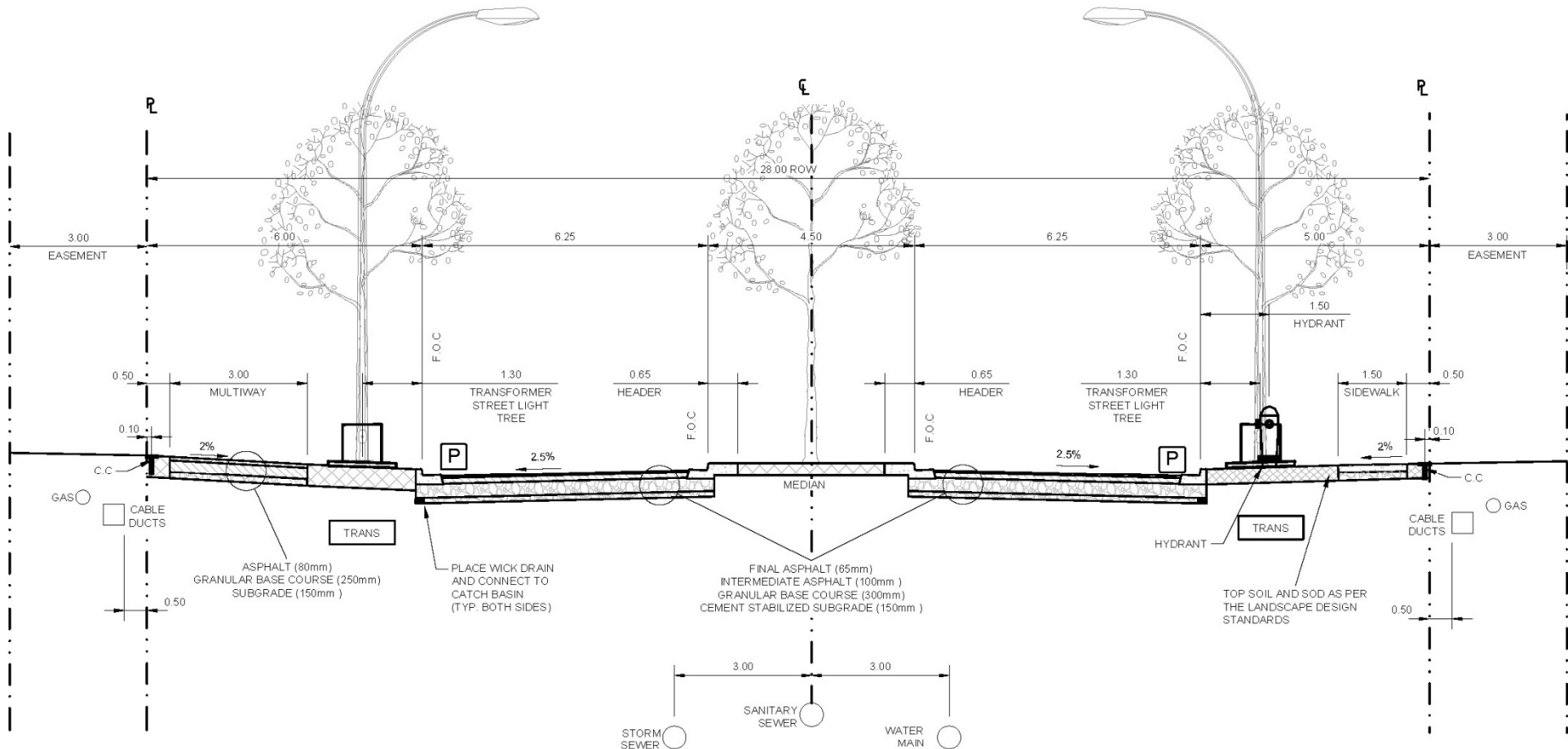


## URBAN 2 LANE COLLECTOR - 23M ROW TRAFFIC CALMING MODIFICATION LOCATIONS

Date: 2022-04-12

Scale: N.T.S

**DWG. NO.  
2-10**



NOTES:

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. WATER TO BE ON OPPOSITE SIDE OF MAIN POWER.</li> <li>2. PIPE SIZES AND DEPTH VARY.</li> <li>3. LANDSCAPING MUST NOT COVER POLE BASE.</li> <li>4. DEPTH OF MAIN POWER, TELEPHONES AND CABLE T.V. TRENCH TO BE MINIMUM 1.10m.</li> <li>5. DEPTH OF GAS TRENCH TO BE MINIMUM 1.10m WITHIN ROAD ROW.</li> <li>6. REQUIRE A MINIMUM OF 0.30m VERTICAL SEPARATION BETWEEN POWER AND GAS.</li> <li>7. SERVICE BOX FOR POWER, TELEPHONE AND CABLE T.V. TO STRADDLE SIDE-YARD PROPERTY LINE.</li> <li>8. PLACE CLAY PLUG IF LANDSCAPING NOT UNDERTAKEN BY ROAD CONTRACTOR.</li> <li>9. MONOWALK WIDTH TO BE MINIMUM 1.50m.</li> </ol> | <ol style="list-style-type: none"> <li>10. MONOLITHIC SIDEWALK CURB AND GUTTER ON BOTH SIDES UNLESS OTHERWISE SPECIFIED.</li> <li>11. CROWNS ARE MEASURED FROM LIP OF GUTTER.</li> <li>12. STREETLIGHT CABLE CAN BE INSTALLED AT THE SAME ALIGNMENT AS POWER AND COMMUNICATIONS.</li> <li>13. ADDITIONAL EASEMENT MAY BE REQUIRED FOR POWER STREET FURNITURE.</li> <li>14. CENTRE MEDIAN DESIGN TO BE DETERMINED ON A CASE-BY-CASE BASIS.</li> </ol> |
|--|--|

**ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED**

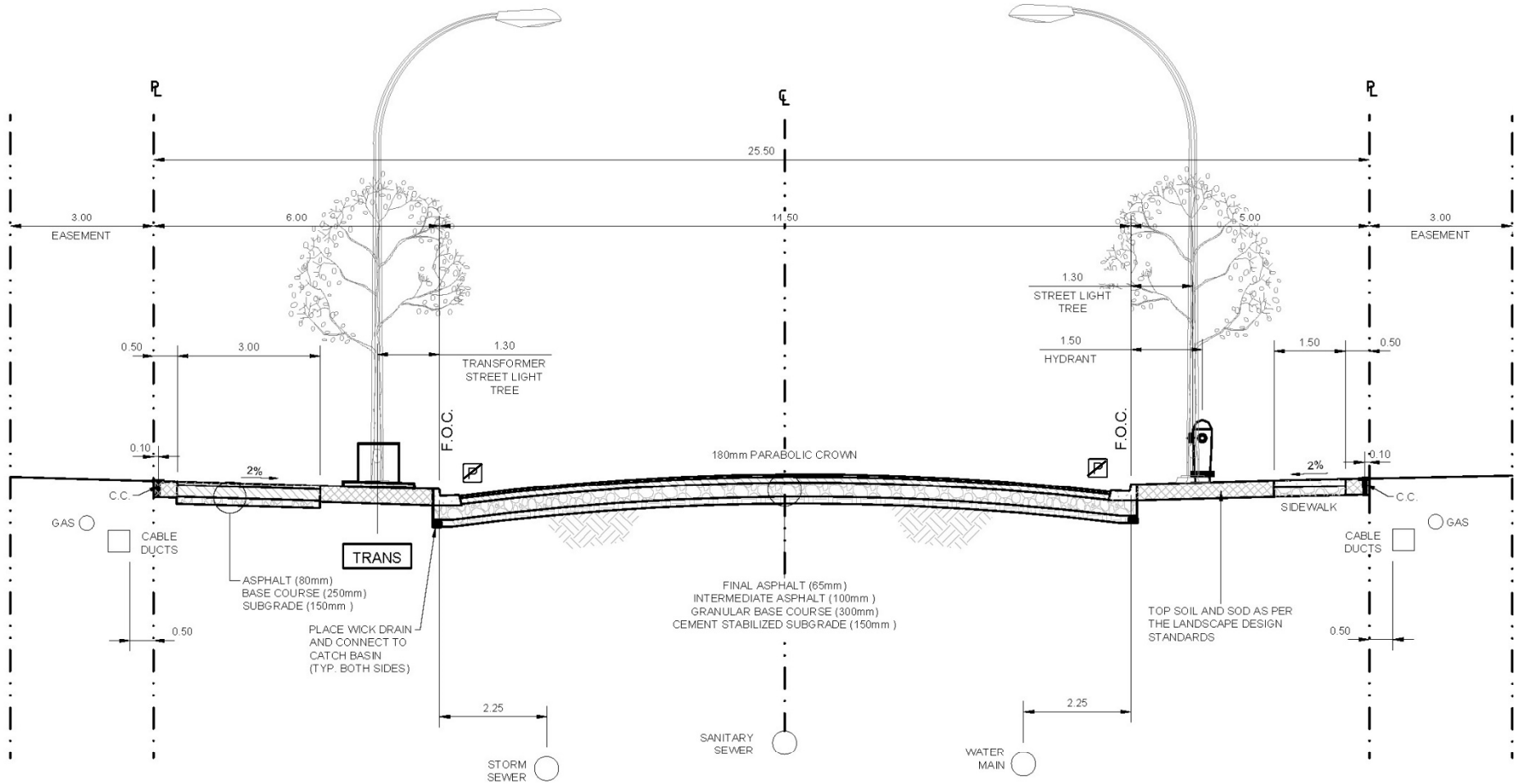
**URBAN 2 LANE COLLECTOR - 28.0M ROW - DIVIDED**



Date:2022-04-12

Scale: N.T.S

**DWG. NO.  
2-11**



NOTES:

1. WATER TO BE ON OPPOSITE SIDE OF MAIN POWER.
2. PIPE SIZES AND DEPTH VARY.
3. LANDSCAPING MUST NOT COVER POLE BASE.
4. DEPTH OF MAIN POWER, TELEPHONES AND CABLE T.V. TRENCH TO BE MINIMUM 1.10m.
5. DEPTH OF GAS TRENCH TO BE MINIMUM 1.10m WITHIN ROAD ROW.
6. REQUIRE A MINIMUM OF 0.30m VERTICAL SEPARATION BETWEEN POWER AND GAS.
7. SERVICE BOX FOR POWER, TELEPHONE AND CABLE T.V. TO STRADDLE SIDE-YARD PROPERTY LINE.
8. PLACE CLAY PLUG IF LANDSCAPING NOT UNDERTAKEN BY ROAD CONTRACTOR.
9. MONOWALK WIDTH TO BE MINIMUM 1.50m.
10. MONOLITHIC SIDEWALK CURB AND GUTTER ON BOTH SIDES UNLESS OTHERWISE SPECIFIED.
11. CROWNS ARE MEASURED FROM LIP OF GUTTER.
12. STREETLIGHT CABLE CAN BE INSTALLED AT THE SAME ALIGNMENT AS POWER AND COMMUNICATIONS.
13. ADDITIONAL EASEMENT MAY BE REQUIRED FOR POWER STREET FURNITURE.

**ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED**

**URBAN 4 LANE COLLECTOR - 25.5M ROW**

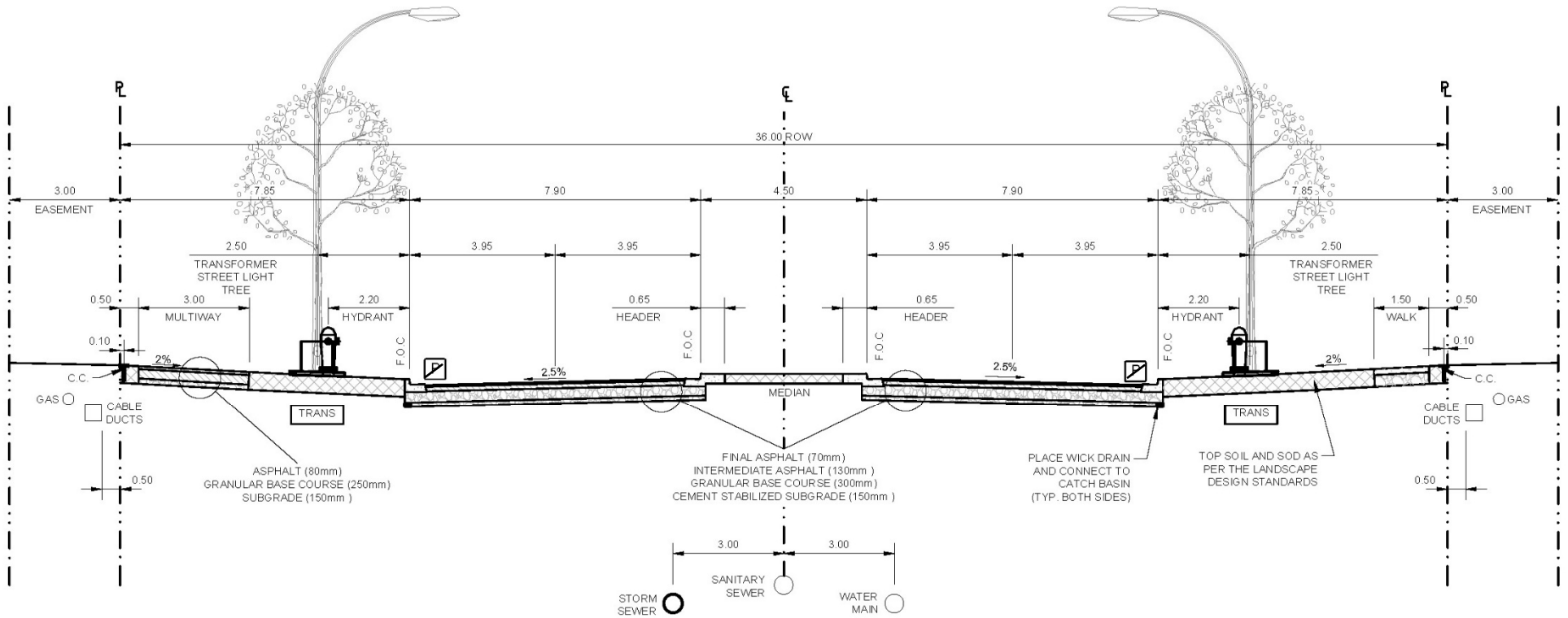


Date: 2022-04-12

Scale: N.T.S

**DWG. NO.  
2-12**





NOTES:

1. WATER TO BE ON OPPOSITE SIDE OF MAIN POWER.
2. PIPE SIZES AND DEPTH VARY.
3. LANDSCAPING MUST NOT COVER POLE BASE.
4. DEPTH OF MAIN POWER, TELEPHONES AND CABLE T.V. TRENCH TO BE MINIMUM 1.10m.
5. DEPTH OF GAS TRENCH TO BE MINIMUM 1.10m WITHIN ROAD ROW.
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11. CROWNS ARE MEASURED FROM LIP OF GUTTER.
12. STREETLIGHT CABLE CAN BE INSTALLED AT THE SAME ALIGNMENT AS POWER AND COMMUNICATIONS.
13. ADDITIONAL EASEMENT MAY BE REQUIRED FOR POWER STREET FURNITURE.
14. CENTRE MEDIAN DESIGN TO BE DETERMINED ON A CASE-BY-CASE BASIS.

ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED

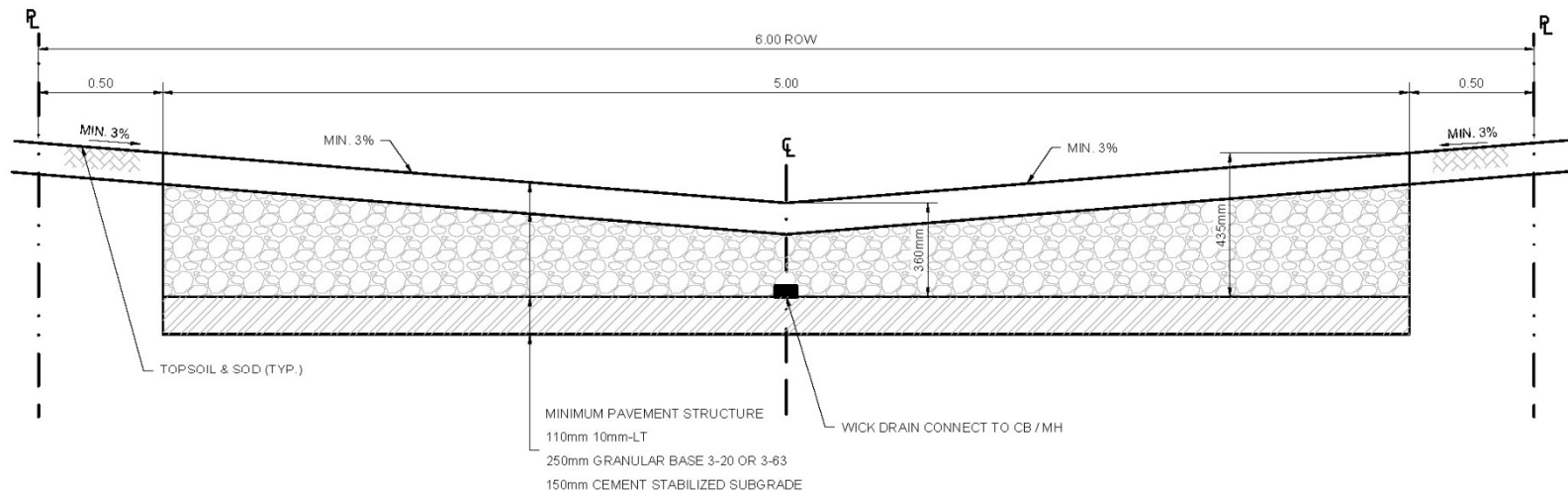
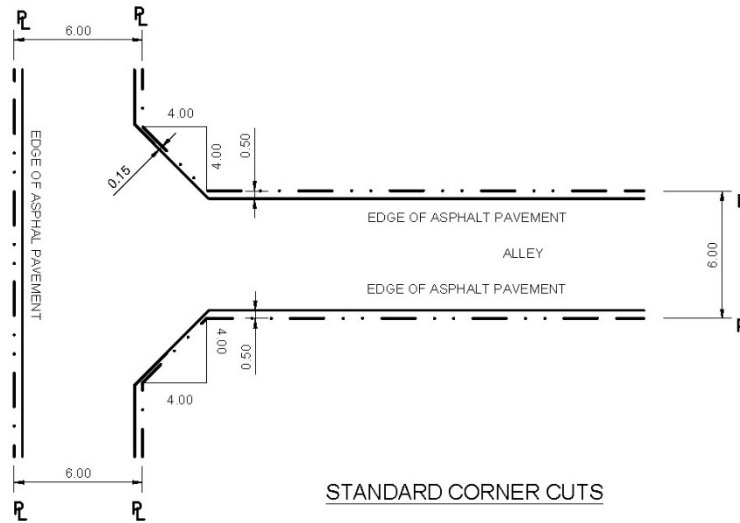
URBAN 4 LANE ARTERIAL - 36M ROW - DIVIDED



Date: 2022-04-12

Scale: N.T.S

DWG. NO.  
2-13



NOTES:

1. REDUCE CENTRELINE "V" TO 50mm AT TIE-IN TO BACK OF BOULEVARD WALK TO FACILITATE DRAINAGE AS REQUIRED.
2. EDGES OF PAVEMENT TO BE WARPED TO FIT DRIVEWAYS.
3. STAGED ASPHALT PAVING WILL BE REQUIRED IF MULTIPLE UTILITIES ARE INSTALLED WITHIN THE 5.00m PAVED AREA.

ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED

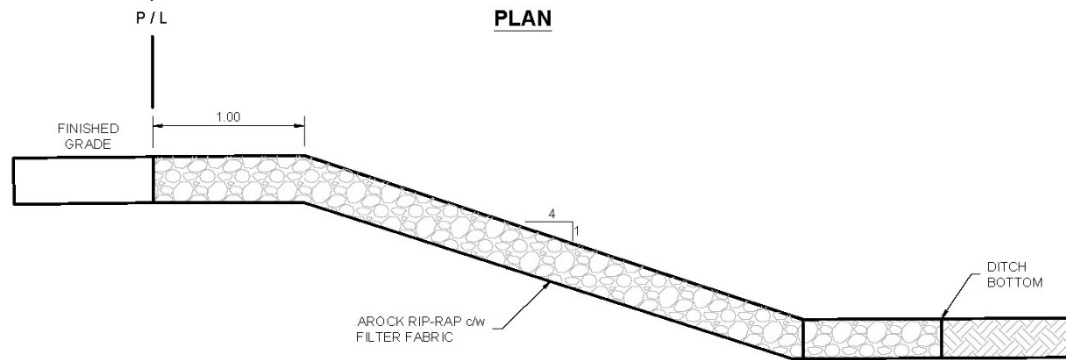
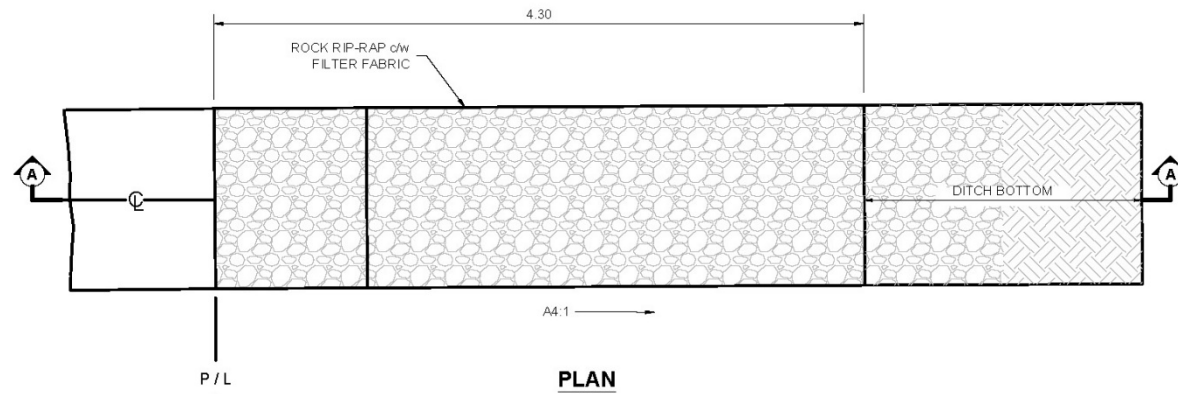
5.00m RESIDENTIAL ALLEY - 6M ROW



Date: 2022-04-12

Scale: N.T.S

DWG. NO.  
2-14



RIP-RAP GEOTEXTILE MIN. SPECIFICATION

- NON-WOVEN GEOTEXTILE
- GRAB TENSILE (N) 890 ASTM D4632
- TEAR (N) 370 ASTM D4533
- PUNCTURE (N) 480 ASTM D4833
- MULLEN BURST (kPa) 2400 ASTM D3786

NOTES:

- CLASS 1M ROCK RIP-RAP c/w FILTER FABRIC
- 100% SMALLER THAN 300mm OR 40kg
- AT LEAST 20% LARGER THAN 200mm OR 10kg
- AT LEAST 50% LARGER THAN 175mm OR 10kg
- AT LEAST 80% AT LARGER THAN 125mm OR 30kg

ALL DIMENSIONS IN METRES  
UNLESS OTHERWISE NOTED



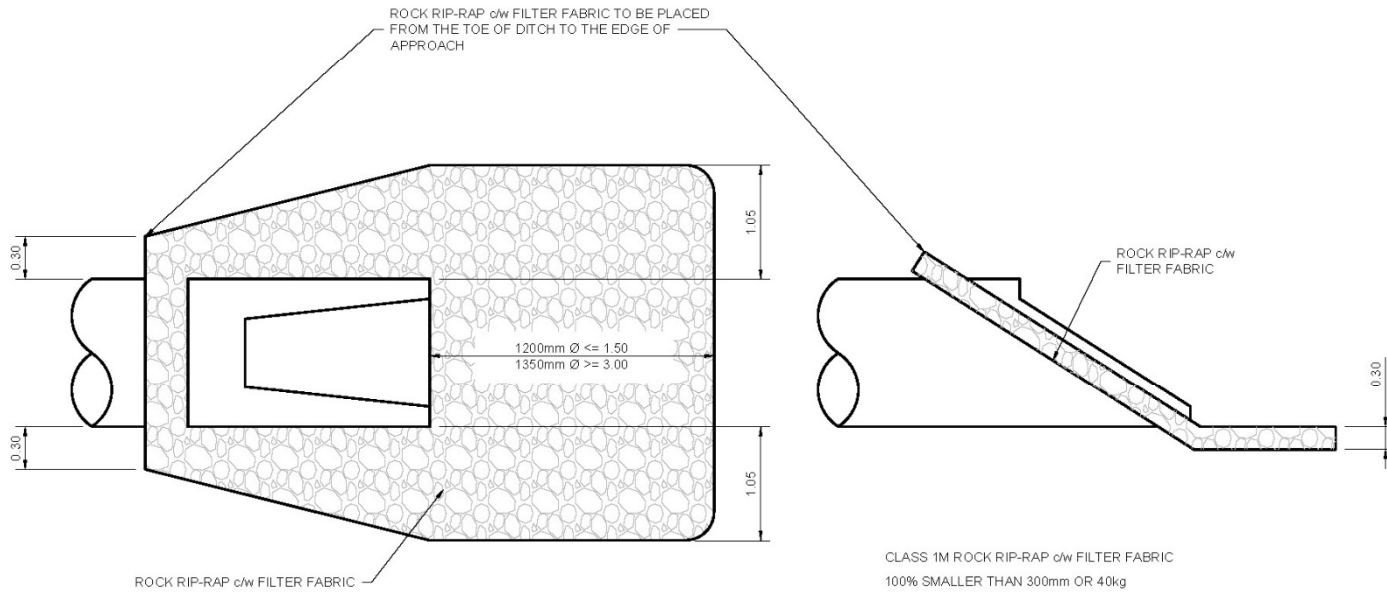
**TYPICAL LOT DISCHARGE DETAIL**

Date: 2022-04-12

Scale: N.T.S

DWG. NO.  
2-15





**PLAN VIEW**

**SIDE VIEW**

CLASS 1M ROCK RIP-RAP c/w FILTER FABRIC  
 100% SMALLER THAN 300mm OR 40kg  
 AT LEAST 20% LARGER THAN 200mm OR 10kg  
 AT LEAST 50% LARGER THAN 175mm OR 10kg  
 AT LEAST 80% AT LARGER THAN 125mm OR 30kg

ALL DIMENSIONS IN METRES  
 UNLESS OTHERWISE NOTED

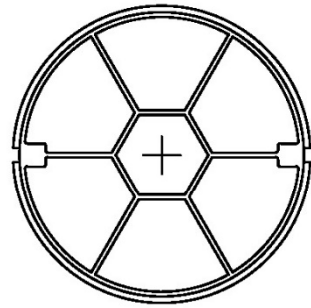


**CULVERT INSTALLATION DETAIL**

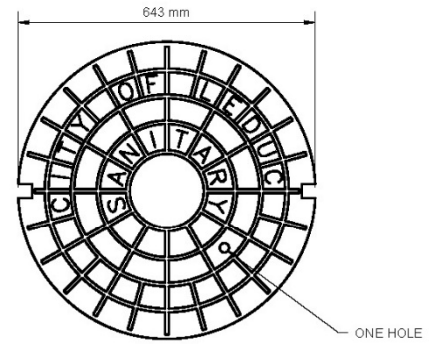
Date: 2022-04-12

Scale: N.T.S

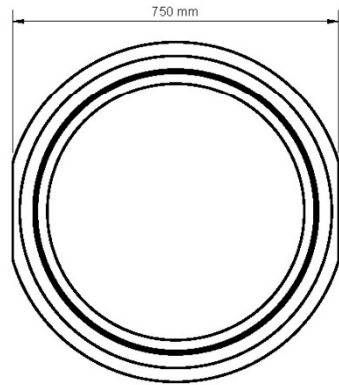
DWG. NO.  
 2-16



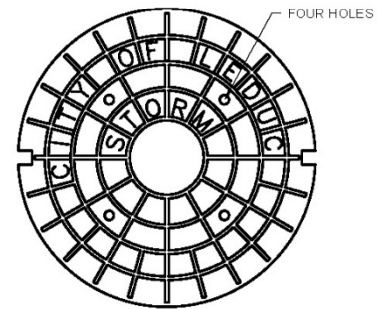
COVER BOTTOM



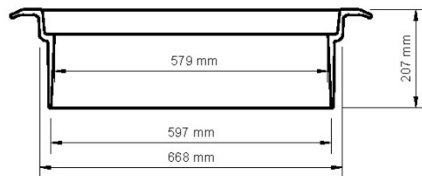
SANITARY COVER TOP



FRAME TOP



STORM COVER TOP



FRAME SIDE

NOTE

NORWOOD FOUNDRY TYPE NF-80 OR  
 TROJAN FOUNDRY TYPE TF-80  
 GROUTING OF MANHOLE RINGS IS REQUIRED

ALL DIMENSIONS IN METRES  
 UNLESS OTHERWISE NOTED

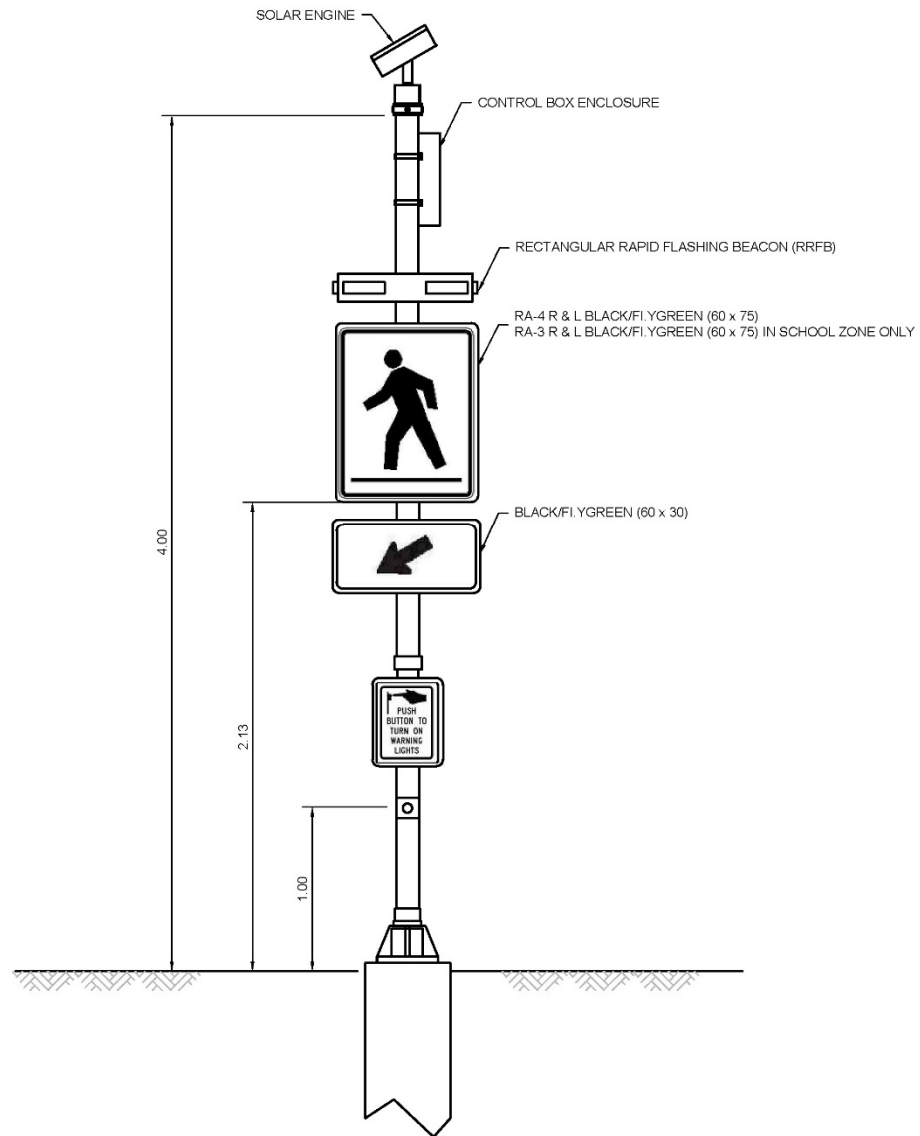
NF/TF 80 FRAME AND COVER DETAIL



Date: 2022-04-12

Scale: N.T.S

DWG. NO.  
 2-17



**NOTES:**  
 RRFB TYPE: CARMANAH R920-E OR APPROVED EQUIVALENT  
 EXTENDED TEMPERATURE BATTERY, 7A  
 POLARA BULLDOG PUSH BUTTON, YELLOW  
 POLE BASE: 1.5M TYPE B PRECAST BASE  
 POLE: 4.0M TYPE 4A OCTAGONAL GALVANIZED SIGNAL POLE WITH CAP

ALL DIMENSIONS IN METRES  
 UNLESS OTHERWISE NOTED



### SOLAR PEDESTRIAN CROSSING

Date: 2022-04-12

Scale: N.T.S

DWG. NO.  
 2-18



## PART III: SUPPLEMENTARY GUIDELINES, PROCEDURES & POLICIES



## 13 NOISE ATTENUATION GUIDELINE

### 13.1 DEFINITION

- 13.1.1 Noise is defined as the sounds generated by vehicles operating on the roadway. It includes but is not limited to engine/exhaust sounds and road contact sounds.
- 13.1.2 Noise level expressed in decibels (dB) is taken to mean the A-weighted 24-hour equivalent sound level.

### 13.2 GUIDELINES

- 13.2.1 Where an arterial roadway, Secondary Highway or Primary Highway abuts or passes through a development area, the Developer shall engage an independent consultant to conduct a noise study to forecast noise levels that would be experienced within the development area from the rail and/or roadway. Modeled noise levels are to predict future sound levels based on the 20-year traffic volume. This testing methodology applies to all existing and proposed residential developments that require modeling.
- 13.2.2 Where the noise study predicts a 24-hour  $L_{eq}$  of 55 dBA or less measured or calculated at a distance of 5.0 metres from the nearest dwelling facade adjacent to the rail and/or the roadway within the subdivision area, no further action by the Developer shall be required.
- 13.2.3 Where the noise study predicts a 24-hour  $L_{eq}$  in excess of 55 dBA, the Developer shall provide noise attenuation in a form that will reduce the noise level to 55 dBA or below. Under extenuating circumstances and at the discretion of the Engineer, the design noise level may be relaxed.
- 13.2.4 The Developer is referred to the following reference materials for noise studies and attenuation devices:
- .1 Transportation Association of Canada (TAC): Integrating Health and Transportation in Canada
  - .2 Canadian Acoustical Association (CAA): Guide to Acoustic Standards



## 14 CADD AND DRAWING SUBMISSION GUIDELINE

### 14.1 PREREQUISITES TO REVIEW OF ENGINEERING DRAWINGS

14.1.1 Engineering drawings for a proposed subdivision may not be accepted for review in the absence of the required design studies and reports and approval of a plan of subdivision by the Subdivision Authority for the City of Leduc.

### 14.2 ENGINEERING DRAWING SUBMISSION AND APPROVAL PROCEDURE

14.2.1 The Developer shall submit to the City of Leduc, copies of complete engineering drawings prepared by a professional engineer, indicating all data that is relevant to the proposed municipal improvements. Drawing submissions shall include landscape drawings, where applicable, prepared by a Landscape Architect. All engineering drawings shall be subject to the approval of the Engineer. Incomplete submissions will not be accepted and circulated for review and approval.

14.2.2 The Developer shall submit such engineering drawings a minimum of 3 months before the proposed initial date of construction. Should the Engineer not approve the Developer's engineering drawings or proposals, these will be returned to the Consultant with comments for revision by the Consultant to the satisfaction of the Engineer. The period from the return of the engineering drawings to the re-submission of the revised Drawings or proposals shall be deemed to be additional to the minimum lead-time required for submissions. The time period for review by the City will be increased as a direct result of excessive number of cycles of review and comment as required.

14.2.3 All detailed engineering drawings must be approved as required by City departments, utility agencies and stakeholders.

14.2.4 The Developer shall not proceed with construction until the Engineer has approved the engineering drawings, and the City has executed a Development Agreement for the development.

14.2.5 Some City departments may require the submission of engineering drawings in a particular electronic format after approval.

### 14.3 ARTERIAL ROAD PRELIMINARY DESIGN PLAN REQUIREMENTS

14.3.1 An arterial concept plan must be approved by the City of Leduc prior to proceeding with a preliminary design plan. The concept plan should be 1:1000 scale and must outline the turning movements, number of lanes, access locations, and right-of-way limits. The limits of a concept plan must extend from arterial road to arterial road.

14.3.2 The primary purposes of the preliminary plan are to establish the staging with respect to the existing and ultimate plan; provide a plan that minimizes removals when future stages are constructed; and identify potential conflicts with other improvements or utilities.

14.3.3 The Developer shall submit arterial road preliminary design plans (2 copies required for first submission and an electronic submission) for review and approval by the City when a



development involves improvements on an existing and/or a proposed arterial road. Approval of such plans is required prior to the submission of detailed Engineering Drawings.

- 14.3.4 Preliminary plans shall be drawn to a scale of 1:500 horizontal and 1:50 vertical and shall include the following:
- .1 Key Plan (complete with North Arrow)
  - .2 Appropriate signature / approval signing block
  - .3 Design criteria/standards/considerations (for example, design and posted speed, design vehicle and e-rate) for the existing, initial and ultimate stages.
  - .4 Proposed access locations (including width and curve radii)
  - .5 Approved access locations and turn bay requirements (taper and bay lengths as identified with TIA).
  - .6 Horizontal and vertical alignment.
  - .7 Pedestrian and cyclist accessibility, curb ramps, and bus stop requirements.
  - .8 Typical and non-typical road cross-sections showing lane width, sidewalks, multiway, streetlights, trees, utility alignments, ditch, berms, noise attenuation, superelevation.
  - .9 Pipeline/railway crossing conflicts; upgrade requirements.
  - .10 Existing and proposed property lines, including all easements, surface and underground encroachments, and identify road right-of-way requirements
  - .11 Pavement marking that indicates lane width and turn bay/taper requirements.
  - .12 Existing accesses and infrastructure.
- 14.3.5 Identify permanent and temporary construction on the initial stage relative to the ultimate stage.
- 14.3.6 Conceptual horizontal and vertical alignments for storm drainage may be required.
- 14.3.7 Show both existing and proposed utilities (both surface and underground), including but not limited to streetlights, traffic signals, trolley poles, overhead signs, secondary electrical, sanitary, water, gas, power, telephone and cable.
- 14.3.8 Additional project specific information may be requested.

## 14.4 COMPLETE SUBMISSIONS

- 14.4.1 All engineering drawings submitted to the City for approval must be signed and sealed by a registered professional engineer and shall be stamped with a permit to practice seal where appropriate. Engineering drawing submissions shall be complete and shall be accompanied by all supporting documents, calculations, cost information and geotechnical reports or other information as required by the City.
- 14.4.2 Incomplete submissions, submissions found to contain excessive omissions or errors, or which do not include appropriate authentication of professional authorship, may be returned without review or comment, at the discretion of the Engineer.



## 14.5 GENERAL REQUIREMENTS FOR ENGINEERING DRAWINGS

14.5.1 Each drawing shall include the following:

- .1 a suitable title and key plan, identifying the name and location of the project;
- .2 the scale of the drawing;
- .3 a north direction indicator; and
- .4 an appropriate signature block for City approvals.

14.5.2 All dimensions and measurements shown in the engineering drawings shall be in metric units. All elevations shown in the engineering drawings shall be referenced to geodetic datum and shall be noted as such.

14.5.3 The standard drawing size of 841 mm by 594 mm (A1) shall be used.

14.5.4 All lettering must be a minimum of 2 mm high.

14.5.5 For consistency it is suggested that abbreviations and drawing symbols used in the engineering drawings be consistent with those used by the City. A legend for these symbols and abbreviations shall also be provided on the engineering drawings.

14.5.6 The engineering drawings are to provide a complete description of all existing and proposed municipal improvements, including any provisions for future extensions of utilities and systems.

## 14.6 TYPICAL PLANS INCLUDED WITH ENGINEERING DRAWINGS

14.6.1 The cover sheet shall indicate the name of the subdivision as determined by the City of Leduc, the stage of development, the Subdivision Authority approval number and names of both the Developer and Consultant, and a key plan.

14.6.2 The index plan shall be prepared to fit the standard size sheet. This plan should be a copy of the Legal Plan, or Preliminary Legal Plan and shall indicate that portion of a street that relates to a particular plan/profile drawing.

14.6.3 The topography and land use plan should be prepared to a 1:1000 scale and shall indicate the existing contours at a 0.5 m interval and the proposed land uses for each lot or parcel of land as defined in the City of Leduc Land Use Bylaw 809-2013. The plan should also indicate all stands of trees and existing buildings that will remain.

14.6.4 The road, sidewalk and walkway overall plan shall be drawn to a scale of 1:1000 and shall indicate:

- .1 All walks, multiways, alleys, carriageway widths and alignments.
- .2 Catch basins and manholes. However, dimensions need not be included.
- .3 The alignments and widths of all existing and proposed immediately surrounding streets, alleys, walks, ditches and other pertinent topographical features.
- .4 The limits of contracts and financial responsibility for the project.
- .5 The proposed bus routing, bus stops and bus stop pads.





- .6 Location and type of street identification signs.
- .7 All access points into the proposed subdivision, including temporary access connections, emergency accesses, and temporary turnarounds if required.
- 14.6.5 The sanitary, storm and water main overall plan shall be drawn to a scale of 1:1000 and shall indicate the locations of the alignments of sanitary sewers, storm sewers, water mains and services, stormwater management facilities and all associated easements.
- 14.6.6 Telecommunications, gas and power overall plans shall indicate the alignments of telephone, gas and power utilities and shall be drawn to a scale of 1:1000. These plans shall be included in the set of engineering drawings submitted to the City for review.
- 14.6.7 The street furniture plan shall include all surface improvements including roads, sidewalks, walkways, catch basins, entrance features, telecommunication pedestals, Canada Post mailboxes and their pads, streetlights, transformers, switching cubicles and hydrants. Anticipated driveway locations and orientation should also be included if that information is available. Street identification and traffic signs should also be shown.
- 14.6.8 Detailed plans and profiles for streets and alleys shall be drawn to a scale of 1:500 horizontal and 1:50 vertical and shall include the following:
  - .1 legal subdivision;
  - .2 street and walkway names and numbers;
  - .3 road, alley, multiway and sidewalk alignments;
  - .4 bus stop pads and walk connections;
  - .5 alignments of immediately adjacent existing or proposed streets, walks, alleys, roads and ditches, interim access connections and alignment data;
  - .6 chainage of proposed utility alignments;
  - .7 chainage or property line ties to correlate plan and profile;
  - .8 existing ground profile;
  - .9 intersection grades, including PI and  $\frac{1}{4}$ pt elevations
  - .10 profiles of proposed lip of gutters, alley grades and cross elevations for all intersecting roadways;
  - .11 grade of proposed and field-established elevations of existing local improvements affecting proposed design;
  - .12 gutter elevations of catch basins;
  - .13 curb elevations at beginning and end of corner radii, horizontal and vertical curves and locations where a break in grade takes place;
  - .14 centreline grades on profiles may be required.
  - .15 grind and overlay limits at tie-ins to existing roads.
  - .16 temporary surface and underground drainage infrastructure, as required.



- .17 temporary and permanent easements where applicable.
- 14.6.9 Cross-sections should be shown on a separate plan. They should be cross-referenced and show the offsets of road and sidewalk, streetlight, trees, above and underground utilities, relative to the property lines, and pavement structure for roadway construction. The title should specify the exact portion of the roadway covered by each drawing.
- 14.6.10 Detailed plans and profiles for walkways and multiways shall be drawn to a scale of 1:500 horizontal and 1:50 vertical and shall include the following:
- .1 legal subdivision;
  - .2 street and walkway names and numbers;
  - .3 alignment of walks and immediately adjacent roads and sidewalks;
  - .4 alignment and grade data on existing and proposed walks and multiways;
  - .5 chainage or property line ties to correlate plans and profiles;
  - .6 existing ground profiles;
  - .7 proposed edge of walk grades;
  - .8 walk elevations at walk intersections, drainage locations and street intersections;
  - .9 existing and proposed utility installations;
  - .10 berm grading and drainage and back-of-lot elevations of adjacent subdivisions;
  - .11 typical cross-sections showing the type of walk; and
  - .12 pavement structure details and utility placements.
- 14.6.11 Cross-sections could be shown on a separate plan and cross-referenced. The title should specify the exact portion of walkway covered by each drawing.
- 14.6.12 Landscape plans shall be drawn to a scale of 1:500 horizontal and shall include the following:
- .1 legal subdivision;
  - .2 street and walkway names and numbers;
  - .3 walk alignments;
  - .4 utility alignments;
  - .5 alignments of immediately adjacent existing and proposed streets, walks, roads and ditches;
  - .6 berm locations;
  - .7 selection, size, quantity, conditions and installation, specification and location of trees and shrubs;
  - .8 locations of walkway furniture, waste receptacles, other landscape enhanced amenities and street lighting;
  - .9 fence details
  - .10 entrance feature details, where applicable.



14.6.13 Cross-sections could be shown on a separate plan and cross-referenced. The title should specify the general location and include all applicable offsets.

14.6.14 Details of structures, facilities and improvements which are identical to those in the standard drawings provided in this document are to be included in the engineering drawings. PDF reproductions are acceptable. All other structures or unique improvements shall also be included on the detail plans.

## 14.7 DESIGN REVISIONS AFTER APPROVAL

14.7.1 Where it is necessary, for any reason, to make any changes to the engineering drawings after they have been approved, the Consultant shall obtain approval of those changes prior to proceeding with construction of the specific part of the improvement for which the design change is proposed. Four prints of each of the original approved drawings affected shall be submitted to the appropriate City department(s) with the proposed changes shown in red, accompanied by a letter outlining reasons and justification. If the proposed changes meet with the approval of the appropriate City department(s), one copy will be signed and returned, accompanied by a letter authorizing the changes to be made on the original. The changes shall be reflected on the appropriate “as-built” drawings. No changes other than those accepted are to be made to any original approved drawing.

## 14.8 GENERAL REQUIREMENTS FOR AS-BUILT DRAWINGS

Prints of revised approved design drawings showing as-built information shall be submitted by the Consultant. The drawings shall be professionally reauthenticated, signed and dated to indicate as-built information. Some City departments may require an additional submission of as-built plans in an acceptable electronic format.

### 14.8.1 As-Built Requirements for Surface Improvements

- .1 All data shown on the construction drawings shall be changed to as-built information, including:
  - Elevations of the catch basins, manhole covers, and curb returns on the plan and profile drawings, as well as any grade changes which exceed the design grade by more than 0.1% (or 25mm).
  - Curve radii, distances from back-of-walk to property line and sidewalk widths on the plan and profile drawings.
  - Type of curb, whether rolled faced or vertical faced on the overall plan.
  - Elevations at either top-of-curb or lip-of-gutter.
  - Pavement structure.
  - The month and year of completion and the name of the contractor.
- .2 If the cross-section design has been changed in width or structure, then this shall be changed to as-built on the typical section plan.
- .3 Infrastructure asset management data tables. The schema will be provided by the City.



#### 14.8.2 As-Built Requirements for Underground Improvements

- .1 Prints of approved design drawings with revisions shown in red may be acceptable, at the discretion of the Engineer. Refer to the appropriate chapters of this document for further information required on as-built drawings for drainage, water, power and landscape improvements.
- .2 After completion of construction and installation of municipal improvements and following the issuance of construction completion certificates, as-built drawings shall be submitted for review by the applicable City department not later than six months prior to the expiration of the maintenance period for each type of municipal improvement. At this stage, the drawings shall be stamped: “This drawing indicates as-built information”.
- .3 Infrastructure asset management data tables. The schema will be provided by the City.

#### 14.8.3 Submission Requirements

- .1 All as-built submissions must include three hard copies, on PDF copy, and one DWG or SHP file copy in NAD83-3TM-114 projection.
- .2 Presentation, annotation, layering, coding of as-built data and mapping must integrate with the City of Leduc GIS. The City will supply their requirement upon request.
- .3 For all assets installed or confirmed in the field, verify how information presented in the as-built was obtained. In the case of information collected via GPS survey, the resulting coordinate file is to be provided in CSV or XML format.
- .4 Coordinates are to reference the previously stated projection and be scaled to Grid using the appropriate scale factor. For all information that was obtained from another source, indicate it as either existing or future infrastructure.

### 14.9 SPATIAL REFERENCING SYSTEM

- 14.9.1 Should any portion of the land covered by the Development Agreement be located outside of a 1250 metre radius from the nearest Leduc High Precision Network (HPN) monument, a new HPN monument must be established to encompass said lands (for a list of monuments currently comprising the Leduc HPN, contact the City). This can be done by either placing a new monument, or by integrating an acceptable currently located ASCM. Final approval for the location of the HPN monument lies with the City.
- 14.9.2 All cadastral monuments must be horizontally and vertically integrated into the Alberta spatial referencing system.
- 14.9.3 The Developer is responsible for the establishment and integration of Alberta Survey Control Markers (ASCMs) within the development area prior to the issuance of a Final Acceptance Certificate for paved roads. The following information is intended as a guideline for the establishment and integration of the ASCMs:
  - .1 The Developer must retain an Alberta Land Surveyor (ALS) to establish and integrate the ASCMs into the Alberta spatial referencing system at a level compatible with the Leduc High Precision Network. For further information please refer to the Standards, Specifications & Guidelines for GPS Surveys of Alberta Survey Control. Prior to establishment of the ASCMs,



the proposed design must be submitted to the City for approval. Note that the final derivation and publication of co-ordinates values for new and existing ASCMs is the responsibility of the Province.

- .2 Installation of any new ASCMs must be completed prior to issuance of a Final Acceptance Certificate for paved roads. It is recommended that the developer commence the ASCM establishment and integration process as soon as conveniently possible to avoid any unexpected delays in the issuance of a Final Acceptance Certificate for paved roads.
  - .3 Upon completion of the establishment and integration of the ASCMs, the ALS must submit to the City of Leduc Geomatics Services Department the survey data returns in accordance with the Standards, Specifications & Guidelines for Establishment and Maintenance of Alberta Survey Control using GPS manual. The data will in turn be submitted to the Director of Surveys Branch, Alberta Environment. Upon final integration and publication of coordinate values of the ASCMs, the Director of Surveys Branch, Alberta Environment will issue letters of acceptance to both the City of Leduc and the ALS who conducted the survey.
- 14.9.4 The Developer must undertake to preserve all existing and new ASCMs. Should it be necessary to destroy an ASCM, a replacement must be provided as is required for the Leduc High Precision Network within the Alberta spatial referencing system.



## 15 CONSTRUCTION PROCEDURE

### 15.1 BEFORE CONSTRUCTION

- 15.1.1 The following items (not limited to) must be completed and approved before construction can start:
- .1 Signed development agreement from the City of Leduc Planning department and
  - .2 Approved final construction drawings, staging plans, specifications and engineering reports.
- 15.1.2 In conjunction with the submission of final detailed plans and specifications for approval, a copy of the report on pavement structure requirements as required shall also be submitted with the final detailed plans and specifications.

### 15.2 DURING CONSTRUCTION

The following procedures shall be followed during the course of construction:

- 15.2.1 The Developer's engineer shall inspect all construction including the installation of the franchise utilities. The Developer shall appoint an accredited material testing firm to carry out quality control testing to ensure that construction is in accordance with the approved design. The frequency of testing shall be in accordance with the requirements of The City of Edmonton - Servicing Standards Manual, latest edition thereof.
- 15.2.2 All test results shall be supplied to the City as soon as they become available. Failure to receive test results will be considered sufficient cause to stop the work. Where testing indicates that the required standards have not been met, the deficient areas shall be re-worked and subsequently re-tested on either side of the failed test until the standards have been met.
- 15.2.3 Any of the services to be installed by the Developer shall be installed in such a manner as to least interfere with existing services. Any additional costs incurred by the City shall be charged to the Developer who will reimburse the City promptly for such additional expenditures incurred.
- 15.2.4 Approval shall be obtained from the City a minimum of 48 hours prior to closing of developed streets or shutting off of any existing utility service when required for construction. The Contractor shall obtain a permit for any road closure from the City a minimum of 48 hours prior to the closure. City staff only will operate any existing valves on the water distribution system.
- 15.2.5 In the event that a road must be partially or fully closed for crossing or connection, the Developer shall provide all detours, signs, flag-persons, barricades, etc. necessary to provide for the orderly control of traffic around the construction area.

### 15.3 FOLLOWING CONSTRUCTION

- 15.3.1 Prior to applying to the City for a Construction Completion Certificate (CCC) inspection, the Consultant shall fully inspect the work and ensure that the constructed infrastructure is complete, functional and fully commissioned in accordance with the accepted engineering drawings and specifications.



- 15.3.2 A CCC submission must contain all items from the Construction Completion Certificate Submission Check List.
- 15.3.3 CCC inspections may be requested at any time. At the discretion of the City of Leduc and weather permitting and site amenities can be inspected year-round, provided snow cover, temperature, and other considerations do not prevent the ability to perform a thorough inspection.
- 15.3.4 Prior to CCC approval from the City:
- .1 The warranty period shall be effective the date of the inspection which showed all deficiencies have been rectified and shall not expire until the City has issued the Final Acceptance Certificate.
  - .2 The Developer shall be responsible to correct any defects or deficiencies in design, material, and/or installation that are noted during the warranty period.
- 15.3.5 The time period covered by the warranty shall be termed "Maintenance Period". The length of the "Maintenance Period" shall be two (2) years from the date of the Construction Completion Certificate.
- 15.3.6 Not less than sixty (60) days prior to the scheduled date of expiration of the Maintenance Period on any local improvements, the Developer or the Developer's engineer shall arrange for an inspection of the infrastructure to be carried out. Such inspection shall be carried out by a committee consisting of the Developer, the Developer's engineer and the Engineer. Prior to the inspection, the Developer shall arrange and pay for power washing and broom sweeping of all streets and lanes in the development area. Any deficiencies found during that inspection shall be rectified by the Developer prior to the issuance by the City of a "Final Acceptance Certificate".
- 15.3.7 Until such time as a "Final Acceptance Certificate" has been issued, the City will not assume actual take-over of the subdivision and the Developer shall continue to guarantee all materials and workmanship for the infrastructure.
- 15.3.8 Applications for Construction Completion and Final Acceptance Certificates shall be made with the standard checklists included in the Forms Section. Application for a Final Acceptance Certificate may not be made if the As-Built information has not been submitted and accepted.



## 16 AREA STRUCTURE PLAN REQUIREMENTS

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The following requirements supplement the City's area structure plan and outline plan guidelines. These planning requirements must adhere to the standards specified in the other applicable sections of these Standards. The technical report may be required to include the following information regarding proposed municipal infrastructure under the Area Structure Plan:

16.1.1 Geotechnical Report The geotechnical report for the subdivision shall contain all required review and analysis to meet the requirements of the applicable articles of these Standards. The report shall include, but may not necessarily be limited to, the following information:

- .1 Summary of the field drilling program;
- .2 Summary of laboratory testing;
- .3 Site description with details regarding the surface, subsurface, and groundwater conditions, and frost action;
- .4 Soil alkalinity and resistivity test results with recommendations regarding the type of concrete to be used and any corrosion protection that might be required;
- .5 Identification of areas with high groundwater tables;
- .6 Recommendations with respect to any geotechnical conditions in the area that impact design, construction, and/or maintenance of the proposed municipal infrastructure;
- .7 Identification of areas requiring special design/construction considerations;
- .8 Delineation of any contaminated sites within the area with recommended procedures for any site remediation to be completed, including copies of any contaminated site assessments; and
- .9 Top of bank setbacks for areas adjacent to creeks, watercourses, or ravines. These must be reflected on the drawings and registered as caveats on applicable land titles.

16.1.2 Transportation Systems

- .1 Land use and expected trip generation;
- .2 A Transportation Impact Assessment (TIA), signed and sealed by professional engineer, the City of Leduc TIA guideline is to be followed for all assessments;
- .3 Conceptual plan showing the location of all roads within the development;
- .4 Classification of all proposed roads (i.e. arterial, collector, or local);
- .5 Identification of truck routes and dangerous goods routes;
- .6 Identification of all intersections which may require signals and the trigger points where these shall be required;
- .7 Assessment of any special crossing requirements for vehicular, rail, and pedestrian traffic;
- .8 Alignment of proposed pedestrian, bicycle corridors, circulation routes and other active modes of transportation. This includes multi-use trail systems.
- .9 Alignment of any proposed transit routes;





- .10 Detailed description of the phasing of the development noting trigger points when transportation facilities or upgrades shall be required;
- .11 Description of any impacts of the proposed development on existing infrastructure and any proposed measures intended to offset negative impacts on such existing infrastructure; and
- .12 The City may request additional analysis for area structure plans featuring high traffic generation land uses and developments within areas of the city with limited capacity for increased traffic volumes.

#### 16.1.3 Water Systems

- .1 Land use, expected peak demands, and fire flow requirements;
- .2 Conceptual servicing plan showing the approximate location of major water mains, and any other significant water system facilities;
- .3 Definition of the pressure zone to be used for the development with delineation of pressure zone limits where more than one pressure zone may apply to the development;
- .4 Detailed description of the phasing of the development noting trigger points when water distribution facilities or upgrades shall be required; and
- .5 Description of any impacts of the proposed development on existing infrastructure and any proposed measures intended to offset negative impacts, including capacity limitations, on such existing infrastructure.
- .6 The City may request that the technical report include a computer network analysis for the proposed water system.

#### 16.1.4 Wastewater Collection Systems

- .1 Land use and sewage generation rates;
- .2 Expected peak flows and design flows;
- .3 Conceptual servicing plan showing the approximate location of major sewer mains, lift stations, and any other significant wastewater collection system infrastructure;
- .4 Detailed description of the phasing of the development noting trigger points when wastewater facilities or upgrades shall be required; and
- .5 Description of any impacts of the proposed development on downstream infrastructure and any proposed measures intended to offset negative impacts, including capacity limitations, on such downstream infrastructure.
- .6 The City may request that the technical report include a computer analysis for the proposed wastewater collection system.

#### 16.1.5 Stormwater Management Systems

- .1 Definition of the general catchment areas;
- .2 Pre-development peak runoff flows and volumes, including all inflow and outflow points in the area;
- .3 Post-development rate is fixed at 3.0 L /sec/ha;



- .4 Conceptual overland drainage plan illustrating flow routes and trapped low points within the proposed Development and clearly demonstrating the continuity of flow from upstream developments through the Development;
  - .5 Conceptual servicing plan showing the approximate location of major sewer mains, stormwater management facilities, storm outfalls, and any other significant stormwater management system infrastructure;
  - .6 Approximate alignment of proposed trunk sewers;
  - .7 Approximate location of storm ponds and corresponding storage volumes; viii) Proof of wetlands compensation shall be provided in accordance to the Wetland Restoration/Compensation Guide from Alberta Environment;
  - .8 Proposed connection locations to downstream major and minor drainage systems, including proposed release characteristics at each connection compared to predevelopment characteristics;
  - .9 If the site is near any river, creek, watercourse, or wetland, a plan of the floodplain and a letter providing recommendations to limit the risk of flooding must be included;
  - .10 Detailed description of the phasing of the development such that the identified peak release rates are not exceeded at any time. This should include trigger points at which various stormwater facilities or upgrades shall be required;
  - .11 Description of any impacts of the proposed development on downstream infrastructure and any proposed measures intended to offset negative impacts, including capacity limitations, on such downstream infrastructure; and
  - .12 A map or detailed description of the major drainage system flow route from the development boundary to the major drainage system outlet. Such outlets are typically considered as the nearest water body or natural channel where storm runoff from the development would discharge.
  - .13 The City may request that the technical report include a computer analysis for the proposed stormwater management system.
- 16.1.6 Following the ASP, a Neighbourhood Design Brief will be required prior to the first stage of development. The intent of this document is to provide a detailed analysis of how the proposed development addresses community design, function, and compatibility with the surrounding neighbourhood. The document will examine the current site conditions and its surrounding context; document how the design of the development meets the intent of existing master planning documents; and provides an in-depth evaluation of the proposed stormwater, wastewater and water servicing requirements.



## 17 CONSTRUCTION INSPECTION AND CERTIFICATION

### 17.1 GENERAL

- 17.1.1 To ensure quality infrastructure, Engineering Services conducts regular inspections and site visits throughout construction on all new infrastructure within the city. When construction is complete, two certificates are issued, the Construction Completion Certificate and Final Acceptance Certificate.
- 17.1.2 Certificates will not be processed until all supporting documents are received, and all inspections are complete to the satisfaction of the City.
- 17.1.3 The Developer's consultants must use the Inspector's Report to ensure consistency in CCC submissions.

### 17.2 CONSTRUCTION COMPLETION CERTIFICATE (CCC)

- 17.2.1 After construction, a mutual inspection, including the Developer's representative and Engineering Services, is conducted to ensure that the utility is substantially complete.
- 17.2.2 A submission is to be made for deep utilities and surface improvements as per the development agreement/permit.
- 17.2.3 When all supporting documents are received, and all deficiencies are addressed, the CCC is approved, and the maintenance period for the infrastructure begins.

### 17.3 FINAL ACCEPTANCE CERTIFICATE (FAC)

- 17.3.1 Near the expiry of the maintenance period, another mutual inspection is completed, including Engineering Services, the Developer's representative and the Contractor, to identify any deficiencies.
- 17.3.2 Application for a Final Acceptance Certificate may not be made if the As-Built information has not been submitted and accepted.
- 17.3.3 A submission is to be made for deep utilities and surface improvements as per the development agreement/permit.
- 17.3.4 Once all deficiencies have been corrected, and the FAC submission is complete, the FACs are released, and the City will take over the maintenance of the utility.



## PART IV: FORMS

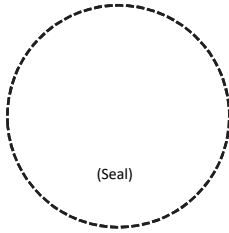
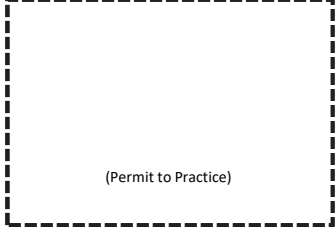


Construction Completion Certificate  
 Deep Utility Improvements  
 Submission Form & Checklist

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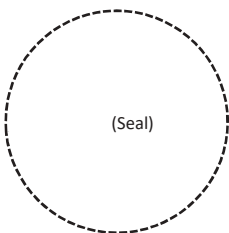



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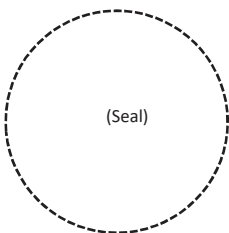
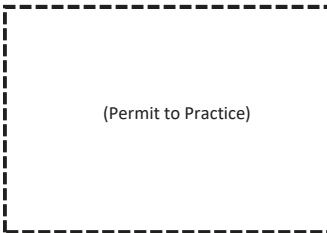


# Final Acceptance Certificate Deep Utility Improvements Submission Form & Checklist

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Final Acceptance Certificate  
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<b>TRANSPORTATION ASSET SUMMARY</b>		
DEVELOPER	DEVELOPMENT AREA	STAGE
CONTRACTOR	CONSULTANT	

ROAD NAME FROM TO	ROADWAY				SIDEWALK/MULTIWAY					CURB/SWALE		
	CLASS	AREA (m <sup>2</sup> )	BASE COST	SURFACE COST	TYPE	SURFACE	LENGTH (m)	WIDTH (m)	COST	TYPE	LENGTH (m)	COST
50 <sup>TH</sup> STREET 48 <sup>TH</sup> AVE TO 47 <sup>TH</sup> AVE	ARTERIAL	1000M <sup>2</sup>	\$32.23/M <sup>2</sup>	\$29.62/M <sup>2</sup>	MONO	CONCRETE	200M	1.5M	INCLUDED IN MONO LM	SF	200M	\$262.00/M
<i>Name of Street, Backlanes can be "Backlane"  From intersection To intersection</i>	<i>"Backlane, Local, Collector, Arterial"</i>	<i>Surface area of roadway in m<sup>2</sup></i>	<i>Cost of base, including geotextile and stabilization per m<sup>2</sup></i>	<i>Cost of road surface per m<sup>2</sup></i>	<i>"Multiway, Mono, Sep. walk"</i>	<i>"Asphalt, gravel, concrete"</i>	<i>Length in metres</i>	<i>Width in metres</i>	<i>Cost per m<sup>2</sup></i>	<i>"RF, SF, Swale"</i>	<i>Length in metres</i>	<i>Cost per metre</i>



DRAINAGE ASSET SUMMARY		
DEVELOPER	DEVELOPMENT AREA	STAGE
CONTRACTOR	CONSULTANT	

PIPE USE	PIPE				CATCHBASINS/MANHOLES					SERVICES			
	DIAMETER (mm)	MATERIAL	LENGTH (m)	COST	USE	DIAMETER (mm)	FRAME TYPE	QUANTITY (ea)	COST	PIPE USE	DIAMETER (mm)	QUANTITY (ea)	COST
SANITARY MAIN	300MM	PVC	562M	\$306.32/M	SANITARY MH	1500MM	NF80	10EA	\$862/VM	SANITARY	100MM	32	\$1200/EA
SANITARY MAIN	450MM	PVC	24M	\$860.32/M	STORM MH	1800MM	NF80	1EA	\$862/VM				
STORM MAIN	600MM	CONCRETE	423M	\$1254.02/M	STORM CB	1200MM	F36	4EA	\$1200/EA				
STORM LEAD	300MM	CONCRETE	20M	\$654.32/M									
"Storm Main, CB Lead, Sanitary Main, Culvert"	Pipe Diameter	"Concrete, PVC, HDPE, CMP"	Pipe length	Cost per metre		Barrel Diameter	"NF80, K7, NF38)	Each for Manholes, Each for Catchbasins	Cost per unit	"Storm, Sanitary)	Pipe Diameter	Each service	Cost per service



<b>WATER ASSET SUMMARY</b>		
DEVELOPER	DEVELOPMENT AREA	STAGE
CONTRACTOR	CONSULTANT	

PIPE USE	PIPE				HARDWARE				SERVICES/LEADS			
	DIAMETER (mm)	MATERIAL	LENGTH (m)	COST	TYPE	DESCRIPTION	QUANTITY (ea)	COST	PIPE USE	DIAMETER (mm)	QUANTITY (m or ea)	COST
POTABLE	300MM	PVC	224M	\$362.22/M	HYDRANT	N/A	1	\$10,000/EA	HYDRANT LEAD	150MM	8M	\$234.33/M
					HYDRANT VALVE	150MM	1	\$456.87/EA				
					WATERMAIN VALVE	300MM	2	\$756.87/EA				
"Potable Water, Non-potable Water"	Pipe Diameter	"PVC, HDPE"	Pipe length	Cost per metre	"Hydrant, Hydrant Valve, Watermain Valve"	"150mm Hydrant Valve, 300mm Main Valve"	Each item	Cost per unit	"Lot Service, Hydrant Lead"	Pipe Diameter	Length for leads, Each for Services	Cost per unit

Note: Industrial water service price includes valve/cc in cost.



## PART V: CHANGE LOG



**Engineering Standards – Clarifications**

Amendment	Leduc Reference	Modification	Reason for Change	Date
Add multiparty trenching	8-Electric Power Service, 9-Communication Service, 10-Gas Service	Added Clauses 8.1.2, 9.1.2, 10.1.3: The City of Leduc endorses and encourages the use of multiparty trenching provided the franchise utilities requirements are met	Request from developers which enables a reduced cost when compared to multiple excavations	23-Feb-21
Clarify cross section "typical"	2.3 Complete Streets Drawings	Added Clauses 2.3.1: The drawings contained within Part II: Typical Drawings in this document are to be used in place of all drawings in the City of Edmonton Complete Streets SECTION 2000 – Cross-Sections, unless explicit approval has been given	Clarification requested from developers	6-May-21
Allow 100x200mm cylinders for the geotech	3 - Complete Streets Construction	Added Clauses to section 3.1 Section 1.0: General: Delete and Replace Complete Streets Design Standards 7.1.1.4 Strength Tests with: For standard strength tests, either 150mm x 300mm cylinders, 125mm x 250mm cylinders or 100mm x 200mm may be used.	Recommendation from consultant to provide more flexibility in testing	6-May-21
Amend lane cross section	DWG 2-14	Cross section shows 350mm structure - should be 360mm (250mm/110mm)	Typo on cross section to match text	6-May-21
Amend Sanitary Flow Rate	4 - Drainage Design Standards	Added Clause to amend section 4.2 Sanitary Sewer Design Criteria. The City of Leduc per capita daily residential sewage generation rate is 300 L/person/day	Accidental omission during update, no change intended from existing City of Leduc standard.	6-May-21
Amend CC location on Roadway Cross Sections	DWG 2-1 to DWG 2-13	Removed CC drawing on all roadway cross sections	Eliminate conflict between road cross sections and Edmonton Complete Streets Drawing 2514-05 and 2514-06	6-May-21



Amend Emergency Access Requirements	2 - Complete Street Design	Added Clause to section 2.1 Intersections: Delete and Replace Complete Streets Design Standard 3.6.11 with: <a href="https://www.leduc.ca/2016-fire-department-access-standard">https://www.leduc.ca/2016-fire-department-access-standard</a>	Eliminate conflict between Engineering Standard and the governing City of Leduc Fire Department Access Standards	6-May-22
Update references to City of Edmonton and EPCOR standards	Volume 2: Complete Streets Design and Construction Standards, Volume 3: Drainage (EPCOR), Volume 4: Water, Volume 8: Manual for Pavement Marking Design	Updated the references in entire City of Leduc Engineering Design Standards, as well as formatting issues.	Updated City of Edmonton and EPCOR standards	8-Jul-22
Add Minimum Curb Cut Requirements	3.6 - Intersections, Complete Streets Design Standards	Added Minimum Curb Cut Requirements table for different road types	Eliminate conflict between Engineering Standard and consultants during drawing submissions	8-Jul-22
Amend Minimum Pavement Structure Requirements	3.2.9 Complete Streets Design Standards	Changed heading to Append Complete Streets Design Standards Section 3.2.9.2 of "Road Structure Design" with: Table 3.1	Table no longer exists in Complete Streets Design Standards	8-Jul-22
Amend Design Rainfall Events	Volume 3-01: Development Planning Procedure and Framework	Removed clause to refer to Section 2.0 - Volume 3-02: Stormwater Management and Design Manual for rainfall data references.	Redundant, as City of Leduc rainfall data references are already included in the Engineering Standards and differ from EPCOR	8-Jul-22
Amend IDF curves	Volume 3-01: Development Planning Procedure and Framework	Amended clause to reference previous section in City of Leduc Engineering Standards instead of EPCOR. Rainfall IDF curves for the City of Leduc as noted in Volume 3-01: Development Planning Procedure and Framework Section 8.5.2.iv above.	Eliminate conflict between Engineering Standard and EPCOR	8-Jul-22



Amend Submission and Approval of Engineering Drawings and Documents	Volume 4 - Water	Removed clause to refer to Volume 4 - Water for "Before Construction" and "After Construction"	Reference no longer exists in Volume 4: Water	8-Jul-22
Amend Water Suppliers	Volume 4 - Water	Removed clause to delete Volume 4 - Water 6.3.4 Suppliers	Reference no longer exists in Volume 4: Water	8-Jul-22
Amend Connecting to Existing Mains	Volume 4 - Water	Removed clause that Ductile Iron (DI) Pipe is not permitted in the City of Leduc. Delete and replace Volume 3 – Drainage Section 3.8.1.1 of "CONNECTING TO EXISTING MAINS".	Reference no longer exists in Volume 4: Water	11-Jul-22
Amend CC location on Roadway Cross Sections and Landscaping Note	DWG 2-1 to DWG 2-13	Moved CC location to be 0.10 m towards the road from property line. Amended landscaping note to "Top Soil and Seed as Per Landscape Design Standards."	Update City of Leduc Standards	11-Jul-22
Amend Grout Note for Manhole Covers	DWG 2-17	Added "Grouting of Manhole Rings is required" to drawing notes	Update City of Leduc Standards	11-Jul-22
Add type of Valve Casings	Volume 4 - Water	Added clauses to use Type A (Slide Type) valve instead of Type B (Screw Type)	Eliminate conflict between Engineering Standard and EPCOR	14-Jul-22
Amend CCC and FAC for Deep Utility and Surface	CCC and FAC	Updated the CCC and FAC forms for Deep Utility and Surface Improvements	Update City of Leduc Standards	14-Jul-22
Amend Width of Pedestrian Through Zone	Volume 2: Complete Streets Design and Construction Standards	Amended clause for Table 3.19 in Appendix F for Complete Streets to reference previous section in City of Leduc Engineering Standards instead of City of Edmonton Standards.	Eliminate conflict between City of Edmonton and City of Leduc Engineering Standards	14-Jul-22
Amend Water Main Materials for Acceptance Testing	Volume 4 - Water	Removed Table 1 of Distribution water main materials	Reference no longer exists in Volume 4: Water	14-Jul-22



Amend Replacement of Detail Drawings	Volume 4 - Water	Removed clause to Replace Drawing WA-005-003 with Leduc DWG No. 9.3 "Typical 50mm & Smaller Water Service."	Leduc DWG No. 9.3 is no longer in practice	14-Jul-22
Added Width of Sidewalk	Volume 2: Complete Streets Design and Construction Standards	Added clause that all sidewalks in the City of Leduc are to be a minimum width of 1.5 m.	Update City of Leduc Standards	18-Aug-22
Amend Monolithic Walk, Curb, Gutter Drawing	DWG 2-19	Removed Drawing	Eliminate conflict between City of Edmonton and City of Leduc Engineering Standards	18-Aug-22
Amend Fire Hydrants	Section 6.3	Add requirement for Storz Adapter	Missing from Standards	14-Nov-22
Add creek setback requirements	Volume 3-01: Development Planning Procedure and Framework	A development setback from all Creeks within the boundary of the City of Leduc based on a minimum distance for the property line from top of bank of 15 m. Developers are afforded the opportunity to request a decrease in the default setback if it can be proven utilizing a qualified fluvial morphologist to complete a meander belt assessment indicating the reduction is appropriate.	New requirement as per stormwater master plan	17-Dec-24
Add multiway geotechnical requirement	Volume 3-01: Development Planning Procedure and Framework	1. Determine if a modified structure is required above the minimum standard for the conditions. 2. Provide a slope stability assessment if a multiway is to be built within the 15m property line setback. 3. Determine if any retaining wall structures are required to ensure adequate slopes are maintained	New requirement as per stormwater master plan	17-Dec-24
Updated Urban 4 Lane Collector Drawing	Dwg 2-12	Corrected parking symbology	Update/correction	17-Dec-24





Update Table notes and classification	2.3 Complete Streets Appendices Amendments Appendix C - Summary of Geometric Design Standards	Update table typos and added note #6	Update/correction	17-Dec-24
Update Table notes and classification	2.3 Complete Streets Appendices Amendments Table 3.31	Removed "Signalized" in table description	Update/correction	17-Dec-24
Add Raised Crosswalks requirement	12 Traffic Control Devices and Signs	To be applied on collectors adjacent to schools or parks in consultation with the City	Increase pedestrian safety	17-Dec-24
Water HNA clarification	6.5 Hydraulic Network Analysis (HNA)	1.12.1 added modeling clarification and 1.12.2 added land use clarification to table	Update/correction	17-Dec-24
Amend Emergency Access Requirements	2 - Complete Street Design	Added Clause to section 2.1 Intersections: Delete and Replace Complete Streets Design Standard 3.6.11 with: <a href="https://www.leduc.ca/fire-department-access-standard">https://www.leduc.ca/fire-department-access-standard</a>	Update/correction	17-Dec-24
Hydrant specification	Volume 4 Water Section 4 - Hydrants	4.2.1.17.5 Hydrant drain port to be pre-sealed(plugged) rather than free draining	Operational request	17-Dec-24