



Design Criteria and Standards

Township of Leeds and the Thousand Islands

December 2021

Township of Leeds and the Thousand Islands
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1.0 GENERAL

1.1 Introduction and Process

The following design criteria and standards are provided to assist applicants requesting development approvals in the Township of Leeds and the Thousand Islands. They address the technical requirements and procedures necessary to obtain approvals for the required infrastructure in support of development in the Township.

Applications for Site Plan Control are submitted to and approved by the Township. Please review the Site Plan Control Guidelines document together with the Municipal Design Criteria and Standards.

Applications for Draft Plans of Subdivision and Plans of Condominium are submitted to the United Counties of Leeds and Grenville, who is the approval authority for such plans. However, final design and engineering approval through a subdivision or condo agreement is issued by the Township.

As detailed in **Section 1.2**, various studies and reports may be required to complete an application to the County. The applicant should consult with the County and Township Planner before submitting an application to ensure that the associated requirements are understood.

Following draft plan approval, drawings shall be submitted to the Township in accordance with **Section 1.3 and 1.4**. Any revised drawings shall be submitted to the Township with a written explanation of how the revisions respond to Township comments and draft plan conditions. Once all concerns have been satisfactorily addressed, the plans shall be stamped by the applicant's engineer and the required sets of plans shall be delivered to the Township. The applicant's engineer shall be responsible for the distribution of plans as required throughout the process.

1.2 Final Subdivision Approval Process

An application for final subdivision approval is required to be submitted to the Planning Department. When a complete application is submitted including all information and application fees the application will be circulated for review and comment. The Owner's Engineer is required to make direct submission to external agencies and copy the Township on all correspondence.

A complete application shall include the following:

- Complete set of design drawings for the subdivision;
- A table detailing each draft plan condition and how it has been addressed in the design of the plan;
- All required studies as identified in the draft plan conditions
- The final plan shall include all approved street names]
- A reference plan for any easements required on the final plan
- An Engineer's cost estimate for the works in the subdivision

1.3 Securities

The design engineer for the subdivision is required to provide a complete cost estimate for all works in the final plan of subdivision. The security amount for the subdivision will be calculated based on detailed estimate including the following:

- 100% of the works to be constructed
- 5% contingency
- 5% maintenance holdback for completed works
- 10% construction lien holdback

No reductions in security, including the construction lien holdback will be processed until after the subdivision agreement is registered.

Securities are required to be provided to the Township in the form of an irrevocable letter of credit or certified cheque.

Reduction of Securities

Requests for reduction of securities shall be made by the owner's engineer and shall include:

- A cover letter outlining the works completed and the details of the security reduction request;
- An estimate of the cost to complete the remaining works, signed, sealed and dated by a Professional Engineer;

Holdbacks

All security reductions will be subject to a 5% maintenance holdback on all completed works and a 10% construction lien holdback.

1.2 Studies and Reports

Initial consultation with Township staff will determine which reports are required to support an application and the timing for their submission. This will be further clarified

in the pre-consultation meeting with Township staff and relevant agencies. All reports must be current and completed by a qualified professional. The Township has the right to require a peer review of any of the required supporting studies and reports. The cost of a peer review is the responsibility of the applicant and will be required to be paid to the Township prior to authorizing work to commence. Report requirements may include, but are not limited to the following:

1.2.1 Planning Rationale Report

A planning rationale is required to provide written support for your development application. The rationale also helps Township staff/ external agencies and the approval authority in the assessment and recommendation for your application.

A planning rationale should:

- provide a clear description of your proposal
- assist staff in reviewing your proposal and assist in the Townships assessment and recommendations on your application
- provide the rationale to establish why your application should be considered and approved
- highlight information that is specific or particular to your proposal (e.g., special history, different circumstances)
- establish how your proposal conforms to the policies of the Township Official Plan and is consistent with the Provincial Policy Statement.

A planning rationale report is required to be prepared by a qualified professional planner. A list of Registered Professional Planners may be found on the website of the Ontario Professional Planning Institute (OPPI) at www.ontarioplanners.on.ca.

1.2.2 Servicing Report

A servicing report will identify how the proposed development will be serviced including: storm drainage, sanitary sewer, and water service connections to existing Township infrastructure; and availability of capacity in the Township system to accommodate additional requirements of the proposed development. It must also address all impacts on downstream infrastructure and any necessary upgrades.

The servicing report must be prepared, signed and stamped by a qualified professional engineer, licensed in the Province of Ontario.

1.2.3 Stormwater Management Report

A stormwater management report will identify all drainage-related impacts caused by the proposed development and assess quantity and/or quality control of stormwater runoff. All stormwater runoff is to be controlled to an appropriate run-off rate in accordance with Provincial standards and/or the Township's design criteria.

A complete Stormwater Management Report shall:

- Provide background information such as zoning, proposals, existing watershed studies, etc. to identify drainage issues
- Review receiving drainage system for components, existing issues, right to outlet, conflicts with future works, etc.
- Assess impacts on the receiving drainage system
- Identify construction operation and maintenance issues
- Provide supporting documentation, maps, and calculations to support any recommendations or proposals

The stormwater report must be prepared, signed and stamped by a qualified professional engineer, licenced in the Province of Ontario.

Please see the following links for information regarding Stormwater Management requirements, planning and design:

- [Ministry of Environment Stormwater Management Planning and Design Manual \(March 2003\)\(link is external\)](#)
- [Ministry of Transportation Stormwater Management Requirements for Land Development Proposals\(link is external\)](#)

1.2.4 Tree Inventory and Preservation Study & Landscaping Plan

A tree inventory and preservation study will identify and provide a surveyed location for all existing trees including their type, height, caliper and condition; those trees proposed to be removed and retained; and methods to be used to maximize tree preservation.

If significant trees or groups of trees are identified to be retained in the tree inventory, a tree preservation plan will be required prior to final approval. This plan shall be reviewed and approved by the Township.

The tree inventory and preservation study and plan must be prepared by a qualified arborist (certified by the International Society of Arboriculture).

A Landscaping Plan may be required and is required to provide details regarding the type, size, and locations of proposed trees and other vegetative plants. A Landscaping Plan should be prepared by a qualified professional.

1.2.5 Traffic Impact Study

A traffic impact study will examine existing traffic conditions and possible impacts from proposed development. The Township will identify through pre-consultation when a traffic impact assessment is required. The assessment is required to provide a traffic impact analysis based on projected traffic flows and the ultimate build out of the development.

A traffic impact study submission is required to:

- Examine existing traffic conditions
- Provide estimated peak flows and traffic movements generated as a result of the project
- Confirm the status of existing traffic conditions and assess impacts from the proposed development
- Provide road classification and recommendations including upgrades to County or Township infrastructure, such as storage lane/turning lane requirements and traffic control devices that will minimize impact or improve existing traffic conditions
- Consider pedestrian and bicycle traffic and routes and active transportation

The traffic impact report must be prepared, signed and stamped by a qualified professional engineer, licenced in the Province of Ontario.

1.2.6 Geotechnical Assessment

A geotechnical assessment will examine the subsurface conditions such as soil type(s), groundwater levels, depth of refusal, soil gases, bedrock, and soil-bearing capacity.

A geotechnical report will:

- Examine and confirm subsurface conditions and provide recommendations to accommodate proposed works on the site
 - Confirm the adequacy of the Township's minimum standard of flexible pavement design or recommend a higher standard of design if site conditions warrant
 - Examine and recommend a method of accommodating sub-grade drainage
 - Address the suitability of native soils, excavated and/or imported materials for roadway construction, trench backfill, and building foundation construction
-

- Identify construction methods including those related to backfilling or the placement of fill materials
- Be accompanied by a scaled plan of the site showing test pit or borehole locations, together with a log of test pit or borehole findings tied to geodetic datum

The geotechnical report must be prepared, signed and stamped by a qualified professional engineer, licensed in the Province of Ontario.

1.2.7 Hydrogeological Study

A hydrogeological study will assess the suitability of a site to support development proposed to be serviced by private septic sewage disposal and individual private wells. Applicants should contact the Township for more details regarding site-specific studies. Such studies must be approved by the Township. A peer review of such studies may be required.

The hydrogeological report will:

- Review the physical setting of the site
- Assess the impact of the proposed system on existing septic systems, municipal waters, and wells
- Assess the quantity and quality of the site's potable water supply
- Assess the site soils and assess their ability to support septic sewage disposal
- Provide a statement of opinion regarding the density of development that can be supported by the site

The hydrogeological report must be prepared, signed and stamped by a qualified professional engineer or professional hydrogeologist, licensed in the Province of Ontario.

1.2.8 Environmental Impact Study

An Environmental Impact Study (EIS) will assess the impact of development on sites that contain significant natural environmental features such as wetlands, woodlands, significant wildlife habitats, threatened/endangered species (SAR) assessment, and will characterize the nature of the impact on the natural feature(s) of concern and will make recommendations to mitigate those impacts.

Applicants shall pre-consult with the Township and the Conservation Authority to determine requirements and scope for an EIS.

The EIS must be prepared by a qualified individual.

1.2.9 Noise and Vibration Study

A noise and vibration study will assess any impacts on a proposed sensitive land use (e.g. residential) from a nearby noise source such as a rail line, major road or an industrial use. The study will follow the requirements of the Ministry of Environment (MOE) and demonstrate that the Ministry's criteria for noise and vibration impact mitigation can be met.

A noise and vibration study must be prepared by a qualified professional engineer, licensed in the Province of Ontario.

1.2.10 Environmental Site Assessment

A phase one environmental site assessment will assess lands intended for development to determine the likelihood that one or more contaminants have affected any land or water on, in, or under the property in accordance with Ontario Regulation 153/04.

If the results of the Phase I Environmental Site Assessment (ESA) indicate a need for further investigation, the applicant shall be required to undertake follow-up studies (Phase II ESAs, Site Remediation Plans, etc.).

The ESA shall be conducted or supervised by a qualified professional engineer, licenced in the Province of Ontario or holder of a certificate of registration under the Professional Geoscientist Act.

1.2.11 Archaeological Report

An archaeological assessment (stage 1) will evaluate the potential for the presence of archaeological resources on sites where deemed necessary by the Township's review of the Ministry of Tourism, Culture and Sport criteria for determining areas of archaeological potential. Additional stages of investigation and mitigation may be necessary depending on the outcome of a stage 1 assessment.

A Letter of Review and **Acceptance** into the Provincial Register of Reports is required from the Ministry and must be provided to the Township where an archaeological report is required. The report must be completed by an individual holding a valid Ontario archaeological license.

1.2.12 Heritage Impact Study

A heritage impact study will assess the potential for impacts from proposed development or site alteration on applications involving 'protected heritage property' and on 'lands adjacent to protected heritage property', as defined in the Provincial Policy Statement. The study shall demonstrate how the heritage attributes of the protected heritage property or

adjacent protected heritage property will be conserved and will provide mitigative measures or alternative development approaches to protect the resource.

The heritage impact study must be prepared and signed by a member of the Canadian Association of Heritage Professionals.

1.3 Services

The following are typical services that may be required by the applicant in support of land development:

- Roads with Curb & Gutter
- Signs and Traffic Control
- Stormwater Management
- Watermains
- Streetlights
- Natural Gas
- Parkland (or cash-in-lieu)
- Sidewalks and Walkways
- Grading and Drainage
- Sanitary and Storm Sewers
- Utilities
- Landscaping/Tree Planting
- Fencing
- Bridges / Culverts

The Township will advise an applicant regarding applicable services at the pre-consultation meeting based on the type of development being proposed.

1.4 Drawing and Information Requirements

As part of a complete drawing submission for site plan or subdivision approval a submission of engineering drawings is required (see list below). All plans shall be digitally prepared.

All plans must be complete, legible, and concise as to the materials, methods and details of construction. In addition to the servicing design, each plan will contain:

- The legal description of land in accordance with the plan of survey
- A description, location, and elevation for benchmarks to be used in establishing vertical control on the site, with a minimum of two geodetic benchmarks to be provided with locations within the project boundaries
- A north arrow
- A title block depicting the date, date of recent revisions, and scale of the plan in metric units
- All approved street names
- The stamp and signature of a Professional Engineer registered with Professional Engineers Ontario (PEO)

Plans which are 'Approved for Construction' shall also be submitted to the Township in digital format compatible with the Township's current version of AutoCAD software and in Adobe Portable Document Format (pdf).

1.4.1 Street Names and Civic Numbers

Street names shall be named to the satisfaction of the Township. A list of the proposed street names shall be submitted by the applicant for approval by the Township and shall be included with the first submission of the engineering drawings.

Prior to final plan approval, the applicant shall provide confirmation that the civic addresses have been assigned to the proposed lots, units, and blocks by the Township's Planning and Development Department.

1.4.2 Phasing of Development

Where an applicant wishes to phase development, such phasing shall be acceptable to the Township and included on the approved plans and supported by the servicing study and implemented in any agreements for the development. Construction of a development in phases shall be coordinated with the Township considering construction access, traffic routing including pedestrian movement and emergency access. In

addition, the logical extension of existing services including municipal underground works and utilities (Hydro, Telecommunications, Cable TV) must be considered.

When phasing of a development is proposed, the phase limits and the works within each phase shall be clearly identified on the engineering drawings and included in the subdivision agreement.

1.4.3 Subdivision Design Submission Requirements

A complete submission consists of the following:

- A covering letter identifying the applicant, the project, and any special features of the submitted design
- A summary table detailing the draft plan conditions and how each condition of draft plan approval has been satisfied including letters of clearance from external agencies.
- All applicable review fees (consult with the Township Planner)
- sanitary sewer design calculations, where applicable
- storm sewer design calculations
- watermain design calculations, where applicable
- streetlight design calculations
- Civic Numbering Plan
- All preliminary plans (e.g., draft-approved plans, plan of survey, first application under Land Titles, reference plans, etc.)
- Specifications for non-standard items
- Other applicable reports as required

1.4.4 Engineering Drawings

Each engineering drawing requires a title block which will include:

- Name of the development
 - Location of the development
 - Name of the engineering company responsible for the drawings
 - Scale used on the drawing
 - Date the drawing was prepared
 - Engineer's seal and signature
 - Drawing number
-

- Indication of revisions and the date of the revisions

Drawing requirements will vary depending on the type of development.

i) Cover Sheet

A cover sheet will include the name of the development, a key plan showing the site location relative to two nearby public roads, and a table of contents.

ii) General Service Plan (maximum scale 1:1000)

The General Plan will indicate the overall scope of the project and the geographic relationship of the site to surrounding lands. The General Plan will include:

- Existing utility services and roads within and around the development
- Proposed storm sewers, sanitary sewers, and water distribution system
- Existing and proposed easements
- Location of test pits or boreholes from geotechnical report
- Limits of each development phase

iii) Lot Grading Plan (maximum scale 1:500)

A Lot Grading Plan will establish the final grade control for all lots and blocks within the development in accordance with the requirements and objectives of **Section 5.0 Grading and Drainage** of this document. The plan must contain sufficient detail to accurately assess the impact of post-development surface drainage both within and adjacent to the development lands. The Lot Grading Plan will include:

- Existing and final elevations at all lot corners
- Existing and final elevations at the centreline of each road at a spacing of 25m or less, and at all street intersections
- Finished ground elevation at the building line
- Finished elevation of all critical points affecting drainage conveyance
- Arrows indicating direction of flow of all surface water
- Location and details of all swales
- Location and details of all surface water outlets
- Entrances

iv) Plan and Profile Drawings (1:500 Horizontal, 1:50 Vertical)

Plan and Profile Drawings will include:

Plan Portion

- Horizontal control data for the road centreline will include:
 - P.I. Station chainage
 - Length of tangent
 - Degree of curve
 - Curve length
-

- Beginning of curve chainage
 - End of curve chainage
- All existing services
- Cross-referenced numbers of adjoining plans and match lines
- All municipal services to be constructed, including service laterals with non-standard locations dimensioned to property lines
- Pipe diameters and pipe material
- Utility Structures i.e. storm and sanitary maintenance holes, valve boxes, valve chambers, etc. with corresponding identifier i.e. number or letter symbol (matching design sheets)
- Catch-basin locations and connection details such as slope, invert, and top of grate elevations
- Streetscape locations, for utility pedestals, community mailboxes, streetlights, and fire hydrants
- All traffic control devices including pavement markings

Profile Portion

- A profile of the existing grade and proposed road grade along the centreline of pavement projected directly below the plan view
 - Existing and proposed centreline road elevations
 - Vertical control data, including:
 - Points of intersection
 - Tangent gradients
 - K - factors
 - Super-elevation details as necessary
 - A profile of the road subgrade elevation showing grade treatment, transition treatment, method of achieving subgrade drainage
 - Rock elevations at sufficient intervals to determine road construction requirements and to determine estimated rock excavation quantities for the construction of underground services
 - Test pit locations and critical bore hole results
 - Station chainage along the centreline of the road - maximum spacing 20m plus those necessary for establishing vertical control
 - All proposed and existing pipes showing length, inside diameter, gradient, invert elevations at maintenance holes (sanitary/storm), depth of cover (sewer/water),
-

type of pipe material, and bedding requirements including specification numbers and reference to detail drawings

- Storm and sanitary maintenance holes, valve chambers etc., including:
 - Type (i.e., OPSD reference)
 - Size (barrel diameter or inside dimensions)
 - Chainage and offset from centreline
 - Top of grate elevation
 - Identifier (i.e. number or letter symbol matching design sheets)
 - Details of drop structures, safety platforms, etc.
 - Proposed and existing watermains with type of pipe material, bedding requirements, and depth of cover
 - Cross-reference to other detail drawings for specific sewer or watermain details
 - All clearance details at pipe crossings

v) Detail Drawings (scale to suit)

Detail Drawings will be required when there is not sufficient space on the Plan and Profile Drawings or on other drawings to fully describe the necessary works. Detail drawings will include:

- Road cross-section, curb, and sidewalk details
- Details of special chambers, such as metering chambers
- Details of special structures, which might include storm sewer inlets and outlets, or retaining walls
- Details of special drainage features, including stormwater retention/detention ponds
- Pumping station details
- Walkway fencing details

vi) Utility Plan (maximum scale 1:750)

A Utility Plan for utilities other than water and sewer detailing requirements of the various public and private utility agencies (Hydro, Telecommunications, Natural Gas, Canada Post, cable, municipal requirements for street lighting) will include:

- Streetlight specifications including electrical distribution system
- Typical utility trench details, duct locations
- Location of all existing and proposed streetlights in and adjacent to the development

- Location of utility structures and street furniture such as Hydro, Telecommunications, Canada Post, and cable in and adjacent to the development
- Connection details for all proposed streetlights, including wiring location, duct requirements, electrical source, and fuse pedestal locations
- Existing and proposed utilities including those in common trench
- Specific duct and trench cross-section details for road crossings

vii) Storm Drainage Plans (scale to suit)

Storm Drainage Plans shall show the contributing areas to each system and how drainage is to be controlled and will identify:

- Existing and proposed sewers and maintenance holes, identifying maintenance hole numbers, and sewer sizes and direction of flow (where they exist)
- Areas within contributing sub-area boundaries (in hectares)
- The extent of drainage areas outside the development supported by existing ground contours

viii) Sanitary Drainage Plans (scale to suit)

A sanitary drainage area plan for sanitary drainage calculations shall identify the contributing drainage areas to each system and how each is to be controlled and will identify:

- Existing and proposed sewers and maintenance holes, identifying maintenance hole numbers, and sewer sizes and direction of flow
- Areas within contributing sub-area boundaries (in hectares)
- Population of catchment areas
- The extent of drainage areas outside the development supported by existing ground contours

ix) Miscellaneous Plans (as required)

- Park Development Plans
- Noise Attenuation Fencing Details
- Tree Preservation Plan
- Vegetative Planting Plans
- Traffic Details including:
 - Electrical
 - Lane markings
 - Signal layout

2.0 RECORD DRAWINGS (AS-BUILT DRAWINGS)

Upon completion of the installation of underground services, the Township will require as-built drawings for any underground works.

Before the start of the maintenance period for above-ground services a complete set of digital as built drawings is to be forwarded to the Township for review and comments. Revisions must be included on the drawings to reflect any changes to the line and/or grade of the roadways and services, and to incorporate all grading modifications. All maintenance holes, catch-basins, valves, hydrants, curb stops, and service connections shall be properly tied to fixed reference points. If revisions are required, a set of red-lined drawings will be returned to the applicant. When all revisions have been made, a set of as-built drawings digital drawings in both AutoCAD and PDF shall be submitted to the Township.

The record drawings shall include the following and any additional information required to accurately depict the as-built conditions.

Road

- Elevation of centreline of roadway at 20m intervals
- Horizontal and vertical curve information
- Bench marks established in permanent locations such as on fire hydrants and/or other permanent structures throughout the new development at sufficient intervals

Storm System

- Invert elevations of all storm sewers
- Invert and top of grade elevations of all storm maintenance holes
- Storm sewer pipe material
- Slope percentages of all storm sewers along with distances between maintenance holes and revised storm sewer design sheets
- As-built elevations of road cross-culvert inverts

Sanitary

- Invert elevations of all sanitary sewers
-

- Invert and top of grade elevations of all sanitary maintenance holes
- Sanitary sewer pipe material
- Slope percentages of all sanitary sewers along with distances between maintenance holes and revised design sheets

Water

- Elevations of top of watermain at 30m intervals
- Watermain pipe material
- Hydrant locations
- Location by measurement of tees, bends, valves, and dead ends

Lot Grading

- Elevations of the final lot grades for all lot corners
- Invert elevations of all ditches, swales, and culverts
- Stormwater Management Facility (if required)

3.0 REFERENCE DOCUMENTS

| Publication | Publisher |
|--|--|
| Geometric Design Standards for Ontario Highways Manual | Ontario Ministry of Transportation (MTO) |
| Guide for the Design of Roadway Lighting | Transportation Association of Canada (TAC) |
| Geometric Design Standards | Transportation Association of Canada (TAC) for Canadian Roads |
| Manual of Uniform Traffic Control Devices | Transportation Association of Canada (TAC) for Canada |
| Design Guidelines for Sewage Works | Ontario Ministry of the Environment (MOE) |
| Design Guidelines for Drinking-Water Systems | Ontario Ministry of the Environment (MOE) |
| Stormwater Management and Design Manual | Ontario Ministry of the Environment (MOE) |
| ANSI/IESNA RP-8-00 | Illuminating Engineering Society of North America's American National Standard Practice for Roadway Lighting |

4.0 TECHNICAL STANDARDS

As this document will be updated from time to time, the Township reserves the right to make revisions, having due regard for applications already in the review process. The applicant is responsible for obtaining the most recent editions of the Standard Specifications and Drawings of the Township and Ontario Provincial Standards and Specifications.

All construction shall be in accordance with Ontario Provincial Standard Specifications and Drawings, unless specifically modified by the Township.

4.1 General

Roads are to be designed to geometric standards established by the Township (contained within this document), the Transportation Association of Canada (TAC), and the Ontario Ministry of Transportation (MTO).

4.2 Design Criteria

Within the settlement area of Lansdowne surface-course asphalt shall not be placed in the same calendar year as the binder course or before the completion of a closed-circuit television (CCTV) inspection of both the storm and sanitary sewer systems. All

maintenance holes within the roadway are to be set to the base asphalt grade pending final adjustment just prior to the time the surface course is applied.

Notwithstanding the requirements of the Ontario Provincial Standard Specifications (OPSS) with respect to asphalt paving, surface course asphalt shall not be applied after November 1st of any calendar year unless written approval is obtained from the Township.

| Criteria | Local | Collector (Minor) | Collector (Major) | Arterial (Minor) | Arterial (Major) |
|--|-------------------------|----------------------|------------------------------|---------------------------------------|----------------------|
| No. of Lanes | 2 | 2 | 2 | 2 | 4 |
| Minimum Right-of-Way (m) | 20.0 | 20.0 | 22.0 | 26.0 | 30.0 |
| Minimum Urban (1) | 8.5 | 9.0 | 10.0 | 12.0 | 18.0 |
| Pavement Width (m) Rural (2) | 7.0/1.0/0.5 | 8.0/1.5/0.5 | 8.0/2.0/0.5 | 10.5/2.0/0.5 | 10.5/3.0/0.5 |
| Minimum Pavement Structure (mm) | 40-HL3 40-MDB (3) | 40-HL3 40-MDB (3) | 40-HL1 MDB (3) MDB (3) | 45-40-HL1 45-MDB (3) 45-MDB (3) | 45- (4) |
| Minimum Granular Base (5) | In Earth | 200mm – Gran 'A' | 200mm – Gran 'A' | 200mm – Gran 'A' | 275mm – Gran 'A' (4) |
| | | 250mm – Gran 'B' | 250mm – Gran 'B' | 350mm – Gran 'B' | 350mm – Gran 'B' |
| | In Rock | 200mm – Gran 'A' | 200mm – Gran 'A' | 275mm – Gran 'A' | 275mm – Gran 'A' (4) |
| | | 300mm – Shatter | 300mm – Shatter | 300mm – Shatter | 300mm – Shatter |

Note: (1) Total pavement width (2) Pavement/ shoulder/ rounding
 (3) Medium Duty Binder (4) To be governed by the Geotechnical Report
 (5) Granular A to be Type II

All asphalt materials and work shall conform to OPSS. Test results shall be provided to the Township Engineer.

4.2.1 Road Classification

| Criteria | Local | Collector (Minor) | Collector (Major) | Arterial |
|---------------------------------|-----------------|---|--|--|
| Objective | Land access | Land access and local traffic movement | Land access and traffic movement | Traffic movement |
| Interconnections | Minor collector | Major collector and public transportation route | Minor collector and local residential arterial | Minor collector and major collector arterial and local |
| Flow | Interrupted | Interrupted | Interrupted | Through |
| Length of Trip | Short | Medium | Medium | Long |
| Speed Limits (km/hr) (1) | 40 - 50 | 50 - 80 | 50 - 80 | 50 - 80 |
| Sidewalks (2) | One side | One side | One side | Both sides |
| On-Street Parking | Allowed | Allowed | Prohibited (3) | Prohibited (3) |
| Right-Of-Way Width (m) | 20 - 26 | 22 - 30 | 26 - 30 | 30 - 45 |
| Access | Allowed | Allowed | Restricted | Side Streets |
| Lanes | 2 | 2 | 2 - 4 Centre turning lanes | 2 or more Centre turning lanes |

Note: (1) Unless specified otherwise by the approval authority
 (2) Within settlement areas
 (3) Consideration may be given in settlement areas

4.2.2 Vertical and Horizontal Alignment

Vertical curves are required where longitudinal grades change by more than 1.0%. Road cross-fall is to be adjusted at sag curves and detailed on the plans as necessary to maintain minimum 0.5% grade along gutter line to catch-basins. In the case of urban sections, roadside ditch grades shall be designed at 1% minimum slope.

The design profiles shall be consistent with the Township's requirements for addressing the 100-year storm while minimizing the number of sag curves. Depth of flow on the roadway shall be limited to a maximum depth of 300mm. Major overland flow routes shall be directed to coincide with public lands (parks, walkways, etc.) to a legal and adequate outlet.

All roads must be aligned to produce safe traffic flow at the design speed.

4.2.3 Cross-Section

For Township standard cross-sections see **Appendix A - Standard Drawings**.

4.3 Boulevards and Public Areas

Urban boulevards (area between right-of-way limit and curb) are to be finished with 100mm of topsoil and nursery sod. The requirements for hydroseeding, sodding, or paving of other public areas will be determined in consultation with the Township.

Boulevard slope shall be a minimum of 2% and a maximum of 8% within the public right-of-way.

4.4 Cul-de-sacs (Turning Basins)

Permanent cul-de-sacs are to conform to the 'Typical Permanent Cul-de-sac' detail (**Appendix A - Standard Drawings**). A minimum grade of 0.5% is to be maintained along the gutter line and grades are to be detailed on the drawings. And the circular right-of-way radius is to be 20m for 20m-wide rights-of-way.

Temporary cul-de-sacs are to conform to the 'Typical Temporary Cul-de-sac' detail (**Appendix A - Standard Drawings**) and shall be provided at the limits of each phase where a temporary dead-end section of roadway would otherwise result. Where feasible, the temporary cul-de-sac should be accommodated on lands beyond the phase boundary. If this is not feasible, they should be offset to one side of the roadway, to impact as few lots as possible.

Easements shall be deeded to the Township for temporary turnarounds outside of the public road system and will be relinquished when no longer required.

4.5 Curb and Gutter Types

The following applies to new development roadways within settlement areas.

| Road Classification | Adjacent Land Use | OPSD Curb and Gutter Types |
|-----------------------------|----------------------------|---|
| Local and Collector (Minor) | Low Density Residential | Concrete Barrier Curb with Narrow Gutter ⁽¹⁾ |
| | Medium Density Residential | Concrete Barrier Curb with Narrow Gutter ⁽¹⁾ |
| | High Density Residential | Concrete Barrier Curb with Wide Gutter |
| | All Other Land Uses | Concrete Barrier Curb with Wide Gutter |

| | | |
|---------------------------------------|-----|--|
| All other Road Classifications | All | Concrete Barrier Curb with Wide Gutter |
|---------------------------------------|-----|--|

Note: (1) Final design is subject to the approval of the Director of Operations and Infrastructure.

4.6 Entrances

Entrance locations are required to be illustrated on the engineering plans and shall conform to OPSD and the Township of Leeds and the Thousand Islands Road Entrance Policy and zoning by-law.

4.6.1 Entrance Pipe

The minimum entrance pipe lengths where D is the distance between the top of the entrance to the bottom of the pipe are:

| D (m) | Minimum Length (m) |
|--------------|---------------------------|
| Up to 1.0 | 9 |
| Up to 1.31 | 11 |
| Up to 1.7 | 12 |
| 1.7 | As approved |

High Density Polyethylene (HDPE) or approved equivalent is to be used and must meet OPS.

4.7 Intersections

Intersection spacing shall be established on the basis of providing safe stopping, turning and crossing sight distances in accordance with the stipulated design speed.

- An intersection angle of 90° is preferred, 70° is the minimum
- Gradients on through-streets are to have a continuous profile, and maximum and minimum grades at an intersection are 8.0% and 0.5% respectively

Edge of pavement radii shall be as follows:

| From | To | Minimum Radii (m) |
|----------------------------|--------------------------|--------------------------|
| Local | Local or Minor Collector | 7.5 |
| Minor Collector | Higher Class Road | 11.0 |
| Major Collector / Arterial | Higher Class Road | 13.0 to 15.0 |

Note: Turning templates are to be used where conditions warrant.

4.8 Sidewalks and Walkways

Location will be determined in consultation with the Township, giving due regard to the pedestrian traffic being generated and barrier-free access.

The location of pedestrian crossings at intersections will be governed by pedestrian movements and the need to avoid conflicts with turning vehicles.

In new developments, sidewalk elevations must be established in the field by the developer prior to township approval of the final grading plan for any individual lots or blocks.

Sidewalks are not required on cul-de-sacs that are less than 150m in length measured from the street line of the intersecting street to the furthest point of the cul-de-sac. However, if a walkway or other public lands connects to the cul-de-sac, a sidewalk will be required to connect to the walkway, regardless of the length of the cul-de-sac.

Sidewalks are not required on dead-end streets less than 150m in length unless through pedestrian access is required from street to park, street to street, etc. The 150m is measured from the intersecting street line to the nearest point of the cul-de-sac right-of-way.

Pedestrian walkways may also be required, in consultation with the Township. Walkways to conform to the 'Typical Walkway' detail (**Appendix A - Standard Drawings**).

At street intersections, the curb and the sidewalk shall conform to OPSD 'Concrete Sidewalk Ramps at Intersections'.

4.9 Signage and Traffic Control

All traffic control devices are to conform to the Ontario Manual of Uniform Traffic Control Devices, including all newly incorporated Ontario Traffic Manuals and shall also meet the requirements of the Highway Traffic Act.

It is the applicant's responsibility to arrange for the manufacture and installation of property numbering, street name, and speed signs as per the approved development plans. Signage text shall be DomCasD font (or equivalent), 107.95mm (4.25") in height, and 97.4% of the total width of the street blade sign.

Sign locations are to conform to the 'Typical Sign Placement' detail (**Appendix A - Standard Drawings**). Civic address blades are required to comply with the Township Civic Addressing By-law.

4.10 Fencing

The Township's Official Plan, Zoning By-law, and Site Plan Guidelines establish requirements for buffering (which may include fencing) for residential zones adjacent to some non-residential zones to minimize potential land use conflicts. Cost of fencing is the responsibility of the applicant. Design service life of all fences shall be a minimum of 20 years. Wooden fences are to be treated for preservation and are to have ground contact components made of galvanized steel. Where fencing is required, a detail is to be included on the plans showing the type of fencing and construction details. Fencing is required to be located on private property and maintenance and care will be the responsibility of the landowners.

4.11 Canada Post Mailbox

Concrete pads, access ramps, and community mailboxes shall be in accordance with Canada Post standards and specifications. Barrier curb shall be installed for a distance of 6.0 m in both directions from Canada Post mailboxes and shall conform to OPSD 'Concrete Barrier Curb with Wide Gutter'. Additional lighting may be required at mailbox locations at the discretion of the Township.

5.0 GRADING AND DRAINAGE

5.1 General

Lot grading and drainage shall be designed to conform to the Storm Water Management Plan. The lot grading and drainage plan shall show the existing and proposed final grades for each lot and block within a development. The design shall adequately provide for any necessary interim drainage to limit flood risk, having regard for the pre-development overland flow patterns. The term 'flood risk' is to be interpreted as a risk of personal liability and/or property damage as a result of flooding brought about by the alteration of pre-development flows and/or flow patterns.

5.2 Design Criteria

Lot grades shall be 2% minimum and 8% maximum on all grassed surfaces. Any grade differential that cannot be accommodated by a uniform slope within this range shall be designed with a 3:1 (33%) slope to a maximum vertical height of 2.0m for each terrace. Subject to height, the Township may require an engineer's seal to support the design of a retaining wall.

- Adequate control measures shall be employed where necessary to control erosion
- Natural drainage patterns and channels must be maintained, unless otherwise approved
- Runoff from up-gradient properties must be accommodated
- Surface runoff water shall not be discharged onto adjacent lands in a concentrated amount nor shall it exceed the predevelopment flows
- Major system drainage is to be directed to public lands and away from onsite sewage systems
- Rear yard catch-basin leads shall be located in easements and spacing between catch-basins shall not exceed 90m
- Leads to rear yard catch-basins shall not be less than 250mm and shall be spaced to coincide with maintenance holes such that access is obtainable from either end
- Maximum depth of ponding resulting from any storm event shall not exceed 300mm

5.3 Individual Lot Grading Plans

Individual lot gradings are to conform to the 'Typical Split Lot Drainage' detail (**Appendix A - Standard Drawings**).

5.4 Overland Storm Flow Routes

All major swales and major system outlets are to be constructed and sodded in conjunction with site servicing.

5.5 Lot Grading Compliance

A lot grading plan, prepared and signed by a qualified Engineer, is required for any building permit. A deposit is required with any building permit application and is refundable upon approval of the lot grading certificate. Final approval of the 'as-built' lot grading plan rests with the Township.

6.0 UTILITIES GENERAL STANDARDS

6.1 General

It is the applicant's responsibility to meet all requirements of utility organizations and provide all necessary documents to the Township prior to final approval of development drawings. The applicant shall coordinate the installation of utilities including (but not limited to) Hydro, Cable, telecommunications such as Bell Canada, and Natural Gas.

6.2 Layout

Utilities shall be aligned in accordance with regulatory authority requirements. For typical joint utility trenches details see **Appendix A - Standard Drawings**.

6.3 Easements

Utility infrastructure to be assumed by the Township and servicing more than one property shall be situated in either a road allowance or on property deeded to the Township by easement or ownership. Easement documents shall be in the standard format prescribed by the Township.

All easements shall be of sufficient width to permit access for routine maintenance, repair and replacement purposes. Widths shall allow for future excavation without the need for shoring and shall permit sufficient working clearance and side slopes. Easement width shall not be less than 5.0m. Where more than one utility main or line is to be contained in a single easement, the easement shall extend to 3.0m beyond the outside edge of the outside mains or lines.

7.0 SANITARY SEWER SYSTEMS

7.1 Design Flows

Design sheets shall be submitted in a spreadsheet format in accordance with Township's standard, in both hard copy and digital format.

7.2 Sewer Design

The minimum cover for sanitary services will be a minimum of 2.7m from the finished grade. Services of less than 2.7m may be considered by the Township on a case-by-case basis based on a professional engineer's opinion/design. In such instances, frost protection must be equivalent to 1.5m cover. Services with less than 1.0m of cover are not permitted. Building sewer services shall be sized to meet the Ontario Building Code (OBC) as amended.

No decrease in pipe size downstream shall be allowed unless otherwise approved by the Township. Contributing industrial, commercial, and institutional design flows shall be considered on a case-by-case basis.

| Criteria | Size/Condition | Minimum | Maximum |
|------------------------------------|----------------------------------|------------------------------|-------------------------------|
| Pipe Size | HDPE/PVC | 200mm | - |
| Velocity (Full Flow) | - | 0.6 m/s | 3.0m/s |
| Pipe Slopes | First 25 Upstream Dwelling Units | 1 . 0 % | - |
| | Top reach (MH to MH) | 1 . 0 % | - |
| | 200mm | 0 . 4 % | - |
| | 250mm | 0 . 3 % | - |
| | ≥300mm | MOE Guidelines | - |
| Cover | - | 2.7m from the finished grade | - |
| Peak Factors | Determined by Harmon's eqn. | - | 4.0 |
| Average Daily Domestic Flow | Plus Infiltration | - | 350 liters per person per day |

Infiltration Rate: 0.00014m³ per second per hectare of contributing area.

| Criteria | Size / Condition | Specification | Required Standard |
|----------|------------------|---|-------------------|
| Pipe | PVC | Polyvinyl Chloride (PVC) pipe conforming to OPSS with min. outer diameter to wall thickness ratio of SDR 35 | CAN/CSA |
| | HDPE | Min. outer diameter to wall thickness ratio of SDR 11 | CAN/CSA |
| Bedding | - | Bedding and cover shall conform to Granular 'A' as set forth in OPSS | OPSD |

7.3 Maintenance Holes

All maintenance holes shall conform to OPSD for 'Catch-basins and Manholes (Maintenance Holes)' and precast drop structures to OPSD for 'Division - Sanitary Sewer'.

Where pipes of different sizes are connected to a maintenance hole, the crowns of the inlet pipe(s) shall not be lower than the crown of the outlet. The difference in invert elevations between inlets and outlets shall be as indicated in MOE Guidelines.

Maximum Spacing:

- Sewers 200mm to 450mm - 120m
- Sewers 525mm or greater - 150m

7.4 Acceptance Testing

The Township shall be given 48 hour notice of all tests.

Testing of gravity sewers and maintenance holes shall be done by either a Water Exfiltration Test or an Air Test, and shall conform to OPSS for 'Pipe Sewer Installation in Open Cut'. Sewers shall be flushed immediately prior to the closed circuit TV (CCTV) inspection. CCTV inspections shall conform to OPSS for 'Construction Specification for Closed-Circuit Television Inspection of Pipelines'.

7.5 Abandoning Sanitary Sewer

Should abandonment of a sanitary sewer be required, the procedure shall conform to OPSS for 'Removal'. The Township amends this OPSS to use a low strength, high flow concrete, and ensure a minimum of 75% pf the calculated theoretical volume of the designated pipe length is filled.

8.0 STORM SEWER SYSTEMS

The objectives of Storm Water Management are to:

- Convey stormwater safely to legal and adequate outlets for water quality control
- Control flooding to minimize health hazard, loss of life and property damage
- Minimize alteration of the local groundwater system and maintain base flows in receiving water courses
- Reproduce or improve pre-development hydrological conditions
- Provide solutions regarding storm water management that are economically efficient to construct and maintain

Development is to meet existing pre-development flow volumes where existing drainage conditions are ideal, and to improve stormwater flow conveyance where opportunities exist.

The Township has a storm sewer system in Lansdowne. Downspouts and/or sump pumps shall not be connected to the storm sewer system. The rest of the Township manages stormwater through site grading and ditches and swales.

8.1 Reports

A storm sewer design sheet shall accompany any submission for the conveyance of stormwater. All designs must be stamped by a Professional Engineer licensed in the Province of Ontario.

8.2 Design Considerations

Storm sewers shall be designed to accept flows in accordance with Provincial standards and/or Township design criteria, and as required by other approval authorities.

The minimum depth of cover measured from the top of a main shall be not less than 1.5m. Pipe bedding and cover shall conform to those set forth in OPSS or as recommended in a geotechnical report.

The sewer design method shall be based on the Rational Method.

8.2.1 Pipe Design

Storm Sewer Design Sheets shall be provided in an industry standard format. Design criteria shall be provided with all submissions.

8.2.2 Minimum Pipe Size

| Type | Minimum Size (mm) |
|---------------------------------------|-------------------|
| Storm Sewer | 250 |
| Catch-Basin Leads: Single | 200 |
| Double Rear Yard | 250 |
| | 250 |
| Foundation and Building Drains | As per OBC |

A decrease in pipe size from a large size upstream to a small size downstream will not be allowed regardless of grade increases.

8.2.3 Flow Design

The maximum velocity at design flow shall not exceed 6m/s. The minimum velocity at design flow shall be not less than 0.75m/s. Minimum grades for pipes based on a roughness coefficient (n) of 0.013 are:

| Size (mm) | Minimum Grade (%) |
|-----------|-------------------|
| 250 | 0.280 |
| 300 | 0.220 |
| 375 | 0.150 |
| 450 | 0.120 |
| 525 | 0.100 |
| 600 | 0.087 |
| 675 | 0.067 |
| 750 | 0.058 |

8.2.4 Acceptable Materials

All sewers must be smooth-walled and conform to OPSS. Approved products include:

- PVC SDR 35

- HDPE smooth inside and corrugated outside, approved by CSA
- BIG O Boss or equivalent as per OPSS for 'Non-Pressure Polyethylene Plastic Pipe Products'
- Concrete pipe as per OPSS

Corrugated steel pipe is not permitted for storm sewers.

8.2.5 Separation Requirements

Sewers/sewage works and watermains located parallel to each other shall be constructed in separate trenches, maintaining a minimum clear horizontal separation distance of 2.5m.

Design shall ensure that adjacent structures are not jeopardized by frost penetration from within a storm sewer, catch-basin, or culvert.

9.0 WATER DISTRIBUTION SYSTEMS

9.1 Design and Installation

Design of the water distribution system shall conform to standards and specification in MOE Watermain Design Criteria. Design Flows are as follows:

| Criteria | Standard | Minimum | Maximum |
|--|---|-----------------|--------------------|
| Average day per capita | - | 350L/Capita/Day | 2.75 times average |
| Max Day Factor | 2.75 | - | - |
| Peak Hour Factor | 4.25 (unless otherwise approved by the Township) | - | - |
| Pressures | | | |
| Under Normal Operating Conditions | - | 280kPa | 700kPa |
| Under Fire Flow Conditions | - | 140kPa | |

Design fire flows shall be in accordance with the Water Supply for Public Fire Protection: A Guide to Recommended Practices by Underwriters Insurance Bureau of Canada.

When using this reference and where insufficient fire flow is projected, the Fire Chief shall determine the minimum fire flows which are acceptable to the Township.

9.2 Watermains

The minimum pipe size for watermains shall be 200mm, with the exception that dead-end mains on cul-de-sacs of twenty (20) or fewer dwelling units may be 150mm, provided adequate fire protection is met.

Where dead-end watermains cannot be avoided, they shall be designed with a means to provide adequate flushing.

The minimum depth of cover measured from the top of a main or a service connection gooseneck shall be not less than 1.8m. Pipe bedding and cover shall conform to those set forth in OPSS or as recommended in a geotechnical report.

All bends and plugged ends shall be restrained with mechanical joint restrainers. Location of mechanical joint restrainers must be at ductile fittings with a minimum of one joint 6m from a ductile fitting in accordance with OPSD and American Water Works Association (AWWA) standards.

Sewers/sewage works and watermains located parallel to each other shall be constructed in separate trenches, maintaining a clear horizontal separation distance of at least 2.5m measured from closest pipe to closest pipe edge.

No watermain shall pass through or come into contact with any part of a sewer access/maintenance hole, septic tank, tile field, subsoil treatment system, or other source of contamination.

Watermains shall be installed with cover and separation from sewer/sewage works, as detailed on the Township standard drawings for 'Typical Road Cross Sections' (**Appendix A - Standard Drawings**).

9.2.1 Materials

Watermains materials shall conform to the following.

| Material | Specification |
|---------------------|--|
| Ductile Iron | <p>Pipes shall be centrifugally cast as per AWWA in 5.5 m lengths</p> <ul style="list-style-type: none"> • Pressure Class 350 for pipes up to 300mm • Pressure Class 250 for pipes 400mm to 500mm • Pressure Class 200 for pipes larger than 500mm <p>All pipes shall be cement lined and shall be polyethylene encased as per AWWA standard.</p> <p>All fittings shall be cement lined with mechanical joints.</p> <p>Every pipe and special casting shall be coated outside with coal tar pitch varnish using a hot dip method.</p> <p>Wedges shall be installed at pipe joints to ensure electrical continuity.</p> |
| Plastic | <p>Pipes shall conform to either:</p> <ul style="list-style-type: none"> • AWWA C900-Poly (Vinyl Chloride) (PVC) Specification, SDR 18, Pressure Class (PC) of 235 <p style="text-align: center;">or</p> <ul style="list-style-type: none"> • AWWA C909-Molecularly Oriented Polyvinyl Chloride (PVCO) Specification, Pressure Class (PC) of 235 <p>Pipes shall be homogeneous throughout, free from voids, cracks, inclusions, discolouration, and other defects.</p> <p>Fittings shall be:</p> <ul style="list-style-type: none"> • Ductile iron according to AWWA 'Ductile-Iron Compact Fittings' • Injection moulded PVC plastic according to CSA B137.2 • Prefabricated PVC plastic for pipe diameters 300mm and larger according to CSA B137.3 <p>The colour for all PVC pipe and PVC fittings shall be blue.</p> |

| | |
|--------------------------|--|
| Concrete Pressure | <p>Shall only be allowed if so stated on the approved subdivision drawings.</p> <p>Concrete pressure pipe shall be laid according to the specifications outlined in the AWWA 'Concrete Pipe Installation Manual'.</p> <p>The internal joint gap shall be checked to ensure the proper seating of the gasket.</p> <p>The interior joint gap shall then be pointed with cement mortar using a hand trowel.</p> <p>The joint exterior shall be protected with a diaper filled with grout installed to the manufacturer's instructions</p> |
|--------------------------|--|

Mechanical joints required for valves 400mm and over, shall be a mechanical joint conforming to AWWA 'Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings'.

The interior of all pipe, fittings, and other accessories shall be kept clean and free from foreign material at all times.

All watermain material shall comply with OPSS for 'Watermain Installation in Open Cut - Transporting, Unloading, Storing, and Handling Pipe'. Cut pipes of length 1.5 m or less, fittings and valves do not require end caps, but shall be field cleaned prior to installation. Pipes delivered on-site with damaged or missing caps shall be field cleaned by swabbing with a 1% chlorine solution to remove all undesirable material along the entire length of the interior of the pipe prior to installation.

9.3 Valves

The operation of valves, curb stops, and hydrants shall be restricted to employees of the Township or their agents.

Three (3) valves shall be placed on a tee intersection and four (4) valves on a cross intersection. Valves are to be located on the projection of the right-of-way limits. On straight runs, isolation valves shall have a maximum spacing of 240m. Valve boxes shall be adjusted to finished grade. Services within the road surface must be set to grade and raised at time of final lift of asphalt. Both valve ends shall be mechanical-joint as per AWWA Standard.

9.4 Service Connections

Each lot is required to have a separate independent lateral connection. Service connections are not permitted in driveways or private sidewalks. Water service

connections shall be installed to the mid-point of the frontage of all single-detached lots. Separate services shall be provided to each lot.

The minimum service size between the watermain and service box shall be 25mm. Services shall otherwise be sized in accordance with the OBC.

A curb stop with drain and associated valve box to finished grade shall be provided on the service connection to each premise and shall be located at the property line.

All new construction shall use pre-manufactured tees service and fittings. Service pipes shall be constructed of materials in accordance with the most current version of the OBC and shall conform to the AWWA standard for Underground Service Line Valves and Fittings.

9.5 Tracer Wire

All non-metallic mains and services shall be traced with a 12 gauge tracer wire. Non-metallic services shall have the tracer wire extending into the building being serviced and terminated at the water meter remote. Tracer wire shall be "tack welded" to valve boxes and service boxes or connected in an equal fashion as approved by the Township. All non-metallic services shall have the tracer wire thermo welded to the curb box.

Tracer wire splices shall be by means approved by the Township.

Tracer wire shall be looped up the outside of all main valve boxes and extended into the valve box by 50mm through a saw cut 50mm below the bottom of the cover bell.

9.6 Cathodic Protection

Tracer wire on mains shall be protected with a 2.3 kg zinc anode, at each end with a maximum spacing of 500 m. Anodes shall be cad welded to valves, metallic fittings, and hydrants and shall be 10.9 kg zinc casting alloy conforming to ASTM B-418 or 14.5 kg magnesium extrusion conforming to ASTM B-843-93, and field tested as per OPSS for 'Construction Specification for Corrosion Protection of New and Existing Watermains'. One (1), 5.5 kg zinc anode shall be installed with each service.

9.7 Abandoning Watermains

Should abandonment of a watermain be required, the procedure shall conform to OPSS for 'Removal'. The Township amends this OPSS to use a low strength, high flow concrete, and ensure a minimum of 75% pf the calculated theoretical volume of the designated pipe length is filled.

9.8 Fire Hydrants

Hydrants shall be installed as per OPSD and shall also conform to the following requirements:

- Access street and fire hydrants for the development are required to be installed, maintained, and kept clear (i.e. 3m radius) prior to the commencement of combustible construction
- Hydrants shall be located such that the maximum road travel distance from hydrant to the centre frontage of a lot shall not exceed 75m, and any deviation beyond the maximum allowable spacing shall require the approval of the Township's Fire Chief

- Each hydrant shall have an isolation valve with a valve box as part of the connection to the watermain system
- Each hydrant shall have a 150mm barrel with two 63mm hose connections and one 100mm Stortz Pumper (Steamer) Port connection and shall be clockwise opening
- Hydrants shall be Clow M67 Brigadier or Canada Valve Century
- Each hydrant shall have a concrete shock collar of 1m x 1m x 150mm thick, the top of which shall be 150mm below the flange
- Hydrant flanges shall be higher than the crown of the adjacent road or the top of the adjacent curb, whichever is higher, and the flanges shall be placed such that connecting bolts can be easily removed
- Hydrants set in ditches or swales shall conform to OPSD for 'Access to Hydrant Across Ditch'
- Hydrants shall be self-draining, with washed gravel of suitable size and quantity placed around the drain holes, and shall be topped with suitable geotextile to ensure fines do not migrate into the drainage rock
- Hydrants, which are not in service, shall have a 300mm x 300mm sign affixed on the road-facing side with 35mm lettering stating "NOTICE: THIS HYDRANT IS NOT IN SERVICE", in black lettering on a reflective yellow background
- A reflective ring is to be installed between the hydrant barrel and the hose connection caps, in accordance to the following:

| Parameter | Specification |
|------------------------------|---|
| Material | White Acrylonitrile Butadiene Styrene (ABS) |
| Thickness | 0.06 mm |
| Inside Diameter (ID) | 92 mm |
| Outside Diameter (OD) | 184 mm |
| Finish | High intensity reflective finish in the below required colour. (i.e. blue, green, orange, red) |

- Hydrants shall be painted Chrome Yellow, and in accordance with Chapter 5 of NFPA 291, bonnet and nozzle caps painted as follows:

| Required Colour | Class | Flow (L/s) | |
|-----------------|-------|------------|----------------------|
| Blue | AA | > 95 | (1500 USGPM) |
| Green | A | 63 - 95 | (1000 to 1500 USGPM) |

| | | | |
|---------------|---|---------|---------------------|
| Orange | B | 31 - 63 | (500 to 1000 USGPM) |
| Red | C | < 31 | (500 USGPM) |

9.9 Hydrostatic Tests

All watermains shall be wet swabbed as follows;

- A minimum of three (3) new foam swabs shall be used
- Swabs shall have a density of approximately 25kg/m³, minimum diameter of 50mm larger than the watermain, and minimum length of 1.5 times the diameter
- Swabs shall be propelled through the watermain using potable water, and shall be spaced a minimum of 1.5m between swabs
- During the swabbing procedure the contractor is to install spool pieces in place of all butterfly valves which shall be supplied, installed, and removed by the contractor
- Gate valves must be left in the open position
- Swabbing shall continue until the discharge water runs clear within 10 seconds of the last swab exiting the discharge point
- All fitting, taps, valves, swabs etc. required for the introduction, propelling, and recovery of the swabs are to be supplied by the contractor and removal of all of these at the completion of the swabbing works is also the responsibility of the contractor

All water discharged by the flushing/swabbing operations shall be at an approved outlet location. The contractor shall be responsible for collecting and/or disposing of all such water, ensuring that all erosion and sediment control and dechlorination requirements of the MOE, CRCA, and various other authorities having jurisdiction are met.

After flushing/swabbing is completed, water from the existing distribution system shall be allowed to flow at a controlled rate into the new pipeline. Liquid chlorine solution shall be introduced so that the chlorine is distributed throughout the section being disinfected. The chlorine shall be applied so that the chlorine concentration is 50mg/L minimum and 200mg/L maximum throughout the section. The system shall be left charged with the chlorine solution for 24 hours.

Sampling and testing for chlorine residual will be carried out by the Engineer's Inspector. The chlorine residual will be tested in the section after 24 hours. If tests indicate a chlorine residual of 25mg/L minimum, the section shall be flushed completely and recharged with water normal to the operation of the system. If the test does not meet the requirements, the chlorination procedure shall be repeated until satisfactory results are obtained.

Immediately after the system has been recharged and then following an additionally 24 hours, samples shall be taken for micro bacteriological testing. Two consecutive acceptable samples taken a minimum of 24 hours apart must be obtained. The system shall not be put into operation until clearance has been given.

A professional engineer shall certify that testing and the disinfecting of mains was undertaken as per OPSS. All newly constructed watermains shall be isolated from the existing distribution system by physical separation or through the use of an appropriate backflow prevention device approved by the Township. This isolation shall remain in place until approval of the Township is granted for permanent interconnection.

10.0 STREET LIGHTING

The following illumination levels will be continually applied to new roadway construction and upgrades to existing roadways that have been designated for other rehabilitation work where application of the new lighting criteria would be justified and warranted.

Street lighting design in the Township shall be based on ANSI/IESNA RP-8-00. Modifications to RP-8-00 have been made in certain areas to conform to the Township's requirements. Lighting standards for other applications such as public pathways shall be considered on a case-by-case basis. Contact the Township to discuss any unique or special situations.

10.1 Design Criteria

10.1.1 Illumination Levels

| Road Classification | Area Classification | Average Maintained Illuminance (Lux) | Illuminance Uniformity Ratio (Ave. to Min.) |
|----------------------------|----------------------------|---|--|
| Local | Commercial | 9 | 3:1 |
| | Intermediate | 7 | |

| | | | |
|-------------------------|--------------|----|-----|
| | Residential | 4 | |
| Collector (Minor/Major) | Commercial | 12 | 4:1 |
| | Intermediate | 9 | |
| | Residential | 6 | |
| Arterial (Minor/Major) | Commercial | 17 | 6:1 |
| | Intermediate | 13 | |
| | Residential | 9 | |

10.1.2 Design Requirements

The street lighting design shall be completed by a qualified professional engineer, licenced in the Province of Ontario, utilizing these design standards and guidelines. The design and supporting documentation shall be included in the design submission for subdivision approval.

10.2 Material Specifications

All street lighting equipment used in the Township must meet these street lighting standards and specifications and the appropriate CSA standards and specifications.

10.2.1 Street Light Poles

Streetlight poles shall be located in accordance with Township standards or as otherwise approved by the Township. On existing rights-of-way in developed areas, poles shall be located having regard for existing utilities and adjacent land use and topographical features. Streetlights shall be located at all urban intersections and all major rural intersections.

10.2.2 Luminaires

The following luminaires are approved for use in the Township.

Cobra Head Luminaires

- Cree: XSP series, or equivalent
 - XSP1-29W, XSP1-38W
 - XSP2-64W, XSP2-82W, XSP2-90W, XSP2-101W
 - XSP2L-168W

Decorative Luminaires

- Lumca: CP6114 and CP6113 series, or equivalent
 - Configuration: 36N/54N/72N
 - Source: LED
 - Wattage: 48W/72W/96W
 - Distribution Type: L3
 - Lens: AC
 - Voltage: 120 – 277
 - Colour: Black

10.3 Energization Process

The developer/contractor shall provide the following documentation to the Township when they wish to have their street lights energized:

- Letter requesting energization
 - As-built drawings clearly showing street light wiring
 - As-built one-line-diagram
-

- List of lights to be energized along with location, ESA certificate number, transformer number, and wattage of light information
- Up-to-date ESA certificates of inspection (ESA certificates are valid for 6 months)

When the Township has received and accepted all required documents and materials, the Township will perform an inspection of the installation. If required, a deficiency list will be provided back to the developer/contractor indicating the deficiencies. When the installation passes the inspection, the Township will send a request to energize the lights to the Supply Authority.

11.0 PARKLAND AND OPEN SPACE

Under the Planning Act Section 51, the Township is entitled to a conveyance of land or a payment of money for parkland purposes that is equal to a percentage of the appraised value of the development lands as of the day before draft approval.

The Township may require a monetary payment ('cash-in-lieu') or a payment in combination with land cash. This will require an appraisal by a qualified appraiser to be completed at the applicant's expense.

By-law 12-057 is the Township Parkland Conveyance By-law. This by-law provides that as a condition of development or redevelopment of land, that land in an amount not exceeding in the case of land for commercial or industrial purposes two percent and for all other development five percent of land be conveyed to the Township for park or other recreational purposes. Alternatively, the Township may require cash in lieu of land to maintain and upgrade existing public recreation facilities.

Should the Township require parkland, the Township will accept only those lands that meet its requirements regarding location and suitability for parkland purposes. The Township will establish whether it will accept the lands in a 'clean' state or whether there will be additional requirements regarding improvements of the lands. The value of such improvements shall be factored into the value of the lands being dedicated.

Clauses may be included in a subdivision or site plan control agreement to provide information or notice to future property owners of specific parkland or open space types, and where applicable, the potential facilities or path system within it, and the expectations of the Township in terms of maintenance.

11.1 Types and Maintenance Levels

Any required park development plan shall be prepared in accordance with the following criteria as applicable.

11.1.1 Natural Area

This type of area is defined as a parcel of land which because of its proximity to sensitive environmental protection areas, water courses, known ANSI's (Areas of Natural and Scientific Interest), or unique physical characteristics will be retained in its existing natural state. The rationale for these types of areas is to preserve natural resources and their aesthetic quality, and to provide in some instances buffering between active recreation areas, roadways, or developments. Where land has been deeded to the Township as a natural area, the Township will only attend to risk management issues and will not perform any regular maintenance on these parcels.

11.1.2 Woodlots

A woodlot is a parcel of land that contains a mix of trees species, and because of the quality and/or numbers of the trees is considered an asset to the community and will be retained for the provision of shade, the quiet enjoyment of nature and the retention of habitat for bird and animals. The woodlot will be managed by the Township and governed by good forestry practices and risk management procedures.

11.1.3 Tot Lots

This type of area is defined as a small park designed to serve a 2-3 block area and generally a population of up to 2,500. Tot lots are 0.5 to 1.0 acres in size and generally contain the following types of recreation facilities: equipped play areas, benches, open space landscaping, and picnic tables. Tot lots may be used in areas where it is difficult to acquire sufficient land for a neighbourhood park. The Township will do regular maintenance of these types of parks.

11.1.4 Neighbourhood Park

This type of area is defined as a park that provides for both passive and active recreational uses that may include play equipment, playing fields for both organized and impromptu games, court games, skateboard ramps, water play features, pathways, lighting, seating and picnic areas, natural and maintained landscaping, gardens plots, or senior citizen areas. Neighbourhood parks are generally 1.0 to 5.0 acres in size and are accessible by foot or bicycle and a service population of up to 5,000 persons. The Township will do regular maintenance of in these types of parks.

11.1.5 Community Park

This type of area is defined as a park that provides a diverse range of recreational, passive, and leisure activities; and may contain areas of environmental or aesthetic quality (natural areas or woodlots). Facilities and activities may include, but are not limited to: athletic fields, community centers, public event spaces and buildings, access roads and parking areas, lighting, and any facilities associated with neighbourhood parks. A community park is typically a "drive-to" facility from five to 25 acres in size that services the needs of up to 25,000 people. Community parks are ideally located near collector or arterial roads to accommodate adequate access and should be well-buffered from adjacent residential areas. The Township will do regular maintenance in these types of parks and will do additional or specialized work based on programming and events held in the park.

Note: A community park can also have a dual function as a neighbourhood park or tot lot when it provides facilities similar to these park types and its proximity to residential areas allows residents to walk or ride bicycles to the park.

11.1.6 Special Facilities

This type of area is generally identified as buildings and supporting lands that can accommodate the needs of the public for activities and events that are unique in function and purpose. Examples of special facilities include public golf courses, areas for field sports, nature trails, boat ramps, beach access points, community sports complexes, and other single-purpose or unique facilities. Special facilities standards are based on the desires or unique characteristics of a community and will be subject to policies and studies undertaken by the Township. The Township will develop specialized maintenance and operational plans for these facilities.

11.1.7 Linear Recreation Spaces

This type of area is defined as continuous aligned open spaces that provide travel routes for one or more types of recreational or non-motorized vehicles such as bicycling, roller blading, strolling, hiking, or jogging. In rural areas such activities as horseback riding would be permitted. Pathways and trails may be developed in association with natural areas or stormwater ponds. The Township will do regular maintenance in linear park systems. Mowing or turf maintenance may be restricted to grassed areas immediately adjacent to the path itself depending on the adjacent land categories.

11.1.8 Open Space Associated with Stormwater Ponds

The Township has acquired through the subdivision process parcels of lands that are used for stormwater purposes and form integral parts of stormwater management systems for the Township. These stormwater parcels are not accepted as dedicated parkland but because of their location adjacent or within township parks or open spaces may contain ancillary amenities for recreational uses. The Township will complete risk management assessment and follow-up maintenance to stormwater

ponds lands (above the high water levels) that are within or adjacent to township parks. These parcels of land may include linear recreation trails/paths. Mowing or turf maintenance may be restricted to grassed areas immediately adjacent to the path itself depending on the adjacent type of pond.

11.2 Fencing Adjacent to Parkland and Open Space

Fencing may be required to be installed adjacent to parks where active recreational or sports fields require such an element. Additional protective fencing or higher fencing may be installed where needed.

All fencing shall conform to OPSD for 'Fence, Chain Link, Installation – Roadway'. Gates within the fencing will be permitted, subject to approval by the Township and the owners signing a waiver that absolves the Township for repairs required as a result of the gate being installed or damages to it. The cost of the gate will be the owner's responsibility.

Fencing abutting residential lots shall conform, at minimum, to the requirements defined in the Township's Swimming Pool Regulations By-Law.

11.3 Services Required to Parkland Boundary

The developer will be responsible for connections of a water service and electrical services from the street right-of-way to the park property line. The water service sizes shall be based on the functions and size of the proposed park, with a minimum of 50mm

11.4 Drainage and Easements through Parklands

All residential lot drainage shall occur on private lands and no drainage ditches or swales will be permitted on the Township parkland unless approved by the Township. No underground services, hydro transformers, or telecommunication boxes will be permitted on the park land unless approved by the Township.

12.0 ACCESSIBILITY

All public spaces shall be designed in accordance with Accessibility for Ontarions with Disabilities Act (AODA). This includes sidewalks, walkways, parks, and semi-private open spaces. Placement of trees, landscaping, seating, public art, and signage should not obstruct paths of travel.

Integration of access structures to provide barrier-free connections between streets, pedestrian walkways, and parking areas, should include curb ramps, entry ramps, and handrails. In high activity areas, the use of multi-sensory indicators (tactile, visual, and/or audible) should be implemented as directed by the Township.

Barrier-free areas are to be design to standards established by the Accessibility for Ontarians with Disabilities Act and in consultation with the Township.

13.0 STREET TREES

Trees are required to be planted in new subdivisions in settlement areas according to plans reviewed and approved by the Township. Trees should be located an equal distance back from the curb on both sides of the street. Street trees are required to be planted on the public right of way.

The developer shall submit a street tree planting plan prepared by a landscape architect to the satisfaction of the Township as part of the final plan design submission. The plan shall list in a table format the selected species by common and cultivar name, size, planting state and include in the notes all required specifications.

Settlement Areas- Street Tree Planting Plan

Tree Spacing and Location- Subject to separation criteria

| Residential Dwelling Type | Lot Frontage | Spacing | Front Yard Depth | Location |
|--|---------------------|--|---|---|
| Single Family Dwelling | 9m or greater | 1 tree per lot | > 6metres < 6 metres | Within the public right-of-way, respecting service separation requirements and a minimum of 7.5 meters from the foundation of any house |
| Single Family Dwelling | < 9 m | 1 tree every second lot | As Above | As Above |
| Duplex/semi detached dwelling | 9 m or greater | 1 tree per lot | As Above | As Above |
| Duplex /semi detached dwelling | < 9 m | 1 tree per lot | As Above | As Above |
| Triplex dwelling | 9m or greater | 1 tree per lot | As above | As above |
| Town houses | < 7m | 1 tree every third lot | As above | As above |
| Apartment building | > 30 m | Trees 8m on centre | 6 m or greater < 6m | Within the public right-of-way, respecting service separation requirements and a minimum of 7.5 meters any foundation walls. |
| Corner Lots Exterior side yards | Lot depth | 2-3 trees equally spaced between sight triangles on properties | Lot depth 30 m or greater (60 m block length) | Between property line and curbing depending on servicing trench and sidewalk location. |

Separation Criteria

The location of trees in the public right-of-way shall be as per the approved standard road cross section and subject to on-site relocation as impacted by service locates.

| Utility/Infrastructure | Separation Requirement |
|-------------------------------|---|
| Street lights | 3.0 metres |
| Sidewalks | 0.5 metre |
| Curbs | 1.5 metres to back of curb |
| Driveways | 1.25 metres |
| Other Trees | 8.0 metres |
| Electric Transformers | 3.0 metres from the access hatch side |
| Hydrants | 1.5 metres |
| Water/sewer lines | 2.0 metres |
| Hydro Lines | 1.0 metre from line or as required by Hydro One |

Tree Species Selection

Five different species of trees are required to be selected for tree planting from the tables of the approved street trees. Trees are required to be planted so that no two species of the same type are side by side.

The recommended planting order is based on five species of trees being planted in the following order, **A,B,C,D,E,A,B,C...**, with each tree species being reflected by a letter.

14.0 STANDARDS

It is the responsibility of applicant to acquire the most up-to-date OPSS and OPSD documents.

APPENDIX A - STANDARD DRAWINGS

Typical Road Cross Section:

Local Road - Urban - 18.0m Right-of-Way

Local Road - Urban - 18.0m Right-of-Way - No Sidewalk

Local Road - Urban - 20.0m Right-of-Way

Local Road - Urban - 20.0m Right-of-Way - No Sidewalk

Local Road - Urban - 20.0m Right-of-Way

Local Road - Urban - 20.0m Right-of-Way - No Sidewalk

Local Road - Rural - 20.0m Right-of-Way

Local Road - Rural - 20.0m Right-of-Way - No Sidewalk

Collector (Minor) Road - Urban - 20.0m Right-of-Way

Collector (Minor) Road - Rural - 26.0m Right-of-Way

Collector (Minor) Road - Rural - 26.0m Right-of-Way - No Sidewalk

Typical Permanent Cul-de-Sac

Typical Temporary Cul-de-Sac

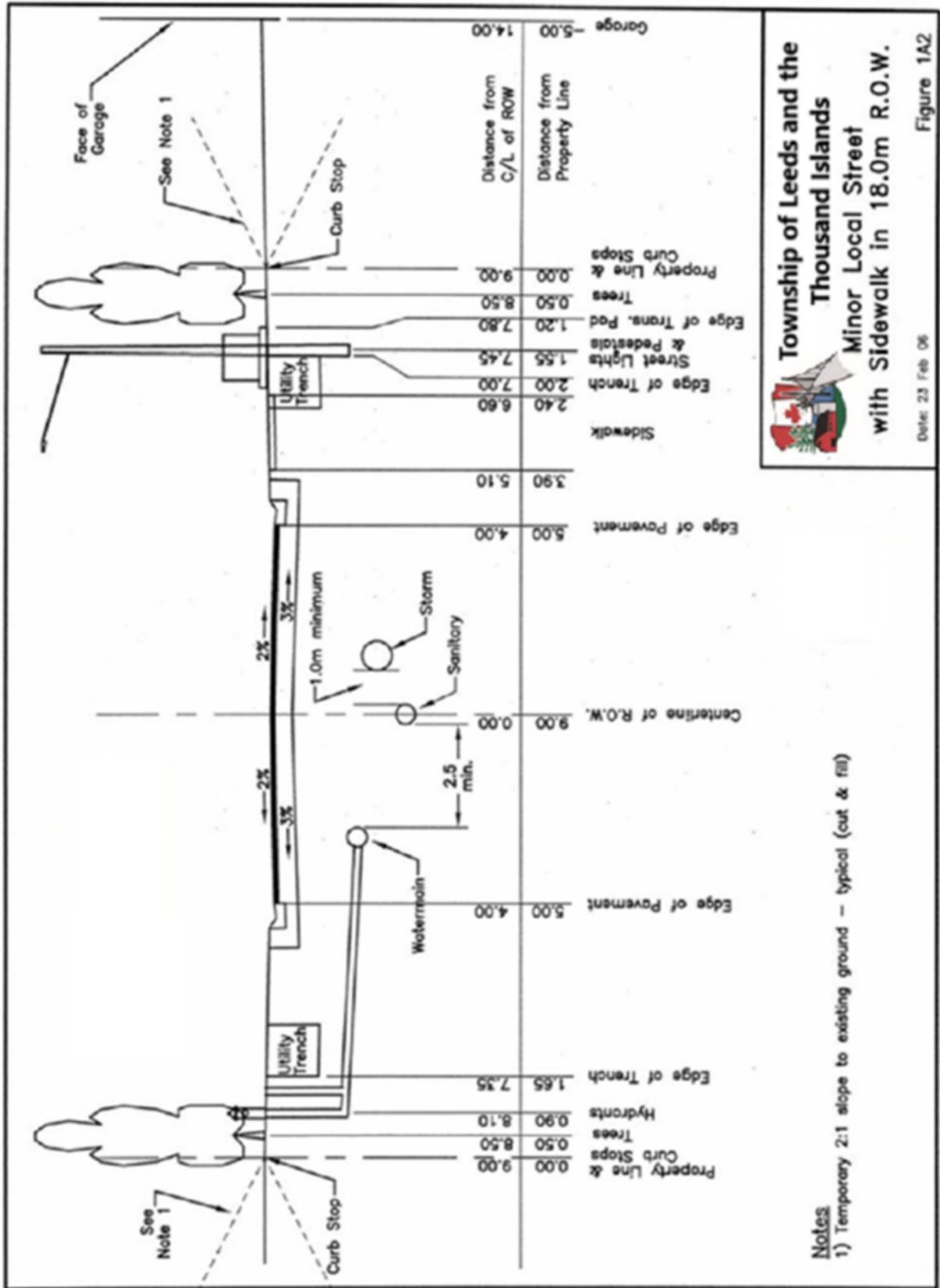
Typical Sign Placement

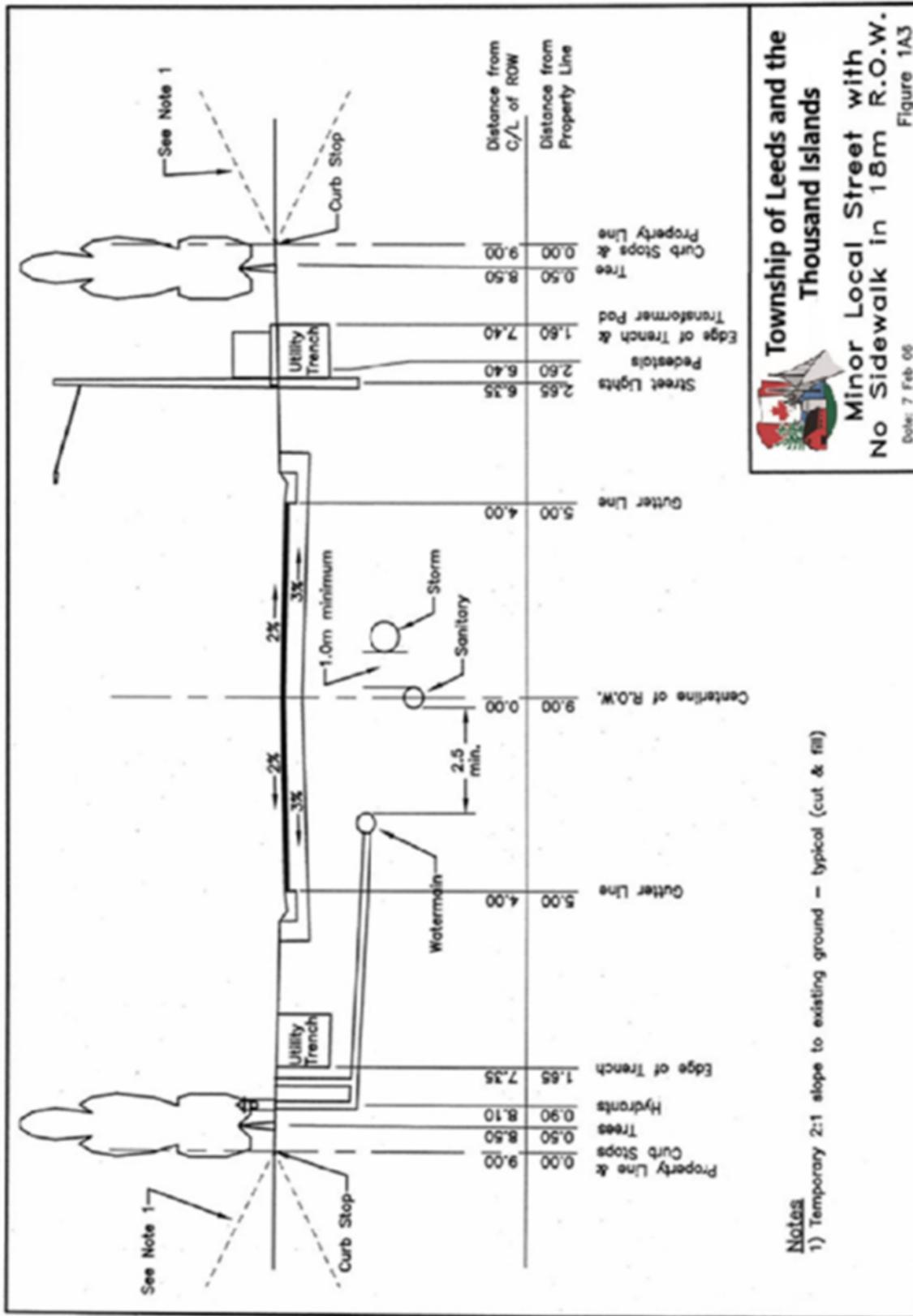
Typical Split Lot Drainage

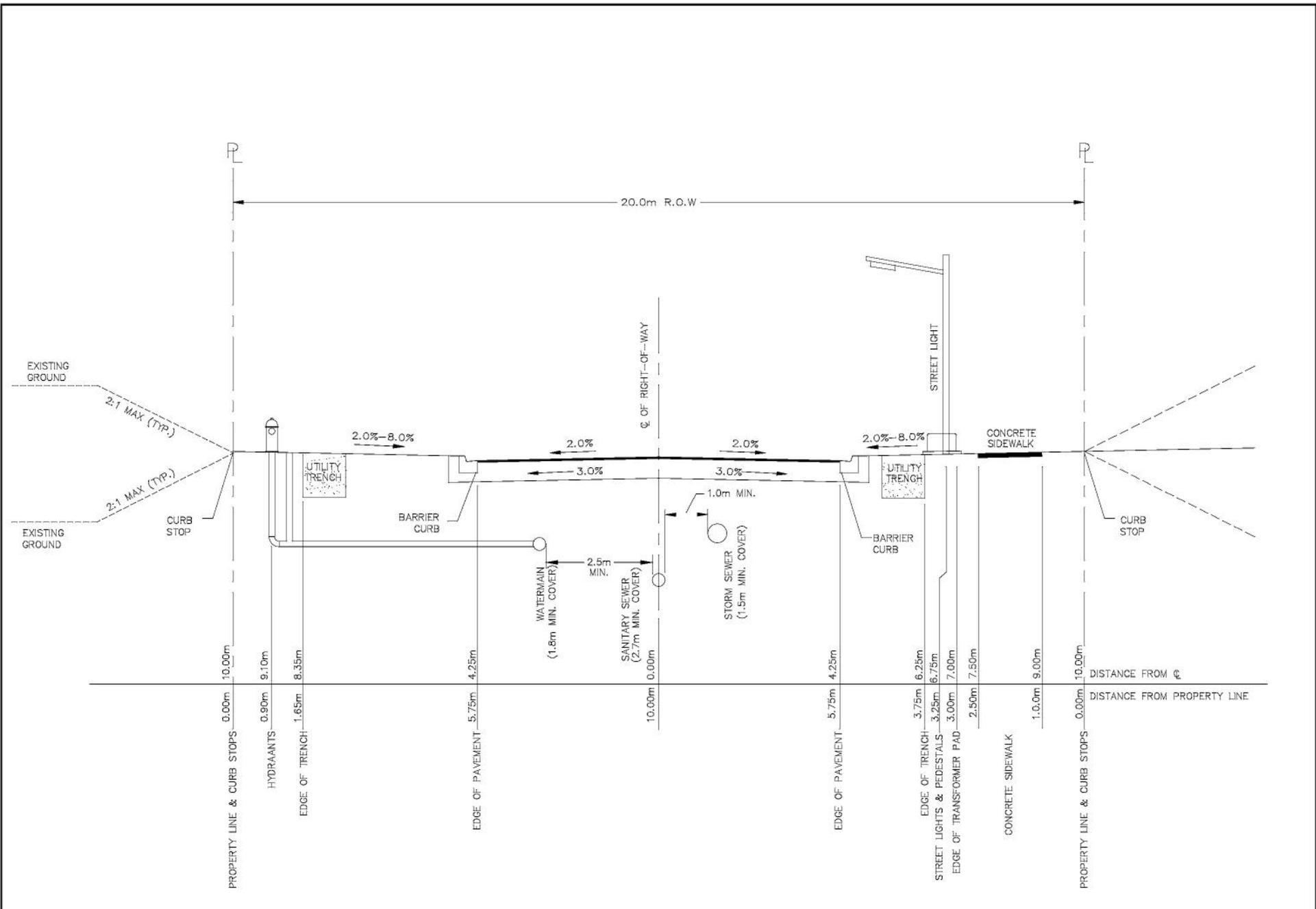
Typical Back to Front Lot Drainage

Typical Joint Utility Trench

Typical Walkway



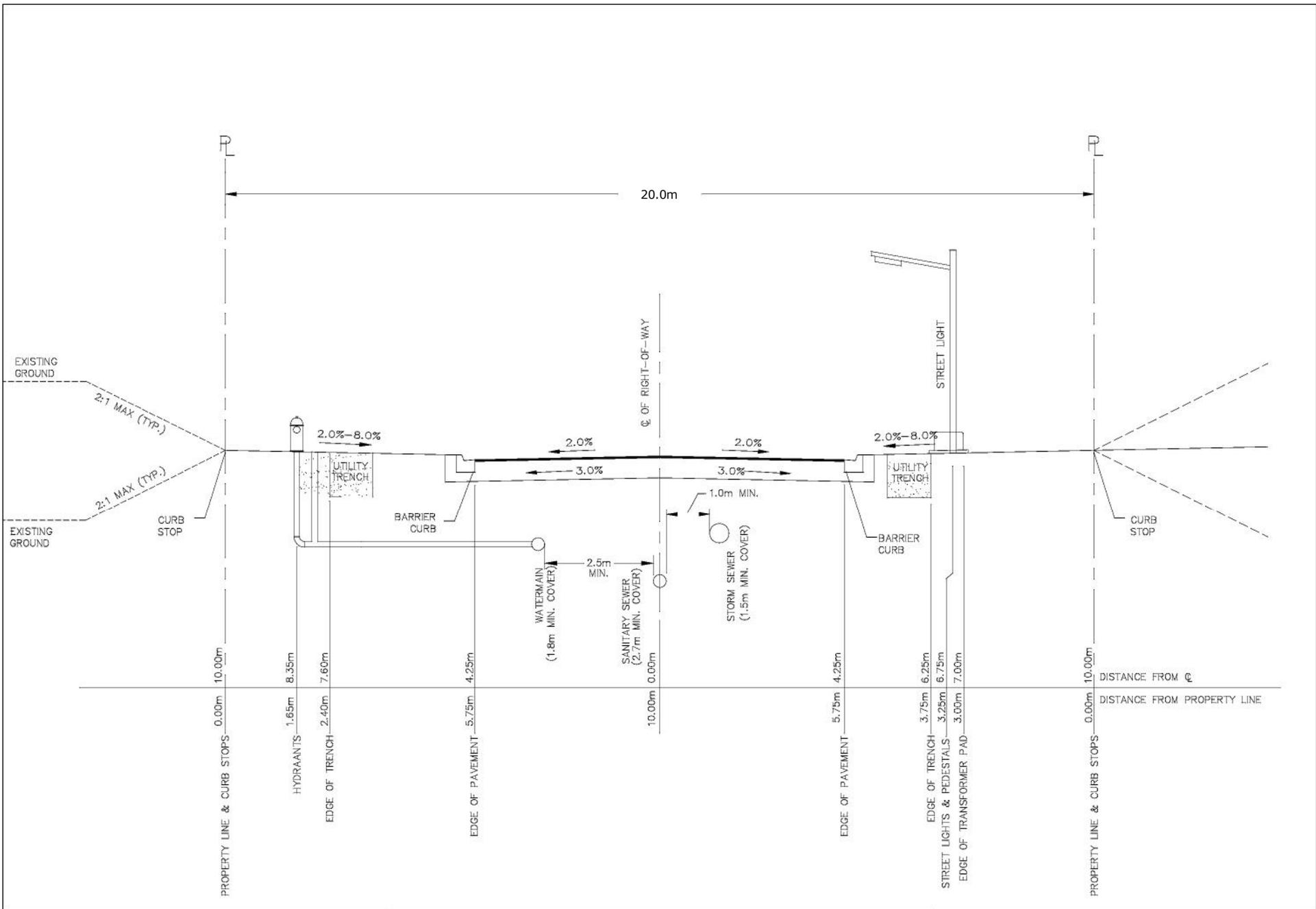




NOTES:
REFER TO DESIGN CRITERIA FOR ADDITIONAL DETAILS.

TYPICAL ROAD CROSS SECTION
LOCAL ROAD - URBAN - 20.0m RIGHT OF WAY
SCALE: N.T.S.

DESIGN CRITERIA
AND STANDARDS



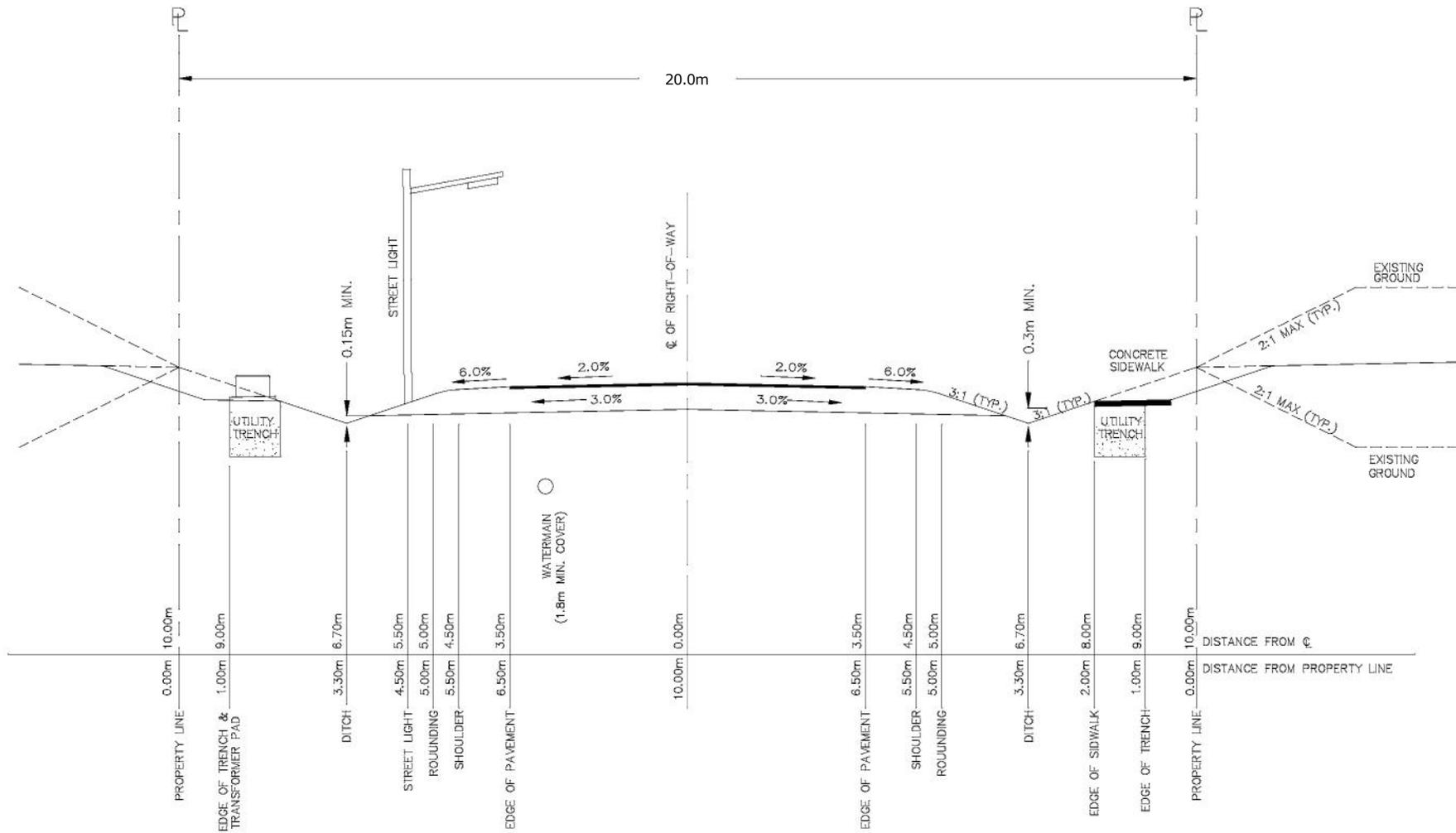
NOTES:

REFER TO DESIGN CRITERIA FOR ADDITIONAL DETAILS.

TYPICAL ROAD CROSS SECTION

LOCAL ROAD - URBAN - 20.0m RIGHT OF WAY - NO SIDEWALK
SCALE: N.T.S.

**DESIGN CRITERIA
AND STANDARDS**



NOTES:

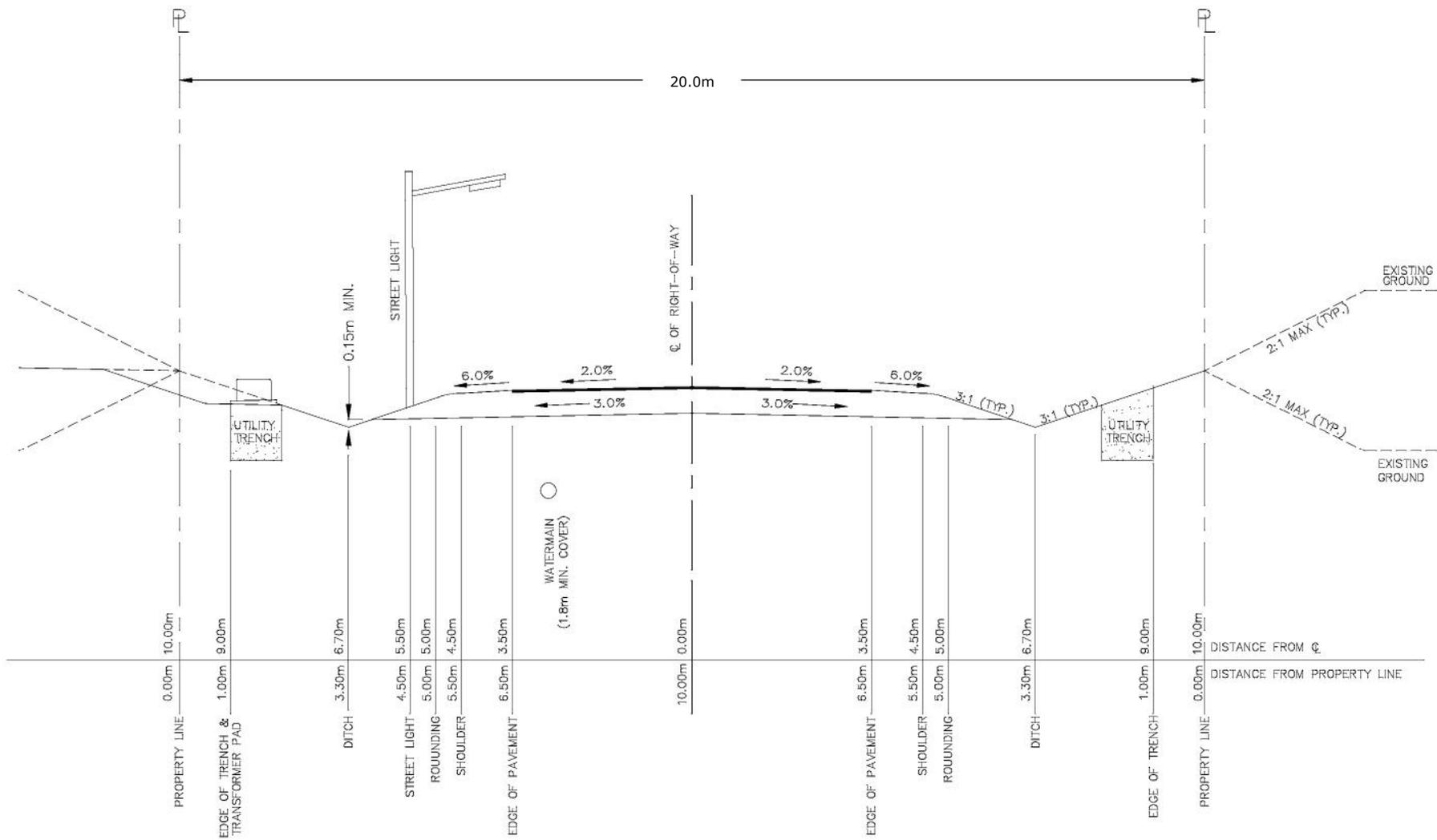
1. REFER TO OPSD EARTH AND ROCK EXCAVATION (GRADING) DETAILS.
2. REFER TO OPSD FOR HYDRANT ACCESS.

TYPICAL ROAD CROSS SECTION

LOCAL ROAD - RURAL - 20.0m RIGHT OF WAY

SCALE: N.T.S.

DESIGN CRITERIA
AND STANDARDS

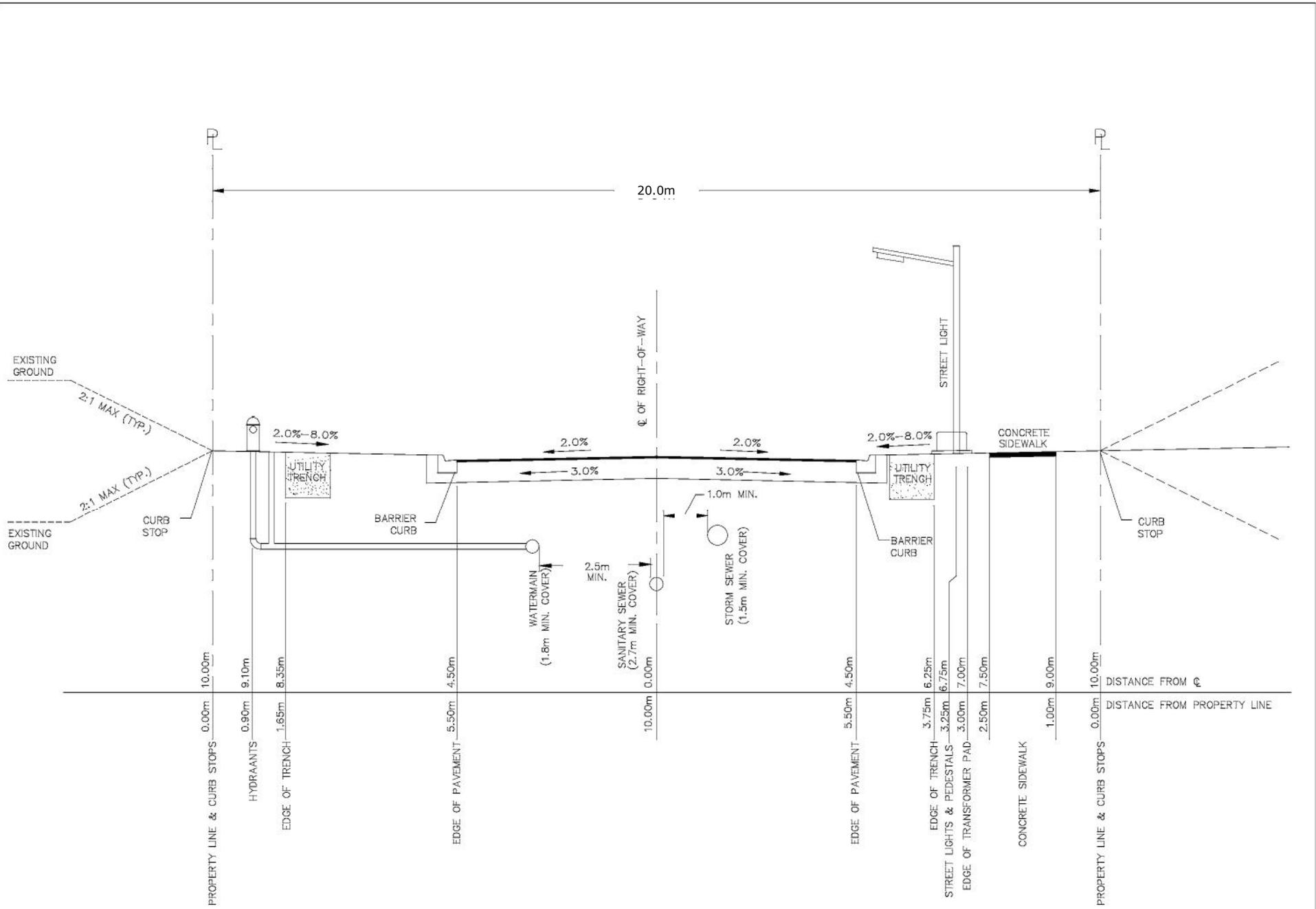


NOTES:

1. REFER TO OPSD EARTH AND ROCK EXCAVATION (GRADING) DETAILS.
2. REFER TO OPSD FOR HYDRANT ACCESS ACROSS DITCH.

TYPICAL ROAD CROSS SECTION
 LOCAL ROAD - RURAL - 20.0m RIGHT OF WAY - NO SIDEWALK
 SCALE: N.T.S.

**DESIGN CRITERIA
 AND STANDARDS**

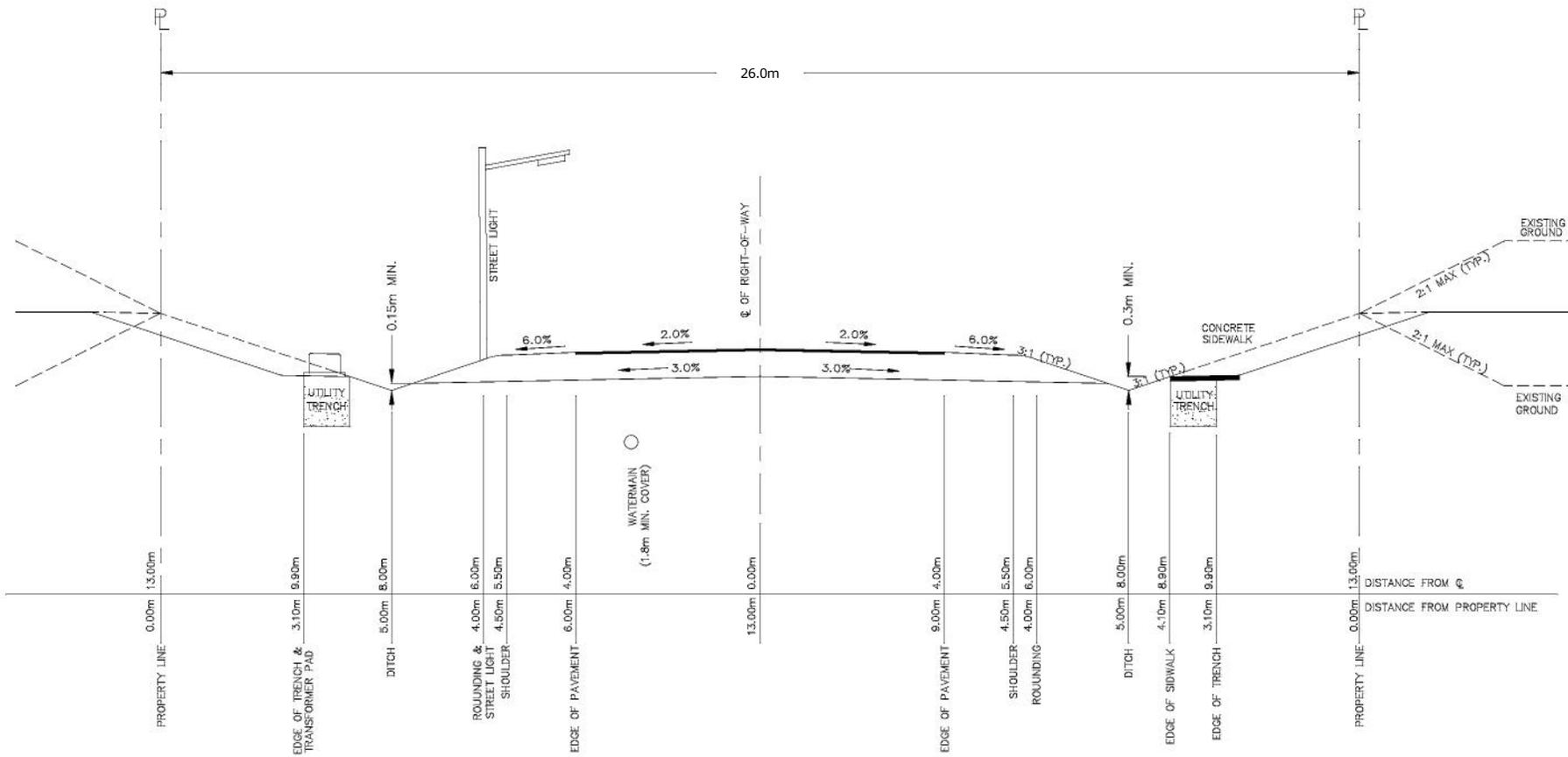


NOTES:

REFER TO DESIGN CRITERIA FOR ADDITIONAL DETAILS.

TYPICAL ROAD CROSS SECTION
 COLLECTOR (MINOR) ROAD - URBAN - 20.0m RIGHT OF WAY
 SCALE: N.T.S.

**DESIGN CRITERIA
 AND STANDARDS**

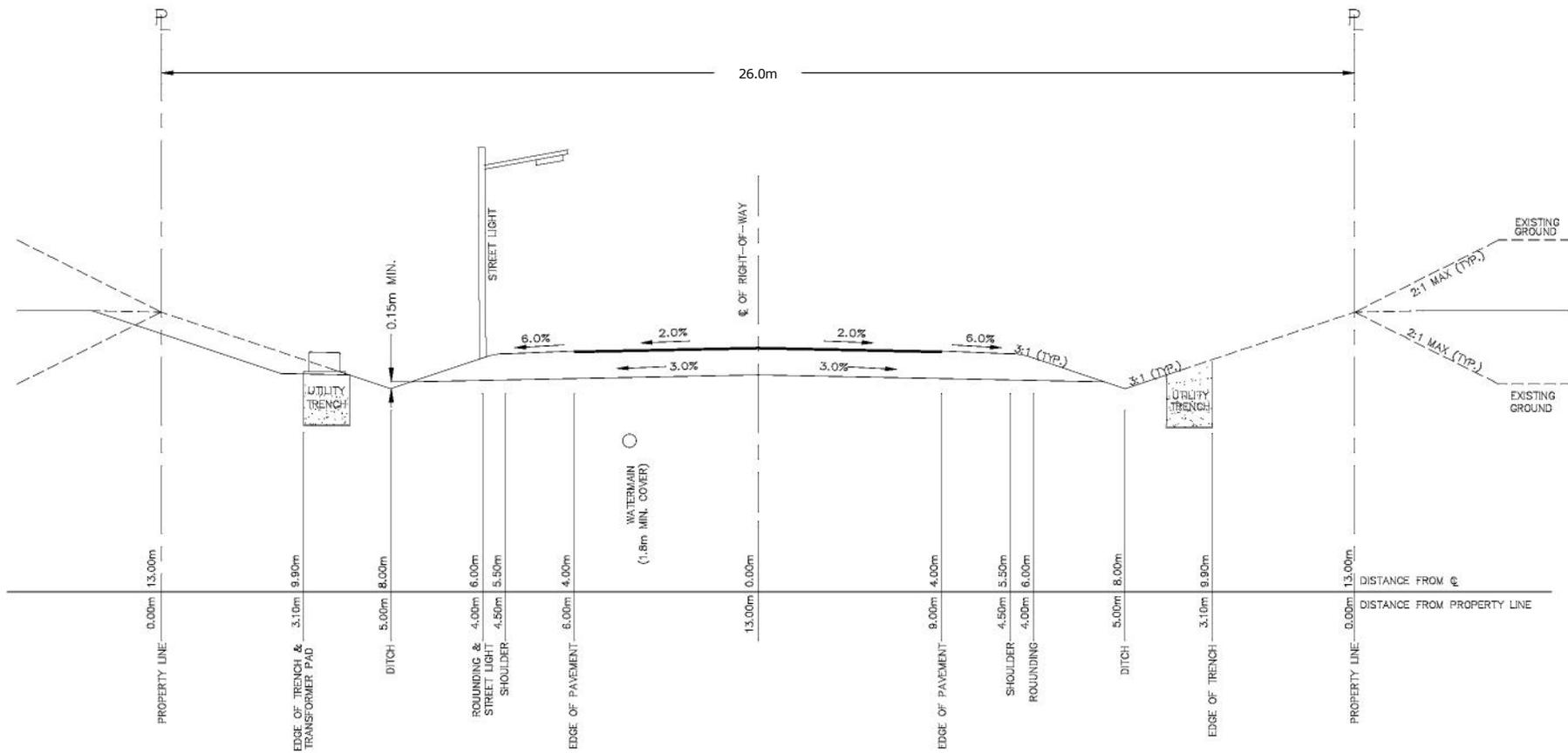


NOTES:

1. REFER TO OPSD EARTH AND ROCK EXCAVATION (GRADING) DETAILS.
2. REFER TO OPSD FOR HYDRANT ACCESS.

TYPICAL ROAD CROSS SECTION
 COLLECTOR (MINOR) ROAD - RURAL - 26.0m RIGHT OF WAY
 SCALE: N.T.S.

**DESIGN CRITERIA
 AND STANDARDS**



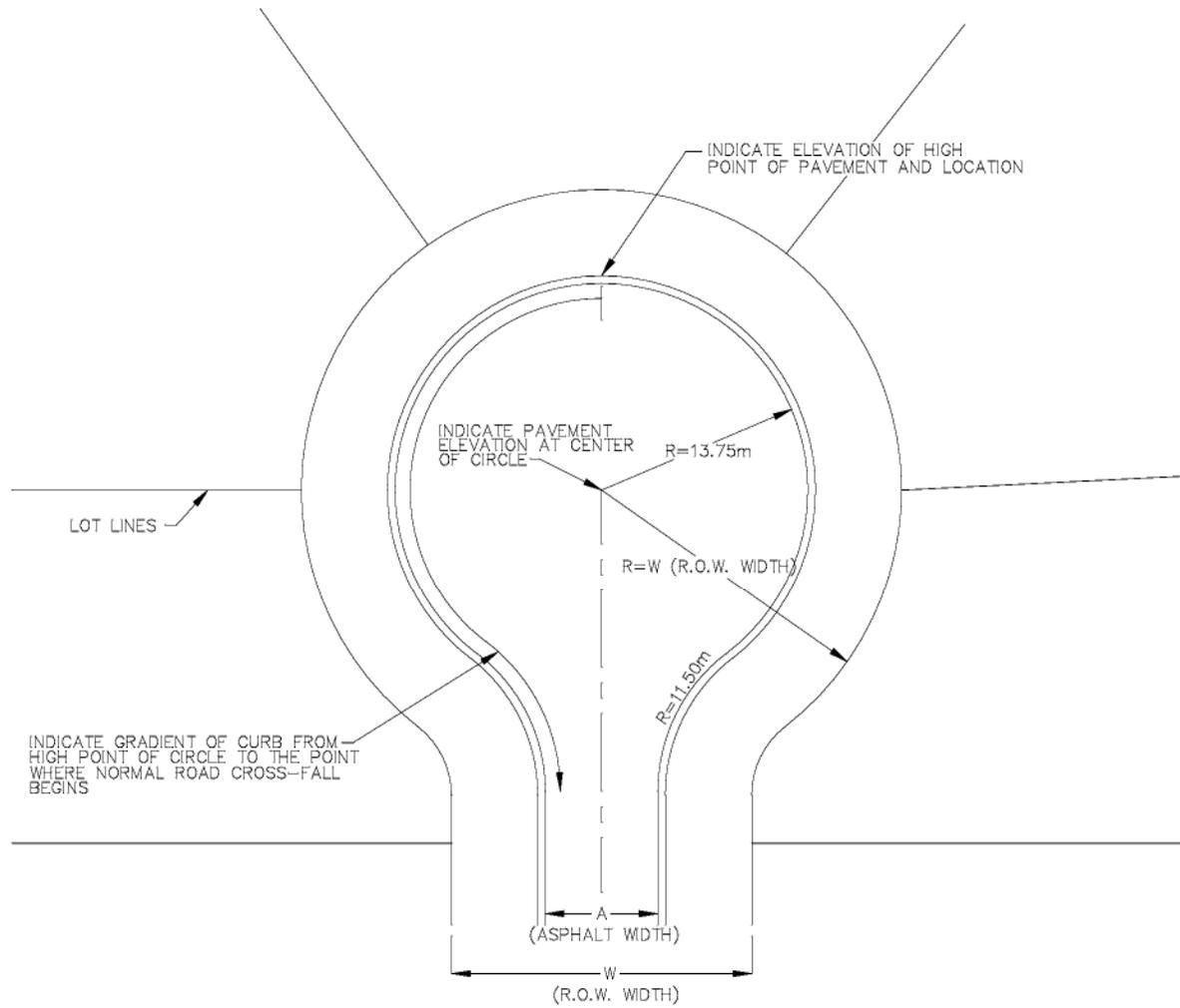
NOTES:

1. REFER TO OPSD EARTH AND ROCK EXCAVATION (GRADING) DETAILS.
2. REFER TO OPSD FOR HYDRANT ACCESS.

TYPICAL ROAD CROSS SECTION

COLLECTOR (MINOR) ROAD - RURAL - 26.0m RIGHT OF WAY - NO SIDEWALK
SCALE: N.T.S.

DESIGN CRITERIA
AND STANDARDS



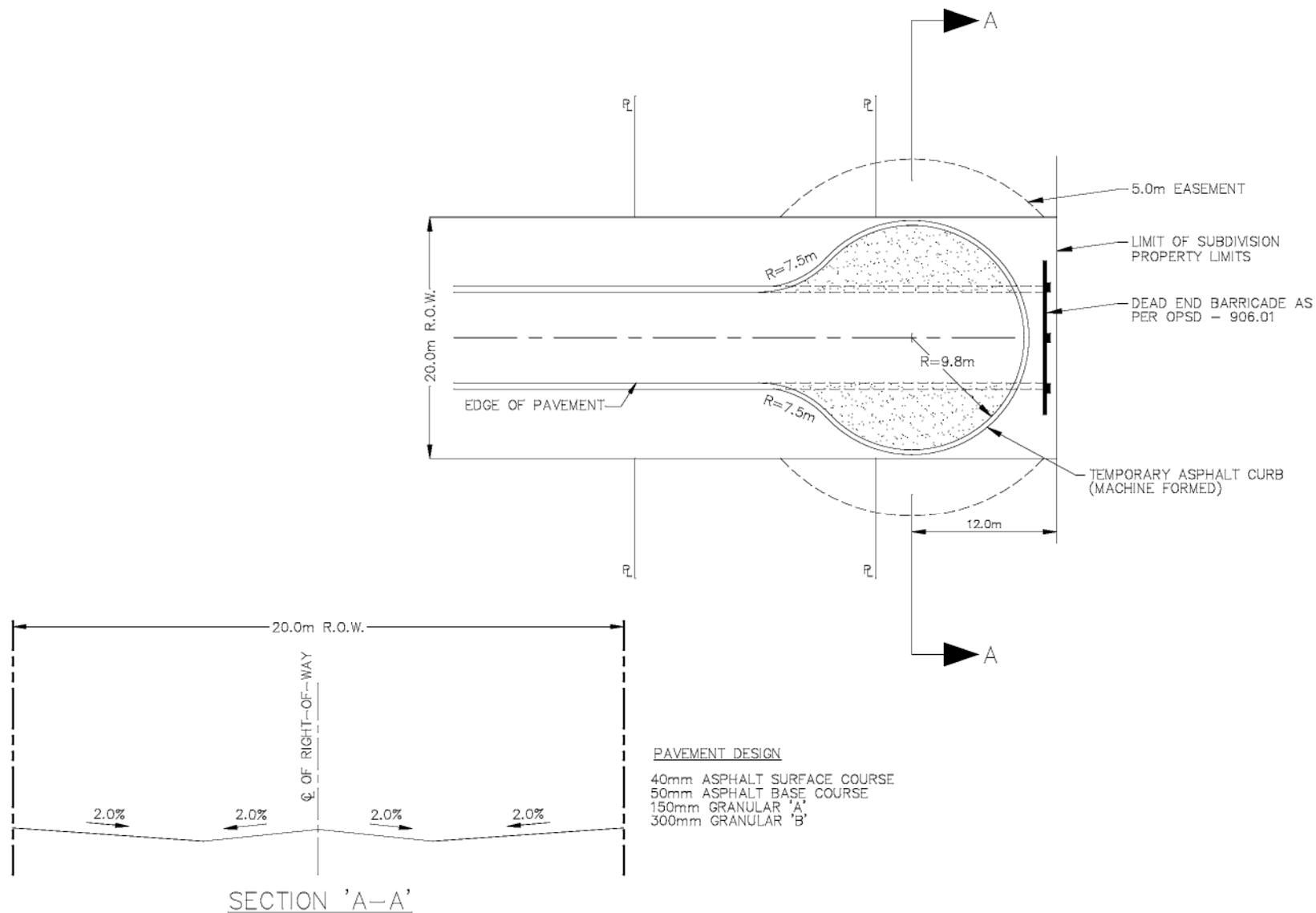
NOTES:

1. A = ASPHALT WIDTH
2. W = RIGHT-OF-WAY (R.O.W.)

TYPICAL PERMANENT CUL-DE-SAC

SCALE: N.I.S.

DESIGN CRITERIA
AND STANDARDS



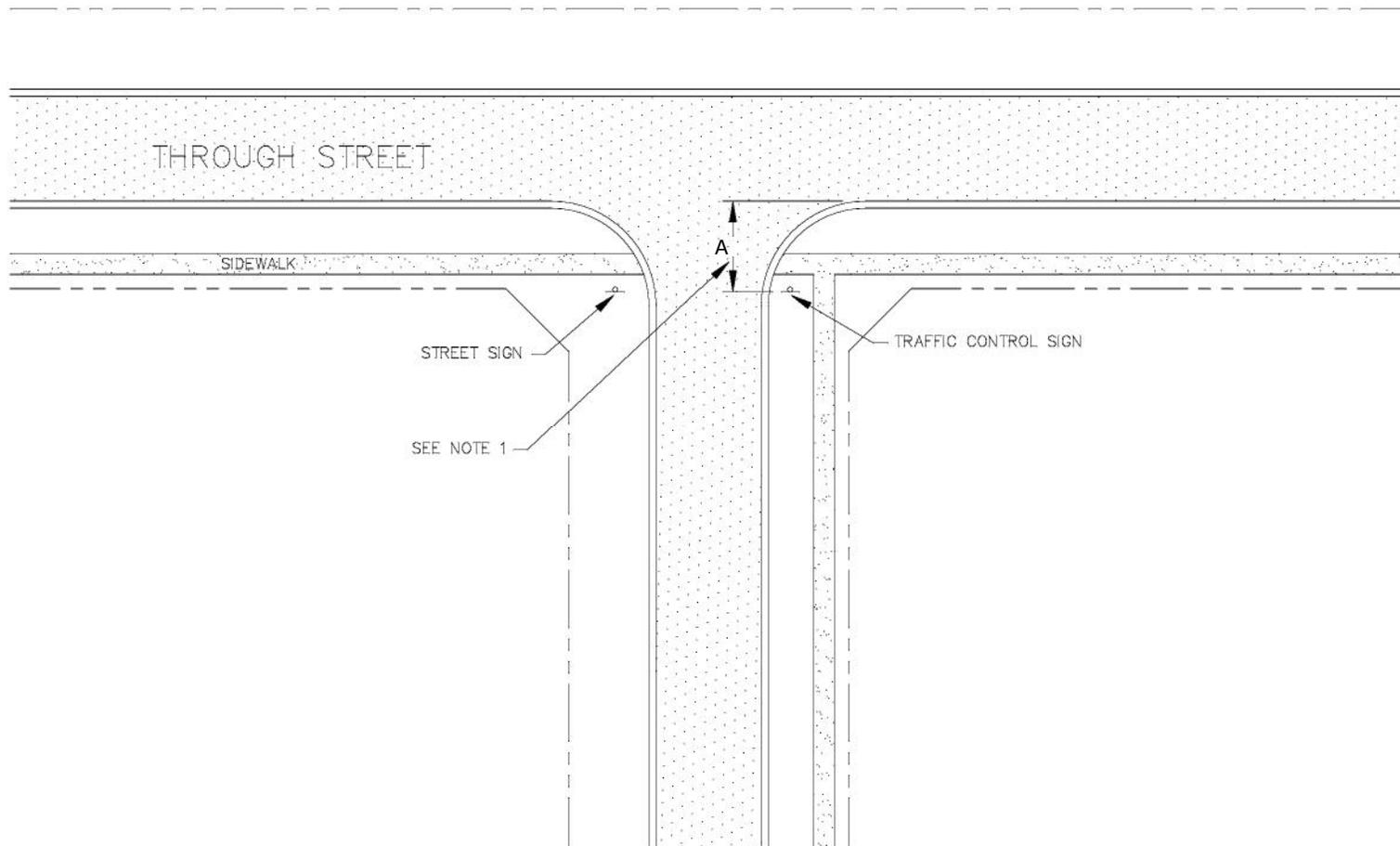
NOTES:

1. AT PHASE LIMITS TERMINATE CURB AND SURFACE ASPHALT WHERE SHOWN, OR AT LIMIT OF PHASE. BETWEEN SUBDIVISIONS, EXTEND CURB AND SURFACE ASPHALT TO LIMIT OF SUBDIVISION.

TYPICAL TEMPORARY CUL-DE-SAC

SCALE: N.T.S.

DESIGN CRITERIA AND STANDARDS



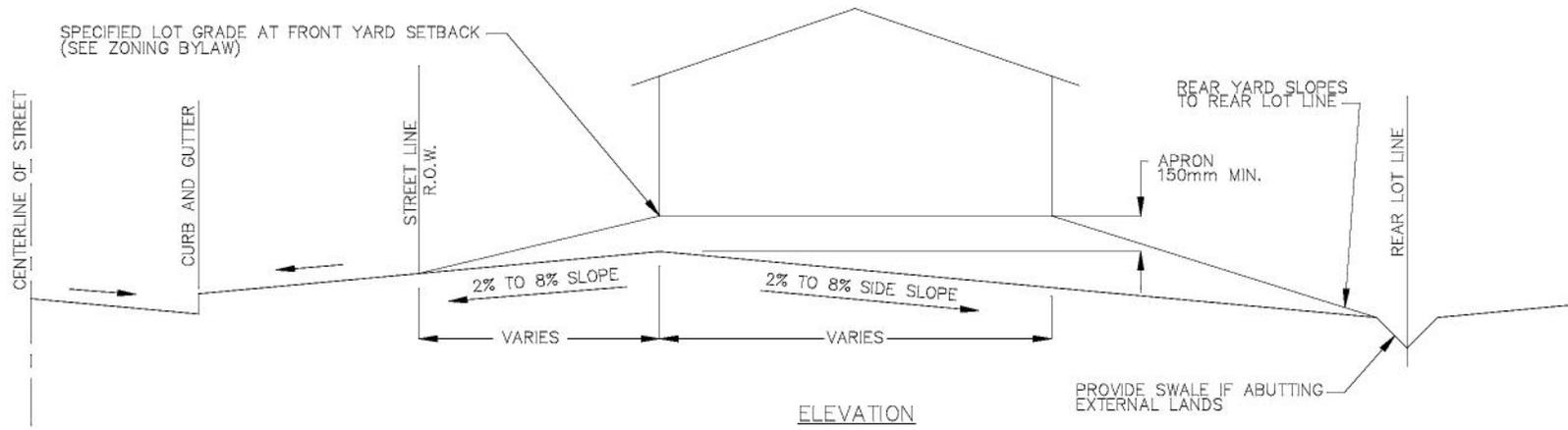
NOTES:

1. WITH SIDEWALK ON THROUGH STREET; A = 6.0m MINIMUM
WITH NO SIDEWALK ON THROUGH STREET; A = 3.0m
MINIMUM LOCATE SIGNPOST 1.5m FROM BACK OF CURB
2. SIGNS TO BE MOUNTED AT A MINIMUM HEIGHT OF 2.0 METRES,
MEASURED FROM FINISHED GRADE TO THE BOTTOM OF THE SIGN.

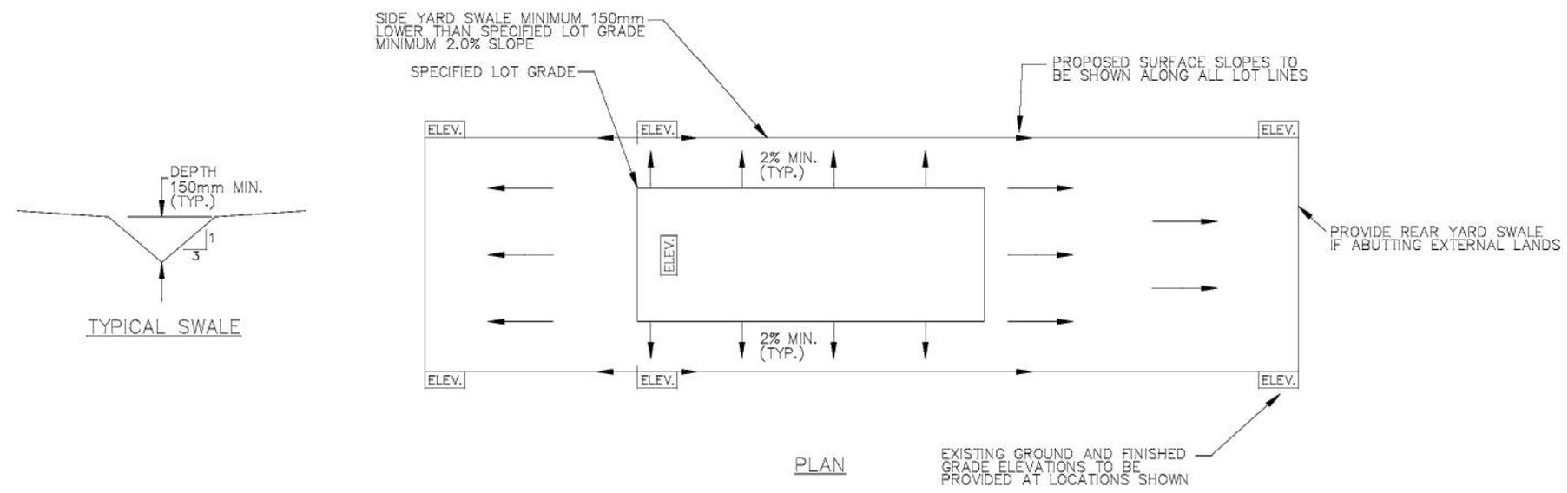
TYPICAL SIGN PLACEMENT

SCALE: N.T.S.

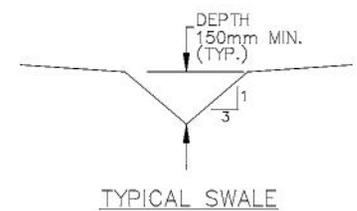
DESIGN CRITERIA
AND STANDARDS



ELEVATION



PLAN

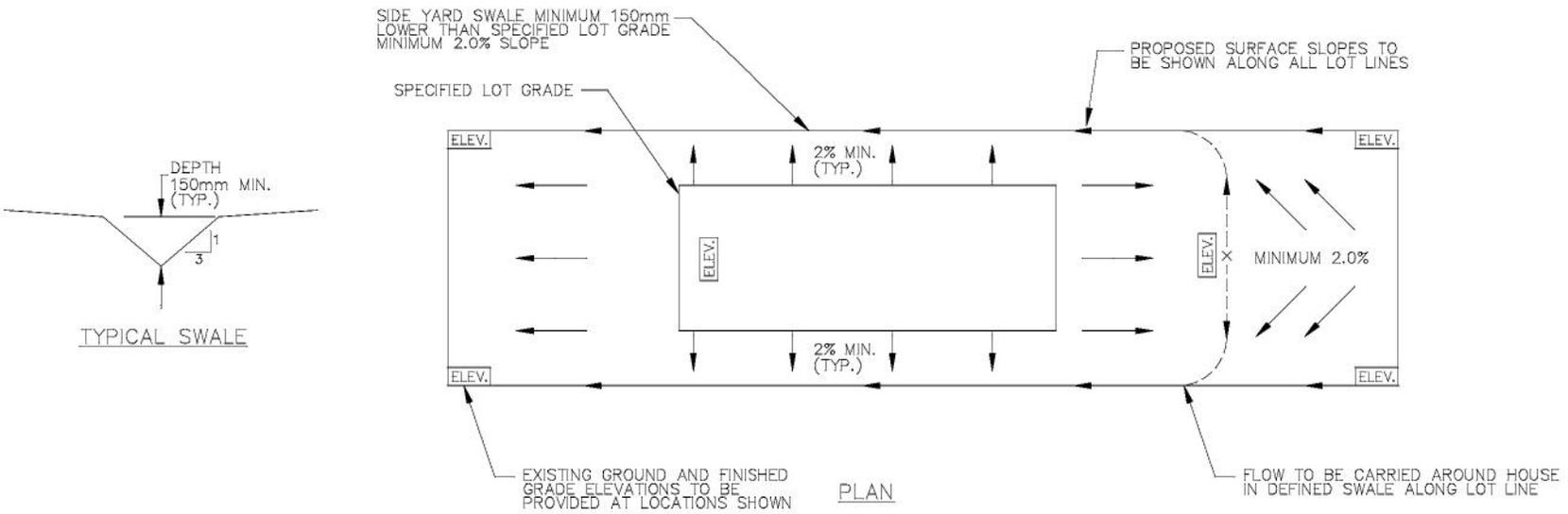
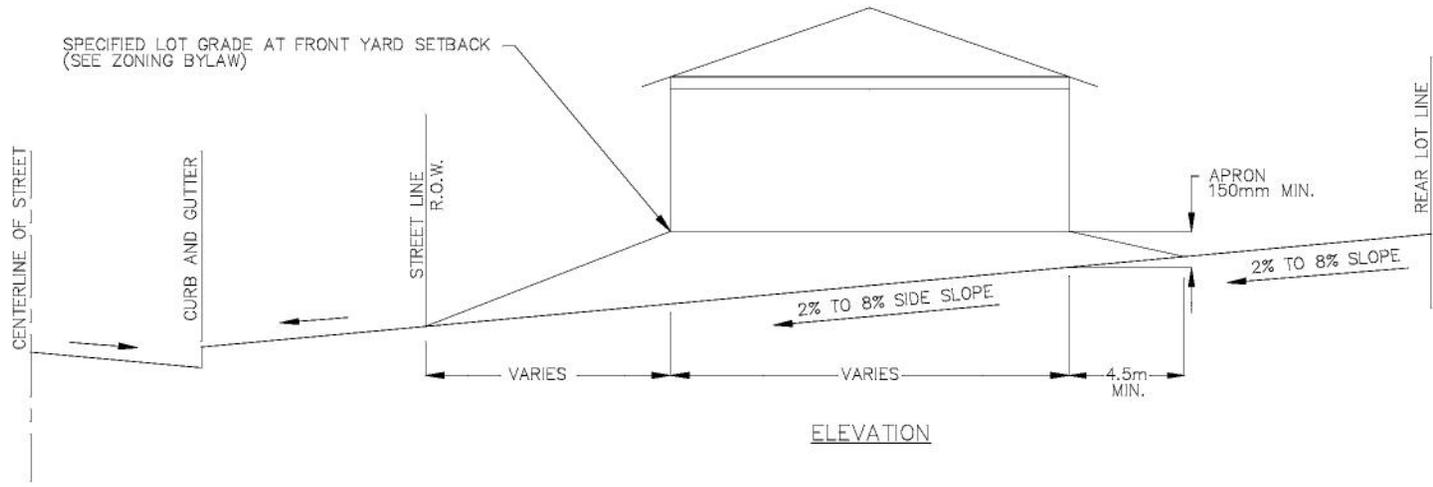


TYPICAL SWALE

TYPICAL SPLIT LOT DRAINAGE

SCALE: N.T.S.

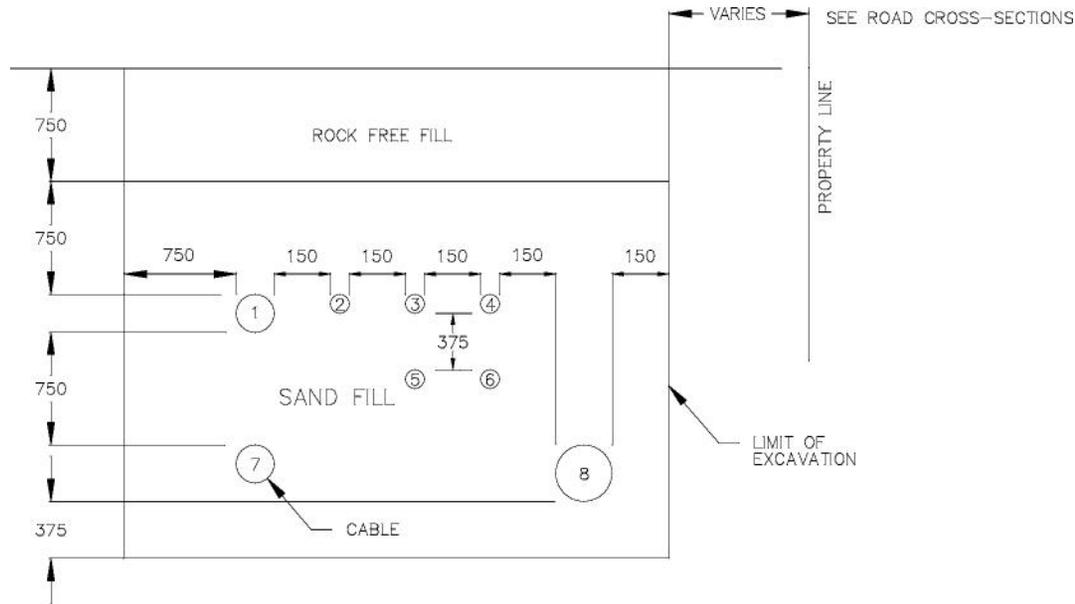
DESIGN CRITERIA AND STANDARDS



TYPICAL BACK TO FRONT LOT DRAINAGE

SCALE: N.T.S.

DESIGN CRITERIA AND STANDARDS



NOTES:

1. CABLE LEGEND AS FOLLOWS
 1. HYDRO SECONDARY
 2. STREET LIGHT IN CONDUIT
 3. CABLE T.V.
 4. TELEPHONE
 5. FIBRE OPTICS CONDUIT
 6. OTHER LOW VOLTAGE CONDUIT AS REQUIRED
 7. HYDRO PRIMARY
 8. GAS MAIN
2. DIMENSIONS SHOWN ARE MINIMUM UNLESS GREATER SEPARATION IS REQUIRED BY CODES OR STANDARDS.

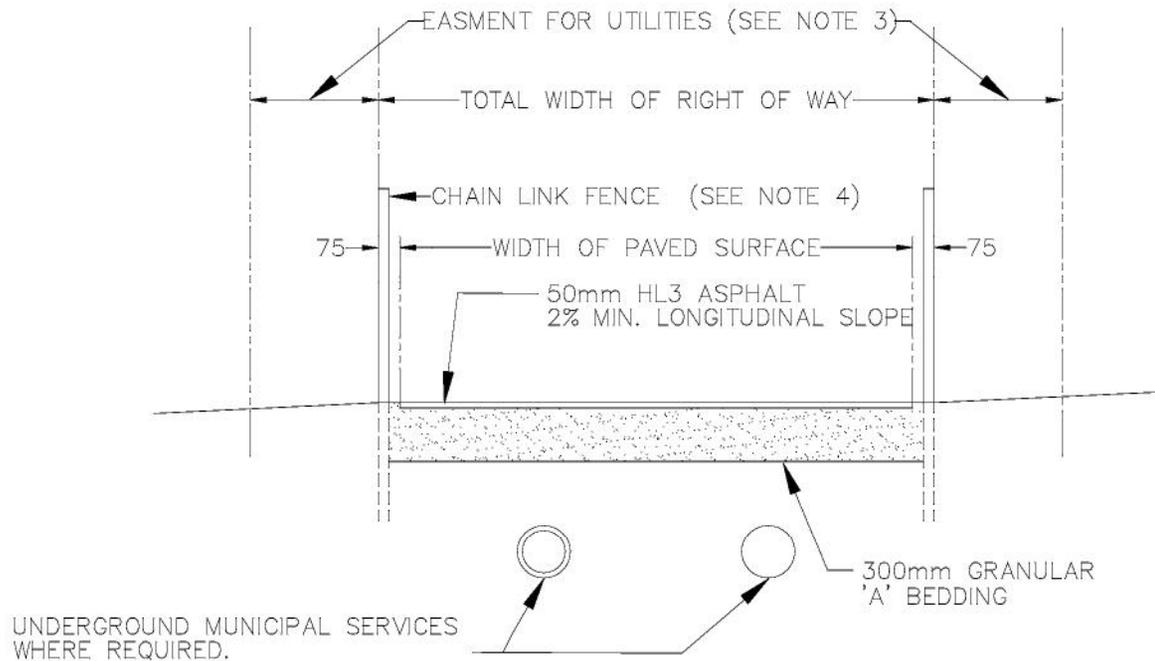
NOTES:

DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

TYPICAL JOINT UTILITY TRENCH

SCALE: N.T.S.

DESIGN CRITERIA
 AND STANDARDS



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
2. ALL THICKNESS DIMENSIONS ARE AFTER CONSOLIDATION TO 95% STD. PROCTOR DENSITY.
3. EASMENT WIDTH TO BE DEPENDANT UPON LOCATION AND DEPTH OF UNDERGROUND WORKS.
4. REFER TO OPSD FENCING, CHAINLINK, INSTALLATION-ROADWAY. USE A DIAMOND MESH NO GREATER THAN 38mm, WITH A HEIGHT OF 1.2m.

TYPICAL WALKWAY

SCALE: N.T.S.

DESIGN CRITERIA
AND STANDARDS