MUNICIPAL SERVICING STANDARDS

TOWNSHIP OF WELLINGTON NORTH

March 2023
Revision No.: 7

MANUAL OF MUNICIPAL SERVICING STANDARDS

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MANUAL OF MUNICIPAL SERVICING STANDARDS

THE CORPORATION OF THE TOWNSHIP OF WELLINGTON NORTH

1. PROCEDURE AND DESIGN CRITERIA

A. GENERAL REQUIREMENTS

The Township of Wellington North has adopted the following procedure for development of private lands requiring the design, approval and construction supervision of Municipal Services. This policy applies to developers that require site plan approval from the Township under Section 40 of the Planning Act, or for a subdivision approval under Section 50 of the Planning Act. A development approval can include severance or consent agreement where municipal services in new road allowances are created through the draft plan process.

It is understood that these standards will be referred to as a schedule in a development agreement and that the current revision of the standards are then considered to be part of the agreement.

A.1 Definitions

In these standards the following definitions shall apply:

“Arterial Roads” are intended to carry large volumes of all types of traffic moving at medium to high speeds.

“Collector Roads” provide both traffic service and land service to move traffic between local streets and arterial roads.

“Contractor” shall mean the firm of Contractors, the company of individuals acting as the Contractor and having entered into a contract with the Developer to construct the Development.

“Developer” shall mean the Owner or party specifically named in the Development Agreement or in the Subdivision Agreement.

“Engineer” shall mean professional engineer(s) licensed to practice in Ontario and shall be responsible for the preparation of drawings, specifications, reports and to act on behalf of the Developer in all technical aspects of the Development.

“Local Roads” are to provide land access; they are not intended to move large volumes of traffic.

“Ministry of the Environment” refers to the most current Ontario Ministry of the Environment.

“Municipality” or “Township” shall mean the Township of Wellington North.

“Planner” shall mean the County and/or the Municipality’s Planner or their designate.

A.2 Planning Process

In the Township of Wellington North, Plans of Subdivision and Condominiums applications are to be submitted to the County of Wellington. Application packages and associated guides are available through the County which will provide an overview of the steps to make an application and obtain a decision on a specific proposal. Development Approval application are to be completed and submitted to the Township.

The County of Wellington Planning Department should be contacted to arrange for a pre-consultation meeting prior to initiating the planning process for any development. The pre-consultation meeting will assist to identify key planning issues as well as any major technical items including studies (i.e., traffic, noise, servicing, etc.) that may be required as part of the formal submission. The applicant may wish to have their consultant (planners, engineers, etc.) present at this initial meeting. It is anticipated that the following items would be discussed or reviewed:

- County will confirm the Official Plan designation and Zoning, identifying any Official Plan and Zoning amendments which may be required in addition to draft plan approval.
- The necessary application requirements including fees, supporting documents (contour plan, general plan of services, drainage plan, preliminary Stormwater management plan, etc.), draft plan drawing requirements, and possible agreements that may be required.
- Timelines and potential scheduling for public hearing and Council meetings.

Following submission of a complete application, it will be processed by Wellington County staff, who will circulate it to the Municipality, community organizations and required public bodies for comments, as well as to all property owners in the vicinity of the subject site. A Public Meeting must be held, usually in the community, to provide information on the proposed application and to allow the public to provide comments. The County will work with the applicant to address any agency and/or public concerns. A comprehensive report will be prepared by the County planner, along with draft plan conditions (based on input from agencies and the public) and presented to Wellington North Council for review. Council will let Wellington County know if it is in support of the application.

The County Planning Director can then make a decision to approve or to refuse the draft plan application. This decision is subject to a 20 day appeal period. If there are no appeals, the draft plan is in effect.

As noted, there will be a number of conditions that must be satisfied before final approval of the development can be given by the County. Among the conditions is a requirement that the owner enter into a development agreement with the Municipality regarding matters such as the construction of roads and servicing which will require the completion of engineered drawings to the standard contained herein. It is the responsibility of the applicant to ensure that the conditions are satisfied. Developers are encouraged to engage with the various utility companies early in the process to determine the utilities requirements.

a) Site Plan

Site Plan Control applications are to complete a Development Approval application which are typically for developments where the land use principle has already been established (i.e. permitted by the Official Plan and Zoning). The application is to be submitted to and approved by the Township. Matters are limited to site design details such as stormwater management, parking, sidewalks, easements, road widening, lighting, waste storage areas, landscaping, etc. A public meeting is not required for the site plan control process. Comments will normally be made by the conservation authority for stormwater management and sometimes by the County where the development abuts a county road. Wellington North Council makes the decision to approve site plans. The Planning Act does not provide for an appeal by the public. A development agreement is normally required between the municipality and the owner.

A.3 Engineering Process

Following acceptance and approval of the draft plan, the developer shall proceed to the engineering phase of the development process which will include a number of submissions including preliminary and follow-up submissions as required. Prior to the commencement of the Engineering Design, the Developer's Engineer shall obtain copies of the current Municipality's Municipal Servicing Standards to familiarize themselves with the requirements of the development design in the Municipality.

The initial submission of engineering drawings shall be delivered to the Municipality's Development Clerk and should include a covering letter to address any previous discussion or submission comments, copies of the preliminary drawings and servicing (functional design) report(s) in electronic format (PDF and AutoCAD or similar). The initial submission of engineering drawings shall also

contain a declaration from the Developer's Engineer showing that they have been retained to design and supervise the construction of the development according to the terms of the Development Agreement. The purpose of the initial submission is to review the general design concept prior to the Developer proceeding to detailed engineering. In some cases, this information may have been provided in conjunction with the Draft Plan process. The preliminary drawing and report should consider items such as existing conditions, tree preservation, road alignments, cross section details, railway crossings, parkland dedication, trunk sewer, storm water management and drainage, water distribution, lot grading, sewage conveyance, sidewalks, walkways, street lighting and utilities, etc. This document becomes particularly important when servicing is to be phased in conjunction with the development plan. When a development is being phased the servicing report is to include details of how the phasing will occur and how infrastructure may be impacted by such phasing. The servicing report shall confirm that the servicing design does not limit future development areas. Comments may be provided related to any issues that are evident and the Developer will be asked to update the Engineering Drawings accordingly.

The Developer may be required to submit hydrogeological, hydrology, traffic, acoustical, geotechnical, archaeological, biological or other studies. Appropriate engineering or other consultants shall be retained to complete these reports as part of the applications and submissions required. The Developer's Planner and/or Engineer shall consider future adjacent land uses, and all design and layout of services shall incorporate considerations with respect to future servicing, grading and drainage issues on the adjacent lands. Upon completion of designs and submissions, sufficient copies of preliminary design briefs, agency approval submissions and all final drawings and reports shall be submitted to the Municipality for review by the Municipality and the Municipal Engineer in electronic format (PDF and AutoCAD or similar).

Submissions are to be made until the Engineering Drawings, design and reports, are acceptable to the Township of Wellington North and the Municipal Engineer. Final submissions to be made to the Municipality's Development Clerk in hardcopy and electronic format (PDF and AutoCAD or similar). Hardcopy drawings to be submitted in 24" x 36" paper size. Hardcopy reports to be submitted on 8.5" x 11" paper size with any figures or drawings printed on 11" x 17" paper size.

Additional details related to drawing requirements and approvals are provided in later sections of this document.

A.4 Planning and Reports

Prior to the design of a project being undertaken, the Developer will provide various reports and studies which discuss the requirements for the development. The reports and studies shall include but will not necessarily be limited to the following:

a) Planning Report

All proposed plans of subdivision applications must be accompanied by a Planning Report. This report will briefly describe site orientation, site issues and inter-relationship of site issues. The report provides a starting point for analysis of the development proposal. This report is not to replace any detailed or specific reports identified during any submission consultation.

b) Environmental Impact Study (EIS)

With the growing concern for the preservation of natural heritage features and ecological functions and the protection of groundwater resources, there is a need to assess new development and municipal infrastructure projects for environmental impacts both comprehensively and on a project specific basis.

An Environmental Impact Study, if required, shall be prepared by a qualified professional prior to development in order to investigate potential environmental impacts of the proposed undertaking. An Environmental Impact Study will determine whether development may proceed and, if so, will identify actions which could be taken in order of preference to prevent, minimize, mitigate or compensate the environmental impacts of the development.

Any Environmental Impact Study shall be completed in consultation with the appropriate agencies in accordance with the Township's Official Plan, Grand River Conservation Authority, Saugeen Valley Conservation Authority, Maitland Valley Conservation Authority, Ministry of Natural Resources and Forestry policies, and/or Federal Department of Fisheries and Oceans and/or any other applicable government agency policies or legislation.

c) Source Water Protection/Geotechnical Investigation/Soil Report/ Hydrogeological Investigation

All proposed plans of subdivisions may be required to provide supporting documentation including a Geotechnical Investigation, Hydrogeological Investigation and a Source Water Protection Review as deemed necessary by the Township, Authority and/or the local Risk Management Official for Source Water Protection. These investigations shall be required to be

carried out by a competent consulting engineer or a qualified person (i.e.. Hydrogeologist) in order to assess conditions with respect to the proposed infrastructure, building construction and source water protection for the municipal water supply.

The Source Water Protection review shall conform to the requirements of the Clean Water Act, 2006 (as amended from time to time), the applicable Source Protection Plan (as amended from time to time) and all requirements regarding Source Water Protection included in the Township of Wellington North and County of Wellington Official Plans (as amended from time to time).

For the construction of new roads or underground utilities, a geotechnical investigation will be required. The purpose of the investigation will be to determine the type of soil, its engineering properties, bearing capacity, soil permeability, location of groundwater, and to verify whether contamination is present. Soil investigation work is to take place after determining the proposed sewer or watermain alignment, so that the required boreholes and test pits follow the same alignment. When appropriate, geotechnical also to include neighbouring properties and streets that will be affected as part of the servicing work to the development site. Undersides of footing elevations for all basements of buildings are to be 0.6 m above the seasonally high groundwater elevation.

Soil test borings will be placed at suitable spacing to provide adequate representation of the soil conditions. Additional boreholes may be required to establish the water table for storm water management ponds and to design the foundations of outfall structures. In fill areas or areas close to water courses, piles may be required to achieve satisfactory bearing strength to support any proposed infrastructure. Bedrock profiles will be required to be submitted where applicable.

Groundwater monitoring may be required if deemed applicable. Predevelopment groundwater monitoring can be carried out by advancing boreholes including monitoring wells on the site. Several seasons of data may be required to finalize recommendations related to groundwater. Upon commencing site development, monitoring wells may have to be relocated to areas such as parks, walkways or street boulevards if longer term monitoring is required. Typically, general information from base mapping etc. will not be sufficient.

The geotechnical report will make recommendations for the design of the road base, parking lot base, sub-drain requirements, pipe bedding, construction methods, site preparation, grading and engineered fill, building foundation founding elevation table, dewatering, perimeter building drainage, excess soil management, soil chemistry testing and soil

percolation rates to determine the feasibility of stormwater management infiltration works.

d) Servicing Design Brief or Functional Servicing Report

The intent of the servicing design brief report is to evaluate the effects of a proposed change in land use or development on the Township's municipal servicing infrastructure and watercourses. The Township will assist with evaluation of the off-site infrastructure impacts/capabilities as required and when information is available. The Developer will be responsible for costs associated with this assistance.

The report should also address the adverse impacts, if any, of providing this servicing on any environmentally sensitive features (e.g., Areas of Natural and Scientific Interest, Environmental Sensitive Areas and hydrologically sensitive areas, etc.).

The report shall include a preliminary plan for sanitary sewer servicing, and another separate plan for preliminary storm sewer servicing. Each plan is to include pipe inverts, to illustrate how the system will properly drain and match into existing conditions.

The report shall also outline the design assumptions, overall impact on the trunk and local municipal service capacities, such as: location and capacity of municipal water supply, storm drainage outlet and sanitary sewer outlet, water treatment plants, water distribution systems and pressure zones, pump stations, wastewater treatment plants, trunk sewers and stormwater management facilities, etc. due to the proposed change in land use or development, functionality of proposed and existing services, calculations, supporting documentation and references to previous studies, for each component of the development.

e) Preliminary Grading Plan

All proposed plans of subdivisions must be accompanied by a Preliminary Grading Plan. This plan shall include proposed grades and elevations at key locations to show how the proposed subdivision will meet lot grading and roadway grading requirements. Existing condition elevations are to be shown where matching proposed grades. Cross-sections shall show how the site will be graded.

The design and calculation of overland flow routes are to be included to understand impacts on the proposed and surrounding lands.

f) Water Distribution Report

The Water Distribution report is to be submitted and shall address water distribution systems, pressure zones, water consumption - estimated consumption, fire flows, current capacities of trunk systems, phasing, net impact due to the proposed change in land use or development, need for expansion and upgrades. The Township will assist with evaluation of the off-site infrastructure impacts/capabilities as required and when information is available. The Developer will be responsible for costs associated with this assistance.

g) Stormwater Management (SWM) Report

Refer to Section D2 - Stormwater Management

h) Transportation Impact Study (TIS)

A Transportation Impact Study (TIS) is a requirement of any development in the Township and at the Township's discretion. Consideration should be given to the impact of new traffic from the proposed development on the adjacent road system and future development lands within the proximity of the proposed subdivision. TIS should also consider pedestrian traffic needs. Prior to proceeding with the TIS, consultation with the Township is to be completed to review the terms of reference. TIS is to incorporate guideline recommendations outlined in the document entitled: "Traffic Impact Study Guidelines" (City of Guelph), April 2016, should be followed when preparing the TIS report. Growth rate can be found in the current Township Community Growth Plan.

When determined by the Township and at the Developer's cost, in substitution to a full TIS the Township may utilize the Township's Consulting Transportation Engineer to review the proposed development and prepare TIS or letter of opinion for the proposed development.

i) Environmental Site Assessment (ESA) Subdivision

An Environmental Site Assessment (ESA) may be undertaken when a portion of the site is to be dedicated to the Township free of encumbrances and/or when the Township, Wellington County or Ministry of Transportation (MTO) requires land dedication for a road widening. When lands are to be dedicated to the Township, a Phase I/II Environmental Site Assessment must be completed in accordance with either CSA Standard Z768-01 or Schedule D of Ontario Regulation 153/04 (as amended from time to time) under the Environmental Protection Act. Depending on the findings of the Phase I ESA, a Phase II ESA and possible record of site condition (RSC)

may be required on the portion of the land that is to be dedicated to the Township, County or MTO in accordance with Ontario Regulation 153/04 (as amended from time to time). The Township Building Department may also require a RSC when a property is changing the land use through a Site Plan application, Building Permit, or completing a zone change. Under Ontario Regulation 153/04 (as amended from time to time), a RSC will be required if the proposed development will change the site to a more sensitive land use.

j) Archaeological Assessment

An Archaeological Assessment of the proposed development may be required from a licensed Archaeologist to conduct an assessment of the site, to ensure preservation or resource removal and documentation of any significant archaeological resources found on site.

k) Heritage Impact Assessments and Conservation Plan

As part of a complete application for the proposed development, the Subdivider may be required to submit a Heritage Impact Assessment and/or Conservation Plan, in accordance with the requirements of Heritage Planning staff and "Info Sheet #5 Heritage Impact Assessment and Conservation Plans" of the Ministry of Culture, Tourism and Sport Heritage Tool Kit, to the satisfaction of the Township and County planning staff.

l) Easements which are known to be required by the Township and such other legal and property matters as the Township may be aware of at the time.

m) Shadow Study (where applicable)

n) Traffic and Noise Abatement Study (where applicable)

o) Tree and Preservation Plan (where applicable)

Depending on the nature of the proposed development, additional studies, reports and plans may be required by developer's engineering, at the request of the Township, beyond those listed above.

A.5 Development Requirements

All developments requiring Municipal Servicing extension to existing municipal services or opening up new serviced lands shall be undertaken and/or supervised by a Professional Engineer (Engineer) registered with the Professional Engineers of Ontario, or a Consulting Engineering firm authorized to practice in the Province

of Ontario. All final drawings and relevant reports submitted to the Township shall bear the seal of the registered professional Engineer responsible for the design of the project. Drawings are to be 24” x 36” size and at a scale which is adequate to show sufficient detail of the proposed work.

The Engineer shall submit to the Township’s Development Clerk in electronic format (PDF and AutoCAD or similar) of plans, specifications and pertinent design calculations for the proposed Municipal Services in accordance with the requirements of the Township. Once approved by the Township or Township’s Consulting Engineer, at which time, Township requests three hard copies of drawings on 24” x 36” paper and electronic files (PDF and AutoCAD or similar) for Township records.

Where appropriate, the plans to be submitted shall include, but are not limited to the following:

a) A copy of the plan for registration in the case of a subdivision or such other legal survey plan(s) as may be available; (only one copy of the legal plans are required).

b) General Plan(s) of Services showing all municipal services (including external works where applicable);

c) Area Grading Plan showing all proposed road and lot drainage provisions including adjacent properties;

d) A Storm Sewer Drainage and Storm Water Management Plan including the entire area to be drained;

e) A Sanitary Sewer Drainage Plan including the entire area to be serviced;

f) Plan and Profile drawings of all proposed streets, services, easements and external works;

g) Plans showing General Notes and Miscellaneous Details including standard and special details together with material and construction specifications, if required;

h) Landscape Plan;

i) Tree and Plant Preservation Plan;

j) Sediment and Erosion Control Plan;

k) Utility Servicing Plan/Composite Utility Plan, including Street light layout and illumination plan;

l) Line Painting Plan and Traffic Control Plan showing all required signage (i.e. street name signs, stop signs) and no parking signs for on-street parking on one side of the road), where applicable;

m) Such other plans as may be required or requested by the Municipality for Site Plan/Subdivision Agreements.

A.6 Design Guidelines

These guidelines should be read in conjunction with the standard engineering practice as established by the Ministry of Environment and Ministry of Transportation together with regulations, the current drinking water license, current municipal sewage collections ECA, current municipal stormwater management system ECA, design manuals, and guidelines of the Municipal Engineers' Association. Unless superseded by the Municipal Servicing Standards standard drawings and specifications from the Ontario Provincial Standards Specifications and Ontario Provincial Standard Drawings shall be used as reference for individual details (OPSS, OPSD).

A.6 Design Calculations

The design calculations shall include:

a) Storm sewer design sheet.

b) Stormwater Management Report (where applicable).

c) Sanitary sewer design sheet.

d) Design notes on pipe strengths and bedding requirements.

e) Water distribution and fire flow calculations.

f) Sanitary unit allocation calculations. (Residential to include number and type of units. Industrial, commercial, institutional and multi-residential to provide estimated flows.).

g) Water supply calculations.

h) Detailed cost breakdown of all Municipal Services to be provided. Cost estimates shall be provided with final submission to enable the Township to

evaluate project costs and determine security requirements. Further, costs are to be separated into on-site and external work, where applicable.

A.7 Review of Plans and Specifications

The plans, specifications and other documentation submitted will be reviewed by the Township. Written comments, along with markups as required, will be provided to the Developer and their agents noting any required revisions. One copy of information submitted may be returned to the Consulting Engineer noting any required revisions. All design and drawings to be in metric units.

A.8 Regulatory Agencies

Where applicable, the Municipality will require copies of the approvals from the appropriate regulatory agencies including, but not limited to: Ministry of Environment; Maitland Valley Conservation Authority (MVCA); Saugeen Conservation Authority (SVCA); Grand River Conservation Authority (GRCA); Ministry of Transportation (MTO); Ministry of Natural Resources (MNR), Department of Fisheries and Oceans (DFO), and County of Wellington (County).

A.9 Municipal Approval

When the plans, specifications and other design calculations are considered satisfactory, the Township will sign as the municipality and/or applicant, all applications for submission to the appropriate regulatory agencies.

One complete digital set of engineering drawings and a digital copy of the Ministry of Environment Environmental Compliance Approval (ECA) forms for storm sewer, stormwater management, and sanitary sewer approvals (where required) shall be submitted to the Municipality. These copies will be signed by the Municipality and then returned to the Developer's Engineer who will then make application to the Ministrey of the Environment for acceptance under the Ontario Water Resources Act. When required, air, noise, and water related applications are also to be provided for signing.

For most additions and alterations to the municipal water distribution system, where and ECA is not required, the Developer's Engineer shall provide a complete MECP Form 1 – Record of Watermains, and all supporting information and calculations.

For most additions and alterations to the municipal sewage collection system, where an ECA is not required, the Developer's Engineer shall provide a complete MECP Form SS1 – Record of Future Alteration Authorized for Separate Sewers/Nominally Separate Sewers/Forcemains and where needed, a complete Form SS2 – Record of Future Alterations Authorized for Components of the Municipal Sewage Collection System, with all supporting information and calculations.

For most additions and alterations to the municipal stormwater management system, where an ECA is not required, the Developer's Engineer shall provide a complete MECP Form SW1 – Record of Future Alterations Authorized for Storm Sewers/Ditches/Culverts and where needed, a complete Form SW2 – Record of Future Alteration Authorized for Stormwater Management Facilities, with all supporting information and calculations.

A.10 Commencement of Construction

Following acceptance of the draft plan or Site Plan approval, no construction work related to the development shall begin until the Developer has provided written proof to the satisfaction of the Township that the required approvals and permits have been received from regulatory agencies and they have been satisfied.

Following execution signing of the applicable agreement, Certificate of Insurance, security deposit (i.e. Letter of Credit), and at least two weeks advance notice shall be submitted to the Township prior to the commencement of construction. The Developer's Engineer must schedule a pre-construction meeting with sufficient advance notice, which includes and shall chair and prepare meeting notes within one week from the meeting date to all municipal representatives in attendance.

The Developer's Engineer shall submit the following information to the Municipality for review and acceptance:

- Two sets of construction specifications;
- A list containing the Contractor, subcontractors and the Contractor's material suppliers;
- List of materials that will be used to install the Works;
- Notice of Project and WSIB;
- Proposed disposal sites;
- Proposed haul route;
- Traffic Control Plan;
- Insurance documents;
- Project schedules;
- Spills Action plan;
- Any other information as required by the Township or the Township's Consulting Engineer or as specified in the Development Agreement.

In addition to the above items, the Developer's Engineer must provide confirmation that all recommendations of the Sediment and Erosion Control plan are implemented.

Right of way works to be completed in accordance with the Development Agreement prior to the issuance of a Building Permit and to the satisfaction of the Operations Department.

A.12 Site Meetings

The Developer's Engineer shall chair and prepare meeting notes of construction site meetings. Meetings are to be held at two-week intervals after the start of construction unless the Township agrees that a longer interval is acceptable. The Developer's Engineer and site inspector along with the contractor's project manager and site foreperson shall attend the site meetings. Minutes shall be distributed within one week of the meeting date.

A.11 Inspection of Construction and As Recorded Drawings

The Developer's Engineer or Consulting Engineering Firm who is responsible for the works shall be required to provide full-time inspection during construction activity, maintain a daily site diary that can be viewed by the Township or their agent, and retain a red line drawing and records of all revisions to the design that were implemented during construction. The Engineer shall also be responsible for preparing and submitting within six (6) months of achieving Preliminary Acceptance of the servicing Works of the applicable development the following items:

i. As Recorded Drawings to be submitted to the Township's Development Technologist for review in electronic file (PDF) format. Once approved by the Township, the Developer shall submit three (3) bound sets of hard copies of drawings printed on 24" x 36" paper copies and electronic files (PDF & AutoCAD or similar & GIS shape files).

ii. Individual Service Record Sheets (SRS) are required for each property and to include each applicable municipal service: drinking water, sanitary sewer and storm sewer. Each sheet must clearly identify the registered plan number, lot number and municipal street address together with the size and location of the service. The SRS are to be submitted to the Township's Development Technologist for review, until approved by Township, at which time Township requests two (2) sets of hard copies of SRS printed on 8.5" x 11" paper and electronic files (PDF). Template of SRS is found in Appendix B.

- If items described in the tender drawings were constructed in variance to the designs illustrated in the approved proposed construction drawings, then the As Recorded submissions should be revised and/or edited to accurately reflect how the work in question was constructed. As Recorded drawings should also include: an "As-Recorded" revision note and date on revision block; new street names; lot numbering and block identification shall be checked against the Registered Plan; municipal street address; final elevation of centre line of roadway every 20 metres; locations of sanitary, storm and water services; size and type of material for all types of services (sanitary, storm and water) are to be

indicated in a table format shown on plan view or indicated on the drawing in form of a note on the plan and profile drawings; grades to two decimal places; gradients of all sewers; elevation of top of watermain every 20 metres; location and invert elevation of rear and side yards storm sewers and swales; grade changes in sewer mains; label size and type of material on sewers and watermains; all newly installed utilities; hatching of sidewalk and driveways to be shown; If insulation or geotextile was installed, the location is to be indicated with hatching on the plan and profile view; any additional information that has been required for construction after acceptance of the approved engineered drawings that are listed in the agreement. All valves and terminations shall be properly swing tied into permanent structures. Service Record Sheets are to show tie-in dimensions from property bar to each service location at property line. Water service curb box is to include tie-in dimensions from both property bars. See Appendix B for an example of a complete Service Record Sheet.

If any revisions are required, one set of drawings, with comments marked in red, will be returned to the Developer's Engineer.

A.12 Acceptance of Services

Subject to details contained within the Development (Subdivision) agreement specifications, the general requirements of acceptance of services are as follows:

a) Preliminary Acceptance

New services installed by the Developer shall be secured in a development agreement (i.e. Pre-servicing, subdivision and/or site plan agreement) to the satisfaction of the Township.

1. The Consulting Engineers for the Township have recommended approval to the Township of the written certification from the Developer's Consulting Engineer that all such services have been constructed and installed in accordance with the approved plans, specifications, and the agreements; and
2. The Developer has paid all monies payable by them to the Township and Wellington North Power.

Following which Township Council may, by resolution, grant *Preliminary Acceptance* of the applicable services and thereafter the said services shall be subject to a minimum of two (2) year guarantee and maintenance period.

Applicable services for Stage 1 *Preliminary Acceptance* are as follows:

i) All underground services, mains and laterals, including sanitary sewers, storm sewers, watermains, and including all water, storm and sanitary sewers service connections to the limit of the street allowance for each

proposed building lot, and watermains that have been installed including testing requirements found in Appendix C;
ii) Stormwater management facility (if applicable) including full restoration;
iii) Sewage pumping station (if applicable);
iv) Road Not Assumed sign posted at all entrances; and
v) All deficiencies have been listed.

Applicable services for Stage 2 *Preliminary Acceptance* are as follows:

i) All roads Works including granular base, curbs and gutters and base asphalt including testing requirements found in Appendix C;
ii) Grading of boulevard areas;
vi) Final grading, topsoil and seeding, and required fencing of parks and walkways;
vii) Final grading, topsoil and seeding, of easements that are to be deeded to the Township;
iv) Street signs and traffic control signs;
v) Road Not Assumed sign at all entrances;
vi) Utilities (Gas, telephone, fiber optics, etc.);
vii) Installation of property bars and OLS survey;
viii) Final Grading Plan; and
ix) All deficiencies have been listed.

Applicable services for Stage 3 *Preliminary Acceptance* are as follows:

i) completion of the electrical distribution system including appropriate testing and inspections;
ii) service connection to the edge of the street allowance for each proposed utility and street lighting;
iii) All deficiencies have been listed.

Applicable services for Stage 4 *Preliminary Acceptance* are as follows:

i) Surface coat of asphalt and sidewalks including testing requirements found in Appendix C;
ii) Sidewalks;
iii) Topsoil and sodding;
iv) Trees;
v) Driveway ramps;
vi) Fencing;
vii) All other requirements; and
viii) All deficiencies have been listed.

b) Final Acceptance

At the written request of the Developer's Engineer, the Consulting Engineer for the Township will submit a recommendation letter to the Township to grant *Final Acceptance* and assume the development provided that all of the below

requirements have been met. Township Council may, by resolution, grant Final Acceptance of all or part of the applicable services constituting a stage of servicing at a date at least two (2) years after the date of the Preliminary Acceptance for such services, provided the Developer has paid all monies payable by them to the Township and the following has been satisfied by the Township:

i) The applicable services have been completely installed to the satisfaction of the current Township's Municipal Servicing Standards;
ii) All testing requirements for Final Acceptance have been completed as found in Appendix C. All sanitary sewers and service connections are to be flushed clean and CCTV inspected;
iii) 30 days prior to the expiration of the maintenance period, the Developer's Engineer is to arrange for a field inspection with the Contractor and Township staff to review the Works. All structures shall be cleaned and all repairs or maintenance work is repaired prior to the municipal inspection;
iv) No repairs or maintenance work on the applicable services remains to be completed;
v) All standard iron bars, concrete monuments or monumentation of higher standard which were disturbed in the course of building, have been restored by or at the expense of the Developer and that a certificate from the Ontario Land Surveyor or other evidence satisfactory to the Town's solicitor has been provided to confirm that all such monumentation has been located and, where necessary, replaced;
vi) If applicable, provide the Operations and Maintenance Manual for the SWM facility, including cleanout of sediment;
vii) Approved As Recorded drawings and Service Record Sheets have been submitted;
viii) Developer's Engineer to provide a statement that all works have been completed and there are no deficiencies; and
ix) Statutory Declaration of accounts paid.
x) Has approved the formal certification from the Developer's Consulting Engineers to the Township certifying that all applicable works and services have been completely installed in accordance with the approved plans, specifications and the agreements; **and**
xi) Has received similar copy of all "As Recorded" drawings and Service Record Sheets as described in section A.11, Inspection of Construction and As Recorded Drawings, thereof including the Approved Grading plan.

A.13 Construction Maintenance Period

Township's construction maintenance period on all projects is to be a minimum of two (2) years. The commencement date of the maintenance period for subdivision agreements is the date of Council's resolution for Preliminary Acceptance. The commencement date of the maintenance period for all other agreements is based upon the date of the Township's letter of acceptance to the Developer for the services. The Engineer or Consulting Engineering Firm responsible for the project

will work with the Township in carrying out any appropriate inspection during the maintenance period. If deficiencies or maintenance work is required, full time inspection of all servicing components that will become property of the Township is required by the Developer's Engineer.

During the Maintenance Period, the Developer is responsible for the maintenance costs and physical construction of any remaining or deficient works, operating costs of street lighting, street sweeping, grass cutting, weed control on vacant lots and boulevard, etc. Inspection of SWM Facilities following rainfall events is the responsibility of the Developer and shall be documented to ensure the pond is functioning per the design.

A.14 Operation and Connection of Municipal Services

No operation of or connection to, existing municipal services without prior written approval from the Township of Wellington North Operations Department will be permitted.

All works within the municipal right of way as a result of private development will require a cost estimate and a 100% security deposit for the value of work. All Right of Way works including boulevards, sidewalks, curb and gutter, asphalt roadways etc. are to be completed to the satisfaction of the Township or the Municipal Engineer.

A.15 Additional Standards and Specifications

For items not specifically covered by the Municipal Standards, the minimum criteria to be used will be referenced in the Ontario Provincial Standard Drawings (OPSD), Ontario Provincial Standard Specifications (OPSS), Ministry of the Environment, Ministry of Transportation (M.T.O.), Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (and associated MTO Design Supplemental) or other recognized authority, and when conflicts arise, the Township's decision will be binding.

Where specific product or methodology is identified by the Municipal Standards, alternatives of similar or superior quality and performance will be considered at the sole and exclusive discretion of the Township.

B. PLAN AND DRAWING SPECIFICATIONS

The plans and drawings shall be prepared as follows:

B.1 General Plan

a) Minimum scale of 1:1000.

b) Indicate a north arrow and construction north arrow.

c) Show a title block.

d) All datum should be referred to a metric geodetic municipal benchmark.

e) Show all the existing and proposed lots, blocks, easements, road allowances and street names.

f) Show all existing and proposed curbs and sidewalks.

g) Show the direction of flow for all existing and proposed sewers and ditches

h) Show all existing and proposed sewer sizes, maintenance holes, catch basins, and stormwater detention areas.

i) Show all existing and proposed watermain sizes including valves and hydrants.

j) Show all existing and proposed services and utilities, including street light pole locations, control pedestals and hydro transformer locations.

k) Show all existing structures, vegetation, natural features on, or adjacent to the subject property.

l) Show proposed phasing.

m) Show all abutting properties and land usage.

n) Show a table for a list of revisions.

B.2 Plan and Profile Drawings

The plan and profile drawings shall be prepared in accordance with the Standard Drawings, to the satisfaction of the Municipality, and as follows:

a) All plans and profiles must be drawn at a minimum scale of 1:500 horizontally and 1:50 vertically.

b) Indicate a north arrow.

c) Show a title block and key plan.

d) All elevations should be referred to a metric geodetic municipal benchmark.

e) Show all the existing and proposed lots, blocks, easements, road allowances and street names.

f) Show all existing and proposed curbs and sidewalks.

g) All existing basement elevations must be shown on the profile to determine flooding impacts.

h) Show all existing and proposed sewer and watermain lengths, types and class of pipe, type of pipe bedding, grades, sewer inverts and direction of flow, roadways and include all services on both plan and profile drawings.

i) Show all existing structures, vegetation, natural features on, or adjacent to the subject property.

j) Show dimensions and curb radii.

k) Where the plans are amended or revised after they have been approved by the Municipal Engineer, the date of amendment or revision shall be noted in the table for the list of revisions on the plan, and resubmitted to the Municipal Engineer.

B.3 Lot Grading Plans

See Section G.

C. SANITARY

C.1 Sanitary Sewers

Sanitary sewer design may be subject to Ontario Ministry of Environment review and approval. Approval for construction will not be given until the approval for both sewers and sewage treatment facilities has been received within a format authorized by the Ministry of the Environment. Discharge into the Township's sanitary sewer system must be as per the Township's current sewer-use by-law.

Sanitary sewer allocations can be received through the Sewage Allocation Policy process and by submitting an application to the Director of Operations.

C.2 Sanitary Design

- Decreases in pipe size from upstream to downstream will not be permitted.
- Sanitary sewers with service connections to each lot or block shall be provided in accordance with the Ministry of the Environment Guidelines and the following Township of Wellington North design criteria.
- All sanitary sewers shall be designed so that the hydraulic gradeline under peak flow condition is equal to or below the obvert of the pipe. Velocities shall be sufficient for self-cleaning in the mains. Low pressure systems will be considered when no gravity system is available – easements may be required.
- First upstream leg of sanitary sewer is to have a minimum slope of 2.0%, where possible.

a) Sizing:

- Sewer Capacity: Manning's Formula (full flow)

$$Q = VA = \left(\frac{1.0}{n}\right) AR^{\frac{2}{3}}S^{\frac{1}{2}}$$

Where;

Q = Flow Rate (m^3/s)
V = Velocity (m/s)
A = Flow Area (m^2)
n = Manning's Roughness Coefficient (unitless)
R = Hydraulic Radius (m)
S = Pipe Slope (m/m)

b) Population:

- Based on Official Plan and Zoning By-Law maximum densities.
- Residential — Maximum Densities from Official Plan or Zoning By-Law or other criteria as determined from capacities of existing trunk services and facilities.

c) Domestic Flows: 350 L/cap.d. (litres per capita per day)

d) Non-Residential Flows: To be determined by the applicant's Engineer.

e) Extraneous Flows: 0.15 L/ha.s. (litres per hectare per second)

f) Peaking Factor:

- Commercial peaking factor of 1.0
- Residential (Harmon Formula):

$$M = 1 + \frac{14}{4+Pop.^{0.5}}$$ (Max = 4.0 – Ministry of Environment guide lines)

- Industrial: To be in accordance with current Ministry of the Environment design criteria.

g) Minimum Velocity: 0.6 m/s based on actual flow

h) Maximum Velocity: 3 m/s

- Pipe Roughness: Manning's "n" value 0.013 for concrete and PVC pipes.

C.3 Sanitary Sewer Main or Collector

a) Minimum Size: 200 mm (trunk or collector)

b) Pipe Bedding: As detailed in Table 1

c) Pipe Materials: See Table 2

d) Minimum Depth of Cover: 2.4 m (Insulation to be provided if cover is below 1.5 m)

e) Location:

- All sanitary sewer mains shall be located within the center line of roadway in accordance with the Township of Wellington North typical road cross–sections. (See Standard Drawings R1, R2, and R3).

C.4 Maintenance Holes:

a) Maintenance Hole Spacing: 100 m for pipes up to 1200 mm diameter

b) Maintenance Holes:

- Minimum of 1200 mm diameter conforming to OPSD 701.010 or as required for larger trunk sewer sizes..

- All maintenance hole base, riser and lid sections to be installed with rubber seal gasket. Frost straps (internal or external) shall be provided to hold maintenance hole sections together (at least two (2) between each section) conforming to OPSD 701.100. External straps to extend vertically from top to bottom and for deep maintenance holes extended at least 1 m below frost depth.

- Lift holes to be plugged with mortar.

- Pre-benched structures to be used where possible.

- Approved “Kor-N-Seal” pipe adaptors shall be used for the connection of all pipes at maintenance holes.

- Drop Structure required where the inlet and outlet inverts differ by more than 0.6 m.

- External frost straps to extend vertically from top to bottom and for deep maintenance holes extended at least 1 m below frost depth.

- Maintenance hole safety grates are required for maintenance hole that are greater than 5.0 m. Refer to OPSD 404.020 (latest revision).

- Invert Drops: Determined by hydraulic calculations for all junction and transition maintenance holes.

  For all others:

0° Turn	25 mm
10° – 45° Turn	50 mm
46° – 90° Turn	80 mm

- Waterproofing/Sealing: All external joints in precast concrete sanitary maintenance holes shall be wrapped with a waterproof membrane that has a minimum 300 mm wide strap. Denso tape, Blueskin waterproofing (including primer) or approved equivalent.

c) Maintenance Access Hole Adjustment:

- Castings within the roadway to be left at base asphalt elevations and adjusted to finished elevations prior to surface asphalt.
- Only precast concrete adjustment units to be used.
- Minimum 200 mm adjustment allowance.
- Maximum 300 mm adjustment allowance.
- No brick, block or steel lift rings permitted.
- Frame and Grate: AutoStable manufactured by Bibby-Ste-Croix with closed style grate. OPSD 401.010A may be used **only** on existing structures where required adjustment spacing needed for AutoStable lid is not achievable. See Table 1 and 2.

C.5 Sanitary Service Connections

a) Service Pipe Sizing:

- Service pipe material shall be colour green to avoid cross connection.
- Minimum 125 mm or match to existing for residential services (single detached, semi-detached, townhouses)
- Minimum 150 mm for industrial, commercial, condominium, institutional, apartment or multi-residential services.

- Decreases in pipe size from upstream to downstream will not be permitted.

- Minimum Grade: 2%

- Minimum depth of cover at Property Line: 2.4 metres

- Residential services up to and including 150 mm, a 45^{o} wye cleanout with PVC cap below grade to be provided at Property Line marked with a 50 mm x 100mm marker painted green to 300 mm above grade as required. See Standard Drawing S9.

- Residential services greater than 150 mm, Industrial, Commercial, Condominium, Institutional, Apartment or Multi-Residential services, shall provide a water tight maintenance hole (OPSD 701.010) at Property Line but entirely within private property.

- All connections to be installed as per OPSD 1006.010 and Standard Drawing S8 to be made with an approved manufactured prefabricated "Tee" or approved equivalent. When connecting to an existing main, stainless steel straps and saddles may be permitted, see Table 2.

- Sanitary service will **NOT** be allowed to connect into maintenance holes. All sanitary services are to be connected to the sanitary sewer main using a manufactured tee.

- New development (singles, semis, row or block townhouses) requires one (1) service per residential unit. See Standard Drawing S1 and S2 for service layout.

- For deep sanitary service connections exceeding 4.0 m connection at main will conform to Pipe Manufacturers Specifications (Installation Guide). See Standard Drawing S8.

b) Pipe Bedding: See Table 1

c) Pipe Material: See Table 2

d) Pipe Location

- All residential units including single detached, semi-detached, row or block townhouses shall be located 1.5 m to the left (facing property) of the center of the lot and 2.5 m to the left of the water service. The

minimum separation between services at property line shall be 2.5m. See Standard Drawings S1, S2, S3 and S4.

- All commercial, industrial and institutional service to be located to the left (facing property) of the water service. The minimum separation between services at property line shall be 2.5 m.

C.6 Inspections and Testing

a) Closed Circuit T.V. (CCTV) inspections in accordance with OPSS.MUNI 409 will be required at the following three (3) milestones:

i) Prior to Preliminary Acceptance (after base asphalt and curb is placed), this also includes main sewer and services to Property Line.

ii) As part of preparation to surface asphalt (main only).

iii) Prior to Final Acceptance, this also includes main sewer and services to Property Line.

- All mains and services to be flushed prior to CCTV inspection.

- CCTV inspections for all sizes of sewer pipe shall be undertaken using pan and tilt equipment capable of providing a clear view of lateral connections at mainline and any potential deficiencies. Additionally, a CCTV inspection of each lateral service shall be performed from the mainline sewer to the property line that clearly shows the capped service or reconnection point to check for deficiencies that may have occurred during or after installation. Video of each lateral inspection must clearly show the municipal address or lot number that it is associated with. Developer's Engineer to review CCTV inspection and provide a commissioning report and identify any deficiencies. If deficiencies are identified, they must be immediately corrected and re-inspect those sewer or service sections by CCTV.

- Upon completion of a connection to any Township sanitary sewer system, no sewage or liquid may be discharged into the system from the building serviced by the connection until a closed circuit television (CCTV) inspection of the pipe from the building to the Township's sewer main has been completed, in form and content and with functionality results satisfactory to and approved by the Township's Environmental Services Department or the Township's Building Department.

b) Sanitary sewers shall be tested in accordance with OPSS.MUNI 410 and as specified by the Township. Developer's Engineer to provide a commissioning report.

i) Infiltration/exfiltration testing (after base asphalt and curb is placed) is a requirement on all new sewer main and services. Low pressure air testing may be considered when water is not readily available and approved by the Township. Low air testing equipment shall include a pressure relief valve set to a maximum of 9 psi to avoid over pressurizing. If a segment of the system fails during leak testing, source of leakage shall be identified, and all defective material shall be repaired or replaced to the satisfaction of the Township. The repaired or replaced sections shall be retested until results are found acceptable to the Township are obtained.

ii) Deflection testing in accordance with OPSS.MUNI 438 of pipe sewers (main only) is a requirement when using flexible pipe prior to Preliminary Acceptance (after base asphalt and curb is placed). The device (mandrel) shall be pulled manually through the pipe not sooner than 30 days after the completion of backfilling and installation of service connections. Pipe segments failing the deflection test shall be removed and replaced, and deflection test retested.

C.8 Sanitary Sewage Pumping Stations

Sanitary sewage pumping stations and discharge forcemains shall be designed in accordance with the latest edition of the Ministry of Environment design guidelines for sewage works. The design shall be completed by a Professional Engineer licensed in the Province of Ontario. A minimum of two sewage pumps (one duty and one standby) shall be provided each rated at the peak flow capacity of the station. When station peak flows exceed 100 L/s, three pumps shall be provided. One pump (jockey pump) shall be rated for the average day flow of the station and the other two pumps shall be rated for the peak flow of the station.

For stations with peak flow capacities of 100 L/s or less, the part of the structure housing the pumps may consist of a wet well only. When the peak flow capacity exceeds 100 L/s, the station configuration shall be wet well/dry well where the pumps are located in the dry well for easier maintenance.

All sewage pumps shall be rated as submersible and shall be manufactured by Flygt/Xylem. All pump installation accessories (anchor bolts, guiderail holders, chain hooks, lifting chain, etc.) shall be 316 stainless steel when available. Otherwise accessories shall be 304 stainless steel. Pump removal guiderails shall be galvanized steel (grade and diameter as per pump supplier's recommendations). The pump shall be supplied with a discharge/suction elbow supplied by the manufacturer for wet well and dry well installations respectively. Pumps shall be supplied with Flygt/Xylem seal monitoring systems for the model of pump selected. Pump motors shall be premium efficiency. Pump removal equipment shall be supplied by the pump supplier.

Risers from pumps shall not enter the bottom of the discharge header. Pump riser pipes shall enter the discharge header via a 45 degree wye connection. The pipe header shall include a valve near the wall of the chamber where the header exits the station, a 75 mm diameter drain complete with valve and a 150 mm diameter station by-pass/forcemain flushing connection complete with valve.

The station discharge shall be equipped with a magnetic flow meter either located in the dry well or in a separate chamber outside the wet well or dry well. Piping and valves for a meter bypass shall be provided. A sufficient number (minimum of 4) of bidirectional knife gate valves shall be installed to isolate the flow meter and the meter bypass. The meter shall be rated as explosion proof (Class 1, Division 1, Group D). In addition, the flow meter shall be rated for continuous/prolonged submersion (NEMA 6P) in water/sewage.

All piping used for conveying sewage, sump pump discharge and potable water shall be flanged Schedule 40S, 316L stainless steel. The stainless steel shall originate from a Canadian or an American mill. Mill reports shall be provided for all stainless steel piping. Piping 100 mm in diameter and larger shall be flanged. Flange backing rings shall be hot dipped galvanized steel. All flanged connections

shall be assembled with 316 stainless steel bolts, nuts, washers, etc. and all threads shall be treated with copper based anti-seize compound.

Check valves shall be Valmatic Surge Buster check valves with fusion bonded epoxy coating inside and out, 316 stainless steel cover bolts, disc accelerator, backflow actuator and EPDM reinforced disc.

All isolation valves for pump discharges and flow meters shall be stainless steel bi-directional knife gate valves. They shall be Dezurik KCB or Stafsjo. Valves shall be wafer style/semi-lug design, ANSI class 150, full port, two piece stainless steel body with a stainless steel super structure and standard gland packing. The 316 stainless steel, fully machined blade will have rounded edges and be fully guided to prevent blade movement causing stuffing box seal failure. The gland box shall be fully machined with radiused ends to match the round edges on blade. There will be a fully encapsulated seat of EPDM material which is field replaceable. The valve will be non-rising stem with a double lead acme screw thread which together with needle axial bearings assures ease of operation. All valves shall be operational from outside the wet well for wet well only configurations. Provide suitable operators for all isolation valves in wet wells and dry wells.

Dry wells shall be equipped with sewage sump pumps with a minimum discharge diameter of 75 mm. Dual check valves and a plug valve shall be installed on the sump pump discharge piping.

All stations shall include the installation of variable frequency drives manufactured by ABB Inc. Acceptable motor control centre (MCC) manufacturers are Eaton and Allan-Bradley. Variable frequency drives from the approved MCC manufacturers are not acceptable/approved.

All system programmable logic control (PLC) panels shall be manufactured by Allan-Bradley and shall be SCADA programmed using language that is the same as that used in other Township sewage facilities at the time of installation. The human machine interface shall have a colour touch screen that is 375 mm (15") wide. Program source code shall be provided to the Township.

Wet well stations shall be equipped with aluminium platforms inside the wet well for servicing equipment. Safety guardrail for the platforms shall be anodized aluminium with 150 mm high kick plates. Safety chains for the guardrail shall be stainless steel. All ladders shall be 316L stainless steel with a minimum 20 mm diameter anti-slip rungs. Ladder side rails shall be a minimum of 50 mm wide by 10 mm thick. All anchoring systems for platforms and ladders (drop-ins, bolts, nuts, washers, etc.) shall be 316 stainless steel. Minimum bolt diameter shall be 13 mm. Wet wells for stations that are wet well/dry well configurations shall include aluminium or fiberglass stairs complete with anodized aluminium or fiberglass handrail to allow easy access to the wet well for operating staff.

Wet well vents shall be 11 gauge, 304L stainless steel complete with stainless steel 24 mesh screen. Vent screens shall be removable with stainless steel fasteners.

Stations and flow metering chambers shall be equipped with access hatches. All access hatches shall be aluminium and rated for H20 loading. The man access hatches shall be 750 mm by 900 mm. Pump access hatches shall be sized based on pump dimensions. The manufacturer shall provide structural calculations stamped by a registered Professional Engineer in the Province of Ontario. The channel frame shall be a minimum ¼" aluminium with full anchor flange around the perimeter and have a minimum cross-sectional area of 7.5 square inches for proper water drainage. Covers shall be equipped with Type 316 stainless steel hinges having a minimum 3/8" diameter stainless steel pins and shall pivot so the cover does not protrude into the channel frame. Hinges shall be specifically designed for horizontal installation and shall be through bolted to the cover with tamperproof stainless steel lock bolts and shall be through bolted to the frame with stainless steel bolts and lock nuts. All bolts shall be flush with the covers' surface. Covers shall be equipped with compression springs fully enclosed in telescopic tubes. The upper tube shall be the outer tube to prevent accumulation of moisture, grit and debris inside the tube assembly. The lower tube shall interlock with a flanged support shoe fastened to a formed ¼" gusset support plate. Covers shall be fitted with the required number and size of compression spring operators to provide smooth, easy, controlled operation through the entire arc of opening and to act as a check in retarding downward motion when being closed. Operation shall not be affected by temperature. Covers shall be equipped with a stainless steel hold-open arm which automatically locks the cover in the open position. A conveniently located handle shall release the covers for closing. Each cover shall be equipped with a recessed padlock hasp covered by a hinged lid that is flush with the surface. Each cover shall have a lift handle that is designed to be flush with the walking surface when not in use. A 40 mm (1½") drain coupling shall be located in the right front corner of the channel frame. All hardware shall be for installation in a highly corrosive environment, Type 316 stainless steel. All fasteners shall be Type 316 stainless steel. Hardware to include spring tubes, springs, lifting mechanism supports, hold-open arms(s), hinges, hinge pins, safety chain (on double cover units) and lock assembly. The pump removal hatches shall permit the installation of submersible pump guide rail brackets. Provide safety access grates under all hatch covers. Ensure all access grates are hinged, equipped with retractable lifting handle, rated for and reinforced for a live load of 14.4 kN/m², equipped with lock mechanism which holds the grate at 90 degrees vertical. Provide aluminium safety grating. Grating shall be safety orange. Grating shall be powder coated, applied by electrostatic spray process. Coating shall be a thermosetting epoxy powder coat finish minimum 2 mm thick and baked at 180 degrees C until cured.

For wet well stations, the control building shall be offset from the wet well location. For wet well/dry well stations, the building shall be located above the dry well. The building shall be constructed of concrete masonry block with either brick or face block as the architectural finish of the exterior of the facility. The architectural finish shall be approved by the municipality. When the station is designed with a pitched roof, the roofing material shall be prepainted galvanized steel as manufactured by Indal Metals, Vic West Steel or Agway Metals Inc. The panel core thickness shall be a minimum of 26 gauge. Panels shall be long enough so that horizontal splices are not required. The nominal width of the panels shall be a minimum of 600 mm. Architectural louvers for the building shall be prepainted aluminium and be designed to attenuate noise to 70 dB at 7.0 m. Motorized dampers for the louvers shall be aluminium. For wet well/dry well configurations, provide lifting equipment to remove the pumps from the dry well that will allow the pumps to be removed to the outside of the building and loaded on to a truck.

Stations shall include the supply and installation of standby power diesel generators. The generator shall be sized to operate the entire electrical system of the station continuously plus 25% spare capacity for future loads. The fuel tank shall be integral with the generator complete with a double walled fuel tank with a capacity to operate the generator under full load for 72 hours. The generator shall be equipped with a hospital grade silencer. The acoustical design of the generator enclosure/building shall be a minimum of 70 dB at 7.0 m. The acoustic evaluation and design shall be completed by a Professional Engineer licensed in Ontario. The generator may be housed in the station control building or in an acoustically designed walk-in enclosure supplied by the generator manufacturer. Acceptable generator suppliers include: Toromont/Caterpillar, Cummins Eastern Canada, Kohler (Paramount Power Systems), Generac (Total Power Limited), Wajax Power Systems and GAL Power. The generator installation shall comply with all applicable regulations including but not limited to all requirements of the Technical Standards and Safety Authority (TSSA).

Discharge forcemains shall be designed by a Professional Engineer licensed in Ontario. Forcemain material shall be PVC pipe with a minimum pressure rating of 160 psi (SDR 26). Pipe strength, pressure rating and dimension ratio shall be determined through the completion of a transient analysis. The design of the forcemain shall also include the installation of pressure and vacuum relief valves in precast concrete chambers and one forcemain flushing connection for every 500 m of forcemain length. Relief valves shall be located where recommended by the transient analysis. Piping inside flushing and relief valve chambers shall be Schedule 40S stainless steel. Isolation valves shall be as specified above. Relief valves shall be stainless steel complete with flushing connections/attachments, shall be manufactured by ARI Valves and shall be suitable for use with wastewater. The forcemain shall be buried at a depth of 2.0 m, shall be white or purple in colour and shall be installed with tracer wire as specified for watermain.

The site shall be fenced with black vinyl covered galvanized wire (50 mm mesh No. 6 gauge) with 1.2 oz/ft² (366 g/m²) of galvanizing on wire and barbed wire overhang pointing outward. Overall height shall be 2400 mm including the barbed wire projection.

The access road and interior of the site shall be paved.

The land development company shall provide Township staff with training on all equipment at the station and shall provide the municipality with an overall functional operating and maintenance manual along with manufacturer's operating and manuals for all equipment installed at the station.

D. STORM

D.1 Storm Drainage

Storm sewer system design may be subject to Ministry of Environment, Ministry of Transportation, Wellington County and Conservation Authority review and approval. Discharge into the Township's storm sewer system must be as per the Township's current sewer-use by-law.

At times, storm water design may utilize municipal or ward drains for outlets. In addition to other approvals, design that outlet to a municipal and ward drain are also subject to approval by the Township's drainage superintendent.

Township road ditches are not typically used for storm water outlets and their use is subject to Township review and approval.

Storm drainage systems including lot grading, catch basins and piped outlets shall be designed with consideration being given to Major and Minor systems. Minor systems are to be conveyed to the receiver (stormwater management facility or watercourse) via sewers. Major flows are to be conveyed via overland routes.

The storm drainage system shall adhere to the Ministry of the Environment Guidelines and the following Township of Wellington North design criteria.

D.2 Design Criteria

a) Rainfall Intensity: Ontario Ministry of Transportation (M.T.O.) Intensity Duration Frequency (IDF) curves.

b) Design Storm

The stormwater management system shall be designed using modeling software or an alternate approved hydrologic model/calculation method. The Developer's Engineer shall use the 3 hour Chicago storm distribution or the 6 hour SCS Type II distribution, depending on developments location within the local conservation authority (See part c). Post-development runoff flows shall be controlled to pre-development levels for rainfall events with return periods between 2 year and 100 year storm events. The design of the stormwater management system shall be in accordance with the latest version of the "Stormwater Management Practices, Planning and Design Manual" and "Design Criteria for Sanitary Sewers, Storm Sewers and Forcemains for Alterations Authorized under Environmental Compliance Approval", as prepared by the Ministry of the Environment. The Minor and Major storm systems shall be designed as follows:

- Minor System: 1 in 5 year storm event for local sewers designs.

  1 in 10 year storm event for high value commercial development downtown business and trunk collectors.

- Major System: Regional Storm expressed as “Hurricane Hazel” or 1 in 100 year storm event (whichever generates greater runoff values).

- Rural System: 1 in 25 year storm event for road culverts.

  1 in 10 year storm event for entrance culverts.

c) Rainfall Distribution:

Developer to verify appropriate Authority for jurisdiction.

- 3 hour Chicago – Grand River Conservation Authority and Maitland Valley Conservation Authority.

- 6 hour SCS, Type 2 – Saugeen Valley Conservation Authority.

d) Runoff Coefficients:

The drainage area shall include all lands which will outlet through one common system. The design shall take into consideration the eventual use of all the lands within the drainage area and assign the appropriate coefficient to the lands based on the designation in the Official Plan. Run-off coefficients to be used in storm sewer design with the Rational Method are to follow Ministry of Environment current Table 5-1 Runoff Coefficients as the following ranges:

Table 5-1 - Runoff Coefficients

Sources	Coefficient (C)
Asphalt, concrete, roof areas	0.90-1.00
Grassed areas, parkland	0.15-0.35
Commercial	0.75-0.85
Industrial	0.65-0.75
Residential Single Family	0.40-0.45
Residential Semi-detached	0.45-0.60
Residential Row housing, Townhouses	0.50-0.70
Residential Apartments	0.60-0.75
Institutional Residence	0.40-0.75

e) Inlet Time of Concentration:

- Major System: Bransby Williams 10 minute minimum
- Minor System: Bransby Williams 10 minute minimum

f) Pipe Roughness:

- Manning's "n" value, 0.013 for concrete, HDPE smooth wall, and PVC pipes.
- Manning's "n" value, 0.024 for corrugated steel pipes.

g) Pipe Capacity:

- Sewers: Manning's Formula (full flow)

$$Q = VA = \left(\frac{1.0}{n}\right) AR^{\frac{2}{3}}S^{\frac{1}{2}}$$

Where;

Q = Flow Rate (m^3/s)
V = Velocity (m/s)
A = Flow Area (m^2)
n = Manning's Roughness Coefficient (unitless)
R = Hydraulic Radius (m)
S = Pipe Slope (m/m)

- Culverts: MTO Drainage Manual, Section 'D'

h) Pipe Materials: See Table 2.

i) Pipe Bedding: See Table 1.

j) Velocity:

- Minimum 0.75 m/s
- Maximum 4.5 m/s

k) Location:

Storm sewers shall be located within the roadway under the gutter line, with lateral connections to the catch basins located along gutter lines of the

curbing and in accordance with the Township of Wellington North typical road cross–sections. (See Standard Drawings R1, R2, R3 and R4).

l) Pipe Slope:

Regardless of flow velocities obtained, the minimum design grades for pipe storm sewer shall be as follows:

Sewer Size (mm)	Minimum Slope in metres Per 100 metres
250	0.28
300	0.22
350	0.17
375	0.15
400	0.14
450	0.12
525	0.10
600	0.08
675	0.067
750	0.058
825	0.052
900	0.046
975	0.041
1050	0.037

D.3 Storm Sewer Main or Collector

a) Minimum Pipe Size:

- 200 mm diameter where only lot services are connected for residential.
- Trunk - 300 mm diameter.
- Single Catch Basin leads - 250 mm diameter.
- Twin Inlet Catch Basin leads - 300 mm diameter.
- Culvert - 450 mm diameter.
- Rural Driveway Culvert – 450 mm diameter, minimum 9 m in length.

- All pipes to be bell and spigot joints and shall have elastomeric gaskets (CSA B182.8) to provide a water tight seal.

- Minimum cover on flexible pipe or culvert to be 300 mm, rigid pipe 600 mm.

b) Pipe Bedding: As detailed in Table 1

c) Pipe Materials: See Table 2

d) Minimum Depth of Cover: 1.2 meters

e) Blind Connections:

- Blind connections on new construction of sewer main is not permitted.

  Blind connections are not permitted to storm sewers under 900 mm diameter.
- When blind connections are permitted to an existing concrete storm main and with prior approval from the Operations Department, connections are to use an approved sanded adaptor or approved alternative connection. Blind connections are required to have an upstream maintenance hole at a maximum distance of 30m to facilitate maintenance.

D.4 Maintenance Hole and Catch Basin

Maintenance Holes and Catch Basins are not to be located within driveway entrances, crosswalks, and pedestrian sidewalk ramps, where practical.

a) Maintenance Holes:

- Minimum of 1200 mm diameter or as manufacturer's specifications.

- All maintenance hole base, riser and lid sections to be installed with rubber seal gasket.

- Lift holes to be plugged with mortar.

- Spacing:

  a. 100 m for pipes up to 1200 mm diameter

  b. 150 m for pipes greater than 1200 mm diameter

b) Catch Basins:

- 75 m maximum spacing except at intersections where no surface drainage across intersecting streets will be permitted.
- Where gutter grade on a cul-de-sac is less than 2% then catch basins shall be required in the cul-de-sac. Curb grading in cul-de-sac to be shown on Grading Plan including running grade label and flow arrow.
- All types of catch basin leads to be a minimum 1% slope.
- Lift holes to be plugged with mortar.

c) Twin Inlet Catch Basins:

- Required at sag points.
- Lift holes to be plugged with mortar.

d) In-Line Drains and Rear Yard Catch Basins:

- Singles: Surface inlets (catch basin) are required for every 3 units along the rear lot line swales. See Standard Drawing S1.
- Townhouse or Semis: Surface inlets (catch basin or inlet basin) are required for every 2 units along the rear lot line swales. Townhouses require a catch basin at the lead from the road but inlet basins can be used thereafter. See Standard Drawings S1 and S2.
- Sewer from the road to the rear yard (i.e. side yard) is to be a minimum of 300 mm diameter concrete pipe, offset 0.5 m from the lot line situated on a 3 m easement divided equally on the side lot line. See Standard Drawing S5.
- Sewers across the rear lot line to be offset 1 m from the rear lot line on a 3 m easement entirely on one lot with centre of catch basin offset 1.0m upstream of property line. See Standard Drawings S1 and S2.
- Sewers along the rear lot lines of townhouses are to be a minimum of 200 mm in diameter. Where the number of upstream inlets basins exceeds 2, the pipe size is to be increased to a minimum of 250 mm in diameter. These sewers along the rear can be PVC or HDPE.

- Sewers along the rear lot lines of singles are to be a minimum of 250 mm in diameter. Where the number of upstream catch basins exceeds 1, the pipe size is to be increased to a minimum of 300 mm in diameter. These sewers along the rear can be PVC or HDPE.

- All types of in-line drain lead, rear and side yard leads to have a minimum 0.5% slope.

e) Storm Structure Sumps:

- Catch basin maintenance holes are to have a 300 mm sump

- Catch basins are to have a 600 mm sump.

f) Benching:

- Manholes and catch basin manholes with pipes over 450 mm diameter require benching.

- Rear yard storm sewer catch basin that service lawn areas are to be benched.

g) Structure Pipe Connections

- Structure Pipe Connections may be connected using brick, block and non-shrink grout shall be used for the connection of all pipes at structures.

- Approved “Kor-N-Seal” pipe adaptors shall be used for the connection of PVC SDR35 pipe at structures.

h) Structure Access Hole Adjustments

- When frame and grate castings are found within the concrete curb and gutter line, the castings are to be set to final elevation using precast concrete adjustment units. Temporary drainage pipe are required at low points and all structures at intersections of the road to temporarily drain water into basin until final asphalt is placed. See Standard Drawing R5. Frame and grate to be OPSD 400.110. See Table 1.

- When frame and grate casting is found in the asphalt roadway, castings are to be set to base asphalt elevations using precast concrete adjustment units and adjusted to finished elevations prior to placement of surface asphalt. Frame and grate to be AutoStable manufactured by Bibby-Ste-Croix with open style grate. OPSD 401.010B may be used **only** on existing structures where required spacing needed for an AutoStable lid is not achievable. See Table 1 and 2.

- Only precast concrete adjustment units are to be used.

- Minimum 200 mm adjustment allowance.

- Maximum 300 mm adjustment allowance.

- No brick, block or steel lift rings permitted.

D.5 Storm Service Connections

a) Service Connections:

- Minimum size - 150 mm. Service pipe material shall be colour code white to avoid cross connection.

- Minimum Grade - 1%

- Minimum depth at Property Line - 1.2 metres

- All connections to new sewer main to be made with an approved manufactured prefabricated “Tee” or approved equivalent. When connecting to an existing concrete main a “Kor-N-Tee” may be permitted, as approved by Township. See Table 2.

- 45º wye cleanout with PVC cap below grade to be provided at Property Line marked with a 50 mm x 100 mm marker painted orange to 300mm above grade, as required. See Standard Drawing S10.

- Services greater than 150 mm shall provide a water tight concrete structure (i.e. maintenance hole (OPSD 701.010), catch basin (OPSD 705.010), etc) for access at Property Line but entirely within private property.

- Services to be located 1.5 m minimum from side lot line, for singles locate on low side of lot. One service/residential unit for singles, semis, row or block townhouses. See Standard Drawings S1, S2, S3 and S4 for service layout.

- All lots to be provided with a storm service connection for foundation drain sump pumps to be connected. Direct gravity connections at building are not permitted except where foundation drain is 0.5m higher than street property line elevation. A backflow preventor or check valve is to be installed within 1.0 m of the sump pump. An air gap must be provided outside of the house foundation wall above grade between the sump pump and the storm service. See Standard Drawing S7.

D.6 Swales:

Swales to be constructed with 3 (horizontal) : 1 (vertical) with a minimum 150mm depth. Minimum running slope of 2%.

D.7 Private Drainage:

Private property shall be graded in such a way that private storm water does not flow onto municipal assets and cause any negative impact to public assets (i.e. icing on sidewalks, etc.) Additionally, all private drainage pipes or tiles shall be terminated a minimum of 3.0 m from Township property line and not cause any negative impact to public assets (icing on sidewalks, organic growth in gutters, etc.)

a) Roof Drains:

All roof drains shall discharge to the surface with a minimum of 3.0 m back from street property line. Flow is to be controlled on property and conveyed to a suitable outlet.

D.7 Storm Sewer Outlets:

Suitable bank and stream bottom erosion protection must be provided. (i.e. headwalls with grates, rip rap, corrugated steel pipe end section including rodent grates, etc).

D.8 Subdrain:

A minimum of 6 m lengths of 150 mm diameter geotextile wrapped subdrain required on the upstream of all storm structures and in both directions at sags in the road profile. Additional subdrain as recommended by geotechnical consultants. Maximum stone size for the granular cover and bedding material shall be 50 mm in diameter. The Municipality reserves the right to require video inspection of subdrains prior to acceptance, if required.

D.9 Inspection and Testing

a) Closed Circuit T.V. (CCTV) inspections in accordance with OPSS.MUNI 409 will be required at the following interval:

i) Prior to Preliminary Acceptance (after base asphalt and curb is placed), this also includes main storm sewers and services to Property Line.

- All mains and services to be flushed prior to CCTV.

- CCTV inspections for all sizes of sewer pipe shall be undertaken using pan and tilt equipment capable of providing a clear view of lateral connections at mainline and deficiencies. Additionally, a CCTV inspection of each lateral service shall be performed from the mainline sewer to the property line to check for deficiencies that occurred during or after installation. Video of each lateral inspection must clearly show the municipal address or lot number that it is associated with. Developer's Engineer to review CCTV inspection and provide a commissioning report and identify any deficiencies. If deficiencies are identified, they must be immediately corrected and re-inspect those sewer or service sections by CCTV.

b) Storm sewers shall be tested in accordance with OPSS.MUNI 410 and as specified by the Township.

i) Deflection testing in accordance with OPSS.MUNI 438 of pipe sewers (main only) is a requirement when using flexible pipe prior to Preliminary Acceptance (after base asphalt and curb is placed). The device (Mandrel) shall be pulled manually through the pipe not sooner than 30 Days after the completion of backfilling and installation of service connections. Pipe segments failing the deflection test shall be removed and replaced, and deflection test retested.

D.10 Stormwater Management Requirements

a) Quality Control:

In accordance with "Stormwater Management Planning and Design Manual", March 2003 by the Ministry of Environment and requirements of the conservation authority where applicable. Quality treatment to be Enhanced Protection (80% S.S. removal) unless otherwise approved by the Township.

All Commercial, Industrial, Multi-Residential and Apartment properties shall have a form of quality treatment (i.e. OGS system, sand filter system, etc.) installed prior to stormwater leaving the property.

b) Quantity Control:

Control of post-development runoff flows to pre-development levels for rainfall events with return periods between 5 and 100 years. Over-control may be required to satisfy downstream constraints.

c) All hazard lands, wetlands, Environmentally Sensitive Areas (ESAs), Area of Natural or Scientific Interests (ANSIs) and floodlines are to be identified on drawings

d) Facility configuration and landscaping to incorporate design recommendations outlines in the document entitled "Design Principles of Stormwater Management Facilities" (City of Guelph), August 1996. Developer to verify appropriate Authority for jurisdiction. A copy of the document is available upon request.

e) Sediment/Erosion Control: Detailed plan to be submitted for approval.

f) All Stormwater Management Facilities shall be subject to Class Environmental Assessment requirements.

g) Note: Other approval agencies may have additional requirements.

E. WATER WORKS

E.1 Water Supply System

Central water supply systems shall be designed in accordance with current Ministry of the Environment Design Guidelines for Drinking Water Systems (2008), as amended from time to time, and all applicable Regulations. All materials used for the municipal drinking water system shall meet all applicable American Water Works Association (AWWA) and National Sanitation Foundation (NSF) standards. All fittings associated with the water supply system shall meet NSF 372 requirements for lead content.

The pre-servicing report shall address the requirements for water supply to service the Development. Should the existing supply system not have sufficient capacity to provide for new development, the Developer's Engineer shall provide a Hydrogeological Report commenting on proposed sources for additional water supply and how any impacts on the existing ground water regime will be mitigated.

Fire flow protection and storage provisions shall be reviewed with the Township of Wellington North for each development during the initial stages of Draft Plan Approval. Any expansions to the existing water systems, together with the requirements for additional wells, storage facilities and/or trunk mains will be resolved at that time.

Where the development is not connected to an existing municipal system and a communal water supply is proposed, two wells will be required. Where connections are to be made to an existing municipal system, the capacity of existing wells and storage facilities will be considered when reviewing the requirements for new source wells and storage facilities. All water supply systems shall incorporate provisions for standby power, metering, chlorination, fire storage, precharged tanks to buffer the well pumps and security fencing of the site.

Note:

Developments outside the areas designated by Council as requiring municipal water supply systems may be approved on the basis of individual wells and sewage disposal systems. The specific requirements for central water systems in rural areas shall be reviewed with Council on submission of the Preliminary Draft Plan.

E.2 Watermains

Developer's Engineer must comply with the requirements of the Ontario Safe Drinking Water Act and all applicable regulations made in accordance to the act, including but not limited to the Drinking Water Works Permits (DWWP) and the Municipal Drinking Water License (MDWL). DWWP and MDWL are available from the Township's Environmental Services Department and it is the responsibility of the developer's engineer to obtain copies as necessary.

Watermains with services to each lot or block shall be provided in accordance with the Ministry of the Environment Design Guidelines for Drinking Water System and the following Township of Wellington North Environmental Services Department design criteria based on PVC C900 or C905 Class 235 PVC (DR18) CSA B137.3-M86 pipe:

E.3 Watermain Pipe Sizing

a)	Capacity:	Hazen-Williams formula in accordance with current Ministry of the Environment design criteria.
b)	Population:	See Section C – Sanitary Sewers.
c)	Design Flow:	Greater of Maximum Daily Demand plus Fire Flow or peak demand flow.
d)	Average Day:	350 L/cap.d. (litres per capita per day)
e)	Peaking Factor:	In accordance with current Ministry of the Environment design criteria.
f)	Minimum Watermain Size:	150 mm diameter mains.
g)	Minimum Watermain Depth of Cover:	2.0 metres for mains and services.
h)	Location:	Watermain shall be located within the roadway, in accordance with the Township of Wellington North typical road cross-sections. (see Standard Drawings R1, R2, and R3).
i)	Material:	See Table 2.
j)	Pipe Bedding:	As detailed in Table 1.

E.4 Tracer Wire

- Watermain and services being installed by open cut trench method shall include tracer wire that is TWU, No. 12/7 stranded copper conductor with thermoplastic insulation, in accordance with CSA C22.2 No. 75, colour shall be blue, rated for underground use.

- Watermain and services being installed by horizontal directional drilling method shall include tracer wire that is #12 AWG Copper Clad Steel. High Strength with minimum 450 lb. break load and minimum 30 mil HDPE insulation thickness suitable for direct burial and colour coded blue. Minimum three (3) tracing wire strands to be tapped every 3 m to watermain pipe prior to watermain being pulled.

- Direct bury wire connectors shall include 3-way lockable waterproof connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installations. Connectors shall be dielectric silicone filled to seal out moisture and corrosion. Non-locking friction fit, twist or taped connectors are prohibited. See Table 2.

- All watermain and services shall be installed with tracer wire. See Standard Drawing W9.

- Tracer wire is to be left accessible inside the main water valve boxes by extending the wire up the outside of the main valve box through the manufactured hole at the top of the main water valve box with 400mm slack above grade for future locating purposes. See Standard Drawing W9.

- Tracing wire is to be left accessible at fire hydrant and shall be attached to storz pumper connection of fire hydrants. See Standard Drawing W9.

- Conductivity testing will be required on all new tracer wires prior to the final connection to the existing main. Developer will demonstrate the integrity of the new underground tracer wire by applying a conductivity signal and confirming the signal corelation on all watermains and services. The Township's Environmental Services Department must witness the conductivity test(s).

E.5 Valves and Fittings

a) Fittings:

Ductile iron cement mortar lined mechanical joint (MJ) type with adaptors to suit other materials, where necessary. All fitting shall be in accordance with AWWA C110 and the rubber-gasket joints for ductile iron fittings shall be in accordance with AWWA C111. Pressure rating to 1035 kPa or 150 PSI.

b) Valves:

- Same number of valves as the number of intersecting streets at an intersection with valves are located at the extension of property line of intersecting street. i.e. 3 valves at tee intersection, 4 valves at cross intersection.
- Maximum 200 m spacing on straight runs.
- Maximum 250 m spacing on trunk lines.
- Chambers will be required for all valves over 300 mm diameter (OPSD 701.010)
- Waterproofing and sealing of all external joints in the watermain precast valve chamber shall be wrapped with 150 mm Denso tape or BlueSkin (with primer) or approved equivalent.
- If valves exceed 2.5 m in depth – valve nut extensions are required.
- Valve Type: See Table 2.
- Valve Boxes: See Table 2 and Standard Drawing W2.

E.6 Hydrants

A hydrant shall be placed at the end of every cul-de-sac and dead-ended street. Wherever possible, hydrants shall be located at street intersections within 3 m of the corner, and located at the same side of the road as the watermain.

Hydrants shall be installed as per OPSD 1105.010, and Standard Drawing W9, W10 and W11.

a) Hydrants Type:

- See Table 2.
- All hydrants to be red. Storz cap and 2.5" caps to be black.
- Private hydrants to be yellow.
- Valves to be located 1.2 m from hydrant.
- Hydrant marker to be yellow installed on 2.5" cap.
- Hydrant flange to be set 100 mm to 150 mm above finished grade.

b) Hydrant Spacing: 150 m maximum.

c) Hydrant Cover: 2.0 m

E.7 Water Service Connections

a) Services Pipe:

- Minimum water service sizes are subject to change, with an intent of the MSS being consistent with the current version of Ontario's Building Code.
- Minimum 19 mm diameter services for Industrial, Commercial, Institutional, and Residential.
- Minimum 32 mm diameter service for Multiple Residential up to 6 units. Greater than 6 units is to be a minimum 50mm diameter service.
- All services up to and including 25mm to be polyethylene Type "K" copper pipe **or** crosslinked (PEX) conforming to AWWA C904, ("Municipex" by Rehau or "Blue904" by Ipex).

- All services 38 mm and greater to be crosslinked (PEX) conforming to AWWA C904, (“Municipex” by Rehau or “Blue904” by Ipex).

- Water service line must be a continuous length with no couplings within the Municipal Right Of Way.

- Bedding and cover material for water services shall be approved **sand** material with fine aggregate passing the 4.75 mm sieve and retained on a 75 µm sieve, as per OPSS 1001. Bedding to be a minimum of 300 mm thickness and cover to be a minimum of 300 mm above the top of pipe. See Table 2.

- Best efforts to keep water services out of driveways.

- 100 mm diameter PVC sleeves (frost collar) are required where curb stops are located in driveways. See Standard Drawing W6.

- Temporary plastic blow-off pipes are required for all unconnected services.

- Water meter idler is to be installed horizontal within 1.0m from where the water supply pipe comes into the house (i.e. foundation wall or concrete basement floor). See Standard Drawings W4 and W5.

- Service box - see Table 2.

- Additional information found in Table 2.

E.8 Cathodic Protection

- DZP-24, 10.9 kg anode to be installed on watermain appurtenances greater than 300mm diameter, fire hydrants and shall be installed on all connections to existing iron watermain.

- DZP-12, 5.4 kg anode to be installed on watermain appurtenances up to and including 300 mm diameter. Including all iron fittings, valves, curb stops, main stops, etc.

- Anodes to be installed using double nut method. Anodes installed to existing iron watermain to be thermite welds including protective coating.

- Zinc nuts are to be added in conjunction with anodes as per Table 3, Cathodic Protection, below.

- See Standard Drawing W10 for additional information.

Appurtenance	**Method of Cathodic Protection**
Existing Iron Watermain	One anode (10.9 kg)
PVC Piping	Not required
Hydrants	One anode (10.9 kg) per each
Services (Copper or PEX)	One anode (5.4 kg) per each main stop **and** curb stop
Valves	Sacrificial zinc nuts **and** one anode (5.4 kg) per each
Iron Fittings	Sacrificial zinc nuts **and** one anode (5.4 kg) per each
Mechanical Restraints	Sacrificial zinc nuts
Bell Joint Restraints	Sacrificial zinc nuts on both ends of the threaded rod

Table 3: Cathodic Protection

E.9 Watermain Restraints

It is up to the Developer and Developer's Engineer to ensure the performance of the pipe and the restraining system.

Design of the pipe joint restraining system shall consider the pressures that the system will be subjected to as well as any expansion and contraction due to temperature changes during and following construction, of the various pipe materials selected. Shop drawings are to be submitted to the Township's Development Technologist prior to the start of construction.

a) OPSS 441.07.23 is amended to the following:

All thrust restraint shall be designed to adequately provide the minimum number of pipe/joint restraints required by mechanical joint restraint device alone. Concrete thrust blocks are not an accepted method of thrust restraint in the Township of Wellington North, except for connections to an existing watermain, as approved by the Township's Environmental Services Department. See Standard Drawing W11 for Township's minimum restraints requirements.

Thrust restraint shall be provided at all fittings, bends, tees, valves, hydrants, crosses, reducers, and plugged or capped dead ends.

b) Mechanical Joint Restraints:

- See Table 2 for acceptable mechanical joint restraint material.
- Mechanical joint restraints shall be provided at all fittings, bends, tees, valves, hydrants, crosses, reducers, and plugged or capped dead ends. See Standard Drawing W11 for Township's minimum restraints requirements.
- Concrete thrust blocks are not an accepted method of thrust restraint in the Township of Wellington North, except for connections to an existing watermain, as approved by the Township's Environmental Services Department.

c) Thrust Bell Joint Restraints:

- Restrain lengths for watermain 100 mm to 300 mm shall be in accordance with the requirements outlined below and section E.9.c. Restrained length calculations for watermains 400 mm and greater shall be supplied by the pipe manufacturer using the design criteria set out below.
- For DI pipe refer to AWWA C600 – Section 3.8. For PVC pipe refer to UNI-BELL and AWWA M-23.
- See Table 2 for acceptable thrust bell joint restraint material.

d) Minimum Design Criteria for Mechanical and Bell Joint Thrust Restraints:

- Watermain placed in fill locations must be mechanically restrained at all joints with bell joint restraints.
- All inline valves up to 200 mm in size shall be mechanically restrained on each side and have a bell joint restraint installed (including a minimum of two (2) steel rods) a minimum of one (1) full pipe length (6m) on each side of the restrained valve.
- All inline valves 250 and 300 mm in size shall be mechanically restrained on each side and have a bell joint restraint installed (including

a minimum of four (4) steel rods per restraint) a minimum of two (2) full pipe length (12m) on each side of the restrained valve.

- All bends up to 200 mm in size must be mechanically restrained on each side and have a bell joint restraint installed (including a minimum of two (2) steel rods) a minimum of one (1) full pipe length (6m) on each side of the restrained bend.

- All bends from 250 mm to 300 mm in size shall be mechanically restrained on each side and have a bell joint restraint installed (including a minimum of four (4) steel roads) a minimum of two (2) full pipe lengths (12m) on each side of the restrained bend.

- All dead ended watermains up to 200 mm in size cap and or plug shall be mechanically restrained and have a bell joint restraint installed (including a minimum of two (2) steel rods per restraint) a minimum of three (3) full pipe lengths (18m) on each side of the restrained dead end or plug.

- All dead ended watermains 250 mm and 300 mm in size cap and or plug shall be mechanically restrained and have a bell joint restraint installed (including a minimum of four (4) steel rods per restraint) a minimum of five (5) full pipe lengths (30m) on each side of the restrained dead end or plug.

- All fitting which would include tees, fire hydrants, reducers and crosses up to 300 mm in size shall be restrained on both sides and have a bell joint restraint installed (including a minimum of two (2) stee rods per restraint) a minimum of two (2) full pipe length (12m) on each side of the restrained fitting.

- Fire hydrant leads shall have bell joint restraints including steel rods installed on all watermain joints between the tee at the watermain to fire hydrant.

- Water services 100 mm or larger shall have bell joint restraints including steel rods installed on all watermain joints within the Municipal Right Of Way between the tee at the watermain to valve at property line.

- All branch valves shall be treated as dead end watermains and shall be restrained according to the above-mentioned dead end watermain criteria.

- NOTE: If any joint is encountered in the above restrained lengths, it must also be restrained.

E.10 Water Sampling Stations

Sampling stations shall be Eclipse #88 on a pedestal as manufactured by the Kupferle Foundry Company. The number and location of water sampling locations shall be reviewed and approved by the Township.

E.11 Additional Watermain Details

Additional watermain details not included in above notes are shown on the Township of Wellington North Standard Drawings.

The Developer's contractor shall not operate any valve or hydrant on the existing water distribution system. Operation of valves and hydrants on the municipal system shall only be undertaken by certified municipal staff.

Grounding of hydro services to the municipal water system is prohibited.

E.12 Watermain Commissioning Plan:

A Watermain Commissioning Plan shall be submitted to the Township's Environmental Services Department for review and comment, a minimum of 2 weeks prior to installation of watermain and water services. The Watermain Commissioning Plan should include the following items:

a. Connection point(s) between existing and new watermains
b. Source water connection(s)
c. Cross-connection prevention procedures and equipment
d. Proof of Ontario Water Works Associated (OWWA) Certified Cross Connection Control Specialist Certificate or a Ministry-approved equivalent
e. Temporary watermains, if any
f. Swabbing details, including swab velocities
g. Hydrostatic pressure test details, including calculations of allowable leakage
h. Disinfection details, including calculations of required chlorine
i. Dechlorination details
j. Flushing water disposal details
k. Locations of sampling points
l. Details of final connection to existing watermain, including valve operation. All final connections must be less than 6 metres.
m. Details of final connection to existing services, including curb stop operation
n. Upon completion of the watermain construction, a watermain commissioning report from the Developer's Engineer shall be

submitted to the Environmental Services Department and Township Consulting Engineer.

E.13 Watermain Testing Procedures:

Watermain testing procedure is consistent with the current version of Ontario's Watermain Disinfection Procedure, ANSI/AWWA C651 – Disinfecting Watermains, Ontario Regulation 170/03, Ontario Provincial Standard Specifications, and the Township's MSS, or more stringent, at the Township's sole discretion and approval.

Watermain testing procedures and commissioning shall not commence until all mainline sewers and services to property line (sanitary and storm), watermain and water services to property line have been installed and backfilled, including the placement of subdrains and Granular B.

a) Temporary watermain connection shall be as follows:

- No new watermain shall be connected to an existing watermain until all testing procedures have been completed and approved by the Township of Wellington North Environmental Services Department.

- The new watermain shall be kept isolated from the existing waterworks system using a physical separation until satisfactory microbiological testing has been completed and accepted by the municipality. Water required to fill the new main for hydrostatic pressure testing, disinfection and flushing shall be supplied through a temporary connection between the existing water system and the new main (refer to Standard Drawing W3). No temporary water supply shall be fed from an existing municipal fire hydrant. The temporary connection shall include an appropriate and approved cross-connection control device (reduced pressure zone backflow preventer). Environmental Services Department requires a written certification of the backflow preventer operation in accordance with CAN/Canadian Standards Association – B64.5 Series Manual and/or AWWA C510.

b) Flushing of New Watermains (Reference OPSS 441.07.25):

- Flushing and disinfecting operations shall be conducted under the supervision of the Township of Wellington North Environmental Services Department. The Environmental Services shall be notified at least two (2) business days in advance of the proposed date on which flushing and disinfecting operations are to commence.

- At the beginning of each new watermain installation, a minimum of two (2) new swabs shall be installed. Swabs shall be labelled to be easily identified. Swabbing of each section of watermain and all services 100 mm diameter and larger shall be completed with fire hydrants and leads being thoroughly flushed prior to hydrostatic testing.

c) Hydrostatic Testing (Reference OPSS 441.07.24):

- Hydrostatic testing shall be conducted under the supervision of the Developer's Engineer upon completion of the watermain including services and placement of Granular B within the roadway. The Developer's Engineer is to provide a completed Township of Wellington North Watermain Pressure Test Form upon completion of hydrostatic testing.

- A test section shall be either a section between valves or the completed watermain. All hydrant leads, services, stubs, blow-offs etc. shall also be subject to the hydrostatic pressure testing. Hydrant valves shall be in the open position to subject the hydrant to the hydrostatic testing.

- Test pressure shall be 1035kPa or 150 psi. Pressure gauge to be liquid filled and read the range of zero to 160 psi.

- The test section shall be filled slowly with water and all air shall be removed from the pipeline. A twenty-four (24) hour absorption period may be allowed before starting the test. The test section shall be subjected to the specified continuous test pressure for two (2) hours.

- The leakage is the amount of water added to the test section to maintain the specified test pressure for the test duration. The measured leakage shall be compared with the allowable leakage as calculated for the test section. The allowable leakage is 0.082 litres per millimeter of pipe diameter per kilometer of watermain for a two (2) hour test period.

- If the measured leakage exceeds the allowable leakage, all leaks shall be located and repaired and the test section shall be retested until a satisfactory result is obtained.

- Watermain Pressure Test Form shall be completed for all installations, see Appendix B.

d) Disinfection of New Watermains (Reference OPSS 441.07.25):

- Liquid chlorine (sodium hypochlorite) solution shall be introduced by continuous feed method so that the chlorine is distributed throughout

the section being disinfected. The chlorine shall be applied so that the chlorine concentration is at an acceptable concentration (refer to Table 1 – below) throughout the section. The system shall be left with the chlorine solution for a minimum contact time of twenty-four (24) hours.

- The Township of Wellington North Environmental Services Department may consider alterative chlorine concentration and contact times on an individual basis.

TABLE 1:
CHLORINE CONCENTRATION AND CONTACT TIMES FOR NEW WATERMAINS

Disinfection Method	Minimum Contact Time	Initial Chlorine Concentration	Maximum Allowable Decrease in Chlorine Concentration
Tablet or Continuous Feed	24 hours	≥ 25 mg/L	40% of the Initial Chlorine Concentration to a Maximum of 50 mg/L

Example 1:

When using the continuous feed method of chlorination with an initial chlorine concentration of 50 mg/L, the maximum allowable decrease in chlorine concentration is 40% of 50 mg/L, or 20 mg/L. Therefore at least 30 mg/L of chlorine must be present after 24 hours.

Example 2:

When using the continuous feed method of chlorination with an initial chlorine concentration of 150 mg/L, the maximum allowable decrease in chlorine concentration is 50 mg/L, because 40% of 150 mg/L is greater than the maximum allowable decrease of 50 mg/L. Therefore, at least 100 mg/L of chlorine must be present after 24 hours.

- Sampling and testing for chlorine residual will be carried out by the Township of Wellington North Environmental Services Department. The chlorine residual will be tested at the initial chlorine concentration and again after the minimum contact time of twenty-four (24) hours. If tests indicate an acceptable decrease in chlorine concentration, 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.

e) Flushing and Dechlorination:

- Following disinfection of the watermains and watermain branches, the heavily chlorinated water shall be flushed and managed as per the most recent version of the Ministry of Environment document “Watermain Testing Procedure, - ANSI/AWWA C655 – Field Dechlorination”. Watermain shall be flushed in a sequence approved by the Township of Wellington North Environmental Services Department. The Environmental Services may permit or require the flushing to be carried out in stages as sections of the system are completed. Flushed sections shall be protected from contamination.

- Sites within 100 m of natural drainage, or with direct discharge to a water body, should be considered high risk. In such instances, the Township may request an enhanced dechlorination plan along with contingency and mitigation plans in the event that the chlorine residuals exceed those specified.

- The Contractor shall provide acceptable equipment and chemical additives to dechlorinate the water that must be wasted. Chlorinated water discharged to the sanitary sewer shall be discharged at such a low flow rate or dechlorinated prior to discharge so that there is no possibility of chlorine residual remaining in the waste water when it reaches the waste water treatment plant. Total residual chlorine in water discharged into storm sewers, drainage ditches or watercourses shall not exceed 2 ug/L.

f) Microbiological Samples for New Watermains

- Recharge the watermain with Municipal water and flush via a 20 mm maximum diameter pipe.

- After final flushing and before the watermain is approved for connection of the new main to the existing water system, two (2) consecutive sets of water samples, taken a minimum of sixteen (16) hours apart, shall be collected, every 370 metres, plus from the beginning of the line, the end of the line and from each branch. Certified staff form the Environmental Services Department shall collect for bacteriological samples.

- All water samples will be taken in accordance with the most current ANSI/AWWA Standard C651 and Watermain Disinfection Procedure August 1, 2020, collected by the Township of Wellington North Environmental Services Department and analyzed by a certified laboratory. Two (2) – 200 ml microbiological sample (bottles supplied by the Township – ONLY) must be obtained at each location. The chain of custody form is to be filled out requesting for E.coli and Total Coliforms

and shall include the samplers name. A standard Heterotrophic Plate Count (HPC) test may be required at the request of the Township. Each sample collected must include a 'Total and Free Chlorine residual' reading.

- The Township will pay Laboratory expenses for the initial first set of sampling required for microbiological results. If the disinfection fails to produce satisfactory samples, disinfection and testing shall be repeated at the contractor's expense including water usage until satisfactory samples have been obtained.

- The Township of Wellington North minimum requirements for acceptability of microbiological tests are:

E-coli Coliform	0 CFU/100 ml
Total Coliform	0 CFU/100 ml

g) Commissioning of New Main and Services

- Prior to the final connection of the new watermain to be connected to the existing water system, a complete set of microbiological samples that have satisfactory test results and written approval from the Environmental Services Department must be obtained. The Environmental Services Department must witness the final connection of the new main to the existing waterworks and removal of the temporary connection. See Standard Drawing W3.

- All new piping and appurtenances placed in the connection of the new main and existing waterworks system must be disinfected with a 1% solution of sodium hypochlorite or equivalent method. Final connections must be less than 6 m.

- The system shall not be put into operation until clearance has been given by the Township of Wellington North Environmental Services Department.

i) Accessibility and Operation:

- All water valves, curb stops and hydrants must be inspected for accessibility and operation prior to Preliminary Acceptance and Final Acceptance.

E.14 AMR/AMI Ready Mechanical Residential Water Meters:

Connection to municipal water on private property side shall be plumbed with a water meter spacer located within a building and in a location that is accessible to Municipal Staff, as per Standard Drawing W4 and W5.

This specification is based on the requirement for AWWA Standard 16 mm to 25 mm residential size Mechanical Water Meters, for Utility water metering usage data and revenue collection.

The entry level standard today for Utility water meter reading is Automated Meter Reading (AMR) using a Radio Read AMR solution, using Walk-By or Drive-By Radio Reading equipment. Migration to Advanced Metering Infrastructure (AMI) can be achieved with a Fixed Network Data collection solution. The following specification provides for water meters that are AMR/AMI ready and with standard output configurations, required for the collection of accurate water usage data for optimum individual service billing and for more general Water Resource Management, Data Analytics and enhanced Customer Service applications.

a) General Specifications for Water Meters:
   - Only Mechanical Water Meters that meet the following AWWA Standard will be considered.
   - AWWA Standard C700 - Cold Water Meters – Positive Displacement Type for Revenue Applications.

b) The meters will be available in the following sizes:
   - 16 mm x 12.7mm
   - 16 mm x 19 mm
   - 19 mm x 19 mm (Standard 228.6 mm (9”) length)
   - 19 mm x 19 mm (Short 190.5 mm (7-1/2”) length)
   - 19 mm x 25 mm
   - 25 mm

c) Material for Body of water meter: Bronze Alloy

d) The meters must be NSF/ANSI/CAN 61 Approved and Listed. Each meter must be marked accordingly to show that they are an NSF/ANSI/CAN 61 Approved and Listed product.

e) The meters must be IP68 rated for all possible installation environments including meter pits or chambers, that may occasionally flood.

f) Meters must be fitted with an Encoder Output Register that meets the following:

- AWWA Standard C707 – Encoder Type Remote Registration Systems for Cold Water Meters.
- Mechanical or solid-state electronic registers.
- Solid-state electronic registers that contain a battery must come with a minimum 20-year life expectancy.

g) The meters must be AMR/AMI ready, providing a 3 wire Encoder Output Protocol that is fully compatible for use with all the most commonly utilized AMR/AMI Radio Modules available today, including, but not limited to, Honeywell EA Water Modules; Itron ERT's; Aclara MTU's; Neptune R900 MIU's; Sensus MXU's; Badger Orion Endpoints and Mueller Systems Mi.Net Modules.

h) The Encoder Output connection with the meter must be provided in the form of a 3 wire cable that is at factory fitted and potted to the meter register and be at least 3.66 m long, with the cable end being bare end cable as standard, with available options to provide the encoder cable fitted with standard AMR/AMI Radio Module connectors if necessary.

i) Register Configuration and Encoded Digits:

- Meter registers must provide metric measurement in Cubic Meters and Liters.
- The visual register display must provide 5 whole Cubic Meter digits and then 3 or 4 decimal place digits, as per the examples shown below:
  - 00000.000 m^3, 5/3 Config - provides a 1 Liter VISUAL read resolution.
  - 00000.0000 m^3, 5/4 Config - provides a 100 Milliliter VISUAL read resolution.

- As a Standard, the meters must encode 8 digits on the register, example shown below, with the ENCODED digits shown as X's:
  - XXXXX.XXX m^3, provides a 1 Liter ENCODED read resolution.
  - XXXXX.XXX0 m^3, provides a 1 Litre ENCODED read resolution.

- Meter sizes 16 mm to 25 mm, acceptable VISUAL register configurations:
  - 5/3 – 00000.00 m^3
  - 5/4 - 00000.00 m^3
  - 8 digits ENCODED – Providing a 1 litre ENCODED read resolution
  - 5/3 – XXXXX.XXX m^3
  - 5/4 – XXXXX.XXX0 m^3

- Meter sizes 38 mm to 100 mm, acceptable VISUAL register configurations:
  - 6/2 – 000000.00 m^3
  - 6/3 - 000000.00 m^3
  - 8 digits ENCODED – Providing a 10 litres ENCODED read resolution
  - 6/2 – XXXXXX.XXX m^3
  - 6/3 – XXXXXX.XXX0 m^3

- Meter sizes 150 mm to 300 mm, acceptable VISUAL register configurations:
  - 7/1 – 0000000.00 m^3
  - 7/2 - 0000000.00 m^3
  - 8 digits ENCODED – Providing a 100 litres ENCODED read resolution
  - 7/1 – XXXXXXX.XXX m^3
  - 7/2 – XXXXXXX.XXX0 m^3

F. ROADWAYS

F.1 Accessibility

All applicable municipal infrastructure is expected to be designed and constructed consistent with current Provincial and County standards including provisions for accessibility. The roadway design is to take into account accessibility design criteria and shall conform with both of the Accessibility for Ontarians with Disabilities Act (AODA) and Wellington County 2005 Facility Accessibility Design Manual. In the absence of these provisions being met, the developer/engineer is expected to obtain approval, or consult, with the local accessibility committee for any proposed deviation(s).

F.2 Roadway Design

Roadway design and driveway entrance may be subject to Ministry of Transportation or Wellington County review and approval**.**

The following Township of Wellington North Road design criteria for residential roads applies to local and minor collector streets:

Standard Road Section:

The residential roadway section is shown on Standard Drawing R1, R2 and R3. This section designates standard locations for all Municipal Services and other utilities.

Geometric Standards:

- Streets with 20 m, 22 m and 26 m Right-of-Ways will have a minimum pavement width of 8.5 m, 9.5 m and 14.0 m respectively. This width does not include the concrete gutter.

- The minimum pavement radii for intersections shall be 10.0 m and 16.8 m on a cul-de-sac with an island and 13.0 m on a cul-de-sac without an island (permanent or temporary).

- The minimum property radius on a cul-de-sac shall be 20.0 m.

Rural Road Section:

The rural road section is shown on Standard Drawing R4. In the case of rural roads located away from urban centres and mainly used by local traffic, the Township will consider for local development, reducing the rural

standards to match existing conditions of roads in that specific area. The minimum gravel surface width for consideration would be 7.3 m.

F.3 Geotechnical Report

A qualified geotechnical consultant shall be engaged by the Developer's Engineer to confirm the suitability of the minimum pavement designs and subdrains contained in these standards for use in the Development, or to recommend a higher pavement design standard if required. A geotechnical firm shall be retained by the Developer's Engineer to carry out field testing during construction to verify the design.

Copies of all test results are to be submitted to the Township and proposed road designs shall be reflected on the engineering drawings. Testing and acceptance of all granular materials at the designated pits prior to placement is required along with subsequent in-situ verification tests shall also be performed by the Developer's geotechnical consultant.

Prior to placement of asphalt pavement and concrete, the Developer's Engineer must submit to the Municipal Engineer for acceptance, the asphalt pavement mix designs and concrete mix designs.

F.4 Road Construction

The following standards are to be followed, however, specific conditions may warrant some change. Any change will require approval from the Township of Wellington North. All road construction shall conform to applicable standards of the Ontario Provincial Standard Specifications (OPSS) and the Ontario Provincial Standard Drawings (OPSD).

a)	Minimum Running Grade:	To maintain 0.50% minimum on gutter grade.
b)	Maximum Running Grade:	Maximum 5.0% to meet AODA standards with an absolute maximum of 8.0%
c)	Vertical Curves:	Vertical curves to effect gradual change between tangent grades are to be used in accordance with the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Road.

d) Horizontal Curves: Use in accordance with the Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Road.

e) Cross Fall: 2%

f) Asphalt Depth:

Depending on soil conditions and a geotechnical report (see Section F3), but no less than:

- 90 mm Minimum (50 mm HL-4 & 40 mm HL-3 compacted) on Local Residential.
- 100 mm Minimum (60 mm HL-4 & 40 mm HL-3 compacted) on Collector & Arterial.
- 140 mm Minimum (2 lifts of 50 mm HL-8, 40mm HL-3 compacted) on MTO Connecting Link and County of Wellington roads.
- 50 mm HL-4 on temporary cul-de-sac or temporary access roads.
- 60 mm HL-4 on Local Rural.
- Asphalt work shall conform in all respects to OPSS.MUNI.310

g) Granular Depth:

Depending on soil conditions and a geotechnical report, but no less than:

- 150 mm Granular “A”
- 450 mm Granular “B”
- Proof roll of subgrade -to be completed and verified by the Developer’s Geotechnical Consultant prior to placement of Granular road base. Proof roll of subgrade is to be witnessed by the Developer’s Geotechnical Consultant and Township staff.
- Fine grading of Granular A prior to the placement of asphalt shall be shaped using a road grader with a minimum 3.0 m straight edge. OPSF314-1 form shall be submitted by the developers engineer as part of the certification for Stage 2 Works.

h) Maximum Cul-De-Sac Length:

- Industrial or commercial use - 150 m
- Residential uses having a density of more than four dwelling units per 0.4 Hectare – 200 m
- Residential uses having a density of four or less dwelling units per 0.4 Hectare – 300 m
- This section shall not be construed to be prohibit the approval of a division of land utilizing frontage on an existing cul-de-sac of more than the maximum permitted length nor shall it be construed to prohibit the planning commission from reducing the length of a proposed cul-de-sac to provide for the efficient circulation of traffic, the future development of the neighbourhood street system or the deployment of emergency services. (As per American Legal Publishing)
- Residential site design requirement for cul-de-sac longer than 150 m is to provide an emergency access route that is no further than 150 m from the farthest point to a public right of way.

F.5 Driveways

Residential driveways to be offset from property line a minimum of 0.6 m unless it is a shared driveway. Greater offsets required for driveways servicing other land uses to the satisfaction of the Township. Driveways shall not be used as outlets for any swales. All driveway entrances shall be constructed to the below standards.

a) Granular Depth:

Depending on soil conditions and a geotechnical report, but no less than:

- 150 mm Granular “A”
- 300 mm Granular “B” on residential driveways
- 450 mm Granular “B” on industrial, commercial and multi-residential

b) Width:

As per the Township of Wellington North’s Road Entrance Policy:

- Rural and semi urban – Maximum 6 m

- Urban entrance – Maximum 6 m

c) Asphalt:

- Minimum of 50 mm Hot Mix Asphalt HL 3F (modified fine) compacted to property line for residential driveway entrances.

- Minimum of 90 mm Hot Mix Asphalt (50 mm HL4, 50 mm HL 3F (modified fine)) compact to property line for industrial, commercial, institutional, and multi-residential driveway entrances.

- Driveway ramps between back of curb and Property Line shall be hard surface treated (asphalt, concrete or similar material) to the above asphalt standards.

F.6 Curb and Gutter

a) Concrete curb and gutter shall be constructed on both side of all streets in accordance with Table 1 and Standard Drawings R1, R2, R3 and as follows:

- Mountable curb to be used on local residential internal streets.

- Barrier curb to be used on collector and external streets.

- Curbs shall be bedded on the granular base construction. Upon completion of the curbs, Granular A backfill shall be placed behind the curb with a minimum of 500mm width and thoroughly compacted to prevent the displacement of the curb by subsequent placement of roadway Granular A and asphalt. All curb and gutter is to be protected from damage by heavy equipment and vehicles. Two stage curb is not permitted. During the final grading of lots, 200 mm of topsoil and sod shall be place adjacent to the curb, as required.

- Curb termination shall be as per OPSD 608.010.

b) Contraction joints: Shall be saw cut.

c) Concrete Mix Design:

- Concrete Mix Design shall be in accordance with the current OPSS.MUNI 351.

d) Hot and Cold Weather Concrete:

- The placing and protection of concrete curb and gutter in hot and cold weather shall be in accordance to OPSS.MUNI 904.

e) Driveway cuts shall not be made until after building foundation is constructed. All cuts shall be mechanically cut in accordance with specifications approved by the Township of Wellington North.

F.7 Sidewalks

Concrete sidewalks with a minimum width of 1.5 m and shall be provided on one side of residential local street and both sides of collector and arterial streets. Sidewalk adjacent to curb and gutter shall be a minimum 1.8m wide. Minimum 150 mm Granular "A" base or to increased to the same depth as the sidewalk concrete thickness at driveways and pedestrian crossing ramps. Ramps shall be provided at all intersections with curb. Hand railings are required where three (3) or more steps are present.

a) Concrete Thickness:

- Minimum 125 mm
- When sidewalk is adjacent to curb and gutter - 150 mm
- At pedestrian crossing ramp – 200 mm
- At location of residential driveway entrance - 150 mm
- At location of industrial, commercial, institutional, and multi-residential entrances - 200 mm

b) Expansion and Contraction Joints:

- All longitudinal and transverse joints shall be **saw cut** in the hardened concrete within a sufficient time of placing the sidewalk. These joints shall align with the control joints in the curb when sidewalk is placed against the curb and gutter.
- Expansion joint material, bituminous impregnated fiberboards, is not to be used within the Municipal sidewalk.
- Adjacent to private driveways or sidewalks - Expansion joint material is to be bituminous impregnated fiberboards and placed on the backside of municipal sidewalk between Municipal sidewalk and private driveway or private sidewalk only.

c) Concrete Mix Design:

- Concrete Mix Design shall be in accordance with the current OPSS.MUNI 351.

d) Hot and Cold Weather Concrete:

- The placing and protection of concrete sidewalks in hot and cold weather shall be in accordance to OPSS.MUNI 904.

e) Tactile Warning Surface Indicators (TWSI):

- Comply with O.Reg. 191/11 Accessibility for Ontarians with Disabilities Act, 2005, and OPSD 310.039.
- TWSI to be set between 150 mm and 200 mm from the back of curb edge.
- Signalized intersections to have a radial curve tactile plates to suit curb lines.
- TWSI to be clay red in colour
- See Table 2.

F.8 Turning Circles

Where construction is phased, the Township may require the installation of temporary turning circles. These turning circles will be constructed in accordance with the requirements for cul-de-sacs in Section F.2. Temporary cul-de-sacs shall be paved and curb and gutter shall be provided when needed to contain surface water and direct it to the storm sewers.

F.9 Walkways

Pedestrian walkways shall be concrete, 1.8 m wide with 1.5 m minimum height black vinyl chain link fence on each side within property limits. Minimum Right-of-Way width is to be 6.0 m. Pedestrian gates are to be installed as per Standard Drawings L3, L4 and L5.

Minimum Right-of-Way to be increased to minimum 9.0 m where servicing and walkway exist through same corridor.

F.10 Boulevards

- All boulevards shall be graded, topsoiled with a minimum depth of 200 mm, and sodded from the property line to the back of curb.

- Asphalt boulevard is an acceptable alternative, as approved by the Township, up to a boulevard width of 1.8 metres.

F.11 Traffic Control and Street Name Signs

Street name sign shall be provided at locations designated by the Township and will be 150 mm in height and minimum 600 mm in length and have a green background with white lettering (double sided), reflectorized and mounted on galvanized steel 60 mm diameter x 3.2 m posts in accordance with the Township of Wellington North specifications. Where streets are named after Veterans, they will include a red poppy (black centre) at left side of sign. At each intersection there shall be erected an approved double unit street name sign.

Traffic control signs will be provided at locations designated by the Township and shall be in accordance with the current Ontario Traffic Manual – Book 5, Regulatory Signs. Traffic signs and posts will be provided by the Developer at their expense and following the passing of the By-Law for their installation.

Traffic control pavement markings will be provided at locations in accordance with the current Ontario Traffic Manual – Book 11, Pavement, Hazard and Delineation Markings.

F.12 Daylighting Triangle

- Local road intersection corners - Minimum 7.5 m by 7.5 m daylighting triangle required.

- Arterial and collector road intersection corners - Minimum 9.0 m by 9.0 m daylighting triangle required.

- Additional size may be required for special circumstances.

- Daylight triangles are to be part of municipal right-of-way.

- For all other Daylighting requirements refer to the current Township of Wellington North Zoning By-law.

F.13 Parking

- Refer to Township of Wellington North Zoning By-law.

F.14 Easements

- Minimum 6.0 m easements required for single municipal mainline services, minimum 9.0 m easements required for two (2) municipal mainline services. Where more than two (2) services are to be accommodated by an easement consult with the Township for specific easement requirements.

- For rear yard storm sewers 300 mm diameter or less, and catch basins, minimum easement width to be 3.0 m. Rear yard easement to be entirely on one property and to have a pipe 1.0 m offset of the property line. For storm sewers larger than 300 mm diameter consult with Township for specific easement requirements.

- Sewer from the road to the rear yard (i.e. side yard) situated on a 3.0 m easement divided equally on the side property line and to have pipe offset 0.5 m from the property line. See Section D.1p, Storm Drainage, In-Line Drains and Rear Catch Basins and Standard Drawing S5.

The Township of Wellington North Standard Drawings which apply to road construction are included and/or referenced in this Manual found in Appendix A.

F.15 Retaining Walls

- A handrail is required on all retaining walls exceeding a vertical height of 1.0 m.

- Retaining walls over 1.0 m in height must be offset from the property line by a minimum of 0.6 m, entirely on private property.

- Retaining walls 1m and under may be located at the property line with no offset.

- Retaining walls over 1.0 m in vertical height requires the submission of a detailed drawing accompanied with the certification of a Professional Structural Engineer. Manufacturer's specifications are acceptable.

G. LOT GRADING

G.1 Plan Requirements

Lot grading plans shall be prepared in accordance with the Standard Drawings G1 and G2, to the satisfaction of the Township, and as follows:

a) Lot grading plans must be drawn at a minimum scale of 1:500.

b) Indicate a north arrow.

c) Show a title block including date, name of consultant and owner.

d) All elevations should be referenced to a metric geodetic municipal benchmark.

e) Show all existing and proposed lot numbers and blocks.

f) Show all proposed rear lot catch basins, pipes, swales, top of grate elevations and inverts and easements.

g) Show a table for a list of revisions.

h) Show existing contours (maximum 0.5 m intervals).

i) Show existing and proposed elevations at lot corners.

j) Show adjacent topography and drainage patterns.

k) Show all existing structures, vegetation, natural features on, or adjacent to the subject property.

l) Show maximum building envelope, driveway location, and indicate specified house grade, top of foundation and finished floor elevations, steps in foundation, low openings and garage floor elevations including proposed driveway grade.

m) Show proposed road grades and elevations on all streets with arrows indicating direction of slope.

n) Show proposed elevations along boundary of all blocks abutting single family and semi-detached lots in the subdivision.

o) The approval of a drainage plan is related to drainage only. It is the responsibility of the developer to ensure that the drainage plan compliments the land and suits the houses to be constructed.

p) Show all temporary erosion control measures to be in place during the construction period and permanent erosion control works to be left in place after construction.

q) The maximum side slopes on swales should be 3 horizontal to 1 vertical. All swales must have a minimum depth of 150 mm. Swales within the development are to be centered on property lines. Swales abutting other properties are to be constructed entirely within development lands.

r) The maximum slope of all embankments should be 3:1. Where grades greater than 3:1 are proposed a retaining wall should be constructed. All 3:1 or steeper are to be indicated on the plan, clearly defining the limits of the slope.

s) The proposed direction of overland flow shall be indicated on the plans by arrows. High points and all changes in grade are to be clearly noted on the plan with spot elevations.

All individual lot drainage (including each semi and townhouse unit) shall be directed to its side yard and rear yard swales. (i.e. no rear lawn surface drainage for a semi shall flow across the neighbouring semi rear lawn.) For example, where an upper lot drains towards a lower lot, an intercepting swale will be located on property line in such a manner as to divert the drainage to the side yard swale of the lower lot.

t) The Township's consulting engineer may require details of all terracing and slope treatment and in depth cross-sections to be provided, with the lot grading plan.

u) The Township's consulting engineer may require details in regrading of existing municipal roadway and regrading of existing municipal driveway aprons. In depth cross-sections of existing municipal roadway and driveway aprons may be requested, where applicable. Existing driveways to be labeled with final restoration grade.

v) All Regional Flood and Fill Lines, verified by the Conservation Authority, must be indicated on lot grading plans where developments are adjacent to existing watercourses.

w) Topsoil shall be stripped in all cut and fill areas and stockpiled for reuse during final lot grading operations. Site specific exceptions may be applicable at the discretion of the Township.

x) Multiple unit blocks are subject to approval through the site plan approval process, individual site plan agreements are required for each block.

y) Show existing and proposed fencing.

G.2 Drainage Plan Requirements

The Drainage Plan shall indicate the proposed grading of all the lands to be developed and how all the lands adjacent to the subdivision which drain through the property are to be provided for.

H. UTILITIES AND STREET LIGHTING

All hydro, natural gas, telephone, fibre optic telecommunications and other utilities shall be provided underground and installed in a common corridor at the location provided in the Standard Drawings R1 to R4, and in accordance with current Hydro Servicing Standards and with current Ontario Electrical Safety Code as set out by the Electrical Safety Authority, Bell Canada, Enbridge Gas and/or local utility company regulations and standards, as well as Ontario Provincial Standards. A Composite Utility Plan shall be provided to the Township for review.

Satisfactory evidence that the Developer has entered into an agreement providing for the installation of underground hydro and street lighting must be submitted to the Township of Wellington North prior to the execution of a Subdivision Agreement.

All developments shall be provided with street lighting in accordance with the current requirements of the local utility companies and the Township of Wellington North.

All materials and installation shall meet or exceed current OPSS standards and the requirements of the local utility supplier. The materials and supplier shall be reviewed with the Township prior to approval and samples shall be supplied if requested.

All utility installations within the Municipal right-of-ways are required to obtain a Municipal Consent Approval from the Township. Prior to issuance of Municipal Consent the following is required:

- Composite Utility Plan (CUP) is to be prepared and submitted to the Township for review and approval. The CUP is to reflect all utilities to be installed within the municipal right-of-ways.

- All utility agencies must review and approve the CUP with respect to their specific utility in the context of the CUP (i.e. Sign-offs).

- Submission to Township to include CUP, original utility plans and agency Sign-offs.

- Drawings for Municipal Consent must not be submitted to the Municipality until after the Developer and the Developer’s Consultant have stamped and accepted (i.e., signed-off) on the MC submission drawings.

Discussion with utilities will occur regarding placement of utilities in the boulevard, specifically natural gas routing around hydro transformer locations. Refer to Standard Drawing U1.

Utility crossings for new roads shall be placed prior to placement of granular road base materials.

H.1 Street Lighting Design

Lighting designs (light levels, uniformity ratios, etc.) shall be based on the latest version of American National Standards Institute/Illuminating Engineering Society of North America's American National Standard Practice for Roadway Lighting; (ANSI/IESNA RP-8 latest revision).

Roadway lighting must provide uniform lighting at a level that is adequate and comfortable for vehicular and pedestrian movement on the roads and sidewalks. All roadway lighting systems shall be designed by an Engineer experienced in roadway lighting. Designs shall be carried out using the luminance method as described in RP-8 (latest revision) (unless noted otherwise) by a qualified engineer, while incorporating the Township standards and specifications as given below. Design calculations with photo metric layouts shall be prepared by utilizing one of the following approved lighting and design programs: AGI 32 and Autolux.

As per the current roadway lighting policy, all proposed lighting shall be reviewed and approved by the Township. Lighting design submissions to the Township must include:

- Photometric distribution diagram
- design criteria used
- design calculations
- contract drawings and specifications
- manufacturers literature

All roadway lighting design and construction must satisfy Electrical Safety Authority (ESA) requirements and is subject to ESA inspection and approval. All materials used for roadway lighting must meet Canadian Standards Association (CSA) specifications.

H.2 Material Specifications

All roadway lighting equipment used must meet the Township’s roadway lighting standards and specifications. It shall be the responsibility of the street lighting contractor to ensure they have the latest revisions of the Township’s street lighting specifications and list of approved suppliers prior to ordering any materials. All street lighting components are to be manufactured in accordance with the Township’s requirements as amended from time to time.

Unless otherwise indicated, all electrical materials shall be new and of uniform pattern throughout the work and ESA shall approve all materials, components or completed assemblies of components.

a) Street Light Poles:

Street light poles shall be concrete. Height of poles shall be determined by lighting system designers. For “cobra head” combinations, the pole shall be Class B centrifugally cast round concrete pole and have a mold finish. For decorative combinations, the pole shall be centrifugally cast concrete. Developers shall submit manufacturer’s literature for the proposed standard and decorative poles to the municipality for approval. All poles must meet CSA specifications and are subject to Electrical Safety Authority (ESA) inspection and approval.

b) Luminaires:

All luminaires shall be light emitting diode (LED) lamps and shall come complete with a bird stop. Luminaires must meet CSA and electrical code requirements and are subject to ESA inspection and approval. The luminaires shall be Lumex p/n RFM-72W32LED4K-G2-R2M-UNV-DMG-FAWS-RCD7-GY3 or approved equivalent. Electrical supply for the street light circuit will need to be coordinated and approved by the local hydro authority.

c) Brackets:

All street light brackets must meet CSA specifications and are subject to ESA inspection and approval. Standard street light brackets for use with “cobra head” luminaires shall be manufactured in accordance with the latest revisions of ANSI C136.1. Brackets shall be a 1.8 m or 2.4 m tapered elliptical aluminum bracket as needed for the lighting design. Decorative street light brackets shall be manufactured in accordance with the latest revisions of ANSI C136.1 with the changes necessary to apply to arms for decorative fixtures. Decorative brackets shall be 1.5 m or 1.8 m nominal curved bracket. The style and design of the bracket shall be submitted to the municipality for approval.

d) Photo-Electric Controllers:

Photo-electric controllers shall be suitable for use with LED fixtures. Controllers shall be electronic twist lock with the following features:

- A filtered (human eye spectral response) silicon light sensor with infrared blocking filter;
- MOV surge protection;
- Rated for 120 volts;
- Load rating: 1000 watts, 1800vA ballast;

- Turn on level at 16 lux (1.5 FC) and turn off at 1.5 times turn on;

- Operating temperature range from -40ºC to 70ºC

Photo-electric controllers must be manufactured using non-hazardous materials.

All photo-electrical controllers must meet CSA specifications and are subject to ESA inspection and approval.

e) Loadcentres:

The Township requires the ESA mandated disconnect for street lighting systems. The disconnect shall be provided by means of a service entrance rated loadcentre (pedestal type for underground systems and pole-mounted units for overhead systems) with stainless steel weather proof enclosure (minimum NEMA 4X rated) and complete with:

- 60 amp, 22 kAIC, 120 V / 240 V double-pole line side main breaker, and

- 40 amp, 120 V single-pole load side breakers (quantity: up to 6)

- Hydro meter

f) Street Lighting Cable Duct:

Street light cable duct shall be 50 mm (2") Type II PVC, direct buried duct meeting CAN/CSA-C22.2 NO.227.1 (latest revision). All ducts must meet CSA specifications and are subject to ESA inspection and approval.

g) Street Light Wiring from the Handhole to the Luminaire:

Street light wiring from the handhole to the luminaire shall be 2 - #12 copper NMWU plus 1 - #12 copper ground, CSA approved.

h) Street Lighting Distribution Cable from Loadcentre to Street Light Poles:

The street light cable from the loadcentre to the pole and from pole to pole shall be CSA approved and consist of the following:

- 2 - #6 copper, RWU-90-CSA complete with 1 - #6 jacketed green ground (for 120V);

- 3 - #6 copper, RWU-90-CSA complete with 1 - #6 jacketed green ground (for 240V)

i) Street Light Power Cable from Transformer to Loadcentre:

The street light supply cable feed from the transformer to the street light loadcentre shall be 3 - #2 copper RWU-90-CSA with 1 - #2 ground. Cable shall be CSA approved.

j) Grounding Rods and Plates:

Ground rods shall be solid steel, 19 mm diameter, 3 m long, copper clad for the full length and shall be according to CSA C22.2 No. 41.

Ground plates shall present not less than 0.2 m² of surface to exterior soil and be not less than 6 mm thick as per the Electrical Code. The plates shall be made of hot dip galvanized solid steel. Steel shall be according to CAN/CSA G40.20/G40.21, Grade 230G and shall be galvanized according to CAN/CSA G164.

The number of grounding rods and grounding plates shall be determined by the lighting system design engineer.

H.3 Electrical Drawings

The electrical layout drawings are a schematic representation of the requirements. All equipment shall be installed in locations detailed in the contract.

H.4 IES Illumination and Luminance Design Criteria

The illuminance method of roadway lighting calculations determines the amount or quality of light incident on the roadway surface and the luminance method of roadway lighting calculations determines how 'bright' the road is by determining the amount of light reflected from the pavement in the direction of the driver. Design criteria shall be in accordance with the requirements of ANSI/IES RP-8 (latest revision).

H.5 Lighting for Intersections

The luminance method is difficult to use with the design of lighting for intersections due to the basic assumptions inherent in luminance design and the methods used in its calculation. Therefore, illuminance criteria and calculations are recommended for use in the design of intersections. Intersections should be illuminated to a level equal to the sum of the recommended average illumination levels for each of the intersecting roads. Refer to Table 8 in ANSI/IES RP-8-14 as amended.

At a minimum, all lane changes (additions or subtractions), left or right turn lanes, median islands, etc. should be adequately illuminated and are recommended to be included in the illumination design calculations.

Typical lighting layouts for intersections are given in ANSI/IES RP-8 (latest revision) and in the Transportation Association of Canada's (TAC) "Intersections Lighting", (latest revision).

H.6 Light Trespass

The basic light trespass requirements as per the current acceptable practice, the vertical illuminance values should be limited to a maximum of 3.0 lux at a height of 1.5 m above finished grade along the property line.

H.7 Road/Entrance Crossings

The street lighting ducts shall be heavy wall PVC or polyethylene duct with a minimum cover of 1200 mm under roadways and all commercial and industrial driveways. The ducts shall be installed in accordance with the requirements of the Township of Wellington North. Where a road crossing is required on a project that does not include road reconstruction, it shall be installed via a trench less method.

H.8 Walkways, Pathways and Trails

Requirements for the lighting of walkways, pathways and trails for a specific project are to be confirmed in consultation with the Township. Quality and quantity of light is to meet Illumination Engineering Society (IES) standards for the specific application. Lighting design is to ensure light trespass onto adjacent properties or into adjacent areas that are to be kept dark at night time achieve basic light trespass requirements as per the current acceptable practice. Note: This section is not applicable to sidewalks within road right-of-ways, which are to be addressed as part of the street lighting design.

H.9 Installation

a) General:

The contractor shall ensure that the construction and installation of the street lighting system will be completed in a good and workmanlike manner and in accordance with Township standards.

Street lighting shall be located on the boulevard in accordance with the Township's standard cross sections and as shown on the CUP, trenching plans and typical road sections while maintaining proper clearances from fire hydrants, driveways, transformer and switching units and trees or any other services.

The street lighting power supply is to be supplied to each street light loadcentre in accordance with ESA requirements.

The entire street light installation is subject to inspection and approval by the ESA. The contractor is responsible for applying and obtaining said inspection. Hydro One or Wellington North Power Inc. shall make the connections inside the transformer once the following steps have been fulfilled:

- Approval has been given by the ESA, and a Connection Authorization has been received by Hydro One or Wellington North Power Inc. The Township requires a copy of the ESA authorization.

Hydro One or Wellington North Power Inc. shall notify the Township and the Developer once the street light system connection at the transformer has been completed. The Township shall then energize the street light system at the loadcentre and inspect the system operation. Any deficiencies shall be reported by the Township to the contractor for rectification.

b) Cable:

Street light cables shall be installed in conformity with Township standards. The cable shall be installed in 50 mm (2”) Type II PVC, direct buried duct with a minimum of 600 mm cover. As per the Electrical Code, a 6” wide red plastic warning tape is to be installed with black lettering stating ‘ELECTRIC LINE BURIED BELOW”. This warning tape is required to be installed midway between the topmost conductor and final grade above all conductors within the trench.

Where the street light poles are not in place at the time of the cable installation, the end of the cable shall be coiled and staked at the intended pole location in a similar manner to the secondary service cables except that at least 3 m of cable shall be left above grade. Where the cable is to continue on to another light, the cable shall be looped and not cut and at least 6 m in total shall be left above grade.

Cables are to be inserted into the poles via the cable access ports and the ground wire shall be connected to the internal ground lug at the hand hole by means of a #6 AWG compression connector lug.

All connections to ground and to the luminaire conductors are to be made at the hand hole and taped or otherwise insulated after installation.

All connections inside the transformer shall be made by Hydro One or Wellington North Power Inc.

c) Street Light Cable Duct:

In general, the ducts shall be placed in accordance with applicable Ontario Provincial Standard Specifications (OPSS) and Drawings (OPSD) for underground electrical distribution systems. In general, the street light duct shall be placed in the common trench on the same level as the secondary and/or communication cables, and on the road side of the trench, with a minimum of 600 mm cover.

When street light ducts are placed under driveways, the top 300 mm of the backfill shall be compacted to 100% Standard Proctor Density with granular "A".

Street light duct placed under roadways shall be installed in accordance with OPSD 2100.06.

A ¼" Polypropylene fish rope is to be pulled into each duct.

d) Poles:

Installation of street light poles are to be in accordance with applicable OPSD Series 2200 (Foundation) drawings and the manufacturer's requirements.

In general, poles are to be installed in augured or vectored (high pressure water evacuation method) holes to the depths given in the above referenced drawings. The bottom of the hole must be cleaned of loose material before placing the pole.

The Contractor shall take care to ensure that no damage occurs to the electrical or street lighting system or other utilities during the installation of street light poles.

e) Luminaires, Brackets and Photo Controllers:

Installation of street light luminaires and brackets shall be in accordance with the manufacturer's requirements.

The photo-electric controller shall be positioned to face north.

The contractor shall take care to ensure that no damage occurs to the pole, luminaire, bracket or wiring during their assembly and erection.

f) Grounding:

A minimum of two (2) rods must be installed adjacent to the street light loadcentre pedestal/pole, at least 0.3 m below final grade and connected to

the bonded neutral block of the service entrance and must be spaced no less than 3 m apart in accordance with the Electrical Code requirements.

Alternatively, a ground plate must be installed adjacent to the street light loadcentre pedestal/pole at least 0.6 m below final grade level and connected to the bonded neutral block of the service entrance.

A ground rod/plate shall also be installed at the last street light pole of every circuit and bonded to the pole's internal ground. The number of ground rods/plates for each street lighting circuit shall be determined by the design engineer.

Either system is acceptable providing the installation conforms to the Electrical Code requirements.

g) Set Backs:

Driveways are to have a minimum 1.5 m setback from above surface utilities including but not limited to poles, transformers, utility boxes, hydrants, etc.

I. LANDSCAPING

I.1 Boulevards

- All boulevards shall have a minimum depth of 200 mm topsoil plus sod.

I.2 Parks

- All parks shall have a minimum depth of 200 mm topsoil, seed and mulch.

- Seed mix shall be as follows:

TYPE	AMOUNT
Nu Blue Kentucky Bluegrass	25%
Baren Kentucky Bluegrass	25%
Herald Creeping Red Fescue	15%
Wilma Chewing Fescue	10%
Pinnacle Turf Type Per Rye	25%

- Seed shall be applied at a rate of 1.5 – 1.7 kg/100 square metres.

- All topsoil shall be in conformance with OPSS.MUNI 802.

I.3 Trees

- Trees shall be planted in front of every lot on private property at a location 300 mm from the street property line or maximum spacing of 25 m.

- Corner lots shall have a tree planted every 15 m on private property adjacent side yard on the flanking street.

- Trees are to be planted so as not to interfere with other street functions (I.e. daylight triangles) or services when the tree matures. Where it is not possible to conform with the foregoing, the trees shall be planted at locations approved by the Municipality.

- Planting of trees shall be as detailed on Standard Drawings L1 and L2. They shall be watered at time of planting and every two (2) weeks thereafter up to the expiration of the guarantee period. The guarantee period shall be two (2) years from the date of planting and the period for planting shall be Spring and Fall only.

- All trees shall be No. 1 nursery stock, 2.5 m minimum height with a minimum caliper of 60 mm measured 300 mm above ground level.

- All areas for planting shall be stabilized with sod or seed as required, prior to planting of trees.

I.4 Species

- Alternate species shall be provided on all streets. A species list shall be provided and approved for each street, prior to any planting.

- The species that are approved for planting on Municipal property shall include the following:

Scientific Name	Common Name
Acer Nigrum	Black Maple
Acer Rubrum	Red Maple
Acer Saccharum	Sugar Maple
Aesculus Hippocastanum	Common Horse Chestnut
Phellodendron Amurense	Amur Cork Tree
Celtis Occidentalis	Common Hackberry

- The following species are suitable for downtown areas:

Scientific Name	Common Name
Pyrus Calleryana	Chanticleer Pear, Redspire Pear
Amelanchier Canadesis	Serviceberry
Quercus Robur “Fastigiata”	Pyramidal English Oak

I.5 Park and Recreational Areas

The Township may request that the Park or Recreation Areas dedicated for the development be provided with a suitable entrance, including pedestrian gates in Standard Drawings L3, L4 and L5, fencing, and grade and seeded so that the area is suitable for recreational use.

The area to be dedicated for park use shall be reviewed with the Township on submission of the Preliminary Draft Plan. Requirements for entrances, services, fencing, landscaping, grading and seeding will be finalized at time of engineering drawing review. The Township may also request that a different area then that

proposed by the Developer be set aside for a park due to the physical features of site.

I.6 Fencing

Fencing shall be installed where there are varying land uses on adjacent properties. The following is applicable;

a) Black Vinyl Chain Link Fencing:

- Fencing is to be 1.5 metre high, located 0.1 metres on Township property.
- Required along rear or side yards adjacent to public property, including open space, walkways, parkland, SWM blocks, utility corridors and servicing blocks.
- Adjacent to school properties the fencing requirements of properties abutting school board lands requires consultation with the local school board.
- All chain link fencing to be installed as per OPSD 972.130 and OPSS 772.
- Gates are not permitted in required fencing.

b) Privacy Fencing:

- Fencing is to be 1.8 m high wood board-on-board privacy fence, located on the property line.
- Required between residential and industrial/commercial/institutional properties. Also required along residential flankages and/ or rear yards which abut collector and arterial roads.
- Gates are not permitted in required fencing.
- Fencing is not required where acoustic barriers are to be installed.

c) Highway Wire Fencing:

- Must be installed with 150mm (6 in.) diameter wood posts with wire fencing (OPSD 971.101)
- May also be required between public lands and natural heritage features; public lands and agricultural lands. This to be determined on a site specific basis at the Town's discretion.
- Gates are not permitted in required fencing.

I.7 Walking Trails

- Walking trails and pathways to be constructed with a limestone finish material and to be a minimum 1.5 m wide.

- Walking trail designs shall be a minimum of 75 mm limestone, and 150 mm Granular A. 300 mm Granular B may be required on access trails with vehicle traffic and at the discretion of the Township.

- Trail heads to have a sign installed at walking trail entrances. Trail head sign and posts will be provided and installed by the Township at the Developer's expense.

- Walking trails shall have a resting area located a mid-point of trail or as determined by the Township that includes sufficient landscaped area for a bench to be installed.

I.8 Play Structures

- All applicable municipal infrastructure is expected to be designed and constructed consistent with current Provincial and County standards including provisions for accessibility. The play structure design is to take into account accessibility design criteria and shall conform with both of the Accessibility for Ontarians with Disabilities Act (AODA) and Wellington County 2005 Facility Accessibility Design Manual. In the absence of these provisions being met, the developer/engineer is expected to obtain approval, or consult, with the local accessibility committee for any proposed deviation(s).

- Curbs to be plastic timbers.

J. REVISIONS TO SERVICING STANDARDS

J.1 Revisions

Since the Design Criteria and Standard Drawings could be revised, the Consulting Engineer should ensure that their Manual is up-to-date before commencing design work on a specific project. Copies of the current Standards can be obtained from the Township of Wellington North or on the Township of Wellington North website.

2. STANDARD DRAWINGS

Where the Ontario Provincial Standard Drawing number has been indicated, this Standard shall apply. Where a Township of Wellington North Standard Drawing number has been indicated in addition to the Ontario Provincial Standard Drawing number, the latter shall be read in conjunction with the Township of Wellington North Standard. Should there be an inconsistency between the Standards; the Township of Wellington North Standard shall take precedence.

The Township of Wellington North reserves the right to update its Standards from time to time and any person using them should ensure they have a copy of the current listing prior to proceeding with a project.

In all cases, the latest revisions of the Standard Drawings as of the date the design is completed shall be used. For the Township of Wellington North Standards, the Standard number includes the month and year of the latest revision of the Standard.

TABLE 1: STANDARD DRAWINGS LIST

TITLE	ONTARIO PROVINCIAL STANDARD DRAWING (Latest Revision)	TOWNSHIP OF WELLINGTON NORTH STANDARD (Latest Revision)
Pipe Bedding-Granular 'A' Cover Material-Granular 'A' or sand	802.010 802.013 802.030 802.031 802.032 802.033	
M.H. Frame and Cover a) Sanitary Existing Structure (C.4.c) b) Storm – In Roadway Existing Structure (D.5.a) Curb line c) Watertight – Sanitary	 AutoStable by Bibby St. Croix 401.010 (Type 'A') AutoStable by Bibby St. Croix 401.010 (Type 'B') 400.110 401.030	 - - - - - -
Catch Basin Frame and Grate	400.110	-
Ditch Inlet Catch Basin Frame and Grate	403.010	Special where required
Maintenance Hole Steps	405.010 (Circular Aluminum)	-
Safety Platform, Aluminum	404.020	-
Sewer Service Connections	1006.010	-

STANDARD DRAWING LIST CONTINUED		
Maintenance Hole (precast)	Section 700	-
Catch basin (precast)	Section 700	-
Catch basin M.H. (precast)	Section 700	-
M.H. Benching	701.021	-
Frost Strap Installation	701.100	-
Precast Concrete Adjustment Units	704.010	-
Internal Drop Structure for Ex. M.H.	1003.030	-
25 mm Blow Off Installation	-	W1
Valve and Box	-	W2
Hydrant Setting	1105.010	-
Connection of New Watermain to Existing Watermain	-	W3
Thrust Blocks *When approved by the Township on existing watermain only. See section E.9 for mechanical restraints.	1103.010 1103.020	-
Spacer For Water Meter	-	W4
Typical Water Meter Installation	-	W5
Frost Collar Installation For Curb Stop Boxes Located In Driveways	-	W6
Non-Metallic Water Service Connection Detail For Non-Metallic Watermain 50 mm diameter or less services	-	W7
Metallic Water Service Connection Detail For Non-Metallic Watermain 25 mm Diameter or Less Services	-	W8
Watermain Tracer Wire Installation Procedure	-	W9
Cathodic Protection For PVC Watermain Systems	-	W10
Minimum Watermain Restraint Requirements	-	W11
20 m Right-of-Way	-	R1
22 m Right-of-Way	-	R2

STANDARD DRAWING LIST CONTINUED		
26 m Right-of-Way	-	R3
Typical Rural Section 20 m Right-of-Way	-	R4
Temporary Catch Basin Drain	-	R5
Concrete Sidewalk (125 mm Concrete) (125 mm Granular “A” minimum)	310.010	-
Sidewalk Ramps	310.030 310.033	-
Tactile Warning Plates	310.039	-
Barrier Curb and Gutter	600.040	-
Mountable Curb and Gutter	600.100	-
Curb with Gutter Method of Termination	608.010	-
Asphalt Gutter	601.010	-
Chain Link Fence	972.130	-
Highway Wire Fence	971.101	-
Lot Grading Plan Detail	-	G1
Lot Grading Plan Townhouse	-	G2
Typical Servicing Layout Single and Semi-Detached	-	S1
Typical Servicing Layout Townhouse	-	S2
Typical Servicing Layout For Infill Lots Townhouse	-	S3
Typical Servicing Layout For Infill Lots Townhouse	-	S4
Side Yard Easement on 3.0m Wide Easement	-	S5
Sanitary Service Connection With Clean-Out	-	S6
Sump Pump To Storm Service Connection	-	S7
Sanitary Connection $\geq$ 4m Deep	-	S8
Residential Sanitary Service Detail	-	S9
Storm Private Drain Connection Detail	-	S10
Utility Plan	-	U1
Deciduous Tree Planting Detail	-	L1

STANDARD DRAWING LIST CONTINUED		
Bare Root Tree Planting Detail	-	L2
Barrier For Tree Protection	220.010	-
Trail Barrier Gate	-	L3
Stainless Steel Security Barrel/Pin For Trail Barrier Gate & Maintenance Access Gate	-	L4
Maintenance Access Gate	-	L5

STANDARD DRAWINGS – SEE APPENDIX A

3. APPROVED MATERIALS AND PRODUCT LIST

Table 2: Approved Materials and Product List		
SERVICE	**ITEM**	**APPROVED PRODUCT**
SANITARY	Sewer Pipe	- PVC SDR 35 - Concrete CSA #A257.1/A257.2
	Service Pipe	- PVC SDR 28 to building foundation, colour green
	Connections	- Kor-N-Seal (Maintenance Hole) - Prefabricated tees (Services on new sanitary sewer) - Stainless Steel Straps and saddles (Permitted only for tapping into existing sanitary main sewers with advance approval from the Township.) - Kor-N-Tee Saddle Connector (Services on existing PVC or clay sanitary sewer)
	Frame and Grate	AutoStable manufactured by Bibby-Ste-Croix. (See Section C.4.c)
STORM	Sewer Pipe	**600 mm diameter or less:** - PVC SDR35 - PVC pipe "Ultra Rib" as manufactured by IPEX, in accordance with CSA B182.4 - Concrete - CSA A257.2 (reinforced) - HDPE Boss 2000, smooth wall, 320 kPa stiffness c/w Ultra Stab 75 Joint as manufactured by Armtec, in accordance with CSA B182.8-02 Storm Sewer Grade. Pipe and fittings must bear CSA logo (B182.6 is also acceptable) - PVC pipe, "KORFLO" as manufactured by Royal Pipe Company, in accordance with CSA B182.4
		675 mm diameter or greater: - Concrete - CSA A257.2 (reinforced)
		- Leads to rear yard catch basins (i.e. Side yard) are to be concrete - All pipes to be bell and spigot joints and shall have elastomeric gaskets to provide a water tight seal.
	Culverts	- HDPE corrugated BOSS 2000, smooth wall, 320 kPa stiffness c/w Ultra Stab 75 joint manufactured by Armtec in accordance with CSA B182.8-02 Storm Sewer.
	Service Pipe	PVC SDR 28 to building foundation, colour white
	Connections	- Kor-N-Seal (Connection of PVC SDR35 pipe at structures) - Adaptor with sand (ribbed) (new storm main to existing concrete storm sewer) with advanced approval from Township - Prefabricated tee (services on new storm main)

STORM CONT'D		- Kor-N-Tee Pipe to Pipe Connector (services to existing concrete storm sewer only) - Kor-N-Tee Saddle Connector (Services on existing PVC and clay storm sewer) - Inserta tees (Services on existing HDPE storm sewer)
	Subdrain	150mm Polyethylene Big 'O' BOSS 2000 with geotextile filter wrap, class 1 with filter opening size of 130-100 µm
	Inlet Basin (rear yard drainage only)	Nyloplast
	Frame and Grate	-OPSD 400.110 in curb line. -AutoStable manufactured by Bibby-Ste-Croix in roadway. (See Section D.5).
WATERMAIN	Watermain Pipe	PVC pipe DR 18, Class 235 PVC and conform to ASTM D1784, AWWA Standard C900 or C905 and CSA Standard CAN3-B137.3-M86.
	Valves	Mueller Resilient Wedge Gate Valve AWWA C-509, A-2362 mechanical joint ends with: - fusion-bonded epoxy coating - bronze stem - open counter clockwise Or; Clow Resilient Wedge Valve AWWA C-509, F-6100 model 2639 mechanical joint with: - fusion-bonded epoxy coating - bronze stem - open counter clockwise
	Hydrants	All with "Storz" pumper connection and open counter clockwise: - Canada Valve, Century Type Compression (as manufactured by Mueller) - Clow Canada, Brigadier Series M-67-B (as manufactured by Clow Canada) - Hydrants to be red in colour with storz pump cap and both 2.5" caps painted black - Hydrant marker 4' yellow with hydrant ID sticker manufactured by Owl Lite Model D1FHM804Y or E.H. Wachs "Pretzel" WC-HYD-MK
	Valve Boxes	- Bibby-Ste-Croix VB2200, Slide Type - Bibby-Ste-Croix VB3200, Screw Type - Star Pipe Canada VB-5006, Slide Type - MVB Composite Valve Box

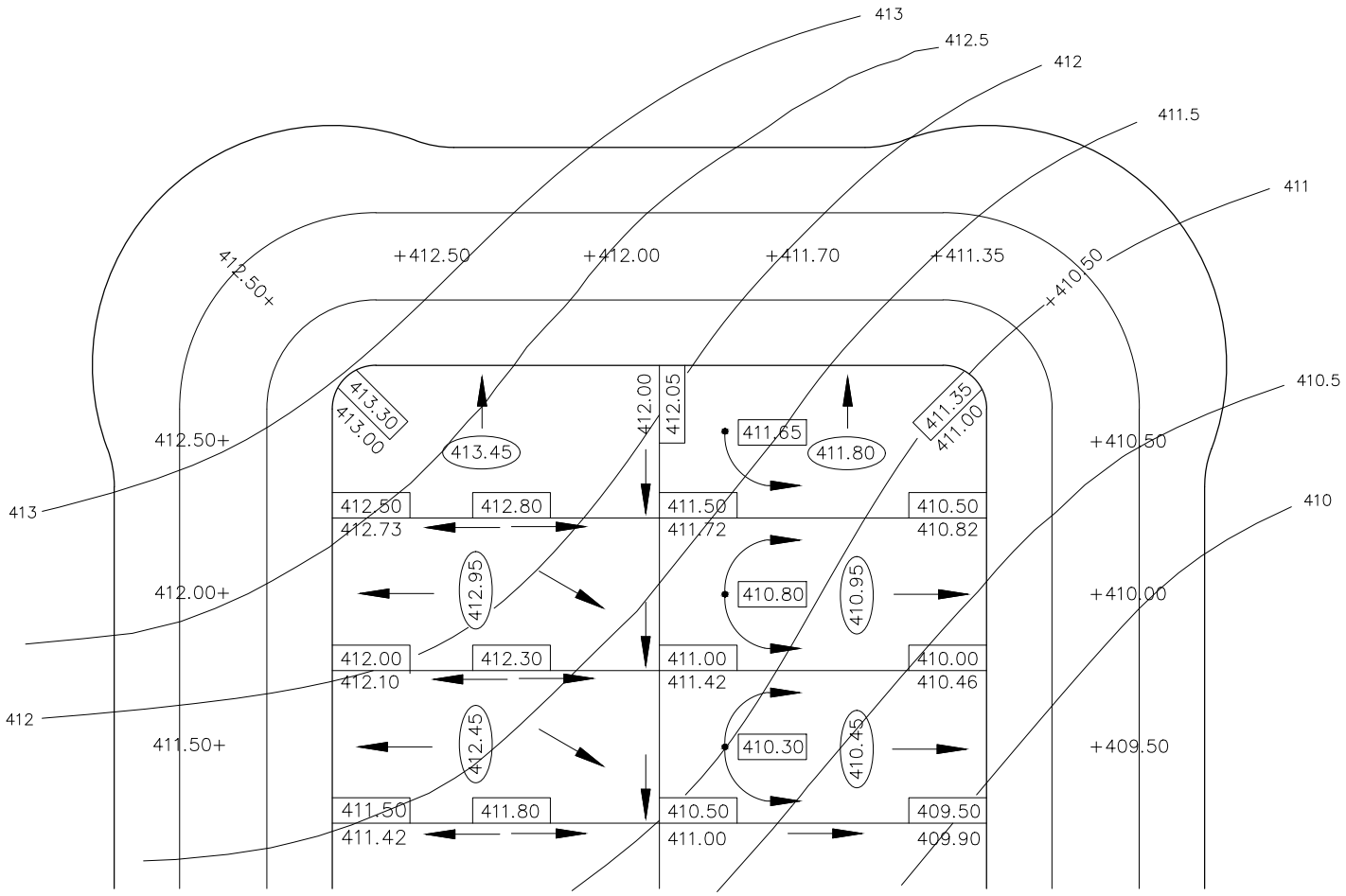
WATERMAIN CONT'D	Corporation Main Stop	- Cambridge Brass, Ball Style, Series 301NL(no-lead) with electrical connection, AWWA x CB assembly Or; - Mueller Canada, Mueller Ground Key Design Type, H-15008N (no-lead) with electrical connection, Mueller 110 Compression Joint
	Curb Stop	- Cambridge Brass, Ball Style, Series 202NL (no-lead) with electrical connection, CB Compression x CB Compression assembly; Or; - Mueller Canada, Mueller Mark II Oriseal, Type H-15209N (no-lead) with electrical connection, Mueller 110 Compression Joint. **ALL ROD AND PIN SHALL BE STAINLESS STEEL**
	Saddle	- Robar Stainless Steel 2616 Double Bolt, Wide Band - Cambridge Brass Series 8403 Stainless Steel Single Piece Saddle Type 304 Double Bolt, - AWWA Thread
	Mechanical Joint Restraints	**PVC Pipe:** - One-LOK Series for SLCE PVC pipe manufactured by Sigma - Uni-Flange Series 1300 manufactured by Ford Meter Box Company Inc. - Megalug Series 2000 PV C900 pipe - ALL Stargrip Series 4300 manufactured by Star Pipe Products **Iron Pipe:** - Megalug Series 1100 - Stargrip Series 3000 manufactured by Star Pipe Products - ALL Stargrip Series 4300 manufactured by Star Pipe Products
	Thrust Bell Joint Restraint	- 600 Series pipe restraint manufactured by Romac Industries Inc. - Uni-Flange Series 1390 for PVC Pipe Bell Joints manufactured by Ford Meter Box Company Inc. - PV-LOK Series PWPR manufactured by Sigma - Pipe Restrainers Series 1100G2 manufactured by Star Pipe Products
	Tracer Wire	12 gauge, 7 strand copper with plastic coating, colour blue. Attached to storz pumper connection
	Waterproof Connectors	Direct Bury Lug Aqua #90220, dielectric silicone filled to seal out moisture and corrosion manufactured by DryConn

WATERMAIN CONT'D	Water Service Material	- Copper seamless Type "K" - Crosslinked polyethylene ("Municipex" by Rehau and "Blue904" by Ipex)
	Service Boxes	All service boxes to be adjustable slide type with a minimum 2.0m length and complete with stainless steel rod and pin: - Mueller A-726 - Concord Clow Canada, D-1-10 or D-2-10
Tactile Warning Surface Indicators	Tactile Plates	Duralast cast iron manufactured by East Jordan Ironworks or an approved equivalent. Clay red in colour.
STREET LIGHTING *All design to be CSA approved	Poles	Cobra head combination: concrete, Class B centrifugally cast round, mold finish. Decorative combination: concrete, centrifugally cast.
	Luminaires	Lumex p/n RFM-72W32LED4K-G2-R2M-UNV-DMG-FAWS-RCD7-GY3
	Brackets	- Standard: 1.8 m or 2.4 m tapered elliptical aluminum. - Decorative: 1.5 m or 1.8 m nominal curved. Manufactured with the current revisions of ANSI C136.1.
	Photo-Electric Controllers	See Section H.2.d.
	Loadcentres	60 amp, 22 kAIC, 120 V / 240 V double-pole line side main breaker, and 40 amp, 120 V single-pole load side breakers (quantity: up to 6).
	Cable Duct	50 mm Type II PVC, direct buried duct meeting CAN/CSA-C22.2 NO.227.1 (latest revision).
	Light Wiring (Handhole to Luminaire)	2 - #12 copper NMWU plus 1 - #12 copper ground, CSA approved.
	Distribution Cable (Loadcentre to Street Light Poles)	2 - #6 copper, RWU-90-CSA complete with 1 - #6 jacketed green ground (for 120V). and 3 - #6 copper, RWU-90-CSA complete with 1 - #6 jacketed green ground (for 240V).
	Power Cable (Transformer to Loadcentre)	3 - #2 copper RWU-90-CSA with 1 - #2 ground, CSA approved.
	Grounding Rods and Plates	Hot dip galvanized (CAN/CSA G164) solid steel, CAN/CSA G40.20/G40.21, Grade 230G, 19 mm diameter, 3 m long, copper clad for the full length, CSA C22.2 No. 41. 0.2 m^2 of surface to exterior soil, >6 mm thick.

Material List Updated –March 2023

APPENDIX A

STANDARD DRAWINGS



REQUIRMENTS

DRIVEWAY GRADES	1% – 6%
WALKWAY GRADES	2% – 5%
LOT GRADES	2% – 6%

BUILDING GRADE 300mm HIGHER THAN HIGHEST FRONT LOT CORNER

ALL SIDE YARD SWALES TO BE CENTERED ON LOT LINES, MIN. GRADE 2%, MIN. DEPTH 150mm, MAX. DEPTH 250mm MAX. SLOPE 3:1

ALL REAR YARD SWALES TO BE ENTIRELY WITHIN THE SITE, MIN. GRADE 2%, MIN. DEPTH 150mm, MAX. DEPTH 300mm MAX. SLOPE 3:1

MAX. DISTANCE WITHOUT CATCHBASIN TO BE 75m.

TOP OF FOUNDATION ELEV. TO BE MIN. 150mm HIGHER THAN PROPOSED GRADES AT BUILDING

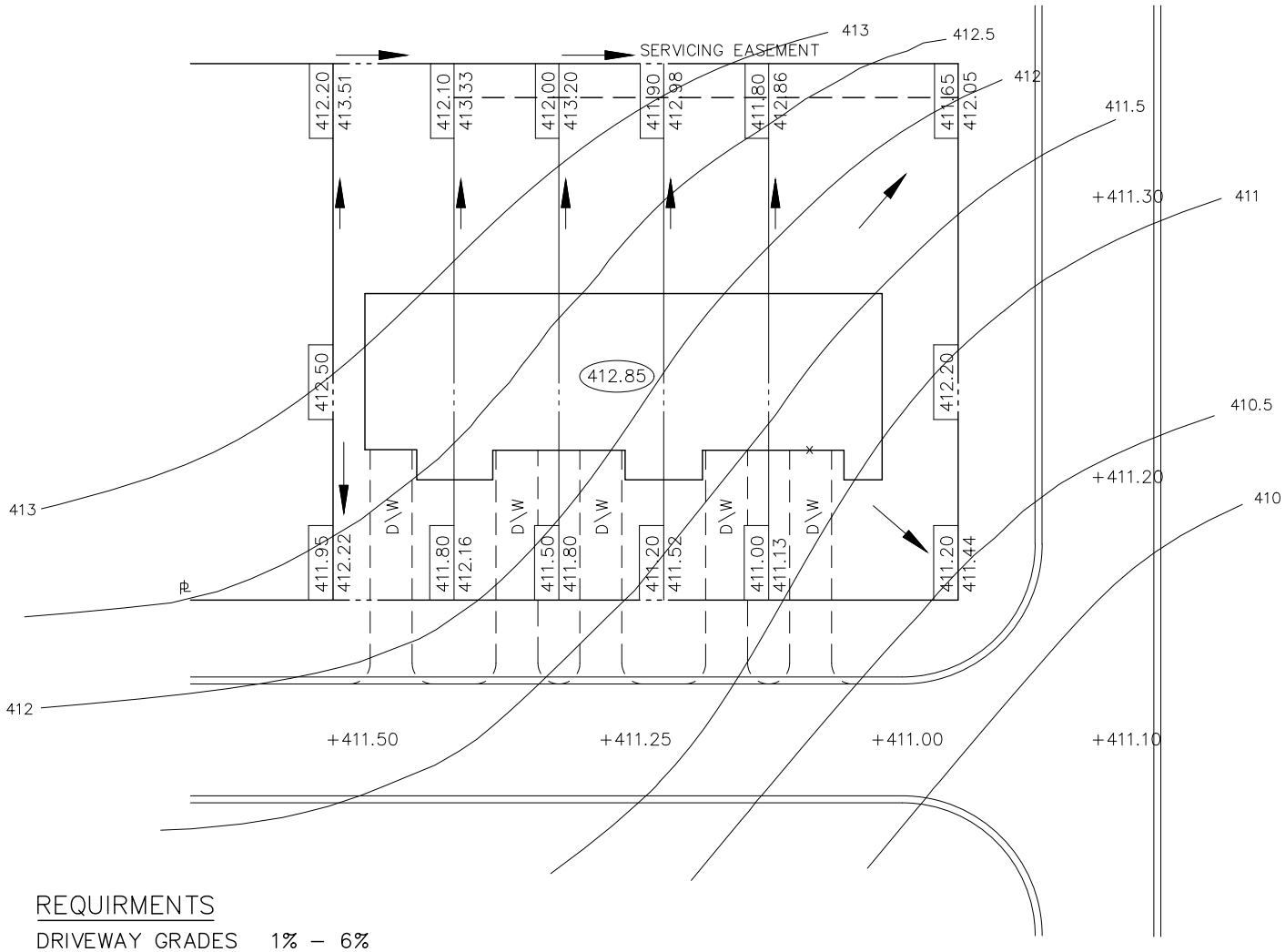
LEGEND

412.73	EXISTING LOT CORNER ELEV.
412	EXISTING CONTOURS @ 0.5m OR LESS
+410.50	PROPOSED ℄ ROAD ELEV. @ 20m STA.
411.45	PROPOSED LOT ELEVATION
→	PROPOSED SURFACE DRAINAGE & DIRECTION
411.95	PROPOSED GRADE @ BUILDING

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 2
LOT GRADING PLAN GENERAL	STD. **G1**	

NOTE:

1. SEE SECTION D.3.d AND G FOR ADDITIONAL REQUIREMENTS.



REQUIRMENTS

DRIVEWAY GRADES	1% – 6%
WALKWAY GRADES	2% – 5%
LOT GRADES	2% – 6%

BUILDING GRADE 300mm HIGHER THAN HIGHEST FRONT LOT CORNER

ALL SIDE YARD SWALES TO BE CENTERED ON LOT LINES, MIN. GRADE 2%, MIN. DEPTH 150mm, MAX. DEPTH 250mm MAX. SLOPE 3:1

ALL REAR YARD SWALES TO BE ENTIRELY WITHIN THE SITE, MIN. GRADE 2%, MIN. DEPTH 150mm, MAX. DEPTH 300mm MAX. SLOPE 3:1

MAX. DISTANCE WITHOUT CATCHBASIN TO BE 75m.

TOP OF FOUNDATION ELEV. TO BE MIN. 150mm HIGHER THAN PROPOSED GRADES AT BUILDING

HIGH GROUND WATER ELEVATIONS TO BE SHOWN.

LEGEND

412.73	EXISTING LOT CORNER ELEV.
412	EXISTING CONTOURS @ 0.5m OR LESS
+410.50	PROPOSED ℄ ROAD ELEV. @ 20m STA.
411.45	PROPOSED LOT CORNER ELEV.
→	PROPOSED SURFACE DRAINAGE & DIRECTION
411.95	PROPOSED ELEVATION OF TOP OF FOUNDATION

REV.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
LOT GRADING PLAN TOWNHOUSE	STD. **G2**	

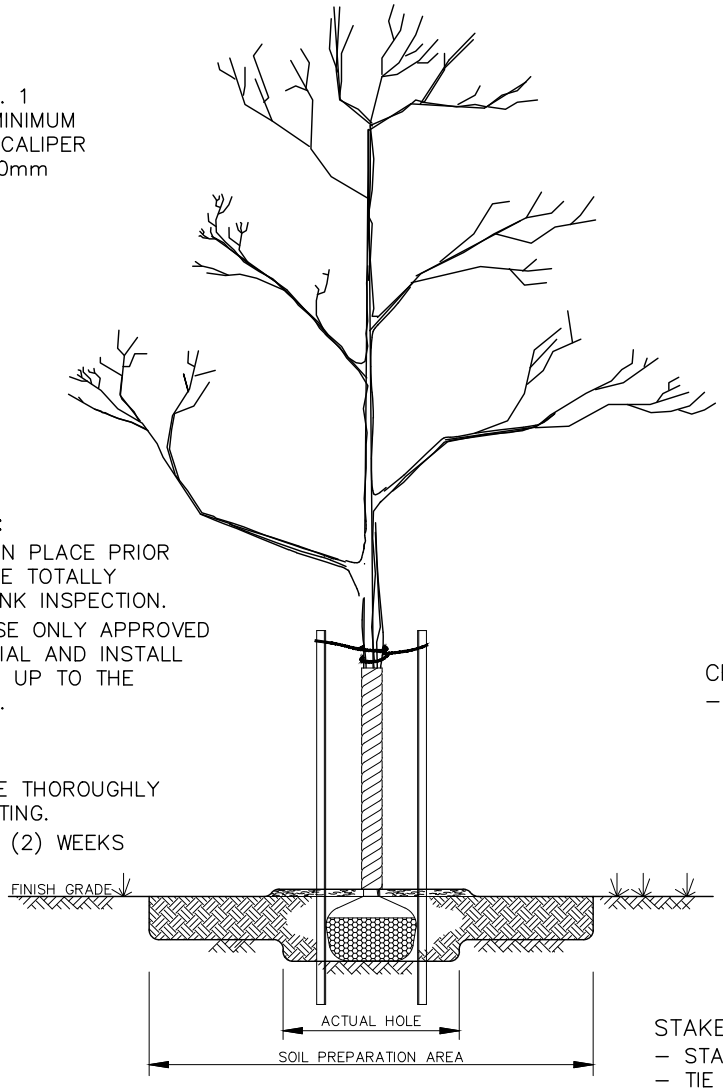
NOTE:

1. SEE SECTION D.3.d AND G FOR ADDITIONAL REQUIREMENTS.

ALL TREES SHALL BE NO. 1 NURSERY STOCK. 2,5m MINIMUM HEIGHT WITH A MINIMUM CALIPER OF 60mm MEASURED 300mm ABOVE GROUND LEVEL.

SOIL AMENDENT:
- EXISTING TOPSOIL TO BE AMENDED WITH TRIPLE–MIX WHERE REQUIRED.

PLANTING SOIL:
- HOLE TO BE BACKFILLED AND CONCURRENTLY TAMPED AND WATERED TO ELIMINATE AIR POCKETS.



PLANTING DEPTH:
- IN HEAVY CLAY OR POORLY DRAINED SOIL, ALL WOODY PLANTS TO BE PLACED SO THAT THE ROOT COLLAR IS POSITIONED 75–100mm HIGHER THAN SURROUNDING GRADE.

TRUNK PROTECTION:
- TRUNK WRAPPING IN PLACE PRIOR TO PLANTING TO BE TOTALLY REMOVED FOR TRUNK INSPECTION.
- WHEN REQUIRED USE ONLY APPROVED TREE WRAP MATERIAL AND INSTALL FROM THE GROUND UP TO THE LOWEST BRANCHES.

CROWN PRUNING:
- PRUNE AT PLANTING TO CAREFULLY REMOVE DEAD, BROKEN, DAMAGED & INTERFERING BRANCHES, DOUBLE LEADERS & NARROW ANGLE BRANCH UNIONS. THIN HEAD WHEN & WHERE APPLICABLE.

WATERING:
- ENSURE TREES ARE THOROUGHLY WATERED AT PLANTING.
- WATER EVERY TWO (2) WEEKS THEREAFTER.

STAKES AND TIES:
- STAKE IMMEDIATELY.
- TIE USING BIODEGRADEABLE MATERIAL SUCH AS FOLDED BURLAP, ETC.
- STAKES TO BE PLACED TO PREVENT DAMAGE TO ADJACENT BRANCHES.
- USE 50mm x 50mm x 2m WOOD STAKES OR METAL T–BARS DRIVEN SECURELY INTO GROUND. ALIGN STAKES WITH PREVAILING WINDS.
- APPLY RODENT PROTECTION WHERE REQUIRED.

MULCHING:
- MULCH WITH SHREDDED BARK OR COMPOSTED HARDWOOD CHIPS TO A MAXIMUM DEPTH OF 75mm, OVER AN AREA OF THE ROOTBALL. KEEP MULCH 150mm AWAY FROM TRUNK.
- FOR OTHER TYPES OF MULCHING, REFER TO SPECIFICATIONS.

PLANTING AREA:
- ACTUAL HOLE TO BE 300mm WIDER AROUND PERIMETER OF ROOTBALL.
- SOIL PREPARATION AREA TO BE 5X ROOTBALL DIAMETER.
- SCARIFY SOIL PREPARATION TO A DEPTH OF 300mm FOR AERATION.

ROOTBALL, BURLAP, TWINE:
- CUT AND REMOVE ALL WIRE, ROPE, BURLAP AND TWINE FROM AROUND TRUNK AND THE TOP 1/3 OF THE ROOTBALL.

IMPORTANT:

SOME OR ALL NOTES MAY NOT APPLY TO THE SPECIAL REQUIREMENTS OF A SPECIES OR A PLANTING ENVIRONMENT.

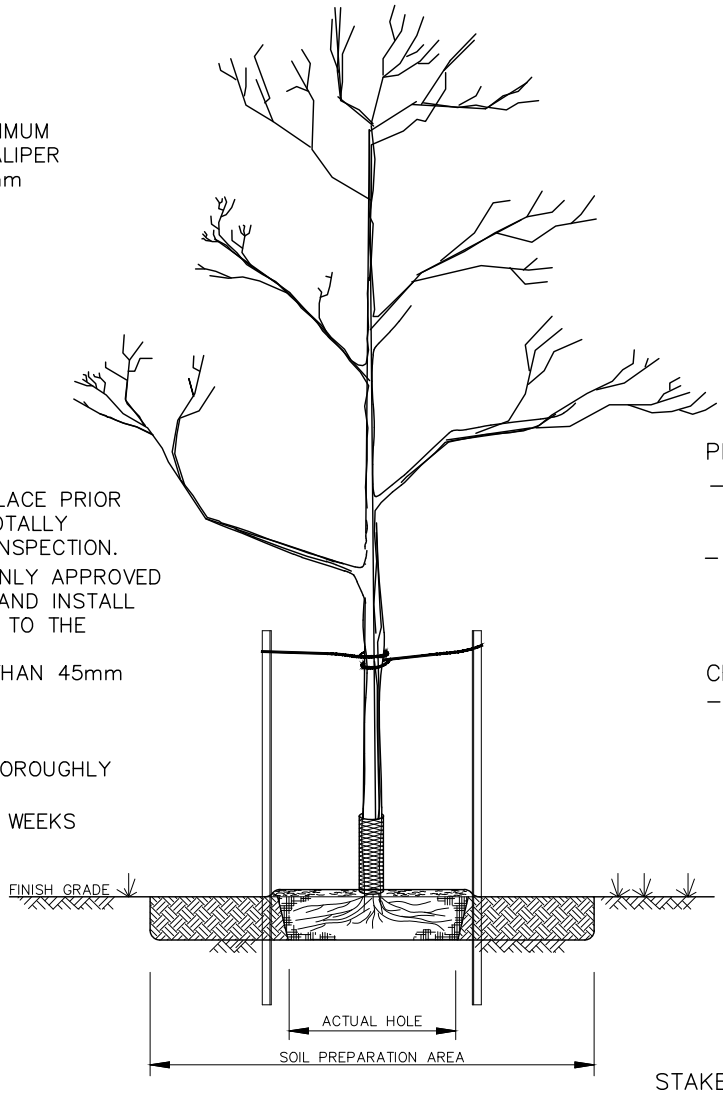
BACKGROUND INFORMATION PROVIDED FROM LANDSCAPE ONTARIO.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 1
DECIDUOUS TREE PLANTING DETAIL	STD. **L1**	

ALL TREES SHALL BE NO. 1 NURSERY STOCK. 2,5m MINIMUM HEIGHT WITH A MINIMUM CALIPER OF 60mm MEASURED 300mm ABOVE GROUND LEVEL.

SOIL AMENDENT:
- EXISTING TOPSOIL TO BE AMENDED WITH TRIPLE-MIX WHERE REQUIRED.

PLANTING SOIL:
- HOLE TO BE BACKFILLED AND CONCURRENTLY TAMPED AND WATERED TO ELIMINATE AIR POCKETS.



TRUNK PROTECTION:
- TRUNK WRAPPING IN PLACE PRIOR TO PLANTING TO BE TOTALLY REMOVED FOR TRUNK INSPECTION.
- WHEN REQUIRED USE ONLY APPROVED TREE WRAP MATERIAL AND INSTALL FROM THE GROUND UP TO THE LOWEST BRANCHES.
- WRAP TREES LARGER THAN 45mm CALIBER.

WATERING:
- ENSURE TREES ARE THOROUGHLY WATERED AT PLANTING.
- WATER EVERY TWO (2) WEEKS THEREAFTER.

PLANTING DEPTH:
- PLANT TO BE PLACED SO THAT THE ROOT COLLAR IS POSITIONED AT THE SAME LEVEL AS IN THE NURSERY FIELD.
- CARE SHOULD BE TAKEN TO AVOID EXCESSIVE SETTLEMENT OF ROOTS FOLLOWING PLANTING.

CROWN PRUNING:
- PRUNE AT PLANTING TO CAREFULLY REMOVE DEAD, BROKEN, DAMAGED & INTERFERING BRANCHES, DOUBLE LEADERS & NARROW ANGLE BRANCH UNIONS. THIN HEAD WHEN & WHERE APPLICABLE.

MULCHING:
- MULCH WITH SHREDDED BARK OR COMPOSTED HARDWOOD CHIPS TO A MAXIMUM DEPTH OF 75mm, OVER AN AREA OF THE ROOTBALL. KEEP MULCH 150mm AWAY FROM TRUNK.
- FOR OTHER TYPES OF MULCHING, REFER TO SPECIFICATIONS.

PLANTING AREA:
- ACTUAL HOLE TO BE 300mm WIDER AROUND PERIMETER OF ROOT SYSTEM.
- SOIL PREPARATION AREA TO BE 5X ROOT DIAMETER.
- SCARIFY SOIL PREPARATION TO A DEPTH OF 300mm FOR AERATION.

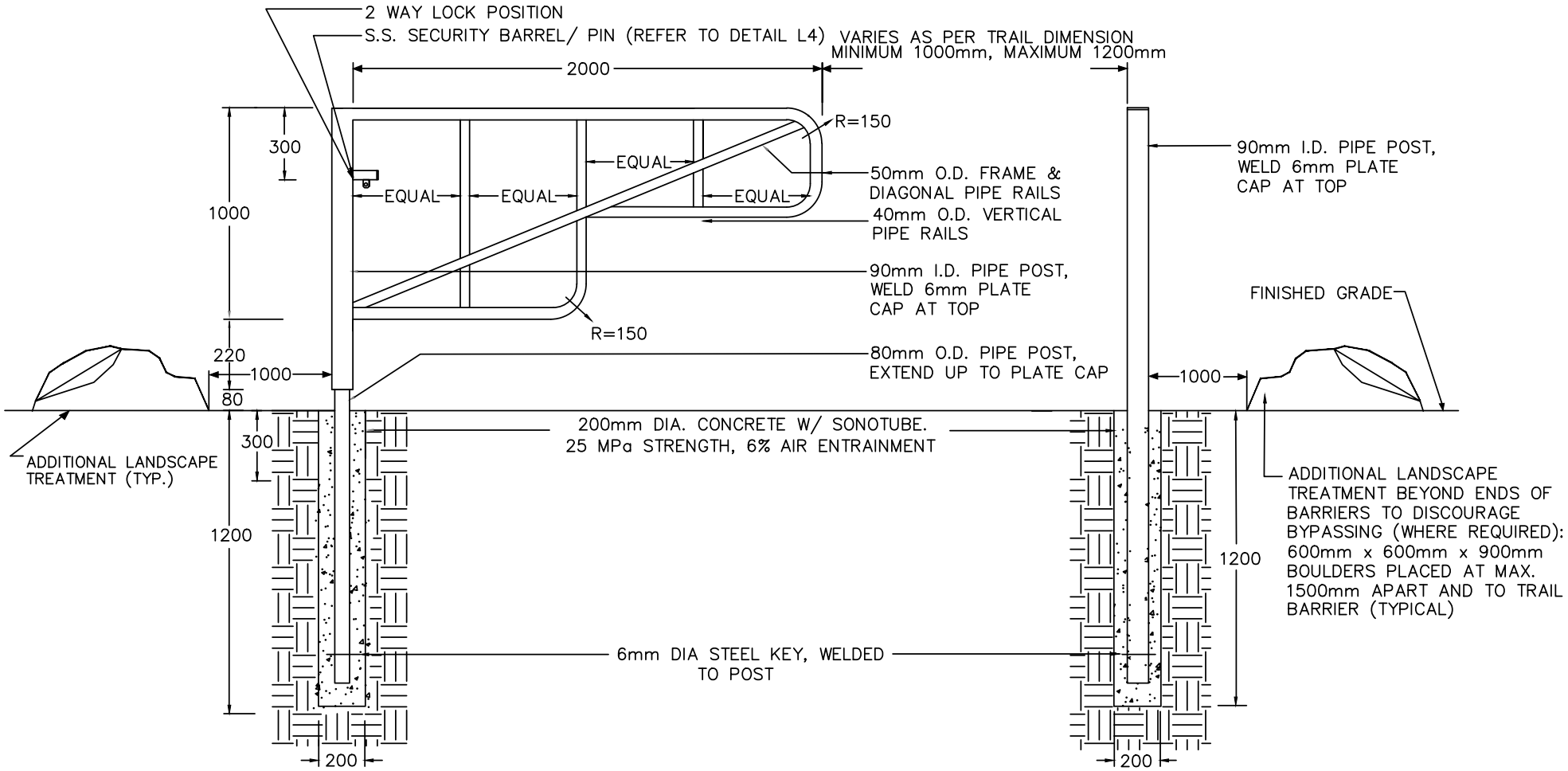
STAKES AND TIES:
- STAKE BEFORE PLANTING.
- TIE USING BIODEGRADEABLE MATERIAL SUCH AS FOLDED BURLAP, ETC.
- STAKE TO BE PLACED TO PREVENT DAMAGE TO ADJACENT BRANCHES.
- USE 50mm x 50mm x 2m WOOD STAKE OR METAL T-BAR DRIVEN SECURELY INTO GROUND. ALIGN STAKE WITH PREVAILING WINDS.
- APPLY RODENT PROTECTION WHERE REQUIRED.

IMPORTANT:

SOME OR ALL NOTES MAY NOT APPLY TO THE SPECIAL REQUIREMENTS OF A SPECIES OR A PLANTING ENVIRONMENT.

BACKGROUND INFORMATION PROVIDED FROM LANDSCAPE ONTARIO.

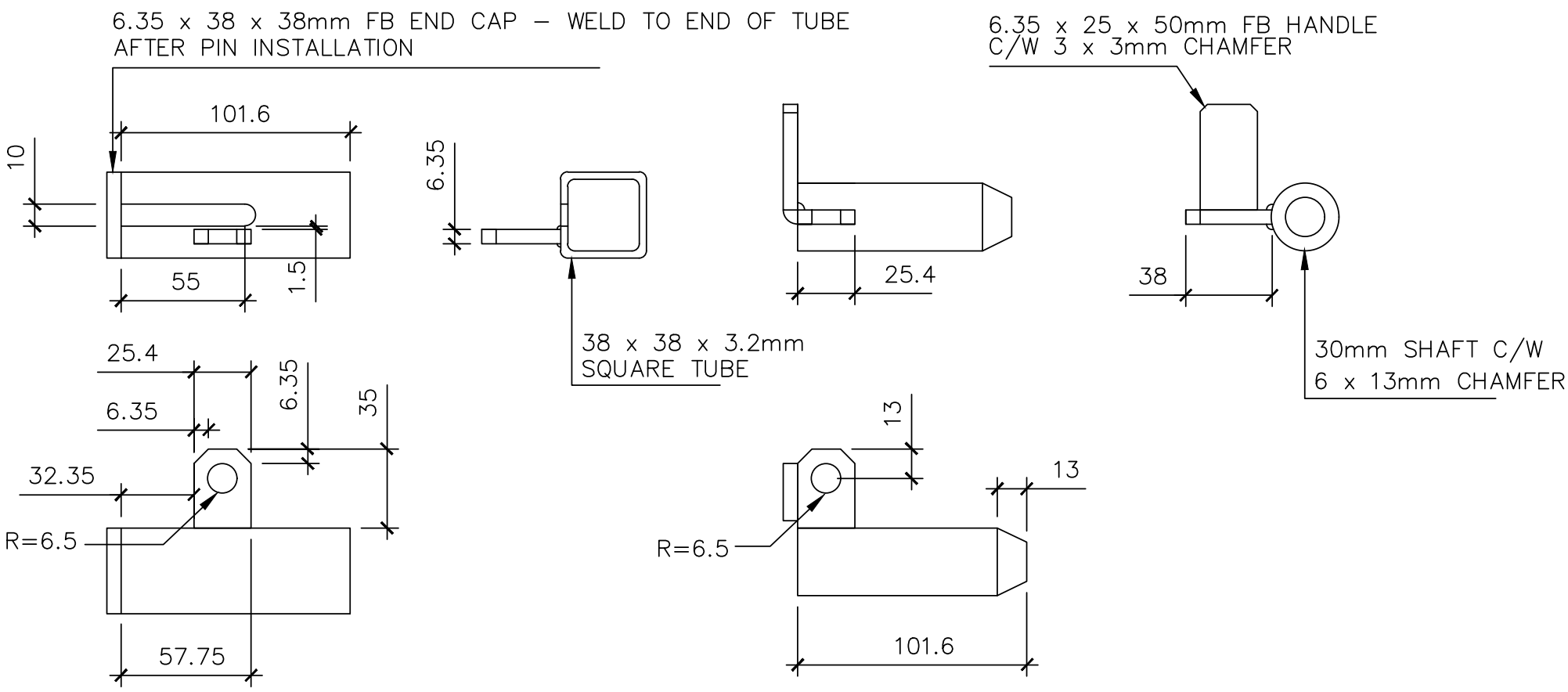
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 1
BARE-ROOT TREE PLANTING DETAIL	STD. **L2**	



NOTES:

1. ALL GATE METAL AND PIPE POST EXCEPT S.S. SECURITY BARREL/PIN TO BE SCHEDULE 40 STEEL PIPE, HOT DIP GALVANIZED TO MEET CSA–G164–M1981 AFTER FABRICATION. ALL WELDS TO MEET CSA W59–M1989 AND BE GROUND SMOOTH. TOUCH UP ALL MINOR DAMAGED AREAS WITH ZINC BASED PAINT AFTER INSTALLATION. POSITION DRAINAGE HOLES TO MINIMIZE WATER INGRESS; FILL HOLES IF DIRECTED BY TOWNSHIP REPRESENTATIVE.
2. EXACT LOCATION OF GATE AND ANY ADDITIONAL LANDSCAPE TREATMENTS TO BE AS DIRECTED ON SITE BY TOWNSHIP REPRESENTATIVE.
3. THIS DRAWING MUST BE READ IN CONJUNCTION WITH DRAWING L4, STAINLESS STEEL SECURITY BARREL/PIN FOR TRAIL BARRIER GATE.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
TRAIL BARRIER GATE	STD. **L3**	



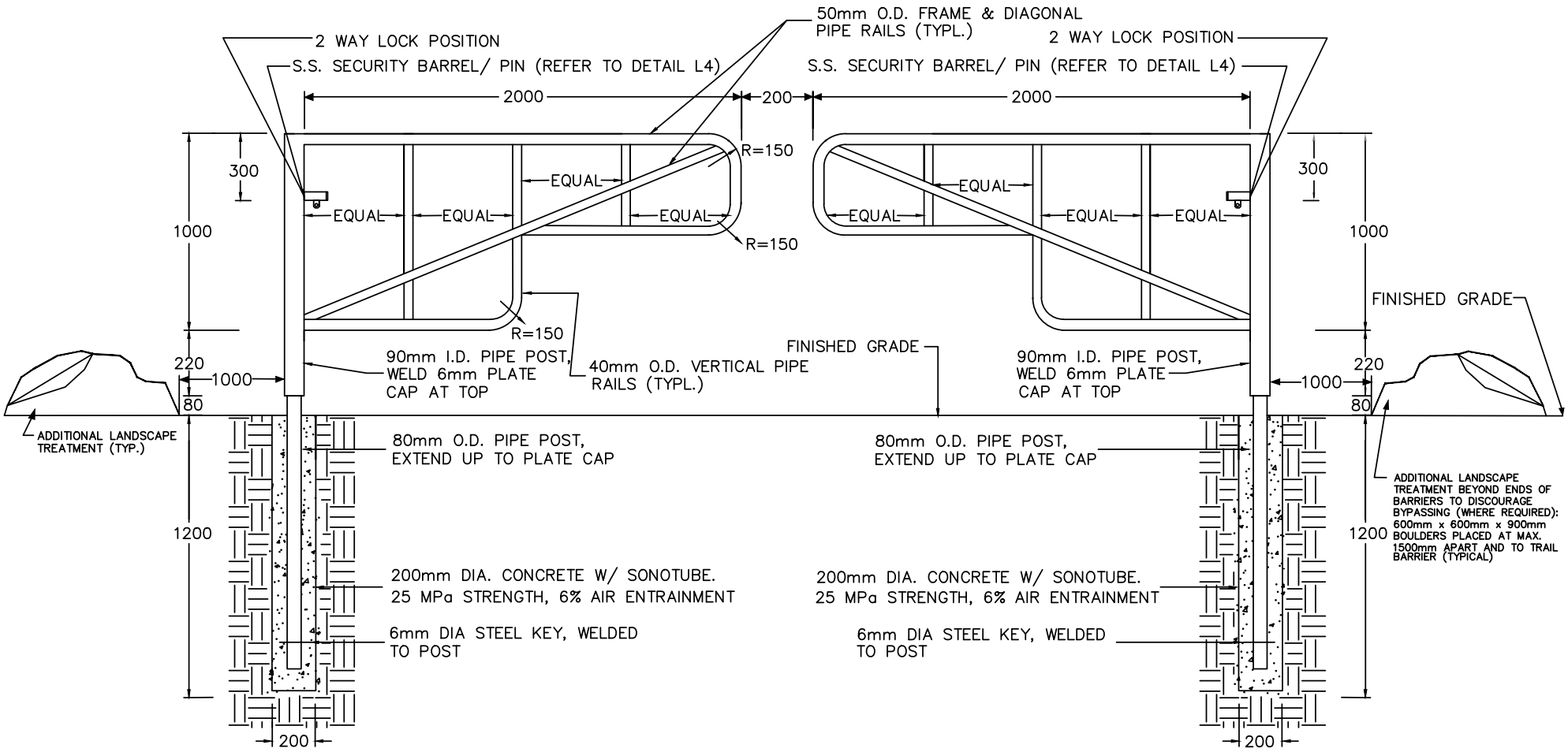
BARREL DETAIL

PIN DETAIL

NOTE:

1. REMOVE GALVANIZING FROM GATE AT BARREL/PIN WELD AREA AND FULLY COAT WELD SURFACE WITH ZINC BASED PAINT OVERLAPPING ONTO STAINLESS STEEL.

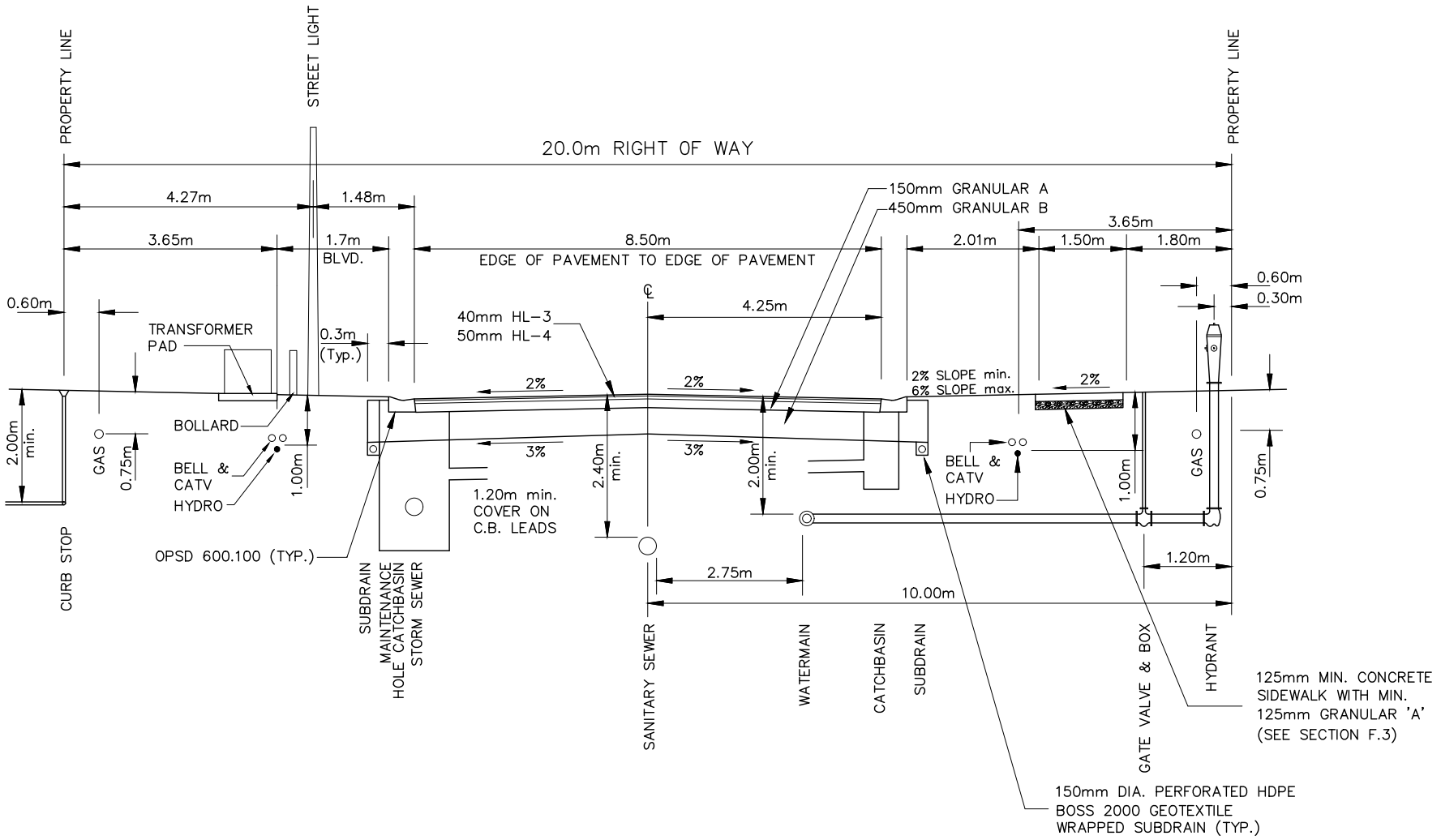
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
STAINLESS STEEL SECURITY BARREL/PIN FOR TRAIL BARRIER GATE & MAINTENANCE ACCESS GATE	STD. **L4**	



NOTES:

1. ALL GATE METAL AND PIPE POST EXCEPT S.S. SECURITY BARREL/PIN TO BE SCHEDULE 40 STEEL PIPE, HOT DIP GALVANIZED TO MEET CSA–G164–M1981 AFTER FABRICATION. ALL WELDS TO MEET CSA W59–M1989 AND BE GROUND SMOOTH. TOUCH UP ALL MINOR DAMAGED AREAS WITH ZINC BASED PAINT AFTER INSTALLATION. POSITION DRAINAGE HOLES TO MINIMIZE WATER INGRESS; FILL HOLES IF DIRECTED BY TOWNSHIP REPRESENTATIVE.
2. EXACT LOCATION OF GATE AND ANY ADDITIONAL LANDSCAPE TREATMENTS TO BE AS DIRECTED ON SITE BY TOWNSHIP REPRESENTATIVE.
3. THIS DRAWING MUST BE READ IN CONJUNCTION WITH DRAWING L4, STAINLESS STEEL SECURITY BARREL/PIN FOR TRAIL BARRIER GATE.

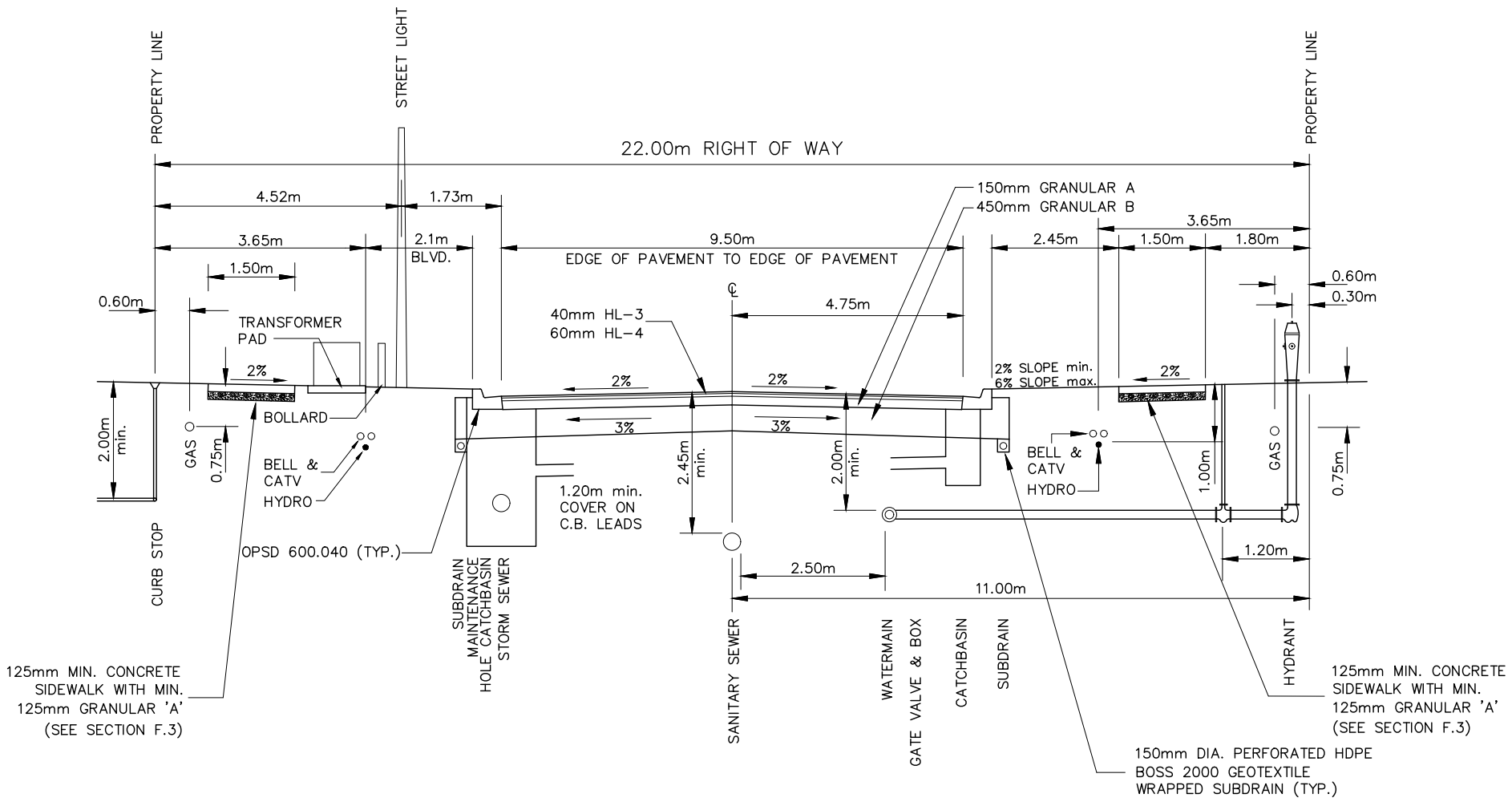
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
MAINTENANCE ACCESS GATE	STD. **L5**	



NOTES:

1. BOLLARDS ARE NOT TYPICALLY REQUIRED, RATHER THEY ARE ASSESSED ON A CASE-BY-CASE BASIS AND AT THE SOLE DISCRETION OF WELLINGTON NORTH POWER INC. AND THE TOWNSHIP.
2. CATCHBASIN LEADS TO HAVE A MINIMUM 1% SLOPE.

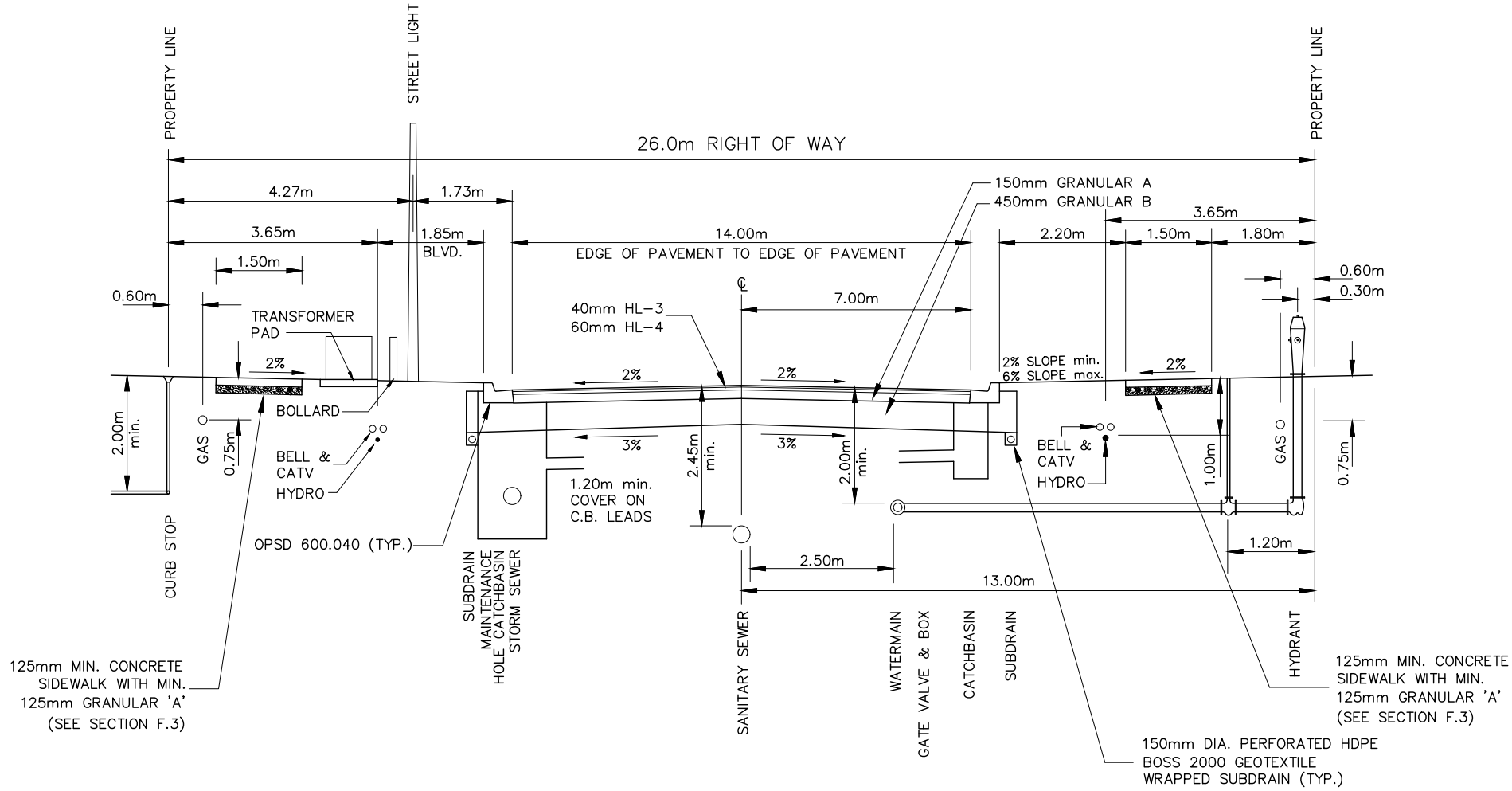
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 3
STANDARD CROSS-SECTION LOCAL STREET – 20.0m R.O.W.	STD. **R1**	



NOTES:

1. BOLLARDS ARE NOT TYPICALLY REQUIRED, RATHER THEY ARE ASSESSED ON A CASE-BY-CASE BASIS AND AT THE SOLE DISCRETION OF WELLINGTON NORTH POWER INC. AND THE TOWNSHIP.
2. CATCHBASIN LEADS TO HAVE A MINIMUM 1% SLOPE.

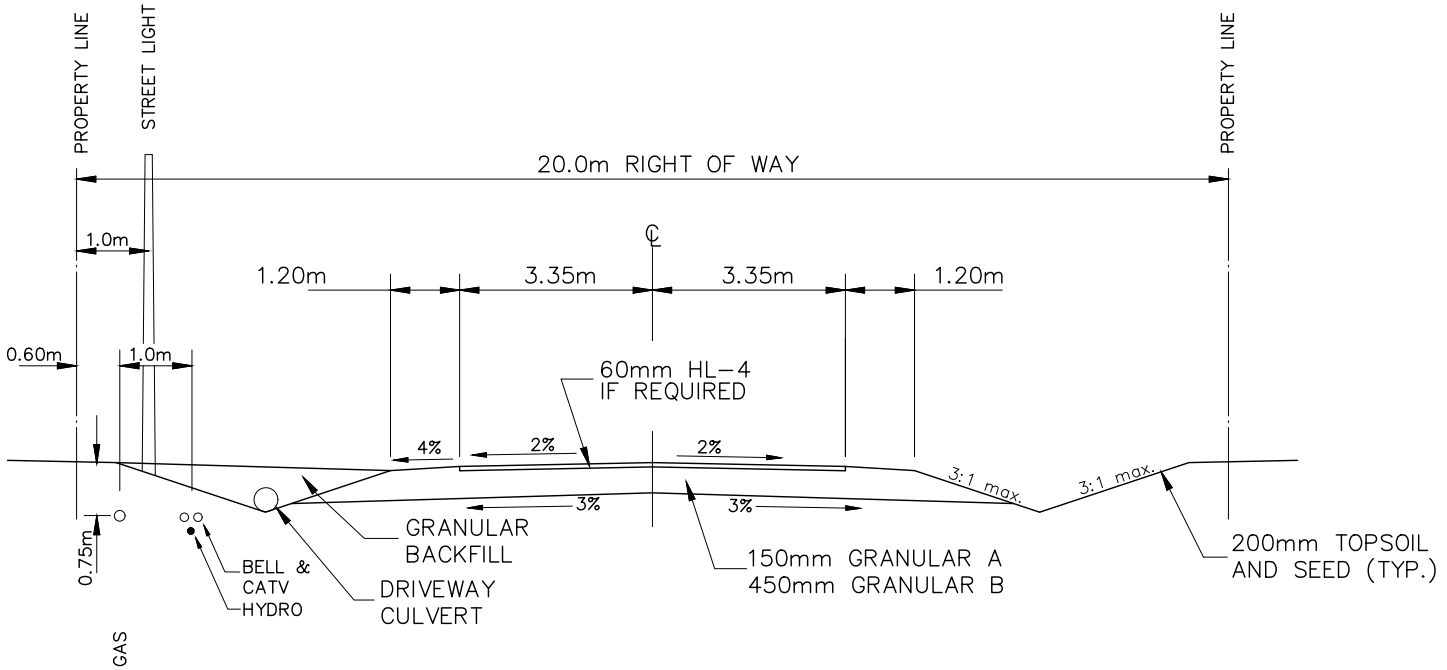
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 1
STANDARD CROSS-SECTION COLLECTOR STREET 22.0m R.O.W.	STD. **R2**	



NOTES:

1. BOLLARDS ARE NOT TYPICALLY REQUIRED, RATHER THEY ARE ASSESSED ON A CASE-BY-CASE BASIS AND AT THE SOLE DISCRETION OF WELLINGTON NORTH POWER INC. AND THE TOWNSHIP.
2. CATCHBASIN LEADS TO HAVE A MINIMUM 1% SLOPE.

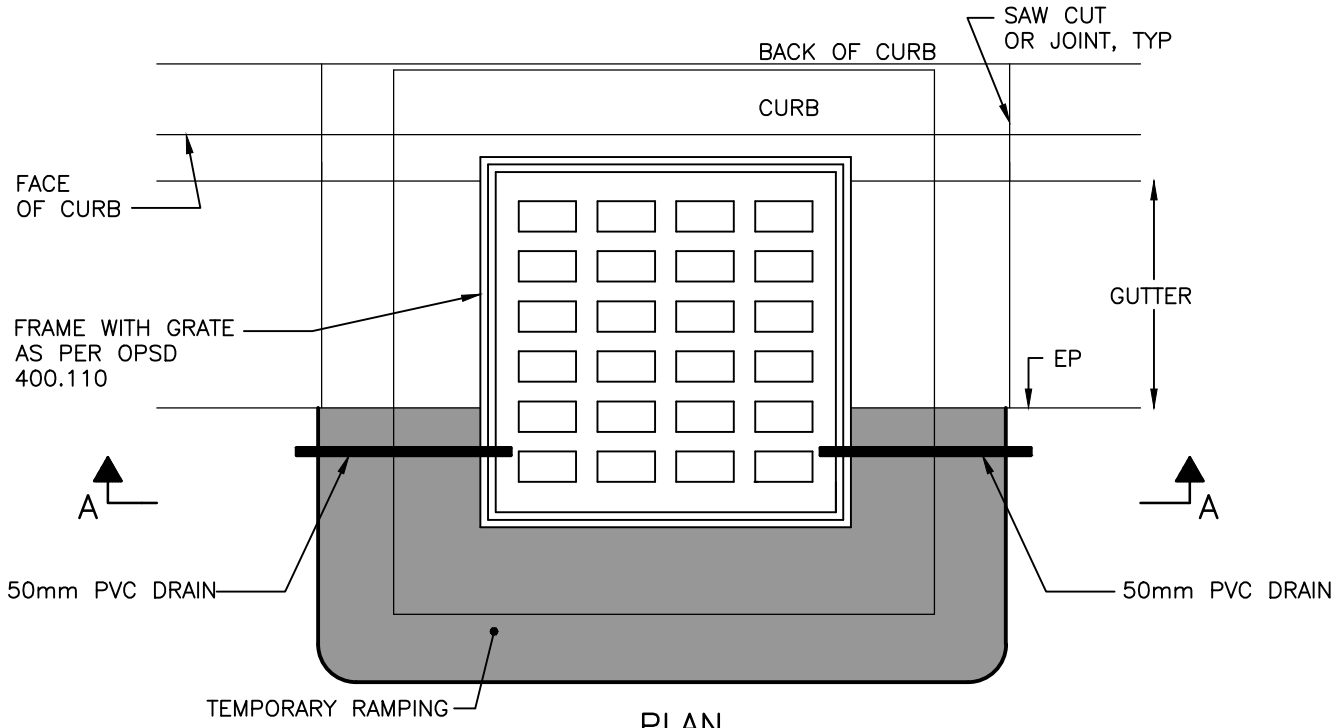
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 1
STANDARD CROSS-SECTION ARTERIAL/COLLECTOR STREET 26.0m R.O.W.	STD. **R3**	



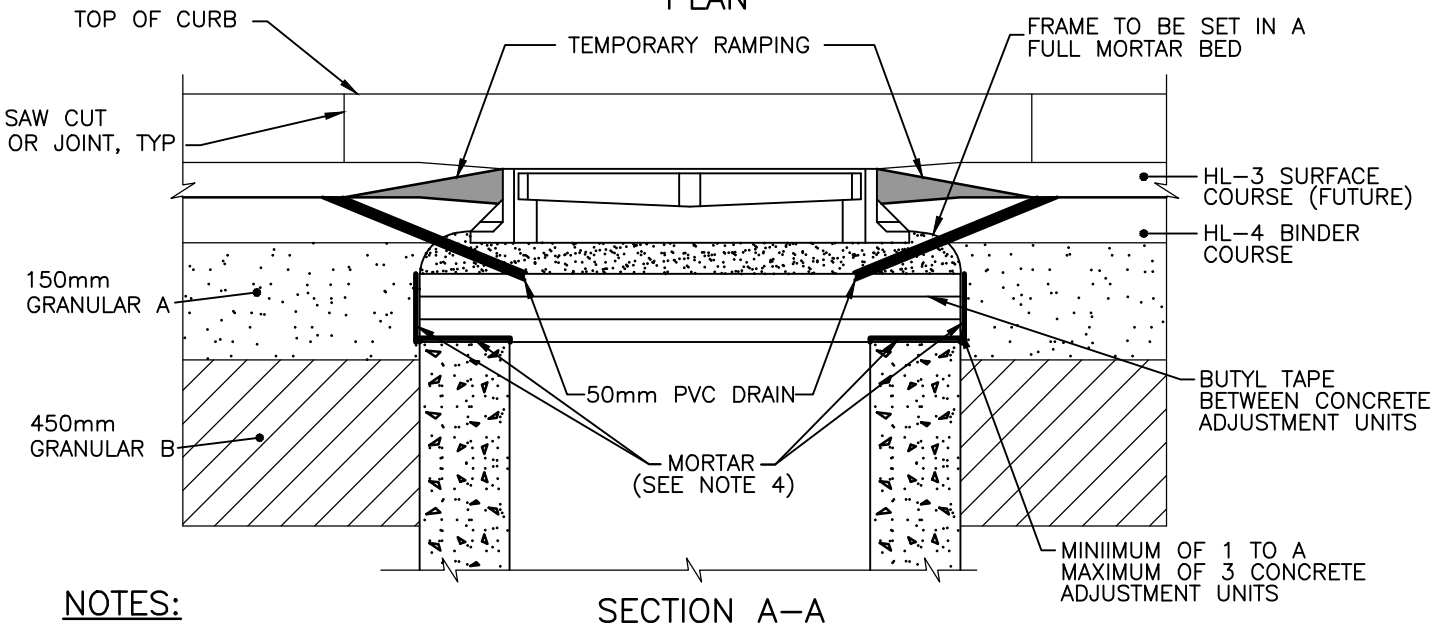
NOTES:

1. BOULEVARD SLOPES – 2% min., 8% max.
2. BOULEVARD & DITCHES TO BE TOPSOILED & SEEDED.
3. MINIMUM DRIVEWAY CULVERT – 400mmø, MINIMUM 9m LENGTH.
4. GRANULAR BASE TO BE CONFIRMED BY SOILS REPORT.
5. DITCHES TO BE 150mm min. BELOW GRANULAR ROAD BASE.
6. MINIMUM RUNNING ROAD GRADE – 0.50%.
7. MAXIMUM ROAD GRADE – 8.0%.
8. TOPSOIL – 200mm THICKNESS.
9. RURAL AND SEMI URBAN MAXIMUM ENTRANCE WIDTH – 6m.
10. STREET LIGHTING TO BE PROVIDED ON ONE SIDE OF ALL ROADWAYS. ALL HYDRO, BELL AND OTHER UTILITIES TO BE UNDERGROUND.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 2
STANDARD CROSS-SECTION RURAL ROAD – 20.0m R.O.W.	STD. **R4**	



PLAN



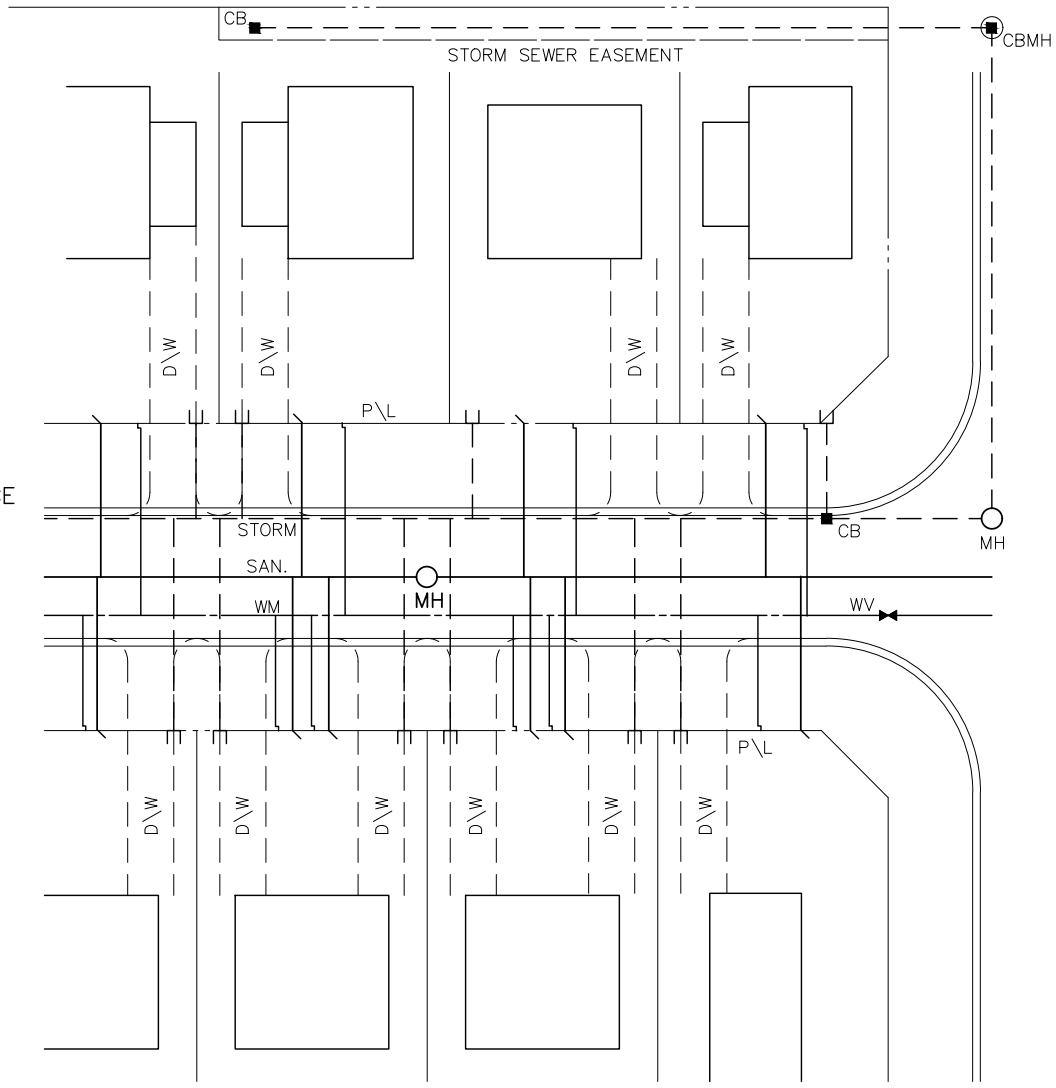
SECTION A–A

NOTES:

1. TEMPORARY DRAIN TO BE USED WITH ALL STORM SEWER STRUCTURES LOCATED IN GUTTER LINE.
2. TEMPORARY DRAIN TO BE PLUGGED USING 30MPa CONCRETE PRIOR TO THE SURFACE COURSE ASPHALT BEING PLACED.
3. ADJUSTMENT OF THE FRAME AND GRATE TO FINISHED GRADE SHALL BE ACHIEVED BY USING PRECAST CONCRETE ADJUSTMENT UNITS THAT ARE SET IN A FULL BED OF MORTAR. BROKEN AND CRACKED ADJUSTMENT UNITS ARE PROHIBITED.
4. THE PRECAST ADJUSTMENT UNITS WILL BE GROUTED IN PLACE BY MEANS OF AN APPROVED MORTAR MIX AND SHALL BE PARGED ON THE OUTSIDE WITH 12mm THICK MORTAR COAT.
5. THE INSTALLATION OF THE 50mm DIA. DRAIN SHALL BE DONE PRIOR TO OR DURING CONCRETE CURB INSTALLATION, IF APPLICABLE.
6. DEVELOPER/CONTRACTOR TO MAINTAIN 50mm DRAIN HOLES AND ENSURE THAT THEY ARE FREE OF MUD AND DEBRIS TO ALLOW SURFACE WATER TO DRAIN.
7. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH OPSD 704.010.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
TEMPORARY CATCH BASIN DRAIN	STD. R5	

SINGLE FAMILY



LEGEND

SANITARY SERVICE

STORM SERVICE

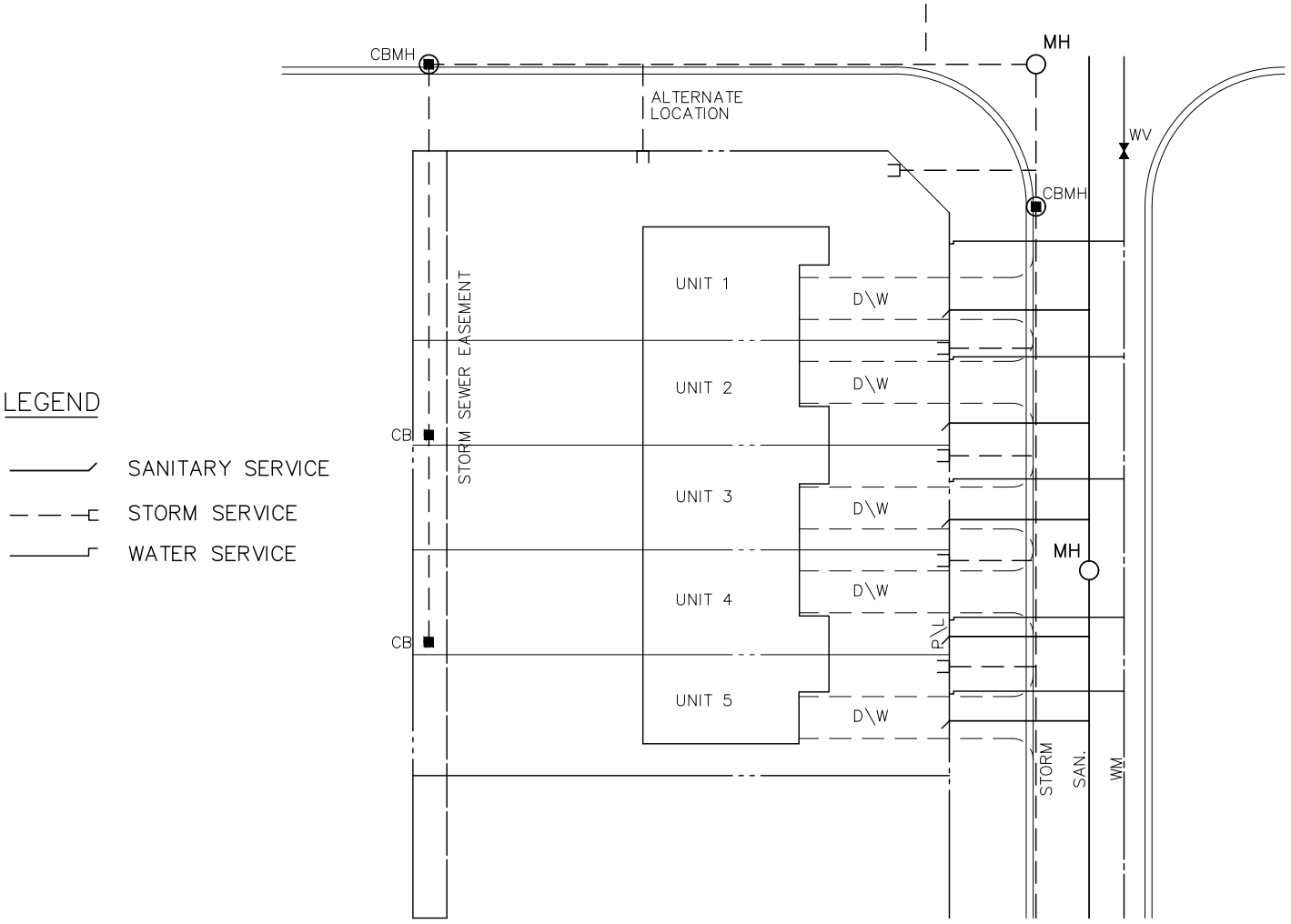
WATER SERVICE

SEMI–DETACHED

NOTES:

1. 2.5m min. BETWEEN SANITARY SEWER & WATER SERVICE CONNECTIONS AT CENTRE OF LOT. SPATIAL WATER SERVICE TO HAVE 2.5m HORIZONTAL OR 0.5m VERTICAL.
2. STORM SEWER SERVICES 1.5m min. FROM LOW SIDE LOT LINE WHERE POSSIBLE AND MIN. 2.5m FROM WATER SERVICE, HYDRANT LATERAL, OR OTHER WATER PIPING.
3. WATERMAIN VALVES, CURB STOPS, HYDRANTS & CATCHBASINS NOT TO BE LOCATED IN WALKWAYS OR DRIVEWAYS.
4. ALL SERVICES TO RUN IN A STRAIGHT LINE, PERPENDICULAR TO ℄ OF ROAD FROM MAIN TO PROPERTY LINE.
5. REAR YARD STORM SEWER CONFIGURATION TO SUIT LOT CONFIGURATION. SEE SECTION D.3.d.
6. SANITARY SEWER TO BE LOCATED 1.5m TO THE LEFT (FACING PROPERTY) OF THE CENTRE OF THE LOT AND 2.5m TO THE LEFT OF THE WATER SERVICE.
7. TO BE READ IN CONJUNCTION WITH STANDARD DRAWING S5.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 1
TYPICAL SERVICING LAYOUT SINGLE AND SEMI–DETACHED	STD. **S1**	



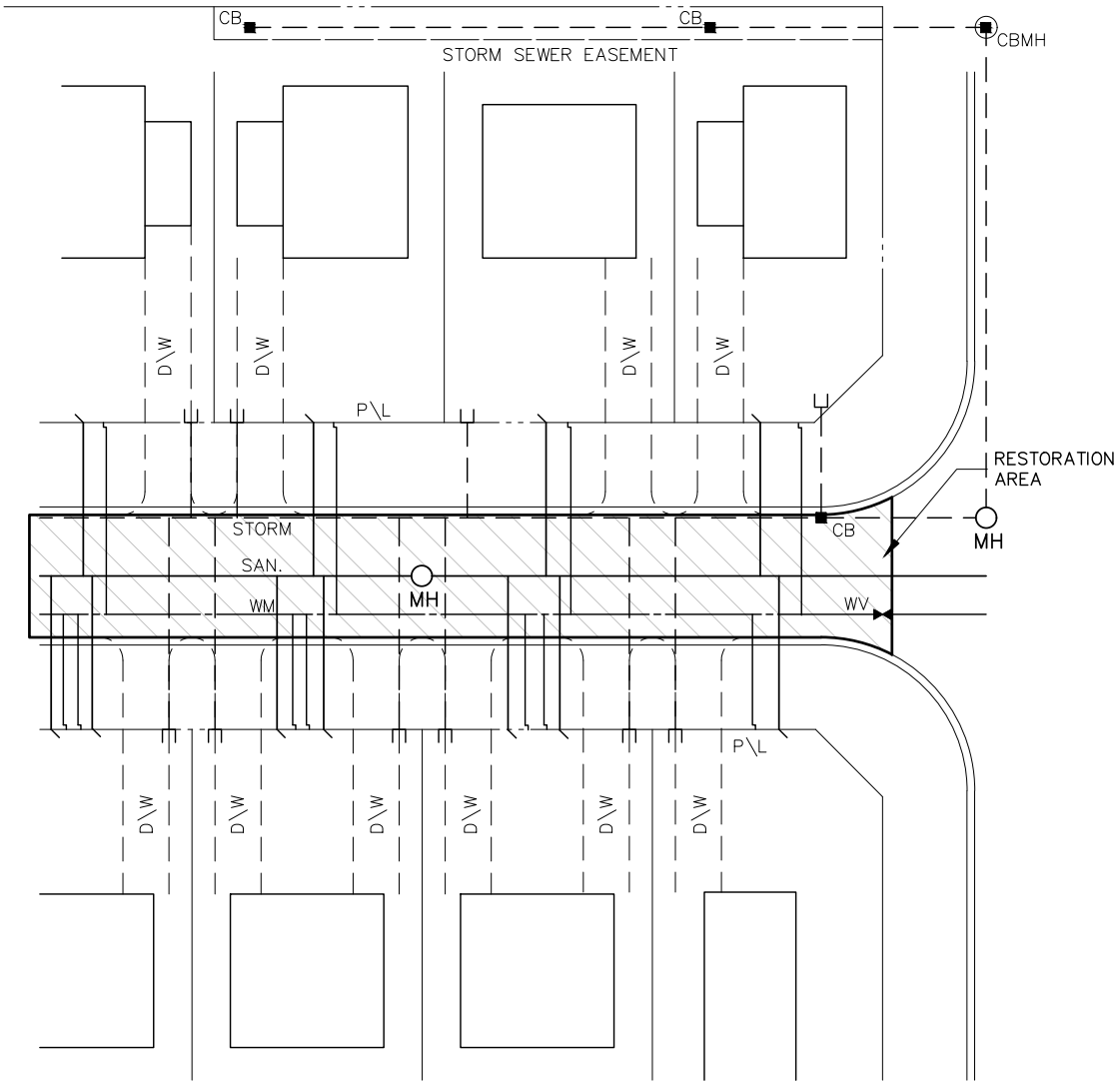
TOWNHOUSE

NOTES:

1. 2.5m min. BETWEEN SANITARY SEWER & WATER SERVICE CONNECTIONS AT CENTRE OF LOT. SPATIAL WATER SERVICE TO HAVE 2.5m HORIZONTAL OR 0.5m VERTICAL.
2. STORM SEWER SERVICES 1.5m min. FROM LOW SIDE LOT LINE WHERE POSSIBLE AND MIN. 2.5m FROM WATER SERVICE, HYDRANT LATERAL, OR OTHER WATER PIPING.
3. WATERMAIN VALVES, CURB STOPS, HYDRANTS & CATCHBASINS NOT TO BE LOCATED IN WALKWAYS OR DRIVEWAYS.
4. ALL SERVICES TO RUN IN A STRAIGHT LINE, PERPENDICULAR TO ℄ OF ROAD FROM MAIN TO PROPERTY LINE.
5. REAR YARD STORM SEWER CONFIGURATION TO SUIT LOT CONFIGURATION. SEE SECTION D.3.d.
6. NUMBER OF TOWNHOUSE UNITS MAY VARY.
7. SANITARY SEWER TO BE LOCATED 1.5m TO THE LEFT (FACING PROPERTY) OF THE CENTRE OF THE LOT AND 2.5m TO THE LEFT OF THE WATER SERVICE.
8. TO BE READ IN CONJUNCTION WITH STANDARD DRAWING S5.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
TYPICAL SERVICING LAYOUT TOWNHOUSE	STD. **S2**	

SINGLE FAMILY



LEGEND

SANITARY SERVICE

STORM SERVICE

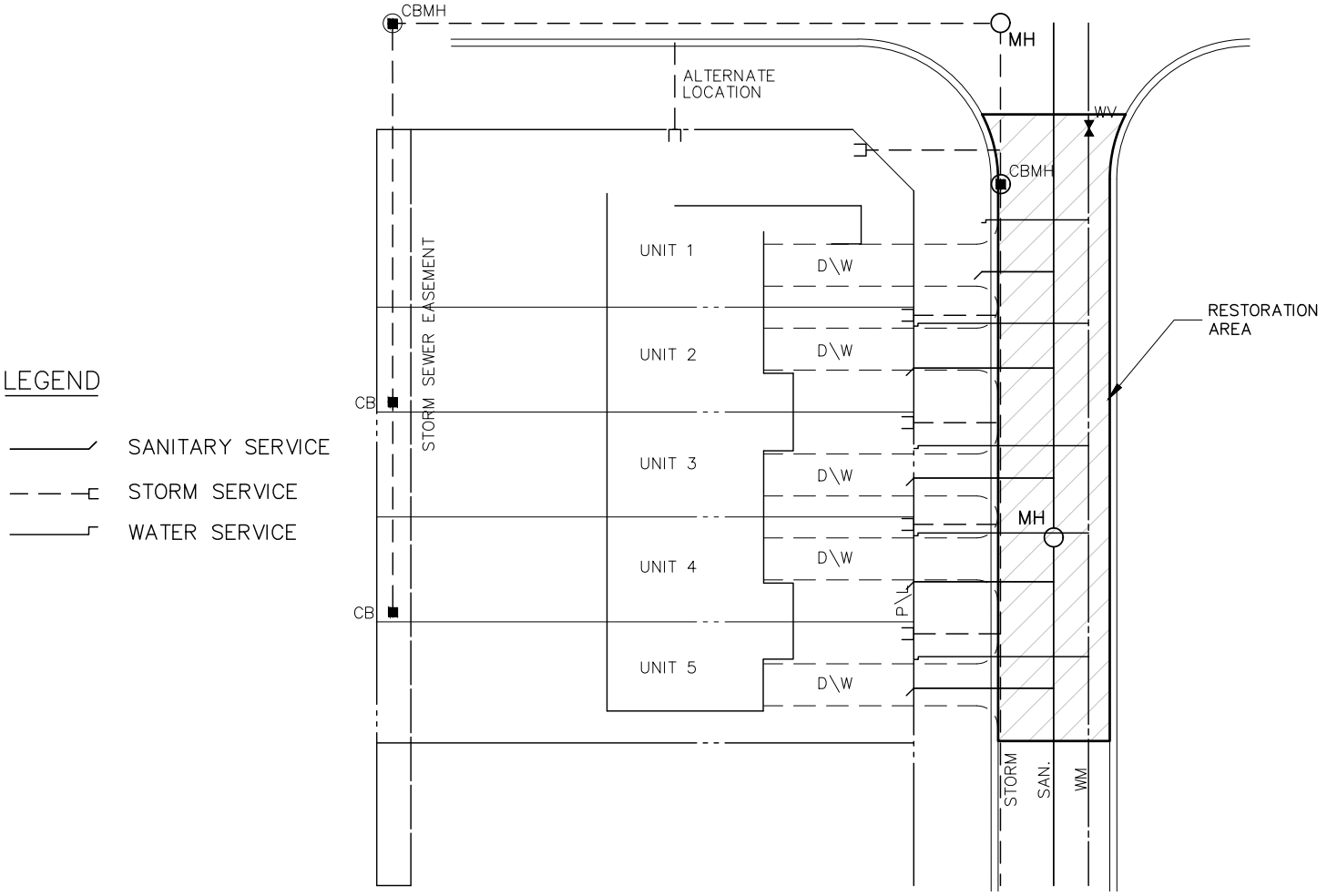
WATER SERVICE

SEMI–DETACHED

NOTES:

1. 2.5m min. BETWEEN SANITARY SEWER & WATER SERVICE CONNECTIONS AT CENTRE OF LOT. SPATIAL WATER SERVICE HORIZONTAL OR 0.5m VERTICAL.
2. STORM SEWER SERVICES 1.5m min. FROM LOW SIDE LOT LINE WHERE POSSIBLE AND MIN. 2.5m FROM WATER SERVICE, HYDRANT LATERAL, OR OTHER WATER PIPING.
3. WATERMAIN VALVES, CURB STOPS, HYDRANTS & CATCHBASINS NOT TO BE LOCATED IN WALKWAYS OR DRIVEWAYS.
4. ALL SERVICES TO RUN IN A STRAIGHT LINE, PERPENDICULAR TO ℄ OF ROAD FROM MAIN TO PROPERTY LINE.
5. REAR YARD STORM SEWER CONFIGURATION TO SUIT LOT CONFIGURATION. SEE SECTION D.3.d.
6. SANITARY SEWER TO BE LOCATED 1.5m TO THE LEFT (FACING PROPERTY) OF THE CENTRE OF THE LOT AND 2.5m TO THE LEFT OF THE WATER SERVICE.
7. RESTORATION OF EXISTING R.O.W. SHALL BE AS FOLLOWS: ASPHALT TO BE FULLY RESTORED FROM EDGE OF PAVEMENT TO EDGE OF PAVEMENT AND FULLY ENCOMPASS SERVICING.
8. CURB SHALL BE RESTORED (IF APPLICABLE) INCLUDING REQUIRED CURB CUTS.
9. TO BE READ IN CONJUNCTION WITH STANDARD DRAWING S5.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
TYPICAL SERVICING LAYOUT FOR INFILL LOTS SINGLE/SEMI	STD. **S3**	

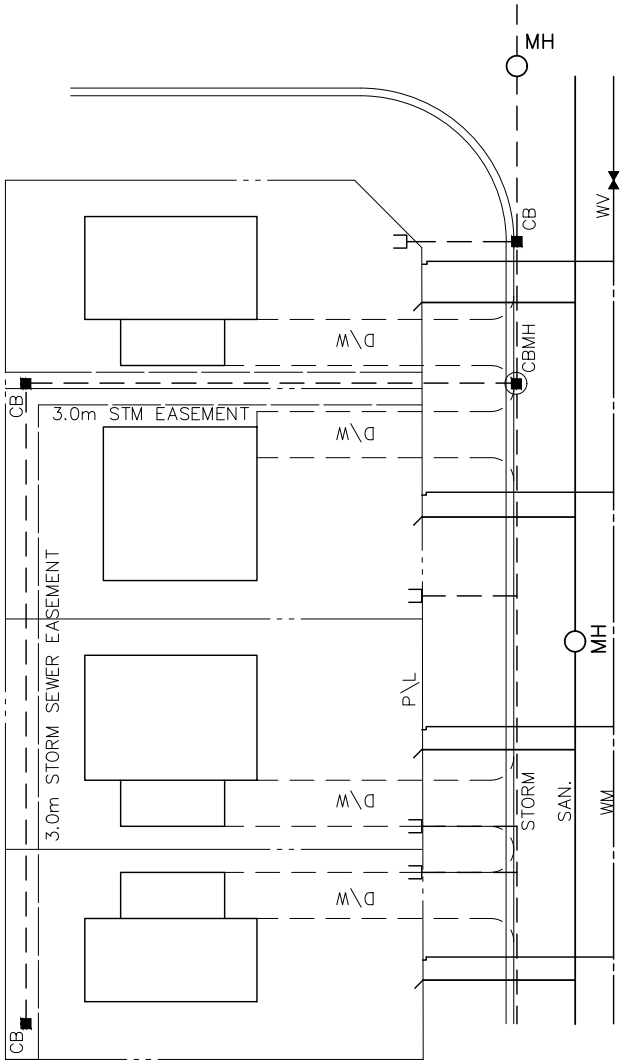


TOWNHOUSE

NOTES:

1. 2.5m min. BETWEEN SANITARY SEWER & WATER SERVICE CONNECTIONS AT CENTRE OF LOT. SPATIAL WATER SERVICE HORIZONTAL OR 0.5m VERTICAL.
2. STORM SEWER SERVICES 1.5m min. FROM LOW SIDE LOT LINE WHERE POSSIBLE AND MIN. 2.5m FROM WATER SERVICE, HYDRANT LATERAL, OR OTHER WATER PIPING.
3. WATERMAIN VALVES, CURB STOPS, HYDRANTS & CATCHBASINS NOT TO BE LOCATED IN WALKWAYS OR DRIVEWAYS.
4. ALL SERVICES TO RUN IN A STRAIGHT LINE, PERPENDICULAR TO ℄ OF ROAD FROM MAIN TO PROPERTY LINE.
5. NUMBER OF TOWNHOUSE UNITS MAY VARY.
6. RESTORATION OF EXISTING R.O.W. SHALL BE AS FOLLOWS: ASPHALT TO BE FULLY RESTORED FROM EDGE OF PAVEMENT TO EDGE OF PAVEMENT AND FULLY ENCOMPASS SERVICING.
7. CURB SHALL BE RESTORED (IF APPLICABLE) INCLUDING REQUIRED CURB CUTS.
8. SPACIAL WATER SERVICE TO HAVE 2.5m HORIZONTAL OR 0.5m VERTICAL.
9. REAR YARD STORM SEWER CONFIGURATION TO SUIT LOT CONFIGURATION. SEE SECTION D.
10. SANITARY SEWER TO BE LOCATED 1.5m TO THE LEFT (FACING PROPERTY) OF THE CENTRE OF THE LOT AND 2.5m TO THE LEFT OF THE WATER SERVICE.
11. TO BE READ IN CONJUNCTION WITH STANDARD DRAWING S5.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
TYPICAL SERVICING LAYOUT FOR INFILL LOTS TOWNHOUSE	STD. **S4**	



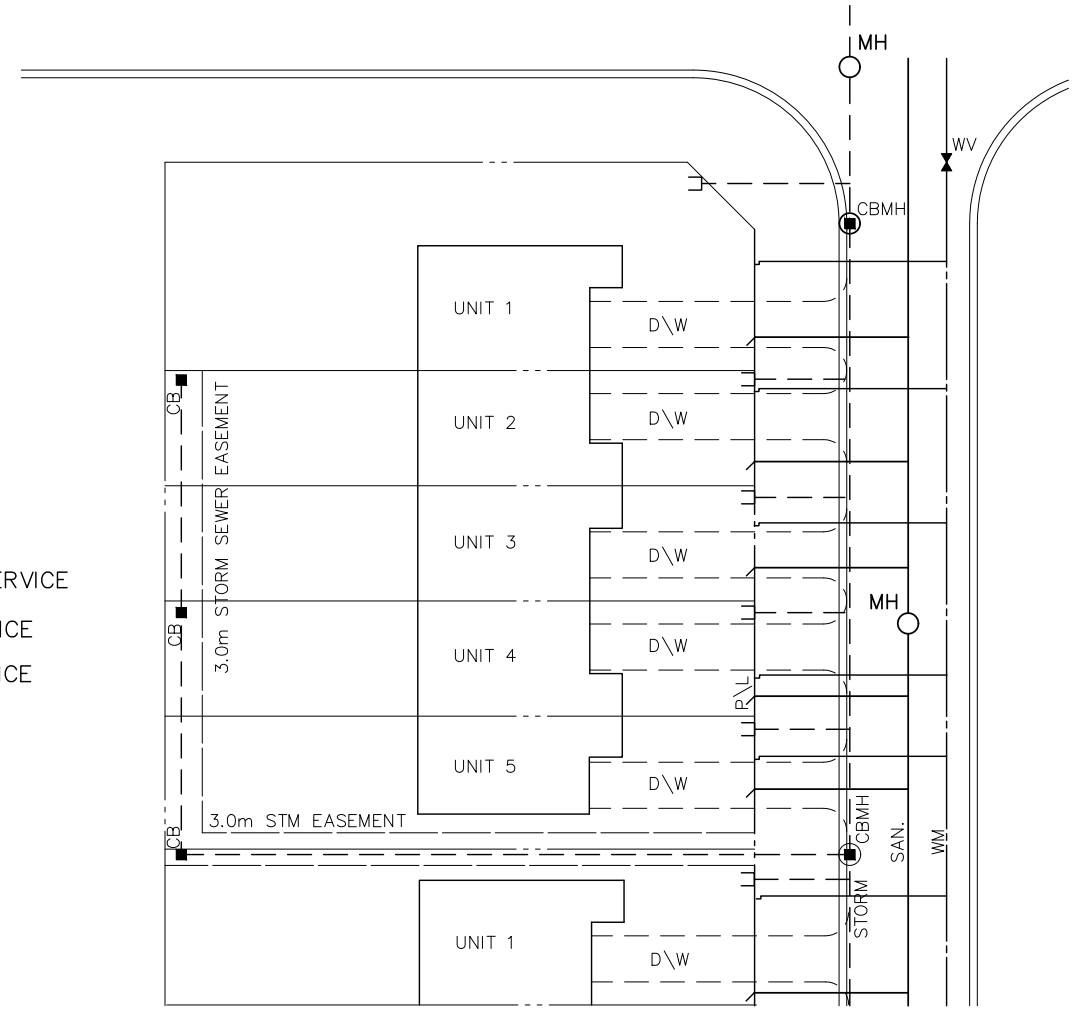
SINGLE FAMILY

LEGEND

SANITARY SERVICE

STORM SERVICE

WATER SERVICE

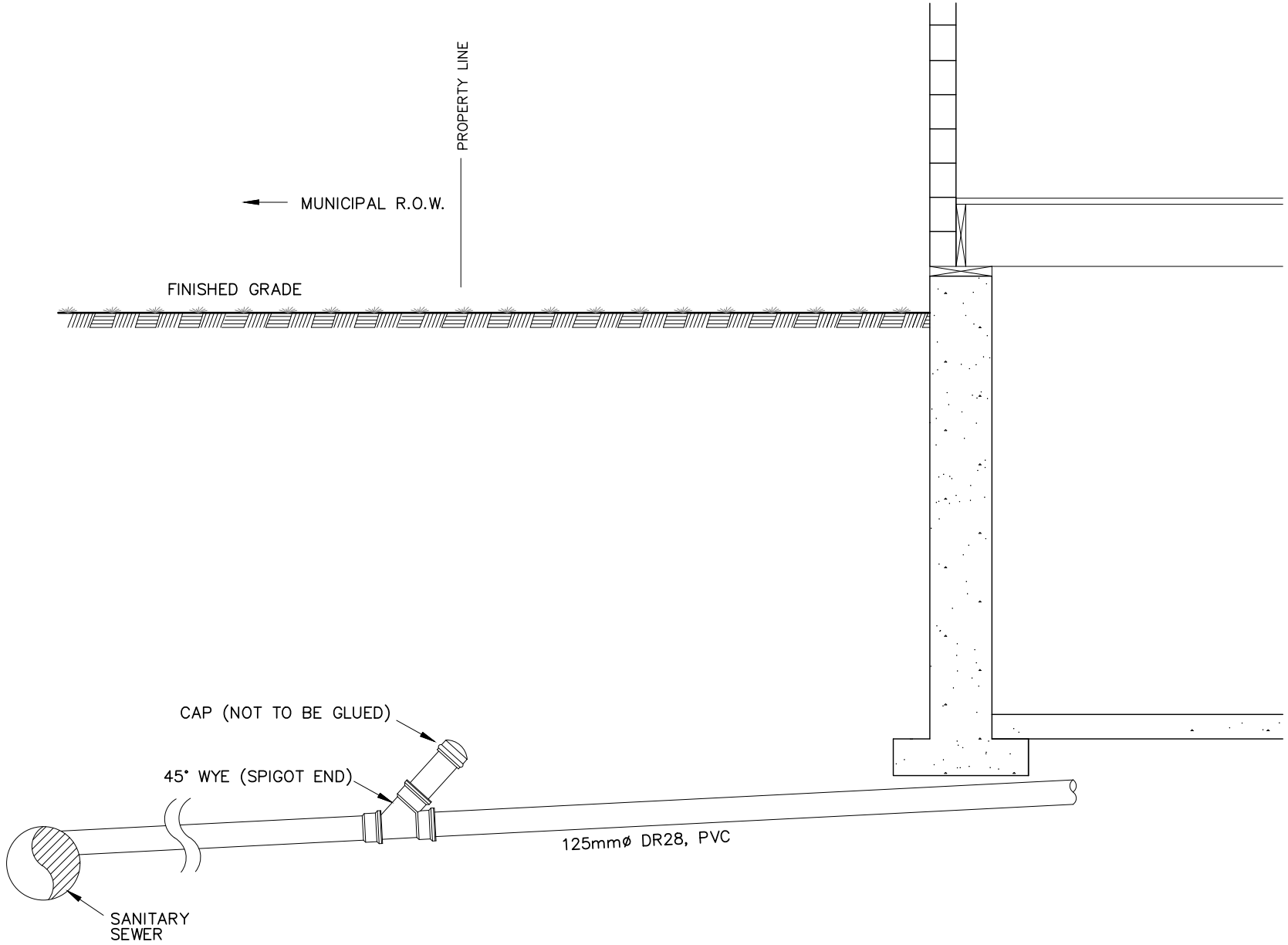


TOWNHOUSE

NOTES:

1. SEWER FROM THE ROAD TO THE REAR YARD (I.E., SIDE YARD) IS TO BE A MINIMUM OF 300mm DIAMETER CONCRETE PIPE.
2. SEE SECTION D.3.d.
3. REAR YARD AND SIDE YARD STORM SEWERS TO HAVE A MINIMUM OF 0.5% SLOPE.

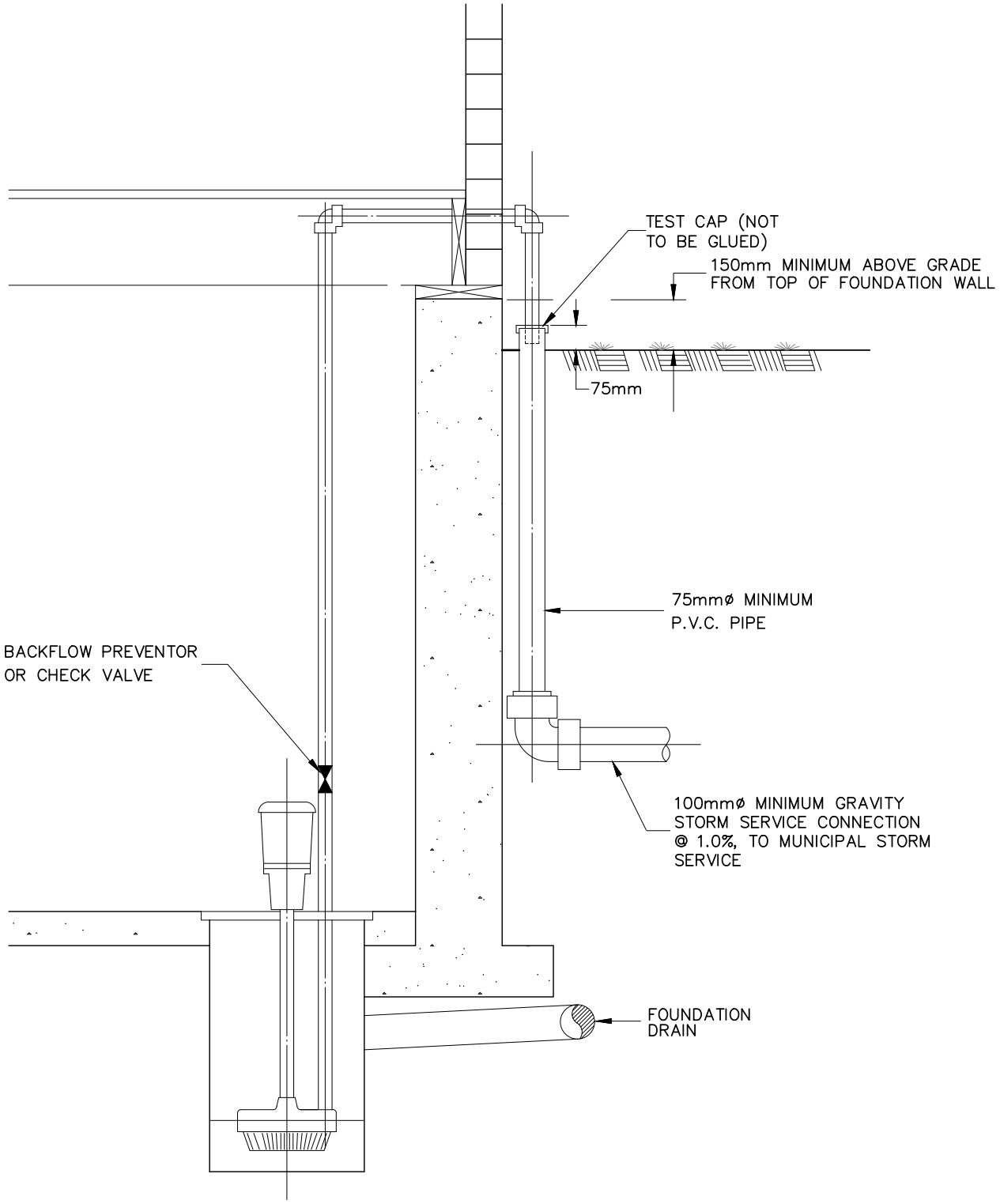
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
SIDE YARD EASEMENT ON 3.0m WIDE EASEMENT	STD. **S5**	



NOTES:

1. BEDDING, EMBEDMENT AND COVER MATERIAL SHALL BE GRANULAR A OR AS SUPPORTED BY GEOTECHNICAL INVESTIGATION.
2. SERVICE TEES SHALL BE FACTORY MANUFACTURED TEES.
3. SERVICE CONNECTIONS SHALL BE AS PER OPSD 1006.010 FOR SEWER SERVICE CONNECTIONS FOR MAIN PIPE SEWER.

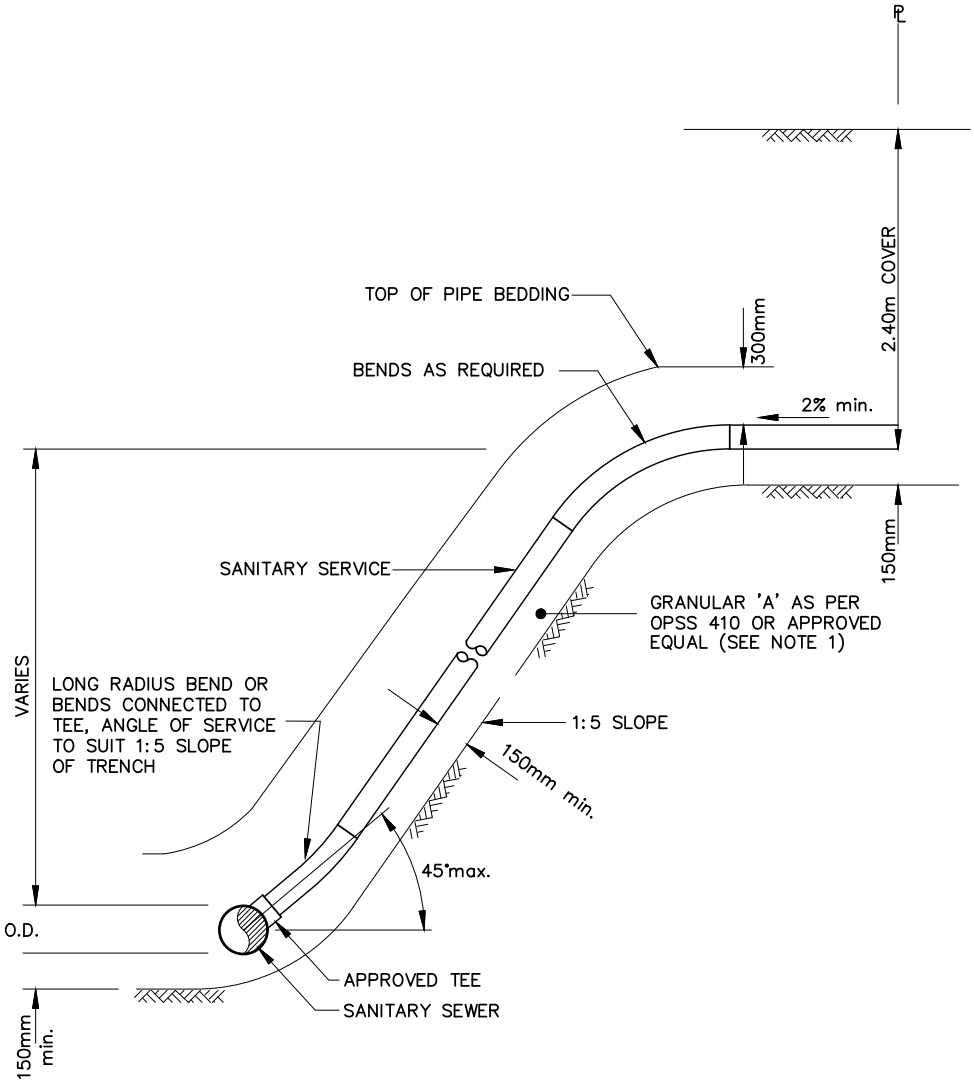
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 1
SANITARY SERVICE CONNECTION WITH CLEAN–OUT	STD. **S6**	



NOTE:

1. MUNICIPAL STORM SERVICE CONNECTION TO BE LOCATED FIRST.

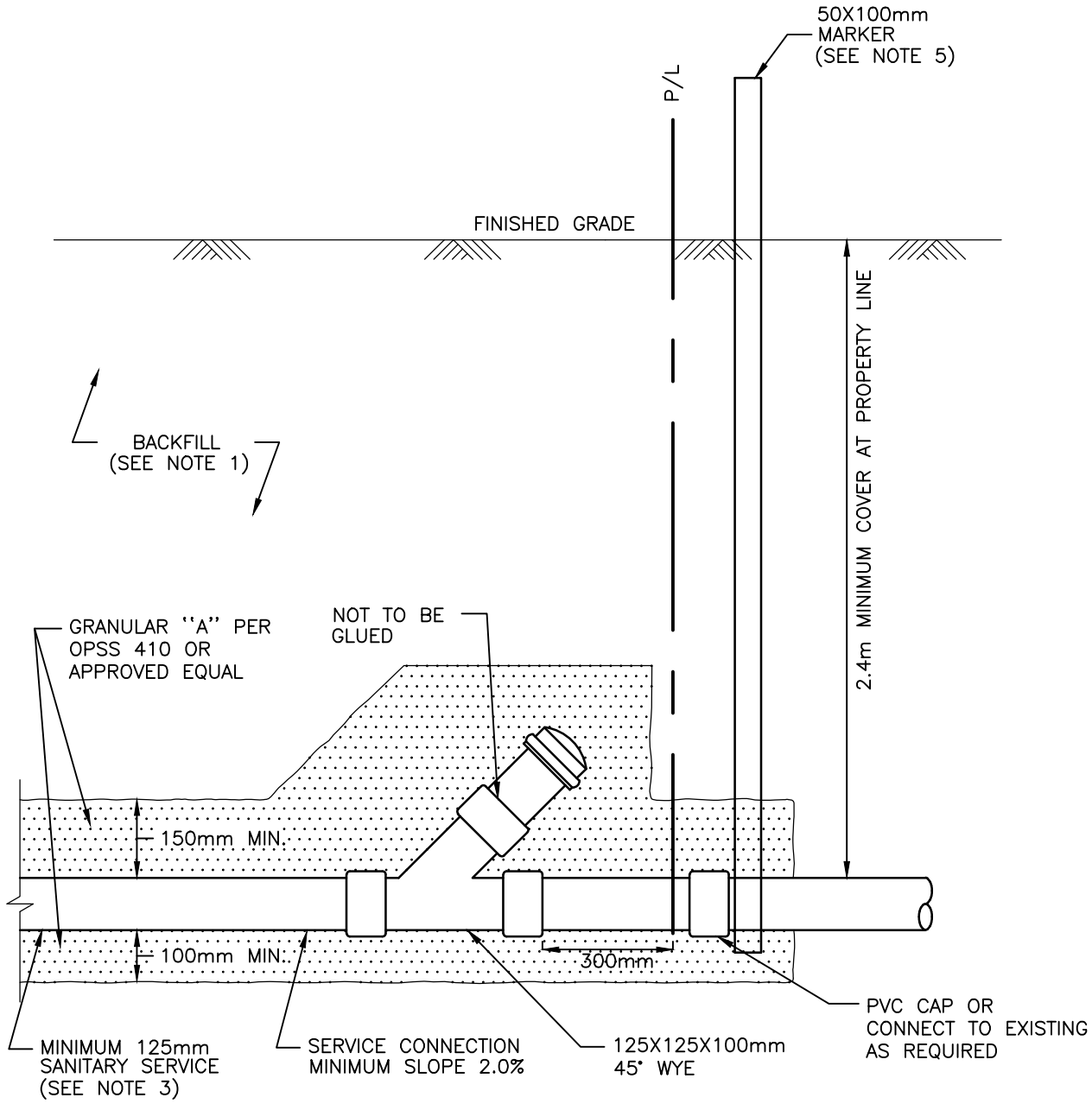
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 1
SUMP PUMP TO STORM SERVICE CONNECTION	STD. **S7**	



NOTES:

1. BEDDING, EMBEDMENT AND COVER MATERIAL SHALL BE GRANULAR A OR AS SUPPORTED BY GEOTECHNICAL INVESTIGATION.
2. SERVICE TEES SHALL BE FACTORY MANUFACTURED TEES.
3. SERVICE CONNECTIONS SHALL BE AS PER OPSD 1006.010 FOR SEWER SERVICE CONNECTIONS FOR MAIN PIPE SEWER.
4. WHEN DEEP SERVICES ARE ENCOUNTERED WITH NEAR VERTICAL RISERS EXTENDING OUT OF THE SERVICE TEE, CONTROLLED SETTLEMENT JOINTS TO BE USED AS PER OPSD 1006.010.

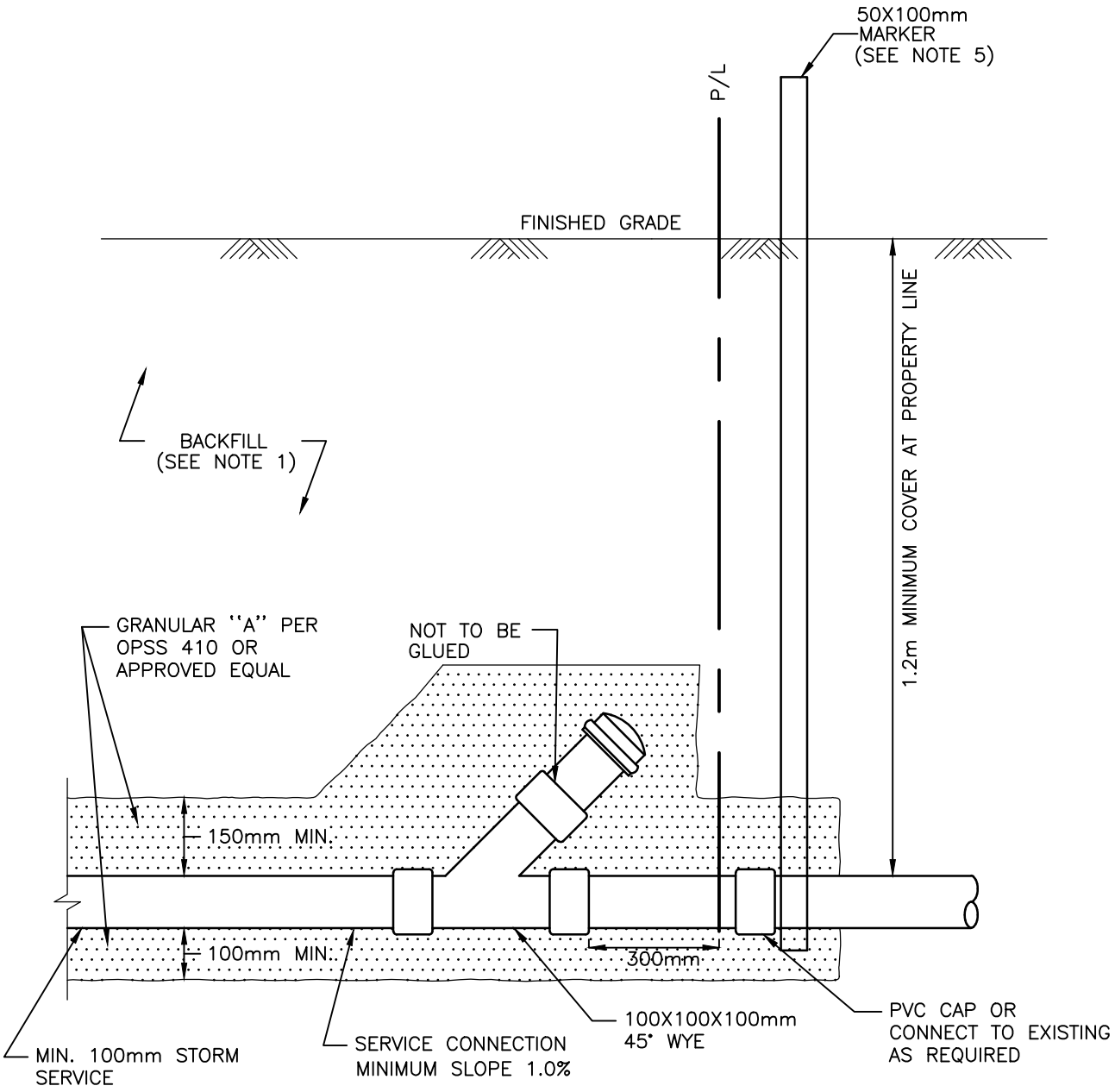
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 1
SANITARY SERVICE CONNECTION FOR SEWER MAINS ≥ 4.0m DEEP	STD. **S8**	



NOTES:

1. BACKFILL OF SERVICE SHALL MATCH THE MAIN LINE SANITARY SEWER BACKFILL.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH SECTION C OF THE MUNICIPAL SERVICING STANDARDS
3. SIZE OF SERVICE TO BE A MINIMUM 125mm FOR SINGLE UNIT RESIDENTIAL SERVICE AND MINIMUM 150mm FOR MULTIPLE UNIT RESIDENTIAL SERVICE.
4. SANITARY SERVICE TO BE INSTALLED WITH 2.4m MINIMUM COVER AT PROPERTY LINE AT A MINIMUM 2.0% SERVICE GRADE. RECONNECT NEW SERVICE TO EXISTING ELEVATION BEYOND CLEANOUT BY USING MANUFACTURED VERTICAL SWEEPS, AS REQUIRED. CONNECTION OF NEW SERVICE TO EXISTING SERVICE SHALL BE MADE USING APPROVED FITTINGS (FERNCO OR EQUIVALENT).
5. PVC CAP FOR VACANT LOTS TO BE MARKED WITH A 50mmX100mm WOOD POST EXTENDING FROM THE SERVICE TO 300mm ABOVE THE FINISHED GRADE WITH THE TOP SECTION PAINTED GREEN.

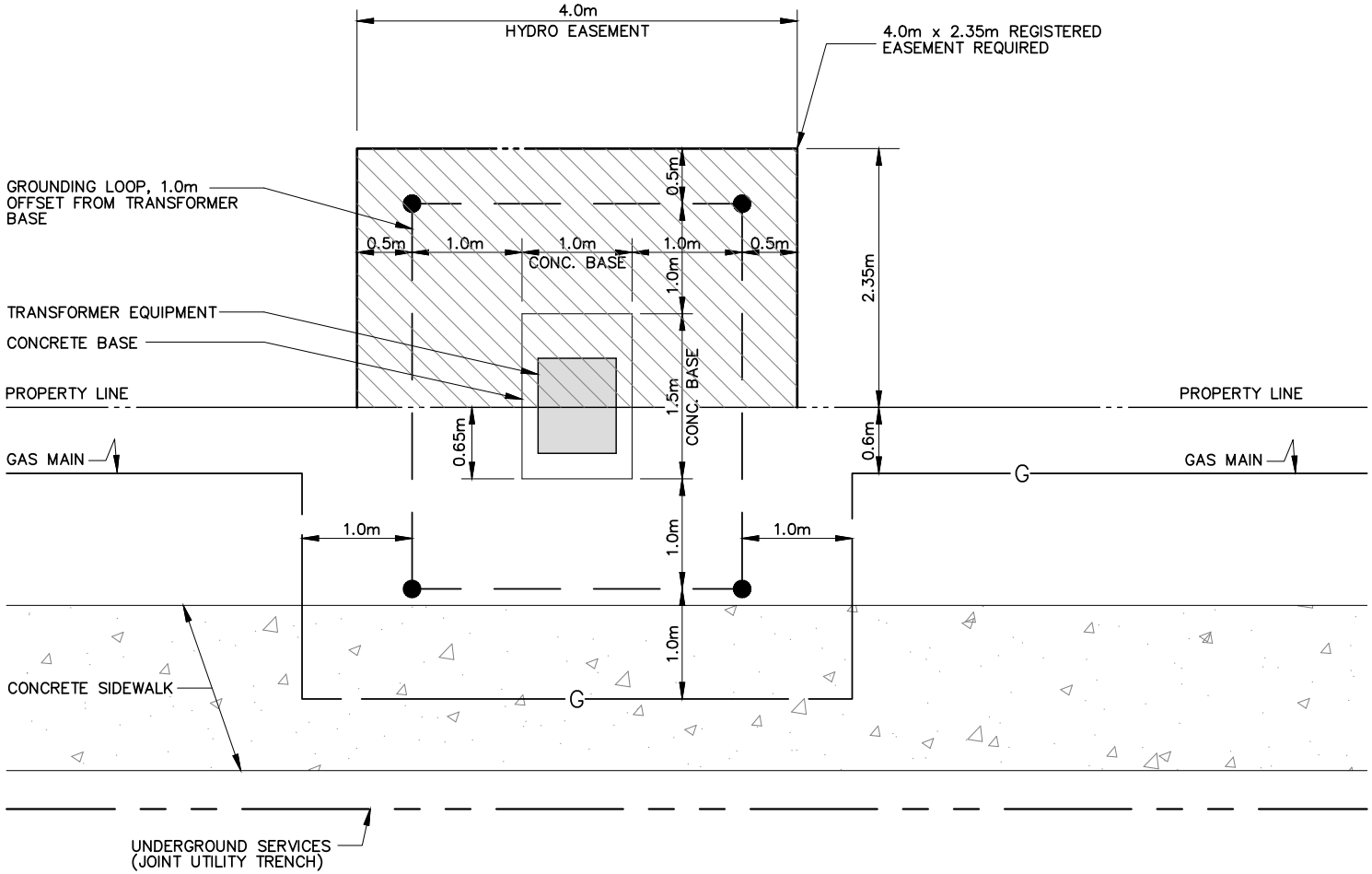
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
RESIDENTIAL SANITARY SERVICE DETAIL	STD. S9	



NOTES:

1. BACKFILL OF SERVICE SHALL MATCH THE MAIN LINE STORM SEWER BACKFILL.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH SECTION D OF THE MUNICIPAL SERVICING STANDARDS
3. SIZE OF SERVICE TO BE A MINIMUM 100mm.
4. STORM SERVICE TO BE INSTALLED WITH 1.2m MINIMUM COVER AT PROPERTY LINE AT A MINIMUM 1.0% SERVICE GRADE.
5. PVC CAP TO BE MARKED WITH A 50mmX100mm WOOD POST EXTENDING FROM THE SERVICE TO 300mm ABOVE THE FINISHED GRADE WITH THE TOP SECTION PAINTED ORANGE.

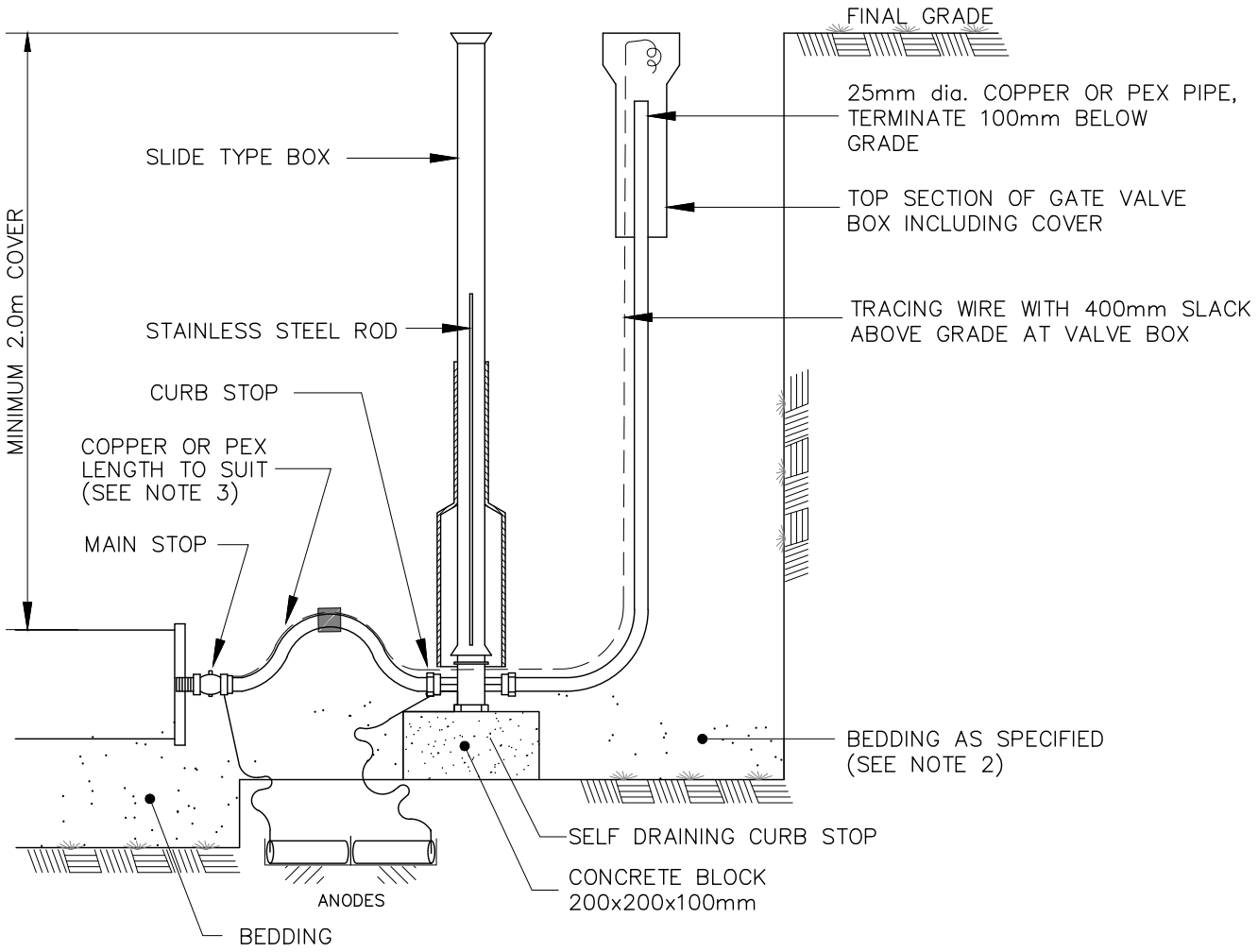
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
STORM PRIVATE DRAIN CONNECTION DETAIL	STD. S10	



NOTES:

1. TRANSFORMER INCLUDING GROUNDING LOOP TO BE ALIGNED ON THE LOT FRONTAGE BASED ON THE FOLLOWING CRITERIA:
   - PLACE ENTIRELY, INCLUDING GROUNDING LOOP. ON ONE LOT IF POSSIBLE TO AVOID CONFLICT WITH SIDE YARD DRAINAGE SWALE AND TO REDUCE EASEMENT REQUIREMENTS.
   - LOCATED ON THE OPPOSITE SIDE OF THE PROPERTY AS THE DRIVEWAY SO THAT GROUNDING GRID IS NOT UNDER THE DRIVEWAY.
   - MINIMUM 1.0m CLEARANCE BETWEEN GROUNDING LOOP & MUNICIPAL SERVICES.
   - MINIMUM 1.0m CLEARANCE BETWEEN TRANSFORMER BASE & DRIVEWAYS.
2. EASEMENT SHOWN IS BASED ON 1.5m x 1.0m TRANSFORMER BASE ORIENTED AS SHOWN. BASES LARGER THAN THIS WILL REQUIRE EASEMENT TO BE ADJUSTED ACCORDINGLY.
3. STANDARD SHOWN INCLUDES SIDEWALK, STANDARD WITHOUT SIDEWALK IS THE SAME.

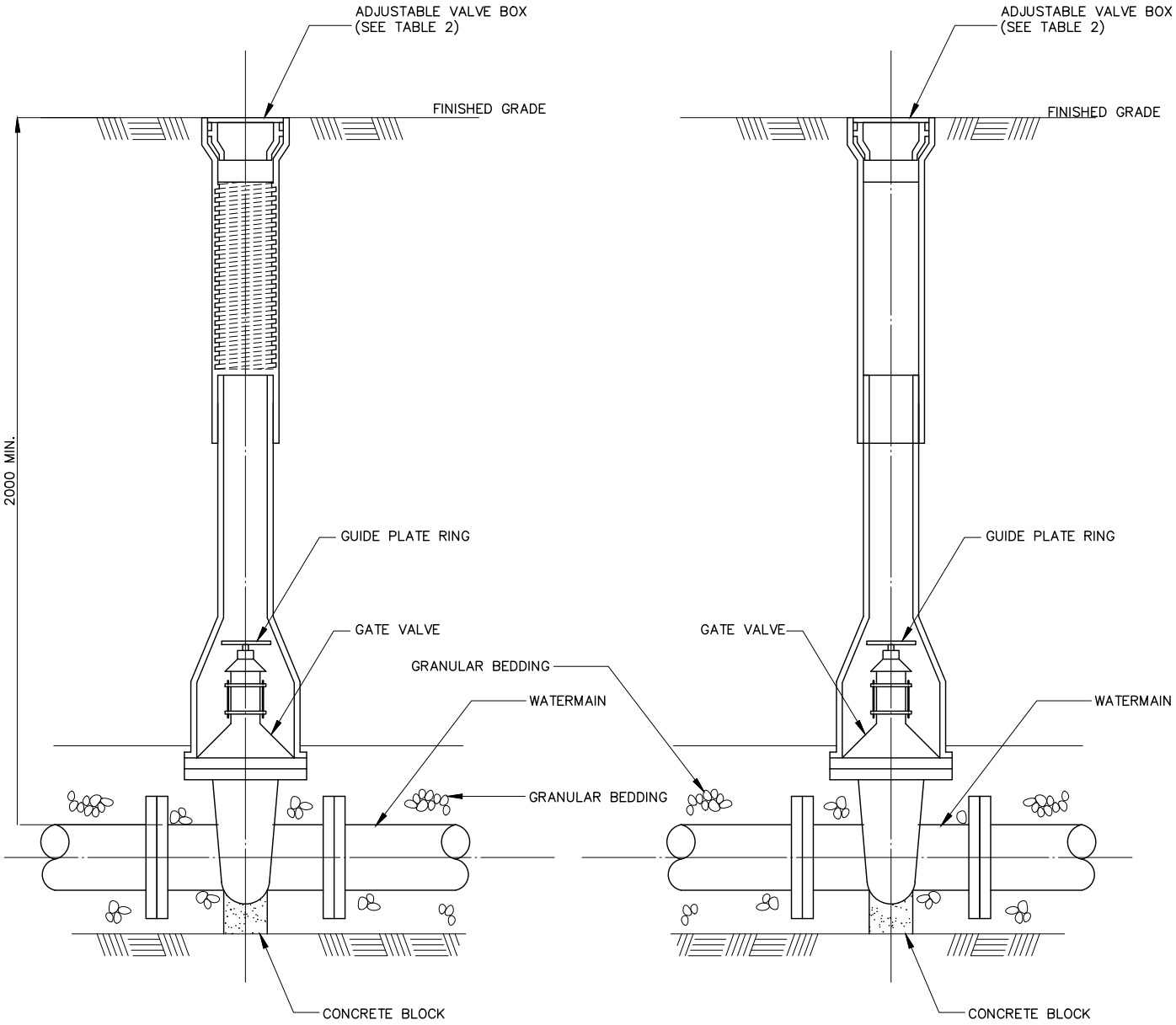
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 1
ALTERNATIVE TRANSFORMER LOCATION & GAS ROUTING DETAIL 20.0m & 22.0m ROW	STD. U1	



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES OR METRES UNLESS OTHERWISE SHOWN.
2. BEDDING AND COVER OF 25mm BLOW OFF PIPE ARE TO BE IN APPROVED SAND TO 300mm ABOVE THE TOP OF PIPE. SEE SECTION E.7.A.
3. HORIZONTAL GOOSENECK IF NON–METALLIC SERVICE, VERTICAL GOOSENECK IF COPPER SERVICE.
4. ALL DEAD ENDED WATERMAINS UP TO 300mm IN SIZE CAP AND/OR PLUG SHALL BE MECHANICALLY RESTRAINED AND AS WELL THREE (3) FULL PIPE LENGTHS (18m) MUST BE BELL JOINT THRUST RESTRAINED PRIOR TO THE END OF THAT WATERMAIN WITH A MINIMUM OF TWO (2) STEEL RODS TO BE USED ON EACH OF THE BELL JOINT THRUST RESTRAINTS.
5. SEE STANDARD DRAWING W10.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 1
25mm BLOW OFF INSTALLATION	STD. **W1**	



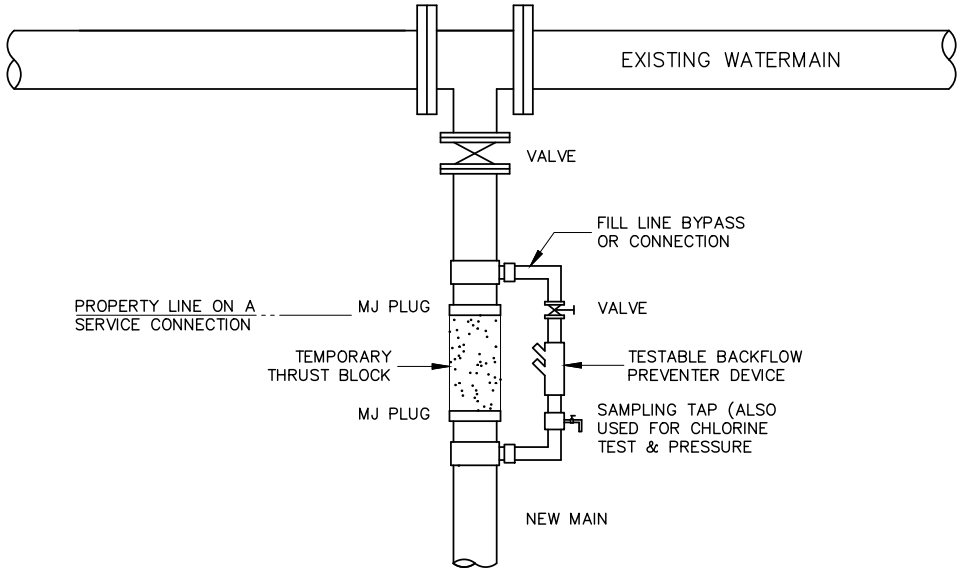
SCREW TYPE

SLIDE TYPE

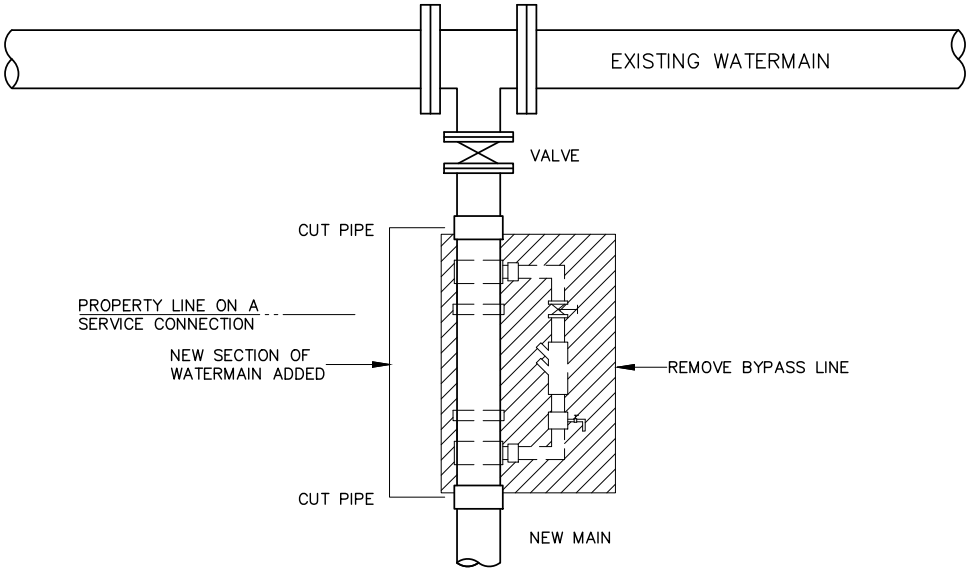
NOTES:

1. SEE STANDARD DRAWING W9 FOR TRACER WIRE INSTALLATION PROCEDURE.
2. SEE STANDARD DRAWING W10 FOR CATHODIC PROTECTION

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 3
VALVE AND VALVE BOX	STD. **W2**	



TEMPORARY CONNECTION FROM WATERMAIN
WITH BACKFLOW PREVENTION

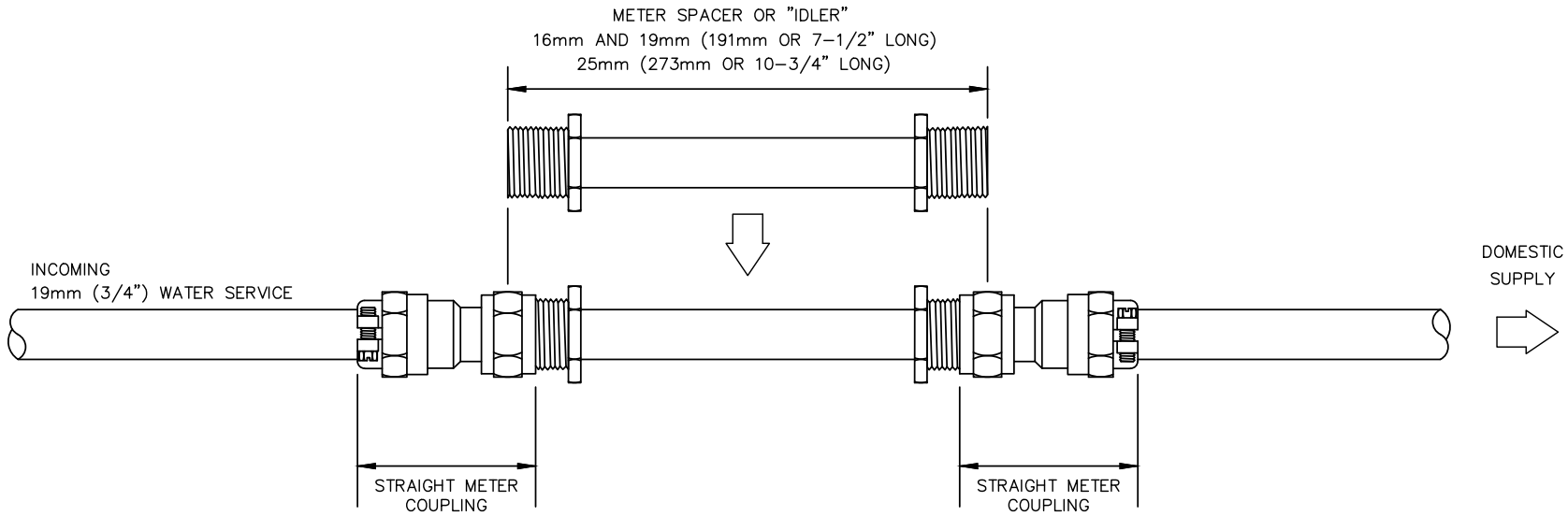


FINAL CONNECTION OF NEW WATERMAIN
TO EXISTING WATERMAIN

NOTES:

1. TYPICAL CONNECTION ON WATERMAINS OR SERVICES 100mm OR LARGER TO ALLOW FOR WATERMAIN DISINFECTION PROCEDURES.
2. ONCE THE MUNICIPALITY AUTHORIZES FOR THE FINAL CONNECTION OF THE NEW WATERMAIN TO THE EXISTING WATERWORKS SYSTEM, THE PERFORATED SECTIONS OF THE WATERMAIN FOR THE BYPASS LINE MAY BE CUT OFF AT THE INDICATED LOCATIONS, THE BYPASS LINE REMOVED AND A NEW SECTION OF WATERMAIN ADDED.
3. MAXIMUM LENGTH OF FINAL CONNECTION IS 6.0m.

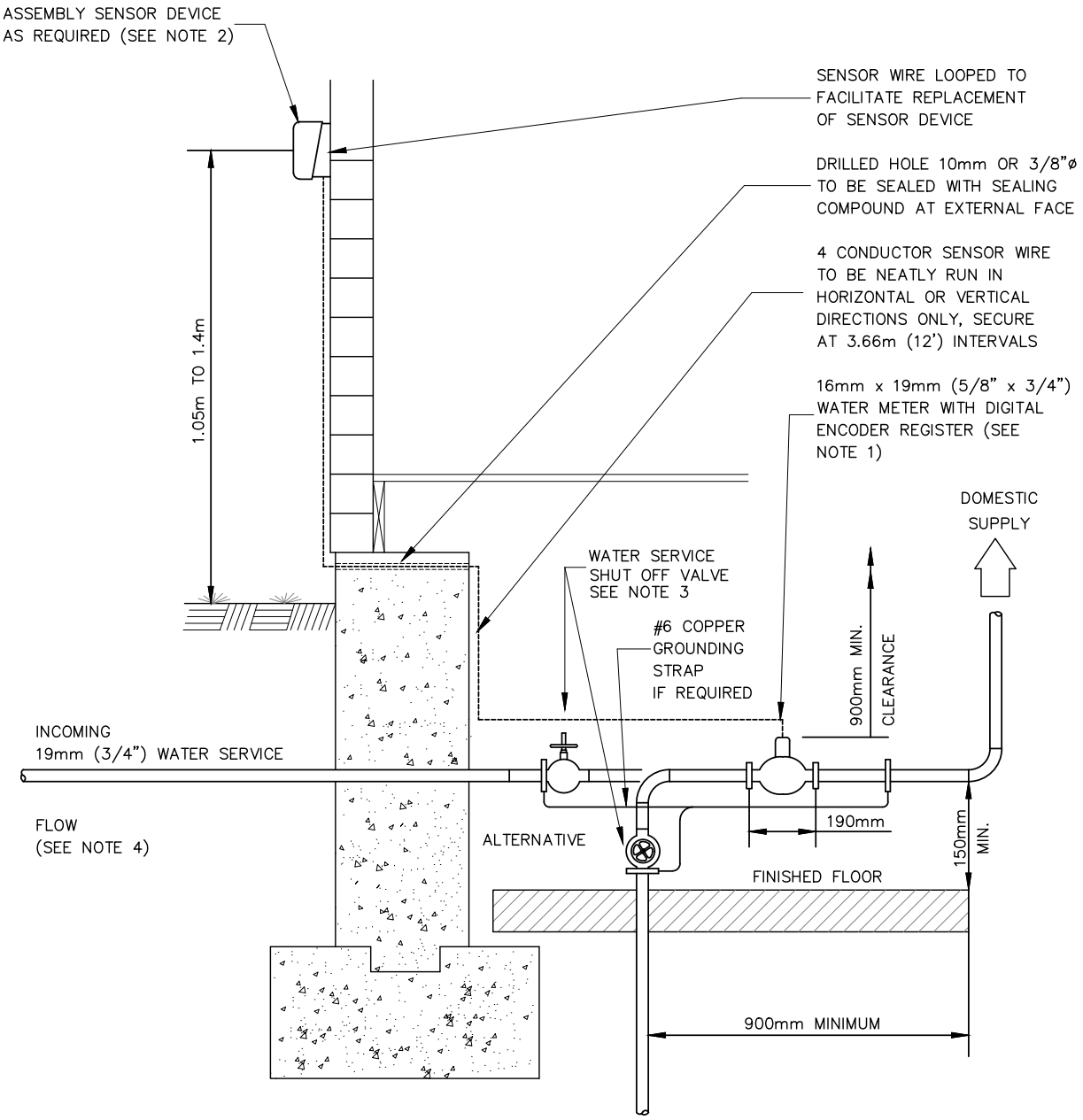
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 1
CONNECTION OF NEW WATERMAIN TO EXISTING WATERMAIN	STD. **W3**	



NOTES:

1. METER SPACER 191mm LONG WITH THREADED ENDS, DESIGNED TO BE REPLACED WITH A 16mm (5/8") x 19mm (3/4") WATER METER, SHALL BE INSTALLED ON DOMESTIC WATER SERVICES AFTER THE STOP AND DRAIN TO ACCOMMODATE FUTURE WATER METER.
2. METER SPACER SHALL BE INSTALLED HORIZONTALLY (PARALLEL TO FLOOR) WITH A MINIMUM OF 150mm SPACING FROM THE FLOOR.
3. METER SPACER SHALL BE INSTALLED AT LEAST 75mm TO A MAXIMUM OF 1.0m FROM WHERE THE WATER SUPPLY PIPE COMES INTO THE HOUSE.
4. NO FAUCETS OR TEES SHALL BE INSTALLED BEFORE THE METER SPACER.
5. STRAIGHT METER COUPLINGS WITH PACK JOINTS AND THREADED METER CONNECTIONS SHALL BE USED TO INSTALL THE METER SPACER.
6. READ THIS DRAWING IN CONJUNCTION WITH STANDARD DRAWING W5.

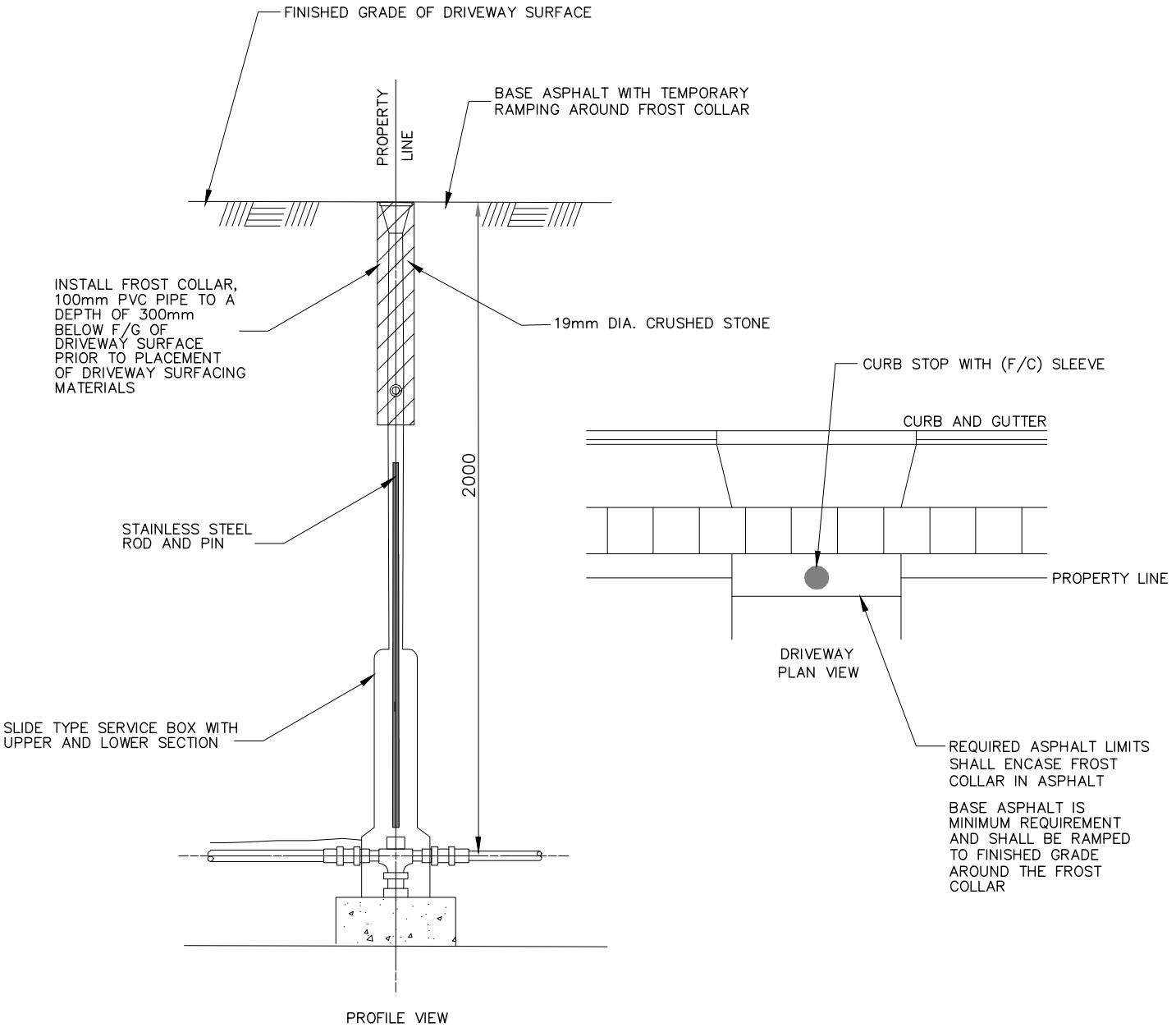
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
SPACER FOR WATER METER	STD. **W4**	



NOTES:

1. METER SHALL BE ONE TRADE SIZE SMALLER THAN SERVICE PIPE. REGISTRATION IN CUBIC METRES. SEE TABLE 2.
2. IF DETERMINED BY THE TOWNSHIP, SUPPLY AND INSTALL REMOTE READOUT DEVICE ON OUTSIDE WALL WITHIN 2.0m OF THE FRONT WALL AND ON THE SAME SIDE AS THE HYDRO METER. REMOTE READOUT DEVICE SHALL BE SUITABLE FOR TOUCH READ AUTOMATED READING AND BILLING SYSTEM. SEE TABLE 2.
3. WATER SERVICE SHUT OFF VALVE TO BE THE SAME SIZE AS INCOMING WATER SUPPLY PIPE.
4. IF HOT WATER TANK IS WITHIN 3.0m OF THE METER, A CHECK VALVE IS REQUIRED BETWEEN THE METER AND THE HOT WATER TANK.
5. METER SHALL BE INSTALLED USING THREADED CONNECTIONS ONLY.
6. WATER METER TO BE INSTALLED WITHIN 1.0m OF WHERE THE WATER SUPPLY PIPE COMES INTO THE HOUSE.
7. METER TO BE INSTALLED HORIZONTALLY (PARALLEL TO FLOOR).
8. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH STANDARD DRAWING W4.

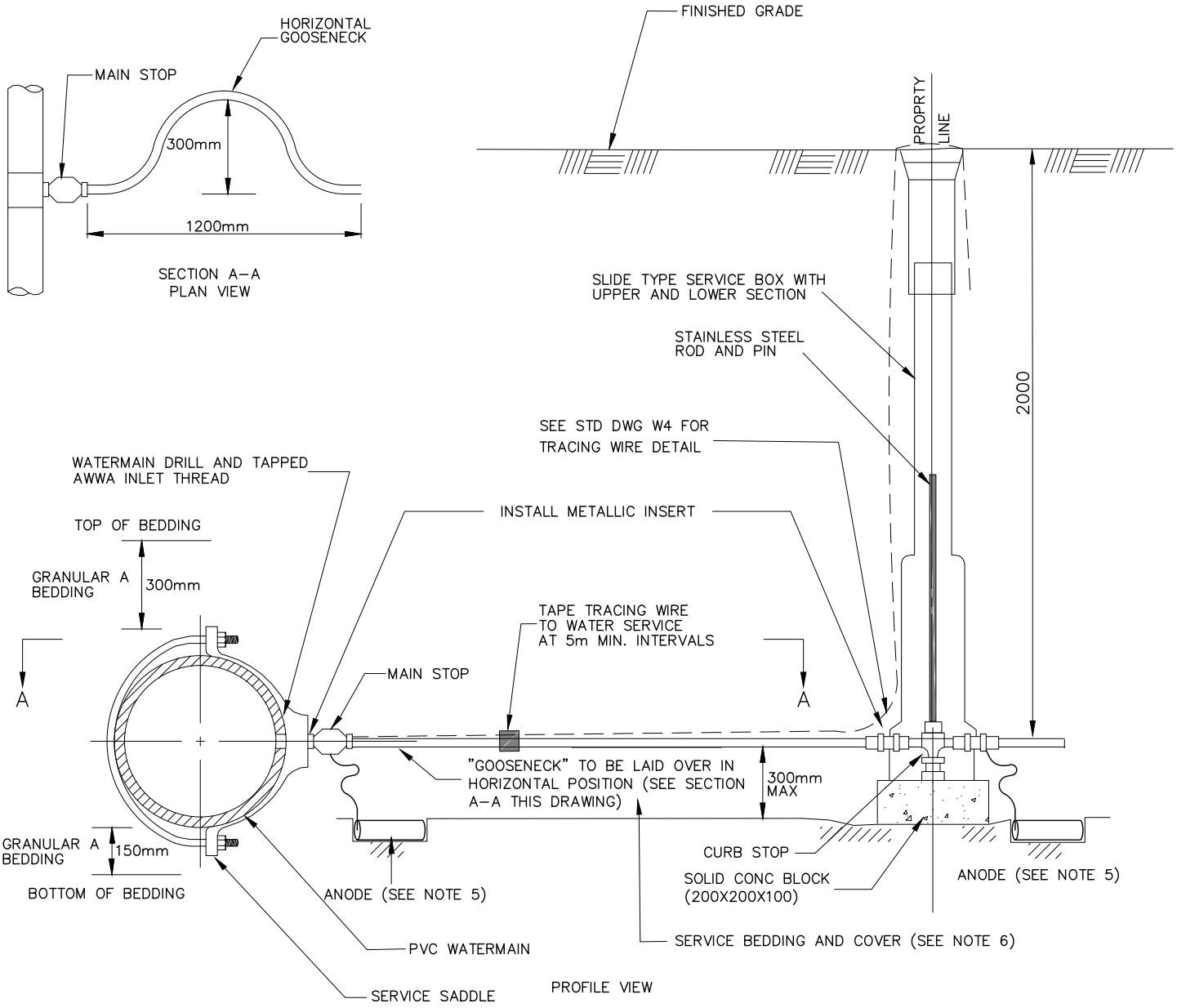
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
TYPICAL WATER METER INSTALLATION	STD. **W5**	



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
2. TOP OF FROST COLLAR SLEEVE TO BE SET AT THE ELEVATION OF FINISHED SURFACE.
3. IF ONLY PLACING THE BASE COAT OF ASPHALT, THE ASPHALT SHALL BE RAMPED AROUND THE SLEEVE UP TO FINISHED. GRADE TO PREVENT DAMAGE TO THE SLEEVE.
4. ASPHALT RAMPING NOT REQUIRED WHEN DRIVEWAY IS FULLY COMPLETED TO FINISHED GRADE WITH SURFACE ASPHALT.
5. CURB STOPS ARE TO BE SET ON PROPERTY LINE AND IN LANDSCAPED AREAS WHENEVER POSSIBLE.

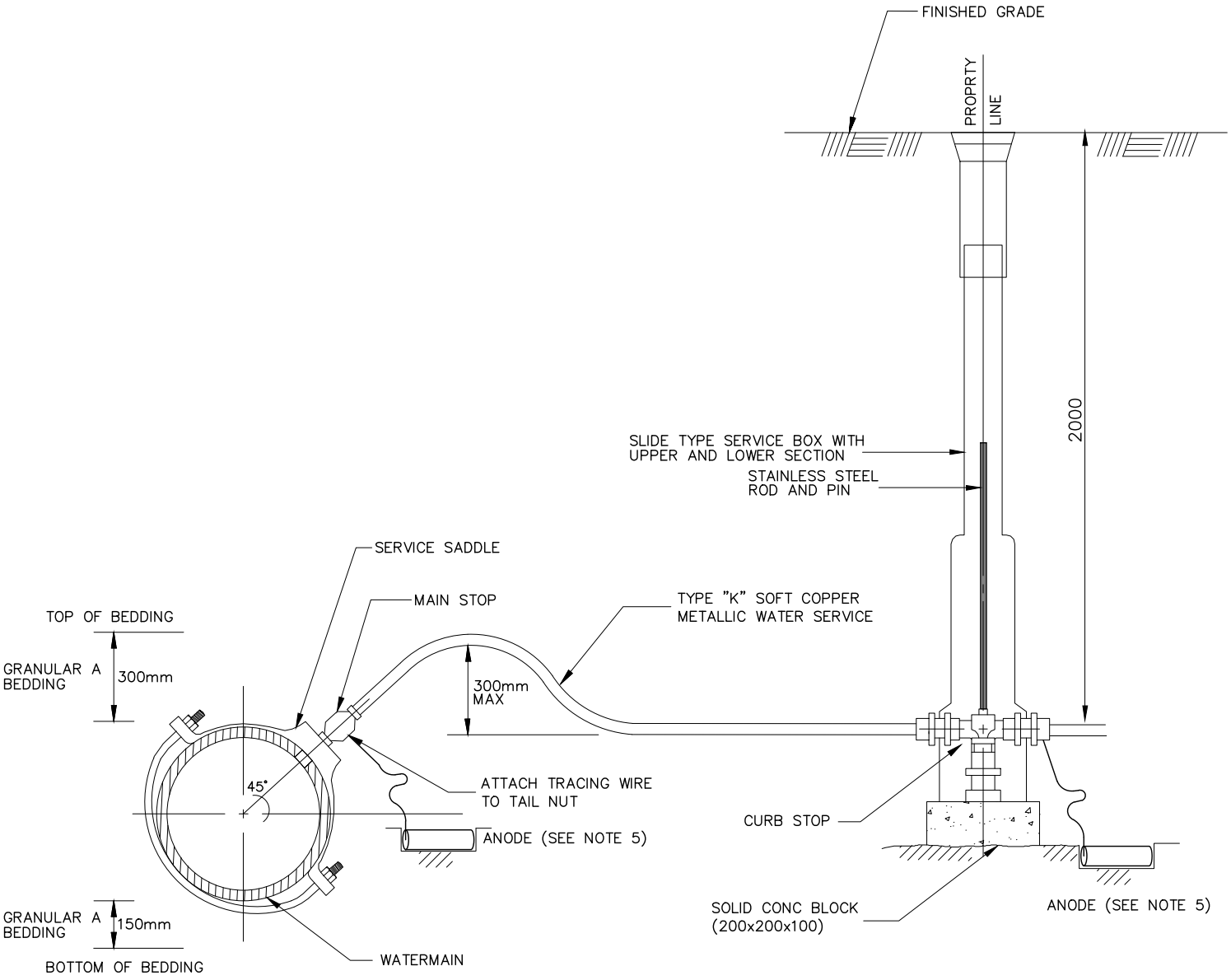
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
FROST COLLAR INSTALLATION FOR CURB STOP BOXES LOCATED IN DRIVEWAYS	STD. **W6**	



NOTES:

1. SERVICE BETWEEN MAIN STOP AND CURB STOP SHALL BE A SINGLE CONTINUOUS LENGTH OF PIPE. COUPLERS ARE NOT ALLOWED WITHIN THE MUNICIPAL R.O.W.
2. CONNECTIONS TO PLASTIC MAINS TO BE MADE USING SERVICE SADDLES.
3. ALL WATER SERVICES GOOSENECK TO BE INSTALLED IN HORIZONTAL POSITION.
4. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
5. A MINIMUM 5.4kg ANODE IS TO BE ATTACHED TO THE CURB STOP AND MAIN STOP.
6. WATER SERVICES BEDDING AND COVER ARE TO BE IN APPROVED SAND IN ACCORDANCE TO OPSS 1001 TO 300mm ABOVE THE TOP OF PIPE ON PUBLIC PROPERTY.
7. SERVICES ARE TO BE PLACED HORIZONTAL WITH A MINIMUM 1200mm LONG GOOSENECK.
8. UNION COUPLINGS WILL NOT BE PERMITTED UNLESS THE SERVICE LENGTH EXCEEDS 20m AND UNIONS SHALL NOT BE PLACED UNDERNEATH ROADWAYS

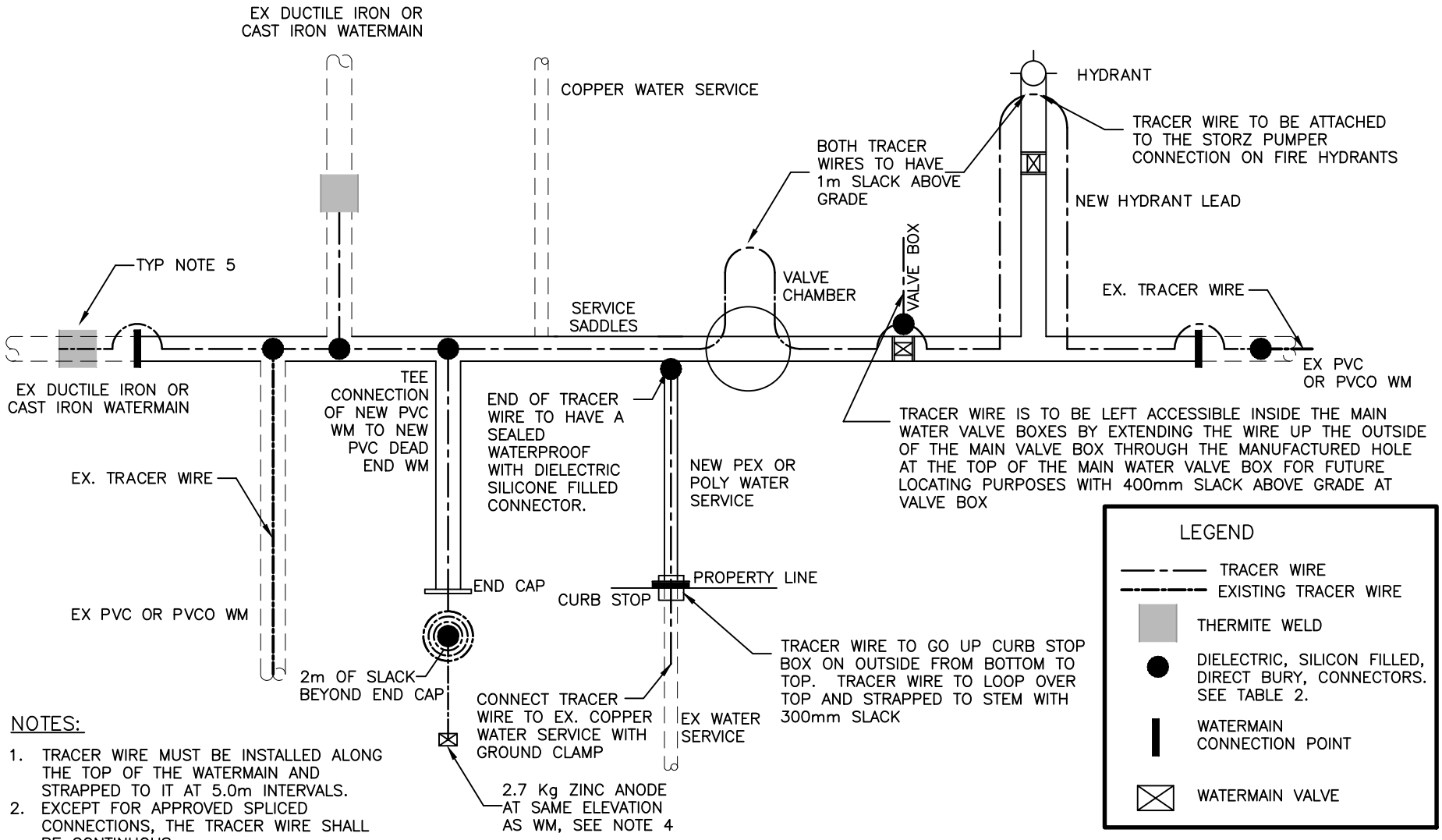
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
NON–METALLIC WATER SERVICE CONNECTION DETAIL FOR NON–METALLIC WATERMAIN 50mm DIAMETER OR LESS SERVICES	STD. **W7**	



NOTES:

1. SERVICE BETWEEN MAIN STOP AND CURB STOP SHALL BE A SINGLE CONTINUOUS LENGTH OF COPPER. COUPLERS ARE NOT ALLOWED WITHIN THE MUNICIPAL R.O.W.
2. ALL WATER SERVICES TO BE INSTALLED 90° TO THE LONGITUDINAL AXIS OF THE WATERMAIN.
3. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN.
4. NO TRACING WIRE IS TO BE INSTALLED ON COPPER WATER SERVICES. SEE STANDARD DRAWING W10 FOR TRACING WIRE DETAIL.
5. A MINIMUM 5.4kg ANODE IS TO BE ATTACHED TO THE CURB STOP AND MAIN STOP.
6. WATER SERVICES BEDDING AND COVER ARE TO BE IN APPROVED SAND IN ACCORDANCE TO OPSS 1001 TO 300mm ABOVE THE TOP OF PIPE ON PUBLIC PROPERTY.
7. SERVICES 25mm OR LESS ARE TO BE PLACED 15 DEGREES ABOVE HORIZONTAL WITH A MINIMUM 1200mm LONG GOOSENECK, SERVICES LARGER THAN 25mm ARE TO BE HORIZONTAL.

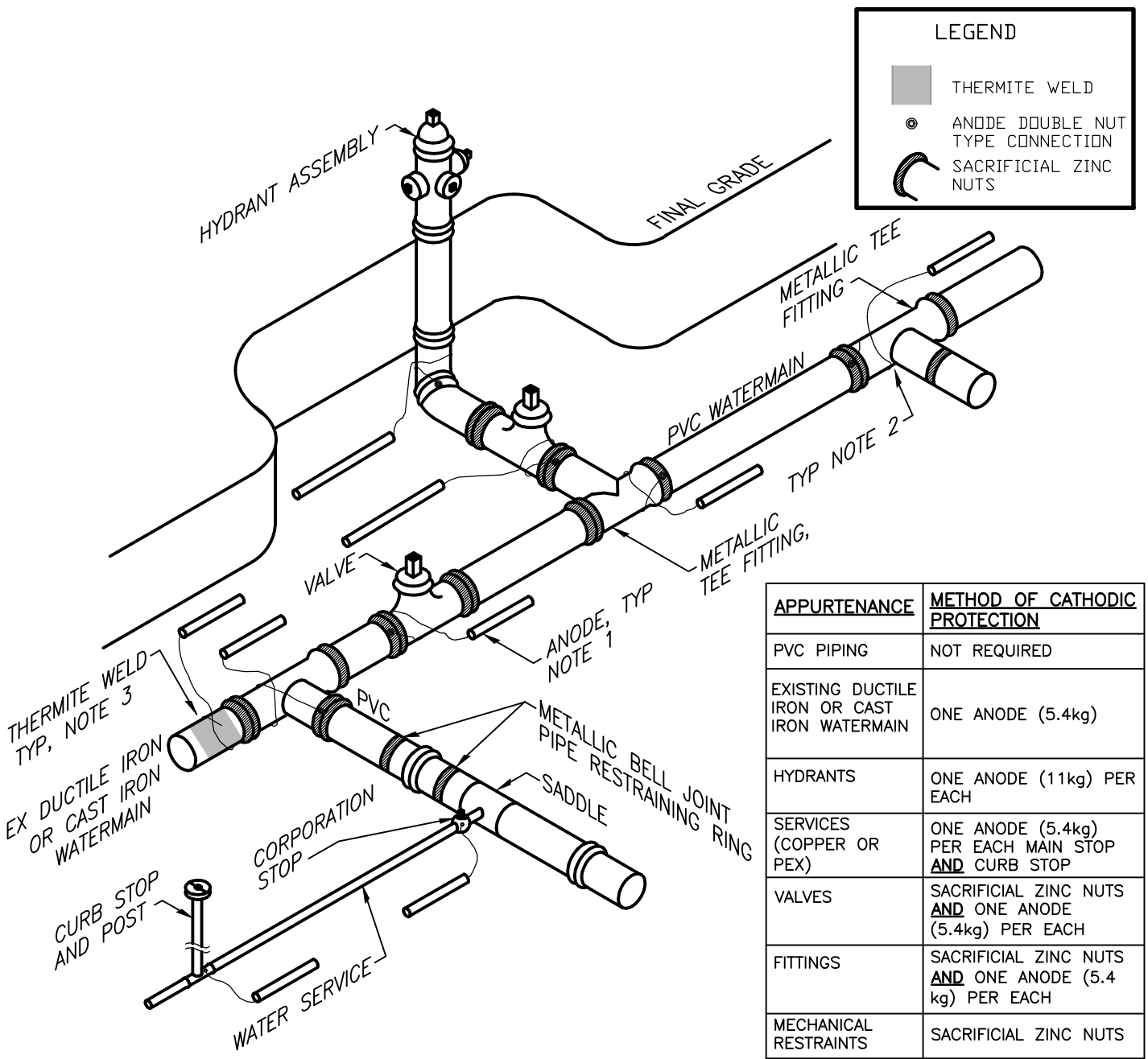
TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
METALLIC WATER SERVICE CONNECTION DETAIL FOR NON-METALLIC WATERMAIN 25mm DIAMETER OR LESS SERVICES	STD. **W8**	



NOTES:

1. TRACER WIRE MUST BE INSTALLED ALONG THE TOP OF THE WATERMAIN AND STRAPPED TO IT AT 5.0m INTERVALS.
2. EXCEPT FOR APPROVED SPLICED CONNECTIONS, THE TRACER WIRE SHALL BE CONTINUOUS.
3. THE CONTRACTOR SHALL CONDUCT THE TRACER WIRE TESTING
4. ALL TRACER WIRE CONNECTIONS AND BARE ENDS BELOW GRADE TO BE SEALED WITH A WATERPROOF CONNECTOR WITH DIELECTRIC SILICONE FILLED TO SEAL OUT MOISTURE AND CORROSION. SEE TABLE 2.
5. PROTECTIVE COATING SHALL BE APPLIED TO ALL THERMITE WELDS AS PER OPSD 1109.025.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 2
WATERMAIN TRACER WIRE INSTALLATION PROCEDURE	STD. **W9**	



APPURTENANCE	METHOD OF CATHODIC PROTECTION
PVC PIPING	NOT REQUIRED
EXISTING DUCTILE IRON OR CAST IRON WATERMAIN	ONE ANODE (5.4kg)
HYDRANTS	ONE ANODE (11kg) PER EACH
SERVICES (COPPER OR PEX)	ONE ANODE (5.4kg) PER EACH MAIN STOP **AND** CURB STOP
VALVES	SACRIFICIAL ZINC NUTS **AND** ONE ANODE (5.4kg) PER EACH
FITTINGS	SACRIFICIAL ZINC NUTS **AND** ONE ANODE (5.4 kg) PER EACH
MECHANICAL RESTRAINTS	SACRIFICIAL ZINC NUTS
BELL JOINT RESTRAINTS	SACRIFICIAL ZINC NUTS ON BOTH ENDS OF THREADED RODS

NOTES:

1. ANODE SHALL BE PLACED AT LEAST 1.0m AWAY FROM THE WATER SYSTEM PIPE AND APPURTENANCES AND AS DEEP AS THE BOTTOM OF THE PIPE AND APPURTENANCES. MINIMUM DISTANCE BETWEEN ANODES SHALL BE 1.0m.
2. ANODE CONNECTING WIRE SHALL BE LOOSELY WRAPPED AROUND PIPES AND FITTINGS AND KNOTTED. ANODE SHALL BE INSTALLED WITH DOUBLE NUT TYPE CONNECTION.
3. PROTECTIVE COATING SHALL BE APPLIED TO ALL THERMITE WELDS AS PER OPSD 1109.025.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 1
CATHODIC PROTECTION FOR PVC WATERMAIN SYSTEMS	STD. **W10**	

DESCRIPTION	MECHANICAL THRUST RESTRAINTS REQUIREMENTS	BELL JOINT RESTRAINTS LENGTH OF PIPE FROM FITTING, VALVE, FIRE HYDRANT, DEAD END	MINIMUM STEEL RODS TO BE USED ON BELL JOINT RESTRAINTS
INLINE VALVES UP TO 200mm IN SIZE	INSTALLED ON BOTH SIDES OF VALVE	1 FULL PIPE LENGTH (6m)	2
INLINE VALVES 300mm IN SIZE	INSTALLED ON BOTH SIDES OF VALVE	2 FULL PIPE LENGTH (12m)	4
BENDS UP TO 200mm IN SIZE	INSTALLED ON BOTH SIDES OF BEND	1 FULL PIPE LENGTH (6m)	2
BENDS 250mm TO 300mm	INSTALLED ON BOTH SIDES OF BEND	2 FULL PIPE LENGTHS (12m)	4
DEAD END WATERMAINS UP TO 200mm CAP AND/OR PLUG	INSTALLED ON CAP	3 FULL PIPE LENGTHS (18m)	2
DEAD END WATERMAINS 250mm AND 300mm SIZE CAP AND/OR PLUG	INSTALLED ON CAP	5 FULL PIPE LENGTHS (30m)	4
ALL FITTINGS UP TO 200mm (TEES, FIRE HYDRANTS, REDUCERS, AND CROSSES)	INSTALLED ON BOTH SIDE OF FITTINGS	2 FULL PIPE LENGTHS (12m)	2
ALL FITTINGS 250mm TO 300mm (TEES, FIRE HYDRANTS, REDUCERS, AND CROSSES)	INSTALLED ON BOTH SIDES OF FITTINGS	2 FULL PIPE LENGTHS (12m)	4

NOTES:

1. IF ANY JOINT IS ENCOUNTERED IN THE ABOVE RESTRAINED LENGTHS, IT MUST ALSO BE RESTRAINED.
2. FIRE HYDRANT LEADS SHALL HAVE BELL JOINT RESTRAINTS INSTALLED ON ALL WATERMAIN JOINTS BETWEEN THE TEE AT THE WATERMAIN TO FIRE HYDRANT.
3. WATER SERVICES 100mm OR LARGER SHALL HAVE BELL JOINT RESTRAINTS INSTALLED ON ALL WATERMAIN JOINTS WITHIN THE MUNICIPAL RIGHT OF WAY BETWEEN THE TEE AT THE WATERMAIN TO VALVE AT PROPERTY LINE.
4. WATERMAIN PLACED IN FILL LOCATIONS MUST BE MECHANICALLY RESTRAINED AT ALL JOINTS WITH BELL JOINT RESTRAINTS.
5. ALL BRANCH VALVES SHALL BE TREATED AS DEAD END WATERMAINS AND SHALL BE RESTRAINED ACCORDING TO THE ABOVE–MENTIONED DEAD END WATERMAIN CRITERIA.
6. SEE SECTION E.9 AND TABLE 2 FOR ADDITIONAL DESIGN REQUIREMENTS.

TOWNSHIP OF WELLINGTON NORTH	DATE APRIL, 2022	REV. 0
MINIMUM WATERMAIN RESTRAINTS REQUIREMENTS	STD. **W11**	

APPENDIX B

FORMS AND TEMPLATES

WELLINGTON NORTH
SEMPER PORRO

Watermain Pressure Test Form

(To Be Completed For All New Installations)

1.0 PROJECT INFROMATION

Project Name: _____ Contract No: _____

Contractor: _____ Project Engineer: _____

2.0 WATERMAIN DETAILS

Location:_____

Total Length of watermain installed _____(m), diameter(s)_____(mm)

Total Length of water services installed _____(m), diameter(s)_____(mm)

Pipe Material: _____ (watermain), _____ (water services)

3.0 HYDROSTATIC TESTING (OPSS 441.07.24)

- Required Test Pressure: **1034 kPa (150 Psi)**
- Minimum Required Continuous Test Pressure: **2 hours**

Backflow Preventor Model Number _____ Date Certified: _____

*Allowable Leakage calculations **FOR 2 HOURS** test (OPSS 441.07.24.03):*

Watermain - 0.082 x ____Dia.(mm) x (_____Length(m) / 1000)= _____ (litres)

Water Services - 0.082 x ____Dia.(mm) x (_____Length(m) / 1000)= _____ (litres)

Water Services - 0.082 x ____Dia.(mm) x (_____Length(m) / 1000)= _____ (litres)

Total Allowable Leakage for 2 Hour Test = _____ (litres)

Leakage Test Date: _____Start Time: _____ End Time: _____

Start Pressure: _____ End Pressure: _____

Actual Measured Volume Leakage Loss: _____ (litres)

Note: for hydrostatic testing of Polyethylene Pipe (PE), see OPSS441.07.24.02

4.0 TEST RESULTS:

Satisfactory ☐ Unsatisfactory ☐

Comments:

_____/_____ _____/_____

Contractor's Representative Name (Print) / Signature Engineer's Representative Name (Print) / Signature

WELLINGTON NORTH
SEMPER PORRO

MUNICIPAL SERVICE RECORD SHEET

Town	Lot Number	House Number	Street Name	Drawing Number
☐ Arthur ☐ Mount Forest				

"As Recorded" Service Location Sketch, North Arrow and Key Plan

SANITARY SEWER MAIN PIPE Type of Material: PVC DR35 Diameter (mm): _____	Top of Sanitary Tee at Sanitary Main (Elev.): _____	Length of service from Sanitary Main to Property Line (m): _____
SANITARY SERVICE Type of Material: PVC DR28 Diameter (mm): _____	Top of Sanitary Service at property line (Elev.): _____	Cover of Sanitary Service at Property Line (m): _____
STORM SEWER MAIN PIPE Type of Material: _____ Diameter (mm): _____	Top of Storm Tee at Storm Main (Elev.): _____	Length of service from Storm Main to Property Line (m): _____
STORM SERVICE Type of Material: PVC DR28 Diameter (mm): _____	Top of Storm Service at property line (Elev.): _____	Cover of Storm Service at Property Line (m): _____
WATERMAIN Type of Material: PVC DR18 Diameter (mm): _____	**Top of watermain elevation at saddle: _____**	**Cover of Watermain (m):_____**
WATER SERVICE **Type of Material** ☐ PEX ☐ COPPER Diameter (mm): _____	**Top of water service at property line (Elev.): _____**	**Cover of Water Service at Property Line (m): _____** **Length of Water Service from WM to Property Line (m): _____**

**Fill out for Reconstruction Projects or at time of house being constructed*

Sanitary Service on Private Property: **Type of Material: _____** **Diameter:_____** **Cover:_____**

Storm Service on Private Property: **Type of Material: _____** **Diameter:_____** **Cover:_____**

Water Service on Private Property: **Type of Material: _____** **Diameter:_____** **Cover:_____**

Contractor Who Installed Municipal Services:	Engineer Inspecting Construction:	Additional Remarks

Location checked by:

_____ _____

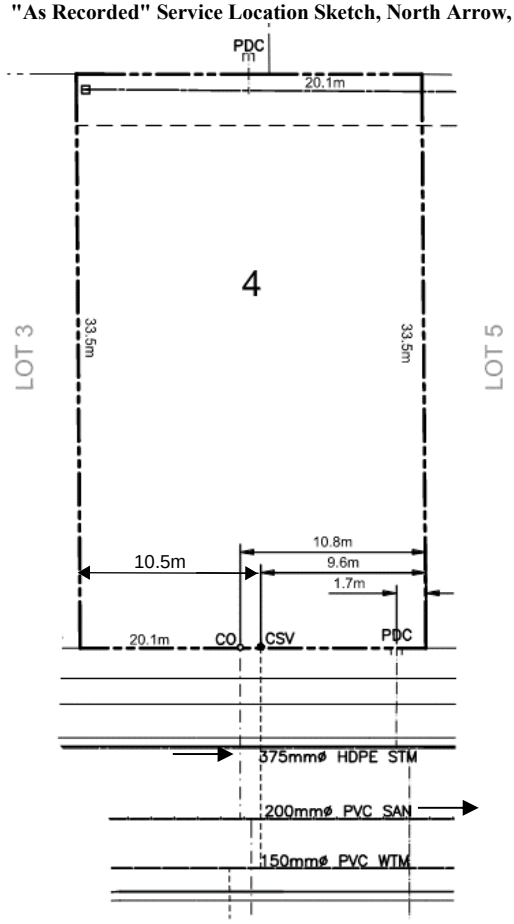
Engineer's Inspector Signature **Date Installed**

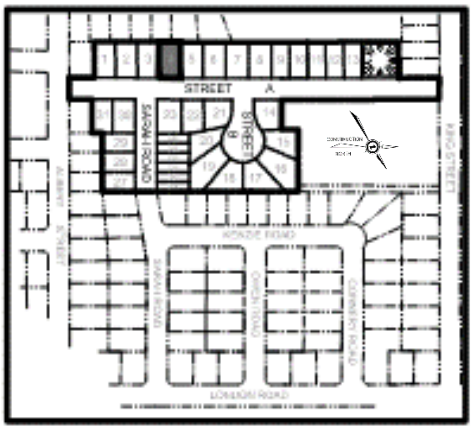
WELLINGTON NORTH
SEMPER PORRO

MUNICIPAL SERVICE RECORD SHEET

Town	Lot Number	House Number	Street Name	Drawing Number
☐ Arthur ☒ Mount Forest	1	101	Ronnies Way	01803-C4

"As Recorded" Service Location Sketch, North Arrow, Flow Arrows, Legend and Key Plan





KEY PLAN
NTS

LEGEND
STM STORM CLEANOUT
CO SANITARY CLEANOUT
CSV CURB STOP VALVE

CONSTRUCTION NORTH

SCALE 1:300
5 0 2.5 5 10 METRES
20 10 5 0 10 20 FEET

SANITARY SEWER MAIN PIPE Type of Material: PVC DR35 Diameter (mm): 200	Top of Sanitary Tee at Sanitary Main (Elev.): 424.97	Length of service from Sanitary Main to Property Line (m): 10.0
SANITARY SERVICE Type of Material: PVC DR28 Diameter (mm): 125	Top of Sanitary Service at property line (Elev.): 425.80	Cover of Sanitary Service at Property Line (m): 2.4
STORM SEWER MAIN PIPE Type of Material: HDPE BOSS 2000 Diameter (mm): 375	Top of Storm Tee at Storm Main (Elev.): 426.37	Length of service from Storm Main to Property Line (m): 8.0
STORM SERVICE Type of Material: PVC DR28 Diameter (mm): 100	Top of Storm Service at property line (Elev.): 427.00	Cover of Storm Service at Property Line (m): 1.2
WATERMAIN Type of Material: PVC DR18 Diameter (mm): 150	**Top of watermain elevation at saddle:** 425.31	**Cover of Watermain (m):** 2.0
WATER SERVICE **Type of Material** ☐ PEX ☐ COPPER Diameter (mm): 19	**Top of water service at property line (Elev.):** 425.31	**Cover of Water Service at Property Line (m):** 2.0 **Length of Water Service from Watermain to Property Line (m):** 13.0

**Fill out for Reconstruction Projects or at time of house being constructed*

Sanitary Service on Private Property: **Type of Material:** _____ **Diameter:** _____ **Cover:** _____

Storm Service on Private Property: **Type of Material:** _____ **Diameter:** _____ **Cover:** _____

Water Service on Private Property: **Type of Material:** _____ **Diameter:** _____ **Cover:** _____

Contractor Who Installed Municipal Services:	Engineer Inspecting Construction:	Additional Remarks
Reeves Construction Limited	Cobide Engineering Inc.	

Location checked by:

_____
Engineer's Inspector Signature - John Smith

June 13, 2019
Date Installed

APPENDIX C

MUNICIPAL SERVICING TESTING REQUIREMENTS

APPENDIX C – MUNICIPAL SERVICING TESTING REQUIREMENTS

WATERMAIN:

All watermain commissioning shall be completed in accordance with the most current version of the Ministry of the Environment Watermain Disinfection Procedure, AWWA C651 – Disinfecting Watermains, Ontario Regulation 170/03, OPSS 441, the Township's MSS and the approved project Commissioning Plan.

- ☐ Commissioning Procedure can commence after Granular B has been placed in the roadway and Watermain Commissioning Plan has been approved by the Township:
  - Swabbing (1*)
  - Municipal Hydrostatic Pressure Test (Pressure Test Form) (1*)
  - Disinfection / Chlorine Residual Testing (2 sets 24 hours apart) (1*)
  - Flushing to Distribution System Chlorine Residual Levels (1*)
  - Microbiological Samples (2 sets 16 hours apart) (1*)
  - Watermain Commissioning Report (1*)
- ☐ Curb Stop Operation review by Township (1* & 2*)
- ☐ Valve Operation after asphalt is placed review by Township (1* & 2*)
- ☐ Hydrant Operation review by Township (1* & 2*)
- ☐ Conductivity Test of Tracer Wire after base asphalt is placed review by Township (1*)

SANITARY SEWER:

- ☐ All testing requirements for sanitary sewer to be completed after base asphalt and curb is placed.
- ☐ Deflection (Mandrel) Test and report (1*)
- ☐ Leakage Testing - Infiltration, Exfiltration or Air Test and report (1*)
- ☐ Flushing of main and services prior to CCTV (1*, 2* and 3*)
- ☐ CCTV Inspection and report
  - After base asphalt and curb is placed. Main and services (1*)
  - Prior to surface asphalt. Main only (3*)
  - Prior to Final Acceptance. Main and services (2*)
- ☐ Visual MH inspection (1* & 2*)

STORM SEWER:

- ☐ All testing requirements for storm sewer to be completed after base asphalt and curb is placed.
- ☐ Deflection (Mandrel) Test and report (1*)
- ☐ Flushing – main and services to property line prior to CCTV (1*)
- ☐ CCTV Inspection and report
  - After base asphalt and curb is placed. Main (including CB laterals, and rear/side yard sewers) and services to property line (1*)

- Visual Inspection – all structures (1* & 2*)
- SWM Facility inspection (1* & 2*)

ROADWORK:

- Sub-grade proof roll inspection with Township staff to witness and report from Geotechnical consultant report (1*)
- Granular (Sieve Analysis, Compaction) (1*)
- Engineered fill, if applicable (Sieve Analysis, Compaction) (1*)
- Fine Grading of Granular A (OPSF314-1) (1*)
- Curb & Gutter (Mix Design, granular base compaction report and concrete compressive strength, air content, and slump test – 1*; Visual – 1* & 2*)
- Base Course Asphalt (Mix Design, compaction report, Marshall – 1*; Visual1*, 2* & 3*)
- Surface Course Asphalt (Mix Design, compaction report, Marshall – 1*; Visual 1* & 2*)
- Sidewalk (Mix Design, granular base compaction report, concrete compressive strength, air content, and slump test – 1*; Visual – 1* & 2*)
- Street Signs (Visual) (1* & 2*)
- Traffic Control Signs (ECA – 1*; Visual 1* & 2*)
- Streetlight (Visual, ECA, Meter, Hydro Utility Sign Off and Visual (1* & 2*)
- Fencing (Visual) (1* & 2*)
- Walkways (Visual, additional information on surface treatment as required by Township) (1* & 2*)

OTHER:

- Other tests called for in the contract documents.
- Other tests required by the electrical authority.

NOTE:

a) **1* - Testing requirement to be completed prior to issuance of Preliminary Acceptance of applicable Stage.**
b) **2* - Testing requirement to be completed prior to issuance of Final Acceptance of applicable Stage.**
c) **3* - Testing requirement to be completed prior to placing surface asphalt.**
d) **All test certificates shall be neatly bound, indexed, and provided to the Township and Municipal Engineer.**

APPENDIX D

GENERAL DRAWING NOTES

APPENDIX D – GENERAL DRAWING NOTES

At a minimum, the following notes are to be included on the Developer drawings:

GENERAL NOTES:

1. All work and material to be completed and conform to the most current Municipal Servicing Standards, OPSS and OPSD. List of materials, see Table 2 of MSS, to be submitted to the Township with a minimum of 2 weeks prior to start of construction.
2. A preconstruction meeting is required between the Developer, Developer Engineer and Contractor, Township Staff and Township Consulting Engineer prior to the start of any construction.
3. 96 hour notice must be given to the Township Operations Department prior to any construction within the Township Road Allowance.
4. Underground utilities to be verified in the field by the contractor prior to the commencement of construction.
5. Contractor shall submit proof of insurance and WSIB clearance certificate to the Township prior to start of construction.
6. Developer's Engineer is to provide full time inspection during the installation of the works. Developer's Engineer is to provide certification of all works. It is the responsibility of the Developer and their contractor to schedule any required inspections to allow for this certification.
7. All temporary traffic control and signage during construction shall be in accordance with current Ontario Traffic Manual Book 7 and must be submitted to the Township prior to the start of construction.
8. Geotechnical Consultant shall be retained to carry out necessary inspections and testing during construction of the Works to ensure placement of proper materials and adequate compaction.
9. The Owner shall rectify all existing disturbed areas to the original condition or better and to the satisfaction of the Township of Wellington North.
10. All property bars to be preserved and replaced by O.L.S. at the Owner's expense if removed during construction.
11. Tree plantings shall be installed at 300 mm on private side of property line as per Standard Drawing L1.
12. All exterior lighting shall be dark sky compliant, directed onto the site and shall not infringe upon the adjacent properties.

EROSION AND SEDIMENT CONTROL:

1. All erosion and sediment control and temporary mud mats shall be installed prior to the commencement of any grading or excavating.
2. Erosion and sediment control shall be maintained during construction and conduct inspections once every two (2) weeks and after each significant storm event (a significant storm event is defined as a minimum of 25 mm of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.

3. All construction vehicles must enter and exit the site through approved construction access only.
4. All catch basin structures to have geotextile cloth installed under the grates and to remain in place until all restoration is completed and site is stabilized.
5. The Contractor shall keep all public roadways free of debris during the construction period. Any material tracked from the site shall be promptly removed from the roadway at the Contractor's expense.
6. Dust suppression is to be provided as required or as directed by the Township.

ROADWAY:

1. Boulevards to have a minimum 200 mm topsoil and sod.
2. All material shall be placed in layers not exceeding 300 mm lifts. Geotechnical testing shall be completed by the soils consultant with results provided to the Township.
3. Subgrade to be proof rolled certified by the Geotechnical Consultant and witnessed by Township staff prior to the placing of any granular road base material.
4. Granular courses to be compacted to 100% SPD.
5. All granular and asphalt materials and placement to be in accordance with OPSS 310, 314, and 1010 or otherwise specified.
6. Concrete sidewalk shall be placed at a 2% grade sloped towards the road with a minimum thickness of 125mm with the thickness increasing to; 150 mm at driveway entrance to residential, and 200 mm at entrance to apartment, commercial or industrial, and 200 mm at pedestrian ramps. Granular A base shall be a minimum 125 mm thickness and increased to match thickness of concrete at various locations. All contractions joints to be saw cut in hardened concrete within a sufficient time of placing sidewalk.
7. Concrete curb and gutter to be as per OPSD 600.040.
8. Subdrain is to be 150 mm Polyethylene BOSS 2000 with geotextile filter wrap, class 1 with filter opening size of 130-100 µm. 50 mm diameter maximum stone size for the granular backfill on subdrains.
9. Where new asphalt matches existing asphalt, a minimum 0.5 m lap joint shall be installed.
10. Maximum slope of driveways to be 6%.
11. Refer to typical road section detail.

SANITARY AND STORM SEWERS:

1. Sanitary Sewer shall be PVC SDR 35. Granular A bedding and cover in accordance with OPSD 802.010.
2. Storm Sewer shall be PVC DR35, HDPE BOSS 2000, or Concrete (reinforced) may be used for sewer pipes 600 mm diameter and smaller, unless otherwise specified. Sewers 675 mm diameter and larger shall be Concrete (Reinforced) and conform to CSA A257.2 (minimum Class 50-D), unless otherwise specified. Granular A bedding in accordance with OPSD 802.010, 802.030, 802.031, or 802.032.

3. All sewers are to be installed with gasketed bell and spigot pipe and to the appropriate OPSS, OPSD and the current Township of Wellington North Servicing Standards.
4. Pipe support at MH's, CB's and CBMH's as per OPSD 708.020.
5. MH's to be installed with Cretex rubber seals between MH sections. Kor-N-Seal rubber boots used for all sanitary pipe connections and when using SDR35 pipe for storm sewers. All sanitary MH external joints to be wrapped in 300 mm Denso tape, or approved equivalent. Frost strapping shall be installed as per OPSD 701.100. All sanitary maintenance holes require benching as per OPSD 701.021.
6. All CB and CBMH found in curb line, frames and covers (OPSD 400.110) to be set to final elevation and install with temporary catch basin drain, see Township Standard Drawing R5. All MH in roadway to use AutoStable frame and lid manufactured by Bibby-Ste-Croix to be set to base course asphalt elevation and raised to surface elevation prior to installation of surface asphalt. Sanitary MH shall be closed cover. Storm MH shall be open cover. Frame and cover shall be adjusted using concrete adjustment units and parged on outside only.
7. All storm CB to have a minimum sump of 600 mm and all MH and CBMH to have a 300 mm sump. Sewer greater than 450 mm diameter require benching. Rear yard CB require benching.
8. Single CB lead is minimum 250mm diameter with a minimum 1.0% slope. Double catch basin lead is minimum 300 mm diameter with a minimum 1.0% slope.
9. Sanitary services are to be minimum 125 mm PVC SDR28 with pipe colour green installed with a minimum 2.0% slope and 2.4 m cover at property line. Sewer services to have manufactured prefabricated tee connection.
10. Storm services are to minimum 150 mm PVC SDR28 with pipe colour white installed with a minimum 1.0% slope and 1.2 m cover at property line. Storm services are to be located 1.5 m from the lowest lot line with 1.2 m cover at property line. Sewer services to have manufactured prefabricated tee connection.
11. The following test requirements of sanitary and storm sewers shall be completed in accordance with OPSS 410 after the placement of curb and gutter and base asphalt:
    a. Flushing of all sewer mains and services.
    b. Sanitary CCTV:
        i. After placement of curb and base asphalt, prior to Preliminary Acceptance (main and services)
        ii. Prior to placement of surface asphalt (main only)
        iii. Prior to Final Acceptance (main and services)
    c. Storm CCTV:
        i. After placement of curb and base asphalt, prior to Preliminary Acceptance (main including CB laterals and rear/side yard sewers and services)
    d. Deflection testing (mandrel) of flexible sanitary and storm sewer mains including CB laterals and rear/side yard storm sewers.
    e. Leakage testing (Infiltration, exfiltration or air testing) of sanitary sewer mains and services.

WATERMAIN:

1. Written authorization is required from the Township's Environmental services department prior to installation of water service. A minimum of 96 hours notice is to be provided to the Environmental Services department prior to the installation of water service. Township's licensed operator to be present for connections to existing watermains.
2. All testing shall follow the most current versions of AWWA C651 Disinfecting Water Mains, Watermain Disinfection Procedure August 1, 2020, Ontario Regulation 170/03 and Township Municipal Servicing Standards. Watermain Commissioning Plan that includes the swabbing, pressure testing, disinfection, sampling/testing, and final connection (less than 6 meters in length) procedures detail are to be provided to the Township for approval with a minimum of 2 weeks in advance of any watermain construction. Only Township's Licensed Operators shall operate valves and fire hydrants located on the Municipal Water System.
3. Watermain testing shall not commence until placement of Granular B has been completed.
4. All new watermains shall be hydrostatically tested in accordance with Township specifications and provincial guidelines. The system shall be constructed and tested as per OPSS 701.
5. Watermain shall be PVC DR18 Class 235 and conforming to ASTM D1784, AWWA C900 of C905 and CAN/CSA B137.3 with gasketed bell end.
6. A 12 Gauge, 7 Strand copper tracer wire, with an outer plastic coating, shall be attached to every non-metallic watermain, hydrant lead and service connection, see Township Standard Drawing W9.
7. Separation distances between sewers and watermains and sewer services and water services shall be as per MECP Procedure F-6-1; in general, 2.5 m horizontal separation between parallel installations and 0.5 m vertical separation at crossings where the watermain or water service crosses under the sewer. Where this spatial separation cannot be achieved, other measures are to be implemented, such as use of pressure pipe (350kPa) for sewers, as to be approved by the Township.
8. All Watermains and services shall have minimum cover of 2.0m.
9. All fire hydrants shall be installed with the storz connection facing the roadway. Fire hydrants shall be painted red with black storz caps and fire hose caps with yellow ID stick marker and conform to the Township of Wellington North Standards. Secondary water valve to be placed 1.2 m from fire hydrant.
10. Water services to be bedded and cover in approved sand conforming with OPSS 1001 and to be placed to 300 mm above the top of pipe.
11. All fittings, valves and hydrant leads shall be fully restrained and at a minimum meets Standard Drawing W11 requirements and manufacturer's recommendations.
12. All services to be Type 'K' copper or Cross-Linked Polyethylene (PEX) conforming to AWWA C904 Municipex by Rehau or Blue904 by Ipex. Minimum required water service diameter to be 19 mm.
13. Curb stops shall not be located within driveways or hard surface areas unless otherwise approved by the Township. When located in driveways or hard surface areas, a 100 mm PVC frost collar shall be installed as per Standard Drawing W6.
14. Cathodic protection shall be installed as per Standard Drawing W10.