AMHERSTBURG
ONTARIO, CANADA
EST. 1796

INFRASTRUCTURE STANDARDS MANUAL

Prepared by:
Infrastructure Services

Engineering standards to be used for design and construction of infrastructure projects within the Town

TABLE OF CONTENTS

LIST OF TABLES

REVISIONS

The following table summarizes the revisions to the Infrastructure Standards Manual since its approval on March 24, 2025. Please ensure you are using the most recent version of the manual with all approved revisions. If you are uncertain of which version to use, please call the Manager of Engineering at 519-736-3664 to confirm the last revision date.

Table 1 - Revisions

Revision Date	Description	Revised Section
March 24, 2025	Original Manual	No revisions

INTRODUCTION

In an effort to streamline the development process, the Corporation of the Town of Amherstburg has consolidated its infrastructure requirements in this Infrastructure Standards Manual. The Infrastructure Standards Manual will be referred to the Manual throughout the remainder of the document.

Throughout the remainder of this document, the Corporation of the Town of Amherstburg will be referred to as Amherstburg.

This Manual will be updated from time to time. The dates of the revisions are noted at the bottom of each page and in the revision section of this manual. It is the responsibility of the Developer and/or Developer's Consulting Engineer to confirm with Amherstburg's Infrastructure Services Department the most up-to-date revision of this Manual to make use of contents for design purposes.

This Manual also refers to Ontario Provincial Standard Drawings (OPSD) and Specifications (OPSS). Unless noted otherwise in the revision section of this Manual, the latest edition of these documents applies.

Provincial or Federal requirements shall supersede the requirements of this Manual. This Manual is not intended to conflict with the requirements of other agencies including, but not limited to, the Essex Region Conservation Authority (ERCA), Ministry of the Environment, Conservation, and Parks (MECP), Hydro One, Essex Power, Enbridge and Bell Canada. Kindly report any conflicts to Amherstburg.

Exceptions to the standards contained in this Manual will be considered for comprehensively planned developments or areas with specific municipal designations. Amherstburg may also develop urban design guidelines and special development standards for comprehensively planned areas that, when adopted by Council, will supersede the development standards contained within this Manual for those comprehensively planned areas.

All requests for deviation from the standards outlined in this Manual must be submitted to the Manager of Engineering in writing. If approved, written confirmation will be provided to the Developer for their records.

Submissions to Infrastructure Services may be subject to fees. Please refer to Amherstburg's User Fee By-law for all engineering review, CLI review, and inspection/walkthrough fees that shall be applicable for all development applications reviewed by Infrastructure Services.

Any suggestions on improving this document should be addressed to Amherstburg's Infrastructure Services Department.

ABBREVIATIONS

Table 2 - Abbreviations

Abbreviation	Definition
AES	Atmospheric Environment Service
AODA	Accessibility for Ontarians with Disabilities Act
AWWA	American Water Works Association
C/L	Centerline
CLI	Consolidated Linear Infrastructure
CSP	Corrugated Steel Pipe
DFO	Department of Fisheries and Oceans
DSC	Digital Security Controls
ECA	Environmental Compliance Approval
EP	Edge of Pavement
ERCA	Essex Region Conservation Authority
F/C	Face of Curb
HDPE	High Density Polyethylene
HL3	Hot Load 3 – surface asphalt
HL4	Hot Load 4 – base asphalt
IESNA	Illuminating Engineering Society of North America
ITE	Institute of Transportation Engineers
LID	Low Impact Development
m	Meters

MECP	Ministry of the Environment, Conservation, and Parks
MNRF	Ministry of Natural Resources and Forestry
mPa	Megapascals
MTO	Ministry of Transportation for Ontario
NSF	National Sanitation Foundation
OBC	Ontario Building Code
OCWA	Ontario Clean Water Agency
OPSD	Ontario Provincial Standard Drawing
OPSS	Ontario Provincial Standard Specification
PDC	Private Drain Connection
PEO	Professional Engineers of Ontario
PVC	Polyvinyl Chloride
Q	Flow
ROW	Right-of-way
SWM	Stormwater Management
TAC	Transportation Association of Canada
V	Velocity
WERSM	Windsor Essex Region Stormwater Manual

1.0 PLAN OF SUBDIVISIONS

A registered plan of subdivision creates new, separate parcels of land and can be legally used for the sale of lots. This Section applies to all plan of subdivision applications submitted under the Planning Act to the Town of Amherstburg.

1.1. PRIOR TO CONSTRUCTION

A pre-submission application is required to be submitted to Amherstburg Planning Department prior to submission of any development applications. All known engineering requirements (and other internal department requirements) shall be noted during pre-submission.

1.1.1. Internal & External Agency Approvals

Developers (or Applicants, can be used interchangeably) are required to obtain all necessary approvals. The following is a partial list of approvals that are required. Developers should contact the various approval authorities to ascertain permit fees and the required time periods to obtain the necessary approvals. The Development cannot proceed until these approvals are received and copies of the approvals have been filed with Amherstburg.

Table 3 - Approvals

Partial List of Approvals	Approving Agency
Draft Plan of Subdivision	Town of Amherstburg, County of Essex
Final Plan of Subdivision	Town of Amherstburg, County of Essex
Stormwater Management	Town of Amherstburg, MECP, ERCA
Wastewater Allocation	Town of Amherstburg
Storm and Sanitary Sewer Design	Town of Amherstburg, MECP
Watermains	Town of Amherstburg, MECP
Road Connections & Setbacks	Town of Amherstburg
County Road Connections & Setbacks	County of Essex

Municipal Drainage	Town of Amherstburg, ERCA
Shorelines, Fill, and Flood Lines	ERCA, MNRF, DFO
Fish Habitats	Federal, administered by DFO
Development in Close Proximity to Railways	CP, ETR
Streetlighting	Town of Amherstburg, Essex Power, Hydro-One

It should be noted that Amherstburg is in possession of CLI-ECA for both our Municipal Sewage Collection System and our Municipal Stormwater Management System. The applicant shall confirm with Infrastructure Services if the proposed works are eligible to be included in the current CLI-ECA and approved by Amherstburg. Otherwise, Amherstburg will require approval from MECP to be submitted to Amherstburg prior to construction.

1.1.2. Submission Requirements

All submissions must be sent to the Amherstburg Planning Department in PDF format. Any documents, material, and/or drawings submitted to Infrastructure Services directly will not be reviewed and comments will not be provided.

1.1.2.1. Draft Plan Approval

At a minimum, Infrastructure Services requires all supporting studies identified in the pre-submission meeting and draft plan submitted in order to review and provide support of the development to Amherstburg Planning.

Detailed design drawings are not required to be submitted at this stage of the application and will not be reviewed at this time.

All draft plans shall be drawn to scale and in metric units. The boundaries of the Development shall be staked and certified by an Ontario Land Surveyor. A reproducible copy of the plan shall be submitted along with an electronic copy and an AutoCAD drawing (AutoCAD 2010 or earlier) that has been coordinated using the Universal Traverse Mercator (UTM) coordinate system. The draft plan shall also show sufficient ground elevations and reference geodetic elevations to identify drainage patterns. Physical features of the site and abutting lots should be shown, including drainage ditches, swales, municipal drains, trees, poles, roads, shorelines, buildings, etc.

1.1.2.2. Design Drawings

In general, the drawings shall be on ARCH "D" size paper (610 mm x 914 mm), shall be signed and sealed by a Professional Engineer licensed in Ontario, and shall include:

- Benchmark Location and Description (referred to geodetic elevations)
- Key Plan
- Legend and Index
- Separate Sanitary, Storm and Water layout plans (including sewer design sheets)
- Existing Conditions and Removals
- Road Alignment, Road Elevations, Pavement Widths
- Plan and Profile Sheets (showing road grades, sewer grades, watermain grades, maintenance hole locations)
- Utility Cross Sections
- Grading Plans (including lot grading)
- Power Distribution and Road Lighting Plans
- Traffic signing plan (including line painting)
- Miscellaneous Details (including bedding and backfill)
- Stormwater Flow Details (including watershed and sub-watershed boundaries)
- Stormwater Retention Pond Details (size, landscaping)
- Landscaping Plans (stamped by a registered Landscaping Architect, where required)
- Tree Protection Zones for publicly owned trees (per Amherstburg Tree By-law)

The drawings shall refer to Ontario Provincial Standard Drawings wherever applicable, except as amended or extended by Amherstburg's requirements.

Sewer design sheets shall be incorporated into the drawing set for all submissions requiring extension or construction of new sewer mainline.

1.1.2.3. Consolidated Linear Infrastructure (CLI) Approvals

Infrastructure Services shall advise the Developer/Consulting Engineer on appropriate timing to submit CLI applications for review and approval. Application requirements for stormwater and sewage (sanitary) works CLI approvals are detailed below.

Stormwater

1. Stormwater Management (SWM) Report, including the following information:
    a. Detailed description of the proposed works & project area
    b. SWM quantity & quality criteria; explanation of how they were established (Town Standards, ERCA, Ontario Water Quality Objectives or Procedure B-1-5)

c. Description of existing drainage patterns at the site and run-off outlet location(s), including the ultimate receiver(s)
d. Stormwater run-off analysis (design storms, hydrologic parameters for pre-development and post-development conditions, modeling results, pre-development and post-development peak flows and volumes)
e. Input & Output reports from the SWM model
f. Description of how the established quantity and quality control criteria will be met
g. Design details for each component of the SWM strategy, including capacity
h. Water Quality Design Features and Oil and Grit Separator Design Sheets
i. Hydraulic performance of the system verifying storm sewer capture rates and major and minor system capacities
j. Low impact development features and ground water table
k. Proposed Monitoring Plan
l. Proposed Operation and Maintenance Plan/Procedures (this may be requested to be submitted as a separate document outside of the SWM report)
m. Acknowledgement and any consideration required to protect drinking water

2. Detailed Design Drawings, signed and stamped by a Professional Engineer licensed to practice in Ontario.

3. PCSWMM compatible model

4. Storm Sewer Design Sheet (this is required to be included in the detailed design drawings)

5. MECP Form SW1, as applicable:
    a. Part 2 - Description of storm sewer/ditch/culvert alteration
    b. Part 3 - Verification by Licensed Engineering Practitioner or Technical Representative

6. MECP Form SW2, as applicable:
    a. Part 2 - Description of stormwater management facility alteration
    b. Part 3 - Verification by Licensed Engineering Practitioner or Technical Representative

7. MECP Form SW3, as applicable:
    a. Part 2 - Description of third-pipe collection system alteration
    b. Part 3 - Verification by Licensed Engineering Practitioner or Technical Representative

Sewage (Sanitary) Works

1. Design Brief/ Functional Servicing Report, including the following information:
    a. Detailed description of the proposed works
    b. Sewage flow volumes/ sewage generation calculations
    c. Inflow calculations based on MECP guidelines
    d. Impacts of infiltration based on the water table
    e. Proposed Monitoring Plan
    f. Proposed Maintenance Plan
    g. Acknowledgement and any consideration required to protect drinking water

2. Detailed Design Drawings, signed and stamped by a Professional Engineer licensed to practice in Ontario.

3. Sanitary Sewer Design Sheet, this can be included in the detailed design drawings or design brief/functional servicing report.

4. MECP Form SS1, as applicable:
    a. Part 2 - Description of alteration of components of the municipal sewage collection system
    b. Part 3 - Verification by Licensed Engineering Practitioner or Technical Representative

5. MECP Form SS2, as applicable:
    a. Part 2 - Description of separate sewer/nominally separate sewer/forcemain alteration
    b. Part 3 - Verification by Licensed Engineering Practitioner or Technical Representative

6. MECP Form CS1, as applicable:
    a. Part 2 - Description of combined sewer/partially separated sewer/combined sewage storage tanks and structures alteration
    b. Part 3 - Verification by Licensed Engineering Practitioner or Technical Representative

7. MECP Form A1, as applicable:
    a. Part 2 - Description of alteration for equipment discharging emissions to the air
    b. Part 3 - Verification by Licensed Engineering Practitioner or Technical Representative

All documents submitted shall be designed in conformance with the most recent version of *MECP Design Criteria for Sanitary Sewers, Storm Sewers and Forcemains for Alterations Authorized under Environmental Compliance Approval* and this Manual.

1.1.3. Street Naming

Council approved street names shall be included in the registered plan of subdivision, supporting studies, and all civil drawings.

1.1.4. Studies and Reports

Specific developments may require the completion of special studies and reports prior to Amherstburg granting approval for the development. Special studies and reports may also be a requirement of the approving authorities such as the County of Essex, Province or a Conservation Authority.

The costs of these studies shall be borne by the Developer.

Refer to Amherstburg's Official Plan (latest version available on Amherstburg website) for a list of supporting studies, information, and materials which may be required as a result of a development application.

A partial list of reports and studies required to be submitted includes but is not limited to:

- Stormwater Management Report
- Functional Servicing Report
- Wastewater Servicing Assessment
- Traffic Impact Assessment
- Geotechnical Report

The specific reports and studies required to be completed will be confirmed during the pre-submission review for the development proposal.

Certain proposed works to be undertaken by Developers may also be subject to the requirements of the Environmental Assessment Act. The Developer shall contact the MECP for further details.

1.1.5. Subdivision Agreements

All Developments must be designed and constructed in accordance with the requirements of this Manual and the corresponding Subdivision Agreement.

The Subdivision Agreement will set out specific requirements for each Development. In case of conflict the Subdivision Agreement will supersede the requirements of this Manual.

No work can proceed in the Development until the agreement is executed by both parties and all financial securities and insurance are provided.

1.1.6. Consulting Engineer

All Developers shall retain a Consulting Engineer who shall design all services and provide full- time, on-site inspection during the installation of the services.

The Consulting Engineer shall be so designated by the Association of Professional Engineers of Ontario and have a minimum of five years of land development experience. All reports, drawings and specifications shall be signed, sealed and dated by a Professional Engineer licensed in the Province of Ontario and employed by the Consulting Engineering firm or personally designated as a Consulting Engineer.

The Consulting Engineer shall be responsible to carry out the design and inspection of all services including:

- the preparation of design drawings, 3D CAD linework and 3D surfaces when applicable;
- the preparation of specifications and contract documents;
- the preparation of studies and reports;
- assisting in obtaining all necessary approvals;
- providing full-time, on-site inspection during service installation;
- the preparation of field records;
- chairing and preparing minutes of pre-construction meetings and regular job meetings;
- the co-ordination of the installation of other utilities (gas, telephone, cable T.V., hydro and Canada Post Services);
- the preparation of record drawings;
- the preparation of private drain connection (PDC) sheets; and
- attending at the final inspection meeting

1.1.7. Allocation and Phasing

To ensure that the proper allocation and phasing of municipal services proceeds in a fiscally sustainable and cost-effective manner, all development proposals will be accompanied by a Wastewater Servicing Review conducted by the proponent in consultation with Amherstburg.

New proposals shall not be granted development approvals unless adequate uncommitted reserve water and sewage treatment and conveyance capacity is demonstrated to be available to be allocated to accommodate the development of the site.

Sewage allocation for draft approved developments shall be limited to three (3) years in order to ensure reserve capacity is efficiently and effectively utilized. Amherstburg reserves the right to reallocate the reserved sewage capacity if the draft plan approval for the development has expired.

Amherstburg acknowledges that Developments may proceed in phases. Prior to the commencement of construction, the Developer shall submit a phasing plan for municipal approval. Amherstburg's approval of the phasing plan will be based on:

- fire fighting protection (All dead-end streets shall have turn-arounds and shall meet the requirements of the Ontario Building Code. Temporary dead-ends shall not exceed 250m in length measured to the end of the cul-de-sac unless otherwise approved);
- the extension of trunk facilities to adjacent Developments in a timely manner;
- minimizing the municipal maintenance costs, such as snow plowing;
- completing the municipal road network (minimizing areas with only one access point)
- proper termination of servicing between phases

All approved supporting studies and reports must recognize the phasing of the development and provide timelines/milestones for construction of critical infrastructure to be constructed i.e. stormwater facilities, pump station upgrades, etc.

The phasing will be implemented according to the Subdivision Agreement. Any construction drawings submitted must be in accordance with the approved Agreement.

1.1.8. Specifications and Contract Documents

All specifications and contract documents shall be prepared in accordance with the "Guidelines, Professional Engineers Providing Land Development/ Redevelopment Engineering Services, 1994" (Refer to Appendix E).

Specifications and contract documents shall be prepared on 8½” x 11” paper and neatly bound with a cover clearly describing the particulars of the Development. The first sheet shall include the date, name and telephone number of the Consulting Engineering firm that prepared the documents.

The specifications and contract documents shall include:

- Information to Tenderers;
- Form of Tender;
- Form of Agreement;
- Special provisions;
- Technical specifications;
- General conditions.

The specifications and contract documents shall refer to the Ontario Provincial Standard Specifications wherever applicable, except as amended or extended by Amherstburg's requirements. The final versions of the specifications and awarded form of tender must be submitted to Amherstburg for file.

1.1.9. Insurance and Indemnification

Developers shall provide liability insurance to protect Amherstburg. Developers shall ensure that their Consulting Engineer, sub-consultants, and general contractors also carry liability insurance.

The liability insurance shall:

- be provided in a form satisfactory to Amherstburg;
- for a minimum amount of $2,000,000; and
- name Amherstburg as an additionally insured; and
- name Amherstburg's consultants as additionally insured; and
- shall not be terminated until Amherstburg has accepted all of the required works.
- renewed annual (or upon expiry) to ensure insurance is active throughout the duration of the development plus two (2) years after acceptance of the last pieces of infrastructure installed.

Notwithstanding the limits of the insurance, the Developer shall indemnify Amherstburg against all or any claims or losses arising out of this Development.

It is recommended that the Developer's Consulting Engineer holds error and omissions insurance related to the design and construction of the development.

Amherstburg reserves the right to modify the above-noted requirements as needed to suit specific project needs.

1.1.10. Sureties

All final requirements related to securities will be outlined in the Development Agreement. Amherstburg shall accept the following forms of security:

- Certified cheque;
- Irrevocable letter of credit (self renewing and without burden of proof)
- Bonds

NOTE: All Letters of Credit are required to have automatic renewal clauses.

Amherstburg will not accept any other forms of security.

1.1.10.1. Performance

To ensure due and proper performance of the work, Developers are required to provide an irrevocable Letter of Credit, Subdivision Bond or Certified Check, each of which must be in a form satisfactory to Amherstburg, in an amount equal to 50% of the value of the works on site and 100% of works on Amherstburg's existing ROW.

The value of the securities to be provided shall be based upon the full amount of construction costs outlined within the awarded tender **including all taxes**. If there is no tender, the Consulting Engineer shall provide an estimate of the value of the work. Amherstburg reserves the right to verify the value of the work and amend the Consulting Engineer's estimate accordingly. The Consulting Engineer's estimate as amended by Amherstburg shall be used for establishing the amount of the securities.

1.1.10.2. Maintenance

Unless otherwise noted in the Subdivision Agreement, Applicants shall, upon acceptance of the services for maintenance by Council, provide a security in the amount of 25% of the value of the work completed and 100% of all delayed work including all taxes. The maintenance period shall be a minimum of one year after the acceptance of all services for maintenance.

In lieu of providing a new Letter of Credit, Certified Check, or Subdivision Bond for the maintenance period, the Developer or Developer's Consultant can provide a written request to Amherstburg to have the current securities remain in place and amount reduced.

1.1.10.3. Delayed Work

A written request may be made by the Developer or Amherstburg to delay some of the works that form part of the development (i.e. surface asphalt, sidewalks). If approved by Amherstburg, performance securities for 100% of the cost of the outstanding works will be required to be held in addition to the maintenance security.

1.1.11. Land Conveyances/ Easements

All lands that contain infrastructure to be assumed by Amherstburg shall be conveyed to Amherstburg by the Developer. Easements will not be accepted in this instance.

Developers shall provide any easements to Amherstburg as Amherstburg deems necessary. The Developer shall retain the services of an Ontario Land Surveyor to prepare all reference plans.

No permanent structures including, but not limited to, trees, fences or shrubs (but excluding driveways) shall be placed on the municipal right-of-way, municipally-owned properties or easements except for fences on side and rear lot lines. Amherstburg will

not be responsible to restore any permanent structure located within the municipal right-of-way or easements, except for driveway approaches. Any trees, shrubs or landscaping structures will not be restored in the event of infrastructure related works completed in the municipal ROW.

Developers shall submit to Amherstburg a copy of all signed purchase/ sale agreements for the lots which clearly states the conditions being encumbered on the easements on the purchased lot and Amherstburg's unrestricted rights to enter upon the easements to maintain, repair, or replace municipal services.

1.1.12. Oversizing

In order to ensure that development in Amherstburg proceeds in an orderly and cost-effective manner, Developers may be required to oversize municipal services to accommodate future Developments. Oversizing includes, but is not limited to, larger pipe diameter and increased depths, increased road widths and sidewalk widths, power distribution and other services.

The Developer's Consulting Engineer will provide an estimate of the oversizing costs. Amherstburg will establish the cost sharing method to be used in attributing oversizing for road and road-related works.

Amherstburg will use its best efforts in recovering these costs on behalf of the Developer. However, Amherstburg does not guarantee that Developers will be repaid for any costs incurred.

1.1.13. Off-Site Improvement Costs

Developers may be required to complete off-site works in order to facilitate development. Typical off-site works include trunk sewers to a suitable outlet, water main connections to a suitable feeder, road widening, intersection improvements, traffic signal installation and downstream drainage works.

The Developer's Consulting Engineer will provide an estimate of the off-site costs. Amherstburg will establish the cost sharing method to be used in attributing off-site costs for road and road-related works.

Amherstburg will use its best efforts in recovering these costs on behalf of the Developer. However, Amherstburg does not guarantee that Developers will be repaid for any costs incurred.

Not all off-site improvements will result in cost sharing with Amherstburg. Consultation with Amherstburg is required to identify any cost-sharing opportunities.

1.1.14. Pre-Construction Meeting

No later than seven days before construction is to commence, the Consulting Engineer shall call and chair a pre-construction meeting. The Consulting Engineer, general contractor and municipal representatives must attend.

It is also desirable to have the Developer, the Consulting Engineer's site inspector, and representatives from the various utility companies in attendance. The topics of discussion for the meeting shall include, but not be limited to:

- the status of contract documents
- the submission of insurance certificates, securities and Work Place Safety Insurance Board clearance
- Ministry of Labour notification
- supervisory staff
- emergency telephone numbers and home telephone numbers
- construction access routes
- schedules
- noise and dust control
- notification for municipal inspections
- suppliers and subcontractors
- specific project items
- pre-construction survey/ photos
- traffic control/ detouring and
- schedule of site meetings

The Consulting Engineer will provide minutes of meetings within one week from the meeting date.

1.1.15. Public/Agency Notification

Prior to the start of construction, the Consulting Engineer shall notify all public agencies and emergency response agencies of the impending start date and completion date of the project. As well, the Consulting Engineer shall notify all abutting property owners of the impending construction.

Copies of the notification shall be submitted to Amherstburg for review. The notification shall include:

- a brief description of the project
- key map of project location
- the construction start date
- the scheduled completion date
- any temporary road closures

- contact people from the Contractor and Consulting Engineer, including their phone numbers

The following is a partial list of agencies that may require notification:

- Ambulance Service
- Canadian Coast Guard (re: Navigable Waters)
- County Engineer (re: County roads)
- Essex Region Conservation Authority
- Fire Department
- Ministry of Labour
- Police Department
- School Boards (Transportation Services)
- Sewage Treatment Plant Operators
- Water Treatment Plant Operators

1.2. DURING AND IMMEDIATELY AFTER CONSTRUCTION

All persons present on any construction site in Amherstburg shall conduct themselves in an appropriate and professional manner.

The Contractor and all workers shall undertake all works in compliance with the “Occupational Health and Safety Act and Regulations for Construction Projects”, Ontario Regulation 213/91 as amended.

1.2.1. Mandatory On-Site Meetings

The Consulting Engineer shall chair and prepare minutes of construction site job meetings.

Meetings are to be held at two-week intervals unless Amherstburg agrees that a longer interval is acceptable. Construction milestones that require mandatory site meetings include:

- Prior to tie-ins to existing municipal infrastructure, at Amherstburg’s discretion
- Pre-Road Cut
- Pre-Curb
- Pre-Base Asphalt

The Consulting Engineer's Project Manager/ Project Engineer and the Site Inspector along with the Contractor's Project Manager/Job Superintendent (or Foreman) and Town representative shall attend the job meetings.

Minutes shall be distributed within one week of the meeting date.

1.2.2. Consultant Inspection and Quality Assurance Testing Services

The Consulting Engineer shall provide full-time on-site inspection services during the construction activity. The inspector's skills shall be suitable for the inspection tasks to be undertaken. Amherstburg reserves the right to request a change to the Consulting Engineer's inspector if Amherstburg determines that the inspector is not representing the Amherstburg's interests appropriately.

The Consulting Engineer's site inspector shall ensure that the work is constructed in accordance with the intent of the contract documents and shall keep adequate records of the work.

As a minimum, the site inspector shall prepare/ conduct:

- a diary indicating daily progress of work, labour and equipment on site;
- measurements of pay items;
- discussions with general public and agency representatives;
- a log of any accidents; and
- record drawing details (including grades, sizes, materials, inverts, etc. of all services)

Daily progress reports produced by the site inspector shall be summarized into a weekly report of progress by the Developer's Consultant and submitted to the Amherstburg weekly.

The Consulting Engineer shall arrange for quality assurance testing by an independent testing firm that specializes geotechnical engineering and construction material testing. Tests shall include:

- geotechnical testing prior to construction to confirm required road base and shoring requirements (bore holes)
- granular material gradation analysis on backfill and road base materials;
- engineered fill assessment;
- asphalt extraction and gradation analysis;
- compaction tests on granular & asphalt;
- road cut sub-grade inspection;
- concrete quality assurance testing
    - slump
    - air content
    - compressive strength
    - 7- and 28-day samples;
- sewer deflection test for storm and sanitary sewers (one of the following)
    - *mandrel testing per OPSS.MUNI 438
    - laser profiling per OPSS.MUNI 434

- sewer leakage tests sanitary sewers and manholes (one of the following)
    - low pressure air testing per OSS.MUNI 410, ASTM F1417, or ASTM C924M
    - water (hydrostatic) testing per OPSS.MUNI 410 or ASTM C969
    - vacuum testing per ASTM C1244/C1244M
- for concrete storm sewer greater than 600 mm (24”), visual inspection and individual joint testing is acceptable as per OPSS.MUNI 433
- sewer camera inspections (CCTV) for storm and sanitary sewers, including services as per OPSS.MUNI 409 (at the time of acceptance and at the time of assumption of the infrastructure)
- water main pressure tests, leak tests, disinfecting tests (see Section 5.5.8.); and
- other tests as described in the contract documents.

One copy of all test certificates shall be provided to Amherstburg electronically without unreasonable delay.

*it should be noted that if the mandrel testing is completed by the Contractor and certified by the Consulting Engineer, the Mandrel Testing Form (See Appendix D) shall be executed by the Consulting Engineer and submitted to Amherstburg for file.

1.2.3. Municipal Inspection

Amherstburg will carry out its own independent inspection as deemed necessary.

As a minimum, Amherstburg will inspect the subgrade excavation, granular base prior to placing curbs, granular base prior to asphalt paving, and testing of watermain and sewers. Representation from Amherstburg’s Water Department may be on site during watermain installation but **must** be on-site to witness and inspect watermain tie-ins & water service connection installation.

The Consulting Engineer will give Amherstburg 72 hour’s notice prior to these inspections. Should sufficient notice not be given, and the Contractor proceeds with the work, the services will not be accepted without further testing, which may include total or partial removal of pavement or curbs, etc. All this additional testing will be at the Contractor's expense. It is therefore imperative that the Contractor's schedule be made available to Amherstburg at the job meetings, and Amherstburg be promptly advised of any changes to this schedule.

1.2.4. Acceptance of Services

Once all of the required municipal services are completed, the Developer’s Consultant will notify Amherstburg that the services are ready to be accepted. This is a two-step process as outlined below:

1. Once all of the required municipal services are installed and all deficiencies are resolved, the Consulting Engineer is to arrange for a field inspection by Amherstburg, the Contractor, and the Consulting Engineer. If the works are deemed acceptable, the Consulting Engineer will advise the Engineering and Public Works Department by letter that Amherstburg should "accept the services" and that the maintenance period should begin.

2. A report is taken to Council recommending that Amherstburg accept the services. The recommendation to accept the services must be supported by Council prior to commencing the maintenance period and reducing securities.

1.2.4.1. Delay of Surface Asphalt and Sidewalks

The Developer or Amherstburg may request that not all services be installed prior to requesting "acceptance of services" by Amherstburg.

Placement of surface asphalt and sidewalk is normally delayed up to a maximum of five years to minimize damage during house construction. Should the surface asphalt and sidewalk be delayed, it shall be placed no later than five (5) years from the commencement date of the first maintenance period for base asphalt, curbs, and underground infrastructure and no sooner than 75% of all foundations have been dug and poured. The acceptance and assumption of this service will be based on the completion of the surface asphalt and the expiration of the maintenance period.

Base asphalt and curb will not be assumed by Amherstburg until the surface asphalt is placed and accepted by Amherstburg.

In this case only, there will be more than one acceptance date of the service and more than one assumption date of that portion of the Development.

1.2.5. Maintenance Period

The maintenance period shall be minimum one year from the date recommended in the Council report.

The maintenance security and liability insurance must remain in force for the duration of the maintenance period.

During the maintenance period, it will be the Developer's sole responsibility to maintain all the services, including but not limited to, maintaining the general condition of the vacant lots, infrastructure, and road rights-of-way as established in the Subdivision Agreement and approved Operation and Maintenance Manual for the development’s infrastructure.

The Developer is obligated to perform (or pay for) all maintenance and repairs to the services (should Amherstburg undertake this work) during the maintenance period

including street cleaning of mud and debris, sewer flushing if necessary, weed control on all developed or undeveloped lands.

Amherstburg will undertake all required snow plowing on the road right-of-way (roads and sidewalk). This act does not constitute the assumption of sidewalks or roads.

1.2.6. Clean Up

The Developer shall maintain the construction site in a neat and tidy manner (also during the maintenance period). Dust shall be controlled by wetting or establishing vegetative ground cover. Debris blown off the site and litter shall be cleaned up on a daily basis. All mud and dirt tracked off-site shall be cleaned frequently and at least once a day.

All vacant lots owned by the Developer, shall be maintained at the Developer's expense as required in the most current version of Amherstburg's Yard Maintenance By-law and all adopted amendments. Periodic maintenance will be required to remove debris, to eliminate standing water, and to cut weeds. All waste materials must be properly disposed to eliminate the risk of injury and to maintain a healthy environment to all surroundings.

The decision of Amherstburg regarding clean up shall be considered final. Should the Developer not clean-up after 48 hours, Amherstburg will arrange to have the work done by others, or its own forces, and will invoice the Developer for its costs.

1.2.7. Record Drawings

Record drawings shall be prepared by the Consulting Engineer showing the as-constructed world coordinated location, invert elevation, size, and material of all services. Wherever possible, underground utilities located relative to property lines shall also be located relative to surface features. Record drawings shall be coordinated using the Universal Traverse Mercator (UTM) coordinate system. The record drawings shall be dated and noted 'As Built'. The record drawings shall be in metric units.

One drawing set in each AutoCAD and PDF format shall be provided in electronic format.

One hard copy of the drawing set shall be delivered to Amherstburg's Public Works Yard.

Record Drawings must be submitted within 60 days from the date Engineering and Infrastructure Services has "accepted the services". Securities will not be reduced until the Record Drawings have been submitted. **Infrastructure services cannot support the issuance of model or full building permits without record drawings and PDC sheets submitted.**

1.2.8. Lot Servicing Sheets/ Registered Lot Creation Drawings

The Consulting Engineer shall provide copies of lot servicing sheets (PDC sheets) and registered lot creation drawings (i.e. M-plans, R-plans).

Hard copy and electronic (AutoCAD and PDF) copies of each (lot servicing and registered lot creation drawings), shall be submitted to the Chief Building Official and the Development Engineering Coordinator. The lot servicing sheets shall show final lot grades, sidewalk widths, setbacks from property line, easements, noise attenuation walls, and the location, elevation, material and size of lot services (storm, sanitary, water).

The municipal address shall also be included on all PDC sheets (contact Amherstburg's Planning Department for approved municipal addressing).

1.2.9. Building Permit Issuance

In accordance with the requirements of the Ontario Building Code, construction cannot commence on any buildings until a building permit is issued. This is Provincial legislation administered by Amherstburg. Amherstburg does not have the authority to waive this Provincial legislative requirement. Building permits will not be issued until such time as Amherstburg "accepted the services" as outlined in Subsection 1.2.4.

1.2.9.1. Model Home Permits

The Chief Building Official may issue building permits in advance of the completion of all required works for the greater of either four dwellings or ten percent (rounded upward) of the total dwelling units in any particular phase of a Development provided:

- the base coat of asphalt has been installed, to the satisfaction of the Manager of Engineering, in the road allowance in front of and abutting the lot for which the building permit is being sought; and
- it is determined from a review of the approved plans that there is no conflict between the activity that would result from the building permit being issued and the installation of various utilities in the utility corridor; and
- a surveyor's certificate has been received by Amherstburg pertaining to the lot for which the building permit is being sought; and
- it is clearly noted on the building permit that occupancy of the dwelling unit will not be permitted until the Developer has completed all required works, except the top coat of asphalt to the satisfaction of the Infrastructure Services Department and that all Agreements to Purchase affecting the subject property will provide a notice regarding the restriction pertaining to occupancy. Such notice will be required on all Agreements to Purchase until such time as the required works,

excluding the top coat of asphalt, are completed to the satisfaction of the Infrastructure Services Department; and
- a letter is received from the Developer's Consulting Engineer confirming support for the model home building permit issuance.

The dwelling unit may connect to water and sewer services.

1.2.9.2. Full Building Permits

In order to issue building permits other than for model homes, Amherstburg's Chief Building Official must have a complete set of documents and be assured that the buildings have full services including base asphalt, fire fighting access, potable water, heat, and energized power. Streetlights must be operational within 60 days of building permit issuance.

Conditional permits may be released subject to approval by the Chief Building Official.

Developers are cautioned that the Chief Building Official will not be in a position to advise that building permits are available until:

- Record drawings have been submitted;
- lot servicing/ PDC sheets have been submitted;
- registered lot creation plans have been submitted; and
- Engineering and Public Works has "accepted the services".

If record drawings have not been submitted within 60 days from the date which Engineering & Public Works has "accepted the services", the Chief Building Official may not continue to issue building permits.

1.2.10. Assumption of Services

Upon expiration of the maintenance period, the Consulting Engineer is to arrange for a field inspection by Amherstburg, the Contractor and the Consulting Engineer.

- All storm and sanitary sewers and storm and sanitary sewer private drain connections shall be flushed clean and video inspected. All repairs to be completed prior to the field inspection.
- Catch basins shall be cleaned and all settlements repaired prior to the municipal inspection
- All roadways cleaned of mud and debris
- All stormwater management facilities and appurtenances flushed, cleaned, and maintained as per the approved Operation and Maintenance Manual. Inspection logs to be provided to Amherstburg.

Provided there are no outstanding deficiencies and all Subdivision Agreement requirements have been satisfied, including payment of all accounts and the receipt of a

statutory declaration that all accounts have been paid, the Consulting Engineer will submit a report to the Engineering Department requesting that Amherstburg "assume ownership of the infrastructure".

A report to assume the infrastructure is required to be presented to Council and passed prior to release of all securities and transfer of infrastructure ownership outlined in the Council report to Amherstburg.

2.0 CAPITAL INFRASTRUCTURE PROJECTS

Capital Infrastructure Projects are presented each year by Amherstburg in order to replace, improve, or construct new municipal infrastructure assets. Projects are posted on Bids and Tenders to provide equal opportunity for all qualified applicants/consultants/contractors to bid on the work. The design and construction of infrastructure capital projects are typically procured separately.

All capital projects posted on Bids and Tenders by Amherstburg are subject to Amherstburg's procurement policy.

2.1 PRIOR TO CONSTUCTION

All Consulting Engineers and Contractors award contracts by Amherstburg shall fulfill all requirements outlined in the tender documents and executed service agreement to the satisfaction of Amherstburg.

2.1.1. Consulting Engineer

Refer to Section 1.1.6.

2.1.1.1. Design Drawings

Refer to Section 1.1.2.2.

2.1.1.2. Supporting Studies and Reports

Refer to Section 1.1.4.

2.1.2. Specifications and Contract Documents

All specifications and contract documents shall be prepared in accordance with the "Guidelines, Engineering Services to Municipalities, 1986" (Refer to Appendix E).

Specifications and contract documents shall be prepared on 8½" x 11" paper and neatly bound with a cover clearly describing the particulars of the Development. The first sheet shall include the date, name and telephone number of the Consulting Engineering firm that prepared the documents.

2.1.3. AODA Compliance for Documentation

Any documentation prepared by the Consulting Engineer for Amherstburg that is being published to a public platform such as Amherstburg's Website, Bids and Tenders, etc. shall be remediated by the Consulting Engineer to comply with AODA standards.

2.1.4. Insurance and Indemnification

The Contractor must provide Amherstburg with a Certificate of Insurance in accordance with the tender documents.

The Town will maintain property insurance on all property owned by the municipality, inclusive of a boiler and machinery endorsement.

2.1.5. Performance Bond

The Contractor must provide Amherstburg with a Performance Bond in accordance with the tender documents.

Contracts will not be executed without the provision of said bonds and no work shall commence until said bonds have been provided and accepted by Amherstburg.

2.1.6. Pre-Construction Meeting

Refer to Section 1.1.14.

2.1.7. Public/Agency Notification

Prior to the start of construction, the Consulting Engineer shall notify all public agencies and emergency response agencies of the impending start date and completion date of the project.

The following is a partial list of agencies that may require notification:

- Ambulance Service
- Canadian Coast Guard (re: Navigable Waters)
- County Engineer (re: County roads)
- Essex Region Conservation Authority
- Fire Department
- Ministry of Labour
- Police Department
- School Boards (Transportation Services)
- Sewage Treatment Plant Operators
- Water Treatment Plant Operators

Amherstburg shall notify all abutting property owners of the impending construction. The notification shall include:

- a brief description of the project
- key map of project location
- the construction start date
- the scheduled completion date
- any temporary road closures
- contact people from the Contractor and Consulting Engineer, including their phone numbers

2.2 DURING AND IMMEDIATELY AFTER CONSTRUCTION

All Consulting Engineers and Contractors award contracts by Amherstburg shall fulfill all requirements outlined in the tender documents and executed service agreement to the satisfaction of Amherstburg.

2.2.1. Mandatory On-Site Meetings

Refer to Section 1.2.1.

2.2.2. Consultant Inspection and Quality Assurance Testing Services

Refer to Section 1.2.2.

2.2.3. Municipal Inspection

Refer to Section 1.2.3.

2.2.4. Contractor Conduct

All Contractors & Subcontractors completing work on behalf of Amherstburg shall conduct themselves in a professional manner and are expected to comply with all Amherstburg Code of Conduct and Workplace Violence, Harassment, and Discrimination Prevention Policies.

2.2.5. Construction Site Cleanup

The Contractor is responsible to ensure the construction site is tidy and safe from ratepayers who may require ingress and egress from the site during the construction period. At a minimum, municipal rights-of-ways shall be tidied and roadways cleaned at the end of each night. No littering will be tolerated during the construction period.

2.2.6. Substantial Completion & Start of Maintenance Period

The payment certifier for the project shall issue a certificate of substantial performance as per the process outlined in the Construction Act.

The start date of the maintenance period will be communicated to the Contractor by the payment certifier or Amherstburg. Specific requirements, holdbacks, and timelines for the maintenance period shall be performed as per the executed service agreement to the satisfaction of Amherstburg.

2.2.7. Record Drawings

Refer to Section 1.2.7.

2.2.8. Lot Servicing (PDC) Sheets

Refer to Section 1.2.8.

3.0 SITE PLAN CONTROL

Site plan control is a planning tool that a municipality uses to evaluate certain site elements, such as walkways, parking areas, landscaping or new structures on a parcel of land where development is proposed.

3.1 PRIOR TO CONSTRUCTION

A pre-submission application is required to be submitted to Amherstburg Planning Department prior to submitting for site plan control. All engineering requirements (and other internal department requirements) shall be noted during pre-submission.

3.1.1. SUBMISSION REQUIREMENTS

All site plan control submissions must be sent to the Amherstburg Planning Department. Any site plan material and/or drawings submitted to Infrastructure Services directly will not be reviewed and comments will not be provided.

3.1.1.1. Studies & Reports

Specific developments may require the completion of special studies and reports prior to Amherstburg granting approval for the Development. Special studies and reports may also be a requirement of the approving authorities such as the County of Essex, Province or a Conservation Authority.

The costs of these studies shall be borne by the Developer.

Refer to Amherstburg Official Plan (latest version available on Amherstburg website) for a list of supporting studies, information, and materials which may be required as a result of a development application.

A partial list of reports and studies that may be required by Infrastructure Services to be submitted includes, but is not limited to:

- Stormwater Management Report
- Functional Servicing Report
- Wastewater Servicing Assessment
- Traffic Impact Assessment

The specific reports and studies required to be completed will be confirmed at the pre-submission meeting for the development proposal.

Certain proposed works to be undertaken by Developers may also be subject to the requirements of the Environmental Assessment Act. Contact the MECP for further details.

3.1.1.2. Design Drawings

Refer to section 1.1.2.2. for further details.

A typical site plan submission includes the following civil drawings (stamped and sealed by a professional Engineer):

- General Site Plan Drawing
- Paving and Grading
- Site Servicing
- Removals

3.1.2. SECURITIES

All requirements related to securities will be outlined in the Development Agreement.

At a minimum, to ensure due and proper performance of the work, Developers are required to provide an irrevocable Letter of Credit (self-renewing) or Certified Check, each of which must be in a form satisfactory to Amherstburg, in an amount equal to 50% of the value of the civil works on site and 100% of works on Amherstburg's ROW (unless otherwise stated in the development agreement).

The value of the securities to be provided shall be based upon the full amount of civil construction costs **including all taxes**. If there is no tender, the Consulting Engineer shall provide an estimate of the value of the work.

Amherstburg reserves the right to verify the value of the work and amend the Consulting Engineer's estimate accordingly. The Consulting Engineer's estimate as amended by Amherstburg shall be used for establishing the amount of the securities.

Securities will not be reduced/released until such time that:

- Construction of all civil works is completed
- Record drawings have been submitted and accepted by Amherstburg (where applicable)
- the final walkthrough has occurred with Building, Infrastructure Services and Planning Departments (combined or separate)
- zero deficiencies are noted as a result of the final walkthrough(s)
- A stamped letter of conformance is issued by the consulting firm responsible for the design of the work and accepted by Amherstburg
- A letter of conformance from the manufacturer of underground storage chambers or pump station are submitted and accepted by Amherstburg (where applicable)

Once Amherstburg has inspected and approved the construction of the onsite and off-site works, the Developer will be required to provide security for a ONE (1) year

maintenance period in the amount of 15% of the cost of on-site and off-site improvements.

3.2 DURING AND IMMEDIATELY AFTER CONSTRUCTION

Construction of the works outlined in the site plan agreement are expected to commence promptly following the execution of the agreement and payment of securities.

3.2.1. INSPECTION AND CERTIFICATION OF WORKS

Although full-time inspection is not required during construction of site plan developments, it is recommended by Amherstburg that the Developer's Consulting Engineer provide full time inspection services for the civil works required to be constructed.

The Consulting Engineer is responsible to provide Amherstburg with a letter of conformance once the project is completed identifying that all the works have been constructed according to the approved plans. This letter will need to be sealed and signed by a Professional Engineer licensed to practise in Ontario.

Amherstburg will carry out its own independent inspection as deemed necessary.

A final walkthrough with the Consulting Engineer and Amherstburg will be required to be completed to ensure any deficiencies in the construction have been resolved.

3.2.2. RECORD DRAWINGS

Record drawings may be requested at the discretion of Amherstburg if significant changes to the approved design occurred during the construction process. All changes noted in the record drawings must be pre-approved by Amherstburg.

The record drawings shall be prepared by the Consulting Engineer showing the as-constructed, world coordinated location, invert elevation, size, and material of all services. Wherever possible, underground utilities located relative to property lines shall also be located relative to surface features. Record drawings shall be coordinated using the Universal Traverse Mercator (UTM) coordinate system. The record drawings shall be dated and noted 'As Built'.

One drawing set in PDF format shall be provided to Amherstburg.

4.0 RESIDENTIAL INTENSIFICATION

This section refers to opportunities for residential intensification on a single lot. This can include residential developments under 10 units that are not subject to site plan control or the establishment of secondary dwelling units within a single-detached, semi-detached, or rowhouse dwelling. Please refer to Amherstburg's Zoning By-law for the definition of a Secondary Dwelling Unit.

4.1 MUNICIPAL SERVICING

Multiple municipal services will not be permitted to be used on single properties proceeding with residential intensification. Any redundant services must be consolidated into a single sanitary, storm, or water service to the subject lands. A public works permit shall be obtained by the property owner prior to proceeding with any municipal servicing changes to the site due to upsizing/abandonment/relocation of municipal services.

4.1.1. Sanitary Servicing

One (1) single sanitary service will be permitted per residential/agricultural property. Requests for multiple sanitary services for a residential property will be denied. The size of the sanitary service shall comply with the requirements in the Development Manual unless approved otherwise by the Manager of Environmental Services in writing. Where a residential/agricultural property is within the Town of Amherstburg's sanitary servicing boundary but is not serviced with municipal sanitary, a security deposit shall be submitted to Amherstburg as per the Town's Fee by-law by the Property Owner, and all work associated with the installation of the sanitary connection shall be completed by the Property Owner's contractor.

4.1.2. Storm Servicing

One (1) single storm service will be permitted per residential/agricultural property subject to residential intensification. The size of the storm connection shall be sufficient to convey all stormwater runoff collected on the site to the legal, sufficient stormwater outlet of the site, but no smaller than 150mm diameter. Any request for a storm connection larger than 150mm diameter for a residential/agricultural property not subject to plan of subdivision must be reviewed and approved by Amherstburg in writing prior to installation.

It is the responsibility of the property owner to ensure all stormwater runoff is retained on the subject parcel and conveyed appropriately to the outlet. Additional measures for consideration to achieve this requirement may include the installation of small catch basins on French drain systems on the private lands.

An overall lot grading plan may be requested to be submitted with the building permit for this category of development at the discretion of Amherstburg.

4.1.3. Potable Water Servicing

One (1) single water service will be permitted per residential/agricultural property. Requests for multiple water services for a residential property will be denied. The size of the water service shall be proposed by the home builder and approved by the Manager of Environmental Services. Where a residential/agricultural property is within the Town of Amherstburg's water servicing boundary but is not serviced with municipal water, charges will be applied on flat rate per the Town's Fee by-law to install a water service.

4.1.3.1. Potable Water Service Metering

A water metering device is required for all properties connected to the existing municipal water system. The Owner must obtain the water meter from the Town of Amherstburg's Environmental Services department. Any water meter not obtained from the Town of Amherstburg is not permitted. Where a water meter is not in place prior to occupancy, charges will be applied on the flat rate per the Town's Fee By-law. The size and type of the water meter required will correspond with the size of water service installed to service the property and the conditions outlined in this manual.

Dwelling Unit with Secondary Dwelling Unit Permitted in the Basement

Where a dwelling unit exists within a single detached dwelling, semi-detached unit, or rowhouse/ street rowhouse unit and a secondary dwelling unit is permitted within the basement of the dwelling, a water meter may be placed within the dwelling. In circumstances where the single detached dwelling, semi-detached unit, or rowhouse/street rowhouse, is located more than 30m from the front property line of the subject property, the use of a water meter pit to collect municipal water consumption information for billing purposes shall be required.

Dwelling Unit with Secondary Dwelling Unit Permitted in an Accessory Building

Where a dwelling unit exists within a single detached dwelling, semi-detached unit, or rowhouse/ street rowhouse unit and a secondary dwelling unit is permitted in an accessory building on the subject property, municipal potable water shall be metered through a water meter pit on the front property line of the subject property. The Building Department is responsible to notify the Environmental Services Department when a building permit application of this nature has been submitted. If the subject property was previously a single detached dwelling, semi-detached unit, or rowhouse/ street rowhouse unit with a single dwelling unit and has an existing water meter within the former single dwelling unit, the Owner of the subject property shall be required to coordinate with the Supervisor of Environmental Services to install a water meter pit on

the subject property, and decommission and/or remove the existing water meter within the home once the water meter pit has been installed.

4.2 DRIVEWAYS

Surface type for all parking areas and access areas are subject to the Town's Zoning bylaw. A dust control plan may be required to be submitted to Amherstburg for approval and adhered to for the lifetime of the site depending on the surface type selected. Amherstburg's Driveway Installation and Alteration Policy remains applicable for the subject lands.

Please see Section 5.6.1.1. for driveway requirements.

5.0 DESIGN CRITERIA

The design criteria noted in this manual is applicable for all civil projects designed and constructed within Amherstburg.

5.1 ROADS

It is a key objective of Amherstburg to encourage the application of sustainable design techniques and planning considerations for the road network (i.e. traffic calming, environmental considerations, bikeways, multi-use pathways, etc.). Amherstburg and the Applicant shall co-operate to develop more creative subdivision plans through the road network design process.

5.1.1. Minimum Design Criteria

In addition to the below noted standards, the Consulting Engineer shall coordinator with Amherstburg related to any additional requirements for the road network noted in the Official Plan or Transportation Masterplan.

Table 4 - Minimum Roadway Design Standards

	Arterial	Collector	Local	Industrial
Function	to facilitate the inter-municipal and through municipal movement of high volumes of traffic to and from major traffic generating sectors within Amherstburg	to collect and carry medium volumes of local traffic to arterial roads or distribute traffic to the local roads as well as provide access to abutting properties	to act as local distributors of traffic to the residential areas, as well as to provide access to abutting properties	to provide direct access to adjacent industrial and commercial properties and distribute traffic from industrial and commercial properties to higher standard roadways
Design Year AADT	more than 10,000	1,000-5,000	1,000 or less	1,000 or less
Lanes Through	2 or 4	2	2	2
Roadway Width ep to ep (m)	10 or 14	9.6	6.6	10
Right-of-way width (m)	26 – 30[Note 4]	22 – 26[Note 5]	22	22

Road Use	through road	through road	through road or crescent	through road
Minimum C/L Curved Radius (m)	120 - 160	90 - 115	80	90
Maximum Super Elevation (m/m)	0.04	0.04		
Minimum Cul-de-sac Radius to edge of pavement (m)			12	15
Intersection Spacing c/l to c/l (m)	220 - 400	220	150	150
Minimum Median Width f/c to f/c (m)	4			
Minimum Stopping Sight Distance (m)	95			65
Maximum Vertical Grade (%)	8	8	8	6
Minimum Vertical Grade (%)	0.4	0.4	0.4	0.4

Notes:

1. Cul-de-sac radius measured at outside edge of pavement
2. Wherever possible, Sandwich Street/County Road 20 right-of-way width shall be 30 metres. Wherever possible, Alma Street, Simcoe Street, Lowes Sideroad, Meloche Road, Fryer Street, Fox Road and County Roads 9 and 10 shall be 26 metres.
3. All collectors designated as bus routes must have a minimum 22-metre right-of-way.

5.1.2. Access Conditions

This section details the restrictions and requirements for private access points (driveways) as well as design criteria related to roadway locations.

5.1.2.1. Arterial Road

Access to abutting properties is permitted subject to traffic and design conditions. The number of access points from abutting properties should be restricted in number. No residential access (driveways) will be permitted unless otherwise approved in writing by Amherstburg.

Every effort will be made to reduce the number of driveway entrances along Arterial Roads by ensuring that, wherever possible, mutual driveway entrances serving two or more lots or developments are provided or planned for through Site Plan Control.

Minimum acceptable intersection spacing under extreme circumstances on arterial roads is 220 metres between centrelines of collector streets. Wherever possible, a desirable spacing of 400 metres should be provided for a major collector to arterial.

5.1.2.2. Collector Road

Direct access is permitted to abutting properties subject to traffic and design conditions. Alternative access locations should be considered to avoid direct access on collector roads wherever possible.

Minimum acceptable intersection spacing under extreme circumstances on collector roads is 60 metres between centreline. Wherever possible, a minimum desirable spacing of 80 metres should be provided.

5.1.2.3. Local Road

Direct access is permitted to abutting residential properties. If cross intersections are not possible, offset intersections are acceptable on residential streets if the offset spacing is at least two residential lot depths (80m) or greater between centrelines. This will be reviewed on a case-by-case basis.

In the event that the adjacent street system has not been developed, interim access arrangements shall be provided through the construction of temporary cul-de-sac. The length of a temporary cul-de-sac shall not exceed 250m in length.

No residential road shall connect to an industrial area. A connection from a residential area to a commercial area is permitted.

5.1.2.4. Industrial Road

Direct access is permitted to industrial and commercial properties.

5.1.3. Traffic Features

This section details specific requirements and considerations for roadway features other than driving lanes.

5.1.3.1. Arterial Road

Arterials are roadways with traffic signals at major intersections. Pedestrian crosswalks may be prohibited subject to traffic conditions. Posted speeds are generally equal or greater than 50 kilometres per hour. The curb lanes may be used for parking depending on the traffic conditions and road widths in the area. Active transportation infrastructure such as bike lanes and/or multi-use pathways shall be required on all arterial roads. Sidewalks will be required on both sides of the road.

5.1.3.2. Collector Road

Collector streets are undivided roadways with traffic signals at major intersections when warranted. Pedestrian crosswalks are at grade. Parking may be permitted, except in bus zones, but may be restricted during peak hours depending on local traffic conditions. Active transportation infrastructure such as bike lanes and/or multi-use pathways are required on all Collector roads. Sidewalks will be required on both sides of the road.

5.1.3.3. Local Road

Undivided roadway with intersection controlled by signage. Parking may be permitted on the road as posted or identified in the local by-law. A sidewalk / multi-use trail will be required on one side of the road.

5.1.3.4. Industrial Road

Undivided roadway with intersections controlled by signage or signals where warranted. Parking will be permitted as posted.

5.1.4. Alignment Standards

Intersection angles of less than 75° are unacceptable. Intersections on the inside of curves are undesirable and should be eliminated wherever possible.

5.1.4.1. Arterial Road

Arterial roads may intersect with collector streets, other primary collector streets and arterial roads.

For sight triangle requirements, please refer to the appropriate Amherstburg's Planning documents.

The grade line of the minor intersecting road shall tie to the lane line of the arterial.

That is, the 2% cross-fall of the arterial will intersect the grade of the minor road such that the resulting vertical curve, (min. 30 metre curve), ends at the lane line of the

arterial. The maximum percent grade on the minor intersecting road, at the intersection, will be 4% and a minimum grade of 0.35%.

5.1.4.2. Collector Road

The road pattern should coincide with the layout shown under the appropriate approved design brief or area plan. This will assure logical collector street ties to adjacent subdivision areas and bus route continuity. In the event that the adjacent street system has not been developed, interim access arrangements shall be provided. The following criteria are to be incorporated in the subdivision layout of streets:

The length of collectors before feeding into arterials should not be excessive (maximum number of dwelling units being 1000).

Collectors may intersect with local roads, collectors, and arterial roads at acceptable minimum spacing according to the standards of roads that they are connecting to.

Offset intersections are acceptable on collectors if the offset is 80 metres or greater between centrelines.

For sight triangle requirements, please refer to the appropriate Amherstburg's Planning documents.

A collector road intersecting with a local road shall have minimum corner curb radii of 9 metres. Maximum approach grade of a lesser category street approaching a collector 4%.

A collector road intersecting with another collector road shall have minimum corner curb compound radius of 16 metres and 75 metres respectively to accommodate truck turning movements.

An arterial road intersecting with a collector road shall have a minimum corner curb compound radius of 18 metres and 95 metres respectively to accommodate truck turning movement. Maximum approach grade on the collector to an arterial intersection is 4%.

5.1.4.3. Local Road

The cumulative length of residential streets before feeding onto collectors should not be excessive. Length is to be based on the results of a Traffic Impact Study.

Residential streets may intersect with other residential streets and with collectors.

For sight triangle requirements, please refer to the appropriate Amherstburg's Planning documents.

A local road intersecting with another local road shall have a minimum comer curb radius of 9.0 metres.

5.1.4.4. Industrial Road

The following criteria are to be incorporated in the subdivision layout of industrial streets. In the event that the adjacent street system has not been developed, interim access arrangements shall be provided.

For sight triangle requirements, please refer to the appropriate Amherstburg's Planning documents.

Beam and post guarding (OPSD 902) are required along all lanes and streets parallel to and adjacent to arterials.

Service roads adjacent to arterial streets are to have a minimum separation of 36-metres between property lines where the service road intersects a street which ties to the arterial thoroughfare. A more acceptable alternate would be to tum the service road such that it runs parallel to the connecting street, until access is gained from an intersecting street.

An industrial road intersecting with another industrial road shall have a minimum curb compound radius of 16 metres and 75 metres respectively measured to the edge of pavement.

5.1.5. Private/Condominium Roads

In Condominium type development where Amherstburg will not assume the roadway and other services, the development standards shall be established in the Site Plan Agreement.

Pavement widths shall be as per Section 5.1.1. of this Manual.

5.1.6. Cul-de-sacs

It is the policy of Amherstburg to discourage the use of cul-de-sacs by utilizing through streets and crescents within the road system due to maintenance and emergency access issue.

Every public roadway to be created by a proposed subdivision must, if it comes to a dead end, have a cul-de-sac with sufficient turning space for emergency and maintenance vehicles unless otherwise approved by Amherstburg.

Maximum length of a permanent cul-de-sac shall not exceed 150 metres to the start of the bulb (This shall include 'P' loops.) If this length is exceeded, a secondary emergency access is to be provided.

5.1.7. Drainage

Pavements shall be designed to provide adequate drainage of storm water runoff as well as drainage of the granular road base.

5.1.7.1. Subdrains

150mm dia. HDPE perforated pipe wrapped in filter cloth (Big 'O' or approved equal)

Subdrains will be constructed continuous along the back of curbs at a gradient equal to the longitudinal pavement slope (or minimum 0.30 percent) and connected to roadway catch basins or other appropriate outlets.

Subdrains are to enter the sides of the catch basin.

5.1.7.2. Catch Basins

Catch basins are required to be installed at the following locations:

- At all intersections for proper drainage
- Spaced for road drainage from no more than 90 m per catch basin per lane
- At the end of all cul-de-sacs

5.1.8. Curb and Gutter

Barrier curb and gutter is the only accepted type of curb and gutter. All concrete curb and gutter shall be built to OPSD 600.040. Before curb and gutter may be constructed in the field, all underground works including but not limited to watermains and sewers (but excluding hydro and private utilities) shall be tested and approved (including flushing and sewer video inspection).

5.1.9. Pavement Structure

A geotechnical report prepared by a geotechnical consulting firm to support the roadway design and construction of underground services is necessary for all roadways constructed or reconstructed within the Town of Amherstburg. The geotechnical report is to establish geotextile, pavement structure design, sewer bedding, backfill and any additional construction methods as required.

Pavement structures shall consist of the following **minimum** material thicknesses:

<u>Residential (Local) Roads</u>

Granular 'A' Base	300mm
HL4 Base Asphalt	50mm
HL3 Surface Asphalt	40mm

Collector Roads

Granular 'A' Base	450mm
HL4 Base Asphalt	60mm
HL3 Surface Asphalt	40mm

Arterial and Industrial Roads

Granular 'A' Base	450mm
HL4 Base Asphalt	100mm (placed in 2 lifts)
HL3 Surface Asphalt	50mm

Unless otherwise determined based on the results of the geotechnical investigation.

Granular 'A' materials shall meet the minimum requirements of OPSS 1010 and shall be compacted to a minimum 100 percent of the Standard Proctor Maximum Dry Density.

Recycled material shall not be used for granular road base or trench backfill.

5.1.10. Asphalt

Asphaltic concrete mixes shall consist of PG 58-28 asphalt cement conforming to OPSS 1101, fine and coarse aggregates conforming to OPSS 1003 and recycled asphalt pavements (RAP). The use of RAP in the final product should not exceed 15% for surface course asphaltic concrete and 20% for binder course asphaltic concrete.

A qualified material testing company shall be retained by the Contractor to design the asphalt mixes, which will be submitted to Amherstburg for review. The use of recycled asphalt in the final product shall not exceed 15%.

Thorough cleaning of base course of asphalt (by mechanical sweeping, flushing with water and compressed air) and application of tack coat to the entire surface is required prior to surface course asphalt placement. Inspection of base course asphalt by Amherstburg is required before surface course asphalt placement. Where surface course asphalt is being placed in nearly completed subdivisions, the tack coat must be applied one lane at a time.

Surface course asphalt will be placed at the end of the 1-year maintenance period for the underground works, base asphalt and curb and gutter or as approved by Amherstburg.

5.1.11. Milling Requirements

Transverse and longitudinal joints between the existing pavement and the new asphalt shall be perpendicular butt joints formed by a milling process or keyed in, as specified in the Contract Documents.

All joints shall be milled in a diamond pattern across the existing lanes and made to ensure a full-face bond and a smooth riding surface. Minimum depth of asphalt milling shall be 40mm.

The requirements outlined in OPSS.MUNI 310 applies.

5.2. SANITARY

All proposed sanitary sewers and appurtenances are required to be designed in accordance with this Manual and the most recent version of *Design Criteria for Sanitary Sewers, Storm Sewers and Forcemains for Alterations Authorized under Environmental Compliance Approval, MECP*. If there are conflicting standards between the two documents, please notify the Infrastructure Services Department.

Sewers and associated appurtenances shall be constructed in accordance with the approved contract documents prepared by the Consulting Engineer.

Work on private property shall conform to the Ontario Building Code.

5.2.1. Minimum Design Criteria

The minimum design criteria for works being installed within the municipal right-of-way are noted below:

Table 5 - Sanitary - Minimum Design Criteria

Design Element	Minimum Design Criteria
Population Density	Residential – 3.5 ppl/unit Dry Industrial – 12.5 l/s/hectare Wet Industrial – 28m^3/hectare/day or based on anticipated usage as provided by the applicant Commercial – based on anticipated use
Average Domestic Flow	450 litres per capita per day
Peaking Factor	Harmon Formula 1 + (14/(4+P/$1000^{0.5}$)) P = population in thousands At minimum, peaking factor of 2 is to be used.
Extraneous Flow	0.28 litres per hectares per second

Minimum Velocity for Pipe (Full Flowing)	0.6 metres per second
Maximum Velocity	3.0 metres per second
Manning Coefficient of Roughness	0.013 (smooth wall pipe)
Minimum Pipe Size	200mm diameter
Pipe Material	PVC DR35 for < 450mm diameter pipe Reinforced Concrete (min 65-D) for > 450mm diameter pipe or PVC (as approved by Amherstburg)
Minimum Pipe Cover	1.5 metres (from obvert of pipe to finished grade) or as per manufacturer's recommendations, whichever is greater
Maximum Manhole Spacing	120m for < 400mm diameter pipe 150m for 450mm < 750mm diameter pipe
Drop Manhole Structure	Shall be provided for sewers entering a maintenance hole at an elevation of 610 mm or more above the maintenance hole outlet pipe invert
Safety Platform	Shall be incorporated in the designed for deep maintenance holes (deeper than 5m) per Occupational Health and Safety Act and any other municipal requirements.
Minimum Manhole Size	1200mm diameter
Manhole Wrapping	Sanitary maintenance holes shall be externally wrapped with Waterproof membrane (Blueskin or approved equivalent) placed externally around all precast joints, including joints below the maintenance hole frame and cover, with a minimum 300mm wide strips.
Frost Straps	Shall be provided to hold maintenance hole sections together (at least two (2) between each section) External straps to extend vertically from top to bottom and for deep maintenance holes extended at least 1 m below frost depth OPSD 701.100 applies Frost straps to be made of galvanized steel, 600mm length
Cretex Inflow Dish	Required in all sanitary manholes with neoprene gasket and diffuser valve

Manhole Adjustment Rings	Shall be concrete only OPSD 704.010 applies
Parging Requirements	Interior and exterior of all lift rings and barrel joints
Ladder Rungs	OPSD 405.020, OPSD 704.010 applies
Manhole Frame and Cover	OPSD 401.020
Minimum Service Connection Size	125mm diameter PVC DR28
Minimum Service Connection Slope	1% (2% is recommended)
Service Connection Location	1.5 metres from the property line Connection directly into manholes is not permitted Double connections are not permitted
Cleanout	All services shall include a Tee and a cleanout at the property line. The cleanout should not project more than 0.3 metres above the ground level for inspection. All connections with cleanouts within hard surface or driveways shall have a cast iron cap as per Domestic Foundry DF66 detail or approved equal.
Pipe Colour Coding	Service Connection pipes shall be colour coded green to avoid cross connections. Color coding method includes pipe color, wrapping, demarcation tape, or stenciling.
Sewage Ejector Pumps	Required 1 per unit
Sampling Manholes	Required at the lot line for all multi-residential, commercial and industrial site plans

5.2.2. Private On-Site Wastewater Treatment Facilities

Within a Settlement Area, Council approval will be required before any development is permitted on private individual sewage disposal and/or water systems. Approval may be conditional on proof of a potable water supply and soil suitable for septic tanks for the long term.

Connection to public systems, should they become available, will be mandatory.

Information that Council may need will include the potable groundwater quality, groundwater yield, groundwater interference, soil suitability and the lot area for effluent treatment.

Areas currently on private systems shall also be required to connect to a public system should the services become available.

All services, whether private, communal or municipal, shall comply with the requirements of the Ministry of the Environment, the Environmental Protection Act, Ontario Water Resources Act, and other Provincial and municipal requirements, as applicable.

5.2.3. Operation and Maintenance Manual

The Developer's Consultant is responsible to prepare an Operation and Maintenance (O&M) Manual for all sanitary appurtenances and pump stations approved by Amherstburg and/or MECP. The O&M manual must reference/address the following items:

1. Detailed procedures for the routine operation of the works
2. Inspection programs, including the frequency of inspection, and the methods or tests required to detect when maintenance is necessary
3. Frequency of maintenance and repair of the sanitary works (i.e. specific month or time of year)
4. Clean out requirements for any storage or overflow tanks, if applicable
5. Requirements to protect sources of drinking water such as those included in the SOP for sewage works and any applicable source protection plans and policies
6. Procedures for routine physical inspection and checks of controlling systems (i.e. SCADA) to ensure the mechanical integrity of the equipment and its accuracy on the controlling system
7. Procedures to prevent odour and other environmental impacts
8. Procedures for calibration of monitoring equipment
9. Emergency response, spill reporting, and contingency plans and procedures for dealing with equipment breakdowns, potential spills, and any other abnormal situations including notification list with contact information
10. Procedures for receiving, responding, and recording public complaints including recording follow up action taken
11. Record drawings of the works

The Developer shall follow the procedures prescribed in the approved O&M Manual during the maintenance period for the sanitary works.

5.3. STORM

Stormwater management shall be required to ensure that runoff is controlled such that development does not increase peak flows to any greater extent than pre-development runoff in watercourses that impact on downstream flooding, to institute runoff control to prevent accelerated enrichment of watercourses from pollutants, and to enhance water quality and aquatic habitat.

Stormwater management proposals must be designed in accordance with this manual and the most recent version of WERSM as published by ERCA.

Where outfalls to waterways or drainage courses are required, the Applicant's Consulting Engineer will supply an outfall design for submission to Amherstburg and ERCA for approval and permits.

Management and consideration of the neighbouring surface and subsurface stormwater runoff may be required based on the existing/proposed drainage patterns of the land.

5.3.1. Minimum Design Criteria

The minimum design criteria for works being installed within the municipal right-of-way are noted below:

Table 6 - Storm - Minimum Design Criteria

Design Element	Minimum Design Criteria
Minimum Velocity for Pipe (Full Flowing)	0.75 metres per second
Maximum Velocity	6.0 metres per second
Manning Coefficient of Roughness	0.013 (smooth wall pipe)
Minimum Mainline Pipe Size	300mm diameter
Pipe Material	PVC Reinforced Concrete Boss 2000 Challenger (320 KPa) under limited conditions (requires approved from Manager of Engineering) ADS Sanitite Pipe under limited conditions (requires approved from Manager of Engineering)
Minimum Pipe Cover	1.2 metres (from obvert of pipe to finished grade) If 1.2 metres of cover is not achievable, insulation is required to be placed around the pipe.

Maximum Manhole Spacing	110m for 300mm < 975mm diameter pipe 130m for 1050mm < 1350mm diameter pipe 160m for 1500mm <1650mm diameter pipe 305m for 1800mm < diameter pipe
Safety Platform	Shall be incorporated in the designed for deep maintenance holes (deeper than 5m) per Occupational Health and Safety Act and any other municipal requirements.
Minimum Manhole Size	1200mm diameter
Frost Straps	Shall be provided to hold maintenance hole sections together (at least two (2) between each section) External straps to extend vertically from top to bottom and for deep maintenance holes extended at least 1 m below frost depth OPSD 701.100 applies Frost straps to be made of galvanized steel, 600mm length
Manhole Adjustment Rings	Shall be concrete only OPSD 704.010 applies
Parging Requirements	Interior and exterior of all lift rings and barrel joints
Ladder Rungs	OPSD 405.020, OPSD 704.010 applies
Manhole Frame and Cover	OPSD 401.010 Closed Cover for Maintenance Holes, OPSD 401.020 applies
Minimum Service Connection Size	150mm diameter PVC DR28
Minimum Service Connection Slope	2%
Maximum Service Connection Slope	8%
Service Connection Location	1.5 metres from the property line Connection directly into manholes is not permitted Double connections are not permitted

Cleanout	All services shall include a Tee and a cleanout at the property line. The cleanout should not project more than 0.3 metres above the ground level for inspection. All connections with cleanouts within hard surfaces or driveways shall have a cast iron cap as per Domestic Foundry DF66 detail or approved equal.
Pipe Colour Coding	Service Connection pipes shall be colour coded white to avoid cross connections. Color coding method includes pipe color, wrapping, demarcation tape, or stenciling.
Catch Basins	OPSD 705.010 OPSD 400.020 In grassed areas with no traffic, 600mm diameter HDPE pipe or concrete sump pit catch basin may be permitted.
Catch Basin Frame and Cover	OPSD 400.020, OPSD 400.100 applies
Catch Basin Spacing	110m where the road grade is 0 - 3% 90m where the road grade is 3.1 - 4.5% 75m where the road grade is > 4.5%
Minimum Catch Basin Lead Size	150mm
Minimum Catch Basin Lead Slope	1%
Box outs	OPSD 600.070
Catch Basin Parging Requirements	Interior and exterior of all adjustment rings and pipe connections
Catch Basin Manholes	OPSD 401.010 Open Cover for Maintenance Holes applies Adjustment rings shall be concrete only, OPSD 704.010 applies

5.3.2. Stormwater Management Report Requirements

When a stormwater management report is required to be submitted to Amherstburg, the following items must be addressed within the body of the report:

1. Site Description
    a. Location
    b. Existing conditions
    c. Proposed conditions
    d. Drainage area

    e. Drainage pattern and ultimate outlet location
2. Background Information (if applicable)
3. Figures
    a. Location plan
4. Quality Control
    a. Design criteria
        i. level of protection
        ii. drainage area to facility in ha
        iii. percentage impervious (minimum 50%)
5. Quantity Control
    a. Design criteria
        i. allowable release rate
        ii. design release rate
        iii. outlet design
        iv. total active storage required (m^3)
        v. total active storage provided (m^3)

Additional information may be required based on the size and complexity of the development being proposed. The following (but not limited to) information may be requested within the SWM report in addition to the above-noted items:

1. Site Description
    a. Location – nearest roads, watershed & sub-watershed
    b. Existing Conditions – land use on site & surrounding areas
    c. Proposed Conditions
    d. Drainage Area – for the site, tributary & watershed
    e. Watercourses, Wetlands - present on site, and type (permanent or intermittent)
    f. Drainage patterns and ultimate drainage location/outfall

2. Background Information
    a. Watershed Plans
    b. Sub-Watershed Plans
    c. Master Drainage Plans (MDPs)
    d. Other Previous Reports and Relevant SWM Requirements
    e. Existing Models
    f. Geotechnical Report

3. Figures
    a. Location Plan
    b. Legal Plan of Survey
    c. Pre-Development Drainage Area Plan
    d. Post-Development Drainage Area Plan

e. Proposed SWMF locations
f. Proposed Site Plan – grading, servicing and details
g. Erosion and Sediment Control Plan

4. Quality Control
    a. Design Criteria:
        i. Level of Protection
        ii. Drainage Area to Facility (ha)
        iii. Percentage Impervious
        iv. SWM Facility Monitoring and Maintenance Requirements
        v. Customized Quality Objectives
    b. Oil-Grit Separators (OGS):
        i. Approved Manufacturer
        ii. Model Number
        iii. Sizing Calculations Included
        iv. TSS Removal (%)
        v. Annual Runoff Treated (%)
        vi. Sediment Storage Capacity
        vii. Specification sheet for approved unit from the Manufacturer
        viii. Total Storage Volume
        ix. Maximum Treatment Flow Rate
        x. Particle Size Distribution and particle specific gravity used in sizing
        xi. Appropriate Lab Results and/or Field Study Results
    c. Wet Ponds/Wetlands/Hybrid:
        i. Permanent Pool Storage Requirements (m3/ha)
        ii. Permanent Pool Storage Requirements (m3)
        iii. Permanent Pool Volume Provided (m3)
        iv. Extended Detention Storage Requirements (m3/ha)
        v. Extended Detention Storage Requirements (m3)
        vi. Extended Detention Volume Provided (m3)
        vii. Detention Time - minimum 24 hours
        viii. Inlet and Outlet Structure Details

5. Quantity Control
    a. Design Criteria:
        i. Runoff Coefficient or Impervious Calculations
        ii. Allowable release rate (m3/s or l/s)
        iii. Design release rate (m3/s)
        iv. Inlet control device specifications from the manufacturer (if applicable)
        v. SWMF Type
        vi. Stage vs Storage Table

vii. Outlet Design
viii. Total Active Storage Required (m3)
ix. Total Active Storage Provided (m3)

6. Hydrologic Modeling:
    a. Runoff method
    b. Infiltration method
    c. Other hydrologic routines (e.g., groundwater, etc., if applicable)

7. Hydraulic Modeling:
    a. Type of Hydraulic Model – 1D, 1D dual drainage, 1D minor with 2D major system
    b. Hydraulic routing method

8. Hydrogeology
    a. Soils / Hydrogeology Report
    b. Seasonal Groundwater Elevations
    c. Pre & Post Development Water Budget
    d. Special Construction Considerations and Recharge Measures

9. Construction Sediment Control
    a. Sediment Control Plan
    b. Sizing of Temporary Sediment Basins and details
    c. Check dam locations and details
    d. Silt fence location and details
    e. Outlet location
    f. 24-hour Extended Detention Calculations
    g. Sequencing and Maintenance/Inspection schedule and notes

10. Other
    a. Summary of model inputs and outputs
    b. Schematic representation of pre and post development hydrologic models
    c. Storm sewer design sheets
    d. Storm sewer design drainage plan, showing areas and runoff coefficients
    e. All final reports and plans signed and sealed

All drawings, calculations and model units shall be in metric. Any submission in imperial units will not be reviewed.

A dual drainage model (PCSWMM Compatible) will be required to be completed and submitted to Infrastructure Services for all plan of subdivision proposals once the SWM report is finalized.

All SWM designs on properties over 2 hectares in size shall be modelled.

It should be noted that orifice plates are not permitted to be used in Amherstburg to control release rates. The release rate for all development proposals shall be restricted to the 2-year pre-development rate.

Above-grade runoff storage in roadways is not permitted on Arterial roads.

5.3.3. Stormwater Management Facilities

Storm sewers and Stormwater management facilities are to be designed in conformance with WERSM and this manual.

The Applicant shall consult the Official Plan for Amherstburg to confirm any specific requirements for environmentally significant areas shown therein.

Landscaping and tree planting plans, prepared by a registered Landscape Architect, will be required for all permanent stormwater facilities. Depending on the duration of a temporary pond, landscaping and tree planting plans, as well as long-term maintenance and care provisions may be requested by Amherstburg.

The minimum side slope permitted shall be 5:1 for all stormwater management facilities.

Rodent grates are required to be installed on all inlet and outlet pipes that are not fully submerged.

A 6-metre offset is required from the top of bank to the property line of all SWM facility lands. A 4.0m maintenance path is required to be installed in the center of the 6.0m offset and connect to all abutting roadways. Where the pathway connects to an excess roadway, barriers to mitigate vehicle traffic must be installed at the curb cut.

All SWM facilities must be fine graded and hydra-seeded by the Developer within 6 months of acceptance of the abutting services on maintenance. A minimum 75% consistent germination is required as determined by Amherstburg prior to the end of the maintenance period.

Permanent pool depth of any wet pond shall not exceed 2.0m.

Pump failure zero-release scenario shall be considered in the design of the SWM facility and is to be stored within the pond with 0.3m freeboard to top of bank.

SWM facilities with a depth of over 1.2m shall have an access ramp made of interlocking pavers (preferably permeable) from the maintenance pathway to the normal water level.

5.3.5. Underground Storage Tanks/Chambers

Amherstburg is generally not supportive of proposals for underground storage tanks/chambers placed within the municipal right-of-way or on Amherstburg-owned property.

All underground storage tank/chambers installed within the municipal right-of-way or located on Amherstburg-owned property will be required to be flushed and cleaned prior to assumption of ownership of the infrastructure by Amherstburg.

Inspection ports are required to be incorporated into the design of the underground storage chamber in locations easily accessible for future maintenance requirements including, but not limited to, either side of the chamber and in the center of the chamber.

Shop drawings of the underground storage tank/chamber shall be included in development proposal submissions for review and approval.

Installation of all underground storage tanks/chambers used for stormwater management purposed shall be certified by the manufacturer of the system.

A letter of conformance from the manufacturer of the underground storage chamber must be submitted prior to acceptance of the infrastructure by Amherstburg and reduction of securities.

5.3.6. Temporary Drainage During Construction

Prior to proceeding with stripping or any disturbance of the area, the Applicant, shall submit to Amherstburg a soil protection, erosion control, and stockpiling plan

During the development of an area, the Applicant shall make provisions for the disposal of all storm water within the Development area, emanating from the development area and any storm water which may be cut off from its natural drainage course as a result of the development, to the satisfaction of Amherstburg.

5.3.7. Municipal Drains and the Drainage Act

The Drainage Act (Act) is one of the oldest legislations in Ontario (1859). The Act provides a communal procedure to construct, improve and maintain a drainage works or a “Municipal Drain”. Amherstburg may assist in providing a legal drainage outlet for surface and subsurface water that are not attainable under Common Law. A Municipal Drain provides a legal outlet under Statute Law (legislation) that provides the means for unobstructed flow of stormwater.

Municipal drains are established by a Council appointed Engineer whose report is adopted by the community of landowners and Council and becomes not only the legal basis for the construction of the drain, it is also used as a cost recovery mechanism to

recover All costs associated with the drainage works by all lands that use the drainage system.

Amherstburg's municipal drainage network of 200 plus Municipal Drains convey stormwater by Statute for over 280km and may extend or traverse a settlement area which may impact the rights and responsibilities of lands slated for development that use, and are assessed to a municipal drain.

Maintenance/repairs or improvements may be required on a Municipal Drain to facilitate development proposals. All works required to be completed under the Drainage Act require the corresponding request form from the Ministry of Agriculture, Food and Rural Affairs, and are to be coordinated through Amherstburg's Drainage Superintendent. The Developer will be responsible to borne the cost of all works necessary and required under the Drainage Act for the development to proceed.

Infrastructure Services will identify any municipal drain requirements to the Developer as part of the pre-submission meeting.

All existing farm tiles shall be redirected around the development or incorporated into the stormwater management strategy of the development.

Management and consideration of the neighbouring surface and subsurface stormwater runoff may be required based on the existing/proposed drainage patterns of the land.

Please contact Amherstburg's Drainage Superintendent for further information.

5.3.8. Low Impact Development

Low Impact Development stormwater management practices can be utilized to help protect Ontario's water resources, the natural and human environments, the ecological services already provided by existing natural systems, and the sustainability of communities.

Amherstburg encourages the incorporation of low impact development designs to provide alternative measures of stormwater management where feasible and practical.

All proposals for Low Impact Development shall conform with the following MECP documents:

- 2003 Stormwater Management Planning and Design Manual
- 2008 Design Guidelines for Sewage Works
- 2022 Low Impact Development Stormwater Management Guidance Manual

The following LID approaches shall be considered by Amherstburg for approval:

- Rain/Bioretention Garden

  - treats runoff from paved areas by using the natural properties of soil and vegetation to remove contaminants
- Bioswales
  - detain, filter and infiltrate runoff as it is conveyed along the grassed ditch, resulting in smaller volumes of runoff and associated pollutants from reaching the watercourse or stormwater management facility
- Infiltration Trenches/ Chambers
  - sub-surface reservoirs that store and infiltrate stormwater runoff at the lot level
- Rain Harvesting
  - the practice of collecting rainwater from a roof or other surface and using it to augment freshwater supplies

A detailed Operation and Maintenance Manual of the LID feature will be required to be submitted to Amherstburg as part of the proposal for consideration.

5.3.9. Operation and Maintenance Manual

The Developer's Consultant is responsible to prepare an Operation and Maintenance (O&M) Manual for all stormwater appurtenances, pump stations, and facilities approved by Amherstburg and/or MECP.

The O&M manual must reference/address the following items:

1. Procedures for the routine operation of the works
2. Inspection programs, including the frequency of inspection, and the methods or tests required to detect when maintenance is necessary, including:
   a. Presence of algae and/or invasive species impairing the operation of the works (e.g. phragmites, goldfish)
   b. Measurements of sediment depth, manual water levels (staff gauge) and/or visual observation as deemed appropriate by Amherstburg
3. Frequency of maintenance and repair of the stormwater works
4. Stormwater pond sediment cleanout, dewatering, and management
5. Excavation, modification, replacement of LID soil/media/aggregate/geotextile such as bioretention cells, green roof, permeable pavement, etc.
6. Frequency of maintenance for any other stormwater appurtenance identified to collect sediment
7. Requirements to protect sources of drinking water such as those included in the SOP for stormwater works and any applicable source protection plans and policies
8. Procedures for routine physical inspection and checks of controlling systems (i.e. SCADA) to ensure the mechanical integrity of the equipment and its accuracy on the controlling system

9. Procedures for routine physical inspection and calibration of monitoring equipment or components in accordance with the Monitoring Plan
10. Emergency response, spill reporting, and contingency plans and procedures for dealing with equipment breakdowns, potential spills, and any other abnormal situations including notification list with contact information
11. Procedures for receiving, responding, and recording public complaints including recording follow up action taken
12. Record drawings of the works

Further guidance on the information to be included in the O&M manual can be find in Appendix C of this manual.

The Developer shall follow the procedures prescribed in the approved O&M Manual during the maintenance period for the stormwater works.

5.4. PUMPING STATIONS

Amherstburg's policy is to promote gravity drainage for all municipal stormwater and sanitary infrastructure. The inclusion of pumping stations to service new or existing development areas will only be considered at the discretion of Amherstburg.

Storm and sanitary pumping stations shall be designed in conformance with this manual and MECP guidelines and constructed in accordance with Amherstburg approved construction drawings & specifications prepared by a Professional Engineer licensed in the Province of Ontario.

Drawings & specifications shall meet the following minimum design criteria. Please note that Amherstburg shall reserve the right to amend and/or impose additional requirements to those noted herein at any time.

5.4.1. Minimum Design Criteria

Where pumping stations are approved, stainless steel products and appurtenances are required to minimize the effects of corrosion from sewage and weather.

Permanent emergency standby electrical generator facilities shall be provided in all cases. The type of emergency standby power shall be reviewed with Amherstburg and MECP Regional Staff early in the design stage.

All pump stations shall also be fitted with an external electrical weatherproof plug for connection of a mobile emergency standby electrical generator in a manner suitable to and approved by Amherstburg

The sewage retention period shall be adequate to allow for transportation time and shall not be less than 4 hours under average daily flow rates plus infiltration.

One or more pumps capable of pumping the peak design flow with an additional stand-by pump (this is known as firm capacity).

Only pumps manufactured by Xylem Flygt shall be used in Amherstburg. The use of alternative manufacturers must be approved by the Manager of Environmental Services on a case by case basis due to or to suit specific circumstances.

Pumping stations shall generally be circular in design and constructed of precast or cast in place reinforced concrete using Type 20 cement. They shall have a minimum inside diameter of 3.0 meters and shall include at minimum, the following items all of which are to be detailed in the construction drawings and specification documents for the project:

5.4.2. Access Hatches

Access hatches shall be of the lockable, single leaf, insulated roof scuttle design of aluminum construction with a minimum clear opening of 762mm x 914mm, and fitted with Type 316 stainless steel hardware complete with continuous piano hinge, gas assist springs, hold open arms with handles, flush recessed lock with provisions for padlock and designed to withstand minimum live load of 150 pounds per square foot using min. 6mm thick aluminum tread plate all as manufactured & supplied by MSU Mississauga or approved equal.

5.4.3. Pump/ Equipment Hatches

Pump/equipment hatches shall be of the lockable, single leaf cast-in-place design of aluminum construction with a minimum clear opening of 914mm x 914mm for 3000mm diameter chambers and 914mm x 1220mm for 3600mm diameter chambers to allow complete removal and replacement of pumps. Hatches shall be fitted with Type 316 stainless steel hardware complete with stainless steel hinges, gas assist springs, hold open arms with handles, flush recessed lock with provisions for padlock and designed to withstand minimum live load of 150 pounds per square foot using min. 6mm thick aluminum tread plate. Hatch shall also come complete with hinged orange colour safety grate and retractable safety post & chain all as manufactured & supplied by MSU Mississauga, Flygt or approved equal.

5.4.4. Access Ladders

Access ladders shall be fabricated, heady duty design of aluminum construction having a width of 500 mm. Ladder shall be supported off chamber wall using flanged brackets at maximum spacing of 1200mm and Type 316 stainless hardware. Top of ladder shall be fitted with heavy duty, retractable, double post access rails all as manufactured & supplied by MSU Mississauga or approved equal.

5.4.5. Platforms

Platforms shall be fabricated and of all aluminum construction (T-6061) with Type 316 stainless steel hardware complete with channel & angle support framing and “close mesh (4.76mm)” aluminum “serrated” grating fastened to framing using Type 316 stainless steel hold down clips at minimum 500mm centers (min of 4 hold down clips per panel).

Provide hinged grating section for access to lower level having minimum clear opening of 762mm x 914mm fitted with aluminum or stainless-steel hinges and lifting handles All edges and holes through grating shall be banded.

shall also be fitted with safety handrail of welded double rail design and aluminum alloy 6063-T6 or 6351-T6 construction with clear anodized finish. Pipe rails shall be 38mm diameter, IPS Schedule 40 complete with bottom flanged posts at max spacing of 1800mm and 150mm high x 6mm thick aluminum kick plates fastened to bottom of posts.

shall also be fitted with 1040 high aluminum post & chain assembly for personnel safety around the hinged grating section. Removable posts shall be set in floor sockets & fitted with two rows of Type 316 stainless steel chain on 3 sides complete with stainless steel eyehooks and spring-loaded hooks to engage the eyehooks.

5.4.6. Sewage Pumps

Sewage pumps shall be of the non-clog submersible design with separate pump base discharge connection and dual sliding rail system. Pumps to be rated for 600 volts, 3 phase, 60 hertz operation and certified for Class 1, Group D, Division 1 hazardous environments. Each pump to be equipped with a mix flush valve and lift system. In addition, each pump to be fitted with leakage detectors capable of sensing stator over temperature and liquid in stator housing complete with automatic reset once the fault has cleared, LED fault indications, dedicated dry output contact closures for temperature and leakage faults using Flygt Mini-CAS II Supervision relay. Pump power cables to be supported from stainless steel cable support grips above with min. 3 meters slack after installation. Pump surfaces to be finished with an epoxy coating system for corrosion protection. Provide a chain hoist with sufficient load chain and grip eye lifting device for proper removal and installation of each pump. All as manufactured and supplied by Xylem/Flygt Canada – N- pump.

5.4.7. Pump Rails

Pump rails shall be of Schedule 80 hot dip galvanized steel piping construction. Intermediate and upper guide bar holders including pump lift chains and chain hooks

shall also be of hot dip galvanized steel construction with Type 316 stainless steel hardware.

5.4.8. Pump Discharge Piping

Pump discharge piping shall be to ASTM A-774/778 Type 316L stainless steel welded construction, I.D. pipe size with minimum thickness of 11 gauge (3.2mm) (0.125-inch).

5.4.9. Fittings

Fittings shall be prefabricated, smooth flow, long radius type. Joints shall be welded except at valves & equipment where flanged type backing flanges and rolled van stone collars are to be used. Backing flanges to be min. hot dip galvanized steel construction drilled to ANSI B16.1, Class 125, thickness T3 for 150 psi test pressure. Victaulic couplings and Victaulic flange adaptors of hot dip galvanized steel construction are to be used where shown on the typical sanitary pump station drawings contained herein. All joint fasteners to be Type 316 stainless steel. All piping and fittings to be pickled and passivized after fabrication and field welding to achieve a consistent finish and appearance. As manufactured and supplied by Douglas Barwick Inc. or approved equal.

5.4.10. Gate Valves

Gate valves shall be of the resilient wedge type to AWWA C509 Class 200W and/or AWWA C515 Class 250W with manual handwheels and gear operators. Manual square nut operators and stainless-steel extension stems shall be implemented where shown on the typical sanitary pump station drawings contained herein. Valve to be of ductile iron construction, bronze mounted with rubber encapsulated modified wedge disk and non- rising stem with O-ring seals and flange x flange ends drilled to ANSI B16.1, Class 125. Valve to open by turning counter-clockwise. All exposed fasteners to be Type 316 stainless steel. The exterior and interior of the valve shall be coated with an NSF/ANSI 61 approved fusion bonded epoxy coating system. As manufactured by Mueller, Clow, American AVK or approved equal.

5.4.11. Swing Check Valves

Swing check valves shall be of the rubber flapper design to AWWA C508. Valve shall be full globe style body with domed access cover and flexible disc made of Buna-N (NBR) and steel reinforcement with disc accelerator. Body shall be of ductile iron construction with all stainless-steel trim and flange x flange ends drilled to ANSI B16.1 Class 125. Valve shall be fitted with screw type backflow actuator to enable opening of valve during no flow conditions and a mechanical indicator to provide disc position indication on valve. All exposed fasteners to be Type 316 stainless steel. The exterior and interior of the valve shall be coated with an NSF/ANSI 61 approved fusion bonded

epoxy coating system. As manufactured by Val-Matic - Surgebuster Swing Check Valve Series 7200.

5.4.12. Curved Sluice Gate

Curved sluice gates shall be fabricated from Type 316L stainless steel to AWWA C501 requirements. Gate shall consist of wall thimble, gate frame, yoke, threaded stem, stem extension and stem guides all constructed from Type 316L stainless steel and assembled using Type 316 stainless steel fasteners and hardware. Stem guide liner, side & top seals to be constructed from polyethylene with bottom seal from neoprene rubber. Leakage rate shall not exceed 0.05 lgpm per linear foot of seal against both seating and unseating head.

Gate to be controlled with manual operator on top of chamber using pedestal constructed of hot dip galvanized steel with geared hand crank and aluminum stem cover with graduated window for valve position indication. All hardware and fasteners to be Type 316 stainless steel. As manufactured and supplied by Armtec, Fontaine or Rodney Hunt.

5.4.13. Sewage Air Release & Vacuum Break Valve

Sewage air release and vacuum break valves shall be suitable for air release and vacuum break functions during pipeline filling, pipeline drawing, water column separation, normal operation and surge alleviation. Body to be compact single chamber design of stainless steel and/or epoxy coated construction with all fasteners and hardware in Type 316 stainless steel. Float, seat and all moving parts to be of Type 316 stainless steel construction. Valve shall incorporate over-pressure safety feature and optional 6mm ports fitted with Type 316 stainless steel ball valves, nipples and caps. As manufactured by Vent-O-Mat - Series RGX.

5.4.14. Vent Pipes (Shallow and Deep Chamber Levels)

Vent pipes shall be made of Stainless steel 304 construction complete with 180-degree gooseneck having a bolted flange arrangement fitted with carbon cartridge box for odour control. Vents shall have min. inside diameter of 100mm for 3000mm diameter chambers and 150mm diameter for 3600mm diameter chambers.

5.4.15. Above Ground Free Standing Fixed Davit Bases

Above ground free standing fixed davit bases are for general purpose use for most applications. These are either attached to concrete or other structural materials such as steel. Review exact socket requirements with Amherstburg at time of specification preparation.

All fasteners and hardware including brackets in interior & exterior of pump chamber shall be minimum Type 316 stainless steel construction.

All thrust restraint and pipe support brackets including fasteners shall be of minimum Type 316 stainless steel construction.

5.4.16. Levels Sensor

Level sensor shall be of the ultrasonic type. The level transmitter shall be equipped with auxiliary relays (minimum three) configurable to control pumps for drawing down the pumping well in a lead-lag process and automatically alternate pump duty. Level transducer is to be supported from its own cable using a strain relief cord grip and hung within a 150mm diameter PVC standpipe accessible from above the top slab via the equipment hatch or dedicated access cover (so as to avoid having to enter the chamber) all as shown and detailed in the typical sanitary pump station drawings contained herein. As manufactured and supplied by Siemens-Milltronics Multi-Ranger 100 w/XPS-15.

5.4.17. Alarm Float Switches

Alarm float switches shall be micro tilt switch type Ex approved version with sufficient cable length to reach control panel without splices and complete with Type 316 stainless steel horizontal hanger, stainless steel or PVC strain relief cord grips and Type 316 stainless steel sway and control rings all as manufactured and supplied by Xylem Flygt Canada.

5.4.18. Electrical Requirements

All pumping stations shall be fitted with electrical service entrance & pump control panels and mounted on standalone aluminum channel support system positioned minimum 1500mm from closest edge of pump chamber (to avoid Class 1 Division 1 or 2 hazardous environment classification). Electrical & controls work shall conform to the following requirements and be detailed in the project‘s construction drawings and specified in the project’s specification documents.

- Supply & Installation of electrical & control works shall meet the minimum requirements of Ontario electrical safety code.
- Electrical and control works shall be designed and constructed in accordance with approved detailed construction drawings & specifications prepared and sealed by a Professional Electrical Engineer licensed in the Province of Ontario competent in undertaking this type of work.
- Electrical design shall include procurement and coordination of power supply from electrical supply authority

- Electrical design shall also include provisions (external plug) for connecting a portable/mobile emergency standby generator set in a manner acceptable to Amherstburg in addition to the permanent emergency standby generator
- Panels shall be fitted with automatic dialer and/or SCADA equipment to relay alarms to Amherstburg's operating authority. Exact requirements are to be reviewed with Amherstburg and their operating authority early in the design stage.
- Service entrance shall be 600 volts, 3 phase, 60 hertz of sufficient capacity to meet pump station requirements. 3 phase power shall be implemented where available and desirable by Amherstburg.
- All current protection must be accomplished through the use of thermal/ magnetic circuit breakers having sufficient interrupting ratings.
- Each sewage pump to be controlled thru a Hand-Off-Auto selector switch and monitored with an hour meter.
- External alarm light for high-high level float switch with push-to-test lamp push button.
- All electrical & control panels, cabinets, enclosures, boxes, fasteners and all hardware shall be of Type 316 stainless steel construction.
- All pumps and associated wiring from the wet well shall be continuous without splices and terminate to a junction box (with terminal strips) located prior to the EYS fittings in accordance with the Electrical Safety Code. Wet well wiring to continue from the junction box through EYS fittings into the pump control panel.
- All electrical equipment to be manufactured and supplied by Allen Bradley, Siemens, Square D or approved equal. Electrical components shall be in full compliance with the NEMA standards and have a NEMA rating identification (IEC components with NEMA equivalent ratings are not acceptable).
- All pump stations constructed in Amherstburg shall be equipped with a flow meter within a separate flow meter chamber. Coordination with Amherstburg is required to review and approve the model of flow meter being proposed.

5.4.19. Alarm Monitoring System

DSC alarm system and minimum zone requirements and features as follows:

- monitor high level float (first stage)
- monitor high-high level float (second stage, where applicable)
- monitor low level float
- monitor pump failure for each pump
- test signal programmed to send to DSC at 7:00am daily
- entire alarm system to be supplied and wired by Security One Alarm Systems
- all zones to be monitored 24 hours and programmed to dial out to Security One Alarm Systems

- alarms to also be monitored at Amherstburg WPCP thru the plant's existing SCADA system receiving signals from the DSC alarm network. Retain the services of Amherstburg's approved system integrator to program the new alarms into the SCADA system.

During the maintenance period, the Developer will be responsible for all costs incurred by Amherstburg excluding hydro, telephone and Security One monitoring services. Hydro, telephone and Security One monitoring services to be set up through Amherstburg's operating authority for all storm & sanitary pump stations.

5.4.20. Maintenance Period Requirements

The Developer shall provide Amherstburg with 2 copies of the operating manual of the pump and a set of keys for the locks on the control panel at the pump station commissioning meeting.

All float alarm levels should be labelled in the control panel by the Contractor.

Any components of the pumping station within 1.5m of the back of curb must be wrapped with reflective tape.

Should any major repairs to a pump station that is under maintenance be required, Amherstburg will advise the Developer who will be given opportunity to make repairs through their contractor within reasonable time period and without unnecessary delay (as determined by Amherstburg). Should Developer not carry out repairs within the reasonable time period, then Amherstburg will carry out all required repairs and all costs incurred shall be assessed to and be borne by the Developer.

In an emergency situation, Amherstburg will coordinate the works required to repair the pump station and all costs incurred shall be assessed to and borne by the Developer.

5.5. WATER

Watermains and appurtenances shall be designed and constructed in accordance with the approved contract documents prepared by the Applicant's Consulting Engineer. All chemicals and materials used in the drinking water system that comes into contact with water within the system shall meet all applicable standards set by MECP, OWWA, and ANSI safety criteria standards NSF/60 and NSF/61.

Any work occurring on live watermains within Amherstburg shall be either performed by a licensed operator employed at the Town of Amherstburg or in the presence of a representative of the Environmental Services Department.

Refer to the W series details in Appendix A for further information on specific water appurtenance requirements.

5.5.1. Minimum Design Criteria

The minimum design criteria are as follows:

Table 7 - Water - Minimum Design Criteria

Design Element	Minimum Design Criteria
Minimum Pipe Size	150mm diameter
Minimum Pipe Cover	1.5 metres (from obvert of pipe to finished grade) below future or existing road grades, whichever is lower
Maximum Hydrant Spacing	150 metres and at all intersections
Maximum Valve Spacing	250 metres and at all intersections (2 valves per tee intersection and 3 valves per cross intersection)
Minimum Service Connection Size	19mm
Maximum Service Connection Size (Residential)	25mm
Maximum Service Connection Size	250mm
Test Pressure & Duration	1,035 kPa (150 psi) for 2 hours
Minimum Separation Distance from Sewers	2.5m (F-6-1 Procedures to Govern Separation of Sewers and Watermains shall be followed)

5.5.2. Backflow Prevention

Contractors are required to follow backflow prevention procedures as specified by MECP. Backflow devices are to be supplied by the Contractor and certified by a licensed plumber on-site and in the presence of a representative of Amherstburg's Water Department prior to usage.

Installation of backflow prevention devices and all other procedures related to potable drinking water and such are to be to the standard as described by the most current version of the By-law to Regulate Cross Connections and Backflow Prevention. It applies to industrial, commercial, institutional and multi-residential buildings and structures except buildings of residential occupancies.

All new ICI buildings require backflow prevention device to be installed right at the point of entry to the building. Such a device would be determined by Amherstburg's Building Department.

Isolation and backflow prevention must be maintained when constructing new Municipal Watermains.

5.5.3. Dead-End Watermains

Dead-end watermains are to be avoided wherever possible. Where dead-end watermains cannot be avoided, the new main shall be closed with cast iron plugs or caps and equipped with suitable blow-off facilities.

5.5.4. Abandonment and Service Disconnections

Watermains to be abandoned shall be capped and removed as decided by Amherstburg. All service disconnections are to be completed by Amherstburg's Water Department. Any costs associated with the service disconnection shall be borne by the Developer/Property Owner in accordance with the most current version of Amherstburg's User Fee Schedule.

5.5.5. Trench Requirements

The trench shall be excavated as specified in Part 3 of The Occupational Health & Safety Act, 1980 and Regulations of Construction Projects.

5.5.6. Storage and Handling of Watermain Pipe & Fittings

All materials shall be stored and handled by the Contractor at his own expense. The Contractor shall be responsible for the safe storage of all materials, obtaining storage areas, for the safe transportation and distribution of the materials at the job site and their inspection to determine defects and breakage. No additional recompense will be provided to the Contractor due to inadequate storage or poor handling. Pipe, fittings, valves, hydrants and all accessories and appurtenances must be loaded and unloaded by lifting with means of a hoist or skidding so as to avoid shock or damage. Chains shall not be used for lifting watermain pipe, hydrants or fittings. Under no circumstances shall any watermain materials or materials for watermain appurtenances be dropped. Pipes shall be supplied with capped ends. Caps to remain on the pipe until being installed. `

5.5.7. Materials

Please refer to Appendix B: Water Material Specifications. All materials used shall be NSF61 compliant.

It should be noted that no substitutions to the material list below will be accepted unless pre-approved by Amherstburg in writing.

Canadian suppliers and manufacturers are preferred to be used for all Contracts; however, non-Canadian materials may be used if CSA approved and only with the expressed approval by Amherstburg in writing.

Changes to the watermain materials specified in the Manual may change during design. Please contact the Manager of Environmental Services to ensure the most up-to-date products and specifications are being used.

5.5.7.1. Fittings

All PVC fittings shall be restrained in accordance with Detail W-7. Refer to Appendix B for approved materials. Tie-in and thrust block shall be completed as per applicable Detail W-7.

5.5.7.2. Tracer Wire

Tracer wire shall be used with all PVC pipes, valves, hydrants and water services. The wire shall be installed along the side or top of the pipe as close to the pipe as possible. The tracer wire shall be brought to the surface at all fire hydrant, valve, and curb box locations. Tracer wire shall be connected to all curb boxes using brass anode clamps. Tracer wire shall be connected with DryConn Waterproof Connectors.

5.5.7.3. Gate Valves

Gate valves are to be used for pipes 100-600mm diameter. Mainline valves shall be the same size as the watermain. Wherever possible, valves are to be located within the boulevard. Valves are required on both sides of any railway crossing, municipal drain crossing, or water body crossing.

The installation of all watermain pipes above 600mm shall require consultation with Amherstburg for specific requirements.

5.5.7.4. Tapping Valves

All tapping sleeves and valves used shall be stainless steel.

5.5.7.5. Valve Boxes

All valves shall be equipped with valve boxes and restrained, unless installed in a chamber. Valve boxes shall be two-piece screw type to suit the size of the valves. Valve boxes shall not rest on the valve. All mainline valve boxes are to be protected during construction and maintenance periods.

5.5.7.6. Hydrants

All hydrants are required to be plugged unless otherwise specified by Amherstburg. All hydrants installed shall stand plumb with nozzles parallel with (or at right angle) to the road with pumper nozzle facing the road.

The depth of bury for the hydrants shall be 1.5m unless otherwise stated by Amherstburg. The hydrant safety breakaway flange must be located between 50-100mm above finished grade and field adjusted if required. Hydrant extensions to adjust the length of the barrel shall be obtained by the same manufacturer as the hydrant and installed per the manufacturer's direction.

Paint on all fire hydrants shall be touched up by the Contractor prior to acceptance of the works.

All hydrant replacements shall be installed in the same location as the existing hydrant wherever possible. Where an existing hydrant being replaced does not meet current standards, the replacement is required to meet all applicable current standards.

Location of all hydrants installed shall be in accordance with the approved cross section specified in the drawings. Wherever possible, hydrants shall be located at the property line between 2 properties, in side yards, or at intersections. All non-standard location will require individual approval in writing from Amherstburg's Manager of Engineering. If subsequent changes are made to the property or design during construction, all costs associated with relocation of water appurtenances shall be borne by the Developer.

All private hydrants must be accessible for Amherstburg to conduct annual hydrant inspections and painted yellow from top to bottom.

5.5.7.7. Service Connections

All water services shall be single connections. The service shall not exceed the diameter of the watermain.

All new water services shall be installed from the new watermain to the property line in accordance with Detail W-9. All curbs stops shall be installed as close as possible to the property line of the lot it is servicing and perpendicular to the road. Wherever practical, the service shall be installed in the center of the lot frontage.

In cases where fire and domestic service is required, two (2) connections from the watermain shall be made to the private lands. Domestic waterline to be metered and fire line shall not be metered.

Requests for new water service connections must be submitted to Amherstburg's Public Works Department by the Developer/Property Owner with a completed Water Connection Application and applicable fee. Once approved, Amherstburg's Water Department will perform the works to install the new water service. Amherstburg will be

responsible for excavation, traffic control, backfilling, restoration, and providing materials to complete the installation.

All unutilized water services shall be abandoned at the watermain with valve and curb box removed under supervision of a representative of the Environmental Services Department.

All water services shall be metered.

5.5.7.8. Main Stops & Curb Stops

All water services shall have the same size main stop as the service pipe. Main stops are not required on water services greater than 50mm diameter.

Service saddles are required for all services manufactured to the latest edition of AWWA C301 and AWWA C303 specifications for all tap sizes.

Main stops or corporation curb stops shall be copper compression type conforming to AWWA C800. Curb boxes shall be installed flush to grade and remain accessible at all time. All curb stops shall be non-draining and supported with concrete blocks or bricks.

Wherever possible, all residential curb stops shall be installed in grassed areas with a minimum distance of 1 meter from the edge of the driveway.

5.5.7.9. Water Meter Chambers and Pits

All meters shall remain accessible at all times for inspection, maintenance and reading for billing purposes.

Meters in chambers or pits shall be installed as per Detail W-3. All types of meters shall not be installed until flushing and testing is completed.

5.5.7.10. Corrosion Protection

Anodes are to be used when connecting new watermains to existing ductile irons watermains. Zinc sack caps shall be used on all threaded bolts.

5.5.7.11. Sampling Stations

Water sampling stations shall be required in developments at the discretion of the Manager of Environmental Services. The location of the water sampling stations shall meet the approval of the Manager of Environmental Services and shall be shown on the construction drawings. See Detail W-4 for details.

5.5.7.12. Auto-flushers

Auto-flushers may be required to be incorporated into the design of the development at the discretion of Amherstburg. The Developer will acquire an auto-flusher from

Amherstburg's Water Department and be invoiced according to the most current version of Amherstburg's Fee By-law.

The Contractor will be required to install a meter pit chamber at the termination point of the dead-end watermain and install the auto-flusher. A representative from Amherstburg's Water Department must be on-site during the installation of the auto-flusher. Please refer to Detail W-8 for details on auto-flusher requirements. Refer to Detail W-8.

5.5.8. Testing Procedures

Watermain testing and commissioning shall follow the current MECP Watermain Disinfection Procedure.

5.5.8.1. Pressure Testing

Prior to pressure testing and disinfection, the Engineer and a licensed water operator from Amherstburg shall inspect the installation. During this inspection, each and every valve will be checked using the proper valve operating key. Each valve must fully open or close as required.

Pressure tests shall be witnessed by the Engineer and the Owner.

The Contractor shall notify the Engineer and the Owner at least 48 hours in advance of the intended testing time. The Owner shall be charged for Amherstburg's time and any sampling costs.

The Contractor is responsible for:

- Supplying pressure tester
- Chlorination
- Backflow prevention
- De-chlorination

Amherstburg is responsible for:

- Witnessing the testing procedure
- Attaining chlorine and microbial samples & delivering the samples to the testing laboratory

The test pressure shall be 1035 kPa (150 psi) for a period not less than two (2) hours. Maximum permissible leakage shall be 2.22 litres per day per mm diameter per km of pipe. Work to be done as per the most current Ontario Watermain Disinfection Procedure.

After the pressure test passes, the new system is filled with highly chlorinated water using continuous feed method with chlorine concentration >25mg/L.

5.5.8.2. Flushing and Disinfecting

Flushing and disinfecting operations shall be carried out in accordance with the MECP and the requirements of Amherstburg Water Department. Amherstburg's Water Department shall be notified at least 48 hours in advance of the proposed date on which disinfection operations are to commence. The Contractor shall de-chlorinate and flush.

The discharge of chlorinated water shall be in accordance with "Environmental Construction Guidelines for Municipal Road, Sewage and Water Projects" by Municipal Engineers Association, Appendix 'B'.

Watermains shall be swabbed and flushed in a sequence and in accordance with the procedure set out by the Consulting Engineer and Supervisor of Environmental Services. The Engineer may permit or require the flushing to be carried out in stages as sections of the system are completed. No unsuitable matter shall be allowed to enter the sections which have been flushed. A soft foam swab is to be inserted into the main at the filling end.

Once swabbing is complete, water from the existing distribution system shall be allowed to flow at a controlled rate into the new pipeline until flushed and full then the control valve shall be closed immediately. The system shall be tested for residual, documented and left charged with the chlorine solution for 24 hours. All valves and hydrants shall NOT be operated during the 24-hour period.

The chlorine residual will be re-tested in the test section after 24 hours. The maximum allowable decrease in chlorine concentration is 40% of the initial chlorine concentration to a maximum decrease of 50 mg/L.

Once acceptable, the section shall be flushed completely and recharged with water normal to the requirements. The chlorination procedure shall be repeated until satisfactory results are obtained. If chlorine residual tests are satisfactory, microbial testing (by an accredited facility) must be carried out as per ANSI/AWWA C651.

5.5.8.3. Tracer Wire Testing

Amherstburg Water Department shall perform a Tracer Wire Test once watermain installation is completed. The Contractor is responsible for repairing any disruptions found as a result of the Tracer Wire Test immediately.

5.6. OTHER

This section provides specifications for various infrastructure that may be required to be located within the municipal right-of-way or on municipal property owned by Amherstburg.

5.6.1. Sidewalk

Concrete sidewalks shall be constructed in accordance with OPSS 351 and OPSD 310. 010, 310.030, 310.031, 310.033, 310.039 as well as Detail R3. Sidewalks shall be constructed through driveways/entrances unless noted otherwise herein. Sidewalk jointing and finishing shall be as per Detail R8.

Sidewalks will be required in the following instances:

- on both sides of arterial roads; 2m wide sidewalk is recommended
- on both sides of collector roads; 2m wide sidewalk is recommended
- on both sides of residential streets which may lead to the location of a school or park; 2m sidewalk is recommended
- on both sides of residential streets (including cul-de-sacs and crescents) which do not lead to schools or parks; 2m sidewalk is recommended
- where there is a possibility of a requirement to provide continuity of sidewalk (single or both sides) to future developments;
- the location is shown on Detail CS-1, CS-2, and CS-3;
- all sidewalks shall be handicap accessible and include wheelchair access ramps at all intersections and curbed driveway approaches as per the applicable OPSS and AODA requirements
- where required, school bus "pick-up" pads shall be constructed in consultation with the respective school boards.

All sidewalks will be 125mm thick, 30 MPa concrete on 150mm Granular 'A' base. Sidewalks shall be constructed through driveways 150mm thick, 30 MPa concrete on a 150mm Granular 'A' base. Sidewalks in commercial areas will at a minimum match the thickness of the asphalt or concrete approach. All sidewalk construction in Amherstburg shall have horizontal broom finish with 3” smooth edging along both sides.

Minimum widths of sidewalks to provide minimum wheelchair turning radii is 1.5m.

Amherstburg encourages developers to consider installing multi-use pathways (up to 3m in width) in lieu of sidewalks on collector roads. This aligns with Amherstburg’s goal of encouraging active transportation throughout the town.

Sidewalk platforms, at intersection radii, shall be constructed in accordance with OPSD 310.030, 310.031, 310.033 and 310.039. All platforms, at crosswalk locations, shall have steel tactile plates as per OPSS 310.039, painted yellow.

The Developer shall install all sidewalks at the time of completion of the maintenance period for the underground works. Any review and approval of development drawings includes the requirement for tactile walking surface indicators at all municipal sidewalk curb ramps. Amherstburg and/or the Developer may require a delay in the schedule to install sidewalks based on the level of building activity and/or to allow for the

consolidation of utility trenches. Refer to Section 1.2.4.1. for details on Delay of Surface Asphalt and Sidewalks.

Developers will be responsible to maintain and repair damaged sidewalks for one year from Amherstburg's "acceptance of services". The Developer shall also include sidewalks shown on the lot grading sheets submitted to Amherstburg, prior to the issuance of building permits.

The Accessibility for Ontarians with Disabilities Act (AODA) was established in 2005 outlining accessibility standards for organizations, including Municipalities. Ontario Regulation 119/11, Accessibility for Ontarians with Disabilities Act (AODA), was amended by Ontario Regulation 413/12 to include Part IV.1, Design of Public Space Standards (Accessibility Standards for the Built Environment). The amendment to the regulation came into force January 1, 2013 and applies to public spaces that are newly constructed or redeveloped after January 1, 2016 by municipalities among other obligated organizations. The Act does not require existing sidewalks or wheelchair ramps to be retrofitted or replaced.

In order to comply with the Act requirements, the exterior path must have a minimum clear width of 1500 mm. Where the curb ramp is provided at a pedestrian crossing, it must have tactile walking surface indicators that:

- are metal,
- have raised tactile profiles,
- have a high tonal contrast with the adjacent surface (yellow in colour),
- are located at the bottom of the curb ramp, and
- follow OPSS.MUNI 351

5.6.2. Multi-Use Pathways

3.0m wide multi-use pathways (75mm asphalt thickness on 250mm Granular 'A') may be requested in lieu of concrete sidewalks. The base is to be 300mm wider than the asphalt on each side. Minimum HL4 base course asphalt is to be used.

5.6.3. Lot Grading Requirements

An overall lot grading plan for the subdivision is prepared by the Applicant's Consulting Engineer and is approved by the Engineering, Building Departments and ERCA. Where new developments outlet to natural water courses or municipal drains, ERCA may also review road grades and minimum structure opening elevations as they may relate to prescribed 1:100 flood line and flood plain criteria.

The elevation of the storm sewer should ensure gravity flow from future buildings and rear yard drains to the sewer main in the road. Existing drainage patterns from abutting

properties must not be blocked. The grading plan must ensure that existing overland flow routes are maintained (including overland flow routes for 1:100-year flows).

The Overall Lot Grading Plan is reviewed to ensure that the building grade elevations are set. The grade elevation difference between adjacent units shall be accommodated through maintainable slopes (i.e. 1 in 6) and driveway slopes shall not exceed 8% on private property and 4% within the municipal right-of-way. Consideration to existing sidewalk grades shall be used to determine appropriate slopes. Desirable allowable grade differences between adjacent lots shall be 150 mm. Where this cannot be provided, terracing, retaining walls, etc. may be required.

The Overall Lot Grading Plan also identifies those building lots that require a Certified Bearing Certificate by a Geotechnical Engineer. This Certificate confirms the allowable soil bearing pressure and are required where the future buildings may be on a previous municipal drainage ditch or low area that has been filled. This information is forwarded to the Building Department for their consideration for footing requirements.

After the sewers, watermain and road have been serviced, the as-built elevation of the sanitary service connections and the storm service connections shall be provided by the Applicant's Consulting Engineer to Amherstburg using a Private Drain Connection Sheet (PDC). When the builder comes in for an individual lot, these elevations are given to the builder for his use. The builder shall verify these elevations in the field prior to construction.

Building Department will provide a copy of the approved lot grading, sanitary service connection, and storm service connection to the permit holder at the time of the issuing of the building permit.

At least two (2) rear yard catch basins shall be installed by the builder on each lot typically near the rear corners. Amherstburg will consider reducing this requirement to at least one (1) rear yard catch basins shall be installed by the builder on each lot typically near the corners for four or more-unit townhomes. One of the catch basins must be installed at the end of the rear yard drainage piping for maintenance purposes. Catch basins are to be high density polyethylene, or concrete with an approved lid. The Applicant or Applicant's home builder will be responsible for the rear yard drainage system to the storm sewer connection at the street limit.

All homes must be designed to include a sump pump overflow.

The Building Department does a visual inspection of the rough grading once construction is complete to confirm that the intent of the lot grading has been satisfied. The permit holder shall have the elevation checked, by hiring an Ontario Land Surveyor at their expense for confirmation. The elevations shall be shown on a final grading sheet for each lot, submitted to the Building Department for final approval.

5.6.4. Cross Sections

Refer to Detail CS-1, CS-2, and CS-3.

5.6.5. Streetlighting and Hydro

The minimum criteria for the design of street lighting, power distribution and other services are noted below. All materials shall be compliant with Canadian Standards, as a minimum, and suitable for its intended application. The Consulting Engineer shall verify all existing services to the best of their knowledge and coordinate all new lighting, power distribution and communication services to avoid conflicts with other trades.

The Developer will be responsible to borne all costs associated with energization of the hydro appurtenances installed.

5.6.5.1. General

Every effort should be made to align street lights with side lot lines or lot lines between parcels. Designer shall follow Amherstburg's cross section details within this Manual.

Electrical ground grid or rods to be installed as per all applicable local codes, regulations and/or standards. Consideration should be made to future ground rod locations during the design stages of any development.

Amherstburg's preference (per the local 22m cross-section) is to design for all streetlights to be installed on one side of the street, and wherever possible, on the same side of the right-of-way as the sidewalks (where applicable). Distribution patterns may vary depending on the design application. Other distribution patterns may be accepted upon review of a complete photometric drawing submission to Amherstburg provided by Engineer.

If changes to the specific poles and fixtures noted in this Manual are required, the Designer shall contact Amherstburg with the Designer's recommendations to be approved prior to implementation.

All new subdivisions and/or roadways shall be designed with LED lighting.

The Developer is responsible for the illumination of all newly created intersections and roadways.

The joint IESNA (Illuminating Engineering Society North America) and IDA (International Dark Sky Association) societies MLO (Model Lighting Ordinance) BUG system (Backlight-Uplight-Glare) was implemented to provide a more accurate and consistent rating system for light fixtures that will provide enhanced control with glare and light trespass and will reduce overall light pollution than the conventional full, semi and non "cut-off" rating system. The BUG system was released as an IES Technical

Memorandum TM-15. The BUG rating system employs zones of intended use and evaluates the desired light fixture by % of total lumens at various angles in specified defined quadrants that represent backlight, up light and glare.

The Consulting Engineer will attempt to implement fixtures that will be rated in accordance with the joint IDA and IES lighting design guideline to minimize light pollution and to better evaluate the proposed light fixture, utilizing fixtures that are compliant with the ratings of the zone intended for use.

5.6.5.2. Minimum Design Criteria

Street lighting design shall be based on road and pedestrian classification as defined by the authority having jurisdiction. Classifications may be found within the Illuminating Engineering Society of North America (IESNA) standards for roadway lighting (RP-8-00), luminaire classification system for outdoor luminaires (TM-15-11) and/or the TAC guide book. The Consulting Engineer is responsible to review the latest edition of all codes and standards to ensure all lighting levels, intensity and uniformity ratios are achieved.

Photometric plans and lamp specifications shall be submitted for review of development applications when specified by Amherstburg and will form part of development approval agreements.

Photometric values shall be shown within the entirety of the right-of-way in streetlight design drawings submitted for approval.

The approved streetlight poles and fixtures to be used within Amherstburg are noted below:

Table 8 - Streetlight Specifications

Streetlight Style	Pole	Fixture
Cobra Head	25 ft Class A round grey street light pole by StressCrete Limited (Pole Order Number E-250-APR-G-MOO S/F 120)	NXT-S Series LED fixtures (Example order # NXT-36S-0-7-2ES-5-GY-3-UL-S-2H)
Cobra Head	30 ft Class A round grey street light pole by StressCrete Limited (Pole Order Number E-300-APR-G-MOO S/F 120)	NXT-L Series LED fixtures (Example order # NXT-48M-0-7-2ES-6-GY-3-UL-S-2H)
Decorative	Octagonal fluted Midnight Lace 20 ft tall pole by StressCrete Limited (Example KTH18-G-E10)	King Luminaire Decorative fixture (Example - K118R-R1AR-III-60SSL-1042-120:277-K14-PE7-SST-4K)

The following guiding principles and techniques are to be adopted for the lighting of private and public lands, and applied consistently to obtain development approvals:

- Contribute to personal safety
    - Locate lamps so as to avoid glare
    - Provide additional shielding of lamp fixtures to avoid glare
    - Provide uniform lighting without sudden light to dark transitions
    - Provide overlap of light distribution
    - Provide illumination to articulate steps
    - Coordinate spacing and height of lamps with landscaping to ensure lighting coverage is not interrupted
- Support the supervision of secure areas
    - Provide good colour rendering for identification purposes using acceptable street lighting standards
    - Provide sufficient lighting coverage including building recesses or inside corners
- Assist in way finding
    - Provide illumination to improve legibility of notes, landmarks and circulation areas
    - Align lamps in consistent, recognizable and unambiguous patterns
    - Provide a uniform and modest brightness along paths of travel
- Conserve energy
    - Employ alternatives to best conserve energy
    - Dim down lighting to minimum levels after normal operating hours (where required/ requested)
- Preserve the experience of the night sky
    - Light pollution is considered undesirable and many feel that it reduces the enjoyment of night sky.
    - Provide full cut-off lighting (zero percent of peak intensity radiating above 90 degrees and 10 percent of peak intensity above 80 degrees) or employ low cut-off where full cut-off lighting alternatives are not feasible, as approved by Amherstburg. As LED fixtures can't be fully evaluated in terms of full, semi-cutoff or non-cutoff terms, and as the movement towards anti-light pollution increases, a new system has been implemented jointly by IESNA and IDA to evaluate luminaires. The MLO (Model Lighting Ordinance) uses the BUG (note 8) rating of the fixture shall follow TM-15, issued by IESNA and IDA.
    - For all area lighting, luminaries should be equipped with devices for re-directing light such as shields, visors or hoods.
    - Beacon lights are strongly discouraged unless the application requires such lighting, and as approved by Amherstburg.
- Respect the privacy of residential space

    - Locate lamps to direct light away from neighbouring properties
    - Provide supplementary shielding of lamps to direct light away from neighbouring properties
    - Provide lamp fixture mounting heights that avoid glare to the vantage point of neighbouring residential units
    - Provide recessed light fixtures that avoid glare to the vantage point of neighbouring residential units
- Respect animal habitat
    - Direct illumination away from abutting Municipal Parks and naturalized areas on abutting private lands
- Heighten the enjoyment of public space and night time activity
    - Provide minimum illumination to encourage night time use
    - Minimize glare using shielding of fully recessed light fixtures, as required
    - Reveal the salient features of a site using a combination of diffused and spot lighting

Fully shielded is assumed in all references.

Luminaires will be full cut-off unless otherwise provided with IESNA BUG rating.

5.6.5.3. Hydro Distribution

The power distribution system consisting of the primary and secondary power feeders, transformers and underground infrastructure shall be designed in accordance with the appropriate power supply authority requirements. The Developer is responsible to obtain the approval of the appropriate power supply authority prior to construction.

5.6.6. Utilities

Utility Services such as, but not limited to, voice, data and television shall be coordinated by the Consulting Engineer unless otherwise advised. These services and associated conduit routing shall be clearly identified in road crossings, on cross-sections, etc.

5.6.7. Tree Planting

The Developer will pay Amherstburg in the amount of $600 per unit within the subdivision, prior to construction of any such phase, for the planting of a tree of at least 60mm caliper in accordance with the Amherstburg's Tree By-law. This requirement will be specified in the subdivision agreement for the lands.

The trees will be installed by Amherstburg on the lots where homes have been constructed and the front and side yards have been seeded and sodded, once per year annually in the fall. The trees will be planted on municipal property at a location selected by Amherstburg.

Tree planting requirements shall also be applicable for newly created lots through consent.

Inquires related to the tree planting process for new development should be directed to Amherstburg's Manager of Roads and Fleet.

5.6.8. Pavement Markings, Information, and Regulatory Signs

A "traffic signing plan" listing all signs and locations and pavement markings is to be submitted for Amherstburg's approval by the Developer's Consulting Engineer. The Manager of Engineering will make the final determination on the scope of this work.

Amherstburg will be responsible for the installation of all new regulatory, warning and street name signs in accordance with all applicable Ontario Traffic Manuals.

All stormwater management facilities are required to have signage to identify the following information to the public:

- That the site contains a stormwater management facility
- Any potential hazards and limitations of water use
- The purpose of the facility
- ECA approval number and/or asset ID
- Owner's contact information

The Developer shall pay for all required signs including "no parking" signs as per Amherstburg's User Fee by-law. The Consulting Engineer must provide Amherstburg with a sign layout plan for review and approval. This plan must include locations of all signs to be used.

No existing signs are to be removed without Amherstburg's written approval.

Dead end barriers shall be constructed at all temporary cul-de-sacs and/ or ends of roadways, which are to be extended in subsequent phases by the Developer.

Signage will be used to designate "no parking" areas. Stop bars are required only at intersections with arterial or collector roads. For arterial and collector roads, stop bars shall be two component cold extruded polymer material. For local residential streets, organic solvent-based or latex-based painted stop bars will be accepted.

The Developer will arrange and be responsible for the cost of all paint markings.

5.6.9. Mailbox Locations

Locations for Community Mailboxes (CMB) must be coordinated and approved by Canada Post and Amherstburg. Mailboxes shall be located on collector roads whenever possible. Car bays shall be incorporated into the right-of-way design for all CMB locations on collector roads.

Specifications for the construction of concrete pads and installation of CMBs must be obtained from Canada Post by the Developer's Consultant and included in the drawing set. The location of CMBs must be approved prior to installation of sidewalk.

5.6.10. Public Works Permits

Any person who will be undertaking activity on Town Highways, Right of Ways or Road Allowances (utility installation, driveway approaches, etc.) shall be required to make application for a Public Works Permit.

An application must be completed and submitted to Amherstburg's Public Works Department prior to commencement of any work.

The Applicant shall:

1. Complete the prescribed application form and identify the Permit being applied for;
2. Provide complete details of the Activity that shall include, but not be limited to the specifications outlined on the application and any attached schedules;
3. Provide a detailed Traffic Control Plan if required;
4. Pay the non-refundable Permit fee by certified check or debit at the Public Works Building;
5. Provide such other information as required by the Director.

A Permit shall not be issued until proof of Insurance and indemnification in accordance with the requirements of this by-law is received.

Indemnity deposit is received by Amherstburg to cover the faithful performance of the terms of the permit including maintenance, repair and restoration carried out by the permit Holder and every other obligation arising under and imposed upon the permit holder.

An emergency contact telephone number for the permit holder is provided. The permit holder shall maintain and answer a telephone at all times during the period for which the permit holder is responsible for the activity.

When the applicant is requesting multiple road cuts, Amherstburg reserves the right to issue a single permit or multiple permits dependant on the nature of the activity.

If it is the intent of the applicant to complete activity within a right-of-way that is minor (at the discretion of the Director) and of short duration, (i.e. does not cause any disruption to traffic flows, does not break ground and does not create a potential for damages to existing utilities) then a permit may not be required.

The permit shall become void if the activity authorized by the Permit is not commenced within six (6) months of the date of issue.

Any person required to renew and/or extend a Permit shall submit a new application form to the Director of Infrastructure Services.

The Director of Infrastructure Services reserves the right to issue or deny issuing any permit.

A permit granted by the Director of Infrastructure Services may be revoked whenever, in their discretion, the permit holder of such permit is in non- compliance with its terms or there are concerns for the safety of the public.

5.6.11. Driveways

All new and modified residential, commercial, industrial and institutional driveways; with or without curb cuts and culverts located on municipal roads within Amherstburg must conform with the Driveway Alteration and Installation Policy.

Applicant will be responsible to upgrade existing sidewalks from 150 mm thickness to 150 mm thickness at the time of driveway construction as well as replace any damaged (cracked, settled, etc.) sidewalk panels.

Sidewalks will extend straight through all driveways, concrete, asphalt, paving, stone or coloured concrete driveways (existing or new). For non-coloured concrete driveways, the Applicant will define the sidewalk across the driveway using an expansion joint, dummy joint or sawcut along with edging to match sidewalk detail.

5.6.12. Restoration & Landscaping

Restoration of all boulevard areas disturbed as a result of the construction of site services shall be completed to match the existing conditions or better, but not less than 100mm topsoil and sod for existing maintained lawn areas.

The Developer must have a landscape plan prepared by a professional landscaping firm and it is to be reviewed and approved by Amherstburg. All landscaping proposed within the municipal right-of-way shall require low/no maintenance.

5.6.13. Backfill and Compaction

Trench backfill and compaction shall generally be in conformance with the minimum requirements outlined in OPSS MUNI.401, OPSS MUNI.402, OPSD 802.010, OPSD 802.013, OPSD 802.020, OPSD 802.023, OPSD 802.030, OPSD 802.031, OPSD 802.032, OPSD 802.033, OPSD 803.010, and the Excess Soil Regulation (O. Reg 406/19).

For all open cut trenches within the road (back of curb to back of curb) approved granular shall be used. Granular trench backfill should be brought up 50mm-100mm

above subgrade. This process is to ensure that during road cut operations, granular trenches are fully exposed in the subgrade.

Based on site specific soil conditions, geotechnical recommendations for alternative degrees of native backfill compaction should be confirmed by a qualified geotechnical engineer.

Only recycled material approved by the Province and Amherstburg may be used. Amherstburg reserves the right to request engineered and environmental reports on the acceptability of the recycled material for specific intended uses at the Developer's expense.

5.6.14. Culverts

In ditched ROWs, driveway culverts are required (other than at highpoints). All culverts shall be new; corrugated/ribbed steel (CSP) or High-Density Polyethylene 320 KPA (Boss 2000) pipe; diameter and length to be specified by Amherstburg.

Culverts shall be backfilled with a minimum compacted base of 100 mm of Granular "A" and cover of 150 mm Granular "A."

Minimum culvert width of 6.1 metre laid on a minimum compacted thickness of 150 mm of approved backfill material, in accordance to OPSS.

Enclosures of abutting open roadside ditches shall be required for new developments, additions and/or alterations to existing properties. Ditch enclosures shall be constructed in accordance with the specifications in this Manual. All culverts shall include catch basins to capture stormwater run-off from existing roadside drainage patterns.

Driveway side slopes should be graded to a maximum of 1.5:1 from the entrance platform to the ends of the culvert invert at the bottom of the ditch with gabion stone. Headwalls may also be approved at Amherstburg's discretion.

Driveways installed over an open Municipal Drain shall require the culvert design and construction approvals to be completed through the procedures of the Drainage Act.

5.6.15. Fencing

The height, type, and construction details of all fences required to be installed as part of the development are to be shown in the design drawings. Required fencing locations are to be determined by Amherstburg's Zoning By-law and Official Plan.

5.6.16. Entrance Features

Entrance feature shall be defined as a permanent sign and all surrounding landscaping that displays the name of the residential, commercial, or industrial subdivision located at the primary entrance of the development.

Amherstburg is generally not supportive of proposals for entrance features.

All entrance features proposed within Amherstburg are subject to review by Planning & Public Works. All entrance features that are proposed are not guaranteed approval.

All entrance features proposed within the municipal right-of-way are required to be low/no maintenance and display zero conflicts with essential municipal services being constructed in the development. Essential municipal servicing shall not be modified or deviate from the standards of this Manual to accommodate an entrance feature. Minimal plantings shall be included in the design of the entrance feature. Electrical service or water supply shall not be permitted to be used within the entrance feature.

The entrance feature shall be subject to the regulations outlined in Amherstburg's Sign By-law.

Upon expiration of the maintenance period of the entrance feature, the entrance feature shall become Amherstburg's property and maintained by the Public Works Department.

5.6.17. Parks

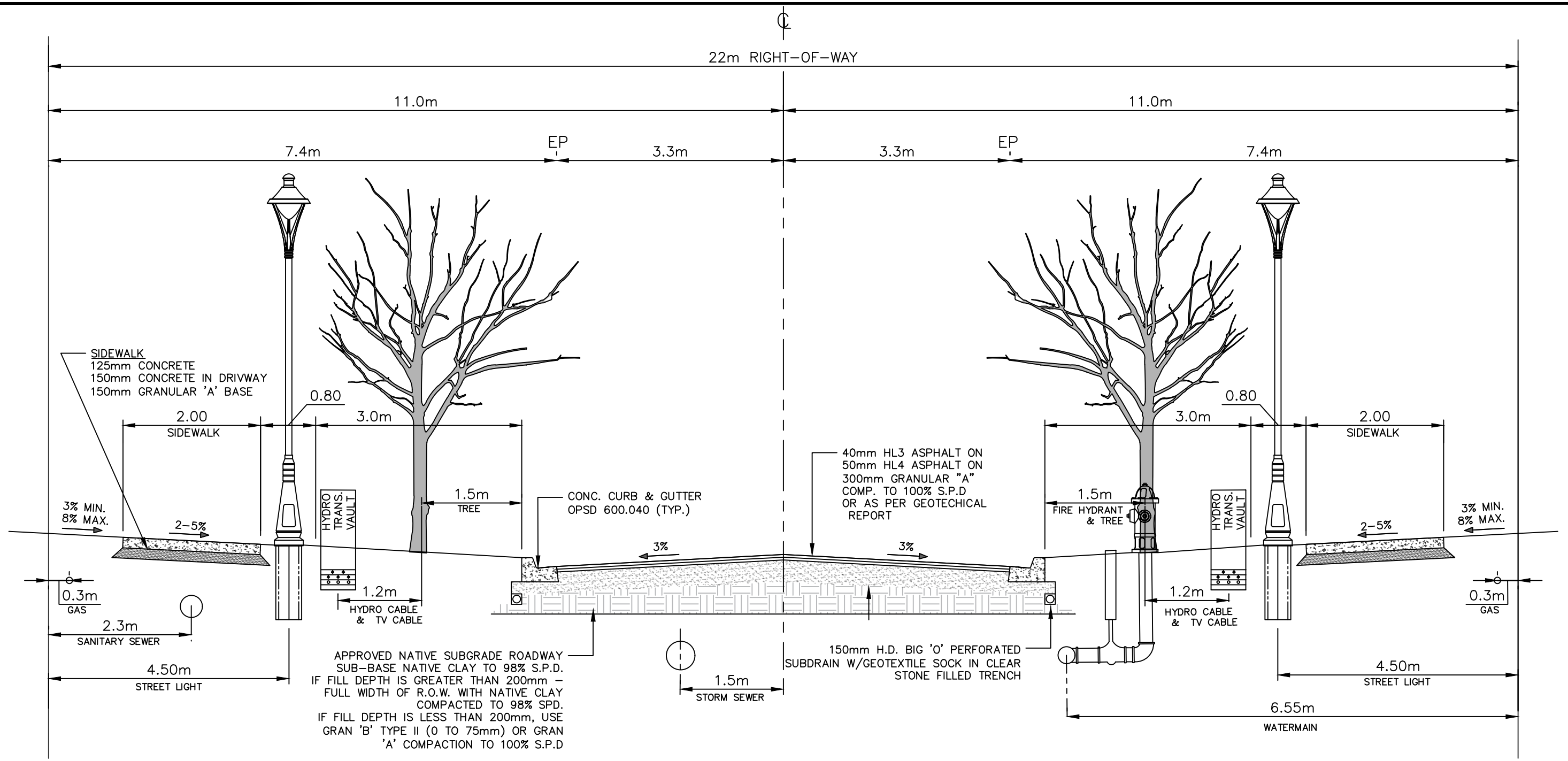
All parkland properties will require full municipal servicing to be installed to the property line for future development of the park amenities.

6.0 TRANSITION POLICY

The requirements within the Infrastructure Standards Manual shall take effect within 30 days of the date of the amendment noted in the footer of each page. For all previously executed development agreements, the requirements for the conditions of the agreements shall apply. For all future phases of development, the requirements of the Infrastructure Standards Manual shall apply unless superseded by specific development requirements in a new development agreement.

APPENDIX A

DETAILS



TYPICAL 22.0m R.O.W. CROSS SECTION
N.T.S

ADDITIONAL NOTES:

1. FINAL LOCATION OF UTILITIES MAY VARY DEPENDING ON UTILITY COMPANY AND ON SITE SPECIFICS REQUIREMENTS. FINAL POSITIONING OF UTILITY INFRASTRUCTURE SHALL BE VERIFIED BY A REPRESENTATIVE OF THE TOWN OF AMHERSTBURG.
2. 3.0m MULTI-USE PATHWAYS (75mm ASPHALT THICKNESS ON 250mm GRANULAR 'A') MAY BE REQUESTED IN LIEU OF CONCRETE SIDEWALK. THE BASE IT TO BE 300mm WIDER THAN THE ASPHALT ON EACH SIDE. MINIMUM HL4 BASE COURSE ASPHALT IT TO BE USED.
3. ALL SANITARY AND STORM SERVICES SHALL INCLUDE A TEE CLEANOUT AT PROPERTY LINE. ALL CLEANOUTS SHOULD PROJECT 300mm ABOVE FINISHED GRADE AND COLOUR CODED FOR INSPECTION. ONCE INSPECTION IS COMPLETE THE CLEANOUT SHOULD BE CUT, CAPPED AND BURIED 150mm-300mm BELOW FINISHED GRADE.
4. WATER SERVICE TO BE SET AT PROPERTY LINE.
5. EXPOSED SUB-BASE SHALL BE PROOF-ROLLED IN THE PRESENCE OF A GEOTECHNICAL ENGINEER TO VERIFY SUITABILITY.
6. SPARE CONDUIT SHALL BE INSTALLED WITHIN THE JOINT USE DUCT BANK AS PER TOWN OF AMHERSTBURG INFRASTRUCTURE STANDARDS MANUAL.
7. ON-STREET PARKING BAYS MAY BE REQUIRED TO BE INCORPORATED INTO THIS CROSS SECTION AT THE DISCRETION OF TOWN FACILITATE THROUGH CURB BUMP OUTS, PAINT AND SIGNAGE WHERE FEASIBLE

NO.	REVISIONS	BY	DATE

DESIGNED	JD
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APPROVED	TH
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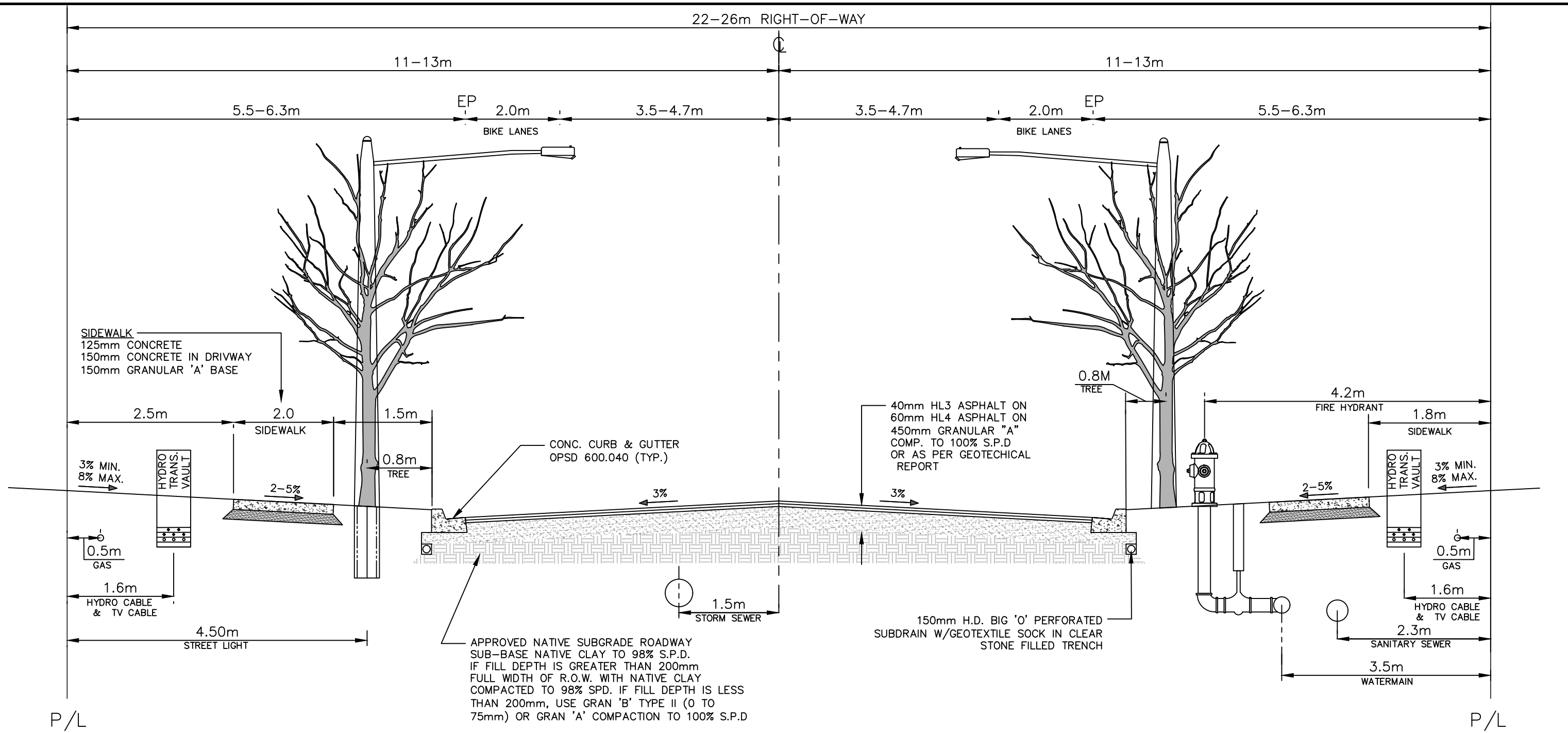
SCALE	N.S.

TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

FIGURE CS-1
TYPICAL ROAD CROSS SECTION
22.0m R.O.W. - LOCAL ROAD



TYPICAL 22.0m R.O.W. CROSS SECTION

N.T.S

ADDITIONAL NOTES:

1. FINAL LOCATION OF UTILITIES MAY VARY DEPENDING ON UTILITY COMPANY AND ON SITE SPECIFICS REQUIREMENTS. FINAL POSITIONING OF UTILITY INFRASTRUCTURE SHALL BE VERIFIED BY A REPRESENTATIVE OF THE TOWN OF AMHERSTBURG.
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3. ALL SANITARY AND STORM SERVICES SHALL INCLUDE A TEE CLEANOUT AT PROPERTY LINE. ALL CLEANOUTS SHOULD PROJECT 300mm ABOVE FINISHED GRADE AND COLOUR CODED FOR INSPECTION. ONCE INSPECTION IS COMPLETE THE CLEANOUT SHOULD BE CUT, CAPPED AND BURIED 150mm–300mm BELOW FINISHED GRADE.
4. WATER SERVICE TO BE SET AT PROPERTY LINE.
5. EXPOSED SUB–BASE SHALL BE PROOF–ROLLED IN THE PRESENCE OF A GEOTECHNICAL ENGINEER TO VERIFY SUITABILITY.
6. SPARE CONDUIT SHALL BE INSTALLED WITHIN THE JOINT USE DUCT BANK AS PER TOWN OF AMHERSTBURG INFRASTRUCTURE STANDARDS MANUAL.
7. CURB INLETS CATCH BASINS ARE TO BE INSTALLED WHEN BIKE LANES ARE PRESENT

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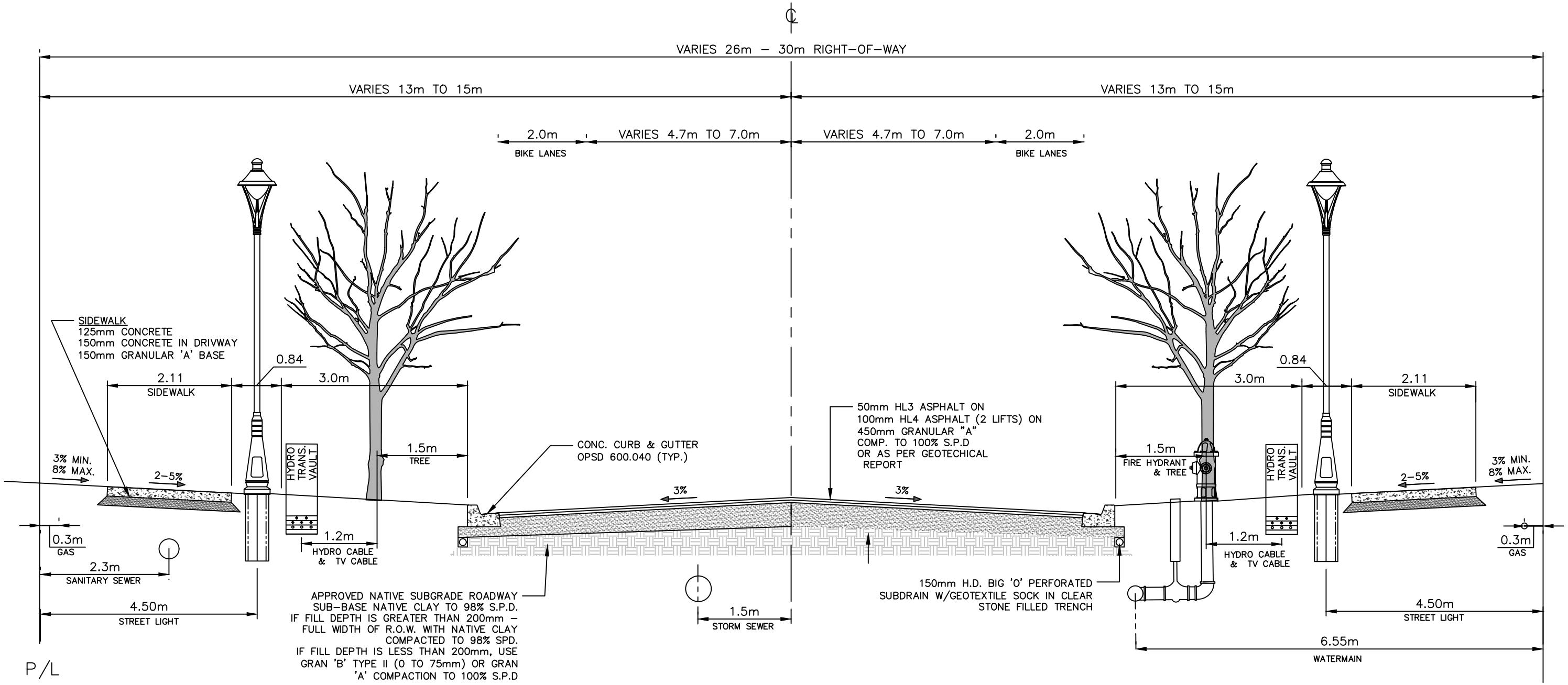
FIGURE CS-2
TYPICAL ROAD CROSS SECTION
22-26m R.O.W. - COLLECTOR



TYPICAL 26m – 30m R.O.W. CROSS SECTION
N.T.S

ADDITIONAL NOTES:

1. FINAL LOCATION OF UTILITIES MAY VARY DEPENDING ON UTILITY COMPANY AND ON SITE SPECIFICS REQUIREMENTS. FINAL POSITIONING OF UTILITY INFRASTRUCTURE SHALL BE VERIFIED BY A REPRESENTATIVE OF THE TOWN OF AMHERSTBURG.
2. 3.0m MULTI–USE PATHWAYS (75mm ASPHALT THICKNESS ON 250mm GRANULAR 'A') MAY BE REQUESTED IN LIEU OF CONCRETE SIDEWALK. THE BASE IT TO BE 300mm WIDER THAN THE ASPHALT ON EACH SIDE. MINIMUM HL4 BASE COURSE ASPHALT IT TO BE USED.
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4. WATER SERVICE TO BE SET AT PROPERTY LINE.
5. EXPOSED SUB–BASE SHALL BE PROOF–ROLLED IN THE PRESENCE OF A GEOTECHNICAL ENGINEER TO VERIFY SUITABILITY.
6. SPARE CONDUIT SHALL BE INSTALLED WITHIN THE JOINT USE DUCT BANK AS PER TOWN OF AMHERSTBURG INFRASTRUCTURE STANDARDS MANUAL.

** SERVICE CORRIDOR OFFSETS TO BE CONFIRMED WITH MANAGER OF ENGINEERING

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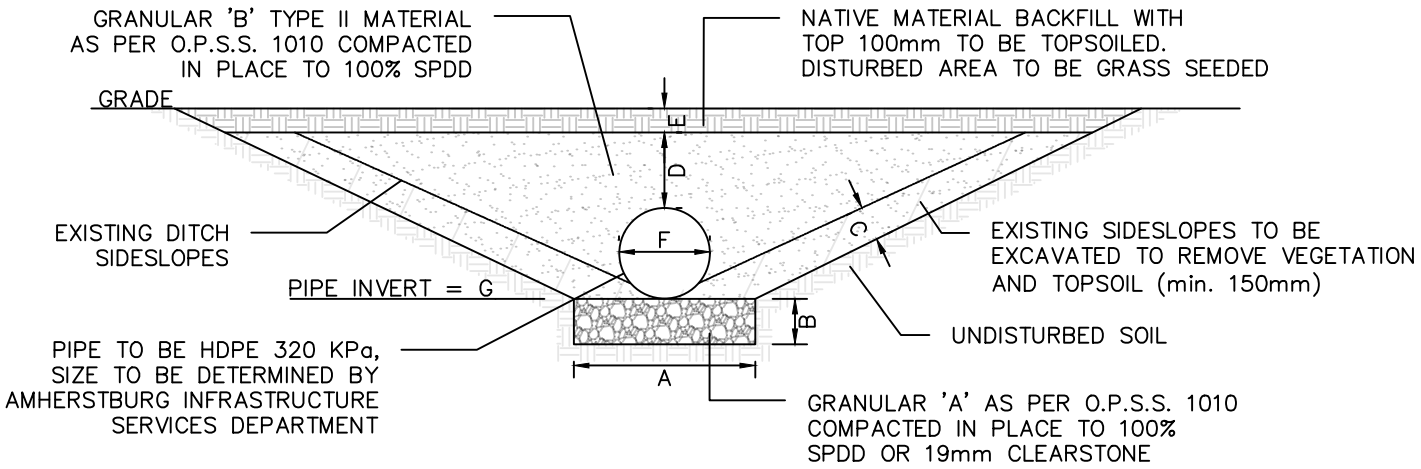
FIGURE CS-3
TYPICAL CROSS-SECTION
FOR ARTERIAL ROAD
26m - 30m RIGHT-OF-WAY



DIMENSIONS
A = DIAMETER OF PIPE + 300mm
B = 150mm
C = 150mm (min.)
D = 150mm (min.) (FOR DRIVEWAYS SEE BELOW)
E = VARIES + 100mm TO BRING GRADE TO FINISHED ELEVATION FOR DRIVEWAYS (SEE BELOW)
F = DIAMETER OF PIPE TO BE VERIFIED BY THE TOWN OF AMHERSTBURG PUBLIC WORKS OFFICE
G = GENERALLY BOTTOM OF EXISTING DITCH, MUST BE VERIFIED BY PUBLIC WORKS DEPARTMENT

NOTES:
FOR DRIVEWAY ENCLOSURES "E" MUST BE 300mm OF GRANULAR 'A' MATERIAL WITH "D" BEING GRANULAR 'B' TYPE II MATERIAL COMPACTED TO 100% STANDARD PROCTOR DRY DENSITY

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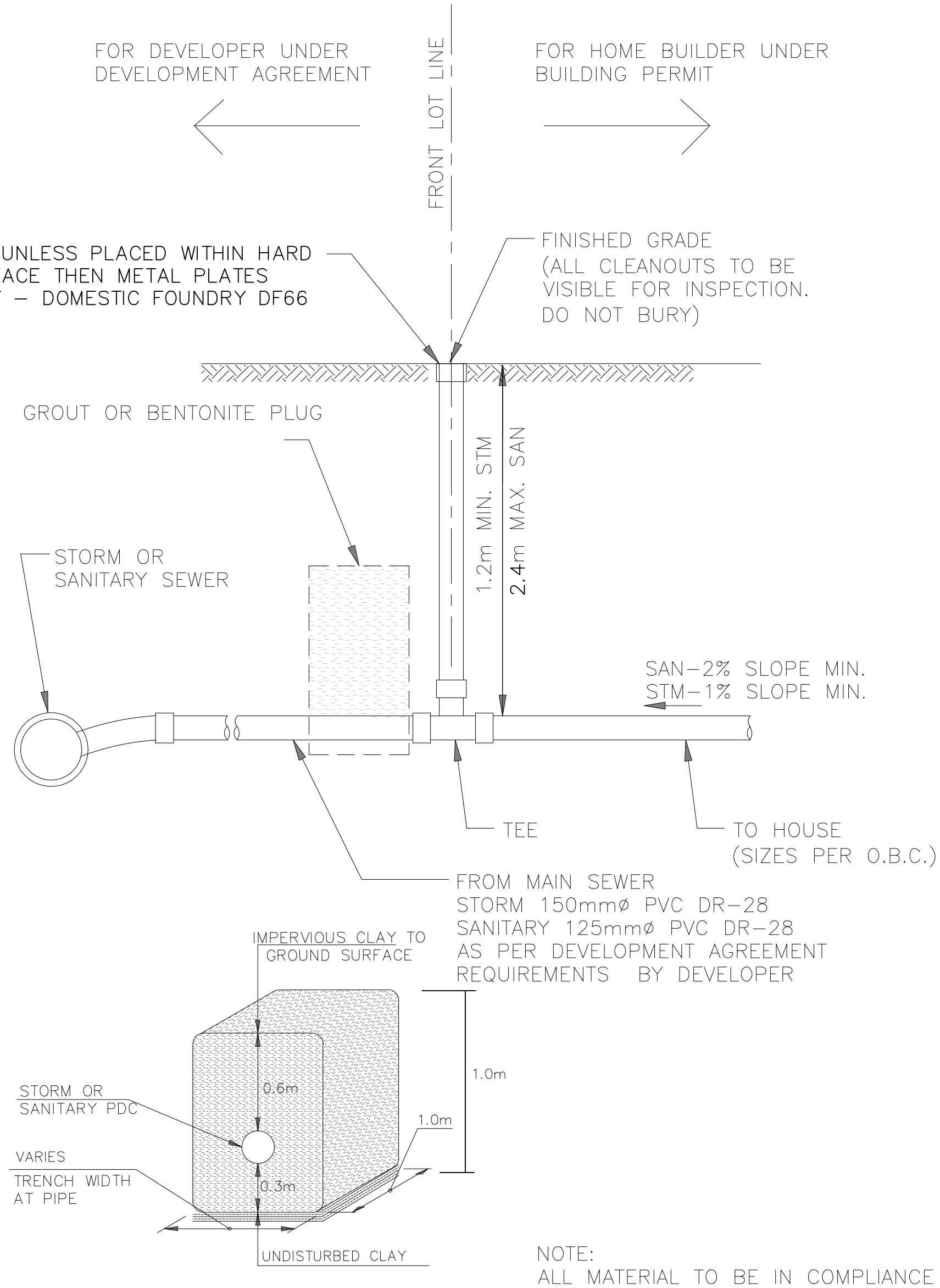
FIGURE R-1
TYPICAL CROSS-SECTION FOR DITCH ENCLOSURES



NOTE:
ALL MATERIAL TO BE IN COMPLIANCE WITH O.B.C. AND INSTALLED AS PER MANUFACTURERS RECOMMENDATIONS

GROUT OR BENTONITE PLUG DETAIL FOR SERVICES

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INFRASTRUCTURE STANDARDS MANUAL

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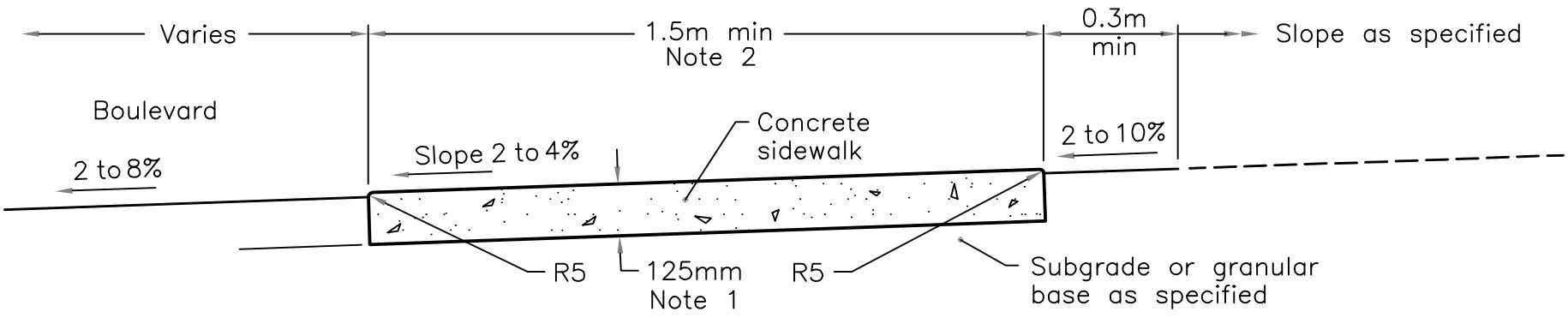
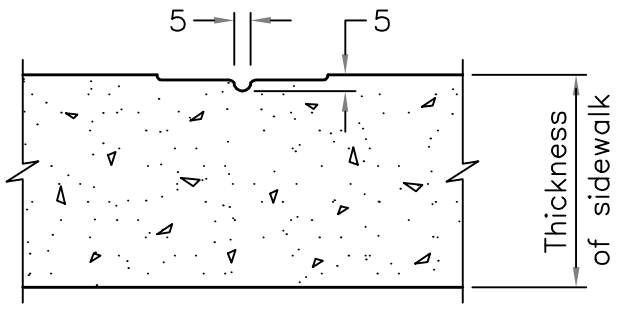
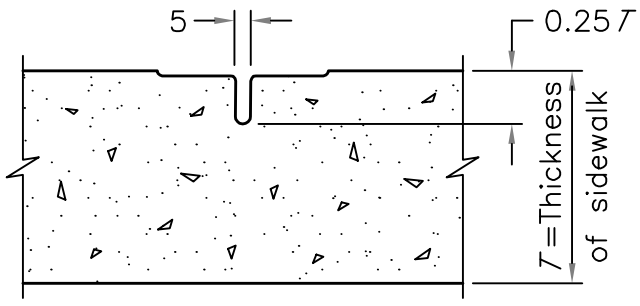
FIGURE R-2
CLEAN-OUT DETAIL



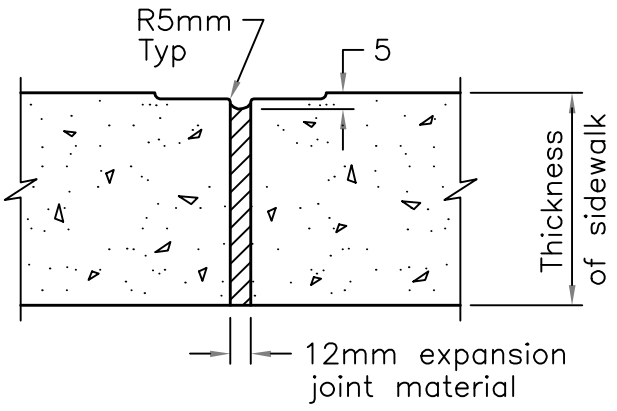
TYPICAL SECTION



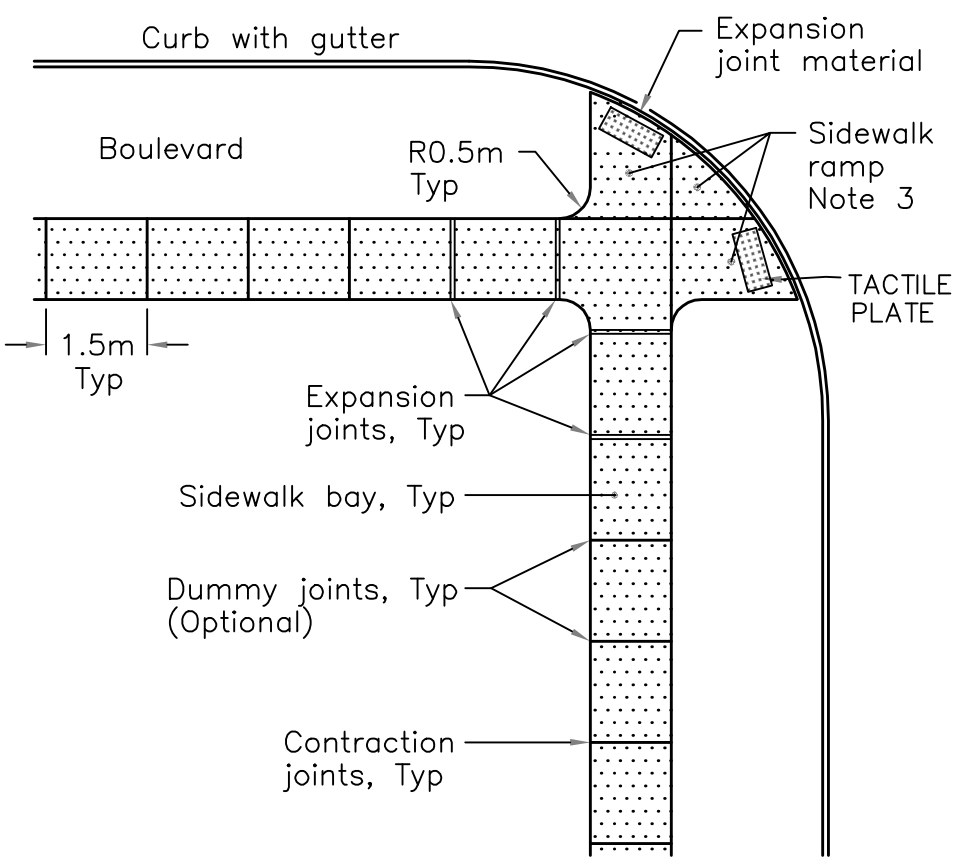
DUMMY JOINT (OPTIONAL)



CONTRACTION JOINT (Note 4)



EXPANSION JOINT



JOINT LAYOUT

NOTES:

1. SIDEWALK THICKNESS AT RESIDENTIAL DRIVEWAYS AND ADJACENT TO CURB SHALL BE 150mm. AT COMMERCIAL AND INDUSTRIAL DRIVEWAYS, THE THICKNESS SHALL BE 200mm.
2. SIDEWALK WIDTH SHALL BE WIDER WHEN SPECIFIED
3. THIS DETAIL SHALL BE READ IN CONJUNCTION WITH OPSD 310.030, 310.031, 310.033, AND 310.039
4. CONTRACTION JOINT MAY BE TOOLED OR SAWCUT.
5. EXPANSION JOINTS ARE REQUIRED EVERY FIVE PANELS AND ON ALL FOUR SIDES WHERE A DRIVEWAY ABUTS A SIDEWALK.

ALL DIMENSIONS AND ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

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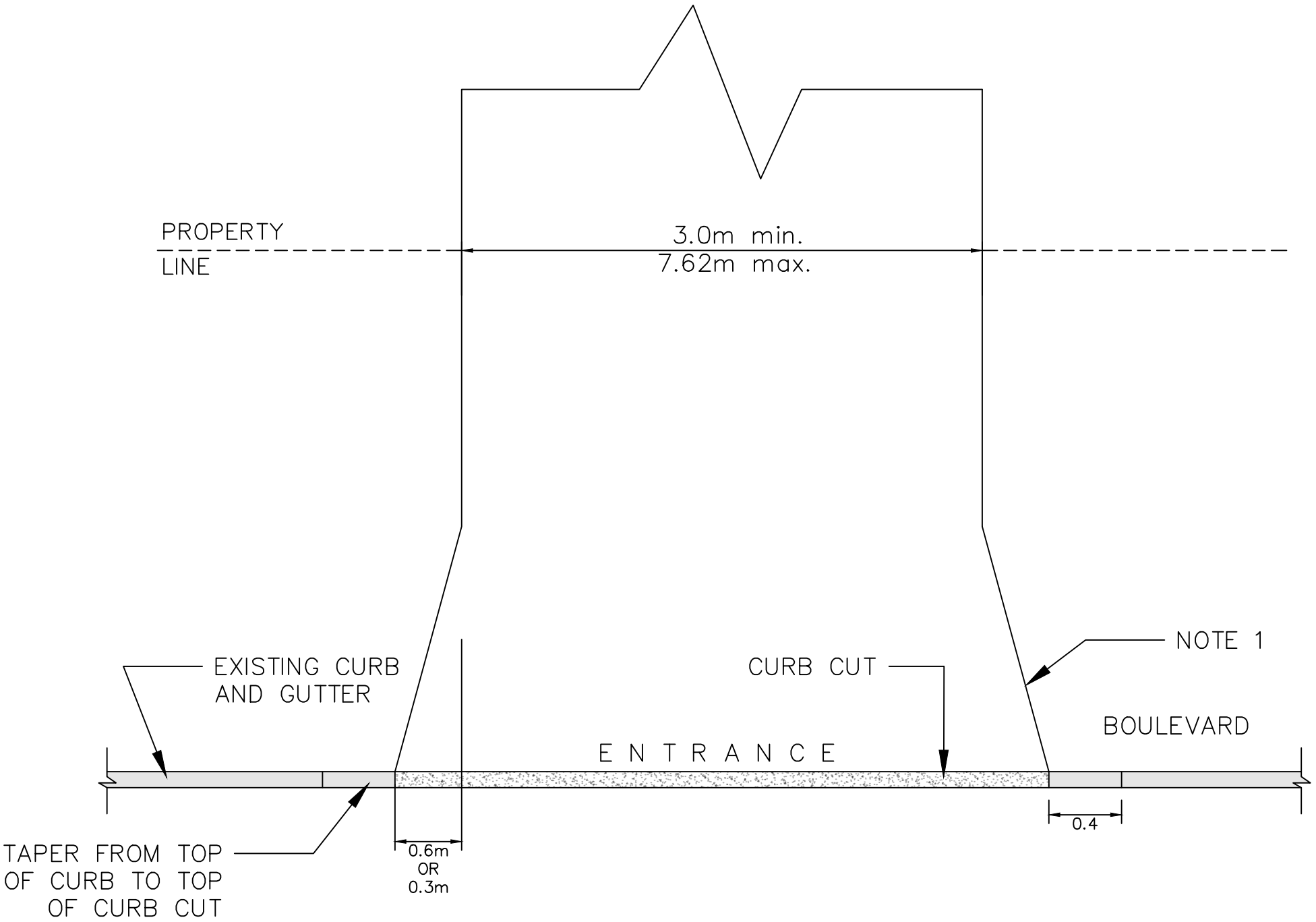
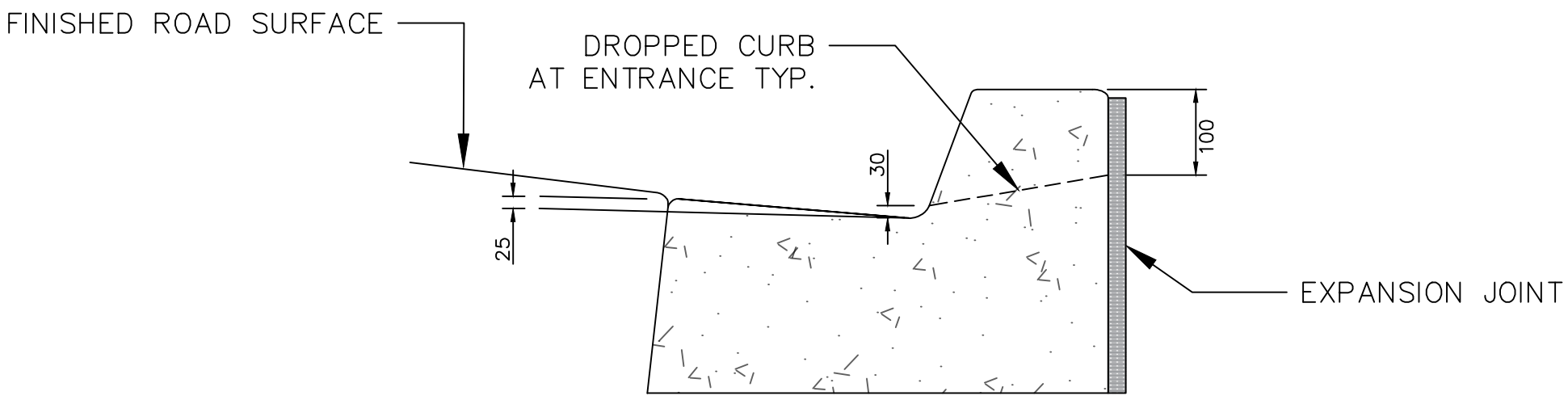
FIGURE R-3
CONCRETE SIDEWALK
WHEELCHAIR RAMP



PLAN



NOTES:

1. DRIVEWAY WIDTHS BETWEEN 3.0m AND 6.0m TO HAVE A 0.60m WIDE FLARE, DRIVEWAY WIDTHS OVER 6.0m TO HAVE 0.3m WIDE FLARE

2. DRIVEWAYS LOCATED NEAR STREET INTERSECTIONS MUST HAVE 8.0m CLEAR SITE DISTANCE FROM INTERSECTION PROPERTY CORNER TO NEAR EDGE OF DRIVEWAY FLARE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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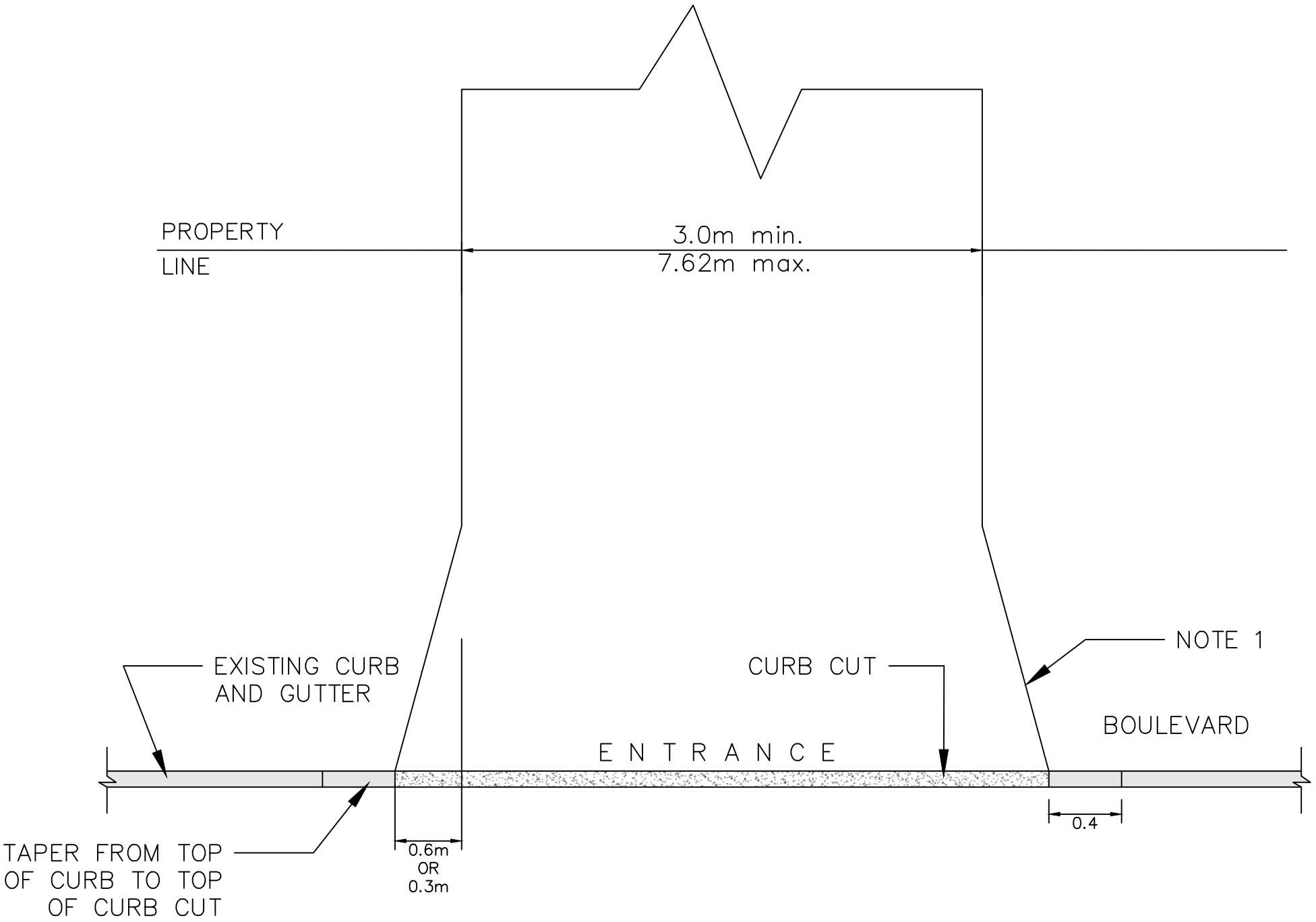
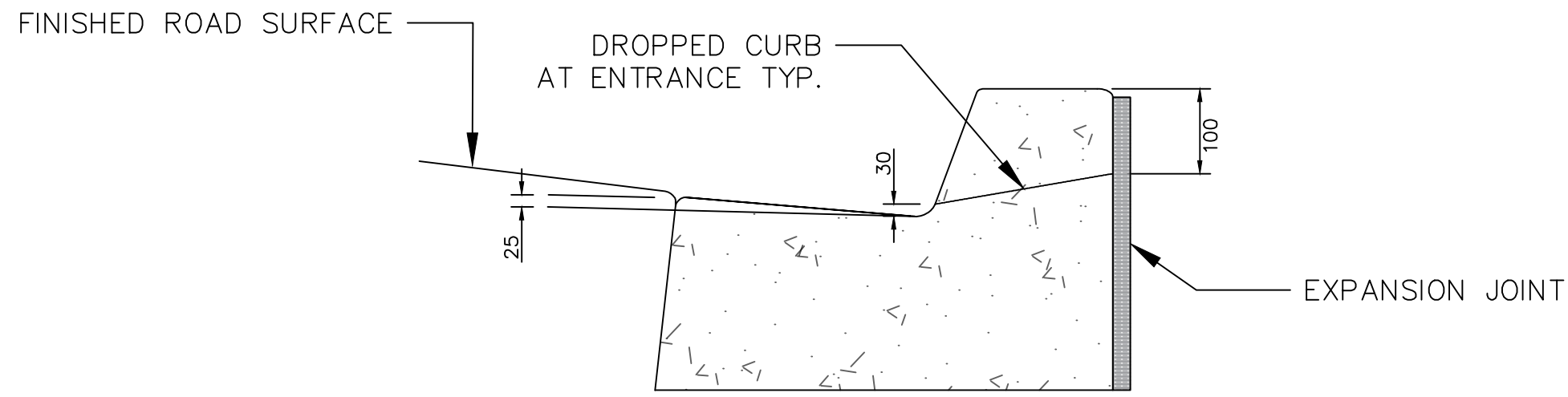
FIGURE R-5
TYPICAL DRIVEWAY CURB CUT
CONCRETE BARRIER CURB



PLAN



NOTES:

1. DRIVEWAY WIDTHS BETWEEN 3.0m AND 6.0m TO HAVE A 0.60m WIDE FLARE, DRIVEWAY WIDTHS OVER 6.0m TO HAVE 0.3m WIDE FLARE

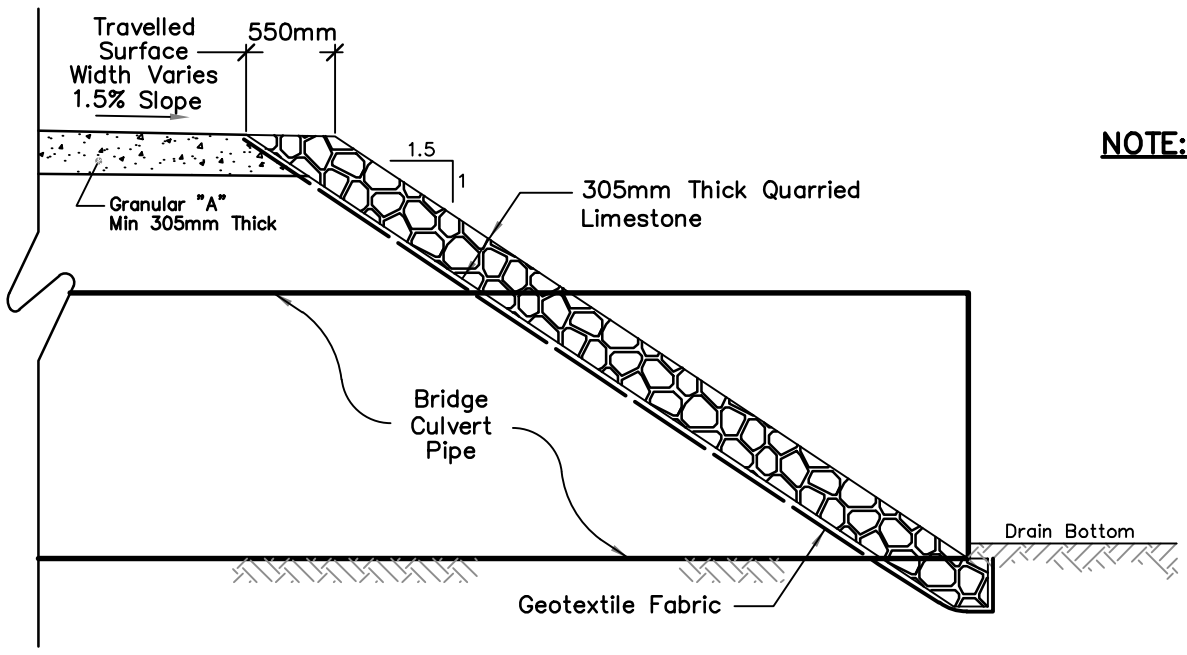
2. DRIVEWAYS LOCATED NEAR STREET INTERSECTIONS MUST HAVE 8.0m CLEAR SITE DISTANCE FROM INTERSECTION PROPERTY CORNER TO NEAR EDGE OF DRIVEWAY FLARE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

DESIGNED	JD
DRAWN	JD
CHECKED	SD
APPROVED	TH
DATE	2023-12-12
SCALE	N.S.

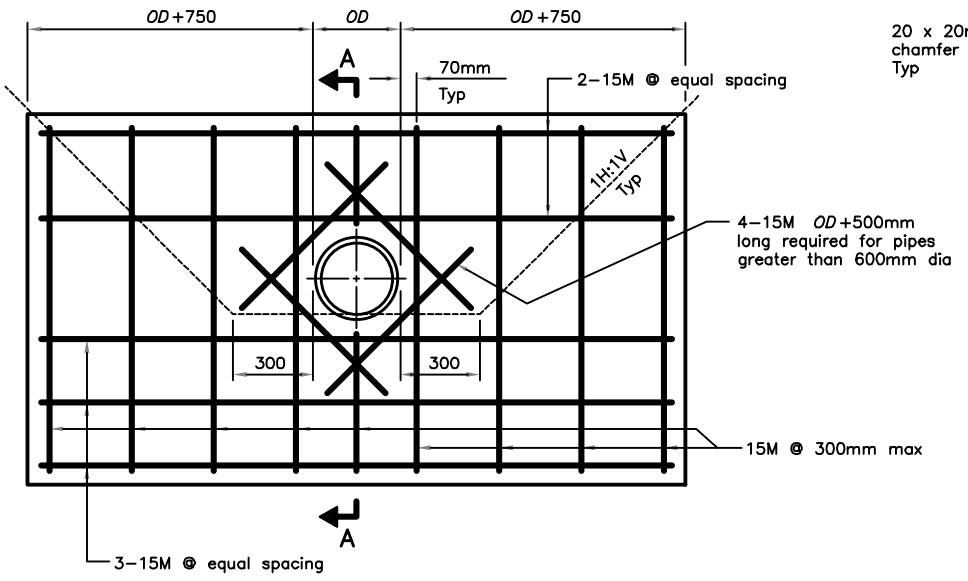
FIGURE R-5
TYPICAL DRIVEWAY CURB CUT
CONCRETE BARRIER CURB



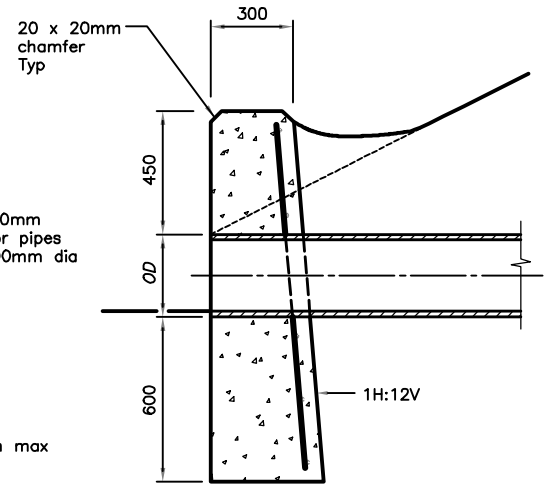
NOTE:

1. Size of Quarried Limestone to be 100mm to 250mm
2. Geotextile Fabric to be GMN 160 OPSS CLASS I or Equal

TYPICAL QUARRIED LIMESTONE END PROTECTION



FRONT ELEVATION



SECTION A–A

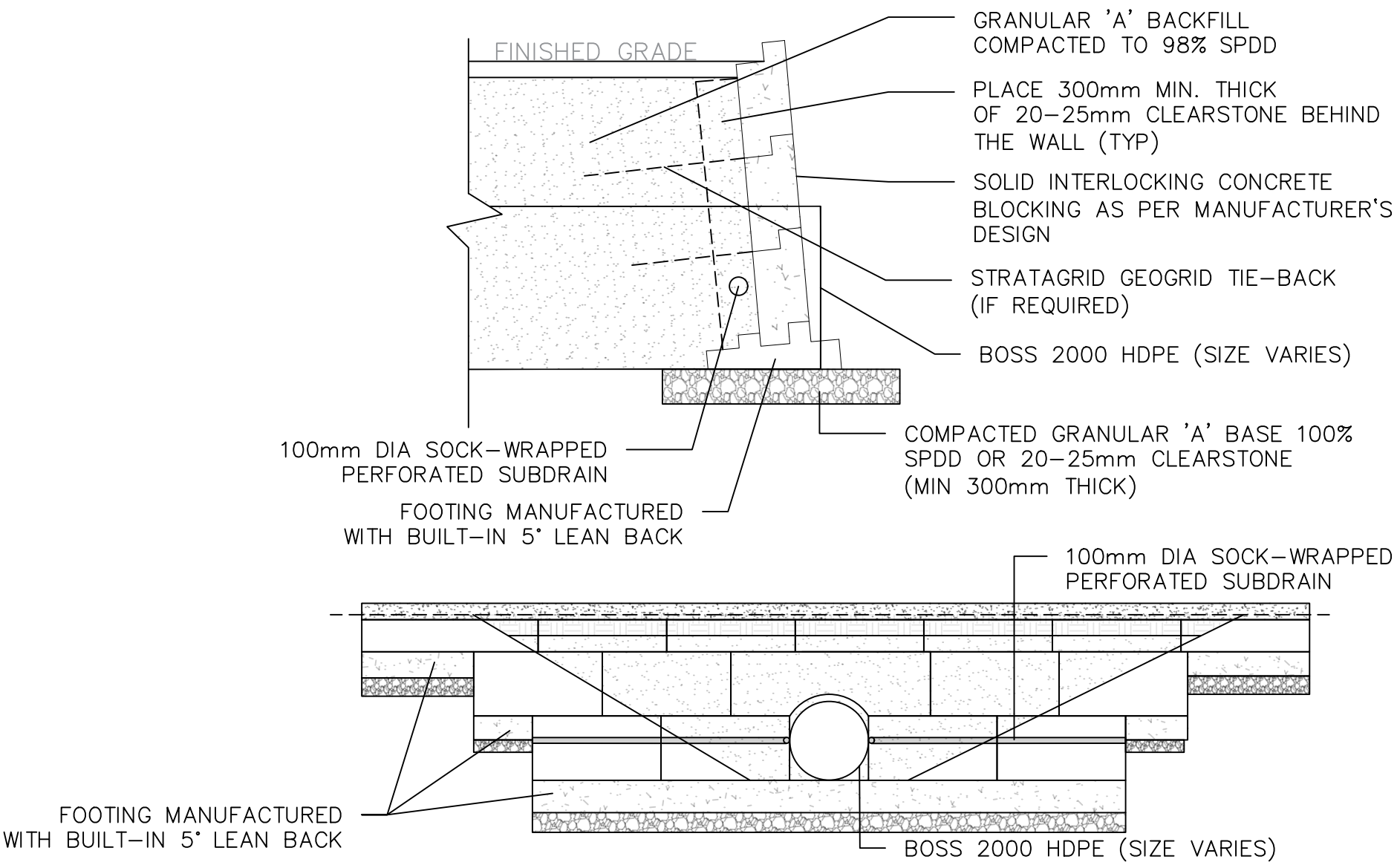
LEGEND:

OD – Outside diameter of pipe

NOTES:

A This OPSD to be read in conjunction with OPSD 3940.150.
B If a steel grate is required, refer to OPSD 804.05.
C Class of concrete: 30MPa.
D Cover to reinforcing bars 70mm ± 20mm.
E All dimensions are in millimetres unless otherwise shown.

CONCRETE HEADWALL



CONCRETE BLOCK HEADWALL

TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

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DATE	2023-12-12
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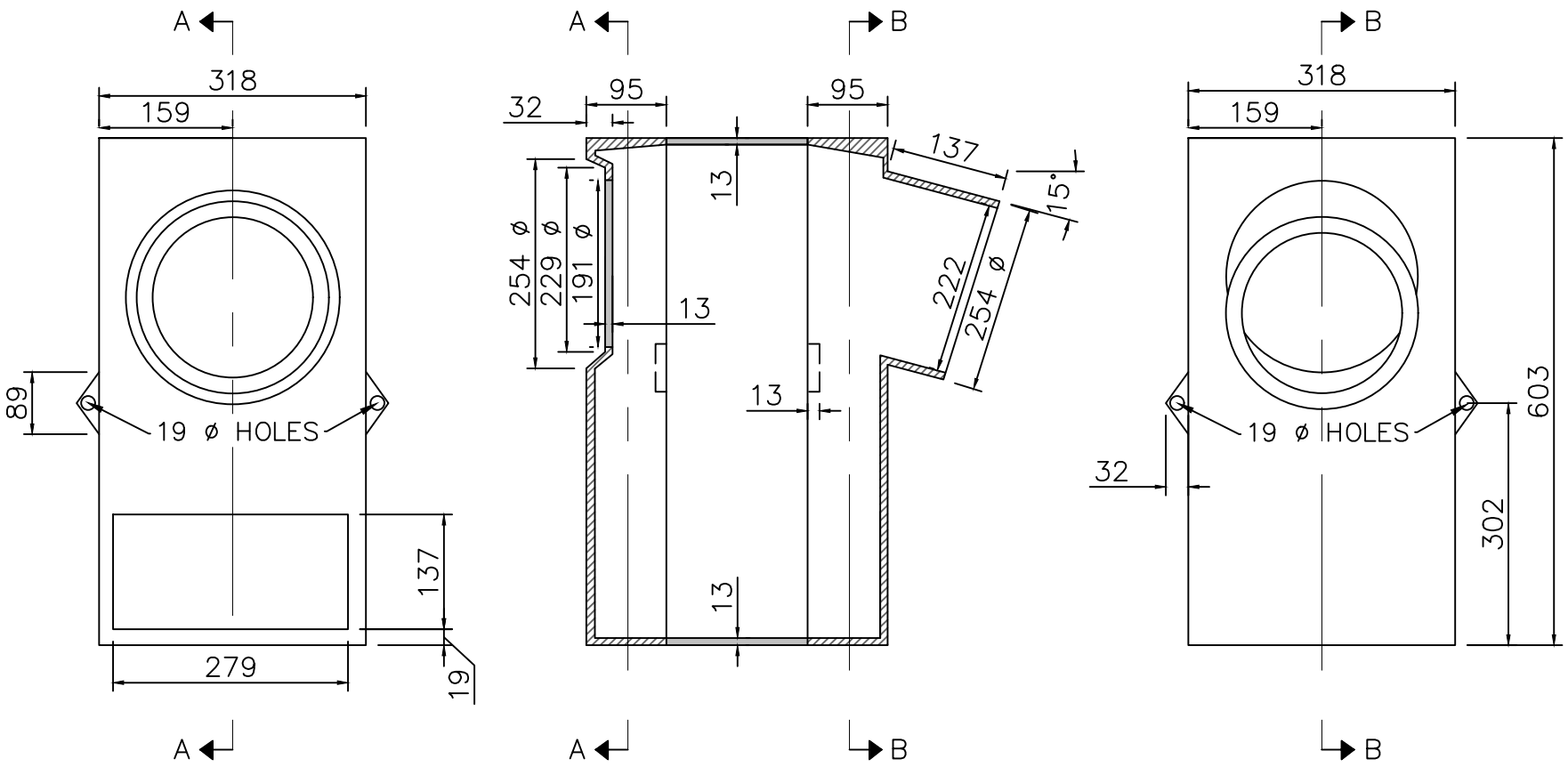
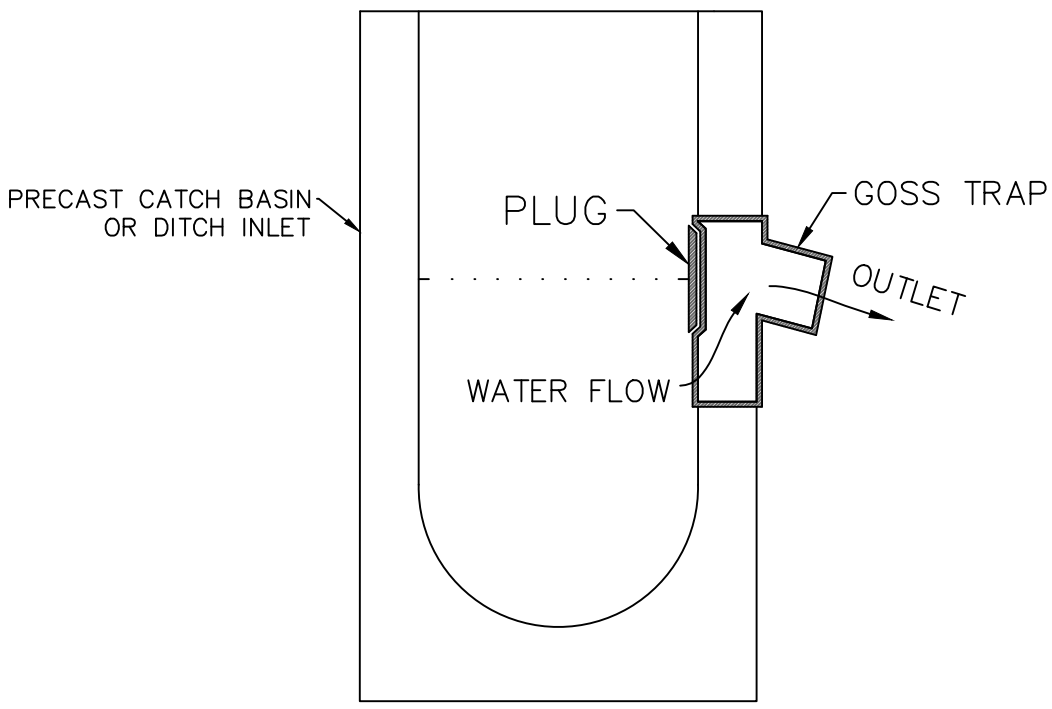
FIGURE R-6
DITCH ENCLOSURE HEADWALLS





NOTES:

1. AS ILLUSTRATED IN THE DIAGRAM ABOVE, THE GOSS TRAP HELPS PREVENT SUBSTANCES FLOATING ON THE SURFACE (i.e GAS, OIL, LEAVES, BRANCHES, etc.) FROM ENTERING THE PIPE

2. CAST IRON GOSS TRAP PLUGS ARE AVAILABLE

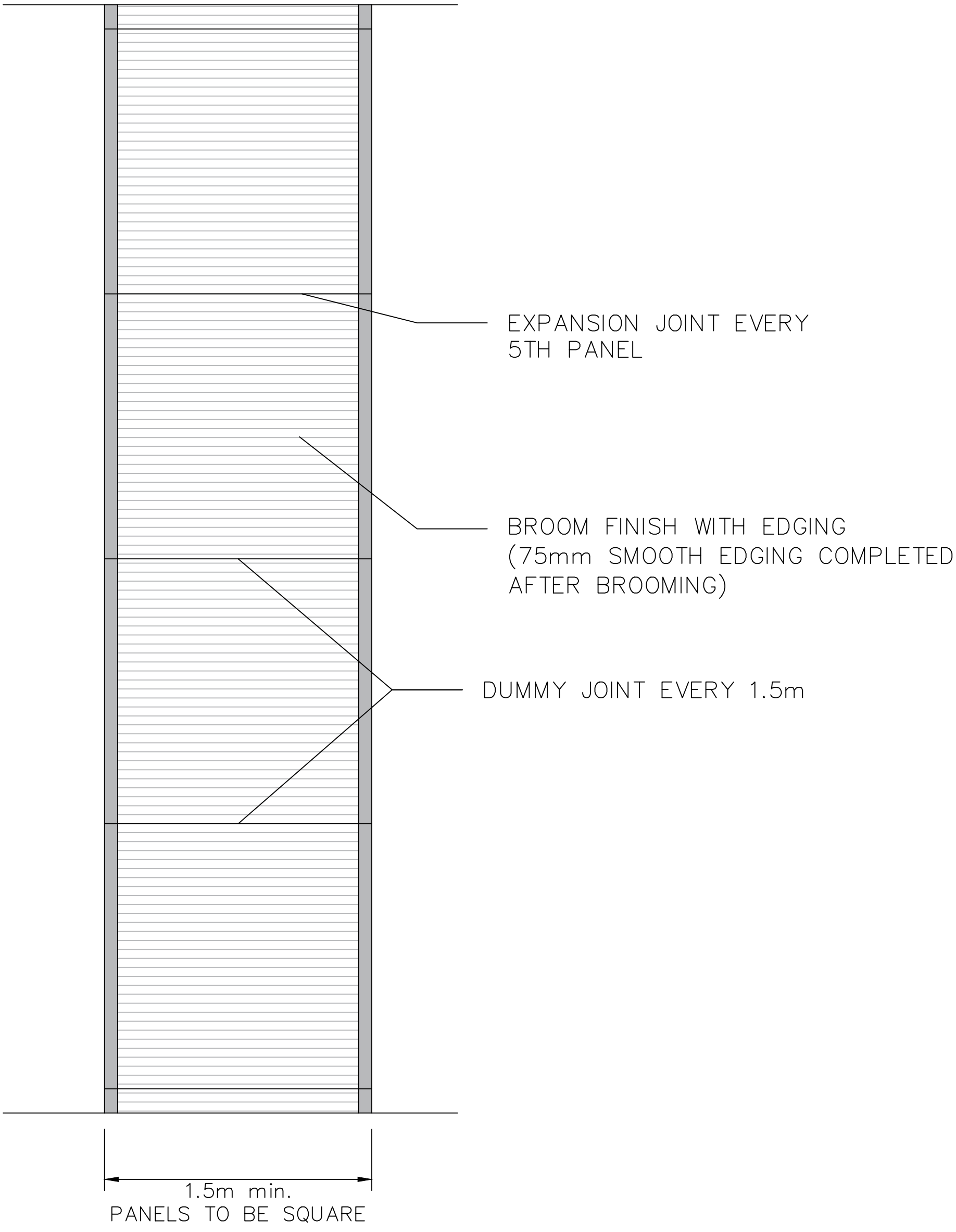
3. FOR OTHER APPLICATIONS CONTACT THE INFRASTRUCTURE SERVICES DEPARTMENT

   ALL DIMENSIONS IN MILLIMETERS, UNLESS OTHERWISE SHOWN

TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

DESIGNED	JD
DRAWN	JD
CHECKED	SD
APPROVED	TH
DATE	2023-12-12
SCALE	N.S.

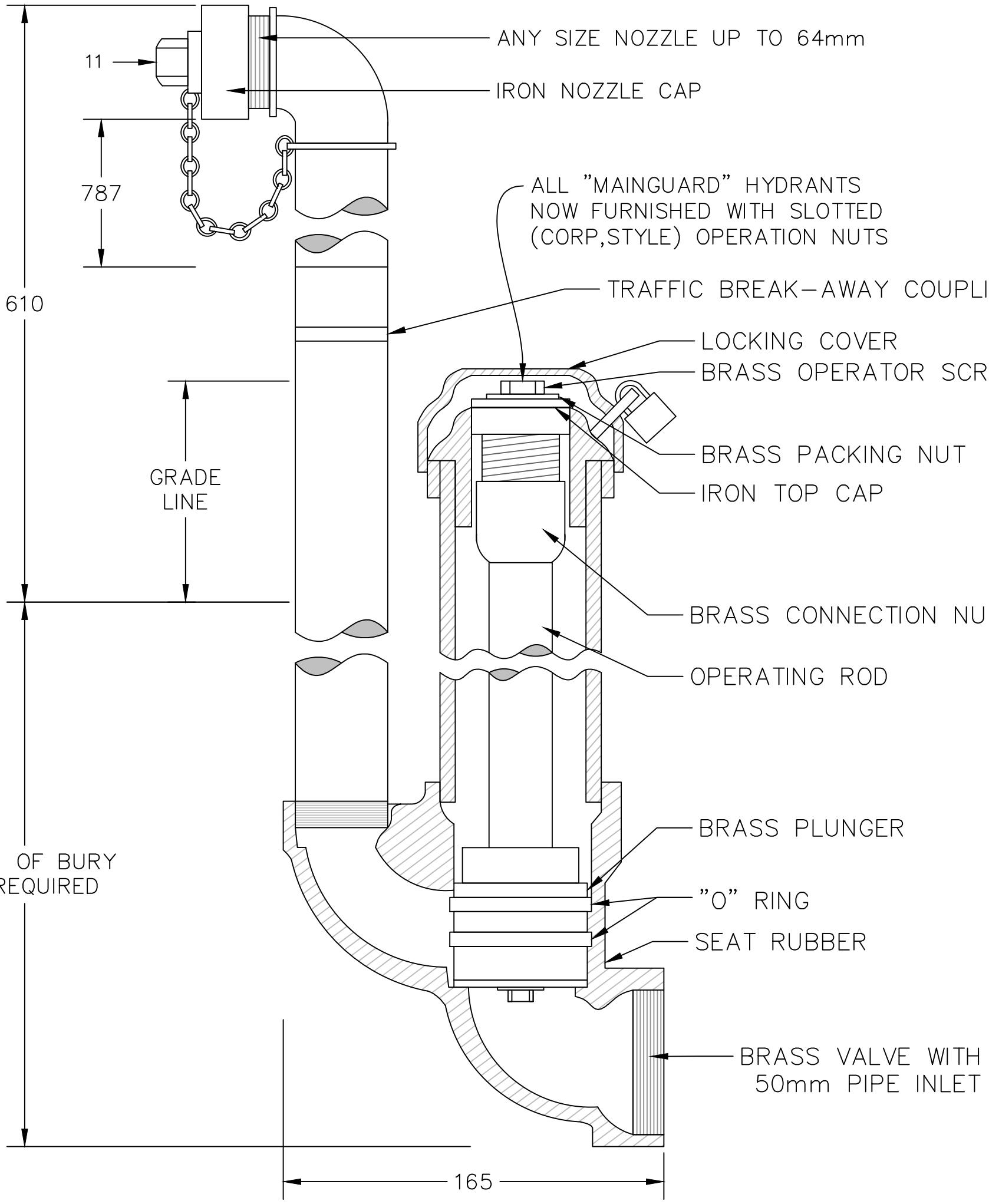
FIGURE R-7
GOSS TRAP



TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

DESIGNED	JD
DRAWN	JD
CHECKED	SD
APPROVED	TH
DATE	2023-12-12
SCALE	N.S.

FIGURE R-8
SIDEWALK JOINTING/
FINISHING DETAIL

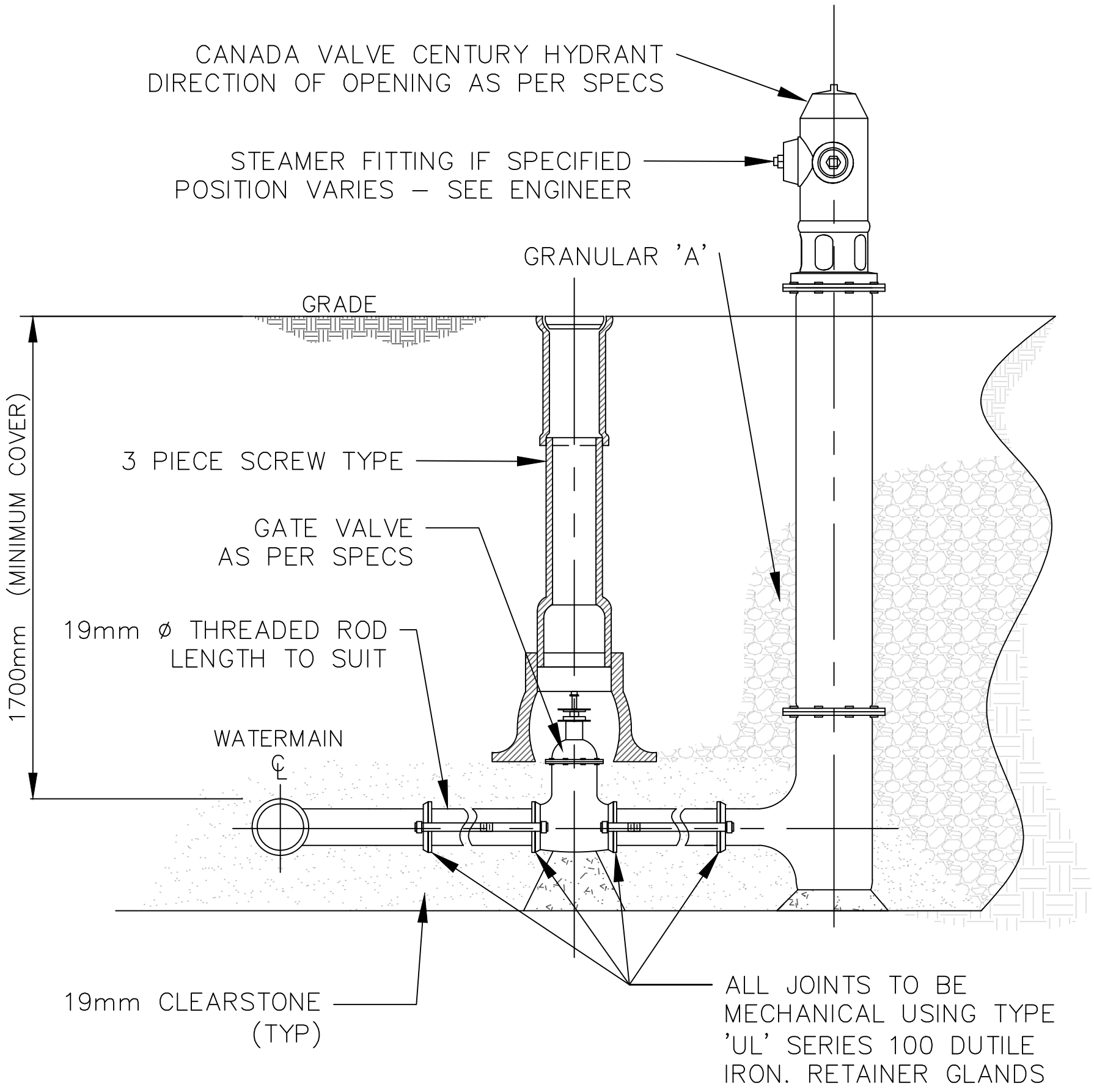


ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

DESIGNED	JD
DRAWN	JD
CHECKED	SD
APPROVED	TH
DATE	2023-12-12
SCALE	N.S.

FIGURE W-1
WATERMAIN
BLOW-OFF



NOTES:

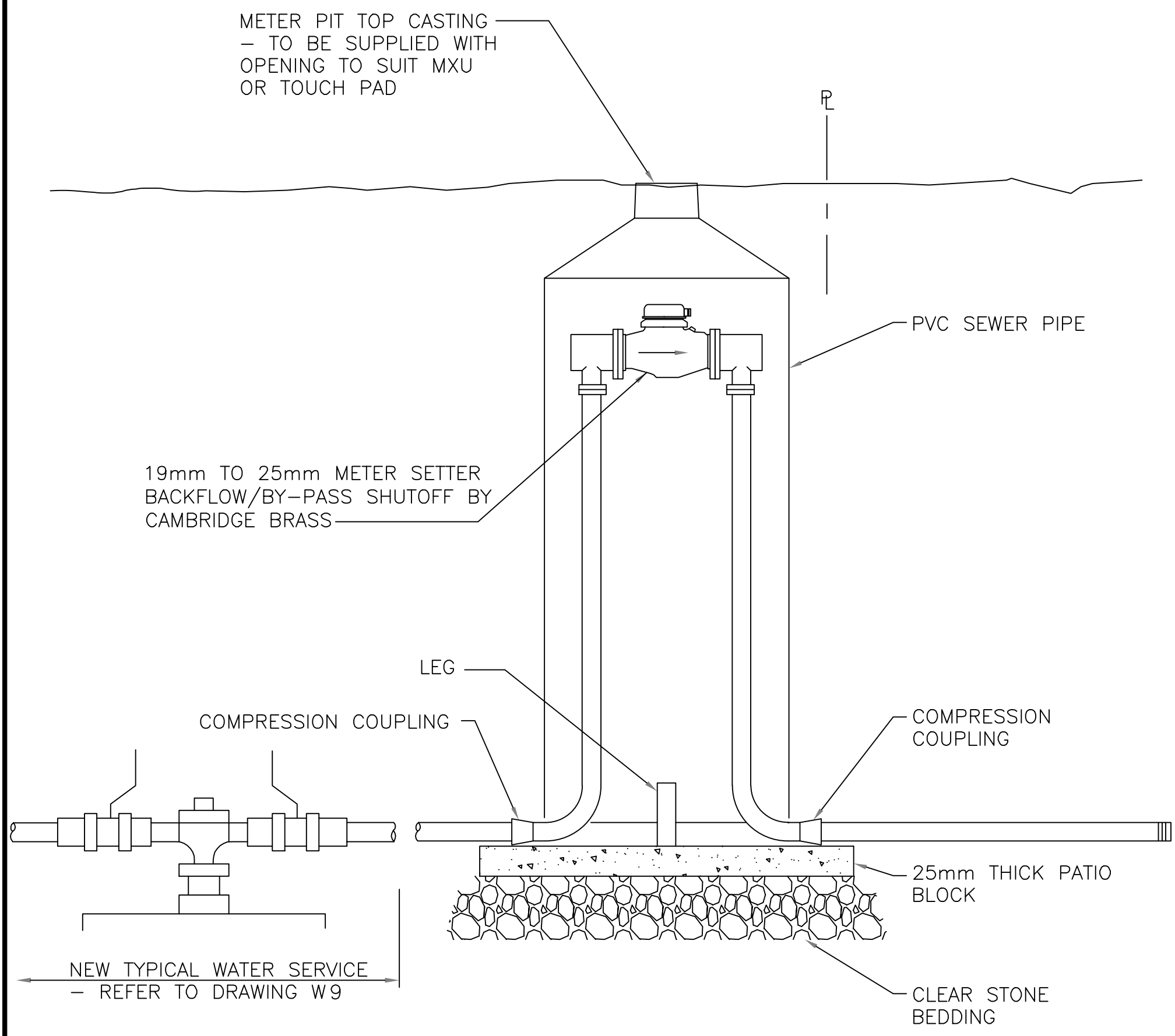
1. BOLTS FOR BURIED FLANGE TO FLANGE CONNECTIONS ARE TO BE STAINLESS STEEL

   ALL DIMENSION IN MILLIMETERS UNLESS OTHERWISE SHOWN

TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

DESIGNED	JD
DRAWN	JD
CHECKED	SD
APPROVED	TH
DATE	2023-12-12
SCALE	N.S.

FIGURE W-2
HYDRANT INSTALLATION



NOTES

1. STANDARD SHALL BE USED FOR 19mm TO 25mm METER SIZES ONLY AND SHALL ONLY BE APPROVED FOR USE BY THE ENVIRONMENTAL SERVICES DEPARTMENT ON A SITE SPECIFIC BASIS

2. PIT LOCATION SHALL BE DETERMINED SOLELY BY THE ENVIRONMENTAL SERVICES DEPARTMENT.

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

DESIGNED	JD
DRAWN	JD
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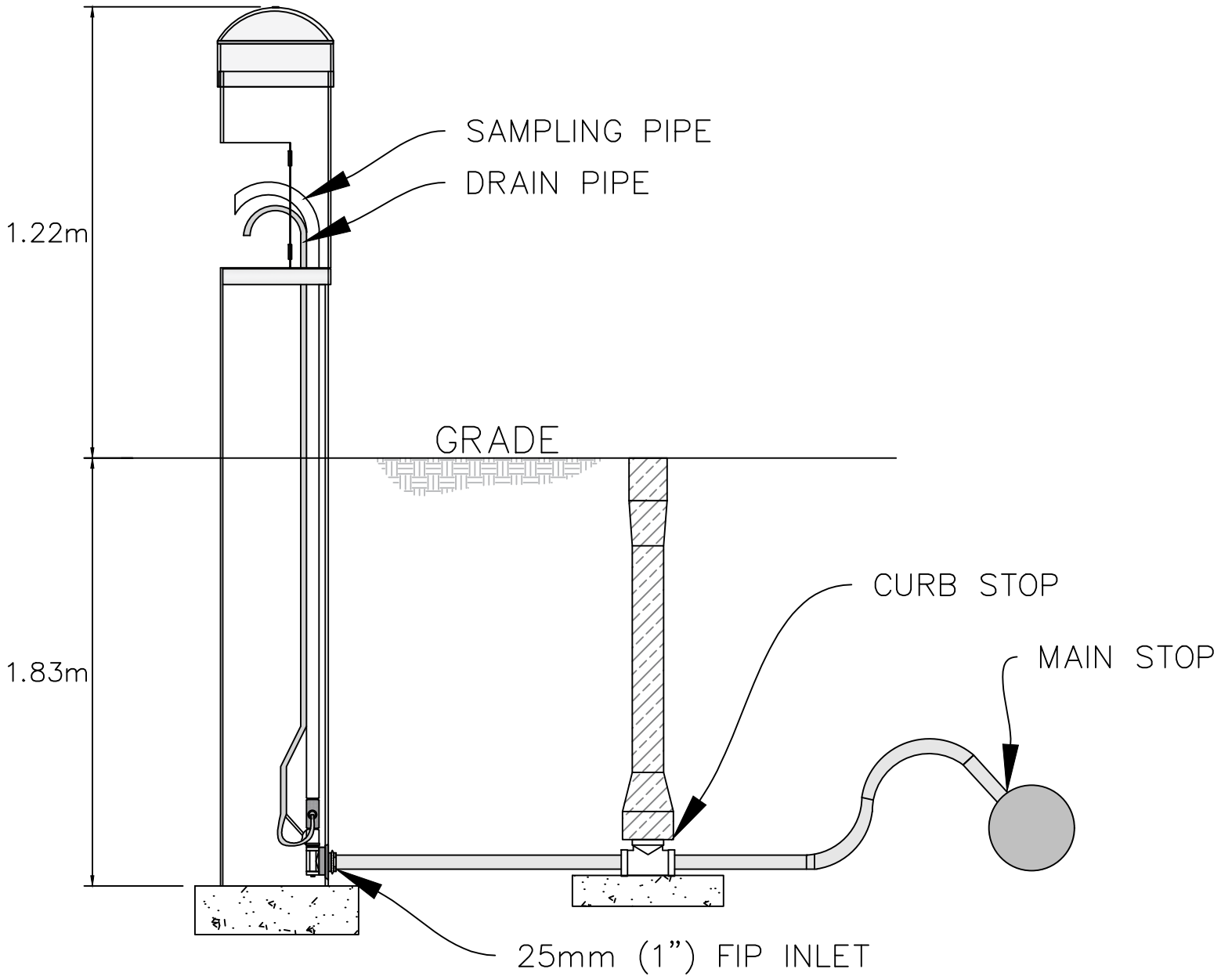
APPROVED	TH
DATE	2023-12-12
SCALE	N.S.

FIGURE W-3
PIT METER DETAIL



- SAMPLING STATIONS SHALL HAVE A 13mm ($\frac{1}{2}$") 316 STAINLESS STEEL WATERWAY. (NO LEAD)
- SAMPLING STATIONS SHALL BE EQUIPPED WITH A 9.5mm ($\frac{3}{8}$") 316 STAINLESS STEEL VENT TUBE. THIS IS USED TO PUMP STANDING WATER FROM UNIT AFTER USE, PREVENTING FREEZING AND BACTERIA GROWTH.
- THE ENCLOSURE SHALL BE MADE FROM PLASTIC PIPE WITH A LOCKABLE ACCESS DOOR.
- THE ENCLOSURE SHALL PROTECT ALL COMPONENTS FROM CORROSIVE SOIL AND GROUND WATER. AFTER THE WATER IS TURNED O AT THE CURBSTOP, ALL WORKING PARTS SHALL BE REMOVABLE WITHOUT DIGGING
- SAMPLING STATIONS WILL BE EQUIPPED WITH A 25mm (1") FIP INLET FOR THE CONNECTION TO THE WATERMAIN.
- STANDARD TEST TAP IS DESIGNED FOR A 1.8 METER (6 FEET) BURY AND A 1.2 METER (4 FEET) PEDESTAL. (ALTERNATE LENGTHS AVAILABLE)

TYPICAL INSTALL FROM WATERMAIN TO TEST TAP SAMPLING STATION:

19mm ($\frac{3}{4}$") mainstop, 19mm ($\frac{3}{4}$") domestic pipe to a 19mm ($\frac{3}{4}$") curbstop, 19mm ($\frac{3}{4}$") domestic pipe to Test Tap.

NOTES:

1. THE TEST TAP SHOULD REST ON A CONCRETE SLAB 30cmX30cm PATIO SLAB IS ACCEPTABLE
2. THE CURBSTOP SHOULD REST ON A CONCRETE SLAB. SMALL PATIO STONE IS ACCEPTABLE
3. ENSURE SERVICE TUBING TO THE TAP IS WELL SUPPORTED TO PREVENT EXCESS PRESSURE ON THE PITILESS ADAPTER
4. BACKFILL MUST BE SLOW AND CONSISTENT TO PREVENT THE DEFORMATION OF THE TEST TAP CLOSURE
5. BACKFILL MATERIAL SHOULD BE FREE OF ROCKS (GRAN B TYPE I)
6. FLEXIBLE TUBING MUST BE USED TO INSTALL THE TEST TAP. (NO RIGID PIPE)

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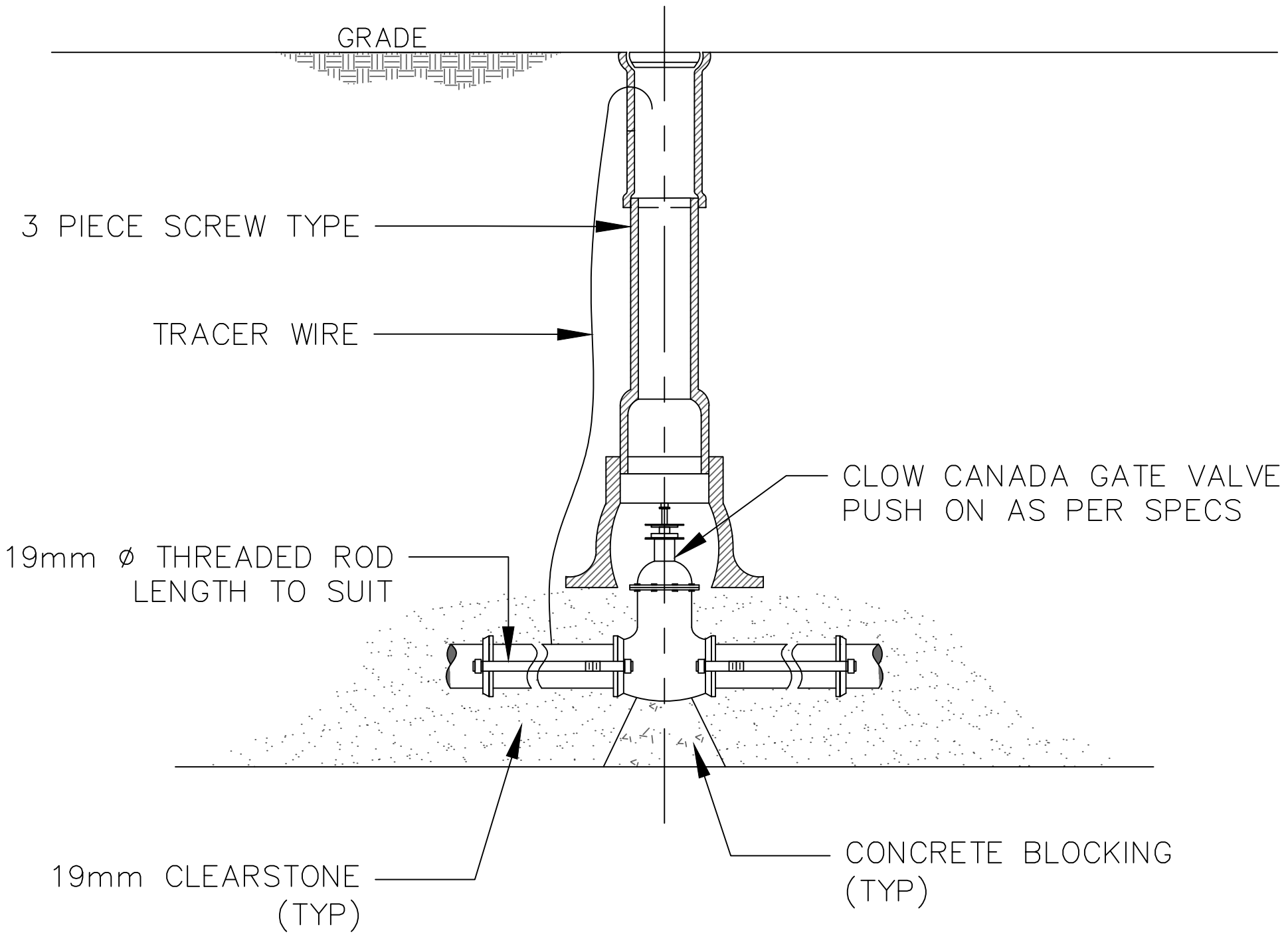
DATE	2023-12-12
SCALE	N.S.

FIGURE W-4
SAMPLING STATION
AND BASE DETAIL



NOTES:

1. TO PROTECT COATINGS ON PIPE, VALVES, FHs, ETC. USE WOOD WEDGES BETWEEN CONCRETE BLOCKS AND LOAD POINTS. DO NOT USE CHAINS FOR LIFTING.

2. ALL TEE BOLTS MUST HAVE ZINC CAPS ON MECHANICAL FITTINGS.

TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

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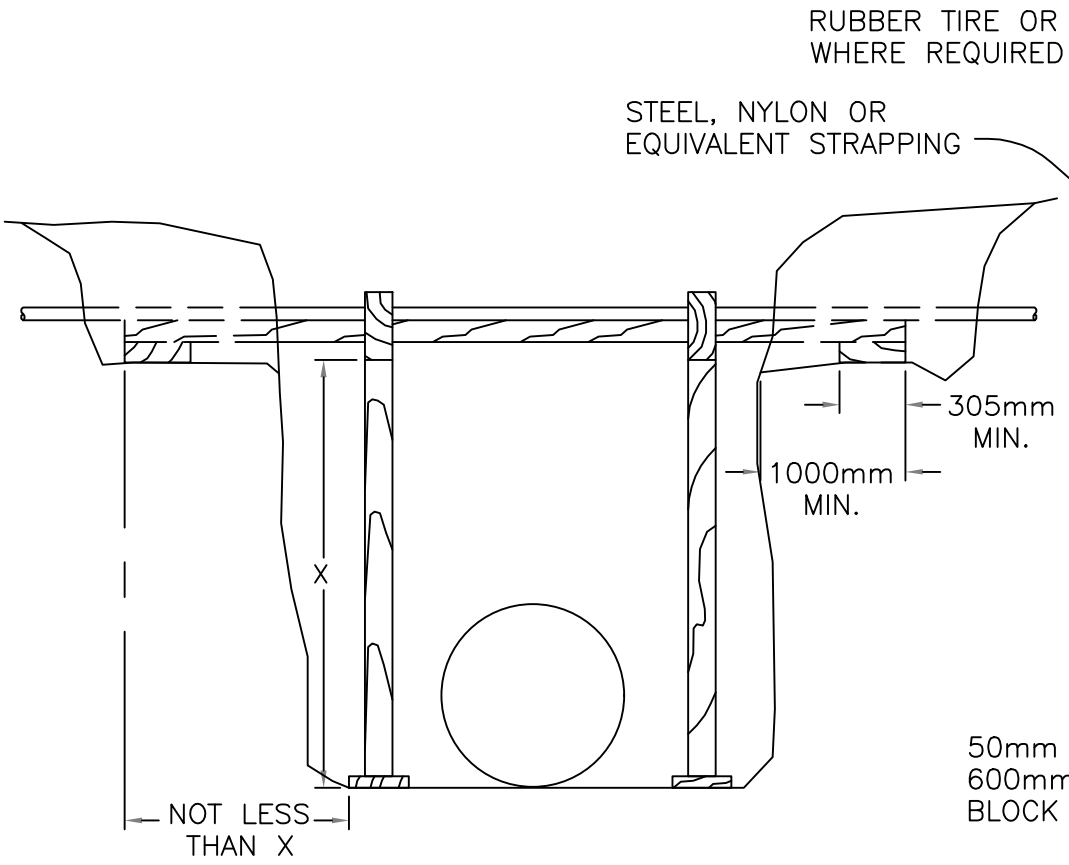
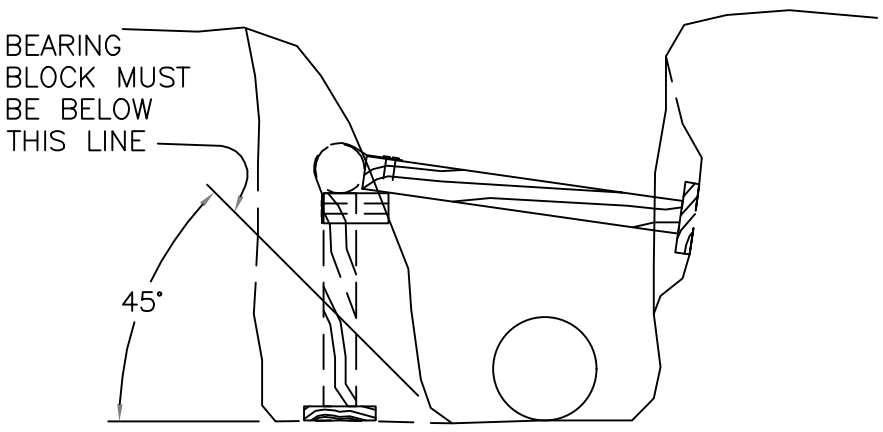
SCALE	N.S.

FIGURE W-5
TYPICAL VALVE SETTING



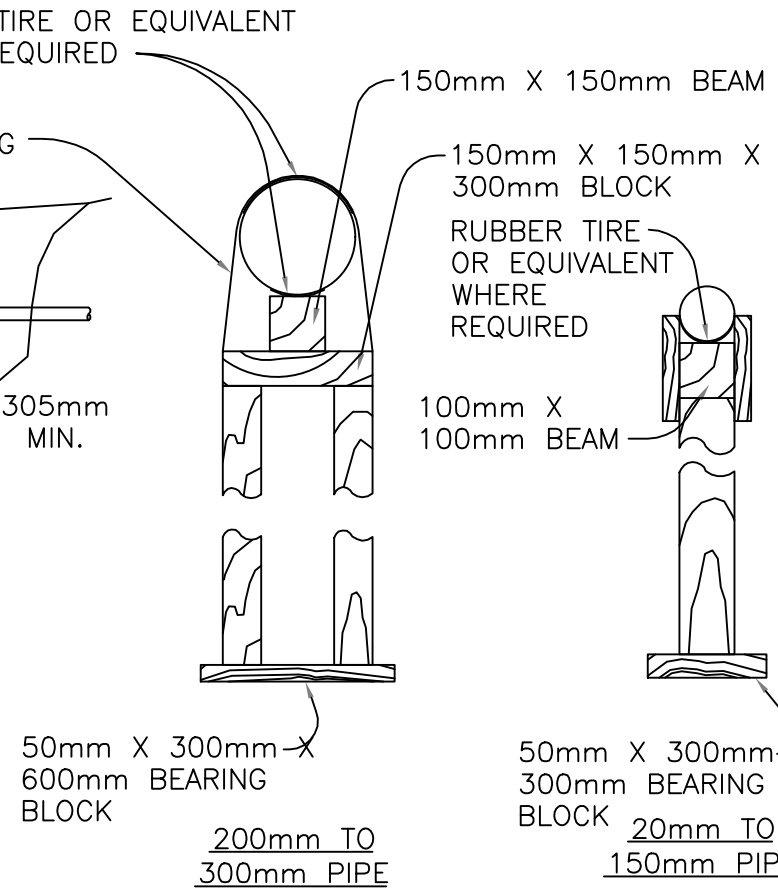
PIPE LINES CROSSING TRENCH

NOTE:
100mm X 100mm TIMBER BEAM REQUIRED BENEATH ALL 20mm TO 150mm PIPE.
NO SUPPORTS REQUIRED FOR PIPE WHEN SPANS ARE 610mm OR UNDER COLUMNS TO BE MAXIMUM 1830mm CENTRE TO CENTRE.



PIPE LINES PARALLEL TO TRENCH

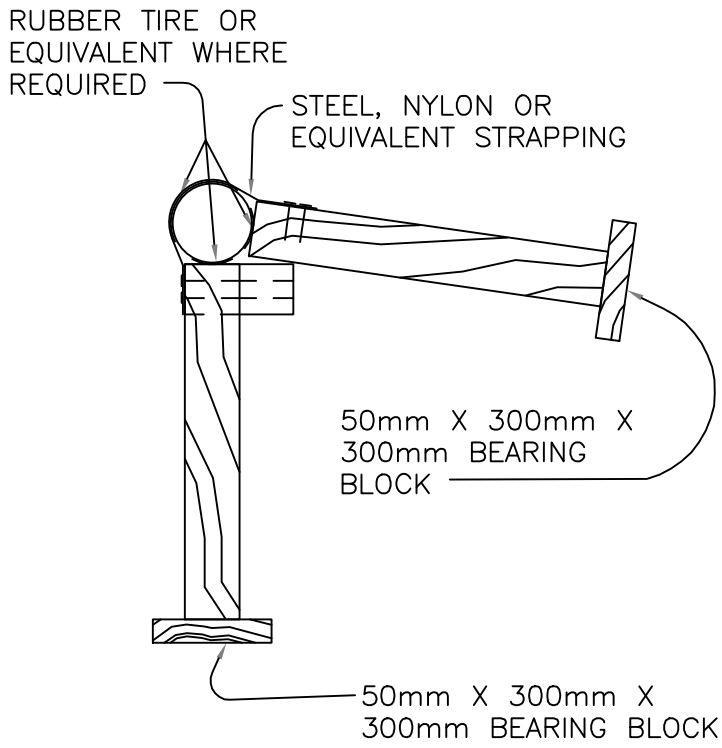
NOTE:
VERTICAL COLUMNS TO BE A MAXIMUM 1830mm CENTRE TO CENTRE. SIDE BRACES TO BE SPACED AS FOLLOWS:
20mm TO 75mm – 3.6m CENTRE TO CENTRE
100mm TO 300mm – 5.5m CENTRE TO CENTRE



200mm TO 300mm PIPE

20mm TO 150mm PIPE

COLUMN DETAILS



COLUMN DETAILS

COLUMN SIZES		
PIPE SIZE	COLUMN LENGTH	
	UP TO 3.0m	OVER 3.0m
20mm TO 150mm	100mm X 100mm	150mm X 150mm
200mm TO 300mm	2–100mm X 100mm OR 1–150mm X 150mm	2–150mm X 150mm OR 1–200mm X 200mm

GENERAL NOTES:

1. ADDITIONAL SUPPORTS WILL BE REQUIRED AT MECHANICAL COUPLINGS OR VALVES
2. PIPE COATING TO BE PROTECTED FROM SUPPORTS & STRAPPING BY A PIECE OF RUBBER TIRE OR EQUIVALENT.
3. THE ABOVE DESIGNS ARE SUGGESTIONS ONLY AND THE UTILITY ASSUMES NO RESPONSIBILITY FOR WORKMANSHIP, VARIABLE SOIL CONDITIONS OR LIVE LOADS.

TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

DESIGNED	JD
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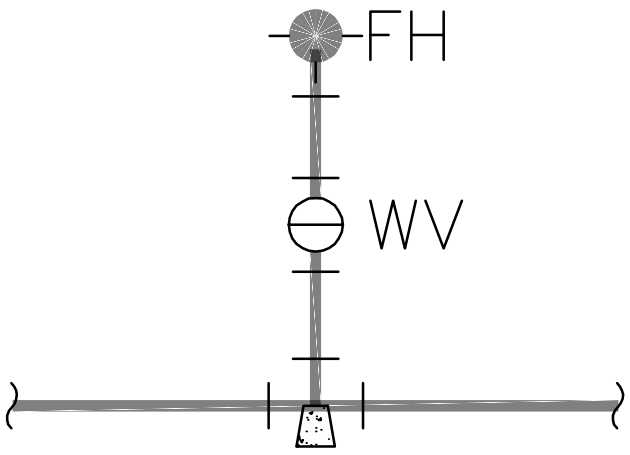
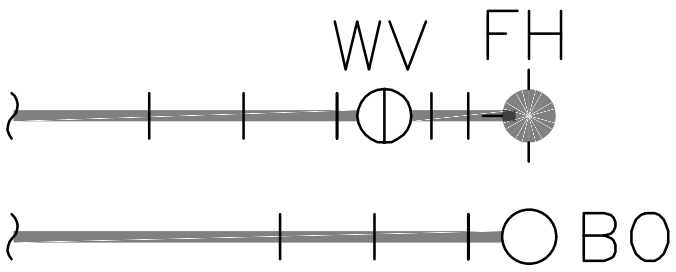
APPROVED	TH
DATE	2023-12-12
SCALE	N.S.

FIGURE W-6
SUPPORT OF UTILITIES OVER EXCAVATION



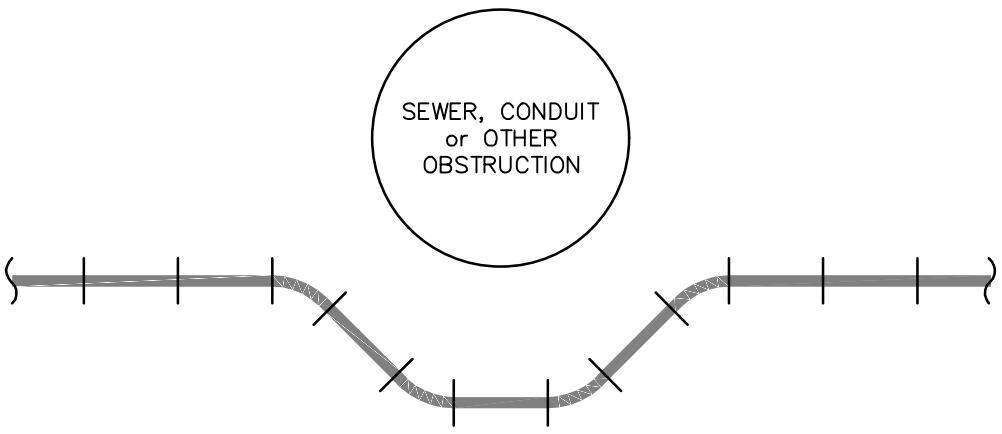
ON LINE FIRE HYDRANT

RESTRAIN FIRE HYDRANT LEAD PIPES AND FIRST MAIN JOINT ON EITHER SIDE OF TEE (REFER TO DETAIL W5)



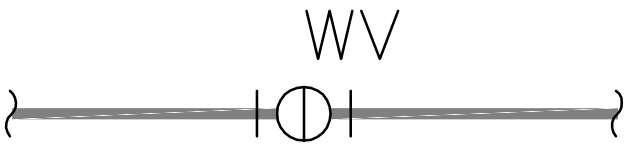
DEAD END BLOW OFF/FIRE HYDRANT

RESTRAIN THREE (3) JOINTS FROM END



WATERMAIN LOWERING

RESTRAIN ALL JOINTS STARTING AND ENDING THREE (3) JOINTS FROM LOWERING



IN LINE VALVE

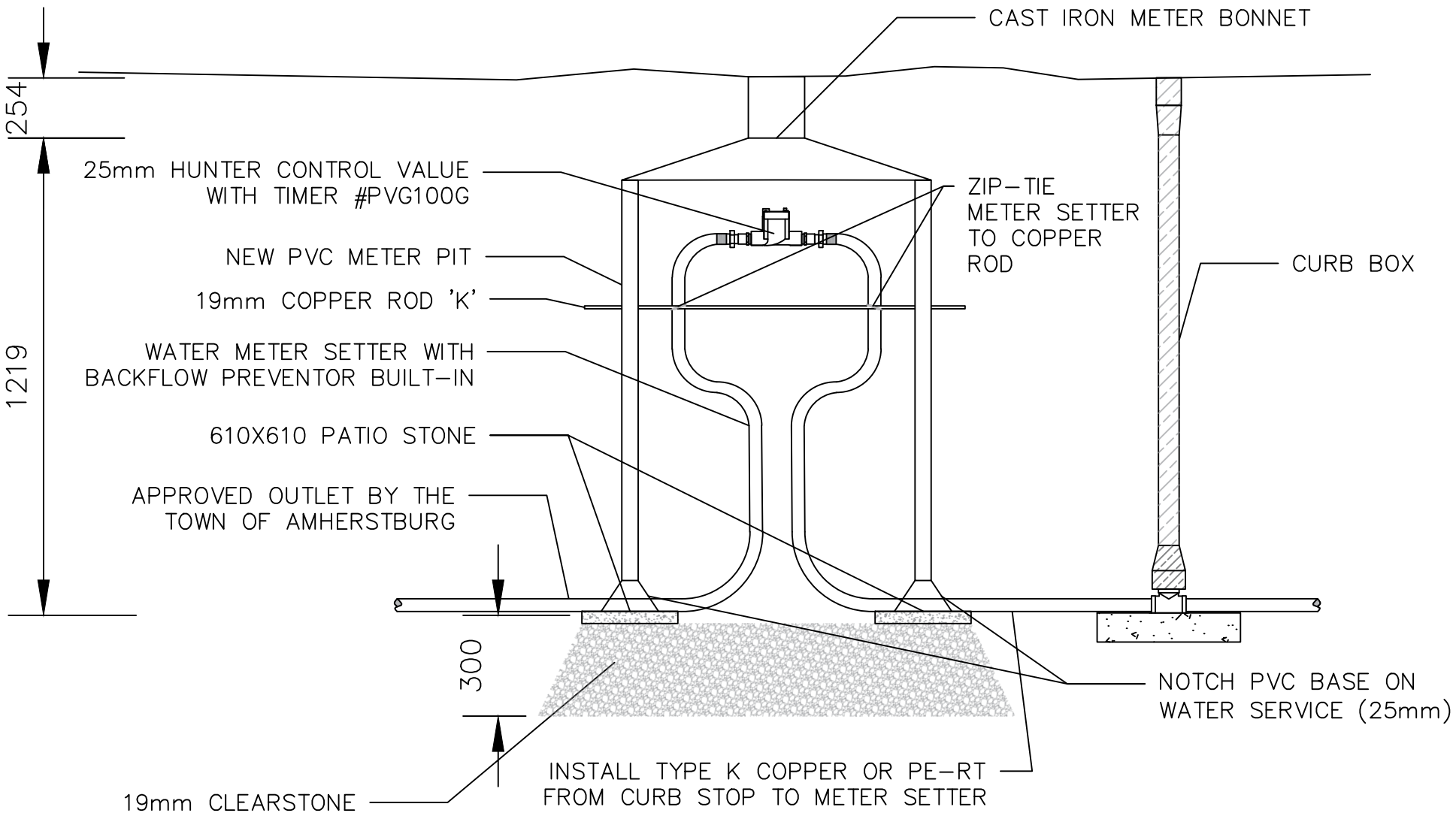
RESTRAIN FIRST MAIN JOINT ON EITHER SIDE OF VALVE (REFER TO DETAIL W4)

TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

DESIGNED	JD
DRAWN	JD
CHECKED	SD
APPROVED	TH
DATE	2023-12-12
SCALE	N.S.

FIGURE W-7

TYPICAL REQUIRED WATERMAIN JOINT RESTRAINTS



NOTES:

1. REPRESENTATION FROM THE TOWN OF AMHERSTBURG ENVIRONMENTAL SERVICES DEPARTMENT SHALL BE PRESENT DRIVING THE INSTALLATION OF THE AUTO FLUSHER

2. OUTLET FOR THE AUTO FLUSHER TO BE APPROVED BY THE TOWN OF AMHERSTBURG PRIOR TO THE COMMENCEMENT OF ANY WORK. THE TOWN WILL BE SOLELY RESPONSIBLE FOR THE REMOVAL OF THE AUTO FLUSHER INSTALLED WITHIN THE TOWN OF AMHERSTBURG.

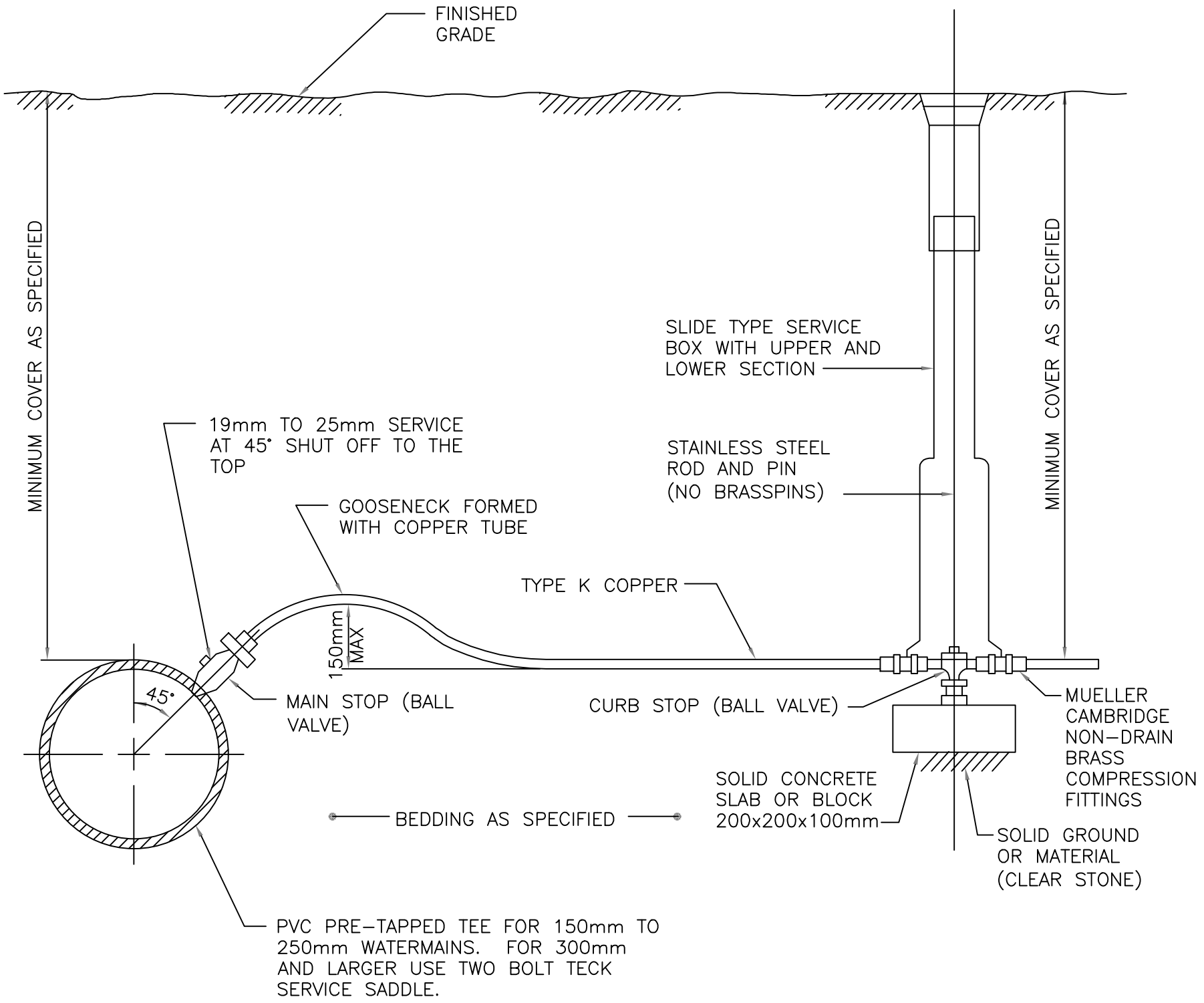
3. IF AN EXISTING 19mm SERVICE IS ACCEPTED TO BE USED FOR AUTO FLUSHER, CONTRACTOR TO INCLUDE 19mm TO 25mm REDUCER TO INCOPORATE THE REQUIRED 25mm AUTO FLUSHER AND PIT

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

DESIGNED	JD
DRAWN	JD
CHECKED	SD
APPROVED	TH
DATE	2023-12-12
SCALE	N.S.

FIGURE W-8
AUTO FLUSHER DETAIL



NOTES:

1. USE PRE–TAPPED TEES FOR ALL SERVICE CONNECTIONS TO PVC WATERMAINS
2. FOR ANY JUNCTION MADE IN THE SERVICE PIPE, BETWEEN MAIN STOP AND CURB STOP, COUPLINGS WILL NOT BE PERMITTED UNLESS THE SERVICE LENGTH EXCEEDS 20m
3. ALL WATER SERVICES TO BE INSTALLED 90° TO THE LONGITUDINAL AXIS OF THE WATERMAIN
4. ALL WET TAPS ON LIVE WATERMAINS SHALL BE DONE BY A LICENSED OPERATOR
5. GOOSE NECK IS NOT REQUIRED WHEN PE–RT PIPE IS USED

TOWN OF AMHERSTBURG
INFRASTRUCTURE STANDARDS MANUAL

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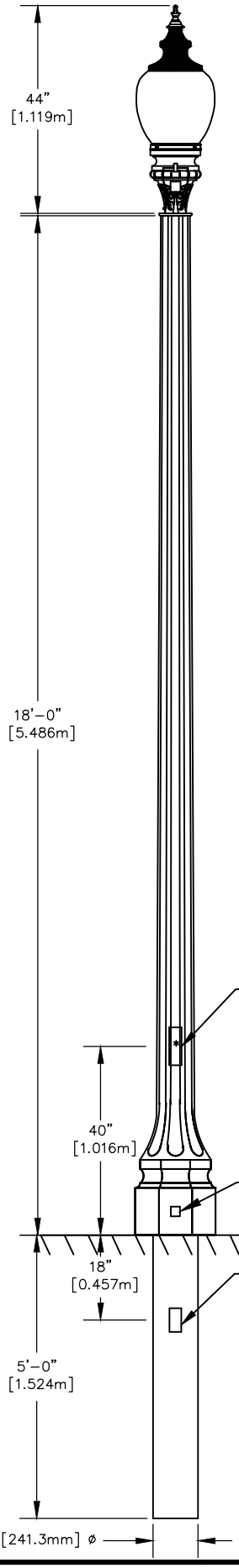
APPROVED	TH
DATE	2023-12-12
SCALE	N.S.

FIGURE W-9
TYPICAL WATER SERVICE INSTALLATION

REV.	ALTERATION	DATE	BY
A	METRIC DIMENSIONS ADDED	06/06/24	J.H.



CHECK ONE	WATTAGE	SERIES
☐	25W	1036
☐	40W	1036
☐	60W	1036
☐	75W	1036
☐	100W	1054

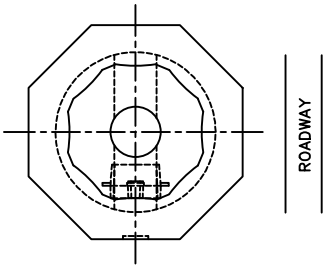
LUMINAIRE SPECIFICATIONS

CATALOGUE NO.:	K118R–B3AR–IV–___(SSL)–_____ –120:277–K14–PE7–SST–4K–WS
QUANTITY:	
OPTICAL SYSTEM:	BAFFLED ARRAY ACRYLIC RIPPLED
IES CLASS.:	TYPE IV
INPUT WATTAGE:	SEE CHART
SERIES:	SEE CHART
SOURCE:	SOLID STATE LIGHTING
LINE VOLTAGE:	120:277V
LIGHT SOURCE:	LIGHT EMITTING DIODE
POLE ADAPTOR:	K14
CCT:	4000K
PAINT:	TEXTURED BLACK
OPTIONS:	#1 VENTED FINIAL SOLID SPUN TOP TWISTLOCK RECEPTACLE (PHOTO–EYE INCLUDED) WATTAGE SELECTOR

POLE SPECIFICATIONS

CATALOGUE NO.:	KTH18–G–E10 C/W 140–35/35
QUANTITY:	
POLE CLASS:	A
SECTION:	FLUTED OCTAGONAL
COLOUR:	MIDNIGHT LACE
FINISH:	ETCHED
POLE TOP:	6 1/8" [155.6mm] FL/FL
POLE BUTT:	9 1/2" [241.3mm] ø
POLE LENGTH:	23' 0" [7.0m]
APPROX WEIGHT:	1,390 lbs [631kg]
MIN. RACEWAY:	1 1/8" [28.6mm] ø

COATINGS REQUIRED
–2 COATS ACRYLIC
FULL LENGTH



TOP VIEW

NOTES:
StressCrete makes no claims that the reference embedment depth shown is suitable for supporting this structure. It is recommended that a competent professional evaluate the soils present on site, confirming required embedment depth, hole diameter and backfill material to be used.

Contractor to install burndy ksu22 6–25 universal servit bolt connectors (or equivalent). connecting the #6 copper wire from the pole to the luminaire ground & a separate connector bonding pole to supply grounding conductor.

CUSTOMER APPROVAL & DATE: _____

CUSTOMER ORDER No:
STRESSCRETE ORDER No:
KING U.S. ORDER No:

King Luminaire • StressCrete • Est. 1953

STRESSCRETE GROUP

Manufacturing Locations:

Burlington, Ontario 1–800–268–7809

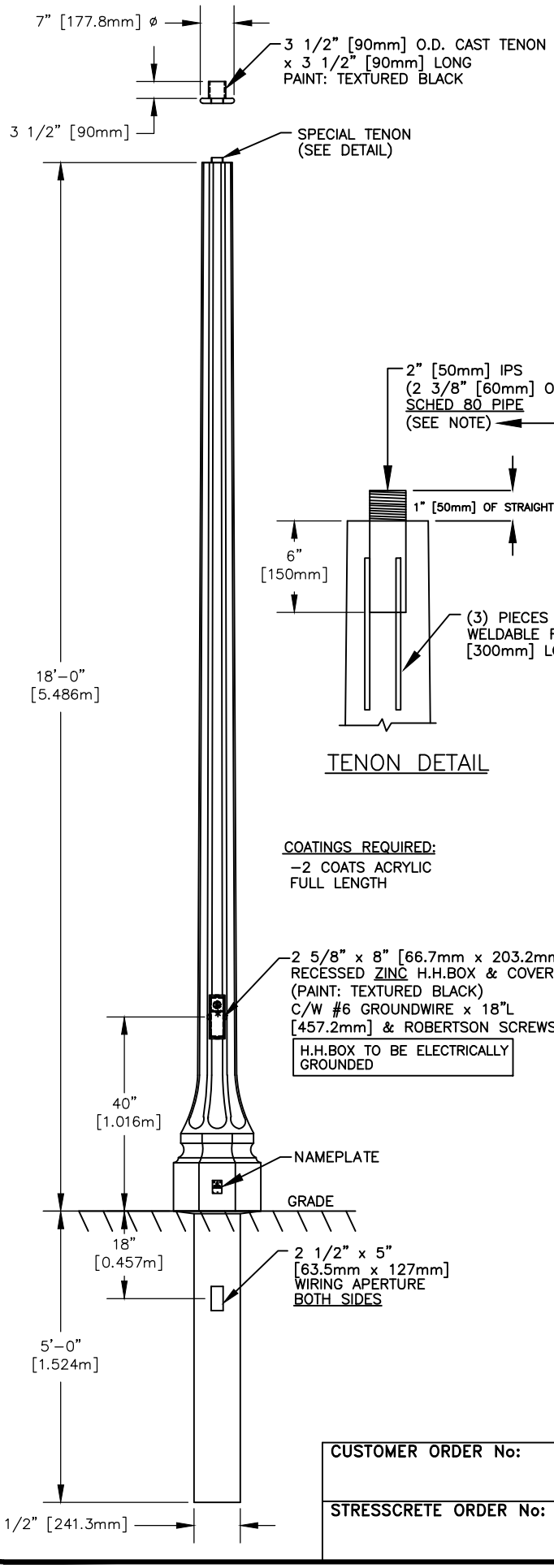
Northport, Alabama 1–800–435–6563

Atchison, Kansas 1–800–837–1024

Jefferson, Ohio 1–800–268–7809

PROJECT/CUSTOMER: TOWN OF AMHERSTBURG				
DRAWN BY: J.H.	AT: SC1	CHECKED BY:	DATE: 05/21/24	REVISION: A
DRAWING TYPE: CONCEPT DWG.			DRAWING NUMBER: Q–2405032–1	

REV.	ALTERATION	DATE	BY
A	METRIC DIMENSIONS ADDED	06/06/24	J.H.



POLE SPECIFICATIONS

CATALOGUE NO.:	KTH18-G-E10 C/W 140-35/35
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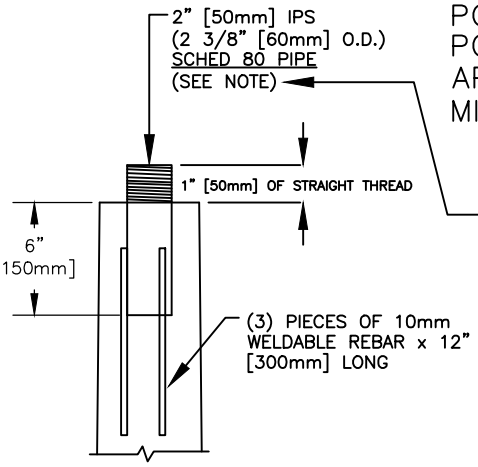
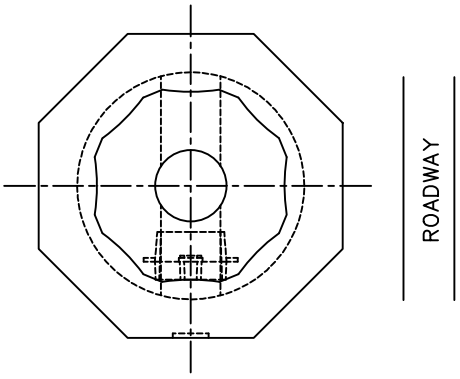


NOTE:
INSTALL 2" [50mm] ELECTRICAL COUPLING DURING SET-UP

TENON DETAIL

COATINGS REQUIRED:
-2 COATS ACRYLIC
FULL LENGTH



H.H.BOX, NAMEPLATE
THRU APERTURE

TOP VIEW

NOTES:
StressCrete makes no claims that the reference embedment depth shown is suitable for supporting this structure. It is recommended that a competent professional evaluate the soils present on site, confirming required embedment depth, hole diameter and backfill material to be used.

Contractor to install burndy ksu22 6-25 universal servit bolt connectors (or equivalent). connecting the #6 copper wire from the pole to the luminaire ground & a separate connector bonding pole to supply grounding conductor.

CUSTOMER APPROVAL & DATE: _____

King Luminaire • StressCrete • Est. 1953

STRESSCRETE GROUP

Manufacturing Locations:

Burlington, Ontario 1-800-268-7809

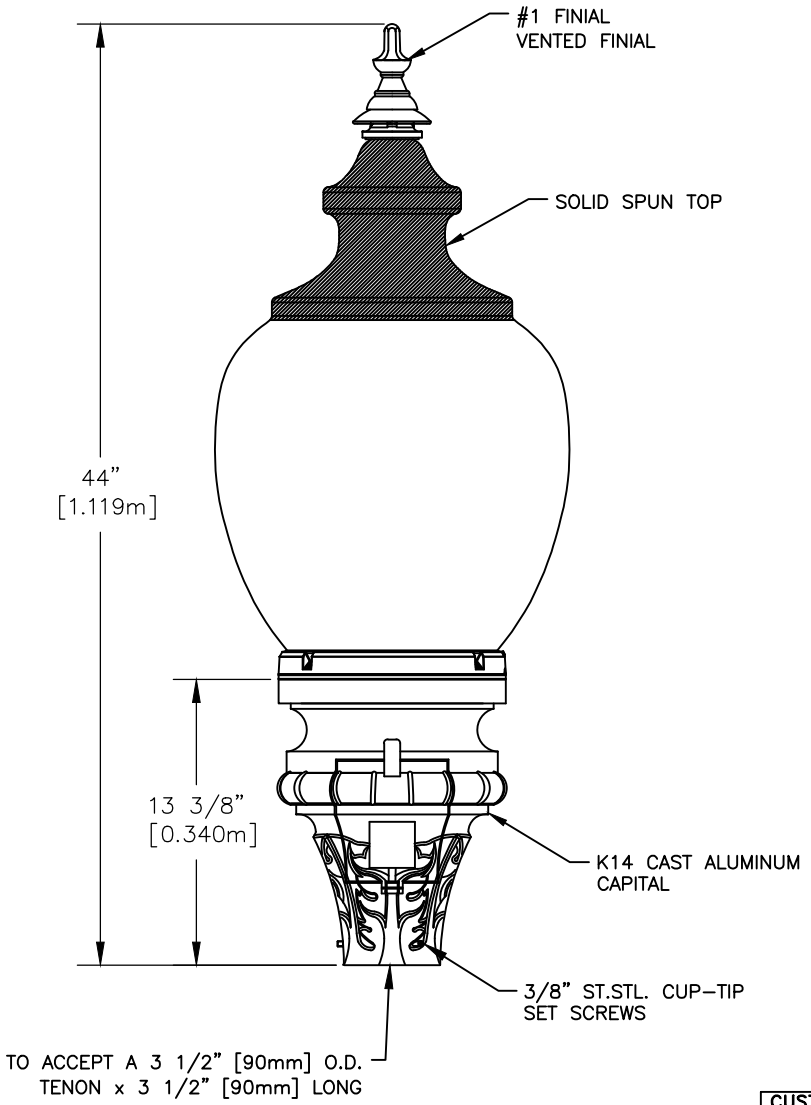
Northport, Alabama 1-800-435-6563

Atchison, Kansas 1-800-837-1024

Jefferson, Ohio 1-800-268-7809

PROJECT/CUSTOMER: TOWN OF AMHERSTBURG				
CUSTOMER ORDER No:	DRAWN BY: J.H.	AT: SC1	CHECKED BY:	DATE: 05/21/24 / REVISION: A
STRESSCRETE ORDER No:	DRAWING TYPE: APPROV./MFG. DWG.			DRAWING NUMBER: Q-2405032-2

REV.	ALTERATION	DATE	BY
A	METRIC DIMENSIONS ADDED	06/06/24	J.H.



LUMINAIRE SPECIFICATIONS

CATALOGUE NO.:	K118R-B3AR-IV-___(SSL)-_____ -120:277-K14-PE7-SST-4K-WS
QUANTITY:	
OPTICAL SYSTEM:	BAFFLED ARRAY ACRYLIC RIPPLED
IES CLASS.:	TYPE IV
INPUT WATTAGE:	SEE CHART
SERIES:	SEE CHART
SOURCE:	SOLID STATE LIGHTING
LINE VOLTAGE:	120:277V
LIGHT SOURCE:	LIGHT EMITTING DIODE
POLE ADAPTOR:	K14
CCT:	4000K
PAINT:	TEXTURED BLACK
OPTIONS:	#1 VENTED FINIAL SOLID SPUN TOP TWISTLOCK RECEPTACLE (PHOTO-EYE INCLUDED) WATTAGE SELECTOR

OPTIONS

QUICK DISCONNECT	☒
TERMINAL BLOCK	☐

CHECK ONE	WATTAGE	SERIES
☐	25W	1036
☐	40W	1036
☐	60W	1036
☐	75W	1036
☐	100W	1054

CUSTOMER APPROVAL & DATE: _____

CUSTOMER ORDER No:	
STRESSCRETE ORDER No:	
KING U.S. ORDER No:	

King Luminaire • StressCrete • Est. 1953

STRESSCRETE GROUP

Manufacturing Locations:

Burlington, Ontario 1-800-268-7809

Northport, Alabama 1-800-435-6563

Atchison, Kansas 1-800-837-1024

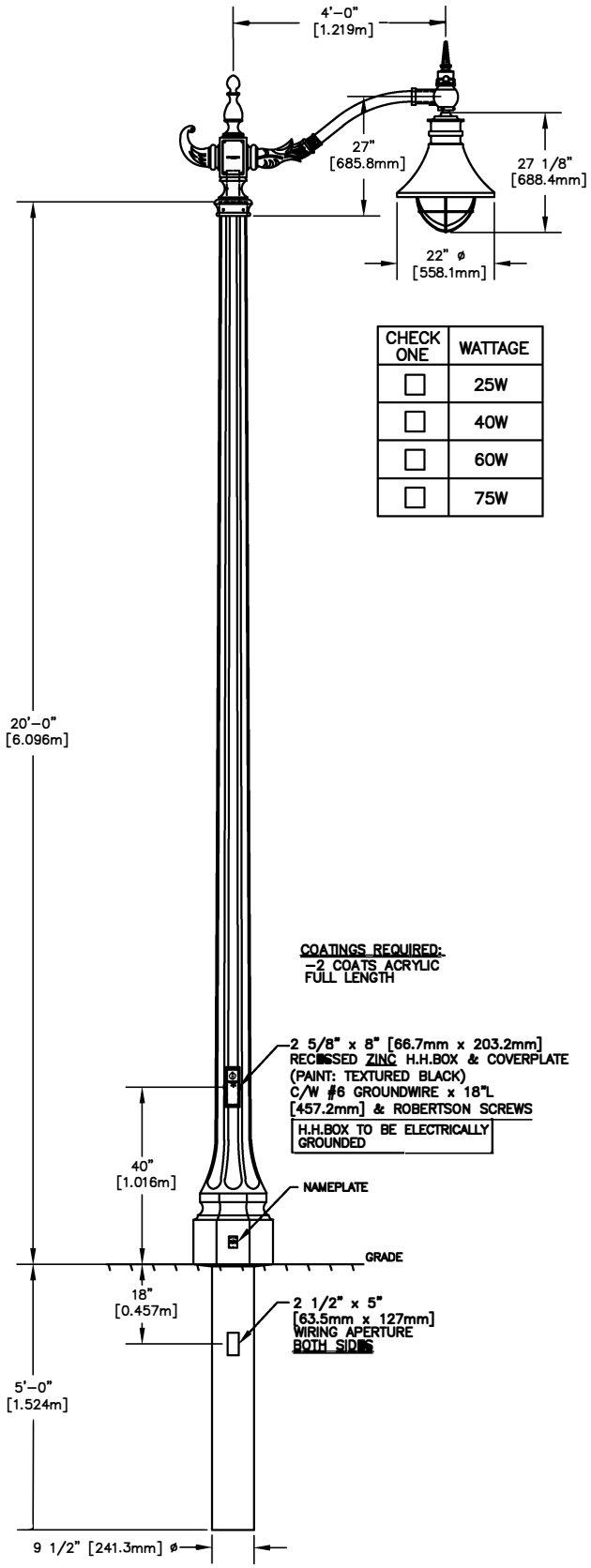
Jefferson, Ohio 1-800-268-7809

PROJECT/CUSTOMER: TOWN OF AMHERSTBURG

DRAWN BY:	AT:	CHECKED BY:	DATE:	REVISION:
J.H.	SC1		05/21/24	A

DRAWING TYPE:	DRAWING NUMBER:
APPROVAL/MFG. DWG.	Q-2405032-3

REV.	ALTERATION	DATE	BY
A	METRIC DIMENSIONS ADDED	06/06/24	J.H.



CHECK ONE	WATTAGE
☐	25W
☐	40W
☐	60W
☐	75W

LUMINAIRE SPECIFICATIONS

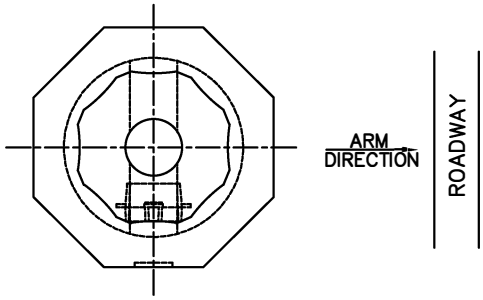
CATALOGUE NO.:	K210–P4GS–III–__(SSL)–7030 –120:277–KPL20–PE7–#5–4K–WS
QUANTITY:	
OPTICAL SYSTEM:	P4 RIPPLED GLASS SHALLOW LENS
IES CLASS.:	TYPE III
WATTAGE:	SEE CHART
SOURCE:	SOLID STATE LIGHTING
SERIES:	7030
LINE VOLTAGE:	120:277V
CCT:	4000K
PAINT:	SMOOTH BLACK
OPTION:	KPL–20 LEVELING DEVICE C/W TWISTLOCK RECEPTACLE (PHOTO–EYE INCLUDED), #5 FINIAL, WATTAGE SELECTOR

ARM SPECIFICATIONS

CATALOGUE NO.:	KA72–T2–1–4' S/F KPL20
QUANTITY:	
TYPE:	ATLANTIC
MATERIAL:	ALUMINUM
PAINT:	SMOOTH BLACK
OPTIONS:	–

POLE SPECIFICATIONS

CATALOGUE NO.:	KTH20–G–E10–DB C/W 140–30/70
QUANTITY:	
TYPE:	TALISMAN HIGHWAYMAN
SECTION:	FLUTED OCTAGONAL
COLOUR:	MIDNIGHT LACE
FINISH:	ETCHED
POLE TOP:	5 15/16" [150.8mm] FL/FL
POLE BUTT:	9 1/2" [241.3mm] ø
POLE LENGTH:	25' 0" [7.62m]
APPROX WEIGHT:	1,450 lbs. [658 kg]
MIN. RACEWAY:	1 1/8" [28.6mm] ø



H.H.BOX, NAMEPLATE
THRU APERTURE

TOP VIEW

CUSTOMER APPROVAL & DATE:

NOTES:
StressCrete makes no claims that the reference embedment depth shown is suitable for supporting this structure. It is recommended that a competent professional evaluate the soils present on site, confirming required embedment depth, hole diameter and backfill material to be used.

Contractor to install burndy ksu22 6–25 universal servit bolt connectors (or equivalent). connecting the #6 copper wire from the pole to the luminaire ground & a separate connector bonding pole to supply grounding conductor.

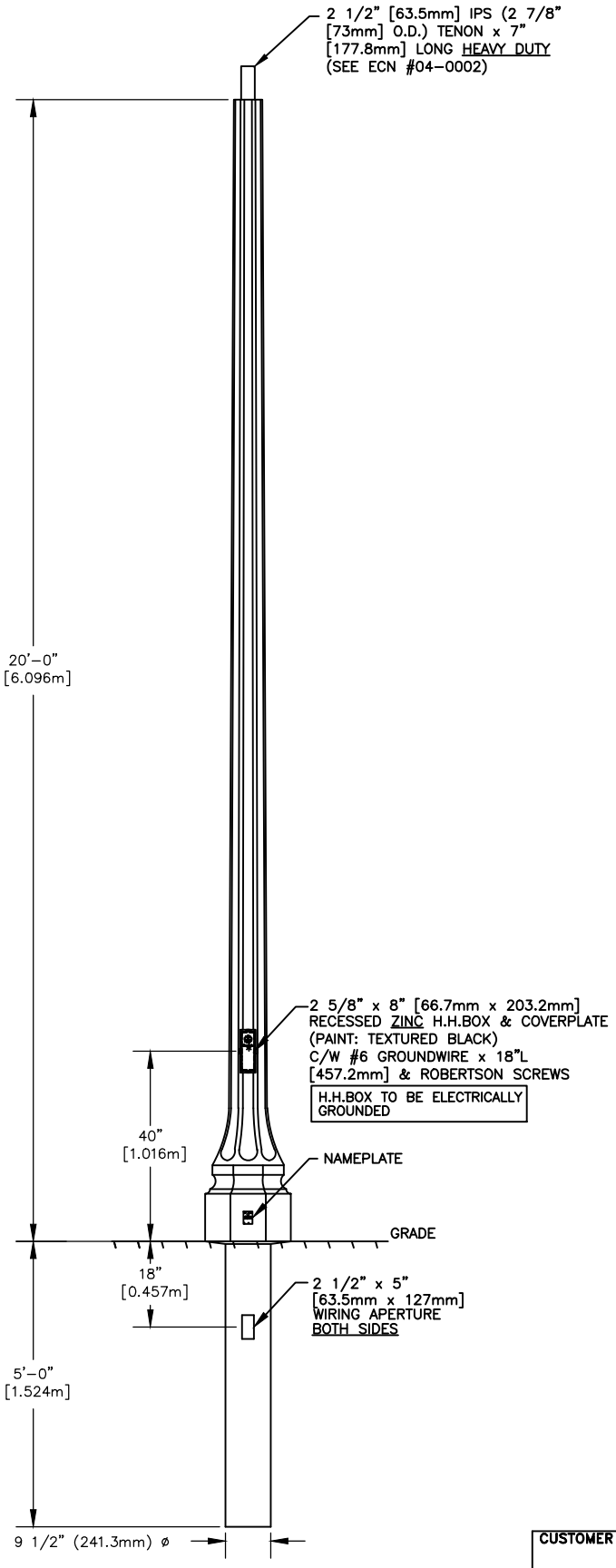
CUSTOMER ORDER No:	
STRESSCRETE ORDER No:	
KING U.S. ORDER No:	

King Luminaire • StressCrete • Est. 1953
STRESSCRETE GROUP

Manufacturing Locations:
Burlington, Ontario 1–800–268–7809
Northport, Alabama 1–800–435–6563
Atchison, Kansas 1–800–837–1024
Jefferson, Ohio 1–800–268–7809

PROJECT/CUSTOMER:				
TOWN OF AMHERSTBURG				
DRAWN BY:	AT:	CHECKED BY:	DATE:	REVISION:
J.H.	SC1		05/21/24	A
DRAWING TYPE:			DRAWING NUMBER:	
CONCEPT DWG.			Q–2405032–4	

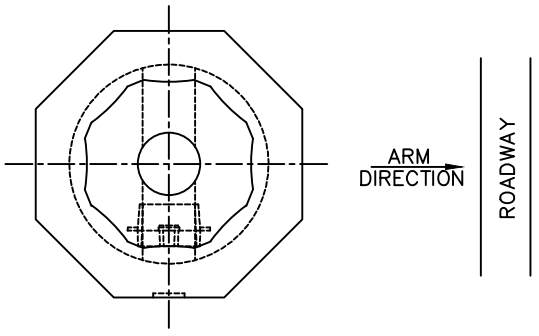
REV.	ALTERATION	DATE	BY
A	METRIC DIMENSIONS ADDED	06/06/24	J.H.



POLE SPECIFICATIONS

CATALOGUE NO.:	KTH20-G-E10-DB C/W 140-30/70
QUANTITY:	
POLE CLASS:	A
TYPE:	TALISMAN HIGHWAYMAN
SECTION:	FLUTED OCTAGONAL
COLOUR:	MIDNIGHT LACE
FINISH:	ETCHED
POLE TOP:	5 15/16" [150.8mm] FL/FL
POLE BUTT:	9 1/2" [241.3mm] ø
POLE LENGTH:	25' 0" [7.62m]
APPROX WEIGHT:	1,450 lbs. [658 kg]
MIN. RACEWAY:	1 1/8" [28.6mm] ø

COATINGS REQUIRED:
-2 COATS ACRYLIC
FULL LENGTH



H.H.BOX, NAMEPLATE THRU APERTURE

TOP VIEW

NOTES:
StressCrete makes no claims that the reference embedment depth shown is suitable for supporting this structure. It is recommended that a competent professional evaluate the soils present on site, confirming required embedment depth, hole diameter and backfill material to be used.

Contractor to install burndy ksu22 6-25 universal servit bolt connectors (or equivalent). connecting the #6 copper wire from the pole to the luminaire ground & a separate connector bonding pole to supply grounding conductor.

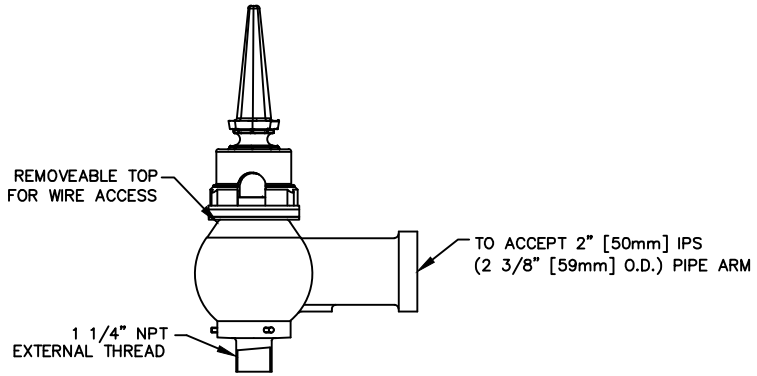
CUSTOMER APPROVAL & DATE:

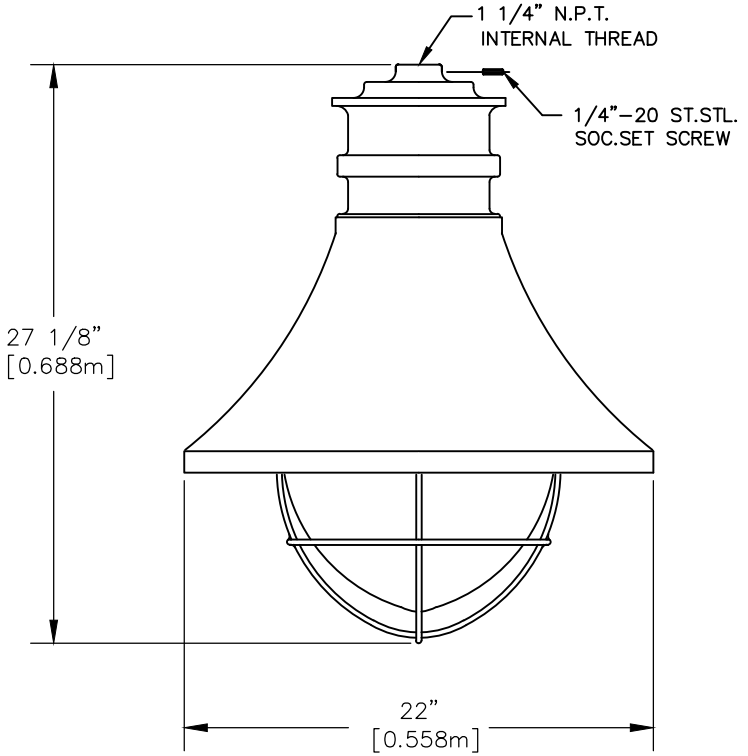
King Luminaire • StressCrete • Est. 1953
STRESSCRETE GROUP

Manufacturing Locations:
Burlington, Ontario 1-800-268-7809
Northport, Alabama 1-800-435-6563
Atchison, Kansas 1-800-837-1024
Jefferson, Ohio 1-800-268-7809

CUSTOMER ORDER No:	PROJECT/CUSTOMER: TOWN OF AMHERSTBURG			
STRESSCRETE ORDER No:	DRAWN BY: J.H.	AT: SC1	CHECKED BY:	DATE: 05/21/24 / REVISION: A
KING U.S. ORDER No:	DRAWING TYPE: APPROVAL/MFG. DWG.			DRAWING NUMBER: Q-2405032-5

REV.	ALTERATION	DATE	BY
A	METRIC DIMENSIONS ADDED	06/06/24	J.H.





LUMINAIRE SPECIFICATIONS

CATALOGUE NO.: K210-P4GS-III-__(SSL)-7030
-120:277-KPL20-PE7-#5-4K-WS
QUANTITY:
OPTICAL SYSTEM: P4 RIPPLED GLASS SHALLOW LENS
IES CLASS.: TYPE III
WATTAGE: SEE CHART
SOURCE: SOLID STATE LIGHTING
SERIES: 7030
LINE VOLTAGE: 120:277V
CCT: 4000K
PAINT: SMOOTH BLACK
OPTION: KPL-20 LEVELING DEVICE
& TWISTLOCK RECEPTACLE
(PHOTO-EYE INCLUDED),
#5 FINIAL,
WATTAGE SELECTOR

CHECK ONE	WATTAGE
☐	25W
☐	40W
☐	60W
☐	75W

CUSTOMER APPROVAL & DATE: _____

NOTE:
1) UNDERSIDE OF SPINNING TO BE PAINTED SAME COLOR AS REST OF LUMINAIRE
2) PIPE SEALER TO BE USED ON ALL N.P.T. THREADED COMPONENTS

CUSTOMER ORDER No:
STRESSCRETE ORDER No:
KING U.S. ORDER No:

King Luminaire • StressCrete • Est. 1953
STRESSCRETE GROUP

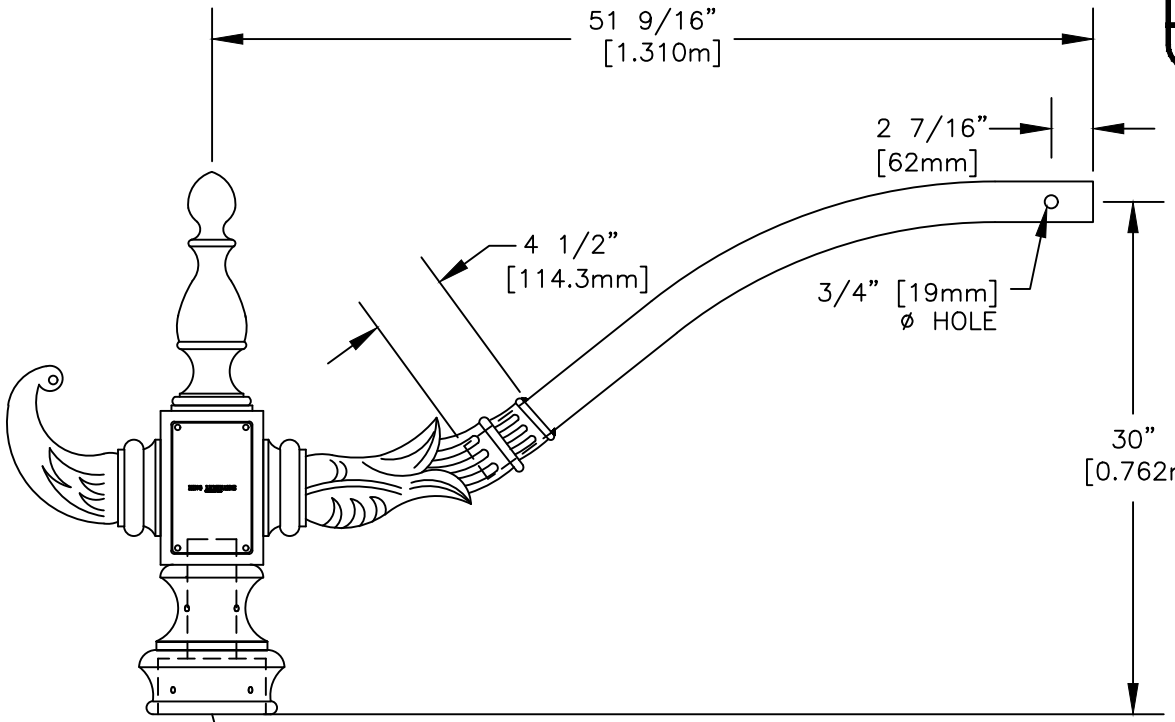
Manufacturing Locations:
Burlington, Ontario 1-800-268-7809
Northport, Alabama 1-800-435-6563
Atchison, Kansas 1-800-837-1024
Jefferson, Ohio 1-800-268-7809

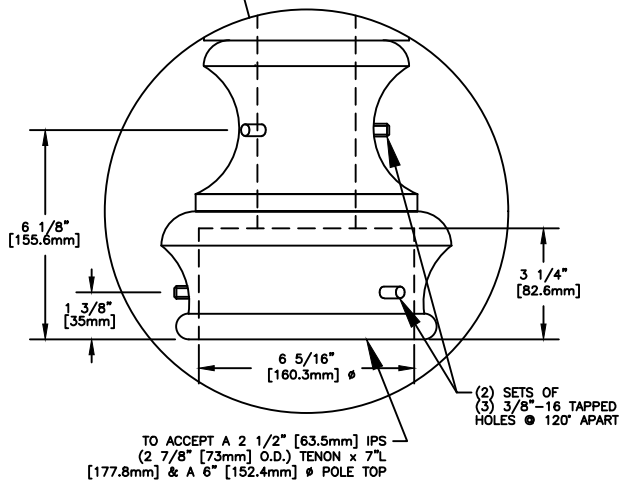
PROJECT/CUSTOMER: TOWN OF AMHERSTBURG

DRAWN BY:	AT:	CHECKED BY	DATE:	REVISION:
J.H.	SC1		05/21/24	A

DRAWING TYPE: APPROVAL/MFG. DWG.
DRAWING NUMBER: Q-2405032-6

REV.	ALTERATION	DATE	BY
A	METRIC DIMENSIONS ADDED	06/06/24	J.H.





TENON DETAIL
SCALE: 2:1

ARM SPECIFICATIONS

CATALOGUE NO.:	KA72-T2-1-4' S/F KPL20
QUANTITY:	
TYPE:	ATLANTIC
MATERIAL:	ALUMINUM
PAINT:	SMOOTH BLACK
OPTIONS:	-

CUSTOMER APPROVAL & DATE: _____

King Luminaire • StressCrete • Est. 1953

STRESSCRETE GROUP

Manufacturing Locations:

Burlington, Ontario 1-800-268-7809

Northport, Alabama 1-800-435-6563

Atchison, Kansas 1-800-837-1024

Jefferson, Ohio 1-800-268-7809

CUSTOMER ORDER No:	
STRESSCRETE ORDER No:	
KING U.S. ORDER No:	

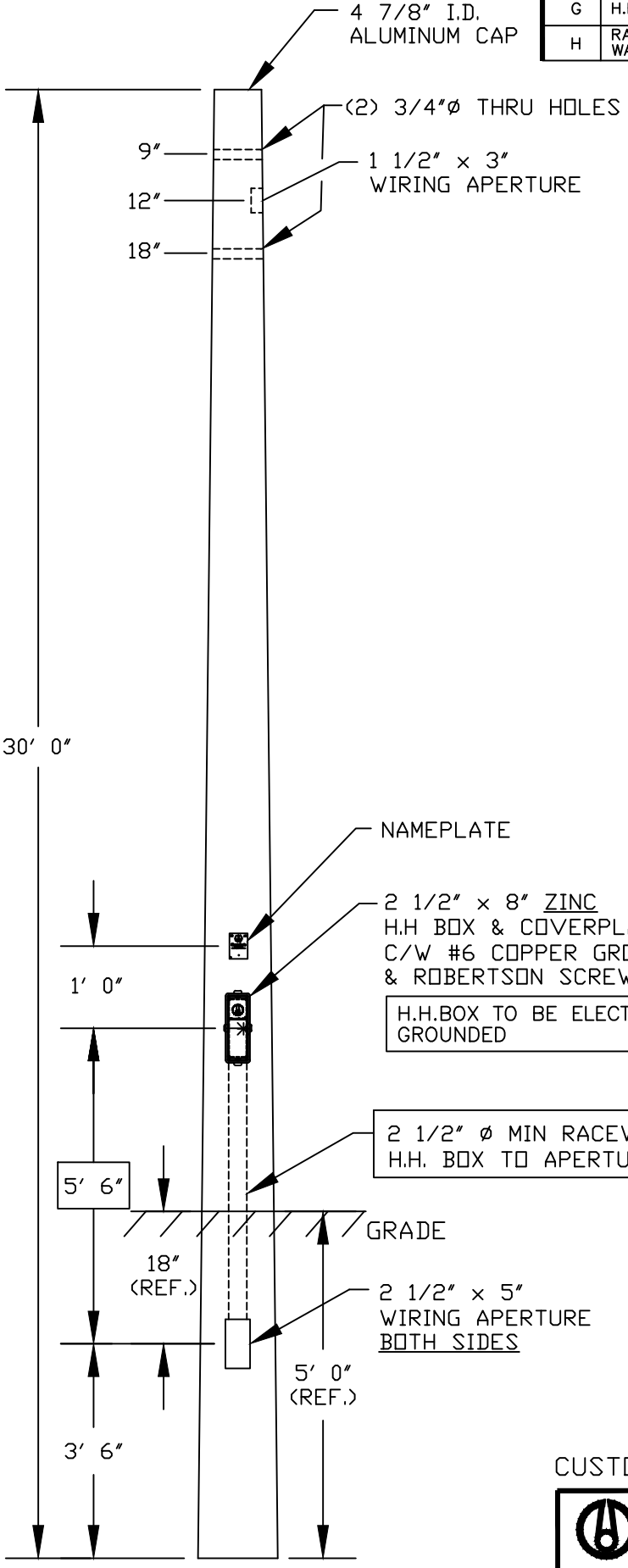
PROJECT/CUSTOMER: TOWN OF AMHERSTBURG

DRAWN BY:	AT:	CHECKED BY	DATE:	REVISION:
J.H.	SC1		05/21/24	A

DRAWING TYPE: APPROVAL/MFG. DWG.

DRAWING NUMBER: Q-2405032-7

REV.	ALTERATION	DATE	BY
G	H.H BOX GROUNDING NOTE ADDED	08/25/23	A.Z.
H	RACEWAY FROM B/G APERTURES TO H.H.BOX WAS 3-1/2" DIA.	07/08/24	A.A.



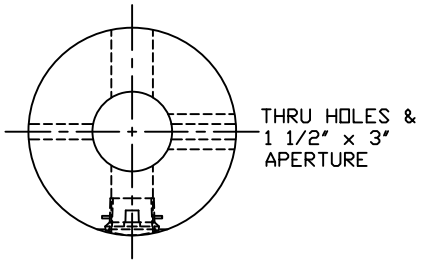
CATALOGUE NO.: E300-APR-G-M00
S/F 120

QUANTITY: 10

SECTION:	ROUND
FINISH:	MOULD FINISH
POLE TOP:	4 3/4" DIA.
POLE BUTT:	10 1/8" DIA.
POLE LENGTH:	30' 0"
APPROX. WGT.:	1,365 lbs.
MIN RACEWAY:	1 1/8" ø

POLE REQUIRED TO HOLD 5.2 SF
EPA IN A 95-MPH 3-SEC GUST
WIND SPEED PER AASHTO LTS-5
POLE DESIGNED FOR NOMINAL
GROUNDLINE MOMENT OF 13.8 K-FT

COATINGS REQUIRED:
-SILANE 10 FT. ABOVE GRADE



NAMEPLATE, H.H.BOX,
& THRU APERTURES

TOP VIEW

CUSTOMER APPROVAL: _____

StressCrete Limited
840 WALKER'S LINE, P.O. BOX 7
BURLINGTON, ONTARIO CANADA L7R 3X9

CUSTOMER ORDER NO.:	DRAWING NAME:	DWG. NUMBER:	DATE:	DWG BY:	REV.
2380-706880	APPROV./MFG. DWG	ESSEX30APR	08/28/03	A.A.	H

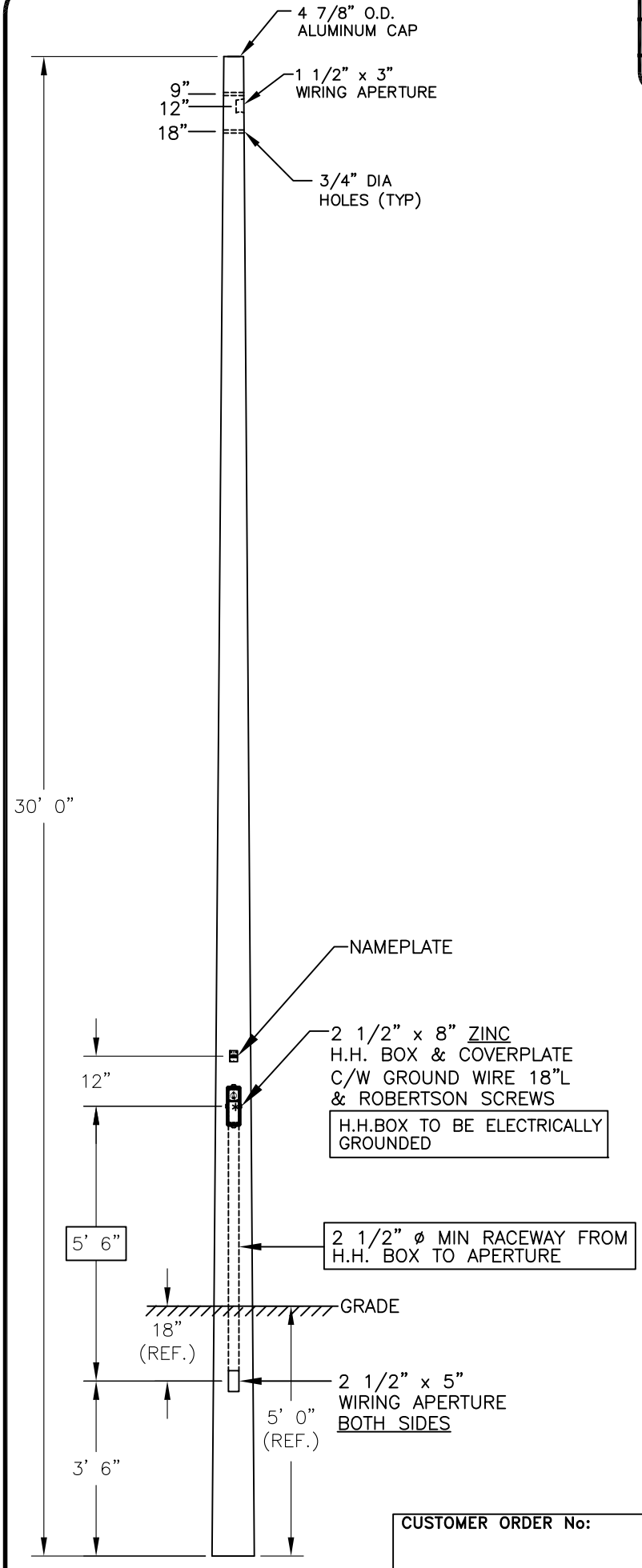
STRESSCRETE ORDER NO.: S-SC1-2406120.1

PROJECT/CUSTOMER: ESSEX POWER

CHK BY:

\SPEC\ESSEX30APR

REV.	ALTERATION	DATE	BY
A	DWG REVIEWED & UPDATED	03/07/24	A.A.
B	MIN. RACEWAY WAS 3 1/2" ø	09/11/24	A.A.



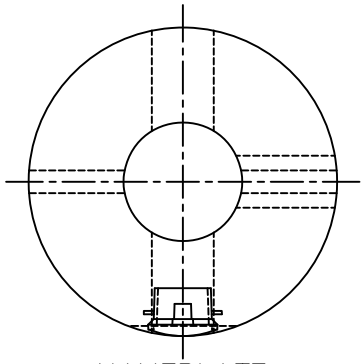
POLE SPECIFICATIONS

CATALOGUE NO.: E300–BPR–G–M00
S/F 120

QUANTITY:	
SECTION:	ROUND
FINISH:	MOULD FINISH
POLE TOP:	4 3/4" ø
POLE BUTT:	10 1/8" ø
POLE LENGTH:	30' 0"
APPROX. WGT.:	1,365 lbs.
MIN. RACEWAY:	1 1/8" ø

COATINGS REQUIRED:

SILANE 10 FT. ABOVE GRADE



NAMEPLATE
H.H.BOX
THRU APERTURE

TOP VIEW

NOTES:
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Contractor to install burndy ksu22 6–25 universal servit bolt connectors (or equivalent). connecting the #6 copper wire from the pole to the luminaire ground & a separate connector bonding pole to supply grounding conductor.

CUSTOMER APPROVAL DATE: _____

King Luminaire • StressCrete • Est. 1953

STRESSCRETE GROUP

Manufacturing Locations:

Burlington, Ontario 1–800–268–7809

Northport, Alabama 1–800–435–6563

Atchison, Kansas 1–800–837–1024

Jefferson, Ohio 1–800–268–7809

ESSEX POWER

DRAWN BY:	AT:	CHECKED BY:	DATE:	REVISION:
TASHI B.	SC1		03/31/16	B

CUSTOMER ORDER No:	DRAWING TYPE:	DRAWING NUMBER:
STRESSCRETE ORDER No:	APPROV./MFG. DWG.	ESSEX30BPR–1

APPENDIX B

WATER MATERIAL SPECIFICATIONS

Item	Size Range (mm)	Specification	CSA Standard	ASTM Standard	Description	Approved Manufacturer / Model
Curb Stops	19-50	AWWA C800			Ball type & non-draining, inlet/outlet compression joints for CTS	Cambridge Brass, Mueller
Main Stops	19-50	AWWA C800			Ball type, Inlet male AWWA taper thread/ outlet compression joint for CTS	Cambridge Brass, Mueller
Compression Coupling	19-50	AWWA C801			Inlet/ outlet compression for CTS	Cambridge Brass, Mueller
Tapping Sleeve & Service Saddles	100-600	AWWA C207			Class 150, All stainless steel with type 304 stainless steel bolts	Cambridge Brass, Smith-Blair, Ford Fast Series, Mueller
Hydrants	All	AWWA C502		B584	One Storz pumper connection with Ontario standard threads, two standard hose connections, 30mm square operating unit, plugged drain holes, shop painted with two coats of yellow enamel, 150mm “Push ON” base, right to close	Canada Valve (Century) & Clow (Brigadier M67)
Hydrant Markers					Round markers	EH Wachs

Item	Size Range (mm)	Specification	CSA Standard	ASTM Standard	Description	Approved Manufacturer / Model
Valves	All	AWWA C550/C509				Mueller, Clow, EJ Flowmaster
Zinc Caps	All				Interprovincial corrosion control	Maple Agencies
Anodes	5.4kg (12lbs) & 10.9kg (24lbs)			B418	#10-7 strand 5' copper wire with jacket	Interprovincial Corrosion Control, Maple Agencies
Tracer Wire				D-1248	#12 AWG high-strength copper clad steel insulated with a 30mil high density polyethylene insulation, blue in colour	Copperhead 1230Blue-SF (open cut only) OR Copperhead 1230Blue-EHS (directional drilling only)
Tracer Wire Connectors						King Innovation 90220 Waterproof DryConn Lug
Tracer Wire Curb Box Clamp					Brass anode clamp G-I-SDB/SB	NSI Industries
Thermal Insulation for Trench				518		DOW Chemical (Styrofoam HI 100) Brand, Owens Corning (Foamular 1000)
Thermal Insulation for Pipe	Consult with Amherstburg Water Department					
M.J. Fitting Gasket	100 – 600	AWWA C111				Sigma, Star
PVC Watermain Pipe	100 – 300	AWWA C900	B137.3		Class 150, DR 18, CIOD, Blue Colour	IPEX/ Blue Brute, IPEX/ Bionax, Royal Seal

Item	Size Range (mm)	Specification	CSA Standard	ASTM Standard	Description	Approved Manufacturer / Model
	350 – 600	AWWA C905	B137.3		Class 165, DR 25, CIOD, Blue Colour	IPEX/ Centurion, Royal Seal
	100 – 450	AWWA C909	B137.3	D1784	Class 12545B	IPEX/ Bionax
PVC Watermain Pipe (Directional Drill)	100 – 300	AWWA C900	B137.3		DR 14, DR 18	IPEX/ Fusible, IPEX/ Terrabrute, Royal/ Cobra Lock
	300<	AWWA C900/C905	B137.3		DR 18	IPEX/ Fusible
HDPE	Consult with Amherstburg Water Department					
PVC Fittings	100 – 300	AWWA C907	B137.2		Class 150, DR 18, CIOD, “Push On” only	IPEX/ Blue Brute, Royal Seal, RCT Flex-Tite
	350 – 600	AWWA C903	B137.3		Class 165, DR 25, CIOD, “Push On” only	IPEX/ Blue Brute, Royal Seal, RCT Flex-Tite
Ductile Iron Fittings	Consult with Amherstburg Water Department					
Transition Couplings	100 – 600	AWWA C219, C213, C550			Ductile Iron type 304 SS hardware, epoxy coated, NSF approved	Smith-Blair All 400 series, OMNI 441 series Robar/1406
Flanged Couplings	100 – 600	AWWA C219, C213, C550			Ductile Iron type 304 SS hardware, epoxy coated, NSF approved	Smith-Blair/ OMNI 912/913 series, Robar/7400 series, Ford/Flex FFCA, Clow 90C series
Reducing Couplings	100 – 600	AWWA C219, C213, C550			Ductile Iron type 304 SS	Smith-Blair/415, Robar 1506R &

Item	Size Range (mm)	Specification	CSA Standard	ASTM Standard	Description	Approved Manufacturer / Model
					bolts, nuts, and washers	1508R, Ford/Flex FRC
Restrainers	All sizes					Ford, Clow, Sigma, Star
Service Pipe	19 (3/4”), 25 (1”)	AWWA C800		B88-49	Copper, Type ‘K’ or PE Pert	Great Lakes Copper
	25 (1”)	AWWA/ CSA Approved	B137.1	2769	PE-RT pipe, blue in colour, NSF 61 & NSF 14 approved	Aquapure Print Stream
	25 (1”)	AWWA C904	B137.1		Poly Class 160, blue in colour	Pex-B IPEX, Rehau
	25 (1”)	AWWA C904	B137.1		Poly Class 160, blue in colour	Pex-A Municiplex IPEX, Rehau
Curb Boxes					Brass pentagon plug, arch base, bolt on curb box lid for tracer wire, 304 CC rod & stainless steel cotter pin	Mueller, Bibby
Valve Boxes				A48	Cast iron, drilled for tracer wire	Bibby, Star, Sigma
Double Check Valve Assembly Backflow Preventer	65 – 300	AWWA C510	B-64			Wilkens 350, Watts 774
Reduced Pressure Backflow Preventer	65 – 250	AWWA C510	B-64.4.1.		Approved for new installation on domestic services	Wilkens 375, Watts 994

Item	Size Range (mm)	Specification	CSA Standard	ASTM Standard	Description	Approved Manufacturer / Model
Double Check Detector Assembly	80 – 250	AWWA C511			Shall be installed on fire protection systems	Wilkens 350DA DCDA, Watts 709DCA
Meter Wire					#18-#22 AWG 3 or 4 conductor non-braided wire	
Meter Cover	19 – 25				Double Lid Cover	Ford
Plastic Meter Cover	19 – 50					IPEX Ultra Rib
Meter Setter					Copper inlet angle ball valve, outlet angle ball valve	Ford
Automatic & Continuous Flusher	Consult with Amherstburg Water Department					
Sampling Station		NSF/ ANSI 372			5’ depth of bury	Cromer Industries/ Test Tap
Liquid Chlorine 12%		NSF/ ANSI 60			Liquid Chlorine 12% (hypochlorite solution)	
Flow Monitor	Consult with Amherstburg Water Department					

APPENDIX C

MUNICIPAL GUIDELINES

Functional Servicing Report Guideline

1.0 Introduction

The Town of Amherstburg's primary objective is to ensure that adequate municipal services such as sewage disposal, water supply, storm drainage, and other essential services can be made available to all development proposals through existing availability of services to the site or required improvements to accommodate the development.

In order to achieve these goals, it is critical to identify, plan for, and where necessary, mitigate the impacts of development on the current municipal servicing network and the people who rely on it. Therefore, a functional servicing report (FSR) may be required for development applications that have the potential to have an adverse impact to the municipal servicing within the Town of Amherstburg.

If it is determined that the demands of the development cannot be accommodated by existing infrastructure, then the report shall outline the necessary improvements to municipal servicing infrastructure required to support the proposed level of development.

The Town of Amherstburg will be referred to as the Town for the remainder of this document.

The purpose of this guideline is to provide a consistent approach to developers and consultants regarding the preparation and submission of an FSR. A standardized set of guidelines will assist Town staff in reviewing FSRs while reducing revisions and resubmissions.

An FSR should be based on established engineering design principles, applicable guidelines (e.g. Ministry of the Environment. Conservation and Parks (MECP) Guidelines), regulations (Environmental Protection Act, Ontario Water Resources Act, Safe Drinking Water Act, Clean Water Act, Nutrient Management Act, etc.) and by-laws and infrastructure information available from the Town and Region.

For any details not addressed in these guidelines, good professional practice based on established standards and methodologies should be followed.

2.0 Public Record

All FSRs submitted to the Town will become part of the public record. Information from these reports may be included in reports to Council or other public documents or shared with other municipalities or agencies, and excerpts from the study reports may be shared with other applicants or consultants to allow other FSRs to properly reflect the anticipated servicing impact and/or required improvements due to area developments.

3.0 Establishing Need

The need for the completion of an FSR (along with other applicable supporting studies) will be identified in the pre-submission meeting with the Town. A high-level introduction of the proposed development will be required to be presented by the Developer at this meeting along with a preliminary sketch of the proposal.

An FSR may be requested any time a proposed development will cause an increased use of water, wastewater and/or stormwater infrastructure.

An FSR may be required to form part of a complete application for the following development application under the Planning Act:

- Official Plan Amendments
- Zoning By-law Amendments
- Draft Plan of Subdivision/Condominium
- Final Plan of Subdivision/Condominium
- Site Plan Control
- Consent to Sever
- Other planning applications, as deemed appropriate by the Manager of Engineering

Any development that does not proceed within 3 years of the original FSR date will be required to complete an updated analysis and resubmit for review and approval prior to proceeding with the works.

The level of detail required depends on the type of application and the size of the proposed development. For example, a report in support of an application for an Official Plan and/or Zoning By-law Amendment will be more conceptual than a report in support of an application for a Draft Plan of Subdivision, which will include more details, such as where lot, block or right-of-way dimensions are approved in principle. The applicant is encouraged to discuss the scope of the study with Town and Region staff prior to study commencement.

An environmental impact study may also be required to address the impact of development on water resources features or functions on- and off-site.

4.0 FSR Requirements

4.1 Introduction/ Existing Conditions

The FSR shall contain a description and a map of the study area including, but not limited to, the following information:

- Site location
- Existing land use type
- Type of surroundings and subject development lands
- Street names

- Existing municipal infrastructure surrounding the development site
- Reference reports and drawings (if applicable)
- Geotechnical conditions
- Environmental features (wetlands, woodlots, etc.)
- Design criteria and documents being used to design the servicing

4.2 Development Land Use/ Site Plan

The FSR shall provide a full description of the proposed development including, but not limited to, the following elements:

- Proposed land use
- Property size (area)
- Number of residential units/ employees/ hotel rooms
- Gross floor area of commercial or industrial development
- Other developments in the study area being constructed, approved or in the approval process that may have potential impact to the recommendations in the FSR
- Any improvements included within the existing EA documents in the study area
- Anticipated timeline for construction of the proposal including any phasing (if phased, the FSR shall include recommendations per phase)
- Development proposal drawing

4.3 Source Water Protection

An assessment of the proposed works shall be completed to determine if the works pose a significant drinking water threat and if so, features to mitigate the threat to sources of drinking water shall be identified in this section of the report.

4.4 Transportation Services

- Site access
- Peak AM/PM trips
- Classification of all streets within the proposed road networks
- Approved street names
- Pedestrian facilities proposed and connectivity to existing pedestrian facilities
- Reference TIA (if applicable)

4.5 Sanitary Servicing

- Design criteria
- Anticipated usages
- Proposed sanitary servicing
- Details on appropriate outlet for the development
- Local capacity restraints (if applicable)
- Peak flow generated by the development
- Capacity analysis and % of capacity allocated to the development
- For industrial developments, confirm quality of discharge will meet Sewer Use Bylaws and/or discuss the nature of exceedances and treatments.

4.6 Water Servicing

- Design Criteria
- Fire flow demand
- Domestic water demand
- For industrial developments, confirm processing water demand
- Hydraulic Modeling and results (if applicable)

4.7 Storm Servicing and Stormwater Management

- Design Criteria
- Proposed storm servicing strategy
- Major overland flow route
- Offsite drainage
- Details on appropriate legal, sufficient outlet for the development
- Municipal drainage works (if applicable)
- Capacity analysis and % of capacity allocated to the development

4.8 Utilities

This section shall discuss available providers for hydro, gas, and communication utilities.

4.9 Additional Considerations for Servicing

- Identify if dewatering is required and how it will be managed

- Any other servicing requirements that do not fall under the headings identified in the guideline.

4.10 Erosion and Sediment Control Plan

This section of the report shall indicate how sediment migration will be minimized and erosion will be prevented on the site throughout the duration of construction activities (including inspection type and frequency to ensure all sediment and erosion control measures are maintained)

4.11 Conclusion

- Summary of the contents of the report
- Identify any limitations to the development and recommended solutions
- Confirmation if municipal servicing can sufficiently accommodate the proposed development

4.12 Relevant tables, figures, appendices, calculations, drawings, etc. (as required)

5.0 Evaluation of Impact

5.1 Servicing Availability

Existing municipal servicing should be evaluated in terms of the availability of treatment and conveyance capacities for all municipal services within the proposed development.

In addition to the immediate receiver, all receiving infrastructure downstream of the Development shall be evaluated for capacity availability unless otherwise noted by the Town.

If the Town has an updated, working model in their possession that may assist the Consultant in determining available capacities specifically related to sanitary servicing, the Developer may choose to have the Town complete a wastewater servicing assessment on their behalf. The Developer shall be invoiced for all costs associated in the Town completing the wastewater servicing assessment upon completion of the work. The assessment results will form part of the FSR.

5.2 Tie-Ins to Existing Municipal Servicing

All proposed municipal infrastructure tie-ins must be detailed in the FSR including but not limited to: sizing of existing & proposed infrastructure, construction methodology, details on road or lane closures that may result from the required tie-in, etc.

5.3 Cost Sharing

The Developer shall be responsible for all municipal servicing improvements/ extensions/upsizing to provide adequate servicing capacities to facilitate the proposed development.

If the proposed development triggers the need for a planned municipal project to be completed sooner than originally anticipated OR includes additional work that will benefit the Town, there may be cost sharing opportunities with the Town of Amherstburg for the works.

In situations where a proposed infrastructure upgrade is identified as a major upgrade outlined in one of the Town's published masterplans and creates an improvement in the existing servicing network, the Town may consider alternative cost sharing measures on a case by case basis.

A cost sharing agreement is necessary in these cases in order to establish the Town's obligations to reimburse the developer's costs in financing the construction and to establish the developer's obligation for construction. Council approval of the construction and the reimbursement must be obtained prior to the commencement of construction.

5.4 Conclusions & Recommendations

A summary of the key findings with respect to the functional servicing report of the proposed development shall be presented along with a summary of the recommended improvements if necessary as well as a high-level cost estimate of the recommended improvements.

6.0 Documentation

AT A MINIMUM, an FSR should include all information outlined in section 4.0 of this guideline.

Operation and Maintenance Manual Guideline

1.0 Introduction

The Town of Amherstburg is in possession of consolidated linear infrastructure (CLI) environmental compliance approval (ECA) for both stormwater and sewage works.

In order to remain compliant with MECP requirements and our current approvals, an Operation & Maintenance (O&M) Manual shall be prepared and implemented for all infrastructure approved under Amherstburg's stormwater and sewage works CLI-ECAs.

An O&M manual is required when the stormwater or sewage infrastructure in the development proposal will be assumed by Amherstburg.

The Town of Amherstburg will be referred to as the Town for the remainder of this document.

The purpose of this guideline is to provide a consistent approach to developers and consultants regarding the preparation and submission of O&M manuals. A standardized set of guidelines will assist Town staff in reviewing O&M manuals while reducing revisions and resubmissions.

For any details not addressed in these guidelines, good professional practice based on established standards and methodologies should be followed.

2.0 Public Record

All O&M manuals submitted to the Town will become part of the public record. Information from these reports may be included in reports to Council or other public documents or shared with other municipalities or agencies, and excerpts from the study reports may be shared with other applicants or consultants.

3.0 Establishing Need

The need for the submission of an O&M manual (along with other applicable supporting studies) will be identified in the pre-submission meeting with the Town. A high-level introduction of the proposed development will be required to be presented by the Developer at this meeting along with a preliminary sketch of the proposal.

An O&M manual will be required to be submitted for review and acceptance if any of the following criteria is met:

- The development proposal includes any of the following elements as part of the stormwater strategy: pump station, LID, OGS unit, flow control device, dry pond, wet pond, etc.

- The development proposal includes any of the following elements as part of the proposed sewage works: pump station, forcemain, odour control device, corrosion control device, etc.

Manhole and linear sewer pipe O&M procedures are identified in the Town's overall O&M manuals for the existing systems. Development proposals that only include linear sewers as part of the overall design may not be required to prepare an O&M manual at the sole discretion of the Town. This will be communicated at the early stages of the development proposal if applicable.

4.0 O&M Manual Requirements

4.1 Stormwater

4.1.1 Introduction

- Site Location
- Brief description of the stormwater management strategy including list of appurtenances
- Outlet location

4.1.2 Routine Operation of the Works

- Detailed procedures for the standard/routine operation of the Works

4.1.3 Inspection Programs

The Inspection Program developed as part of the O&M manual must, at a minimum, address the presence of algae and/or invasive species that may impair the works and measurement of sediment depth, manual water levels (staff gauge) and/or visual observations, as appropriate to the Stormwater Management Facilities. Additional inspection programs may be included for trash build-up, presence of spills/oil/grease contamination, or blockages at the inlet and outlet pipes.

For each aspect of the Inspection program, the following information is required to be discussed:

- Frequency including specific month of the year when the inspection should occur
- Tests to be performed as part of the inspection program
- Methodology of all tests to be performed
- Specific indicators of when maintenance is necessary

- Images as necessary

4.1.4 Maintenance and Repair Programs

The Maintenance and Repair program developed as part of the O&M manual must, at a minimum, address stormwater pond sediment cleanout, pond dewatering, excavation, modification, replacement of LID soil/media/aggregate/geotextile, and sediment loading and removal methodology for all stormwater appurtenances that collect sediment.

For each aspect of the Inspection program, the following information is required to be discussed:

- Frequency including specific month of the year when the maintenance should occur
- Maintenance to be performed
- Methodology of all maintenance procedures to be performed
- Specific indicators of when the repair/maintenance is successful

4.1.5 Source Water Protection

- Operational and maintenance requirements to protect sources of drinking water, such as those included in the Standard Operating Policy for the Works
- Any applicable local Source Protection Plan policies

4.1.6 Monitoring Plan

- Procedures for routine physical inspection and calibration of monitoring equipment or components such as SCADA
- This section should align with the Town's Monitoring Plan for the existing system.

4.1.7 Emergency Response, Spill Reporting and Contingency Plans

- Procedures for dealing with equipment breakdowns, potential spills, and any other abnormal situations, including notification to the Spills Action Centre, the Medical Officer of Health, and the District Manager, as applicable

4.1.8 Public Complaints

- Procedures for receiving, responding, and recording public complaints, including recording any follow-up actions taken

4.1.9 As-Built/ Record Drawings

- Stamped and sealed by a Professional Engineer licensed to practise within the province of Ontario.

4.2 Sewage Works

4.2.1 Introduction

- Site Location
- Brief description of the servicing strategy including list of appurtenances
- Outlet location

4.2.2 Routine Operation of the Works

- Detailed procedures for the standard/routine operation of the Works

4.2.3 Inspection Programs

The Inspection Program developed as part of the O&M manual must, at a minimum, address the presence of odour and visual observation of the Works.

For each aspect of the Inspection program, the following information is required to be discussed:

- Frequency including specific month of the year when the inspection should occur
- Tests to be performed as part of the inspection program
- Methodology of all tests to be performed
- Specific indicators of when maintenance is necessary
- Images as necessary

4.2.4 Maintenance and Repair Programs

The Maintenance and Repair program developed as part of the O&M manual must, at a minimum, address cleanout requirements for any storage or overflow tanks (as applicable).

For each aspect of the Inspection program, the following information is required to be discussed:

- Frequency including specific month of the year when the maintenance should occur
- Maintenance to be performed
- Methodology of all maintenance procedures to be performed
- Specific indicators of when the repair/maintenance is successful

4.2.5 Source Water Protection

- Operational and maintenance requirements to protect sources of drinking water, such as those included in the Standard Operating Policy for the Works
- Any applicable local Source Protection Plan policies

4.2.6 Monitoring Plan

- Procedures for routine physical inspection and calibration of monitoring equipment or components such as SCADA
- This section should align with the Town's Monitoring Plan for the existing system.

4.2.7 Odour Impact Mitigation

- Detailed procedures for the prevention of odours and odour impact

4.2.8 Emergency Response, Spill Reporting and Contingency Plans

- Procedures for dealing with equipment breakdowns, potential spills, and any other abnormal situations, including notification to the Spills Action Centre, the Medical Officer of Health, and the District Manager, as applicable

4.2.9 Public Complaints

- Procedures for receiving, responding, and recording public complaints, including recording any follow-up actions taken

4.2.10 As-Built/ Record Drawings

- Stamped and sealed by a Professional Engineer licensed to practise within the province of Ontario.

5.0 Documentation

All inspections and maintenance completed to this system shall be logged. Templates forms can be found in Amherstburg's Infrastructure Standards Manual.

6.0 Maintenance Period

The Developer shall be responsible to execute all requirements noted in the approved O&M manual during the infrastructure's maintenance period. The Developer shall bear all costs for inspections and maintenance of the infrastructure during the maintenance period.

All inspection and maintenance logs recorded during the maintenance period shall be submitted to the Town prior to the Town's assumption of the infrastructure.

Failure to submit inspection and maintenance logs may result in forfeit of securities being held by the Town.

Traffic Impact Assessment Guideline

1.0 Introduction

The Town of Amherstburg's primary objective is to provide optimum conditions for the movement of people and goods through:

- promoting active transportation and transit
- prioritizing the safety of transportation systems for all users
- improving regional transportation and transit connectivity
- developing urban area with compact built form and complete communities

In order to achieve these goals, it is critical to identify, plan for, and where necessary, mitigate the impacts of development on the current transportation network and the people who rely on it. Therefore, a traffic impact assessment (TIA) may be required for development applications that have the potential to adversely impact the transportation network within the Town of Amherstburg.

The Town of Amherstburg will be referred to as the Town for the remainder of this document.

The purpose of this guideline is to provide a consistent approach to developers and consultants regarding the preparation and submission of a TIA. A standardized set of guidelines will assist Town staff in reviewing TIAs while reducing revisions and resubmissions.

For any details not addressed in these guidelines, good professional practice based on established standards and methodologies should be followed.

2.0 Public Record

All TIA reports submitted to the Town will become part of the public record. Information from these reports may be included in reports to Council or other public documents or shared with other municipalities or agencies, and excerpts from the study reports may be shared with other applicants or consultants to allow other TIAs to properly reflect the anticipated traffic due to area developments.

3.0 Establishing Need

The need for the completion of a TIA (along with other applicable supporting studies) will be identified in the pre-submission meeting with the Town. A high-level introduction of the proposed development will be required to be presented by the Developer at this meeting along with a preliminary sketch of the proposal.

At a minimum, TIA will be required if any of the following conditions are met:

- The proposed development is anticipated to generate 30 auto trips or more in the peak hour of traffic for the development;
- The proposed development is in/near a location where a known local safety or capacity issue exists;
- The proposal includes a new access on or connection to an arterial or collector road;
- The proposal includes a new access or connection at any location where stopping or turning sight distance standards (based on the standards and methodologies given in the Transportation Association of Canada Geometric Design Manual) are not met;
- The proposal includes the closure of an existing through road;
- Site generated traffic associated with the proposed development will result in an intersection or driveway turning movement becoming critical (see definition below) or will make operations for a critical movement worse.

A critical movement is defined as follows:

- All intersections
    - Any movement where the 95th percentile queue exceeds available storage.
- Unsignalized intersections
    - Any movement with level of service “E” or worse.
- Signalized intersections
    - Any movement with level of service “F”.
    - Through movements and shared through/turning movements: any movement with v/c of 0.85 or higher.
    - Exclusive turning movements: any movement with v/c of 1.0 or higher.
- Any location where a driveway access is anticipated to be blocked/inaccessible due to queueing vehicles

A Traffic Brief may be requested by the Town in lieu of a TIA when the development does not meet the criteria noted above but a specific area of concern has been identified by the Town. The Town, at its sole discretion, will determine whether a traffic brief will be sufficient, as well as the specific scope required to be included in the brief.

The TIA or Traffic Brief (as deemed necessary) shall be prepared by or under the supervision of a Professional Engineer (or Limited Engineering License holder practicing within the limits of their license) licensed in the Province of Ontario with experience and expertise in the field of transportation and traffic engineering, who must stamp, sign, date the report, and take professional responsibility for the work.

Any development that does not proceed within 3 years of the original TIA date will be required to complete an updated analysis and resubmit for review and approval prior to proceeding with the works.

4.0 TIA Requirements

The TIA shall be submitted in metric units.

4.1 Study Area

The TIA shall contain a description and a map of the study area including, but not limited to, the following information:

- Site location
- Existing land use type
- Type of surroundings and subject development lands
- Road jurisdictions
- Road classifications, speed limits, and lane configurations
- Street names
- Signalized and/or unsignalized intersections and their locations
- Available transit services, parking facilities, pedestrian and cycling facilities

The limits of the study area shall extend such that the study area includes all highways, interchanges and intersections that will be affected or potentially affected by the traffic generated by the proposed development. The limits of the study area must be approved by the Town in advance of the preparation of the TIA or Traffic Brief.

4.2 Development Land Use/ Site Plan

The TIA shall provide a full description of the proposed development including, but not limited to, the following elements:

- Proposed land use
- Property size (area)
- Number of residential units/ employees/ hotel rooms
- Gross floor area of commercial or industrial development
- Other developments in the study area being constructed, approved or in the approval process that may have potential impact to the recommendations in the TIA
- Any road improvements that are planned within the next 10-20 years or under construction within the study area (refer to Transportation Masterplan and Roads Needs Study)
- Any improvements included within the existing EA documents in the study area

- Anticipated timeline for construction of the proposal including any phasing (if phased, the TIA shall include recommendations per phase)
- Site plan drawing

4.3 Horizon Years/ Scenarios

In general, the horizon year(s) for impact analysis must include the existing conditions at the time of preparation of the TIA, the anticipated time of completed build-out of the proposal, and 5 years from the anticipated build-out of the site. Additional horizon years may be required to be assessed based on phasing of the development.

4.4 Time Periods

Typically, the weekday morning AM and afternoon PM peak hour periods should be evaluated. If the site is located in a major tourism area or is expected to generate significant weekend traffic, then the weekend peak hour may also require analysis.

4.5 Data Collection

The consultant shall undertake collection of the required data on their own. Counts from the local municipality or County of Essex collection counts may be considered acceptable, however, only data collected within 18 months of the submission date for the study shall be used.

4.6 Background Growth

The background growth in traffic should be established in consultation with Town staff based on growth rates identified within area transportation studies. In absence of these methods, a background traffic growth factor between 1 to 2 percent will be determined by the Town Staff.

4.7 Site Generated Traffic

4.7.1 Trip Generation

The volume of traffic generated by a proposed development shall be estimated using the procedures described in the most current version of ITE Trip Generation Manual.

The TIA shall present trip generation assumptions and results in table form identifying the categories and quantities of land uses, with the

corresponding trip generation rates or equations and the resulting number of trips.

The report should also include a detail of any initiatives proposed to provide alternatives to single-occupancy vehicle use and any steps that will be taken to support transit use, walking, cycling or other forms of travel choices.

4.7.2 Trip Distribution

The TIA shall describe methods and assumptions for distribution and route assignment of traffic. Assumptions for Origin/Destination and Percent Distribution shall be presented in table form and traffic assignment shall be presented as a diagram.

Assumptions for trip distribution shall be supported by one or more of the following:

- Transportation Tomorrow Survey (TTS) data
- Origin-destination Surveys
- Comprehensive Travel Surveys
- Planning models
- Market studies

Assumptions for route assignment shall be supported by existing travel patterns and expected future travel patterns and should be presented in table form based on the identified horizon years.

4.7.3 Pass-By and Internal Capture Trips

Pass-by trips are defined as intermediate stops made on the way from an origin to a primary destination. Methods and assumptions for adjusting gross trip generation for pass-by trips shall be in accordance with the ITE's Trip Generation Handbook.

Internal Capture trips are defined as those trips made among land uses internal to the site. The method addressed in the ITE's Trip Generation Handbook shall be followed to estimate the percentage reduction in trip generation due to internal capture.

For land uses not currently included in the ITE's Trip Generation Handbook, all trips will be considered as primary trips.

Assumptions for Pass-by and Internal Capture Trips should be presented in a table form.

5.0 Evaluation of Impact

5.1 Operational Analysis

The evaluation of impacts shall be conducted for all time periods of each horizon year. The peak hour analysis shall be undertaken for full development and, if applicable for all interim stages, with and without the relevant transportation improvements as well as for:

- Existing traffic conditions
- Existing traffic conditions plus background growth
- Existing traffic conditions plus background growth plus site-generated traffic

Capacity analysis shall be performed at all proposed site access points and intersections in the study network in accordance with the methodology described in the latest edition of the ITE Trip Generation Manual data.

Critical movements should be identified within the document.

Conventional signal timing plans should be used and all proposed adjustments to traffic signal timing, phasing and cycle lengths should be evaluated in terms of pedestrian crossing time, effect on queue lengths, adequacy of existing storage and effects on the existing signal co-ordination in accordance to Niagara Region standards.

Two stages left turning movements or pedestrian crossings shall not be considered as part of the capacity analysis.
For developments in which truck trip generation and their effects on the study area have been identified in the Scope of Work, heavy/commercial vehicles shall be considered as part of the capacity analysis and the following information shall be included as part of the TIA:

- Existing conditions related to truck traffic (percentage, number of collisions).
- Relationship between land use and truck traffic (cargo, service hours, routing).
- Physical requirements (dedicated access, dedicated lanes).

The Town will accept the use of modelling/simulation software for intersection & roundabout capacity, operational analysis, and geometric delay analysis.

Any traffic improvements or operational concerns that cannot be adequately mitigated to the Town's standards shall be identified.

5.2 Timing and Signal Justification

The need for traffic signals and/or underground traffic signal utility provisions shall be reviewed at all locations affected by the proposed development and for each proposed development stage. Determination of whether traffic signals or provisions for signals are warranted shall be made according to the process described in OTM Book 12. Intersection timing and traffic signal improvements required due to development or redevelopment shall be considered as improvements in the TIA.

For any locations that are being considered for a potential new traffic signal, a roundabout analysis shall be considered upon discussions with the Town as part of the pre-submission meeting.

The Town may also determine that as part of the TIA, a roundabout analysis must be
completed for an existing signalized intersection with existing or projected poor safety or operational performance.

5.3 Other Transportation Methods

5.3.1 Active Transportation

For all developments, the following information shall be included as part of the TIA:

- Existing and proposed pedestrian and cyclist facilities – including proposed if applicable.
- Measures to maintain and/or improve existing conditions, including interconnection of existing facilities.
- Any possible effects in existing or proposed facilities generated by the proposed development.

5.3.2 Transit

Existing transit services should be evaluated in terms of available capacity and need for increased service.

Potential transit impacts and mitigation measures to be considered as part of the TIA will be determined as part of the pre-submission discussion with the Town. The analysis may include, among others, the following elements:

- Pedestrian access to transit services from the proposed development shall be evaluated and desirable improvements to the site plan to facilitate access should be noted and/or recommended.
- Any impacts on transit operations caused by site-generated traffic shall be identified and suitable remedial measures noted and recommended.
- Any required relocation of transit facilities, such as bus stops, shall be identified and alternative locations determined and evaluated regarding their effect on traffic and transit operations.

5.4 Site Access & Access Management

Site access location and design shall be determined based on the results of the traffic impact analysis. In general, any new access should be designed to restrict the inbound and outbound left turns if they conflict with an expected queue on the main road. All designs for proposed site accesses shall give consideration to cycling and pedestrian infrastructure abutting the access.

5.5 Geometric Improvements

The need for geometric improvements shall be reviewed at all locations in the study area and for each proposed development stage. The TIA shall clearly identify transportation impacts by movement, the transportation system improvements that are needed to mitigate these impacts, and the timing of any recommended improvements. Cyclist and pedestrian infrastructure shall be considered in all proposed geometric improvements.

A schematic representation of all geometric improvements shall be included as part of the TIA, identifying lane arrangements and intersection improvements for each horizon year.

5.6 Cost sharing

The Developer shall be responsible for all road improvements required to provide safe and efficient access and egress to the development, including but not limited to; costs for turning lanes, tapers, traffic control measures, connectivity to existing

active transportation infrastructure, addition of pedestrian and/or cycling infrastructure, and improvements to nearby intersections based on an approved TIA.

If the proposed development triggers the need for a planned municipal project to be completed sooner than originally anticipated OR includes additional work that will benefit the Town, there may be cost sharing opportunities with the Town of Amherstburg for the works.

In situations where a proposed road is identified as a major future road in Official Plan and creates an improvement in the existing road network, the Town may consider alternative cost sharing measures on a case by case basis.

A cost sharing agreement is necessary in these cases in order to establish the Town's obligations to reimburse the developer's costs in financing the construction and to establish the developer's obligation for construction. Council approval of the construction and the reimbursement must be obtained prior to the commencement of construction.

5.7 Safety Impact

Safety of all road users shall be taken into consideration as part of the preparation of
the TIA. The TIA shall identify and make recommendations regarding any geometric or
operational elements that may impact safety, such as:

- Weaving maneuver
- Merging conflicts
- Transit operational conflicts
- Corner clearances
- Sight distances
- Vehicle-pedestrian and vehicle-cyclist conflicts
- Traffic infiltration
- Access conflicts
- Cyclist movements
- Heavy truck volumes and consideration (e.g., turning paths) and size of the trucks
- Speeding

For developments in which significant and/or specific concerns over the development's effect on road safety can be expected, the need for a more detailed

traffic safety analysis shall be discussed. The safety impact analysis should include but is not limited to:

- A road safety review of existing conditions including operational characteristics, collision data, geometric and roadside characteristics, and any remedial measures to address unusual known collision patterns. A field review may be required.
- Detailed analysis and countermeasure recommendations (identification and selection of suitable countermeasures that may address the site's needs, estimation of the benefits associated with the selected countermeasures in terms of collision reduction, and estimation of the costs associated with the selected countermeasures)

The TIA shall include consideration of the safety of vulnerable users, including the identification of pedestrian desire lines and areas of potential conflicts between motorized vehicles and cyclists, motorized vehicles and pedestrians, and cyclists and pedestrians, as well as the need for pedestrian and/or cycling controlled crossings.

5.8 Conclusions & Recommendations

A summary of the key findings with respect to the transportation impact of the proposed development shall be presented along with a summary of the recommended improvements if necessary as well as a high-level cost estimate of the recommended improvements.

6.0 Documentation

AT A MINIMUM, a traffic impact assessment report should include at least the following information:

- Professional details
  - Name(s) of the report author(s)
  - Name, seal and signature of the person(s) taking professional responsibility for the report contents
- Development characteristics
  - Precise location identification (municipal address if available, or lot & concession)
  - Proposed land use type(s)
  - Existing Official Plan and zoning by-law designations for the site (and proposed designations, if an OP or zoning amendment is proposed for the development)

    - Development size for each land use type/building/etc. (site area, gross floor area, gross leasable area, number of employees/dwelling units, etc. as appropriate)
    - Anticipated date of construction completion
    - Anticipated hours of operation (if applicable)
    - Location and type of accesses, clearly distinguishing between existing and proposed accesses and noting the movements permitted
    - Development phasing (including the above details for each phase)
- A site plan for the proposed development, showing the full right-of-way width of all adjacent roads and streets, including any existing entrances opposite the proposed development, pedestrian facilities, and any transit stops on adjacent roads
- General study details
    - Horizon years
    - Time periods analyzed
    - Study area map
- Trip generation, distribution and assignment assumptions
- Volume diagrams showing all peak hours analysed:
    - Existing traffic
    - For each horizon year:
        - Future background traffic
        - New site trips
        - Pass-by trips (if the development will experience pass-by traffic)
        - Future total trips
- Analysis Details
    - For each scenario:
        - Lane configurations at all intersections analysed
        - Level of service, volume to capacity ratio, and delay for all movements (except free-flow movements at unsignalized intersections) at all intersections analysed
        - Identification of all critical movements along with proposed mitigation measures (if applicable)
    - Non-auto modes discussion
    - Traffic calming discussion (if applicable)
    - Summary of the sight distance review (if applicable)
    - Collision review (if applicable)
    - Pedestrian and cycling facility discussion (if applicable)
- Conclusions
    - An overall statement of whether the transportation network can or cannot accommodate the development, along with:

    - Details of the mitigation measures and network improvements required to accommodate the development;
    - Details of any special restrictions on the development (e.g. limits on types of tenant or hours of operation) required for the network to be able to accommodate the development.
    - Confirmation that the report is consistent with the current Provincial Policy Statement.
- Appendices
    - Traffic count data
    - Operational analysis reports
    - Warrant worksheets (if applicable)

APPENDIX D

SAMPLE FORMS

MANDREL TESTING

MANDREL TESTING
INSERT DEVELOPMENT NAME HERE

INSPECTOR INFORMATION	
Inspector Name:	
Place of Employment:	
Date/Time of Inspection:	
Site Location:	
Reason for Inspection:	Start of Maintenance Routine Other:
Pass or Fail?	

INSPECTION INFORMATION	
Contractor completing the Mandrel Testing	

SUMMARY/ INSPECTION COMMENTS

FOLLOW-UP/ MAINTENANCE REQUIREMENTS AS A RESULT OF THE INSPECTION

All mandrel testing was completed in accordance with OPSS.MUNI 438 and witnessed by a representative of the Consulting Engineer.

_____ Initial

_____

Consulting Engineer Name Date Signature

SKETCH OF THE DEVELOPMENT
WITH MANHOLES LABELED

START MH	FINISH MH	RUN LENGTH	PIPE SIZE	MANDREL SIZE

All mandrel testing was completed in accordance with OPSS.MUNI 438 and witnessed by a representative of the Consulting Engineer.

_____ Initial

SWM FACILITY INSPECTION FORM

INSPECTION LOCATION
INSERT DEVELOPMENT NAME HERE

INSPECTOR INFORMATION		
Inspector Name:		Signature:
Place of Employment:		
Date/Time of Inspection:		
Site Location:		
Reason for Inspection:	Routine Post-Storm Other: _____	

INSPECTION INFORMATION

Inspection Items	Inspected?	Maintenance Required?	Comments/Concerns

SUMMARY/ INSPECTION COMMENTS

FOLLOW-UP/ MAINTENANCE REQUIREMENTS AS A RESULT OF THE INSPECTION

MAINTENANCE/ REPAIR FORM

MAINTENANCE AND REPAIR LOCATION
INSERT DEVELOPMENT NAME HERE

MAINTENANCE/REPAIR PERSON INFORMATION		
Inspector Name:		Signature:
Place of Employment:		
Date/Time of Maintenance/Repairs:		
Site Location:		

MAINTENANCE/ REPAIR INFORMATION			
Work Items	**Corrective or Preventative?**	**Date Completed**	**Comments/Concerns**

MAINTENANCE/REPAIR SUMARRY

COMMUNITY COMPLAINT FORM

COMMUNITY COMPLAINT LOCATION
INSERT DEVELOPMENT NAME HERE

RESPONDENT INFORMATION		
Name:		Signature:
Place of Employment:		
Date/Time of Complaint:		
Nature of Complaint:	Odour Trash/Debris Standing Water Visual Spill Other: _____	
Date/ Time Town was Notified:		

COMPLAINENT INFORMATION		
Name	**Address**	**Phone Number**

DESCRIPTION OF COMPLAINT

ACTION TAKEN IN RESPONSE

WAS THE SOURCE OF THE COMPLAINT IDENTIFIED? IF YES, PLEASE DESCRIBE BELOW:

APPENDIX E

PEO GUIDELINES

GUIDELINE

Engineering Services to Municipalities

1986

Published by
Association of Professional Engineers of Ontario

Revised 12/11/98

CONTENTS

PHASES OF SERVICE

Normally four phases of services are required from engineers during the design and construction of municipal services, as noted in phases 2-5 below. A fifth phase (advisory and special services) and a sixth phase (post-construction services) may be required.

Engineers having a regulatory capacity should also ensure that the services set out below for each phase of the work have been completed as appropriate.

The six phases are:

Phase 1–Special Services
Phase 2–Preliminary Design and Reports
Phase 3–Detailed Design, Final Drawings and Specifications
Phase 4–General Review During Construction
Phase 5–Resident Staff Services During Construction
Phase 6–Post-Construction Services

PHASE 1 - SPECIAL SERVICES

Most designs require feasibility or predesign investigations to determine which of several alternatives best meets the objectives. The following are examples of additional or special services, some of which may precede the preliminary design and detailed design services described in Phase 2 and Phase 3:

- Advisory services, including special consultations and advice, preparation of rate structures, research and soil investigations.
- Preparation of feasibility studies comparing alternative routes for services and alternative methods of construction or materials, which may be appropriate and advantageous in terms of capital cost, land requirements, operating efficiency, or for environmental or energy conservation reasons.
- Public hearings before the Environmental Assessment Board, the Ontario Municipal Board or other public authorities regarding the environmental impact of the project, the financial capability of the municipality, the method of charging for the works and property evaluation for easements and purchases.
- Appearance in litigation, arbitration proceedings and attendance at hearings on behalf of the municipality.
- Topographic plans or the obtaining of photogrammetric mapping.
- Negotiations for easements and purchases.
- Preparation of local improvement assessment sheets, attendance at the Court of Revision and similar services under The Municipal Act, The Public Utilities Act or The Drainage Act.
- The allocation of costs between the municipality and other municipalities, authorities or private interests, including the administration of extended financial arrangements, computation of principal and interest, and preparation of accounts.
- Additional services required by reason of contractor's insolvency.
- Changes in design made necessary or desirable by factors beyond the control of the engineer.
- Preparation of special progress certificates and final certificates for subsidy payments, grants or rebates.
- Carrying out prolonged negotiations with public authorities on behalf of the municipality.

PHASE 2- PRELIMINARY DESIGN AND REPORTS

2.1 Outline of Services

The engineer should prepare preliminary plans or reports in the form of drawings and text outlining the nature of the project, a summary of the principal design standards, an outline cost estimate and the extent of services and recommendations. This work is sometimes identified as the preliminary "Engineering Report" but is not to be confused with predesign and feasibility studies, which are included in Phase 1 -Special Services.

2.2 Services to be Provided

The engineer should provide the following preliminary services in connection with the functions shown:

2.2.1 Attend Meetings

Meet with the appropriate representatives of the municipality, including the municipal engineer, planning director, works committee or council, to:

- obtain full information on existing and proposed municipal services, roads and other facilities;
- determine the municipality's standard criteria for design;
- determine the extent of engineering services to be provided and the manner of presentation, and
- determine the municipality's practice for the sharing of costs with other public authorities, private developers and the public.

2.2.2 Familiarization

Conduct a physical reconnaissance and review topographical maps of the project area to ascertain the location, topography, drainage and existing municipal services.

2.2.3 Planning

Study existing plans and reports define zoning and land use and predict the rate and direction of probable community and traffic growth, and apply these factors to the design, as may be required.

2.2.4 Preliminary Design

a) Sewers and Watermains

Carry out preliminary design of sanitary sewers and water distribution systems in accordance with accepted engineering practice and, where applicable, with standards established by the local municipality and other regulatory authorities. In the design of each of these systems, take into consideration the present and future land use, the areas to be serviced, the pipe location, size, depth, material and bedding, suitable inlets and outlets, the design and location of catch-basins, maintenance holes, hydrants, building connections and other appurtenances.

b) Plants and Associated Works

Incorporate sound functional design into all structures, including equipment forming parts of pumping stations, water purification and pollution control plants. When required to design plants will be used for process operations, engineers should avail themselves of special processes may be used, including the nature of, and factors governing, the process.

They should evaluate the various processes, types of instrumentation, automation, etc., and should recommend the adoption of a specific process and type of control, while remaining aware of the required results, the economy of construction, operation and maintenance. Due consideration should be given to the planning and preliminary design of all energy consuming facilities to minimize the impact on future energy demands. This consideration should include energy conservation and utilization practices in the selection of machinery, the location and orientation of structures, and the insulation of buildings.

The engineer, where directed, should produce suitable procedures and documents for the pre-selection of machinery and equipment. A diagrammatic flow-sheet and hydraulic flowsheet should be pro-

vided for treatment plants. An original process design is not a part of this preliminary design service, but is considered to be a special service.

c) Road and Street Construction

Establish the design criteria essential for a proper design consistent with the municipality's long-range land-use and traffic plans. Traffic and land-use studies will assist in providing design criteria to establish the type of street, traffic density, design speed, sight distance, grade and curvature. A further study of the adjacent land use and proposed environmental considerations should provide design criteria for the best dimensional arrangement of the pavement, median, shoulders, right-of-way, intersecting roads, bus bay entrances and other cross section elements. The subsequent engineering design of the subgrade, pavement, sidewalks, curbs and gutters, drainage, utility relocations, minor structures and railway crossings should then be carried out in accordance with accepted practice. Due consideration should be given to such ancillary features as illumination, signs, signals, fences, landscaping and zone painting.

2.2.5 Environmental

Environmental parameters, which have been defined during the predesign studies, should be highlighted and identified, and included in the preliminary design process.

2.2.6 Soils

Existing soils data should be assembled and evaluated. On the basis of this evaluation, a preliminary soils investigation program shall be carried out to obtain sufficient data to permit appropriate decisions to be made during the preliminary design stage. This soils investigation program is part of Special Services.

PHASE 3 - DETAILED DESIGN, FINAL DRAWINGS & SPECIFICATIONS

3.1 General

The engineer should design all structures and facilities to serve the best interests of the public, with due regard for environmental concerns, capital cost and operating efficiency in accordance with current engineering practice and acceptable standards established by the municipality and regulatory authorities.

3.2 Services to be Provided

3.2.1 Surveys

The engineer should obtain detailed profiles and cross sections for the detailed design and computation of tender quantities, as necessary.

3.2.2 Soils

The engineer should prepare a soils investigation program that will subsequently provide all of the subsurface data required for the detailed design. Such a program should include location of boreholes, laboratory work and recommendations in respect to loads, and any special conditions that must be satisfied during construction of the work. The soils investigation is normally carried out as part of Special Services.

3.2.3 Drawings

Engineers should endeavour to standardize plan sizes and scales in the best interests of their clients. The drawings for municipal pro jects will be of two basic types: a) those relating to work within road allowances, either for roads or for services therein, and b) those relating to treatment plants, pumping stations, bridges and other structures:

a) Works within Road Allowances

These drawings should generally show plan and profile, augmented with cross sections and detailed drawings as required.

Plans and profiles should normally be drawn to a horizontal 1:500 scale and a vertical scale of 1: 100, subject to the requirements of the municipality. The north point should be shown on each plan, together with the names of the streets, lot numbers, property lines and frontage dimensions obtained from existing municipal plans.

Design details of standard units of construction, such as road sections, maintenance holes, catchbasins, valve chambers, hydrants, street light standards, guiderails and pipe bedding, should be presented on standard drawings at appropriate scales. Plans should show the location of all known existing utilities both underground and on the surface, all existing topographic features, including embankments, buildings, mature trees, entrances, signs, fences, etc., within the road allowance or in proximity to the work.

Profiles shall show the existing surface profile, the approximate location and elevation of known existing utilities that will be intersected by the new work, and any available soils information.

For roadwork, the profile should indicate the finished road surface, giving the length and grade of each tangent section of vertical curve.

For sewers and watermains, the profile should show an invert and obvert profile of the pipe. For sewers, invert and basement elevations should be shown and, for watermains, centreline elevation of depth of cover. For each section, the length, grade and class of pipe, and type of bedding or encasement for each section should be indicated.

b) Treatment Plants, Pumping Stations, Bridges and Other Structures

Design of pumping stations and plants shall be such that competitive bidding should be encouraged for the supply of equipment and structures, unless special conditions require the supply of specific equipment or structures.

These drawings should be grouped according to the type of work to which they relate and, where applicable, should comply with PEO guidelines in the structural, mechanical and electrical fields.

A general plan should show a summary of all proposed facilities and services at an appropriate scale. For large projects, a location plan at a convenient scale should be provided, showing the geographic location of the project in the municipality.

The manner of presentation of the work in the plan form, the rendering of detail in line diagrams, the dimensioning and lettering and all other drafting work should be carried out in a professional and skilled manner, to ensure that the work is presented in an orderly fashion, the facilities and structures are shown in a recognizable manner, and that the wording on the plans is simple, concise, grammatically correct and completely legible.

3.2.4 Specifications

The specifications should be for all works shown on the drawings or for which the engineer is responsible. They should be complete, clear and concise, with a statement setting forth the general scope of work, followed by an adequate description of the various classes of work, segregated by trade and under proper sections and headings. The quality of materials and standard of work required of the contractor should be described in detail. Each section and heading should be identified for easy reference. Where applicable, standard specifications related to the type of work to be carried out should be used, and the nomenclature should be the same as that used on the plans.

3.2.5 Other Contract Documents

As well as plans and specifications, the design function should include the provision of forms of bonds, a form of tender, schedule of quantities, articles of agreement, general conditions of the contract and special conditions that may be required by the client or other public agency.

3.2.6 Final Cost Estimate

The engineer should provide the client with a cost estimate based on the final design.

3.2.7 Approvals

Engineers should become familiar with all authorities having jurisdiction over any component of the works. They should submit plans, specifications, schedules, and applications for approval to clients and appropriate authorities, as required. They should attend meetings at the offices of these public authorities to discuss designs and provide explanations, for the purpose of furthering the applications towards approval.

In addition, engineers may be required to prepare special applications or reports, to assist the municipality in obtaining subsidy payments, grants or special financing from senior levels of government.

3.2.8 Tender Call

The engineer should provide advice to the client during tender call, including tender evaluations and recommendation for award.

PHASE 4 - GENERAL REVIEW DURING CONSTRUCTION

4.1 General Outline of Services

When, in the opinion of the engineer, a resident engineer and staff are required, the engineer should so advise the client. This service may be provided by an authorized representative of the engineer, or by a sub-consultant reporting to the engineer, or by a representative retained directly by the client.

These services are provided by the engineer to determine that materials used and results achieved by the contractor are in general conformity with the design. Contractors are responsible for discharging their obligations under the terms and conditions of the construction contract. The engineer, on behalf of the client, should carry out a review of the work during its execution.

Contractors are responsible for discharging their obligations under the terms and conditions of the construction contract. The performance of the contract is not the engineer's responsibility, nor are review services rendered for the contractor's benefit. The contractor is responsible for the quality of the work.

It is to be understood that only work that has actually been seen during examination of representative samples can be said to have been appraised, and comments on the balance of the work are assumptions based upon extrapolation.

The extent of the engineer's duties for general review during construction should be clearly defined in the engineer's agreement with the client.

4.2 Services to be Provided

The office and field services to be provided by the engineer during this phase are as follows:

- advise the contractor on the interpretation of the drawings and specifications and issue supplementary details and instructions during the construction period as required;
- review for approval the construction schedule proposed by the contractor and comment on the procedures, methods and sequence of work;
- review submitted shop drawings to the degree necessary to determine if the contractor's work is in general compliance with the design requirements;
- consider and advise on alternative methods, equipment and materials proposed by the contractor;
- advise on the validity of charges for additions or deletions and advise on the issue of change orders;
- process contractor's progress and final requisitions and issue progress certificates for the client's acceptance;
- maintain adequate records related to the contracts;

- make periodic visits to the site during construction, to ascertain that the work is being executed in reasonable conformity with plans and specifications;
- arrange for the testing and inspection of materials and work by an authorized inspection and testing company, where the construction calls for such testing;
- attend job meetings as deemed necessary, and
- report progress and deficiencies to the client.

PHASE 5 - RESIDENT STAFF SERVICES DURING CONSTRUCTION

Normally the resident staff services will be provided by the engineer on a full- or part-time basis. This service may be provided by an authorized representative of the engineer, or by a sub-consultant reporting to the engineer, or by a representative retained directly by the client.

Such services should include:

- provide reference line and elevation to the contractor and, where necessary, check the contractor's line and grade;
- determine if the contractor is carrying out the work in accordance with the contract documents and communicate with the contractor, the engineer's authorized representatives, and the client regarding deficiencies in the work, and other matters of direct interest or concern;
- arrange for, or carry out, all necessary field testing and inspection of materials and equipment installed;
- investigate, report and advise on unusual circumstances which may arise during construction;
- carry out final inspection at the conclusion of the construction contract, as part of the acceptance program of the client;
- obtain and record field information of construction details for the modification of contract drawings to show the work "as- built";
- maintain sufficient data to determine periodic progress of the work, and
- prepare recommendations to the client regarding payments to the contractor, taking into account progress of work, materials and equipment delivered to site, and contractual and statutory holdbacks.

PHASE 6 - POST-CONSTRUCTION SERVICES

The services in this category vary in scope and detail according to the needs of the client and should be described in the scope of the assignment.

They include but are not limited to:

1. Commissioning and start-up assistance.
2. Preparation of maintenance and operating manuals.
3. Preparation of "as-built" drawings.
4. Determination of deficiencies during the guarantee period and final acceptance documentation at its expiry.

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Preparing As-Built and Record Documents

• March 2020 •

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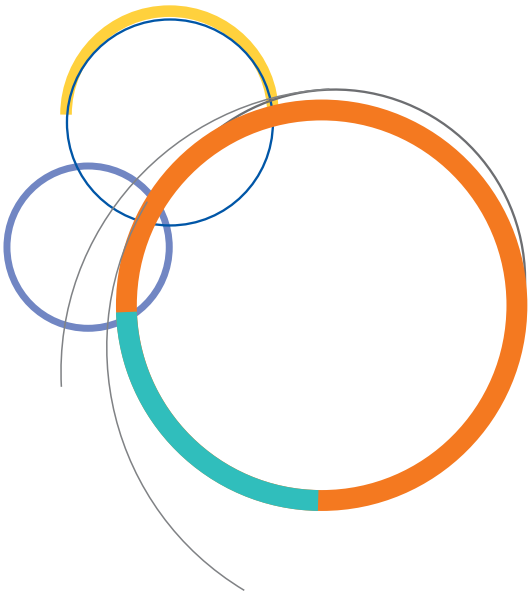
Preparing As-Built and Record Documents Guideline

CONTENTS



Notice: The Professional Standards Committee has a policy of reviewing guidelines every five years to determine if they are still viable and adequate. However, practice bulletins may be issued from time to time to clarify statements made herein or to add information useful to those professional engineers engaged in this area of practice. Users of this guideline who have questions, comments or suggestions for future amendments and revisions are invited to submit these to PEO using the "Guideline Amendment and Revision" form available at: https://www.peo.on.ca/sites/default/files/2020-01/Guideline%20Amendment%20and%20Revision%20Form%20%28FINAL%29.pdf

ABSTRACT

As-built documents should not be sealed. Information on record documents should be thoroughly reviewed prior to bearing the seal.

1.

PURPOSE OF PEO GUIDELINES

Professional Engineers Ontario (PEO) produces guidelines to educate licensees and the public on best practices.

For more information on PEO's guideline and development process, including PEO's standard form for proposing revisions to guidelines, please see the "Guideline Development and Maintenance Processes" document available at: https://www.peo.on.ca/sites/default/files/2020-03/guideline-dev-maintenance-process.pdf

For a complete list of PEO's guidelines, visit: https://www.peo.on.ca/knowledge-centre/practice-advice-resources-and-guidelines

NOTE: References in this guideline to practitioners apply equally to temporary licence holders, provisional licence holders, limited licence holders or certificate of authorization holders.

PEO produces guidelines to meet the following objectives, which were used to develop the content of this document:

1. Guidelines are intended to aid engineers in performing their engineering role in accordance with the *Professional Engineers Act* and Regulation 941.

2.

PREFACE

This guideline is to offer practitioners guidance on the professionally acceptable manner for preparing record documents.

The recommendations provided in this guideline are considered by PEO to be commensurate with the professional responsibilities of practitioners. This guideline should be used in conjunction (as appropriate) with the *Use of the Professional Engineer's Seal* guideline as that guideline focuses on the proper use of the seal, while this guideline focuses on providing information and best practices regarding record documents, and by inference, as-built documents of completed works.

As-built documents should not be sealed. Information on record documents should be thoroughly reviewed prior to bearing the seal.

This guideline provides some details on the considerations that practitioners need to make to meet the requirements of their clients at reasonable levels of risk to the practitioners. Practitioners are to make adaptations to suit.

For this document, reference will be made to record documents and as-built documents as per the definition in the Appendix[1].

3.

PURPOSE AND SCOPE OF THIS GUIDELINE

The purpose of this guideline is to provide guidance for the preparation of record drawings or documents (collectively called record documents in this guideline) and, by inference, to provide guidance for the preparation of as-built drawings or documents (collectively called as-built documents in this guideline).

Clients or regulatory authorities often call upon practitioners to provide records of recently completed works. In many cases, a client may call for an inspection of a particular infrastructure asset.

Inspection consists of visual observation of construction and the equipment and materials used therein to permit the practitioner to prepare the record documents.

Given the inherent limitations of such inspections, the practitioner needs to exercise care in what is included in record documents that shall be sealed, and by inference, what is included in as-built documents.

Sealing a record document is a message to the public that a qualified and experienced person(s) prepared same documents and the information can be relied on. Section 53 of O. Reg. 941 provides that, when affixed to a final engineering document, the seal represents that the practice of professional engineering reflected in the document can be relied on for the document's intended purpose and that the practitioner whose seal is affixed to the document accepts professional liability for the document's engineering content.

Record documents are engineering documents and must be sealed. However, the purpose of record documents is often not well defined and, as such, needs to be carefully considered by the sealing practitioner to ensure that its purpose is clear.

The best time to gather information for either record documents or as-built documents is during construction, manufacturing or product development. Once the work has been covered up or included in assemblies, or product fabricated, it becomes more difficult and, in some cases, impossible to verify the existing conditions.

lf the need to provide record documents is known prior to the start of construction/manufacturing and the level of detail (and associated accuracy) is not established in the engineering services contract, then a typical industry level of accuracy shall be used, unless a level of detail is mutually agreed upon between the owner and the practitioner.

The level of accuracy and scope of inspection required for producing record documents must be documented in writing and agreed to by the practitioner and the owner.

Record documents are prepared based on information that was observed by a practitioner or by someone under the practitioner's supervision. After a practitioner has reviewed the record documents and is satisfied that they are accurate, the practitioner must seal the documents. Normally the record documents are updates to, and contain a similar level of detail to, the design (or fabrication) documents. If a client requires the record documents to contain additional detail, then this should be agreed with the practitioner prior to the construction (or fabrication) work, to allow the practitioner to collect the required information.

It should be noted that the practitioner who seals the record documents may not be the practitioner who sealed the design documents or the practitioner who observed the construction or fabrication. It therefore follows that the practitioner who seals the record documents is only verifying that the record documents are an accurate reflection of what has been constructed or fabricated. Their seal does not mean or imply that they have verified the design or that they have observed the construction or fabrication work for conformance with the design. That responsibility remains with the practitioners who sealed the design documents and who reviewed the construction or fabrication work. To avoid confusion over these responsibilities, "Record Document" or "Record Drawing" should be marked clearly in the revision block or other prominent location before the record document is sealed by the practitioner.

As-built documents are prepared based on information gathered during construction or fabrication by someone other than a practitioner or someone under their supervision. Often, the information is provided by the contractor in the form of red-line mark-ups of the design drawings. If a practitioner then proceeds to revise the design documents to incorporate the red-line mark-ups, these documents should be clearly marked as "As-Built Documents" and not sealed.

[1] The use of the terms "record drawings/record documents" and "as-built drawings/as-built documents" in this guideline is consistent with other PEO guidelines. Other professions, most notably architecture, use the same (and additional) terms, however, they may not have the same meaning as used in this guideline.

4.

INSPECTION

The following are some considerations provided to determine a level of effort for the inspection process to be undertaken by the practitioner:

4.1 Purpose of the Inspection
4.2 Scope of the Inspection Required
4.3 Limitations of the Inspection
4.4 Timing of the Inspection
4.5 Accuracy Levels Required for the Inspection

4.1 Purpose of the Inspection

For this guideline, inspection is limited to the purpose of preparing record documents and not used as a basis of assessment of a particular item or issue. The purpose of the inspection has a significant bearing on the scope of the work required (see section 4.2 Scope of the Inspection Required). If no known purpose for the use of the data to be collected is available, then it is important to determine with the client exactly which quantitative and/or qualitative data will be collected in the inspection process.

Limitations of the inspection are to be discussed and confirmed to ensure that the parties fully understand the feasibility of obtaining information that fits the purpose of the inspection process. Refer to example disclaimers in the Appendix.

Users of record documents may assume that all the information depicts the as-constructed details of the project. However, there may be pre-existing information incorporated in the record documents. Hence, there should be a clear distinction between pre-existing and recently constructed/fabricated information contained in the record documents.

4.2 Scope of the Inspection Required

Record documents of completed works are not to be confused with assessment documents or condition surveys prepared at some time after the work has been constructed. For general guidance regarding assessments refer to the PEO's *Structural Condition Assessments of Existing Buildings and Designated Structures Guideline*.

The scope of inspection required for record documents depends on the level of detail to be included in the record documents. Normally the level of detail required on the record documents would be the same as the level of detail shown on the design drawings. However, if a client requests more detail to be shown on the record documents, this may require an enhanced level of inspection. The level of detail required (and the level of effort that this will involve) should ideally be determined prior to finalization of engineering services contracts.

During construction, manufacturing or product development, observation, and inspection of design or construction work will be helpful prior to items being concealed. If known prior to the contract being awarded/signed, appropriate inspection hold-points can be specified in the (construction, manufacturing or product development) contract. A pre-determined plan for providing record documents allows practitioners the time, resources and access required throughout manufacturing or construction to compare construction, manufacturing or product development documents with as-constructed, as-manufactured or as-produced conditions, with a level of confidence that comes from the opportunity to effectively inspect/observe the constructing, manufacturing or production process.

The inspection contemplated under this guideline is to satisfy the practitioner that the information presented on the record documents accurately represents the project for which record documents are prepared.

The following should be taken into consideration by the practitioner completing the inspection in preparation for record documents:

- The extent of works to be inspected;
- The level of detail required;
- The required timelines; and
- Other contractual requirements.

4.3 Limitations of the Inspection

Inspection of as-constructed conditions is highly dependent upon visual observations and best completed during construction. Inspection post-construction of as-built details may be difficult [or impossible] even with invasive methods. For example, concealed items behind walls and above ceilings or buried or encased items are not visible and even with invasive methods may not be reliably inspected. In some cases, it is not feasible to inspect without destructing the item/material to be inspected. Samples may be taken to assist in the inspection but may be limited by an acceptable level of destruction/damage.

Photos and/or videos (visual media) may be used to support field observations, however excessive reliance on visual media is not recommended or even acceptable for the purposes of inspection.

Some examples of limitations of inspection are:

- Details are hidden within building envelopes;
- Confirmation of material requiring laboratory testing;
- Strength of material compositions;
- Condition of material or item or equipment or systems; and
- Any particular item, equipment or system that was built as an integral unit would be verified as a package, and not in its separate or individual components.

4.4 Timing of the Inspection

The timing and limitations of inspection of completed works has a direct bearing on the level of effort by the practitioner. Required field visits, construction and document review or revision, etc., should ideally be determined prior to finalization of engineering services contracts.

4.4.1 Inspection During Manufacturing or Construction

During construction, inspection will be helpful prior to items being concealed. Appropriate inspection hold-points should be specified. A pre-determined plan for providing record documents allows practitioners the time, resources and access required throughout manufacturing or construction to inspect existing conditions with a level of confidence that comes with the opportunity to effectively observe the manufacturing or construction process. The plan, therefore allows the practitioner to identify possible changes from the design documents or intent. Having work concealed before required records are made may indicate a failure of planning or execution.

4.4.2 Inspection Post-Manufacturing or Construction

After the manufacturing or construction has been completed and items have been assembled or concealed, inspection required for record documents will have limitations. For example, certain assemblies cannot be disassembled without destruction, or certain details are difficult or impossible to be inspected, such as under-floor plumbing or electrical conduit locations and depths that have been concealed by concrete. Where the information required cannot be obtained by using non-destructive methods, the limitations will need to be identified on the record documents.

4.5 Accuracy Levels Required for the Inspection

The accuracy levels required are dependent upon the intended use of the record documents for which the inspection is to be completed. In establishing the accuracy level and required amount of detail with the client, it is prudent that the practitioner considers available standards to confirm the existence of suggested or standardized accuracy levels and the required amount of detail. For example, for underground infrastructure, the applicable CSA standard specifies the positional accuracy of records of the installed utilities in four accuracy levels. If no standards are available, accuracy levels should be discussed at the project outset and confirmed in writing. It should be kept in mind that higher accuracy levels in positioning or dimensioning may require more accurate measuring techniques and/or higher quality devices. It would be prudent to add to the record documents, the accuracy levels used.

Material tests may be required to determine certain characteristics. These should be carefully evaluated prior to the start of construction/manufacturing to ensure that they deliver the required results.

5.

SUMMARY

This guideline provides practitioners guidance on the acceptable manner for preparing record documents and, by inference, as-built documents of completed works. The level of effort needed to produce record documents varies upon the purpose, scope, limitations, timing and accuracy of inspection. It is not acceptable best practice for practitioners to seal record documents where the information provided on these documents has not been inspected by the practitioner, to the associated level of effort, for the purpose or intended use of these documents. The materials in the appendices are to provide further clarity and are for information only.

6.

APPENDIX

6.1 Definitions

As-built drawing/document: A document created by or based solely on information provided by a third party that reflects the installed, constructed, or commissioned conditions of a device, machine, equipment, apparatus, structure, system, or other outcome of an engineering project. Since the engineer has not reviewed and verified that the information is complete or accurate, as-built drawings must not be sealed.

Assessment: A review of an existing building, structure or fabrication sometime after it has been built, constructed or fabricated for a purpose other than to create an accurate record drawing such as, for example, to assess compliance with the Ontario Building Code or applicable CSA standards. “Assess” has a corresponding meaning.

Industry best practices: Activities or operating procedures considered as an established custom or habit which results in the maximum positive effect for the benefit of all concerned parties.

Infrastructure: Consists of the large-scale public systems, services and facilities that are necessary for economic activity, including power and water supplies, transportation, telecommunications, roads, schools, etc. It is often interpreted to mean the most basic level of organizational structure in a complex body or system that serves as a foundation for the rest.

Inspection: Shall consist of visual observation of construction and the equipment and materials used therein to permit the practitioner to render their professional opinion as to the contractor’s conformance with the design professional’s recommendations, plans or specifications. Given the inherent limitations of such inspections, they shall not be relied upon by any party as acceptance of the work, nor shall they relieve any party from fulfillment of customary and contractual responsibilities and obligations and Inspect has a corresponding meaning.

Observation: May be made by the professional or someone acting under the professional’s direct or indirect supervision and observe has a corresponding meaning.

Practitioner: A holder of a licence, a temporary licence, a provisional licence, a limited licence or a certificate of authorization, as the case requires.

Red-line drawings/documents: Refers to Issued for Construction (IFC) documents that have been marked up during the course of construction (usually by the contractor) to reflect changes made during construction.

Record drawings/documents: Documents created to accurately reflect as-constructed, as-built or as-fabricated conditions and that have been sealed by a professional engineer after verifying that the documents are accurate.

Review: Examination of a record document prepared by a third party to determine whether its content accurately reflects the as-built, as-constructed or as-fabricated conditions.

Verification: The record document has been examined for correctness against as-built, as-constructed or as-fabricated conditions. "Verify" has a corresponding meaning.

6.2 Example Disclaimers and Scope of Limitation Statements

Documents often rely on information provided to the practitioner by others. In these cases, it would be prudent to identify the fact that some information has been provided by others and provide a disclaimer on the documents.

Some owners may note that a third-party disclaimer will not be acceptable. An example of a client contractual statement is as follows:

"Record drawings must be sealed and signed by the practitioner. A "Third Party Disclaimer" will not be accepted, i.e. the data shall be collected by the practitioner who is preparing the record drawings."

Practitioners should be aware of such [contractual] statements and the liability that they may confer on the practitioner. It is worth mentioning that this requirement does not rule out including a statement within record documents, in which the practitioner confirms that they are relying, without independent verification, on information provided by the owner or one or more third parties.

Following are some examples of disclaimers or scope of limitation statements that may be used.

6.2.1 Record Document Example Disclaimers or Scope of Limitation Statements (seal to be applied)

Some of these disclaimers have their origin in very specific circumstances and should be adapted by the practitioner to suit the circumstances and the record documentation being completed.

1. *"The issuance of this record document is a representation by the practitioner that this document is a reflection of the completed work to the level of accuracy and purpose set out in the [Engineering Services Agreement or Technical Reference Standard (as applicable)]. It is not a representation that the completed work is in conformity with the design, even if such information is represented on this document."*

The following is an option where changes or variations may occur immediately after issuance of record documents. This type of change occurs subtly in process related designs.

2. *These record documents have been prepared for the purposes of documenting the completed [or existing] works of [description of works constructed, fabricated, installed, etc.] between [start date] and [completion date]. [Company or Practitioner] assumes no responsibility for any changes made after the date of these record documents or for any items denoted on these documents that were not accessible to be inspected at the time these record documents were prepared. Those relying on these record documents are advised to confirm that these record documents are a current reflection of the existing work prior to use of this information.*

6.2.2 As-Built Document Example Scope of Limitation Statements (no seal to be applied):

Some of these scope of limitation statements have their origin in very specific circumstances and should be adapted by the practitioner to suit the circumstances and the as-built documentation being completed.

1. *This as-built document has been prepared based on information provided by others. The practitioner has not inspected the accuracy and/or the completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result.*

2. *This as-built document has been prepared, in part, based upon information furnished by others. While this information is believed to be reliable, the practitioner assumes no responsibility for the accuracy of this as-built document or for any errors or omissions that may have been incorporated into it as a result of incorrect information provided to the practitioner. Those relying on these as-built documents are advised to confirm that these as-built documents are a current reflection of the existing work prior to use of this information.*

6.3 Frequently Asked Questions

The following questions from professional engineers and answers from PEO are intended to demonstrate how the principles outlined in this guideline can be applied to specific situations.

Q1: **Should the original design engineer's seal be removed from the design documents when preparing record documents?**

A1: For record documents, the original design practitioner's seal should be removed. Practitioners preparing record documents must apply their seal.

Q2: **Should the original design engineer's seal be removed from the design documents when preparing as-built documents?**

A2: As-built documents shall not be sealed. The original design engineer's seal must be removed when preparing as-built documents.

Q3: **Can a record document rely on material provided by others (e.g. surveyor)?**

A3: A record document can incorporate limited information provided by others; this means not provided by the practitioner or their direct supervised staff. It would be up to the practitioner to determine what amount of information provided by others is acceptable. However, this information should be clearly identified as such (e.g. in a disclaimer), and it is imperative not to accept ownership of the data provided by others.

Q4: **What disclaimers should record drawings have?**

A4: Please refer to the Example Disclaimers or Scope of Limitation Statements in section 6.2.1 in this guideline.

Q5: **Can an engineer seal a record drawing without going on-site for inspection?**

A5: Record documents are those prepared by a practitioner after inspecting in detail the actual conditions of the completed project. For some projects, this inspection may require frequent or continuous presence on site. However, based on the practitioner's experience and the detail of the inspection required, a competent individual supervised by the practitioner can provide partial inspection on the practitioner's behalf.

Q6: **If an engineer cannot seal as-built drawings, is there another stamp or disclaimer that should be used?**

A6: Yes, the practitioner could use a disclaimer to describe the scope of work. Please refer to Example Scope of Limitation Statements in section 6.2.2 in this guideline.

Q7: **Can a practitioner seal a multi-discipline record document?**

A7: Yes, for a project covering work within several engineering disciplines, a record document could be sealed by a practitioner who is taking responsibility for the record document. Likewise, multiple practitioners representing individual disciplines may jointly seal a record document.

Q8: **What is the expectation on the amount or detail of inspection/review for an engineer to be able to seal a record document?**

A8: The amount or detail of inspection will depend on the practitioner's professional judgment, based on their experience and knowledge.

Q9: **Can a client require all drawings to be record drawings [documents]? Are there limitations to what is considered practical?**

A9: Principally, the practitioner and client should determine what is an acceptable level of effort for the agreed upon information to be gathered and compiled in record documents. It is up to the practitioner to negotiate with the client what is reasonable to provide as a record document and advise the client to what extent their services would be required to perform satisfactory inspection for preparation of such record documents.

Q10: **In sealing a record document, may the professional rely on site mark-up drawings, quality/test reports and other site work from competent site staff?**

A10: If the competent site staff are practitioners, they should seal the record documents. If not, then the practitioner responsible for the direct supervision should seal the record documents. The supervising practitioner is to determine the level of supervision. For more information, refer to the Assuming Responsibility and Supervising Engineering Work practice guideline.

Q11: **In some cases, the responsible engineer has never met the site staff. How does the engineer ensure that the delegate has the necessary level of confidence/competence?**

A11: The responsible practitioner should be familiar with the site staff, their capabilities, and determine the level of supervision required.

Q12: **For work pursuits, some request for proposals stipulate delivery of record drawings at project completion, but do not allow for an allotted time during construction for discipline practitioners to inspect as-built conditions. What minimum level of effort should be included in a bid by all parties that will continue to present a fair and competitive bid?**

A12: For a fair and competitive bidding process, the practitioner should submit a Request for Information to the entity requesting the proposal to inquire and clarify regarding this matter. It is up to the practitioner to determine and negotiate during the bid process what is the reasonable level of effort to perform satisfactory inspection for preparation of such record documents.

Q13: **Construction or installation work is near completion when the project manager realizes delivery of record drawings are a contract requirement. The project manager requests for sealed as-built drawings to be inspected based on photographs, data provided by others, and one (1) site visit at near completion phase. Should the practitioner seal these drawings?**

A13: Only record documents must be sealed. Refer to section 4 of this guideline for general inspection requirements that would allow for sealing record documents.

Q14: **Given the amount of total engineering work that is related to construction under the Ontario Building Code, is this guideline used in relation to the Professional Engineers Providing General Review of Construction as Required by the Ontario Building Code guideline?**

A14: No, the obligations of engineers to prepare as-built and record documents is independent of the obligations that are outlined in the Professional Engineers Providing General Review of Construction as Required by the Ontario Building Code guideline.

NOTE: A practitioner who is not engaged to provide general review services should advise their client that they are not in a position to prepare record drawings since they will not be aware of all changes during construction.

Q15: There is often a need to determine the preexisting conditions of previously completed works. For example, it may be required to determine the locations and sizing of existing infrastructure in a municipal right-of-way to allow for the construction of additional infrastructure. The ASCE has published a guideline, ASCE 38-02: Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data. In many cases, practitioners that collect information using this guideline will seal the final drawings compiled using this process. When preparing drawings based on such an industry accepted standard or guideline, should the practitioner seal such drawings?

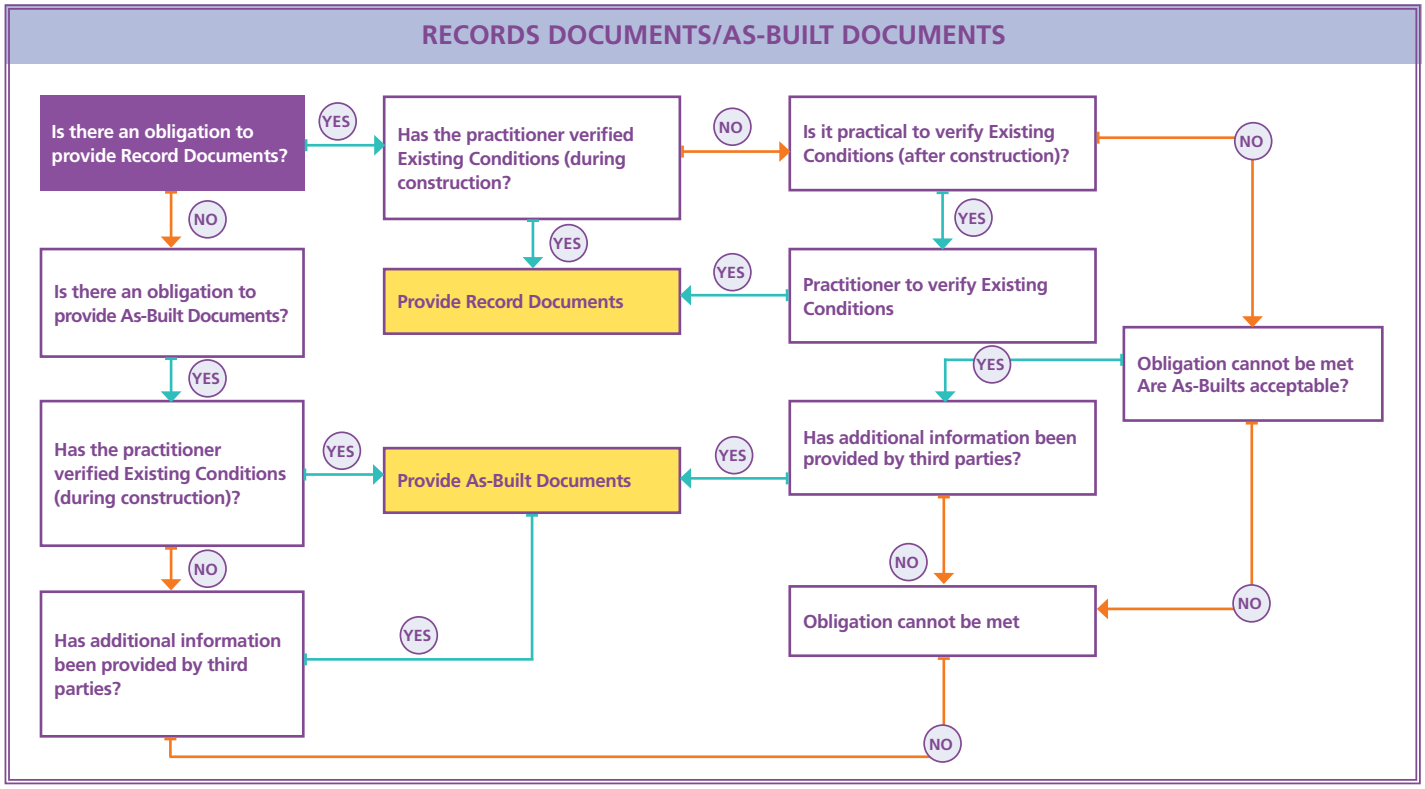
A15: Yes, in such cases the seal indicates that the guideline or industry accepted standard was followed to a level expected from a practitioner. In this context, the processes that were followed will determine the accuracy.

Q16: Sometimes architects and clients use different or not well-defined terminology for documentation pertaining to as-built and/or record documents. How should requirements for these documents be determined? What is the appropriate process that should be followed in this scenario?

A16: It is the responsibility of the practitioner to clarify which definitions from this guideline will be used.

6.4 Flow Chart

6.4.1 Preparing Record/As-Built Documents



6.4.2 Steps to Prepare Record Documents

One or more steps, except for verification, maybe omitted depending on the circumstances of the project.

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