2020 - SECTION 2

DESIGN AND SUPPLEMENTAL REPORT SUBMISSION REQUIREMENTS

2.1 GENERAL

Design reports are a critical link between Engineering Planning studies (Master Plans, system capacity availability studies) and Detailed Engineering Drawings. They connect the engineering design to the approved Outline Plan/ASP. Design reports address two components; sanitary sewer, water supply (either in one report or separate reports). Each component must consider relationships to the other component and to the Supplementary reports.

Supplementary reports, that may be required to be submitted typically include (but not limited to) geotechnical, environmental, hydrogeology, historical, flooding, slope stability assessment and park design reports. With the exception of the geotechnical and environment report, the remaining reports may or may not be necessary depending on the site conditions and location. The Developer is encouraged to liaise with Aquatera in the early stages of the development to determine which Supplementary Reports are required and at which stage of development.

Servicing Agreements will not be signed until the Aquatera Representative has approved all water & sewer Design Reports.

Revisions to the Design and Supplementary reports must be provided when the Outline Plan revisions (i.e. major changes to water or sanitary sewer alignments) are approved.

The design reports are intended to establish the site development and servicing requirements for the development of the subdivision. The reports will ultimately form the basis for detailed design of each phase of development.

Aquatera preference is for the details of individual components (i.e. water modeling, sanitary sewer system modeling) to be contained in separate reports.

Two copies of each report, along with a PDF copy, shall be submitted to Aquatera and the report should include the following general information;

1. Identification and description of issues/constraints related to capacity, depth, grade, operations, or other unique conditions or features.

2. Existing conditions (e.g. vegetation, soils groundwater, structures, contaminants, topographic feature).

3. Description and results of analyses and modeling completed.

4. Proposed phase boundaries and phasing.

5. Base plans should be in the form of a tentative legal plan at a scale of 1:2000 (other common metric scales also are acceptable) conforming to the approved Outline Plan.

6. Discussion of conformance to or deviation from Aquatera guidelines, Master Plans, including justification for deviations;

Further details on the criteria to be considered when preparing each type of Design Report are provided in the following sections.

In the event that the municipality has more stringent standards, those will be used.

2.1.1 PREPARATION

The preparation of both Design and Supplementary Reports is the responsibility of the Developer at the Developer's cost. Subdivision proposals and Detailed Engineering Drawings related to the area will not be approved in the absence of all required Reports. Prior to proceeding with any of the Reports, the Developer is encouraged to meet with representatives at Aquatera to review available background information and to establish Terms of Reference.

2.2 PROFESSIONAL SEAL

Completed reports and support documentation are to bear the professional signature, seal and permit stamp of the engineer and firm responsible, and all responsibilities for authorship of all documents is to be clearly identified. The engineer must be recognized as either a professional engineer or a professional licensee (P.L. Eng.) by APEGA.

2.3 WATER DISTRIBUTION

1. Description of the proposed development, boundary conditions (to address looping) and analysis method used;

   a) Explain how the boundary conditions were determined and assigned to the individual model nodes

   b) Specify Hazen Williams's C-factor

2. Statement of criteria used for analysis (eg. Average demands, peak factors, population densities, commercial / industrial flow rates, pipe material, minimum pressures, etc.).

3. Location and description of high demand users;

4. Water Node analysis is required. Any deficiencies shall be identified and be supported with recommendations and actions to rectify.

5. Pressure zone boundaries and Pressure Reduction Valve (PRV) locations, where a proposed water servicing scheme requires a pressure regulating devices, such as a

booster pump station, check valves/flow control valve (FCV) or pressure sustaining valves (PSV), then the report should include a copy of the peak hour and maximum day simulations without these devices. This will help to facilitate evaluation of the need, operational characteristics and consequences of failure.

6. Figures showing: location of the study area; the land use zoning; the staging of development; the site topography; and the pipe network.

7. A figure showing the assigned pipe and node numbers; pipe diameters, location of fire flow simulation; node elevations (pipe inverts); and all other hydraulic elements modelled into the system;

8. All pipes 300mm(12") and greater shall be simulated; Locations of fire hydrants (verification of spacing/areas of service)

9. Phasing of improvements and fire flows during phasing;

10. An Appendix with model runs for the interim stages and ultimate development showing the following conditions: Peak Hour; Maximum Day; and Maximum Day plus fire flow runs at critical locations (high value properties, remote locations, high elevation locations);

11. Discussion of conformance to or deviation from Aquatera guidelines, Master Plans, Studies or previous Design Reports including all existing and approved developments, including justification for deviations.

12. Provision for extensions to future developments.

13. Submit a hydraulic network analysis report, sealed by a registered professional engineer, for approval by the Engineer.

The water system design submission shall include a copy of the computer modeling analysis. Detailed water system design criteria are included in Section 8 of Aquatera's design manual.

2.4 SANITARY SEWER SYSTEM

The purpose of the sanitary sewer system report is to establish the contributory sanitary service area(s) and discharge points to the existing system, based on topographic considerations and downstream transmission capacities. This may include existing system analysis in terms of planned and projected flows, and assessment and monitoring of existing system capacities and flows. Future growth areas beyond the limits of the Outline Plan area must also be considered, and alternatives for service extensions to these areas (e.g. trunk main extension, oversize main through development, liftstation upgrades etc.) must be determined.

The report should include the following;

1. Assessment of topographic constraints as related to gravity flow in pipes.

2. Statement of criteria used to determine flows (eg. Average demands, peak factors, population densities, inflow/infiltration, etc.).

3. Peak flows at connections to existing system and analysis of impacts on existing systems.

4. Plan showing

    a) Locations and sizes of proposed pipes.
    b) Locations of manholes.
    c) Manhole invert elevations.
    d) Grades between manholes.
    e) Proposed manhole depth.
    f) Pipe Inverts

5. Discussion of conformance to or deviation from Aquatera guidelines, Master Plans, Studies or previous Design Reports including all existing and approved developments, including justification for deviations;

6. Limits of catchment areas including future upstream areas.

7. Discussion of servicing alternatives for future upstream areas including provisions made for future flows.

8. Phasing of improvements.

9. Summary of all calculations for flows and contributing areas shall be shown.

The sanitary sewer system design submission shall include a copy of the computer modeling analysis if requested.

Detailed sanitary sewer system design criteria are included in Section 9 of Aquatera's design manual.

2.5 SUPPLEMENTARY REPORT SUBMISSIONS

2.5.1 STORM WATER MANAGEMENT SYSTEM

Generally, the municipality will look after the Storm water system.

2.5.2 GEOTECHNICAL REPORTS

a) The Developer shall engage the services of a qualified soils consultant to prepare a report prior to commencing detailed subdivision design. The report shall evaluate soil characteristics and existing groundwater conditions and be based on test holes drilled at a maximum spacing of 150 m throughout the Development. Test holes

    must be 6.0 m deep or at least 1.0 m deeper than the deepest utility or anticipated basement excavation. Stanpipe/piezometers shall be installed in each test hole.

b) Required Testing

The minimum number of tests required for this report is as follows:

1. Soil moisture contents at 1 m intervals throughout each borehole,

2. For each test hole, plotted existing moisture content, liquid limit, plastic limit, estimated dry unit weight, optimum moisture content, and unconfined compressive strength of each soil encountered. Samples are to be identified as Disturbed or Undisturbed. With uniform soil conditions, a sufficient amount of sampling will be required to determine the consistency across the site and over the profile of the bore hole.

3. A sufficient number of soil sulphate tests to represent the various soil types throughout the Development,

4. A sufficient number of California Bearing Ratio (CBR) tests to represent the road R/W subgrade soils throughout the Development,

5. Sieve analysis for each predominant soil type,

6. Standard penetration tests for determination of in-situ relative soil density and consistency of the various soil strata,

7. Measurement of groundwater table and analysis of its influence with respect to the design of roadways, utility trenches, and foundations. Groundwater readings shall be provided on completion of drilling, 1 day after drilling, 7 days after drilling, 14 days after drilling, 1 month after drilling, and once a month thereafter for 5 additional months.

c) Final Geotechnical Report

One copy of the report may be required by Aquatera Engineering Department, including the following information:

1. Test hole location plan and soil classification logs for each test hole (Unified Classification System) with geodetic surface elevation and depth to stabilized water table level,

2. Results of the tests noted above,

3. Recommendations on suitability of site for the proposed infrastructure based on final elevations proposed for the site,

4. Comments on the soil bearing capacity and recommended setbacks from escarpments for various types of building foundations,

5. Condition of retaining wall (s) (if any) existing on the site or engineered design for any proposed retaining structures.

2.5.3 HYDROGEOLOGICAL REPORT

A hydrogeological investigation may be required if the geotechnical report shows the depth to established ground water is less than 3.0 m from the existing surface and/or proposed grade.

1. This report shall include information from test holes spaced on a grid of approximately 150 m, complete with standpipe/piezometers at monitoring wells.

2. The report shall determine the stabilized ground water elevation and anticipated seasonally high ground water elevation.

3. The report shall further determine the hydraulic conductivity in the upper 3 meters of the soil profile and the ground water flow direction.

4. The report shall also make recommendations for water & sanitary sewer pipe elevations relative to the ground water elevations and methods to control or mitigate detrimental influences to water & sanitary sewer and related infrastructure.