DRAFT COMPREHENSIVE DEVELOPMENT REVIEW

EDGEMONT EAST

Submitted to:

THE RM OF CORMAN PARK NO. 344

Prepared by:

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In Association With:

BCL ENGINEERING
KGS GROUP

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EXECUTIVE SUMMARY

Edgemont East Development Corp. (the Developer) is applying to rezone and subdivide a 65.2 ha (161.12 acres) parcel, located in the NE and NW quarters of Section 34, Township 35, Range 05, W3M in the RM of Corman Park. The development is located within the Saskatoon North Partnership for Growth (P4G) District Planning area.

The proposed development is situated on lands located within the RM of Corman Park No. 344, approximately 2.0 km south of the City of Saskatoon, immediately south of Grasswood Road and west of Preston Avenue. The purpose of the development is to provide for a multiple country parcel residential development including 131 lots with an integrated recreational component. The recreational amenity will feature dedicated tennis courts, dedicated pickleball courts, children's play equipment, beach volleyball, paved walking trails, a disc golf course, an outdoor picnic area, and potential for cross country ski trails.

Wastewater collection for the development is proposed to be provided by a conventional gravity sewer network. The network collects to a proposed sewage pumping station located centrally within the development. A new collection point and sewage pumping facility will be required to service the proposed development. The area serviceable by the sewage pumping station and force main extend to all boundaries of the development. Approximately 750 m of force main is required to convey sewage from the pumping station to Grasswood Road. The force main connection would continue to the wastewater treatment facility (Membrane Bioreactor) currently under construction on the English River First Nation (ERFN) lands, near Highway 11 and Grasswood Road. It is anticipated that the new treatment facility will be operational in Fall, 2022. If the Edgemont East development has occupied housing prior to the construction of the force mains and pump stations, the wastewater treatment facility can be utilized through conveying wastewater by trucks. The ERFN has indicated that they will develop agreements either through Des Nedhe Group (the development corporation) or through the RM of Corman Park to ensure that there is capacity available for the Edgemont East Development.

Water supply in the development includes a potable water connection to residences for domestic purposes. Delta Construction will be providing and installing potable water at the development. Delta will also function as the utility managing both potable water and wastewater.

A preliminary grading and drainage plan were completed by BCL Engineering at the request of the developer. All site drainage will be contained within the boundaries and directed to the storm pond planned within the MR1 park space development. Internal drainage throughout the site shall be directed to the road right-of-ways, where it will be conveyed using the roadside ditches and culverts. Ditches and culverts will be designed to be free-draining yet provide adequate attenuation in a rainfall event.

Retention pond capacities and development runoff volumes, including any external influences, were modelled based on several storm events, with the ultimate capacity of the system based on a 1:100 year, 24 hour precipitation event. The design includes an additional 25% capacity within the normal operating conditions and ensure that any extreme events can be adequately managed and not subject the development to property damage.

A 1:100 year storm event, plus 25%, will realize a local flood elevation of 502.75 to 503.0 m. This extreme event is used to derive the recommended safe building elevation of 504.0 m, which allows 1.0 m freeboard for all houses. Following a 1:100 year storm event, the water levels are expected to return to normal within a 48 hour period.

The Safe Building Elevation of 504.0 m must be applied to the lowest foundation opening at each lot. Furthermore, engineered foundation plans, house plans, and proposed building elevations must be submitted to the Edgemont East Building Committee for review and approval prior to applying for a development permit from the RM of Corman Park.

A Traffic Impact Assessment was undertaken by KGS Group in January of 2022. The TIA analysis and findings identify that the residential units proposed as part of the Edgemont East development will have a negligible impact on operations along Grasswood Road and at the study intersections, including the intersection at Grasswood Road and Clarence Avenue. No additional turning lanes or other geometric modifications will be necessary to accommodate the proposed development. The Ministry of Highways and Infrastructure reviewed the TIA and indicated that based on the estimated trips generated by the development, there would be minimal impact at both the Highway 219/Grasswood Road intersection or the Highway 11/Grasswood Road intersection as a result of the development. MHI further indicated that the ministry has no concerns with the development or its projected traffic impact on the highway network as shown in the TIA provided.

A public open house was held on Wednesday March 30, 2022, from 5:30 to 7:30 pm at the Village at Crossmount. Prior to the Open House, a letter was distributed to all neighbours within one mile (1.6 km) of the proposed development informing residents of the open house, as well as the intent of the Developer to apply for a new zoning district at the subject site.

1 INTRODUCTION

1.1 PURPOSE

This document shall serve as the Comprehensive Development Review (CDR) document required for the re-zoning and subdivision application from DCR1 and DAG1 to DCR3 – District Country Residential 3 District. This review provides a framework for the rezoning and subdivision of the proposed parcel of land for the purpose of developing a total of 131 country residential lots with an integrated recreational component.

Phase 1 of the development will require a rezoning to DCR3. The remainder of the development will require a rezoning to DCR3 with a holding provision, as provided under subsection 71(1) of *The Planning and Development Act, 2007.* Future subdivision applications for phases 2, 3 and 4 will be submitted to the Community Planning Branch and the RM of Corman Park concurrently with an application to amend the zoning bylaw with the intent of removing the holding provision. The proposed pond (MU1), shallow utilities, roads and associated drainage infrastructure, water lines and sewer lines will follow the phasing of development (e.g. Phase 1).

The Developer of the project is Edgemont East Development Corp. (Edgemont East). The Concept Plan for the Development is attached as Appendix "A" to this document. The Plan of Proposed Subdivision for the development is included in Appendix A.

Questions on the proposal or the material contained within this document should be directed to Jim Walters, RPP, MCIP, Principal Planner at Crosby Hanna & Associates (306-665-3441).

1.2 OVERVIEW

It is the intention of the Developer to rezone and subdivide the land to accommodate a multiple parcel country residential development with integrated recreational component. The proposed development is located approximately 2.0 km to the south of the City of Saskatoon, immediately west of Preston Avenue and south of Grasswood Road.

The RM of Corman Park, City of Saskatoon, City of Warman, City of Martensville and Town of Osler recently adopted a new District Regional Plan entitled the Saskatoon North Partnership for Growth (P4G) Plan. The OCP and accompanying zoning bylaw provide for development of acreage lots not exceeding three lots per acre, or 0.13 ha lots in the DCR3 Zoning District. This zoning district requires that a planned, integrated recreational amenity be developed in conjunction with the development.

The proposed Edgemont East Development was designed to provide for lots as small as 0.5 acres. The density of the proposed Edgemont East is well below the maximum of 3 dwelling units per acre and is provided below:

Phase 1: 24.47 hectares (60.5 acres) and 40 lots for a density of 0.66 lots per acre;
Phase 2: 19.18 hectares (47.4 acres) and 41 lots for a density of 0.86 lots per acre;
Phase 3: 13.14 hectares (32.47 acres) and 32 lots for a density of 0.99 lots per acre;

Phase 4: 8.55 hectares (21.12 acres) and 18 lots for a density of 0.85 lots per acre;

Overall: 161.12 acres and 131 lots for a density of 0.81 lots per acre.

Policy and zoning reviews as it relates to the P4G District Official Community Plan and Zoning Bylaw are provided in Sections 5.1 and 5.2 of this report.

2 INVENTORY AND ANALYSIS

2.1 EXISTING LAND USE

The proposed development site consists of approximately a 65.2 ha (161.12 acres) parcel of land on the NE and NW of Section 34, Township 35, Range 05, W3M. The site is currently characterized by relatively flat and low gradient terrain, with small depressions susceptible to retaining water during spring runoff, higher intensity rainfalls and wet years.

Other land uses in the area consist of a mixture of multiple parcel country residential development, agricultural land (both grain farming and pastureland). The closest highways to the proposed development are Provincial Highway #11, approximately 1.6 km to the east of the east boundary and Highway #219, located approximately 2.2 km west of the west boundary of the subject parcel (see land use map on following page).

The Existing Land Use Context of the Proposed Development is as Follows:

North

- Grasswood Road	Adjacent to north boundary
- Organized Hamlet of Grasswood	North of Grasswood Road
- City of Saskatoon	Approx. 1.6 km northwest of north boundary

South

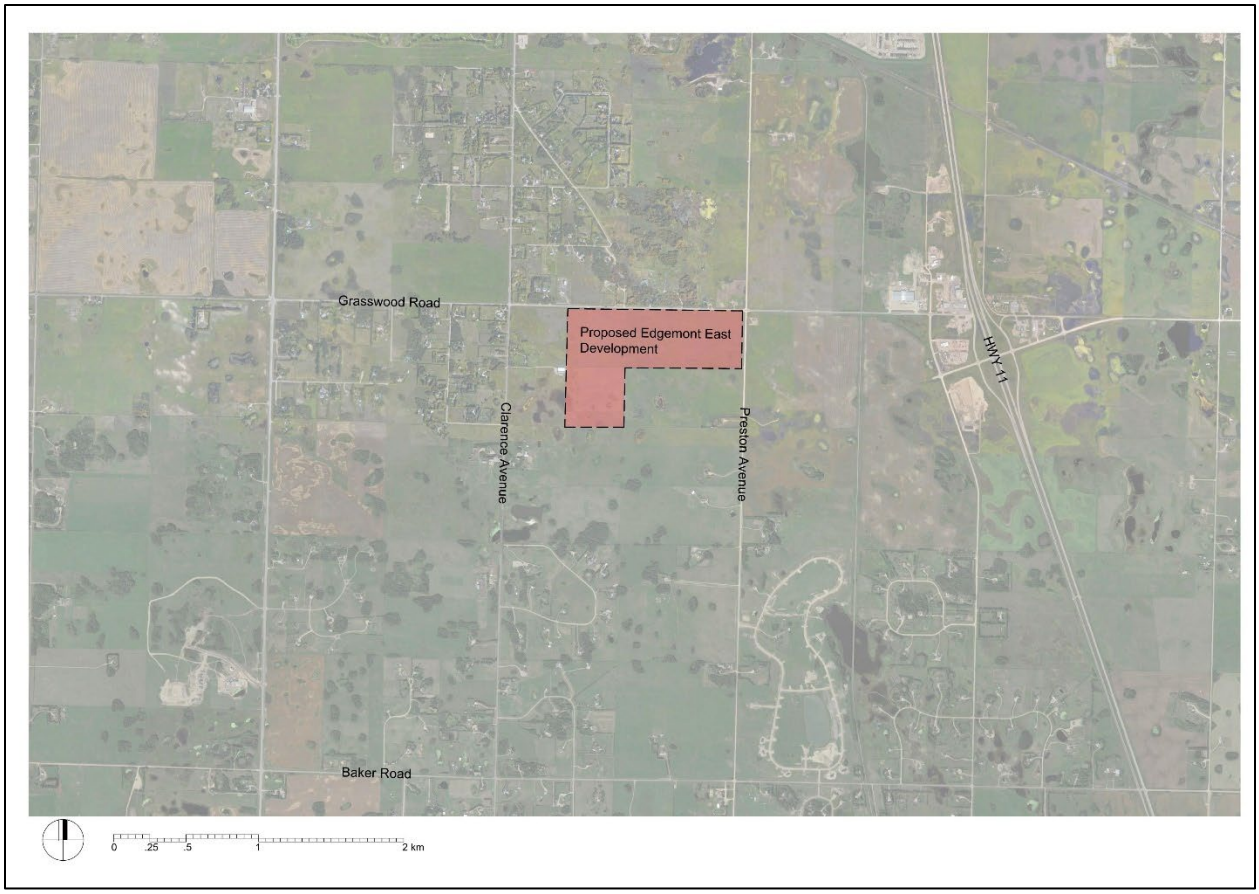
- Pastureland	Adjacent to south boundary
- Organized Hamlet of Casa Rio	Approx. 1.6 km south of south boundary
- Grasswood Estates	Approx. 2.0 km southeast of south boundary

West

- Pastureland	Adjacent to west boundary
- Clarence Avenue	Approx. 800 m west of west boundary
- Edgemont Park Estates	Approx. 800 m southwest of west boundary

East

- Preston Avenue	Adjacent to east boundary
- Highway #11	Approx. 1.6 km east of east boundary
- Grasswood Indian Reserve	Approx. 1.2 km east of east boundary



Location of proposed Edgemont East Development

2.2 PROPOSED LAND USE

The proposed land use is multiple parcel country residential development with an integrated recreational component (District Country Residential 3 District).

The recreational amenity will feature dedicated tennis courts, dedicated pickleball courts, paved walking trails, a disc golf course, beach volleyball, an outdoor picnic area, and potential for cross country ski trails (see Appendix B for the Recreational Area Concept Plan). The development will also feature a children's play area (concept plan attached as Appendix B). The Edgemont East Community Association will be responsible for the maintenance of the recreational area.

This proposed recreation area will benefit members of the proposed Edgemont East community and surrounding developments. The proposed development has also been designed to maximize the number of south and west facing back yard lots. Proposed paved pathways will be utilized for walking trails in the summer. Additional Municipal Reserve (MR) exists around the south side of the development, and potential exists to develop this area into cross country ski trails in the winter. The open space proposed within the recreational area labelled as "Outdoor Picnic Area" is envisioned to be used for picnics, pickup soccer, tag, and other such activities. Lastly, space exists to develop a 9-hole disc golf course within the park area.

The proposed development is compatible with the existing land uses currently in the surrounding area, as this area of the RM is characterized by a variety of existing country residential development including the Organized Hamlet of Grasswood, Edgemont Park Estates, Grasswood Estates, and Casa Rio Estates. As was realized with Edgemont Park Estates, the proposed development offers lots that are smaller and denser, than typical country residential lots in the area, and it has been found that there continues to be a strong market demand for this type of housing.

The density of the proposed Edgemont East is well below the maximum of 3 lots per acre and is provided below:

Phase 1: 24.47 hectares (60.5 acres) and 40 lots for a density of 0.66 lots per acre;
Phase 2: 19.18 hectares (47.4 acres) and 41 lots for a density of 0.86 lots per acre;
Phase 3: 13.14 hectares (32.47 acres) and 32 lots for a density of 0.99 lots per acre;
Phase 4: 8.55 hectares (21.12 acres) and 18 lots for a density of 0.85 lots per acre;

Overall: 161.12 acres and 131 lots for a density of 0.81 lots per acre.

Correspondence with the RM of Corman Park planning staff indicated that there was once an Intensive Livestock Operation (ILO) in the vicinity (E ½ Township, 36, Range, 5, W3M) which now appears to be discontinued. There are no other land use conflicts in the vicinity of the proposed development (see correspondence attached as Appendix C).

3 TRANSPORTATION AND MUNICIPAL SERVICES

3.1 COMMUNITY ACCESS

The proposed development is located immediately west of Preston Avenue / Range Road 3052. KGS Group was contracted to undertake the Traffic Impact Assessment (TIA) in the winter of 2022 (attached as Appendix D).

KGS undertook turning lane movement counts in 2017, as a part of the Edgemont Park Estates development. The volumes were collected during the morning (7:00 am to 9:00 am) and afternoon (4:00 pm to 6:00 pm) peak periods to capture the typical commuter traffic. It was determined that the morning peak hour occurred from 8:00 am to 9:00 am and the afternoon peak occurred from 4:00 pm to 5:00 pm. To determine traffic counts for the Edgemont East development, an annual 5.0% growth was applied to the study intersections to determine background traffic volumes without the additional traffic generated from the site.

Total forecast volumes associated with the proposed development were calculated by combining the background growth with the new trips associated with the development, utilizing the two access points along Grasswood Road, as well as the intersection of Grasswood Road and Clarence Avenue. Total forecast growth volumes were assessed using Synchro 11.0 (industry-standard traffic analysis software). Level of Service (LOS) analysis was completed, which assesses the effectiveness of a transportation system, with LOS "A" equating to the best operating conditions and LOS "F" representing the failure of a movement or intersection.

It was concluded that both the east and west access points at Grasswood Road will operate at a LOS of "A" during the morning and afternoon peak hours. The intersection at Grasswood Road and Clarence Avenue is expected to operate at a LOS A/B for all forecast scenarios.

An illumination warrant assessment was conducted using the Ministry of Highways and Infrastructure (MHI) design manual guidelines. It was concluded that the study intersections do not meet the warrant requirement for area lighting.

The TIA was provided to the MHI for review and comment. MHI indicated that based on the estimated trips generated by the development, there would be minimal impact at both the Highway 219/Grasswood Road intersection or the Highway 11/Grasswood Road intersection as a result of the development. MHI further indicated that the ministry has no concerns with the development or its projected traffic impact on the highway network as shown in the TIA provided.

The following conclusions and recommendations were made concerning the TIA for Edgemont East:

- The TIA analysis and findings identify that the residential units proposed as part of the Edgemont East development will have a negligible impact on operations along Grasswood Road and at the study intersections.

- No additional turning lanes or other geometric modifications will be necessary to accommodate the proposed development.
- A streetlight at each of the access intersections would improve visibility at night and would be warranted if Grasswood Road were a provincial highway. Consideration for implementing a streetlight is recommended but it is acknowledged that other similar intersections within the R.M. are not currently illuminated.

3.2 INTERNAL ROADS

Roads within the development feature a 30 m wide road right-of-way, widened to 48 m at each of the entrances. The widening is intended to accommodate entrance features, signage, and communal mailboxes, with additional parking lanes. To maintain RM development standards, the proposed road cross-section consists of a 7.4 m wide asphalt paved road surface with adjacent ditches. The standard road cross-section includes a 2% crown to shed water from the road surface. The proposed road structure, based on the geotechnical investigation, shall consist of 150 mm subbase, 150 mm base course, and 80 mm asphalt concrete (see geotechnical report in Appendix E). The internal roads will be constructed at the expense of the Developer.

3.3 SEWAGE COLLECTION & WASTEWATER TREATMENT

Wastewater collection for the development is proposed to be provided by a conventional gravity sewer network. The network collects to a proposed sewage pumping station located centrally within the development.

There are no existing sewer facilities within the vicinity of the development. Therefore, a new collection point and sewage pumping facility will be required. The area serviceable by the sewage pumping station and force main extend to all boundaries of the development.

To facilitate development of the full serviceable area, the sewage pumping station depth would be in the order of 7.5 m from finished grade to lower foundation slab, which is considered a conventional depth for such facilities. Due to the water table elevation and sandy ground conditions, dewatering and shoring procedures will likely be required during construction. Effects of buoyancy should also be considered through the course of the design (see Servicing Study in Appendix F).

Approximately 750 m of force main is required to convey sewage from the pumping station to Grasswood Road. The force main connection would continue to the wastewater treatment facility (Membrane Bioreactor) currently under construction on the English River First Nation lands, near Highway 11 and Grasswood Road. Details for the sewage force main components extending along Grasswood Road to the wastewater treatment plant are currently being reviewed under a separate study, due to the potential regionalization of the system. Details concerning the technology utilized by the MBR are found in the letter provided by the ERFN in Appendix G.

The ERFN have indicated that they have capacity and permits to operate with a storage pond and irrigation for at least the next five years. Discharge to the City of Saskatoon Preston Storm Sewer system is being examined, which is a change in the regulatory framework that will allow the ERFN

to sell water directly to industrial users or to SaskWater as non-potable water, and irrigation to nearby farmlands for non-human consumption products.

In the letter provided by the ERFN, it is noted that supporting infrastructure is slated for completion next year (2023). If the Edgemont East development has occupied housing prior to the construction of the force mains and pump stations, it has been confirmed that the wastewater treatment facility can be utilized by conveying wastewater by septic haul trucks. The ERFN has indicated that they will develop agreements either through Des Nedhe Group (the development corporation) or through the RM of Corman Park to ensure that there is capacity available for the Edgemont East Development.

Further details on the design and construction of the pumping station can be found in the servicing study in Appendix F. A letter detailing the operation of the new wastewater treatment plant provided by the ERFN is attached in Appendix G.

The servicing study was provided to the Environmental and Municipal Management Services Division of the Water Security Agency. WSA indicated that an application for a permit to construct, from the Water Security Agency's Engineering Approvals Unit would be required for this work. The permit has since been received (see correspondence attached in Servicing Study).

A Permit to Operate a Sewage Works will be required prior to going into operation. WSA indicated they have no concerns with this application (correspondence attached in Appendix F).

Delta Construction has confirmed their ability desire to form and operate a septic and potable water utility which will be responsible for the maintenance and upkeep of the potable water lines, sewage lines and system, in addition to the invoicing homeowners for their usage.

3.4 POTABLE WATER SUPPLY AND DISTRIBUTION

Water supply in the development includes a potable water connection to residences for domestic purposes. The proposed water distribution network is shown in Figure 7-1 of the servicing study.

Potable water will be supplied and installed by Delta Construction Group (letter attached as Appendix H). Delta Construction will also function as the utility provider for both potable water and sanitary sewer at the Edgemont East subdivision.

The Environmental and Municipal Management Services Division of the Water Security Agency has reviewed the subdivision application. They noted that there would be no concerns with the quality of the water supply. The allocation/capacity of the supply from the SaskWater waterworks system and their agreement with the City of Saskatoon will need to be reviewed. The WSA recommends consulting with SaskWater regarding the capacity to provide water to this subdivision, once fully completed. An application for a permit to construct, from the Water Security Agency's Engineering Approvals Unit has been received. Correspondence is attached as Appendix F.

3.5 DRAINAGE AND STORMWATER MANAGEMENT

A grading plan and associated drainage report were completed by BCL Engineering at the request of the developer in August, 2022 (see servicing report attached as Appendix F).

The existing topography within the development is gently undulating, with pre-existing natural drainage to the southwest corner of the property. Elevations vary as much as 8.0 m. Typical elevations are in the order of 500.5 m in the southwest and 509.0 m in the northeast.

Internal drainage throughout the site shall be directed to the road right-of-ways, where it will be conveyed using the roadside ditches and culverts. Ditches and culverts shall be designed to be free-draining yet provide adequate attenuation in a rainfall event. The longitudinal slope of the ditches averages 0.30%. Slopes within this range provide adequate drainage, accommodate some degree of vegetation overgrowth, and are not significantly affected by any rutting or debris accumulation that may occur between maintenance periods.

To accommodate external influences (adjacent lands) and appropriately capture internal lot drainage (rear lot drainage), the perimeter municipal reserve areas shall be designed to direct all drainage to the major networks, consisting of the roadway ditches or pond areas. This perimeter drainage is noted on the grading plan, with a design slope in the order of 0.25%.

All site drainage will be contained within the boundaries and directed to the storm pond planned within the MR1 park space development (labelled MU1). An earthen embankment along the western-most property line will be required to contain the stormwater runoff and appropriately manage all conditions. The proposed grading plan is shown in Figure 3-2 of the Servicing Study attached as Appendix F.

A surface model of the proposed site grading plan was also generated to assess excavation and fill requirements of the graded site. Total earthwork requirements for the construction of the roadways, lots, and linear greenspaces, are projected to be in the order of 250,000 m^3. Earthwork requirements for excavation of the park space, pond, and construction of the embankment along the western property line, are projected to be in the order of 50,000 m^3. Earthwork requirements are shown in Figure 3-3 of the servicing report.

Further refinement of the final lot grading will be required, considering excavation requirements (cut-fill balancing), market interests (conventional compared to walk-out style homes), and other internal considerations or discussion with the Development Team. However, such details will not influence the overall drainage and stormwater storage requirements of the development and can be further refined through the course of development.

Proposed stormwater infrastructure is provided in Figure 5-1 of the servicing report. Retention pond capacities and development runoff volumes, including any external influences, were modelled based on several storm events, with the ultimate capacity of the system based on a 1:100 year, 24 hour precipitation event. The design includes an additional 25% capacity within the normal operating conditions to ensure that any extreme events can be adequately managed and not subject the development to property damage.

A surface model was created to determine the drainage patterns, storage and resulting water elevations. The following design criteria have been used in the analysis:

- 1:100 year, 24 hour rainfall of 90 mm based on IDF curves for the City of Saskatoon, with 25% added to calculations, for a total of 110 mm of rainfall within a 24 hour period;
- pre-development runoff coefficient of 0.20;
- post-development runoff coefficient of 0.41, in accordance with the City of Saskatoon urban development standards.

It should be noted that a post-development runoff coefficient of 0.41 is representative of an urban development and is considered conservative for country residential development.

The storm pond design ensures that the pond is of reasonable size to accommodate routine and frequent storm events (i.e. 1:5 year events), as well as being manageable and appealing to park space users. Oversizing the active storm pond may realize conditions that are considered undesirable. However, the storm management facilities must also accommodate the extreme rainfall events, which could use additional area within the developed park space that will not be affected in such an event.

The pond area is designed to accommodate a typical 1:5 year return period, as indicated above. Maintenance and management of this area for regular storm events should be considered routine in nature, with a well-defined 'wet' area, pond peripherals, and ensuring vegetation selections can survive within the pond environment. Following these events, the storm pond should return to the normal water levels within a 24 hour period, as described in Section 5.2 of the Servicing Study.

Storms of increased intensity will utilize more of the open park space areas for temporary storage. A 1:25 year return period will realize a local flood elevation of 502.25 m which will flood some of the fields and areas indicated in Figure 5.5 of the Servicing Study. Pathways throughout the development will remain accessible.

A 1:100 year return period will realize a local flood elevation of 502.75 m. Some pathways, depending on their location, may become inundated and be temporarily out of service. However, major park space infrastructure (tennis courts, playgrounds, gazebos, etc.), will be constructed above these flood elevations.

A 1:100 year storm event, plus 25%, will realize a local flood elevation of 502.75 to 503.0 m. The extent of this event is indicated on Figure 5-2. This extreme event is used to derive the recommended safe building elevation of 504.0 m, which allows 1.0 m freeboard for all houses. Following a 1:100 year storm event, the water levels are expected to return to normal within a 48 hour period.

Controlling stormwater discharge from the development will include a controlled outlet at an elevation of 501.00 m. This outlet should be designed to release at a rate matching the pre-development runoff rates, estimated as follows:

$$Q = 2.78\ ciA$$

$$Q = 2.78\ (0.20)\ (4.58\ mm/hr)\ (65.31\ ha)$$

Q = 166 L/s (599 m3 / hr)

Such flow rates would be limited by the use of a 300 mm dia. outlet pipe under all operating conditions. However, the use of a 200 mm outlet pipe would still provide a reasonable drain time of less than three days, for typical rainfall events. A secondary outlet of similar capacity should be provided at an elevation of 502.150 m. As a final safeguard, an overflow structure near an elevation of 503.0 m is recommended.

The pond option shown is intended to function as a wet bottom facility. Groundwater elevations recorded during the recent geotechnical investigation were approximately 500.0 m in the area. The pond bottom elevation should be set at 498.0 m to maintain water within the facility and provide an available surcharge capacity. At typical groundwater levels the pond will maintain a fill level of approximately 2.0 m at the deepest location. At a flood limit of 501.75 m, the pond would provide a retention volume of approximately 13,900 m^3, meeting the 1:5 year return period.

Within the servicing report, it is recommended that a safe building elevation of 504.0 m be applied to the development, which would apply to any houses or permanent structures. Observing the safe building elevation is of particular importance within the southwest area of the development, where potential flood elevations could be realized. Furthermore, engineered foundation plans, house plans, and proposed building elevations must be submitted to the Edgemont East Building Committee for review and approval prior to applying for a development permit from the RM of Corman Park.

3.6 SHALLOW UTILITIES

The Developer has been in contact with SaskPower and SaskEnergy. It is anticipated that this development can be easily serviced by both power and gas utilities, as they have both verbally confirmed availability. Community Planning has also referred the development to all utilities and no issues were identified throughout the subdivision application process. Loraas Disposal will be contracted to provide waste and recycling removal services at the proposed Edgemont East development.

3.7 FIRE AND PROTECTIVE SERVICES

The RM will need to correspond with Saskatoon Fire and Protective Services to set up the general parameters for these services at the proposed Development. Edgemont East would be serviced from the fire truck fill located at Pump House #1 at the corner of Grasswood Road and Preston Avenue. This fill location is where the Saskatoon and Dundurn Fire Departments hook up and fill their tanker trucks. There are no capacity issues at this pump house, as it is only available for fire departments to use. This fill location is located kiddy corner to the northeast corner of the proposed development. Police services will be provided by the Corman Park Police Services and the Saskatoon Detachment of the Royal Canadian Mounted Police.

4 HERITAGE, ENVIRONMENT AND GEOTECHNICAL

4.1 HERITAGE CONSERVATION

According to the Heritage Conservation Branch at the Ministry of Parks Culture and Sport, the proposed development is not located in an area with any potential heritage sensitivity (query attached as Appendix I).

4.2 ENVIRONMENTAL CONSIDERATIONS

The proposed development is located on hayland that has been farmed for many years. A query of the HabiSask website indicated that the development may be located in an area with potential rare/endangered non-vascular plant (see Appendix I). It is noted, however that the land has been used as pasture for many years and any habitat would have been previously removed due to haying activities that occur in July of every year.

The proposed development is also not located in the vicinity of any permanent water sources. The closest permanent water source, the South Saskatchewan River, is located approximately 4.0 km to the west.

4.3 GEOTECHNICAL ANALYSIS

A geotechnical investigation and follow up report were completed in February, 2022 by P. Machibroda Engineering (see attached report in Appendix E). The objective of the investigation was to provide geotechnical recommendations to support the detailed design of the proposed development.

Geotechnical field test drilling, piezecone penetration testing, and monitoring well installation was conducted in November, 2021. Groundwater monitoring was undertaken in December, 2021. Twenty (20) boreholes were drilled at a diameter of 150 mm each and extended to a depth between 3 and 6 m below existing ground surface. Soil stratification, groundwater conditions, the position of unstable sloughing soils and the depths at which cobblestones/boulders were encountered were all recorded (results found in Geotechnical report attached as Appendix E).

The general soil profile consisted of organic topsoil overlying predominantly sand, followed by variable deposits of silt and clay to a depth of at least 18.7 m below ground level, which was the maximum depth investigated. The sand was classified as loose to compact, poorly graded, fine grained, and moist, initially, becoming wet below the groundwater table. The silt was classified as firm to stiff, low to medium plastic, and moist to wet. The clay deposits were classified as firm to very stiff, medium to highly plastic and moist.

Groundwater seepage and sloughing conditions were encountered during field test drilling. The groundwater table was recorded at a depth of between 2.27 to 3.82 m below existing grade on January 10, 2022.

Within the geotechnical report, recommendations are made concerning site preparation; excavations and dewatering; site classification for seismic site response; limit states resistance factors and serviceability; footings; concrete raft foundations; deep foundations; foundation drainage; foundation walls; floors; foundation concrete; and traffic structures. All recommendations can be found in Appendix E.

The Safe Building Elevation of 504.0 m must be applied to the lowest foundation opening. Furthermore, engineered foundation plans, house plans, and proposed building elevations must be submitted to the Edgemont East Building Committee for review and approval prior to applying for a development permit from the RM of Corman Park.

5 POLICY CONTEXT

The proposed Edgemont East residential development is located mostly within the P4G Planning District area. The proposed development has been designed to meet the requirements of the P4G Official Community Plan and Zoning Bylaw, as well as the RM of Corman Park Official Community Plan and Zoning Bylaw, as described in Sections 5.1 to 5.2 below.

5.1 P4G DISTRICT OFFICIAL COMMUNITY PLAN

Agricultural Objectives and Policies (Section 11) - Section 11 of the P4G District Official Community Plan identifies the following Agricultural Policies that are pertinent to the proposed Edgemont East multiple parcel country residential development.

4.2 Disruption of Agriculture Minimized

- 11.3.5: Correspondence with the RM of Corman Park planning staff indicated that there was once an Intensive Livestock Operation (ILO) in the vicinity (E ½ Township, 36, Range, 5, W3M) which now appears to be discontinued. There are no other land use conflicts in the vicinity of the proposed development (see correspondence attached as Appendix C).

Country Residential Policies (Section 12) – Section 12 of the P4G District Official Community Plan identifies the following Country Residential Policies that are pertinent to the proposed Edgemont East Development.

12.3 Policies

- 12.3.1: The proposed development is located on land designated as "Country Residential" as provided on Section B – District Land Use Map.

- 12.3.2: The proposed development is not located on significant wildlife habit lands. A query of the Habi-Sask database indicated that the land is in an area containing a species of "potential rare/endangered non-vascular plant" (see Appendix I). It is noted that the proposed development is located on land that has been previously used as hayland and any habitat would have been previously destroyed a result of annual to haying activities in July. The proposed development is also not located in the vicinity of any permanent water sources. The closest permanent water source, the South Saskatchewan River, is located approximately 4.0 km to the west.

- 12.3.2(c): The proposed development is not located on hazard lands. Correspondence with the RM of Corman Park (attached as Appendix C) was undertaken to ensure the development is not located within required setbacks of hazardous lands or facilities. Although there was once an ILO located in the vicinity, it appears to be discontinued. No gravel pits or sewage lagoons are located near the proposed development.

- 12.3.3(a): The proposed Edgemont East development will minimize pressure to expand or upgrade services and infrastructure. New internal roads will be constructed to the RM of Corman Park's standards. Potable water will be provided by Delta Construction (letter attached as Appendix H), who will also function as the utility responsible for the management of the potable water and wastewater. Wastewater collection for the development is proposed to be provided by a conventional gravity sewer network. The network collects to a proposed sewage pumping station located centrally within the development. A new collection point and sewage pumping facility will be required to be constructed within the Edgemont East development. The area serviceable by the sewage pumping station and force main extend to all boundaries of the development. Approximately 750 m of force main is required to convey sewage from the pumping station to Grasswood Road. The force main connection would continue to the wastewater treatment facility currently under construction on the ERFN lands, near Highway 11 and Grasswood Road. The ERFN has indicated that they will be able to accept wastewater at the facility prior to the construction of the forcemain, via septic haul trucks (see letter attached as Appendix G). The Developer has been in contact with SaskEnergy and SaskPower to confirm their ability to provide the necessary utilities at this development.

- 12.3.3(b): To maintain RM development standards, the proposed road cross-section consists of a 7.4 m wide asphalt paved road surface with adjacent ditches. The standard road cross-section includes a 2% crown to shed water from the road surface. The proposed road structure, based on the geotechnical investigation, shall consist of 150 mm subbase, 150 mm base course, and 80 mm asphalt concrete (see Geotechnical report attached as Appendix E).

- 12.3.3(c): The Edgemont East development will feature a public recreational amenity including dedicated tennis courts, dedicated pickleball courts, paved walking trails, beach volleyball, disc golf, an outdoor picnic area, and potential for cross country ski trails (see Recreational Concept in Appendix B). This amenity coupled with the subdivision design, will feature high-quality living opportunities for Corman Park residents. The Edgemont East Community Association will be responsible for the maintenance of the park.

- 12.3.3(d): The proposed development is located on land that has been used as hayland for years. The proposed pond is proposed the lowest lying area to minimize the amount of disturbance to the terrain and existing drainage patterns.

- 12.3.3(e): The proposed development is not located in an environmentally sensitive or heritage area (see Appendix I for environmental and heritage queries). Although the environmental query indicated that the development is situated in an area of potentially rare/endangered vascular plant, the land has been hayed in July for many years and any habitat would have been previously destroyed. There are no wetlands within the property boundaries. As provided in the servicing study, post-development runoff conditions will remain the same as pre-development runoff conditions.

- 12.3.3(f): The proposed development will promote social benefits to the community in the form of a well-designed recreational amenity, which will help encourage an active lifestyle

for people of all ages and abilities. The amenity will feature dedicated tennis courts, dedicated pickleball courts, beach volleyball, paved walking trails, disc golf, an outdoor picnic area, and potential for cross country ski trails (see Recreational Concept in Appendix B). The park will be maintained by the Edgemont East Community Association.

- 12.3.3(g): Both the developer and the Community Planning Branch have provided details concerning the development to the Prairie Spirit School Division. It is known that Prairie Spirit School Division monitors capacity at all schools on an ongoing basis. This process takes into consideration any new developments within the attendance areas. Any significant enrolment increases in any attendance area would impact capacity and require facility planning. The Ministry of Education sets out calculations to assess the degree to which a school is below, at, or over capacity. These calculations are used by the province to determine which school projects are funded each year. If a school is "over capacity", the provincial government may approve portable classrooms or a new project to add space to a school. It is anticipated that South Corman Park School and Clavet School would have capacity for any additional students added by the proposed Edgemont East development but will be confirmed by the Community Planning Branch prior to subdivision approval.

- 12.3.4(a): The proposed development is located on land that has been used as hayland for many years. The P4G District Official Community Plan identifies this land to be suitable for future Country Residential Development. Consideration was given to the best use of the land as residential development. There is a market demand for smaller acreage lots, as there is less upkeep required by individual homeowners when compared to the larger lots provided for in the DCR-1 Zoning District. The proposed development has been designed to maximize the number of south and west facing back yard lots. Walking paths have been incorporated into the development, all of which lead to the proposed recreational area near the southwest corner of the development.

- 12.3.4(b): The proposed development has been designed and engineered to ensure that post-development runoff conditions do not exceed pre-development runoff conditions. The servicing study completed by BCL Engineering concluded that all site drainage will be contained within the boundaries and directed to the storm pond planned within the MR1 park space development (labelled as MU1). Internal drainage throughout the site shall be directed to the road right-of-ways, where it will be conveyed using the roadside ditches and culverts. Retention pond capacities and development runoff volumes were modelled based on several storm events, with the ultimate capacity of the system based on a 1:100 year, 24 hour precipitation event. The design includes an additional 25% capacity within the normal operating conditions and ensure that any extreme events can be adequately managed and not subject the development to property damage. Within the servicing report, it is recommended that a safe building elevation of 504.0 m be applied to the development, which would apply to any houses or permanent structures. The SBE must be applied to the lowest foundation opening. A careful review of the geotechnical investigation with respect to groundwater elevations will need to be completed by each homeowner. Furthermore, engineered foundation plans, house plans, and proposed building elevations must be submitted to the Edgemont East Building Committee for review and approval prior

to applying for a development permit from the RM of Corman Park (see servicing report as Appendix F).

- 12.3.4 (c): The proposed Edgemont East development will minimize pressure to expand or upgrade services and infrastructure. Internal roads will be constructed to the RM of Corman Park's standards, at the cost of the Developer. Potable water will be installed and provided by Delta Construction, who will also function as the utility for the development. Wastewater collection for the development is proposed to be provided by a conventional gravity sewer network. The network collects to a proposed sewage pumping station located centrally within the development. A new collection point and sewage pumping facility will be required to be constructed within the Edgemont East development. The area serviceable by the sewage pumping station and force main extend to all boundaries of the development. Approximately 750 m of force main is required to convey sewage from the pumping station to Grasswood Road. The force main connection would continue to the wastewater treatment facility currently under construction on the ERFN lands, near Highway 11 and Grasswood Road. The Developer has been in contact with SaskEnergy and SaskPower to confirm their ability to provide the necessary utilities at this development.

- 12.3.4(d): The closest existing country residential development in the immediate vicinity of the proposed Edgemont East development is Grasswood North, located on the north side of Grasswood Road. While the lots within this existing subdivision are larger, the proposed Edgemont East development is buffered by the Grasswood North development by Grasswood Road.

- 12.3.8(a): The proposed Edgemont East development represents the second development in the vicinity to feature smaller-style acreage lots. There is a significant market demand for smaller acreage lots, as there is less upkeep required for individual homeowners when compared to the larger lots provided for in the CR-1 and DCR-1 Zoning Districts. The success of the Edgemont Park Estates development illustrates that this type of development is in very high demand. At the time of the CDR, only 5 lots remain available at the Edgemont Park Estates development. The integrated recreational amenity has been key to the marketing of the Edgemont Park Estates development, and it is believed that Edgemont East will be as successful, as it features an integrated recreational component offering opportunities for individuals and families of all ages and abilities.

- 12.3.8(b): The proposed Edgemont East development stands out from other country residential developments in the area due to the suitability and availability of municipal infrastructure, including the proposed conventional gravity sewer network. The proposed sewer network collects to a proposed sewage pumping station located centrally within the development. Approximately 750 m of force main is required to convey sewage from the pumping station to Grasswood Road. The force main connection would continue to the wastewater treatment facility currently under construction on the ERFN lands, near Highway 11 and Grasswood Road (see servicing report in Appendix F). Potable water will be supplied by Delta Construction (see Appendix H). All internal roads within the development will be paved and constructed to the RM of Corman Park's standards. The

development is also serviced by existing municipal roads (Grasswood Road and Preston Avenue/Range Road 3052).

- 12.3.8(c): The proposed Edgemont East development complements existing smaller lot residential communities in the area, including Edgemont Park Estates. There is a market demand for smaller acreage lots, as there is less upkeep required when compared to the larger lots provided for in the CR-1 and DCR-1 Zoning Districts. The success of the Edgemont Park Estates development illustrates that this type of development is in very high demand and the proposed sanitary sewer network will minimize any perceived conflict with surrounding neighbours, as wastewater will be transported and treated at the proposed wastewater treatment facility currently under construction on the ERFN lands, near Highway 11 and Grasswood Road.

- 12.3.8(d): The proposed development is located on two municipally maintained roadways including Grasswood Road to the north and Preston Avenue/Range Road 3052 to the east. Access to the proposed development is proposed at two separate locations along Grasswood Road (see plan of proposed subdivision attached as Appendix A).

Regional Servicing Policies (Section 23) – Section 23 of the P4G District Official Community Plan identifies the following Regional Servicing Policies that are pertinent to the proposed Edgemont East Development.

- 23.3.3: The Developer will be responsible for costs associated with providing the necessary infrastructure and services for the proposed Edgemont East development. It is anticipated that details of the required services and associated infrastructure will be outlined in the servicing agreement with the RM of Corman Park. Specific details relating to the sewage force main components extending along Grasswood Road to the wastewater treatment plant are currently being reviewed under a separate study, due to the potential regionalization of the system.

Potable Water Policies (Section 24) – Section 24 of the P4G District Official Community Plan identifies the following Potable Water Policies that are pertinent to the proposed Edgemont East Development.

- 24.3.3: Potable water will be provided and installed by Delta Construction. Delta will also function as the utility for both potable water and sanitary sewer system (see letter attached as Appendix H).

- 24.3.4: Connections to the municipal potable water lines will be undertaken in accordance with applicable policies and bylaws, and as specified in the servicing agreement with the RM of Corman Park.

Wastewater Policies (Section 25)– Section 25 of the P4G District Official Community Plan identifies the following Wastewater Policies that are pertinent to the proposed Edgemont East Development.

- 25.3.4: Wastewater collection for the development is proposed to be provided by a conventional gravity sewer network. The network collects to a proposed sewage pumping

station located centrally within the development. As there are no existing sewer facilities within the vicinity of the development. Therefore, a new collection point and sewage pumping facility will be required. The area serviceable by the sewage pumping station and force main extend to all boundaries of the development. Approximately 750 m of force main is required to convey sewage from the pumping station to Grasswood Road. The force main connection would continue to the wastewater treatment facility currently under construction on the ERFN lands, near Highway 11 and Grasswood Road. Details for the sewage force main components extending along Grasswood Road to the wastewater treatment plant are currently being reviewed under a separate study, due to the potential regionalization of the system. The proposed system shall exceed the on-site sewage treatment requirements, established by the Saskatchewan Health Authority (see servicing study attached as Appendix F). Although supporting infrastructure is slated for completion next year, the ERFN has indicated that if Edgemont East has occupied housing prior to the construction of the force mains and pump stations are developed, they will be able to access the wastewater treatment facility through septic haul trucks. The ERFN will develop agreements either through Des Nedhe Group (their development corporation) or through the RM of Corman Park that will ensure that there is capacity available for Edgemont East Development (see letter attached as Appendix G).

- 25.3.7: Edgemont East will be one of the first country residential developments to provide on-site wastewater treatment systems in the form of a gravity sewer network, which will ultimately connect to a wastewater treatment facility currently under construction on the English River First Nation lands, west of Highway 11 and north of Grasswood Road. The potential for regionalization of this system is currently under review under a separate study.

Stormwater and Drainage Policies (Section 26)– Section 26 of the P4G District Official Community Plan identifies the following Stormwater and Drainage Policies that are pertinent to the proposed Edgemont East Development.

- 26.3.2: The proposed Edgemont East development has been designed to avoid on and off-site impacts from alteration to drainage, as per the recommendations provided by BCL Engineering in the attached servicing report (Appendix F). All site drainage will be contained within the boundaries and directed to the storm pond planned within the MR1 park space development. Controlling stormwater discharge from the development will include a controlled outlet at an elevation of 501.00 m. This outlet should be designed to release at a rate matching the pre-development runoff rates. Within the servicing report, it is also recommended that a safe building elevation of 504.0 m be applied to the development (MU1), which would apply to any houses or permanent structures. Observing the safe building elevation is of particular importance within the southwest area of the development, where potential flood elevations could be realized. The SBE must be applied to the lowest foundation opening. Engineered foundation plans, house plans, and proposed building elevations must be submitted to the Edgemont East Building Committee for review and approval prior to applying for a development permit from the RM of Corman Park (see servicing report as Appendix F).

- 26.3.6: A surface model was created to determine the drainage patterns, storage and resulting water elevations. The following design criteria have been used in the analysis:

(1) 1:100 year, 24 hour rainfall of 90 mm based on IDF curves for the City of Saskatoon, with 25% added to calculations, for a total of 110 mm of rainfall within a 24 hour period; (2) pre-development runoff coefficient of 0.20; (3) post-development runoff coefficient of 0.41, in accordance with the City of Saskatoon urban development standards. It is noted that a post-development runoff coefficient of 0.41 is representative of an urban development and is considered conservative for country residential development (see Appendix F).

- 26.3.10: Based on the modeling undertaken by BCL Engineering, the 1:100 year storm plus 25% will realize a local flood elevation of 502.75 to 503.0 m. The extent of this event is provided in Figure 5-2 of the Servicing Study. This extreme event is used to derive the recommended safe building elevation of 504.0 m, which allows 1.0 m freeboard for all houses. Following a 1:100 year storm event, the water levels are expected to return to normal within a 48 hour period.

Transportation Policies (Section 27)– Section 27 of the P4G District Official Community Plan identifies the following Transportation Policies that are pertinent to the proposed Edgemont East Development.

- 27.3.3: The proposed Edgemont East development shall be accessed by two separate entrances located on Grasswood Road. Roads within the development feature a 30 m wide road right-of-way, widened to 48 m at each of the entrances. The widening is intended to accommodate entrance features, signage, and communal mailboxes, with additional parking lanes. To maintain RM development standards, the proposed road cross-section consists of a 7.4 m wide asphalt paved road surface with adjacent ditches. The standard road cross-section includes a 2% crown to shed water from the road surface. The proposed road structure, based on the geotechnical investigation, shall consist of 150 mm subbase, 150 mm base course, and 80 mm asphalt concrete (see geotechnical report in Appendix E).

- 27.3.4: The Edgemont East development is bordered by Grasswood Road to the north. Both proposed approaches are located on the south side of Grasswood Road, which is a municipally maintained roadway. New internal roads will be constructed at the expense of the Developer and shall feature a 30 m wide road right-of-way, widened to 48 m at each of the entrances. The widening is intended to accommodate entrance features, signage, and communal mailboxes, with additional parking lanes. To maintain RM development standards, the proposed road cross-section consists of a 7.4 m wide asphalt paved road surface with adjacent ditches. The standard road cross-section includes a 2% crown to shed water from the road surface. The proposed road structure, based on the geotechnical investigation, shall consist of 150 mm subbase, 150 mm base course, and 80 mm asphalt concrete (see geotechnical report in Appendix E).

- 27.3.5: All-weather legal and physical access to the development will be provided to the proposed Edgemont East development, on a year-round basis. Both access points are located on Grasswood Road, which is a municipally maintained roadway. It is noted that phasing of the development in terms of roadway construction would generally follow the plan of proposed subdivision. A temporary access will be provided during the construction

of Phase 1, on the north side of proposed lot 124, which is located within Phase 4 of the development.

- 27.3.6: The Developer retained KGS Group to undertake a Traffic Impact Assessment at the proposed development (attached as Appendix D). Total forecast volumes associated with the proposed development were calculated by combining the background growth with the new trips associated with the development, utilizing the two access points along Grasswood Road, as well as the intersection of Grasswood Road and Clarence Avenue. Level of Service (LOS) analysis was completed, which assesses the effectiveness of a transportation system, with LOS "A" equating to the best operating conditions and LOS "F" representing the failure of a movement or intersection. It was concluded that both the east and west access points at Grasswood Road will operate at a LOS of "A" during the morning and afternoon peak hours. The intersection at Grasswood Road and Clarence Avenue is expected to operate at a LOS A/B for all forecast scenarios. The TIA was also provided to the MHI for review and comment. MHI indicated that based on the estimated trips generated by the development, there would be minimal impact at both the Highway 219/Grasswood Road intersection or the Highway 11/Grasswood Road intersection as a result of the development. MHI further indicated that the ministry has no concerns with the development or its projected traffic impact on the highway network as shown in the TIA provided (also attached in Appendix D).

Servicing Agreements Policies (Section 29)– Section 29 of the P4G District Official Community Plan identifies the following Servicing Agreements Policies that are pertinent to the proposed Edgemont East Development.

- 29.3.1: A servicing agreement between the Developer and the RM of Corman Park/P4G Planning Commission is expected to address, but is not necessarily limited to, the following:
  - Identify the proposed phasing, including the proposed construction timelines;
  - Identify roadway and approach specifications;
  - Identify off-site servicing fees, payable to the RM;
  - Identify the value of the required performance bond or letter of credit;
  - The proposed Municipal Reserve compromises 4.828 ha (11.93 ac) of land, which represents an under-dedication of land in Phase 1 of the Development (see Table 5-1 below). However, as all phases of the proposed subdivision measure 65.2 ha (161.12 ac) of land, the total MR to be dedicated represents 11.55% of the total amount of land at the proposed Development. The land dedication is therefore above the minimum required 10% of the land base, which will satisfy the requirements, as per Section 181of *The Planning and Development Act, 2007*.

District Zoning Bylaw Policies (Section 31)– Section 31 of the P4G District Official Community Plan identifies the following District Zoning Bylaw Policies that are pertinent to the proposed Edgemont East Development.

- 31.3.6: The proposed Edgemont East development will require a rezoning to DCR3. This document provides information concerning how the development is consistent with the policies and intent of the P4G District Official Community Plan.

- 31.3.9: The Developer wishes to proceed with a phased rezoning of the entire 65.2 ha (161.12 acres) of land within the NE and NW quarters of Section 34, Township 35, Range 05, W3M from DCR1 and DAG1 to DCR3. Phase 1 of the development will require a rezoning to DCR3. The remainder of the development will require a rezoning to DCR3 with a holding provision, as provided under subsection 71(1) of *The Planning and Development Act, 2007.* Future subdivision applications for phases 2, 3 and 4 will be submitted to the Community Planning Branch and the RM of Corman Park concurrently with an application to amend the zoning bylaw with the intent of removing the holding provision. The application to remove the holding provision will largely be determined by market conditions and demand for housing. The proposed pond (MU1), shallow utilities, roads and associated drainage infrastructure, water lines and sewer lines will be installed during Phase 1.

- 31.3.11: The Developer intends on utilizing a building committee (Edgemont East building committee) who would be required to approve and stamp all building permit applications prior to being issued by the RM of Corman Park, instead of an Architectural Control District. The building committee will ensure that the proposed house design conforms to the proposed architectural controls, as well as including building placement on the lot and building elevation. The architectural controls will similar controls to those utilized at the Edgemont Park Estates development, and are attached as Appendix J.

- 31.3.16: This document shall serve as the Comprehensive Development Review (CDR) as required by the P4G Planning District Commission and the RM of Corman Park for rezoning and subdivision. This CDR addresses all matters of land use integration, environmental sustainability, public involvement and conflict mitigation, as well as to identify the provision of services to the development.

- 31.3.19: The Developer has consulted with the public utility companies, both verbally and through the Utility Declaration Form provided with the subdivision application submitted to the Community Planning Branch. At the time of this report, SaskPower and SaskEnergy have indicated verbally that they have capacity to service the development. Additionally, SaskPower indicated that they do not maintain any existing electrical facilities in the development area.

- 31.3.20: A Public Open House was held on March 30, 2022 at the Glen at the Village at Crossmount. The results of this Open House, including written feedback and the Developer's response to the feedback, is summarized in Section 7, Table 7.1 of this document. The development was well attended, with 18 people, including residents and Corman Park Council members who signed in at the welcome table. Residents seemed supportive of the proposed Edgemont East development and the majority of questions were centered around the proposed means of wastewater treatment and one resident requesting information on the conclusions of the traffic study. A total of 3 follow-up emails were sent to the development team following the open house. One resident was concerned about density, one resident requested information concerning the means of wastewater treatment, and one resident indicated they were concerned about the proposed on-site stormwater management. This resident was provided with the stormwater management report

completed by BCL Engineering and no further discussion ensued. The mail out letter, sign-in sheet, open house boards, and feedback emails are provided in Appendix K of this report.

5.2 P4G DISTRICT ZONING BYLAW

The proposed development within the P4G District requires rezoning from DCR1 and DAG1 Districts to DCR3 District. Development standards and regulations within the P4G Zoning Bylaw will be met, as per Table 5-1 below.

Table 5-1
Comparative Site Development Standards in DCR3 Zoning District

Site Development Standards	P4G Planning District Zoning Bylaw (DCR3)	Proposed Edgemont East Development
Total Site Area	No Maximum	65.2 ha (161.12 acres)
Lot Size – Phase 1	Minimum: 0.13 ha (0.33 acres) Maximum: 4.05 ha (10 acres)	Phase 1 Min: 0.618 acres / 0.25 ha Phase 1 Max1.52 acres / 0.615 ha Phase 1 Avg: 0.868 acres / 0.351 ha
Lot Size – Phase 2	Minimum: 0.13 ha (0.33 acres) Maximum: 4.05 ha (10 acres)	Phase 2 Min: 0.501 acres / 0.203 ha Phase 2 Max: 1.768 acres / 0.716 ha Phase 2 Avg: 0.830 acres / 0.336 ha
Lot Size – Phase 3	Minimum: 0.13 ha (0.33 acres) Maximum: 4.05 ha (10 acres)	Phase 3 Min: 0.532 acres / 0.215 ha Phase 3 Max: 1.112 acres / 0.450 ha Phase 3 Avg: 0.771 acres / 0.312 ha
Lot Size – Phase 4	Minimum: 0.13 ha (0.33 acres) Maximum: 4.05 ha (10 acres)	Phase 4 Min: 0.638 acres / 0.258 ha Phase 4 Max: 1.462 acres / 0.591 ha Phase 4 Avg: 0.927 acres / 0.375 ha
Municipal Reserve	Either 10% or Cash-in-Lieu	Phase 1: 11.93 acres / 4.828 ha (7.40% of total land base) Phase 2: 4.83 acres / 1.955 ha (3.00 % of total land base) Phase 3: 1.81 acres / 0.732 ha (1.12% of total land base) Phase 4: 0 acres / 0 ha (0.0% of total land base)
Total Area of Roadways	N/A	Phase 1: 12.19 acres / 4.932 ha Phase 2: 8.51 acres / 3.444 ha Phase 3: 5.975 acres / 2.418 ha Phase 4: 4.426 acres / 1.791 ha
Municipal Utility	N/A	Phase 1: 1.62 acres / 0.654 ha Phase 2: 0 acres / 0 ha Phase 3: 0 acres / 0 ha Phase 4: 0 acres / 0 ha
Required Frontage	Minimum of 15 m	Minimum of 15 m

The minimum site size in the DCR3 District is 0.13 ha (0.33 acres) and the maximum density is 3 dwelling units per acre. The zoning bylaw reads:

"6.8.5. Single detached residential lot density shall not exceed 7.4 principal dwelling units per hectare (3 dwelling units per acre)"

The density of Edgemont East is as follows:

Phase 1: 24.47 hectares (60.5 acres) and 40 lots for a density of 0.66 lots per acre;
Phase 2: 19.18 hectares (47.4 acres) and 41 lots for a density of 0.86 lots per acre;
Phase 3: 13.14 hectares (32.47 acres) and 32 lots for a density of 0.99 lots per acre;
Phase 4: 8.55 hectares (21.12 acres) and 18 lots for a density of 0.85 lots per acre;

Overall: 161.12 acres and 131 lots for a density of 0.81 lots per acre.

It is noted that when the proposed Edgemont East development was designed, the actual density that was targeted was much lower than the maximum of 3 lots per acre.

The proposed Municipal Reserve compromises approximately 4.828 ha (11.93 ac) of land, which represents an under-dedication of land in Phase 1 of the Development (see Table 5-1 above). However, as all phases of the proposed subdivision measure 65.2 ha (161.12 ac) of land, the total MR to be dedicated represents 11.55% of the total amount of land at the proposed Development. The land dedication is therefore above the minimum required 10% of the land base, which will satisfy the requirements, as per Section 181of *The Planning and Development Act, 2007.*

With respect to proposed architectural controls, attached in Appendix H, it is proposed that the Edgemont East building committee approve and stamp all building permit applications prior to being issued by the RM of Corman Park. The EPE building committee will ensure that the proposed house design conforms to the proposed architectural controls and that the Proposed Building Plan for each individual lot is consistent with the building plan map prepared by BCL Engineering (see servicing report in Appendix F).

6 STAGING AND IMPLEMENTATION

A Plan of Proposed Subdivision has been attached as Appendix A, which detail the extent of the proposed subdivision of land at the Edgemont East Development. Appendix B illustrates the layout of the proposed recreational area. It is anticipated that this development will be built out in four phases but will largely depend on market conditions. The proposed recreational amenity would be built concurrently with Phase 1 of the development. It is noted that phasing of the development in terms of roadway construction would generally follow the plan of proposed subdivision. A temporary access will be provided during the construction of Phase 1, on the north side of proposed lot 124, which is located within Phase 4 of the development.

This subdivision will need to be approved by the Community Planning Branch at the Ministry of Government Relations. The proposed development was submitted in April, 2022 for formal review (File R0270-22S).

7 PUBLIC CONSULTATION

A Public Open House was held on March 30, 2022 at the Village at Crossmount. Prior to this, a letter was sent to all residents within one mile (1.6 km) of the proposed Edgemont East Development. The mail out letter, sign in sheet, open house boards, and written responses (feedback emails) are attached in Appendix K.

The development was well attended, with 18 people, including residents and Corman Park Council members who signed in at the welcome table. Residents seemed supportive of the proposed Edgemont East development and most questions were centered around the proposed means of wastewater treatment and one resident requesting information on the conclusions of the traffic study. A total of 4 follow-up emails were sent to the development team following the open house. One resident was concerned about density, one resident requested information concerning the means of wastewater treatment, one resident indicated they were concerned about the proposed on-site stormwater management, This particular resident was provided with the stormwater management report completed by BCL Engineering and no further discussion ensued. One last resident indicated they were concerned about the proposed on-site stormwater management, and one resident indicated they were concerned about several items (density, school capacity, increased traffic, noise, and loss of naturalized land).

Table 7.1 following Section 7 contains the Developer's response to written comments (emails) received by residents following the Public Open House.

With respect to the comments received about the density of the proposed development, it is acknowledged that the DCR3 zoning district provides for development not exceeding two acreages per acre, which is more dense than the existing CR-1 developments in the immediate area. However, it is noteworthy that while 131 lots are being proposed at the development, the maximum density (i.e. number of lots) that could be developed under the DCR3 zoning district is higher than what is being proposed on this parcel of land. In fact, it has always been the intent of this project to provide for a range of lot sizes with only the smallest lots achieving a site size of 0.5 acres, while still providing the benefit of the recreational amenity. The average lot size in all phases of development is as follows:

- Phase 1: 24.47 hectares (60.5 acres) and 40 lots for a density of 0.66 lots per acre;
- Phase 2: 19.18 hectares (47.4 acres) and 41 lots for a density of 0.86 lots per acre;
- Phase 3: 13.14 hectares (32.47 acres) and 32 lots for a density of 0.99 lots per acre;
- Phase 4: 8.55 hectares (21.12 acres) and 18 lots for a density of 0.85 lots per acre;

- **Overall: 161.12 acres and 131 lots for a density of 0.81 lots per acre.**

With respect to comments received about the drainage, the resident who requested further information was provided with the servicing study completed by BCL Engineering which illustrates the stormwater management and overall drainage plan.

The following are important considerations as it relates to drainage:

- All site drainage will be contained within the boundaries and directed to the storm pond planned within the MR1 park space development.
- Internal drainage throughout the site shall be directed to the road right-of-ways, where it will be conveyed using the roadside ditches and culverts. Ditches and culverts will be designed to be free-draining yet provide adequate attenuation in a rainfall event.
- Retention pond capacities and development runoff volumes, including any external influences, were modelled based on several storm events, with the ultimate capacity of the system based on a 1:100 year, 24 hour precipitation event. The design includes an additional 25% capacity within the normal operating conditions and ensure that any extreme events can be adequately managed and not subject the development to property damage.
- A 1:100 year storm event, plus 25%, will realize a local flood elevation of 502.75 to 503.0 m. The extent of this event is indicated on Figure 5-2. This extreme event is used to derive the recommended safe building elevation of 504.0 m, which allows 1.0 m freeboard for all houses. Following a 1:100 year storm event, the water levels are expected to return to normal within a 48 hour period.
- A Safe Building Elevation of 504.0 m should be applied to the development, including any houses or permanent structures.

With respect to increase in traffic, a Traffic Impact Assessment was undertaken by KGS Group in January of 2022. A traffic forecast, including an estimate of background traffic and site-generated traffic, was conducted to estimate the future traffic volumes for the opening date of the proposed Edgemont East Estates residential development. An annual 1% per year linear growth was applied to the total traffic forecast from the Edgemont Estates TIA, for an overall 5% growth on both Clarence Avenue South and Grasswood Road was added to the study intersections. **The TIA analysis and findings identify that the residential units proposed as part of the Edgemont East development will have a negligible impact on operations along Grasswood Road and at the study intersections, including the intersection at Grasswood Road and Clarence Avenue**.

With respect to the school capacity, the proposed development was referred to the Prairie Spirit School Division for review by both the development team and the Community Planning Branch. Based on previous correspondence with the school division, it is understood that Prairie Spirit School Division monitors capacity at all schools on an ongoing basis. This process takes into consideration any new developments within the attendance areas. Any significant enrolment increases in any attendance area would impact capacity and require facility planning. The Ministry of Education sets out calculations to assess the degree to which a school is below, at, or over capacity. These calculations are used by the province to determine which school projects are funded each year. If a school is “over capacity”, the provincial government may approve portable classrooms or a new project to add space to a school. It is anticipated that South Corman Park School and Clavet School would have capacity for any additional students added by the proposed Edgemont East development but will be confirmed by the Community Planning Branch prior to subdivision approval.

With respect to the concern about noise, it is anticipated that construction of the wastewater treatment system and associated force-main will be completed during daylight hours, same with any residential development, including roads.

Table 7.1 Received Written Comments Proposed Edgemont East Development		
Stakeholder	**Written Comments**	**Developer Response to Concerns**
Chelsea DaSilva	Concerns: 1. Increased class size/school enrolment; 2. Increased traffic; 3. Noise disturbance and visual eye sore; 4. Small lots not aligned with acreage style living; 5. Loss of naturalized land and habitat;	With respect to the school capacity, the proposed development was referred to the Prairie Spirit School Division for review by both the development team and the Community Planning Branch. Based on previous correspondence with the school division, it is understood that Prairie Spirit School Division monitors capacity at all schools on an ongoing basis. This process takes into consideration any new developments within the attendance areas. Any significant enrolment increases in any attendance area would impact capacity and require facility planning. The Ministry of Education sets out calculations to assess the degree to which a school is below, at, or over capacity. These calculations are used by the province to determine which school projects are funded each year. If a school is "over capacity", the provincial government may approve portable classrooms or a new project to add space to a school. It is anticipated that South Corman Park School and Clavet School would have capacity for any additional students added by the proposed Edgemont East development but will be confirmed by the Community Planning Branch prior to subdivision approval. With respect to increase in traffic, a TIA was undertaken by KGS Group in January of 2022. A traffic forecast, including an estimate of background traffic and site-generated traffic, was conducted to estimate the future traffic volumes for the opening date of the proposed Edgemont East Estates residential development. An annual 1% per year linear growth was applied to the total traffic forecast from the Edgemont Estates TIA, for an overall 5% growth on both Clarence Avenue South and Grasswood Road was added to

Table 7.1 Received Written Comments Proposed Edgemont East Development		
Stakeholder	**Written Comments**	**Developer Response to Concerns**
		the study intersections. The TIA analysis and findings identify that the residential units proposed as part of the Edgemont East development will have a negligible impact on operations along Grasswood Road and at the study intersections, including the intersection at Grasswood Road and Clarence Avenue. With respect to noise disturbance, With respect to the concern about noise, it is anticipated that construction of the wastewater treatment system and associated force-main will be completed during daylight hours, same with any residential development, including roads. With respect to visual disturbance, it is believed that the plan of proposed subdivision, including recreational amenity, have been well designed to appeal to area residents, as well as those looking to move to the RM of Corman Park. The proposed development is located on hayland that has low agricultural potential for crop development. Low areas have been retained where possible on the proposed development plan. A query of HabiSask indicated that the development may be located in an area with potential endangered vertebrate species, however the land has been previously used as pasture. The proposed development is also not located in the vicinity of any permanent water sources. The closest water source, the South Saskatchewan River, is located approximately 4.0 km to the west.
Dale and Betty Gibbon	Drainage Concerns	The proposed development has been designed and engineered to ensure that post-development runoff conditions do not exceed pre-development runoff conditions. The servicing study completed by

Table 7.1 Received Written Comments Proposed Edgemont East Development		
Stakeholder	**Written Comments**	**Developer Response to Concerns**
		BCL Engineering concluded that all site drainage will be contained within the boundaries and directed to the storm pond planned within the MR1 park space development. Internal drainage throughout the site shall be directed to the road right-of-ways, where it will be conveyed using the roadside ditches and culverts. A 1:100 year storm event, plus 25%, will realize a local flood elevation of 502.75 to 503.0 m. The extent of this event is indicated on Figure 5-2. This extreme event is used to derive the recommended safe building elevation of 504.0 m, which allows 1.0 m freeboard for all houses. Following a 1:100 year storm event, the water levels are expected to return to normal within a 48 hour period. Within the servicing report, it is recommended that a safe building elevation of 504.0 m be applied to the development, which would apply to any houses or permanent structures.
Lori Bjorkman	Concerned about density, increases in traffic, provision of potable water, and wastewater treatment, and park maintenance.	Concerning density, it is apparent that the smaller lots are appealing to people who want to move to the RM, given the success of Edgemont Park Estates. Furthermore, the RM's zoning bylaw accommodates this lot size. Potable water will be supplied by SaskWater via a local utility company. Wastewater will be collected and pumped to a new wastewater treatment plant north of the Jemini rink where it will be treated. No wastewater will be discharged into the soil. The recreation area will be constructed by the Developer and then maintained by a local community association made up of the residents of the development.

Table 7.1 Received Written Comments Proposed Edgemont East Development		
Stakeholder	**Written Comments**	**Developer Response to Concerns**
		With respect to increase in traffic, a TIA was undertaken by KGS Group in January of 2022. A traffic forecast, including an estimate of background traffic and site-generated traffic, was conducted to estimate the future traffic volumes for the opening date of the proposed Edgemont East Estates residential development. An annual 1% per year linear growth was applied to the total traffic forecast from the Edgemont Estates TIA, for an overall 5% growth on both Clarence Avenue South and Grasswood Road was added to the study intersections. The TIA analysis and findings identify that the residential units proposed as part of the Edgemont East development will have a negligible impact on operations along Grasswood Road and at the study intersections, including the intersection at Grasswood Road and Clarence Avenue.

APPENDICES

APPENDIX A

PLAN OF PROPOSED SUBDIVISION

16	X	18	19	20	P	B	A	S.E.¼ Sec.3-36-5-W.3Mer.	D	S.E.¼ Sec.3-36-5-W.3Mer.
PLAN 101896577	PLAN 101896375	PLAN	PLAN 87S43187	102051302	PLAN G447	PLAN 101455871	PLAN 101455860		PLAN 101455848	

ROAD ALLOWANCE — PLAN G447 — ROAD WIDENING — PLAN 87S43187 — PLAN 63S10930 — GRID 663

EDGEMONT ESTATES EAST

PLAN 102210130 — S.W.¼ Sec.2-36-5-W.3Mer. — TWP. 36

TWP. 35

A — PLAN 102038172 — PLAN 84S12629

ROAD ALLOWANCE

N.W.¼ Sec.35-35-5-W.3Mer.

PLAN 61S19399

LS13 Sec.34-35-5-W.3Mer.

LS14 Sec.34-35-5-W.3Mer.5

LS15 Sec.34-35-5-W.3Mer.

LS16 Sec.34-35-5-W.3Mer.

LS11

LS10 Sec.34-35-5-W.3Mer.

LS9 Sec.34-35-5-W.3Mer.

C — PLAN 102093094

MUNICIPAL RESERVE MR1 — 4.827 ha. 11.928 ac. — (Recreation Area) — (Playground)

MUNICIPAL UTILITY MU1 — 0.654 ha. 1.617 ac. — (Drainage Pond)

MUNICIPAL RESERVE

LS5 Sec.34-35-5-W.3Mer.

LS6 Sec.34-35-5-W.3Mer.

34 — 35-5-3

LS7 Sec.34-35-5-W.3Mer.

Planning Authority Approval

PHASE 1 (40 Lots)

PHASE 2 (41 Lots)

PHASE 3 (32 Lots)

PHASE 4 (18 Lots)

Municipal Reserve

Municipal Utility

By :

SASKATCHEWAN LAND SURVEYOR

EXAMINED : EDGEMONT EAST DEVELOPMENT CORP. (Developer)

Date: , A.D. 2022.

PLAN OF PROPOSED SUBDIVISION

SHOWING

SURFACE SUBDIVISION

OF PART OF

LS11 SEC. 34-TWP.35-RGE.5-W.3rd Mer

AND PART OF

LS14 SEC. 34-TWP.35-RGE.5-W.3rd Mer.

R.M. of CORMAN PARK No. 344

SASKATCHEWAN

BY : M.G. RADOUX, S.L.S.

SCALE 1 : 2000

NOTES

- Portion to be surveyed is outlined by a heavy broken line and contains 24.47 Hectares more or less.
- Measurements are in metres and decimals thereof.
- Distance dimensions are approximate and may vary by ±5.0 metres.
- All roads within proposed development are 30.0m., unless otherwise shown.

No.	Date	Revision	Rev. By	Chd. By
1	4/4/2022	Added Lots 39 & 40 to Phase 1	arm	mgr
2	4/26/2022	Outline phase boundaries with blue line.	gmm	mgr
3	4/28/2022	Re-number lots 1 thru 40.	gmm	mgr
4	8/26/2022	Add MU1 and update area for MR1. Add contours	gmm	gar

Drawn By:	Checked By:	Date:	File No.	Drawing Name:	Rev.	
gmm	gar	March 29, 2022	SA221517	SA221517DEV-Ph1-Rev4.dwg	4	Meridian Surveys Ltd.

EDGEMONT ESTATES EAST

16 PLAN 101896577 | X PLAN 101896375 | 18 PLAN | 19 PLAN 87S43187 | 20 102051302 | P PLAN G447 | B PLAN 101455871 | A PLAN 101455860 | S.E.¼ Sec.3-36-5-W.3Mer. | D PLAN 101455848 | S.E.¼ Sec.3-36-5-W.3Mer. | PLAN 102101301 | S.W.¼ Sec.2-36-5-W.3Mer. TWP. 36

ROAD ALLOWANCE | PLAN G447 | ROAD WIDENING | PLAN 63S10830 | GRID 663 | TWP. 35

A PLAN 102038172 | PLAN 84S12829

LS13 Sec.34-35-5-W.3Mer. | LS14 Sec.34-35-5-W.3Mer.5 | LS15 Sec.34-35-5-W.3Mer. | LS16 Sec.34-35-5-W.3Mer.

MUNICIPAL RESERVE | MUNICIPAL RESERVE | MUNICIPAL RESERVE | MUNICIPAL RESERVE

ROAD ALLOWANCE | N.W.¼ Sec.35-35-5-W.3Mer. | PLAN 61S19399

LS11 | LS10 Sec.34-35-5-W.3Mer. | LS9 Sec.34-35-5-W.3Mer.

MUNICIPAL RESERVE MR1 4.777 ha. 11.802 ac. (Playground) (Recreation Area)

MUNICIPAL UTILITY MU1 0.614 ha. 1.517 ac.

C PLAN 102093094

LS5 Sec.34-35-5-W.3Mer. | LS6 Sec.34-35-5-W.3Mer. | 34 35-5-3 | LS7 Sec.34-35-5-W.3Mer.

PHASE 1 (40 Lots) .....

PHASE 2 (41 Lots) .....

PHASE 3 (32 Lots) .....

PHASE 4 (18 Lots) .....

Municipal Reserve .....

Municipal Utility .....

By : _____
SASKATCHEWAN LAND SURVEYOR

EXAMINED : EDGEMONT EAST DEVELOPMENT CORP. (Developer)

Date: _____, A.D. 2022.

PLAN OF PROPOSED SUBDIVISION

SHOWING

SURFACE SUBDIVISION

OF PART OF

LS11 SEC. 34-TWP.35-RGE.5-W.3rd Mer

AND PART OF

LS14 SEC. 34-TWP.35-RGE.5-W.3rd Mer.

R.M. of CORMAN PARK No. 344

SASKATCHEWAN

BY : M.G. RADOUX, S.L.S.

SCALE 1 : 2000

- Portion to be surveyed is outlined by a heavy broken line and contains 24.47 Hectares more or less.
- Measurements are in metres and decimals thereof.
- Distance dimensions are approximate and may vary by ±5.0 metres.
- All roads within proposed development are 30.0m., unless otherwise shown.

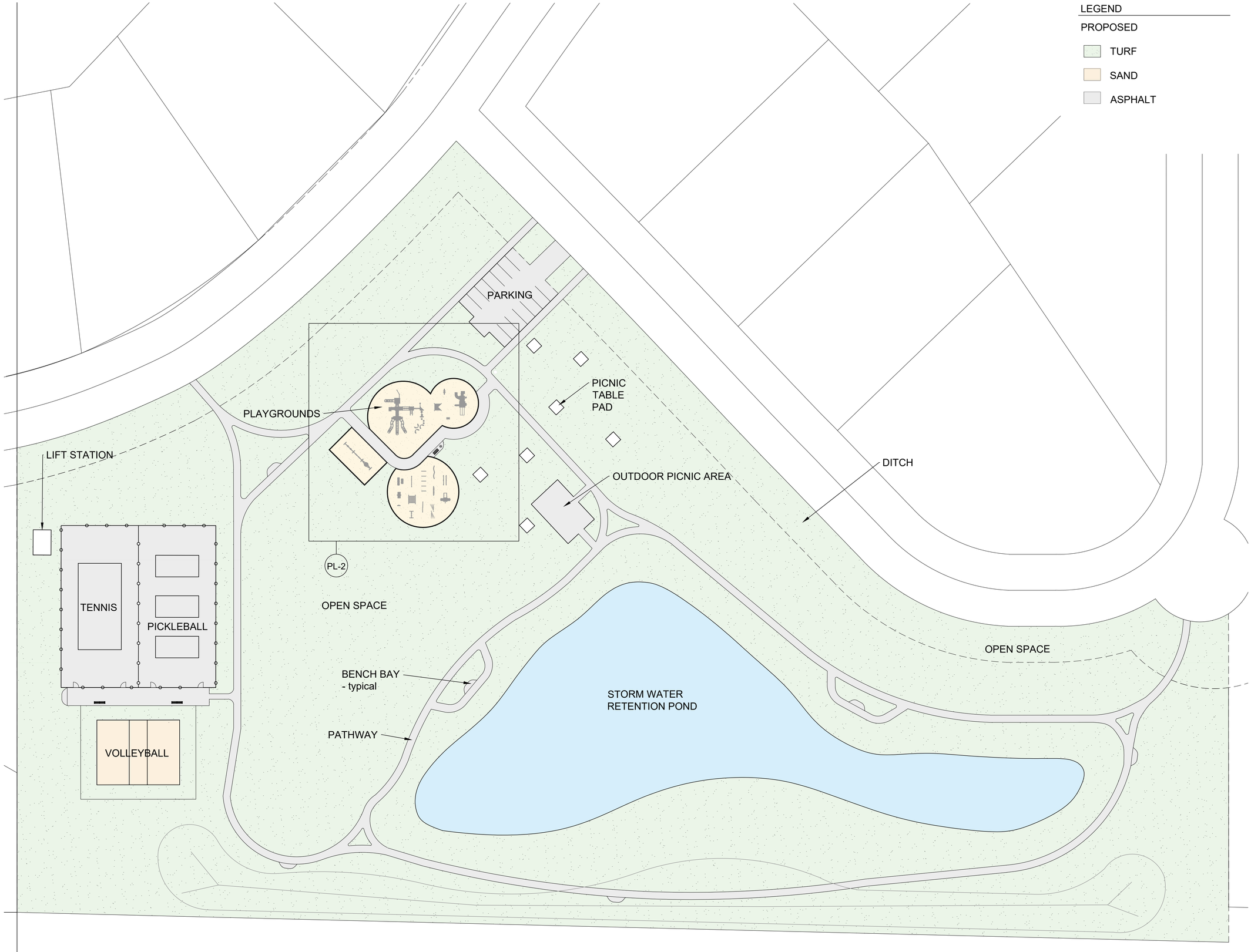
No.	Date	Revision	Rev. By	Chd. By
1	4/4/2022	Added Lots 39 & 40 to Phase 1	arm	mgr
2	4/26/2022	Outline phase boundaries with blue line.	gmm	mgr
3	4/28/2022	Re-number lots 1 thru 40.	gmm	mgr
4	8/26/2022	Add MU1 and update area for MR1. Add contours	gmm	gar
5	9/02/2022	Re-do all lot lines to match to engineer's linework. Update areas.	gmm	gar

Drawn By:	Checked By:	Date:	File No.	Drawing Name:	Rev.
gmm	gar	March 29, 2022	SA221517	SA221517DEV-Ph1-Rev5.dwg	5

Meridian Surveys Ltd.

APPENDIX B

RECREATION CONCEPT PLAN



LEGEND

PROPOSED

- TURF
- SAND
- ASPHALT

General Notes

Revision Date

PRELIMINARY
NOT FOR CONSTRUCTION

CROSBY HANNA & ASSOCIATES
407 1st Ave. North
Saskatoon, SK S7K 1X5
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LANDSCAPE ARCHITECTURE
COMMUNITY PLANNING
T (306) 665-3441
F (306) 652-9613

EDGEMONT EAST

Project Title

PARK CONCEPT

Drawing Title

Drawn	NM	Checked	
Scale	1:500	Date	2022/03/02
Project No.	21067	Drawing	INT-PL-1

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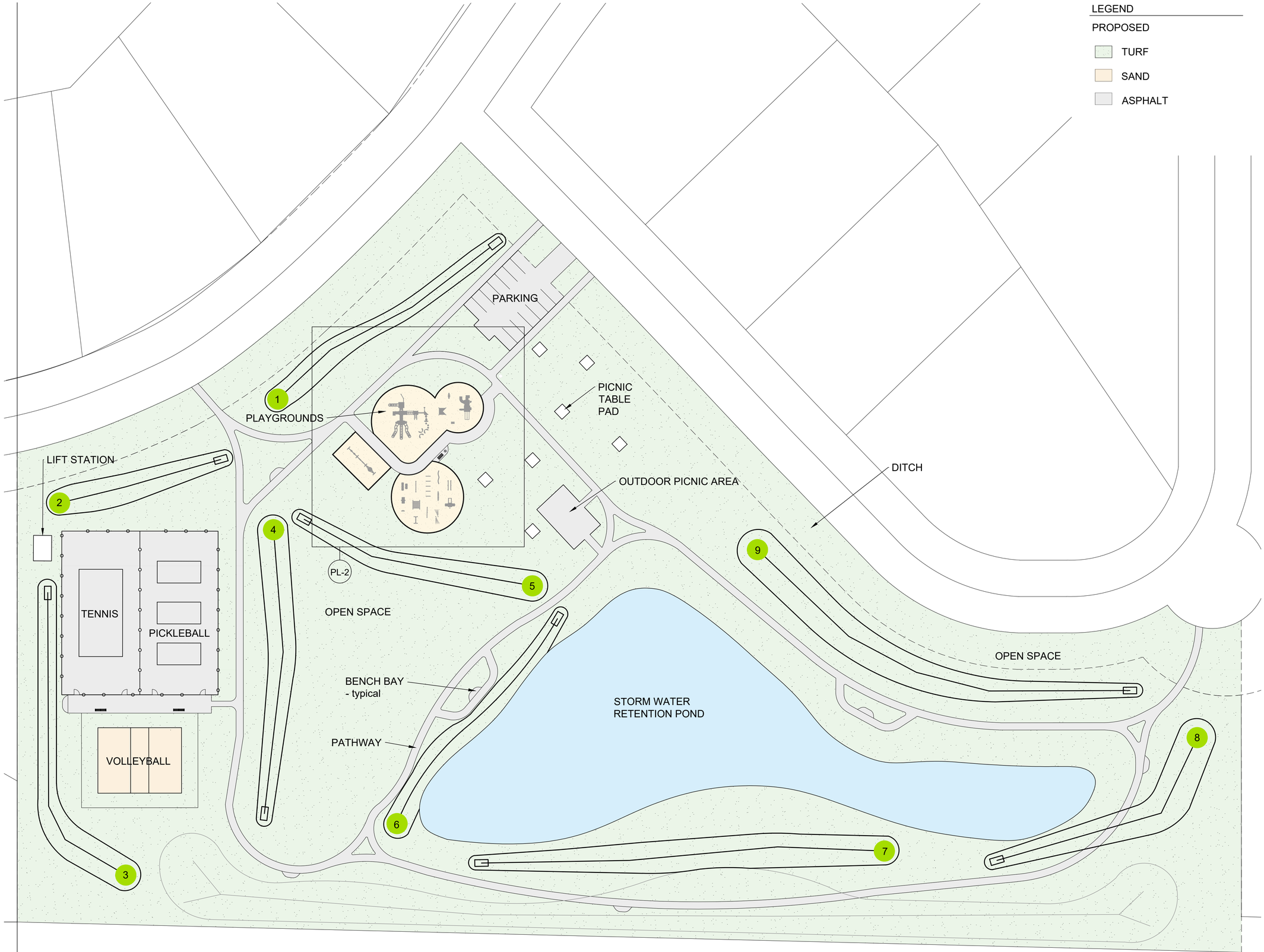

LEGEND

PROPOSED

- TURF
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General Notes

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EDGEMONT EAST

Project Title

PARK CONCEPT

Drawing Title

Drawn	NM	Checked	
Scale	1:500	Date	2022/03/02
Project No.	21067	Drawing	PL-1

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APPENDIX C

RM OF CORMAN PARK CORRESPONDENCE

From: Cory Boudreau
To: Maggie Schwab
Subject: RE: Proposed Residential Development - NE and NW quarters of Section 34, Townhsip 35, Range 05, W3M
Date: March 28, 2022 11:50:34 AM
Attachments: image002.jpg

Hi Maggie,

Generally Jeremy and Adam look after multi-parcel land use review, but I can definitely assist when able to.
That area indicates there was once an ILO in the vicinity but appears to be discontinued (E ½, SE 3-36-5-W3). Some additional research would be needed at referral/time of application. I do not foresee this as an issue.

Other uses indicated below are not within the immediate vicinity. The Grasswood Esso and English River business area is the closest RM commercial. No gravel pits are noted. English River is considering a waste water facility. Details regarding this are preliminary.

One item of concern for future multi parcel development in this area is septic. There are concerns regarding the amount of septic system and possibility of a central system (English River). Septic would need significant review as part of the CDR and approval process. I would encourage you to speak with Vicky Reaney (Sr Planner) in this office regarding the South East Concept Plan and servicing for the future. Additionally you can reach out to Adam Toth to discuss these items as well as he is also familiar.

Hope this helps.

Cory Boudreau ***RPP, MCIP***
Planner II,
R.M. of Corman Park 344
111 Pinehouse Drive, Saskatoon, SK. S7K 5W1
Ph: (306)975-1665 Fax: (306)242-6965
RM-Corman-Park-Final-01

From: Maggie Schwab [mailto:mschwab@crosbyhanna.ca]
Sent: Monday, March 28, 2022 11:14 AM
To: Cory Boudreau <cboudreau@rmcormanpark.ca>
Subject: Proposed Residential Development - NE and NW quarters of Section 34, Townhsip 35, Range 05, W3M

Morning Cory,

Hope all is well with you! It's been a while since we've spoken.

I'm not sure if you're still the one that I'm supposed to correspond with regarding potential land use conflicts in Corman Park. If not, could you please forward this to the person with whom I'm supposed to communicate?

We're working with a Developer who is looking to rezone and subdivide land in the NE and NW ¼'s of Section 34, Township 35, Range 5, W3M for the purpose of developing a multi-parcel country residential development.

This development is located south of Grasswood Road, between Preston and Clarence Avenues. Other residential development in the area includes Grasswood, Casa Rio and Edgemont Park Estates. As such, I don't expect there will be any land use conflicts with ILOs, Landfill or Waste Disposal Site, Lagoon, Industrial/Commercial Dev't, or Gravel Deposit. But, I thought I would do my due diligence and check with you to make sure.

Please let me know if I should be communicating with someone else in the Planning Department.

Thanks!
Maggie

Maggie Schwab, RPP, MCIP
CROSBY HANNA & ASSOCIATES
407C 1st Ave N, Saskatoon, SK S7K 1X5
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c : 306.227.6617
e : mschwab@crosbyhanna.ca
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APPENDIX D

TRAFFIC IMPACT ASSESSMENT AND CORRESPONDENCE FROM MINISTRY OF HIGHWAYS

Kontzamanis Graumann
Smith MacMillan Inc.
Suite 206 - 502 Cope Way
Saskatoon, SK S7T 0G3

P 306-500-2357
kgsgroup.com

January 28, 2022

Edgemont East Estates Ltd.
217 Sturgeon Place
Saskatoon, SK S7K 4C5

Attention: Mr. Darren Hagen
President

Re: Edgemont East Estates Traffic Impact Assessment

Dear Mr. Hagen:

KGS Group is pleased to submit this letter report summarizing the analysis, findings and recommendations for the Edgemont East Estates Traffic Impact Assessment (TIA). The TIA identifies the traffic volumes generated by the proposed development on the adjacent road network and addresses potential mitigation measures to accommodate the development.

1.0 BACKGROUND

Edgemont East Estates, a 130-single family unit development, will be located in the lands immediately south of Grasswood Road between Clarence Avenue South (Range Road 3053) and Range Road 3052 within the R.M. of Corman Park. The development will include two accesses to Grasswood Road, with the east access approximately 130m west of Range Road 3052 and the west access approximately 1 km west of the east access and approximately 500m east of Clarence Avenue South.

The site context for the Edgemont East Estates development in proximity to other development is illustrated in Figure 1.

Edgemont Park Estates and Ravenswood Estates are approved developments along Clarence Avenue South to the south of Edgemont East Estates. A recently completed (2017) Traffic Impact Assessment for Edgemont Park Estates developed a full-build-out traffic volume model (Total Forecast Traffic Volumes) for the area. It was determined that the Edgemont Park Estates Traffic Impact Assessment would serve as a base model for the Edgemont East Estates TIA, upon which Edgemont East Estates site-generated traffic would be applied. The rationale for this approach was a combination of the extent of local area development included in the Edgemont Park Estates study and recent completion date, in conjunction with on-going traffic volume fluctuations as a result of COVID-19 restrictions. This approach was confirmed through discussion with the R.M. of Corman Park.

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FIGURE 1 SITE CONTEXT

2.0 EXISTING CONDITIONS

Clarence Avenue South Clarence Avenue is a two-lane undivided paved roadway where the posted speeds are 60 km/h north of Grasswood Road and 80 km/h to the south. Grasswood Road is posted at 80 km/h.

The Clarence Avenue South and Grasswood Road intersection is a four-way stop-controlled intersection with one lane on each approach.

3.0 TRAFFIC FORECAST

A traffic forecast, including an estimate of background traffic and site-generated traffic, was conducted to estimate the future traffic volumes for the opening date of the proposed Edgemont East Estates residential development.

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Background Traffic Growth

Background traffic growth refers to the amount by which traffic volumes in the area would increase even if the proposed site development did not proceed. The Edgemont Estates Traffic Impact Assessment (titled at the time as *Prairie Lane Estate Traffic Impact Assessment),* completed by WSP Canada Inc. on September 14, 2017, developed a traffic forecast for the area based on surrounding development. To determine the background traffic forecast, a 1% per year linear growth was applied to the total traffic forecast from the Edgemont Estates TIA, for an overall 5% growth on both Clarence Avenue South and Grasswood Road.

The morning and afternoon peak hour background traffic volumes are illustrated in Figure 2 and Figure 3, respectively.

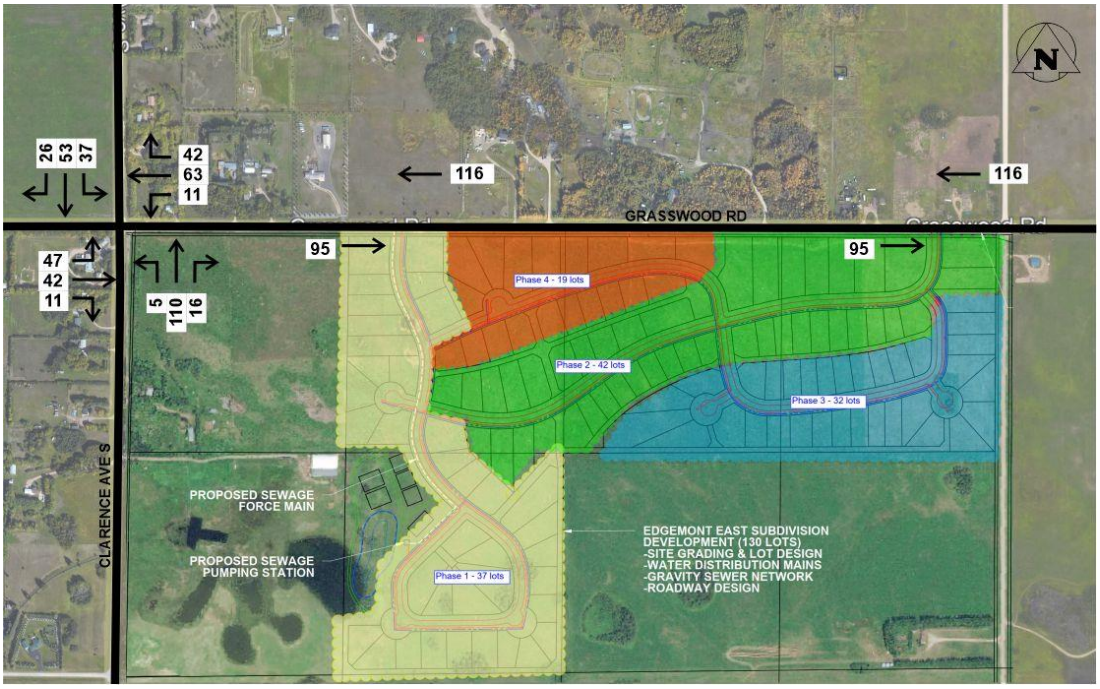

FIGURE 2 BACKGROUND TRAFFIC FORECAST – AM PEAK HOUR

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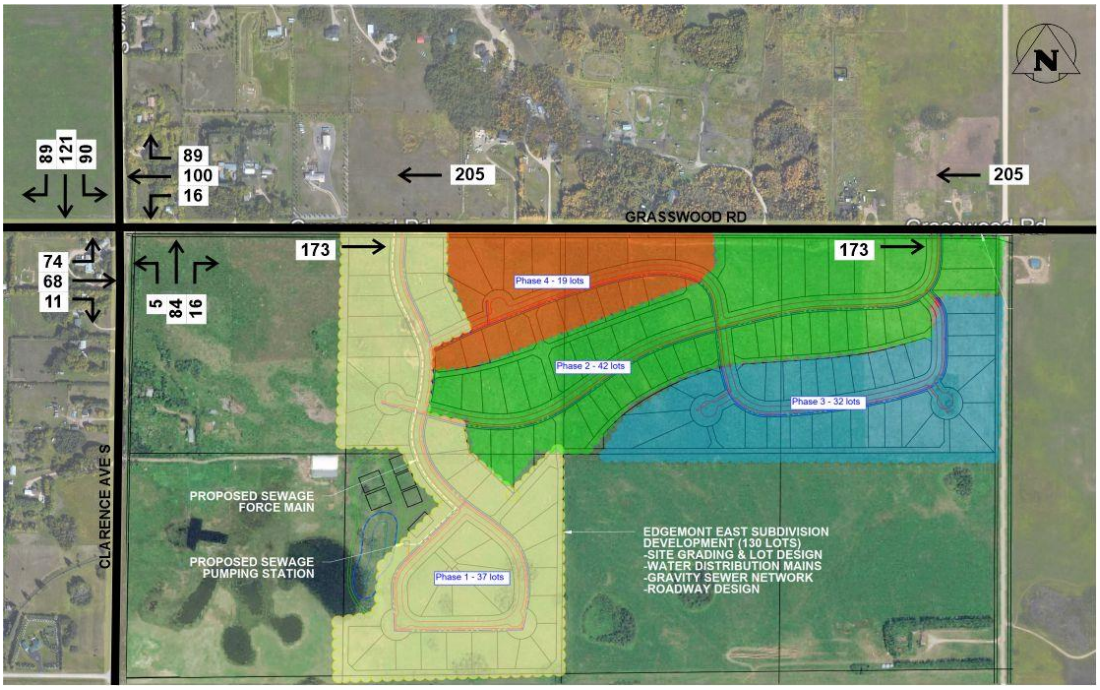

FIGURE 3 BACKGROUND TRAFFIC FORECAST – AM PEAK HOUR

Total Traffic Forecast

The proposed Edgemont East Estates residential development includes 130 units at full build-out. The Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, was used to estimate the trips generated by the proposed development during the morning and afternoon peak hours. The ITE Land Use Single-Family Detached Housing (ITE Code 210) was selected to represent the proposed site.

Table 1 summarizes the land use code, trip rate, and directional distribution for the weekday afternoon peak hour.

Table 1 Proposed Trip Generation Rate

Land Use	ITE Code	Peak Hour	Trip Generation Equation	Directional Distribution	
				Enter	Exit
Residential	210	AM PK	T = 0.71(X) + 4.80	25%	75%
		PM PK	Ln(T) = 0.96 Ln(X) + 0.20	63%	37%

T = Number of Trips X = Number of Dwelling Units

The proposed Edgemont East Estates development is not anticipated to generate pass-by trips nor have site synergy due to being a single use development.

The proposed Edgemont East Estates development is anticipated to generate the follow traffic volumes during peak hours:

- Morning Peak Hour – a total of 97 trips with 24 vehicles entering and 73 vehicles exiting the site
- Afternoon Peak Hour – a total of 131 trips with 82 vehicles entering and 49 vehicles exiting the site

Trip Distribution and Assignment

The traffic forecast was completed by distributing the site-related traffic volumes and assigning them to the road network based on an assessment of how people will access and egress the site. Trip distribution refers to the origins and destinations of the site-generated trips while trip assignment assesses the actual route that the vehicles will take between their origin and destination. The assignment process assumes that motorists will use the most efficient route.

The trip distribution was estimated based on the traffic patterns surrounding the proposed site. Due to the proximity of Saskatoon, the following distribution was assumed:

- 70% of the traffic will travel to / from the north using Clarence Avenue South
- 5% of the traffic will travel to / from the south using Clarence Avenue South
- 20% of the traffic will travel to / from the east using Grasswood Road
- 5% of the traffic will travel to / from the west using Grasswood Road

The site-generated trips were then assigned to the adjacent intersections based on existing traffic patterns and where the proposed site accesses are located. Trips generated by the proposed Edgemont East Estates residential development are presented in Figures 4 and 5.

The site generated trips were added to the background traffic forecast to obtain the opening day traffic volumes. The total morning peak hour traffic forecast is illustrated in Figure 6 and the afternoon peak hour traffic forecast is illustrated in Figure 7.

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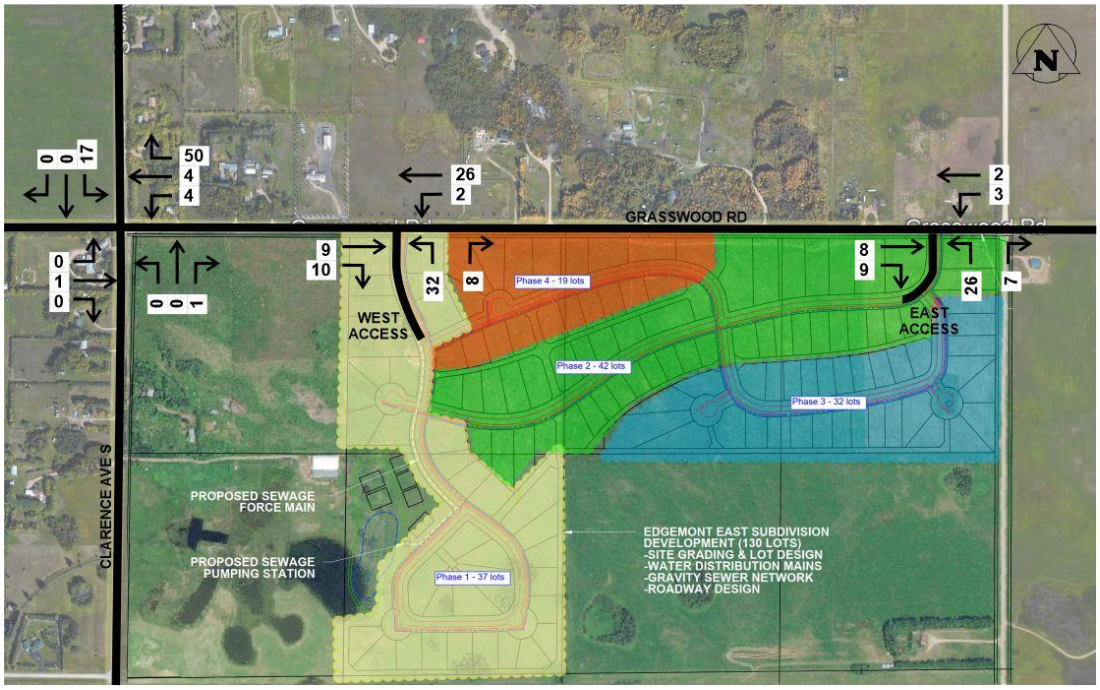

FIGURE 4 SITE-GENERATED TRIPS – AM PEAK HOUR

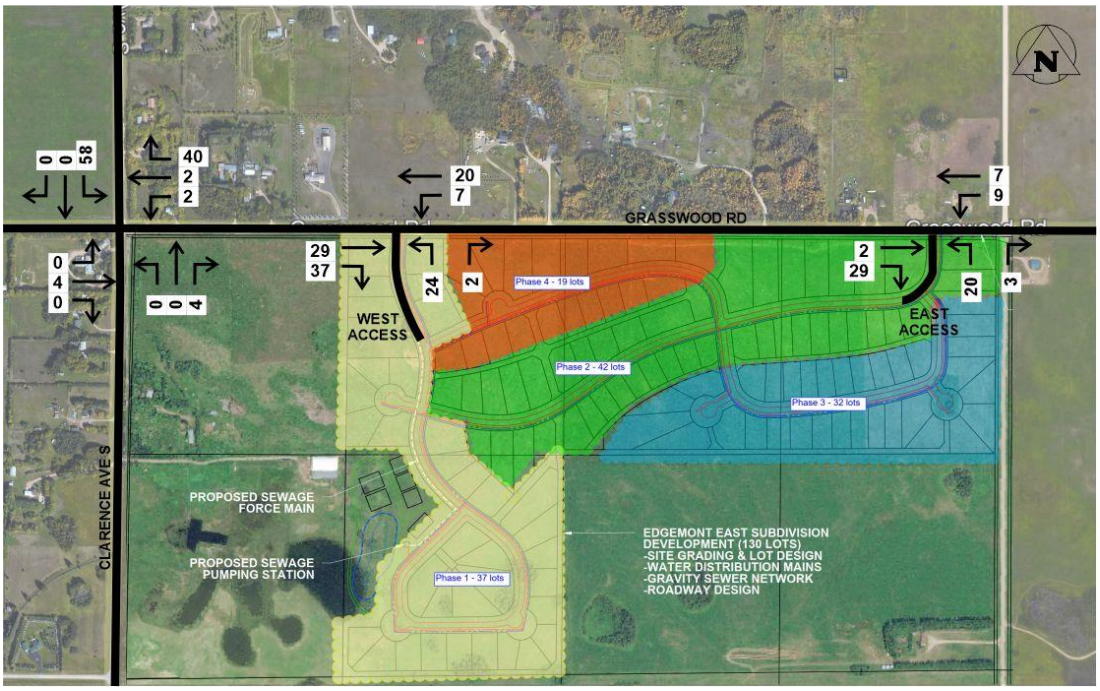

FIGURE 5 SITE-GENERATED TRIPS – PM PEAK HOUR

KGS GROUP

Kontzamanis Graumann Smith MacMillan Inc.
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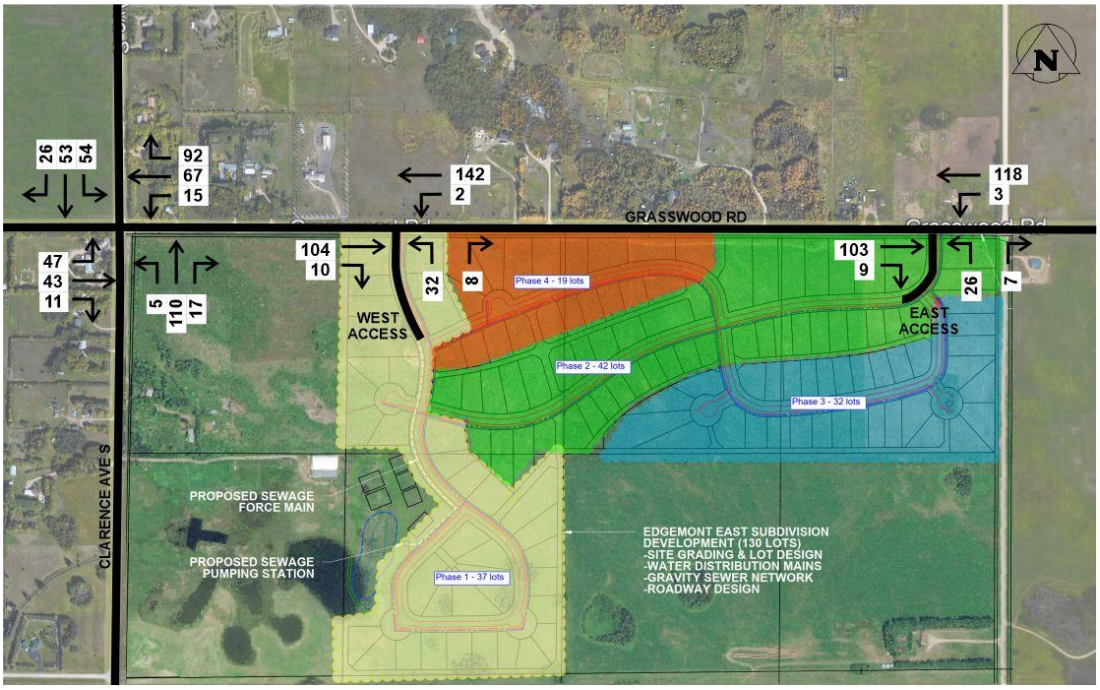

FIGURE 6 TOTAL TRAFFIC FORECAST – AM PEAK HOUR

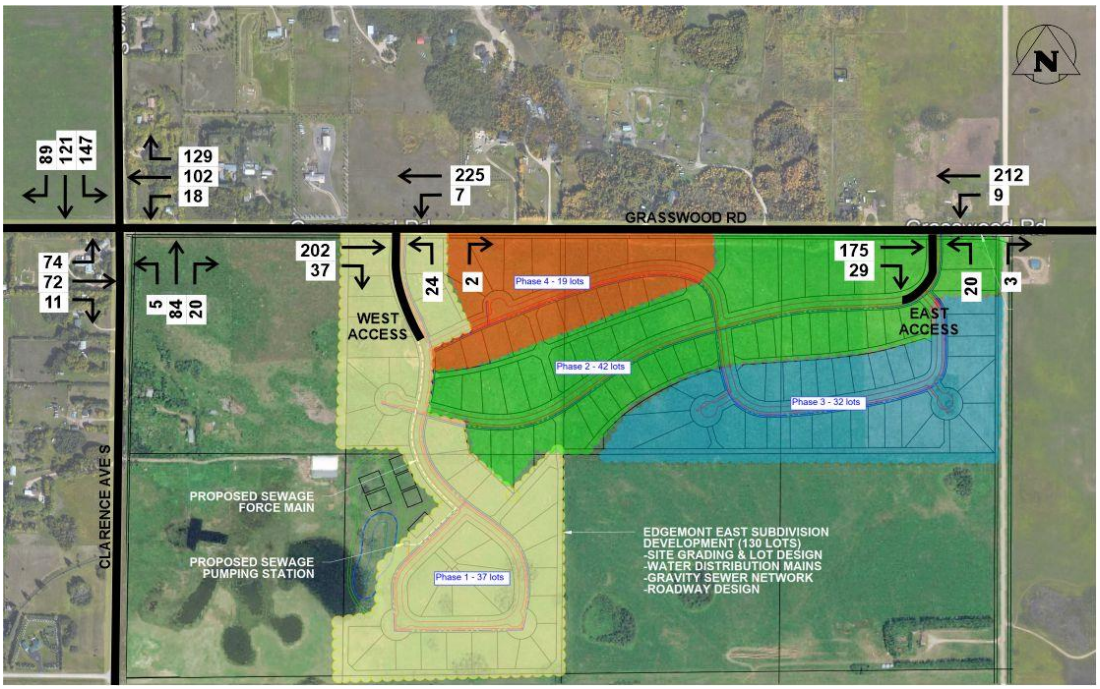

FIGURE 7 TOTAL TRAFFIC FORECAST – PM PEAK HOUR

KGS GROUP

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4.0 TRAFFIC OPERATIONS

Background and total forecast volumes have been assessed using Synchro 11.0 (industry-standard traffic analysis software). The intersections were assessed during the morning and afternoon peak hours with no additional turning lanes or changes applied.

Level of service (LOS) analysis assesses the effectiveness of a transportation system alphabetically from A to F, with LOS A equating to the best operating conditions and LOS F representing the failure of a movement or intersection. LOS D is typically considered the limit of acceptable operation for a rural environment and excessive delays tend to occur beyond this threshold.

The volume-to-capacity (v/c) ratio is representative of congestion and available capacity and may be used to identify a movement's ability to accommodate fluctuations in traffic flow. V/C values of 0.80 or greater typically indicate a system that has reached its limit of operational effectiveness. The 95th percentile queue length, determined using SimTraffic, represents the maximum length of a queue a movement may experience with 95th percentile traffic volumes.

Tables 2 presents the analysis results for the Clarence Avenue South and Grasswood Road intersection for the morning and afternoon peak hour background traffic forecast. Table 3 and Table 4 present the analysis results for all study intersection for morning and afternoon peak hours total traffic forecast.

TABLE 2 BACKGROUND FORECAST INTERSECTION OPERATIONS FOR CLARENCE AVENUE SOUTH & GRASSWOOD RD INTERSECTION

Intersection	Parameter	Eastbound			Westbound			Northbound			Southbound			Overall LOS (Delay)
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
Morning Peak Hour	*LOS*		A			A			A			A		A (8.5 s)
	Delay (s)		8.6			8.4			8.6			8.5		
	v/c ratio		0.14			0.16			0.18			0.16		
	Queue (m)		13.9			15.5			15.3			16.9		
Afternoon Peak Hour	*LOS*		B			B			A			B		B (10.8 s)
	Delay (s)		10.2			10.3			9.4			11.9		
	v/c ratio		0.24			0.31			0.17			0.44		
	Queue (m)		15.7			21.7			15.8			24.5		

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TABLE 3 TOTAL FORECAST INTERSECTION OPERATIONS MORNING PEAK HOUR

Intersection	Parameter	Eastbound			Westbound			Northbound			Southbound			Overall LOS (Delay)
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
AM Peak Hour														
Grasswood Rd & Clarence Ave S	*LOS*		A			A			A			A		A (8.9s)
	Delay (s)		8.8			8.9			8.9			9.0		
	v/c ratio		0.15			0.24			0.19			0.19		
	Queue (m)		13.3			26.9			15.6			17.5		
Grasswood Rd & West Access	*LOS*		-		A			B						A (1.4 s)
	Delay (s)		-		7.5			10.1						
	v/c ratio		-		0.01			0.06						
	Queue (m)		-		1.3			14.9						
Grasswood Rd & East Access	*LOS*		-		A			A						A (1.3 s)
	Delay (s)		-		7.5			9.9						
	v/c ratio		-		0.01			0.05						
	Queue (m)		-		1.5			14.5						

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TABLE 4 TOTAL FORECAST INTERSECTION OPERATIONS AFTERNOO PEAK HOUR

Intersection	Parameter	Eastbound			Westbound			Northbound			Southbound			Overall LOS (Delay)
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
PM Peak Hour														
Grasswood Rd & Clarence Ave S	*LOS*		B			B			A			B		B (12.4 s)
	Delay (s)		10.9			11.6			9.9			14.5		
	v/c ratio		0.27			0.39			0.18			0.55		
	Queue (m)		15.1			23.0			16.3			28.5		
Grasswood Rd & West Access	*LOS*		-		A			B						A (0.7 s)
	Delay (s)		-		7.8			11.8						
	v/c ratio		-		0.01			0.05						
	Queue (m)		-		2.9			13.1						
Grasswood Rd & East Access	*LOS*		-		A			B						A (0.7 s)
	Delay (s)		-		7.7			11.3						
	v/c ratio		-		0.01			0.04						
	Queue (m)		-		2.9			12.6						

The capacity analysis results indicate:

- **Clarence Avenue South and Grasswood Road Intersection** | is expected to continue to operate acceptably during the morning and afternoon peak hours (LOS A/B) with the proposed development traffic. There is minimal queueing anticipated, with approximately 2-4 vehicles queued on each approach during peak commute times. The traffic generated by the Edgemont East Estates is expected to have a minimal impact to the intersection operations at the Clarence Avenue South and Grasswood Road intersection.
- **Grasswood Road and West Access Intersection |** is anticipated to operate well during both peak hours (LOS A) at full build-out. Negligible delay is anticipated for traffic traveling in the eastbound direction, and a minor delay (8 s) is anticipated in the westbound direction. Traffic exiting the proposed Edgemont East Estates development via the west access is anticipated to be delayed approximately 10 - 12 s with approximately a 2-vehicle queue during peak commute times.
- **Grasswood Road and East Access Intersection |** is anticipated to operate well during both peak hours (LOS A) at full build-out. Negligible delay is anticipated for traffic traveling in the eastbound direction, and a minor delay (8 s) is anticipated in the westbound direction. Traffic exiting the proposed Edgemont East

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Estates development is anticipated to be delayed approximately 10 – 12 s with approximately a 2-vehicle queue during peak commute times.

5.0 WARRANTS

Illumination Warrant Assessment

Intersection illumination warrants were conducted using the Ministry of Highways and Infrastructure (MHI) design manual guidelines to improve the traffic safety along Grasswood Road at the west access and east access intersections for the full build-out phase using the total forecast volumes, existing configuration and alignment. It should be noted that the MHI warrants were developed for highways with a higher posted speed than Grasswood Road but were used in the analysis as an indication of potential appropriateness of lights to improve visibility at night.

As per MHI DM 2621-2 for intersection area lighting warrant, the study intersections do not meet the warrant requirement for area lighting.

As per MHI DM 2621-1 for intersection delineation lighting systems, all rural and urban intersections with provincial highways qualify for delineation lighting where the traffic volumes for the intersecting roadways exceed 150 vehicles-per-day (vpd). Delineation lighting would be warranted at both the east and west access to the proposed Edgemont residential development if Grasswood Road was a provincial highway. A streetlight at each access point would improve visibility for drivers at the intersection during evenings.

6.0 SIGHT DISTANCE

The two proposed accesses into the proposed development will be stop-controlled on the minor approach to Grasswood Road and are anticipated to have sight distance above the minimum requirement base on the Transportation Association of Canada's Geometric Design Guide for Canadian Roads. Grasswood Road is very flat with little vertical change through the study area.

The development should ensure that sufficient sight distance is accommodated through the sight triangles at the site accesses by avoiding planting new vegetation or constructing buildings or other infrastructure that will restrict driver's sight lines. The detailed design of accesses will need to ensure power poles do not obstruct a driver's view from the stop bar at the accesses, as well as driver's view approaching the access along Grasswood Road.

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7.0 CONCLUSION AND RECOMMENDATIONS

The TIA analysis and findings identify that the 130 units proposed as part of the Edgemont East Estates development will have a negligible impact on operations along Grasswood Road and at the study intersections. No additional turning lanes or other geometric modifications will be necessary to accommodate the proposed development.

A streetlight at each of the access intersections would improve visibility at night and would be warranted if Grasswood Road were a provincial highway. Consideration for implementing a streetlight is recommended but it is acknowledged that other similar intersections within the R.M. are not currently illuminated.

We trust that this letter will assist in obtaining approval for the Edgemont East Estates development application. Do not hesitate to contact either Destiny or Nathan should you require further clarification.

Prepared By:

Destiny Piper, P.Eng.
Transportation Engineer

DP

Approved By:

Nathan Gray, P.Eng., PTOE, PMP
Senior Transportation Engineer

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STATEMENT OF LIMITATIONS AND CONDITIONS

Limitations

This report has been prepared for Edgemont East Estates Ltd. in accordance with the agreement between KGS Group and Edgemont East Estates Ltd. (the "Agreement"). This report represents KGS Group's professional judgment and exercising due care consistent with the preparation of similar reports. The information, data, recommendations and conclusions in this report are subject to the constraints and limitations in the Agreement and the qualifications in this report. This report must be read as a whole, and sections or parts should not be read out of context.

This report is based on information made available to KGS Group by Edgemont East Estates Ltd. Unless stated otherwise, KGS Group has not verified the accuracy, completeness or validity of such information, makes no representation regarding its accuracy and hereby disclaims any liability in connection therewith. KGS Group shall not be responsible for conditions/issues it was not authorized or able to investigate or which were beyond the scope of its work. The information and conclusions provided in this report apply only as they existed at the time of KGS Group's work.

Third Party Use of Report

Any use a third party makes of this report or any reliance on or decisions made based on it, are the responsibility of such third parties. KGS Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.

APPENDIX A

Synchro Reports

KGS GROUP

Maggie Schwab

From: Nathan Gray <NGray@kgsgroup.com>
Sent: February 22, 2022 3:59 PM
To: Maggie Schwab; Darren Hagen; Lee Warman
Cc: Destiny Piper
Subject: FW: Edgemont East Traffic Impact Assessment

Hi Everyone,

This is good news from the Ministry of Highways for your development.

Thanks,

Nathan

Nathan Gray P.Eng., PTOE, PMP
SENIOR TRANSPORTATION ENGINEER

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From: Andersen, Laura HI <laura.andersen@gov.sk.ca>
Sent: Tuesday, February 22, 2022 3:44 PM
To: Nathan Gray <NGray@kgsgroup.com>
Cc: Fertuck, Jennifer HI <jennifer.fertuck@gov.sk.ca>
Subject: RE: Edgemont East Traffic Impact Assessment

Hi Nathan,

Thank you for providing a copy of the TIA for our review. Based on the estimated trips generated by the development presented in the report, we don't expect much impact at either the Highway 219/Grasswood Road Road intersection or the Highway 11/Grasswood Road intersection as a result of this development. The ministry has no concerns with the development or its projected traffic impact on the highway network as shown in the TIA you provided.

Thanks,

Laura Andersen, P.Eng
Government of Saskatchewan
Operations Project Engineer
Traffic Engineering and Development, Ministry of Highways

18-3603 Millar Avenue
Saskatoon, Canada S7P 0B2

Tel 306-933-5197

Saskatchewan

From: Nathan Gray <NGray@kgsgroup.com>
Sent: Friday, February 18, 2022 3:38 PM
To: Fertuck, Jennifer HI <jennifer.fertuck@gov.sk.ca>
Subject: RE: Edgemont East Traffic Impact Assessment

Hi Jennifer,

I hope you had a good holiday somewhere warm.

No, I haven't received a response yet.

Thanks very much if you could do that for us.

Have a great weekend,

Nathan

Nathan Gray P.Eng., PTOE, PMP
SENIOR TRANSPORTATION ENGINEER

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From: Fertuck, Jennifer HI <jennifer.fertuck@gov.sk.ca>
Sent: Friday, February 18, 2022 3:36 PM
To: Nathan Gray <NGray@kgsgroup.com>
Subject: RE: Edgemont East Traffic Impact Assessment

Hi Nathan,

Did you get have any discussions with my team on this? I was off when you had sent this copy and I wanted to make sure you got a response. If not, I can take a look.

Thanks,

Jennifer

From: Nathan Gray <NGray@kgsgroup.com>
Sent: Tuesday, February 8, 2022 2:09 PM
To: Fertuck, Jennifer HI <jennifer.fertuck@gov.sk.ca>
Subject: RE: Edgemont East Traffic Impact Assessment

Hello Jennifer,

We were under a quick deadline to get this in front of the RM so we figured that we would complete the report and demonstrate the very limited amount of traffic that would be anticipated to use Highway 11 for the development.

Please find attached a copy of the TIA for Edgemont East concept plan.

If you have any questions or concerns with the report, do not hesitate to contact me.

Thanks,

Nathan

From: Nathan Gray
Sent: Wednesday, January 19, 2022 10:58 AM
To: jennifer.fertuck@gov.sk.ca
Subject: Edgemont East Traffic Impact Assessment

Hello Jennifer,

I hope you are having a great start to 2022.

We are completing a Traffic Impact Assessment for a development near the Clarence Avenue and Grasswood Road intersection. This is a new development of 130 lots (see attached map) and will require the RM of Corman Park's approval to proceed. I just wanted to confirm whether the Ministry of Highways will have any requirements for reviewing the Traffic Impact Assessment as our current study area includes the Grasswood and Clarence intersection and the two proposed site accesses.

Will the Ministry require a review of the Traffic Impact Assessment and possibly require the project to examine the Grasswood Road/Floral Road and Highway 11 intersection? I know this has been included in the scope for proposed development closer to the highway but not sure where the interest level ends since most traffic will use Clarence Avenue for access to Saskatoon.

Also, if a discussion or meeting via Teams will help, we can definitely schedule a meeting.

I appreciate your feedback to clarify the Ministry's interest on the project.

Thanks,

Nathan

Nathan Gray P.Eng., PTOE, PMP
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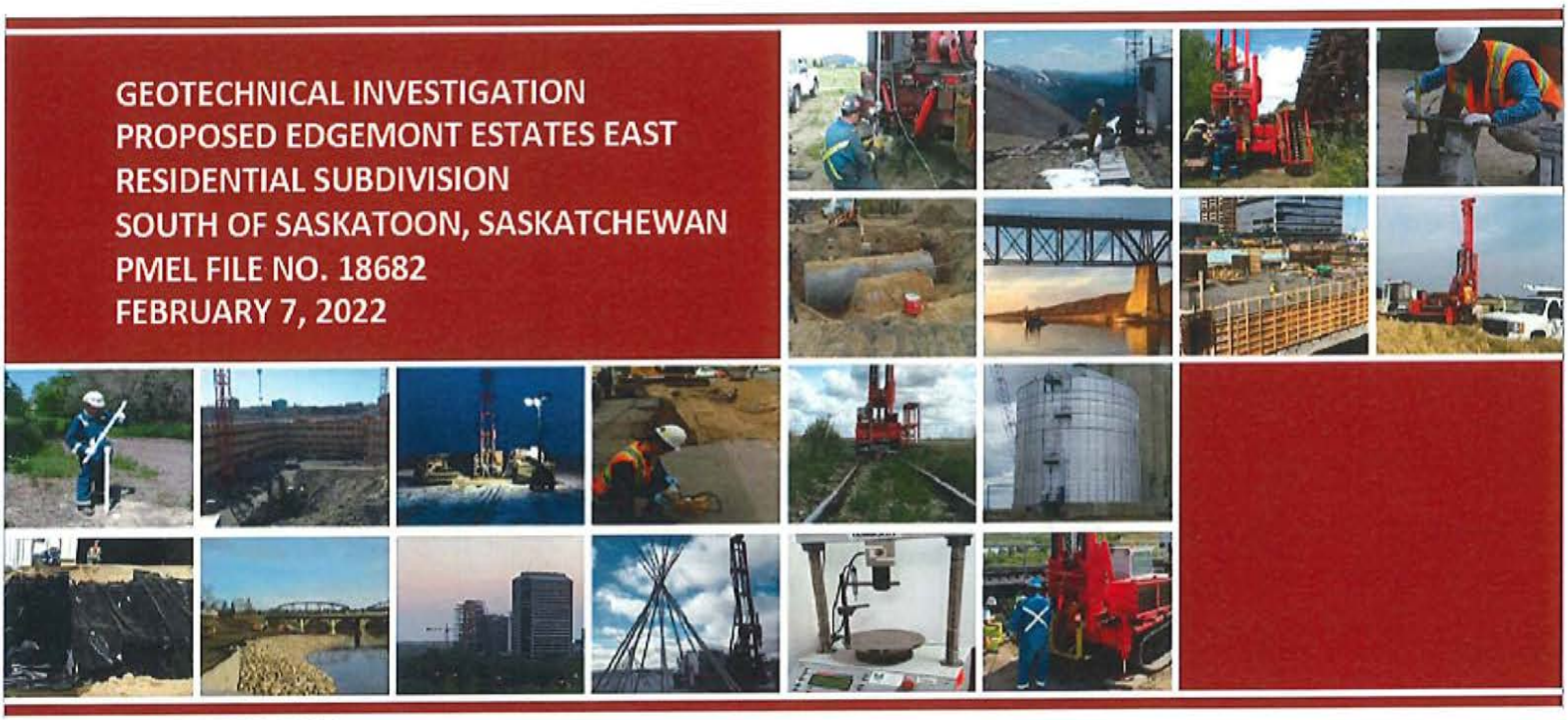
APPENDIX E

GEOTECHNICAL REPORT

GEOTECHNICAL INVESTIGATION

GEOTECHNICAL INVESTIGATION
PROPOSED EDGEMONT ESTATES EAST
RESIDENTIAL SUBDIVISION
SOUTH OF SASKATOON, SASKATCHEWAN
PMEL FILE NO. 18682
FEBRUARY 7, 2022



PREPARED FOR:
102015575 Saskatchewan Ltd. C/O BCL Engineering Ltd.

ATTENTION: Mr. Darren Hagen / Matt Scott, P. Eng.

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DOWN TO EARTH SOLUTIONS

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ENGINEERING LTD.

PROJECT: Geotechnical Investigation
Proposed Edgemont Estates East Residential Subdivision
South of Saskatoon, Saskatchewan
PMEL File No. 18682
February 7, 2022

PREPARED FOR: 102015575 Saskatchewan Ltd.
C/O BCL Engineering Ltd.
200 – 302 Wellman Lane
Saskatoon, Saskatchewan
S7T 0J1

ATTENTION: Darren Hagen (102015575 Saskatchewan Ltd.)
Matt Scott, P. Eng. (BCL Engineering Ltd.)

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1 INTRODUCTION

1.1 GENERAL

The following report has been prepared on the subsurface soil conditions existing at the site of the proposed Edgemont Estates East residential subdivision to be constructed south of Saskatoon, Saskatchewan.

The terms of reference for this investigation were presented in P. Machibroda Engineering Ltd. (PMEL) Proposal No. 18682 dated October 22, 2021. Written authorization to proceed with this investigation was provided in the signed Consulting Agreement between 102015575 Saskatchewan Ltd. (Darren Hagen) and PMEL, dated October 29, 2021.

1.2 SITE LOCATION

The subject site is located just south of Saskatoon, Saskatchewan. The site is bound by Grasswood Road/low density residential development to the north, Range Road 3052/agricultural land to the east, low density residential development to the west and agricultural land to the south.

The study area is relatively flat-lying with a gradual slope to the west; the elevations at our test locations ranged from about 502 to 508 m. A Site Plan showing the location of the study area and test locations has been shown on Drawing No. 18682-1.

2 FIELD INVESTIGATION

The field test drilling, soil sampling, piezocone penetration testing (CPTu) and monitoring well installation was conducted between November 26 and 30, 2021. Groundwater monitoring was conducted on December 16, 2021 and January 10, 2022.

The coordinates and ground surface elevation at each test location were provided by BCL Engineering Ltd.

2.1 FIELD DRILLING PROGRAM

Twenty boreholes, located as shown on the Site Plan, Drawing No. 178682-1, were dry drilled using our truck-mounted, continuous flight auger drilling rig. The boreholes were 150 mm in diameter and extended to depths of 3 to 6 m below the existing ground surface.

Borehole logs, as shown on Drawing Nos. 18682-2 to 21, inclusive, were compiled during test drilling to record the soil stratification, the groundwater conditions, the position of unstable sloughing soils and the depths at which cobblestones and/or boulders were encountered.

Disturbed samples of auger cuttings, collected during test drilling, were sealed in plastic bags to minimize moisture loss. The soil samples were taken to our laboratory for analysis.

2.2 PIEZOCONE PENETRATION TESTING

Four CPTu's, located as shown on the Site Plan, Drawing No. 18682-1, were conducted during the field investigation. The CPTu soundings were extended to depths of 18.4 to 18.6 m below existing ground surface.

The piezocone penetration tests consisted of pushing a cone, on the end of a series of rods, into the ground at a constant rate while near continuous measurements were recorded at the cone tip (i.e., q_t). Local side friction resistance measurements (i.e., f_s) were recorded on a friction sleeve located directly behind the cone tip. Pore-water pressure response (u) generated from the advancement of the cone into the soil was measured via a pore pressure filter located between the cone tip and friction sleeve. The piezocone tip had an apex angle of 60° and a 15 cm² base area. The friction sleeve had a perimeter area of 225 cm².

The equipment and procedures for conducting the cone penetration testing were undertaken in accordance with ASTM D-5778, "Standard Test Method for Performing Electronic Friction Cone and Piezocone Testing of Soils".

The test plots recorded during the cone soundings have been presented in Appendix B.

3 SOIL AND GROUNDWATER CONDITIONS

3.1 SOIL PROFILE

The general soil profile consisted of organic topsoil (100 to 300 mm) overlying predominantly sand (in sixteen of the twenty boreholes; silt was encountered surficially in the remaining four boreholes), followed by variable deposits of silt, sand and clay to a depth of at least 18.7 m, the maximum depth investigated. The sand was loose to compact, poorly graded, fine grained and moist initially, becoming wet below the groundwater table. The silt was firm to stiff, low to medium plastic and moist to wet. The clay deposits were firm to very stiff, medium to highly plastic and moist.

3.2 GROUNDWATER CONDITIONS, SLOUGHING

Groundwater seepage and sloughing conditions were encountered during test drilling. The depths at which groundwater seepage and sloughing conditions were encountered have been shown on the borehole logs. A summary of the groundwater levels recorded in the monitoring wells installed during this investigation has been presented in Table I.

TABLE I RECORDED GROUNDWATER LEVELS

Borehole No.	Monitoring Well Rim Elevation (m)	Ground Surface Elevation (m)	Groundwater Depth (m)		Groundwater Elevation (m)	
			Dec. 16/21	Jan. 10/22	Dec. 16/21	Jan. 10/22
21-2	506.66	505.61	2.48	2.49	503.13	503.12
21-4	505.60	504.89	DRY (>2.8)	DRY (>2.8)	DRY (<502.09)	DRY (<502.09)

TABLE I RECORDED GROUNDWATER LEVELS (CONTINUED)...

Borehole No.	Monitoring Well Rim Elevation (m)	Ground Surface Elevation (m)	Groundwater Depth (m)		Groundwater Elevation (m)	
			Dec. 16/21	Jan. 10/22	Dec. 16/21	Jan. 10/22
21-6	504.61	503.51	2.25	2.27	501.26	501.24
21-10	508.41	507.33	2.82	2.82	504.51	504.51
21-12	507.02	505.98	DRY (>3.6)	DRY (>3.6)	DRY (<503.42)	DRY (<503.42)
21-14	505.39	504.36	DRY (>3.0)	DRY (>3.0)	DRY (<501.36)	DRY (<501.36)
21-17	504.84	503.77	3.79	3.82	499.98	499.95
21-20	504.96	503.92	2.98	2.96	500.94	500.96

Upon review of Table I, the groundwater table was recorded at a depth of 2.27 to 3.82 m below existing grade on January 10, 2021 (elevation of 499.95 to 504.51 m). Groundwater levels should be expected to fluctuate seasonally by as much as 1 m (with the highest groundwater level in the spring and/or during/following spring thaw and/or periods of precipitation).

A groundwater contour map (interpreted/estimated groundwater levels as of January 10, 2022) has been shown plotted on Drawing No. 18682-1A.

3.3 COBBLESTONES AND BOULDERS

Cobblestones and/or boulders were not encountered within the depth of exploration.

4 LABORATORY ANALYSIS

The soil classification and index tests performed during this investigation consisted of a visual classification of the soil, moisture contents, Atterberg limits, unit weights, water-soluble sulphate contents and grain size distribution analysis.

The results of the soil classification and index tests conducted on representative samples of soil have been plotted on the drill logs alongside the corresponding depths at which the samples were recovered, as shown on Drawing Nos. 18682-2 to 21, inclusive.

The results of grain size distribution analyses have been shown plotted in Appendix C.

5 DESIGN RECOMMENDATIONS

Based on the foregoing outline of soil test results, the following foundation considerations and design recommendations have been presented.

5.1 DESIGN CONSIDERATIONS

It is understood that the subdivision will encompass an area of 161 acres and will consist of 127 residential lots with associated roadways/buried utilities.

The subsurface soil conditions consisted predominantly of sand (silt at some locations) overlying variable deposits of silt, clay and sand. The groundwater table was recorded at a depth of 2.27 to 3.82 m below existing grade on January 10, 2021 (elevation of 499.95 to 504.51 m). Groundwater levels should be expected to fluctuate seasonally by as much as 1 m (with the highest groundwater level in the spring and/or during/following spring thaw and/or periods of precipitation).

It is understood that houses, garages and decks will be constructed within the proposed subdivision. It is anticipated that basements will preferably be constructed (where feasible). Where basement construction is not feasible due to high groundwater conditions, structural floors over (shallower) crawlspaces or at-grade structures with grade-supported concrete slabs are recommended.

To minimize the potential for groundwater-related issues, all basements/crawlspaces should be based at least 1 m above the groundwater table (refer to Drawing No. 18682-1A for a groundwater elevation contour map). Existing topographical information along with future site grading plans should be used to determine whether or not basements/crawlspaces are feasible and to determine where structures should be situated within given lots to satisfy the groundwater clearance criteria.

The subgrade soils are frost susceptible and the potential depth of frost penetration could range from about 2 to 3 m, depending on surface cover and severity of the winter.

Footings or concrete raft foundations should be viable foundation alternatives for the anticipated structures within the proposed subdivision. The magnitude of frost-related differential movements can be reduced by ensuring adequate site/foundation drainage and utilizing strategically placed extruded polystyrene insulation adjacent to the foundations.

A deep foundation system consisting of helical screw piles is expected to be the most practical/economical deep foundation alternative for the anticipated structures to be constructed within the proposed subdivision.

Recommendations have been prepared for site preparation; excavations and dewatering; site classification for seismic site response; limit states resistance factors and serviceability; footings; concrete raft foundations; deep foundations; foundation drainage; foundation walls; floors; foundation concrete; and, traffic structures.

5.2 SITE PREPARATION

All trees, vegetation, roots, organic topsoil and deleterious materials should be removed from the construction area. Topsoil thicknesses ranging from 100 to 300 mm were encountered in our boreholes during test drilling. Due to the large aerial extent of the site, deeper thicknesses of topsoil may be encountered, particularly in vegetated or low-lying areas. Staining and root intrusion from the overlying organic material and roots may be encountered during excavation within the subsurface mineral soils.

If these conditions are suspected, a representative of the Geotechnical Consultant should inspect the site during excavation to verify the depth of organic topsoil which should be removed in preparation of the site for construction. Additional information regarding topsoil composition and soil structure is presented in Appendix D.

The general intent of initial site preparation is to make the subgrade suitably stable for construction activities. It is recommended that the subgrade soils within the development footprint are compacted to the below specified densities.

Building Areas	96 percent standard Proctor density at optimum moisture content;
Traffic Areas	100 percent standard Proctor density at optimum moisture content;
Landscape Areas	90 percent standard Proctor density at optimum moisture content.

Soils which meet the required compaction level should be stable to support construction activities. It is anticipated that conventional site preparation (scarifying, moisture conditioning and re-compacting the soils) will suffice at this site. Soils which are unstable during site preparation and fail to achieve the required compaction will require additional treatment, which may include: over-excavation and replacement and/or geosynthetic stabilization. The need for additional treatment should be reviewed by the Geotechnical Consultant during the field construction with respect to the actual conditions and project requirements.

In areas with variable subgrade soils, proof rolling may be an acceptable alternative to density testing and should be reviewed by the Geotechnical Consultant.

Fill, required to bring the subgrade surface to the design elevation in construction areas, should preferably consist of imported granular material, locally available sand or non-expansive fine-grained soil (i.e., low to medium plastic). All proposed subgrade fill should be approved by the Geotechnical Consultant prior to placement. The fill should be placed in thin lifts (maximum 150 mm loose) and uniformly compacted to 96 percent of standard Proctor density at optimum moisture content.

Excavations are susceptible to settlement and should be adequately backfilled and compacted. The magnitude of settlement is directly related to the level of compaction of the backfill material. Well compacted fills will settle a small percentage of the fill thickness whereas poorly compacted fills can settle appreciably, particularly if frozen soils are incorporated in the backfill. Efforts should be made to meet the specified compaction level in areas sensitive to settlement.

The site should be graded to provide positive site drainage away from all work areas and structures prior to, during and following construction.

5.3 Excavations and Dewatering

Temporary excavations should be designed and excavated in accordance with current Saskatchewan Occupational Health and Safety Regulations. The Contractor is solely responsible for protecting the excavation by shoring, sloping, benching and/or other means as required to maintain the stability of both the excavation sides and the bottom.

The groundwater table was recorded at a depth of 2.27 to 3.82 m below existing grade on January 10, 2021 (elevation of 499.95 to 504.51 m). Groundwater levels should be expected to fluctuate seasonally by as much as 1 m (with the highest groundwater level in the spring and/or during/following spring thaw and/or periods of precipitation).

Excavation below the water table should be avoided wherever practical. Excavations below the groundwater table will encounter construction difficulties associated with groundwater seepage and sloughing conditions, particularly where saturated sand/silt soils are encountered (these soils will flow into excavations). De-watering of the excavations will be required during construction. De-watering should be conducted over the time period for which the excavations are left open. A sump (or multiple sumps, if required) should be set up at the deepest excavation points and the floor of the excavation sloped to the sump(s) to handle groundwater seepage and precipitation runoff. A self-actuated sump pump(s) should be operated on a continuous basis and should be discharged well away from the excavations. If conventional dewatering methods are ineffective, dewatering wells may be required.

Sideslopes should be no steeper than 1.5H : 1V above the groundwater table and no steeper than 3H : 1V to 4H : 1V below the groundwater table (as measured from the bottom of the excavation). Slope flattening will be required if unstable conditions are encountered during excavation. Continuous visual monitoring of the sideslopes should be undertaken to assess whether flatter sideslopes are required to maintain stability.

The stability of the excavation will be affected by wetting and drying of the exposed excavation walls, the length of time that the excavation remains open and the consistency and structure of the subgrade soils.

Excavated soil should be stockpiled away from the crest of the excavation to minimize potential sloughing of the excavation walls due to the soil surcharge loading. Similarly, equipment and construction materials should also be placed away from the crest of the excavation.

Depending on lateral constraints, excavations at this site may be completed with unbraced, sloped side walls. If there is insufficient room for excavation cuts, due to close proximity to other structures, then a temporary shoring system would be required.

5.4 Site Classification for Seismic Site Response

Based on the consistency of the subgrade soils encountered at the subject site and Table 4.1.8.4A of the 2015 National Building Code, the site classification for seismic site response falls within Class D.

5.5 Limit States Resistance Factors and Serviceability

The National Building Code of Canada (NBCC, 2015) requires the use of limit states design for the design of buildings and their structural components, including the design of shallow and deep foundations.

It is expected that the designer is familiar with the limit states design method and only a brief discussion will be presented. For a detailed discussion, it is recommended to review the NBCC (2015) and/or the Canadian Foundation Engineering Manual (CFEM, 2006).

Limit states are defined as those conditions under which a structure ceases to fulfill the function for which it was designed (i.e., unsatisfactory performance). In limit states design, two conditions are assessed with respect to performance, these are:

- ultimate limit states (ULS), and
- serviceability limit states (SLS)

Ultimate limit states are concerned with the collapse mechanisms of the structure (i.e., safety), whereas serviceability limit states consider mechanisms that restrict or constrain the intended use, function or occupancy of the structure.

As per NBCC (2015), the factored soil resistance utilized for foundation design may be determined using the following resistance factors applied to the ultimate resistance values presented in the following subsections of the report.

Shallow foundations:

- Compressive Resistance, $\Phi = 0.5$
- Sliding, Based on Friction (c=0), $\Phi = 0.8$

Deep foundations:

- Compressive Resistance, $\Phi = 0.4$
- Tensile Resistance, $\Phi = 0.3$

The above resistance factors have been provided to reflect that semi-empirical methods were used to derive the soil bearing resistances presented in this report using the laboratory and in-situ data collected during this investigation.

To satisfy serviceability limit states, a settlement analysis of the foundation must also be evaluated to ensure the structures are not negatively impacted by excessive settlement at the design load. Estimated foundation settlements have been provided in Sections 5.6, 5.7 and 5.8.2.

Piles exposed to lateral loads are typically designed to restrict lateral deflection of the pile head to tolerable limits. Lateral pile head deflection can be determined using the concepts presented in Section 5.8.3.

5.6 FOOTINGS

A footing foundation based within naturally deposited, undisturbed soil above the elevation of the groundwater table should perform satisfactorily. If the foundation is constructed during freezing conditions, the subgrade soil at the design footing elevation must be protected from freezing. If it is not practical to keep the subgrade from freezing then a deep foundation system should be constructed.

To minimize the potential for groundwater-related issues, all basements/crawlspaces should be based at least 1 m above the groundwater table (refer to Drawing No. 18682-1A for a groundwater elevation contour map). It is recommended that groundwater monitoring be conducted following spring thaw, as groundwater levels will be higher at that time and will likely better represent potential long-term groundwater levels. Existing topographical information along with future site grading plans should be used to determine whether or not basements/crawlspaces are feasible, to determine where structures should be situated within given lots to satisfy the groundwater clearance criteria and to determine at what depths footings should be based. Based on existing topography, full-depth basements will be feasible at some locations whereas basements/crawlspaces may not be feasible at other locations (unless site grading/filling is completed).

The following minimum recommendations should be incorporated into the design of a footing foundation. The recommendations are applicable to footings supporting vertical concentric loading only; footings subject to eccentric/unbalanced loading will require additional assessment.

1. Footings should be founded on naturally deposited, undisturbed soil (footings shall not be based on fill unless approved by the Geotechnical Consultant).

2. For permanently heated, at-grade structures (i.e., no basement or crawlspace), the footings should be based at a minimum depth of 1.8 m below finished grade. Where a heated basement or crawl-space is constructed, footings should be based at a minimum depth of 1.2 m below finished grade. These minimum depths are applicable only where the building envelope insulation is designed to allow heat loss to the foundation. If insulation is placed beneath the floor slab, an uninsulated strip width of at least 1 m is recommended adjacent to all exterior grade beams/foundation caps to allow for heat loss to the foundation. In unheated areas and/or where heat loss from the building to the foundation is not allowed, footings should be based below the potential depth of frost penetration (i.e., 3 m) or protected against frost action with strategically placed extruded polystyrene insulation.

3. If site topography/groundwater conditions do not allow for the construction of footings that meet the criteria outlined in point 2 above, the footings should be protected from frost action using extruded polystyrene insulation. Footing depths will vary within the subdivision depending on local topography and groundwater conditions, but all footings should be based at a minimum depth of 0.75 m below finished ground surface. The extents and thickness of insulation necessary to protect the foundation from frost will depend on heat-loss effects from the overlying building. In all cases, a continuous layer of insulation should be placed over the exterior face of the foundation wall/grade beam, extending vertically a minimum of 300 mm above grade. The lateral section of insulation should be based a minimum of 300 mm below finished grade to provide protection from damage and positively sloped to promote drainage away from the foundation. Suggested recommendations for insulation thickness/length have been summarized below (heat loss to the foundations must be allowed, as discussed above).

    - For footings supporting continually heated structures (heated to at least 18°C year-round), the insulation should be a minimum of 50 mm in thickness and should extend laterally a minimum of 1.8 m beyond the perimeter of the footing foundation.

- For footings supporting continually heated structures (heated to a nominal temperature of at least 7°C year-round), the insulation should be a minimum of 75 mm in thickness and should extend laterally a minimum of 2.4 m beyond the perimeter of the footing foundation.
- For footings supporting unheated structures or seasonally heated structures, the insulation should be a minimum of 125 mm in thickness and should extend laterally a minimum of 2.4 m beyond the perimeter of the footing foundation. In this case, the insulation will need to be placed on all sides of the foundations rather than just the external face and the supported walls must have an insulated layer directly above the foundation wall/grade beam to prevent frost from short-circuiting through the wall.
- In all cases, the thickness and lateral extent of the insulation should be increased by 1/3 (33 percent) at the building corners.
- If insulation is not utilized, frost-related movements should be expected and must be accepted to the Owner.

4. Footings based on naturally deposited, undisturbed soil may be designed to exert an unfactored ULS bearing pressure of 250 kPa and an SLS bearing pressure of 65 kPa (to limit settlements to less than 25 mm). A maximum spread footing dimension of 1.5 m and a maximum strip footing width of 1 m was considered to determine the SLS bearing pressure; for larger footing sizes, an updated settlement analysis will be required.

5. A representative of the Geotechnical Consultant should inspect the footing excavations prior to construction of the footings to verify that adequate soil conditions exist. After inspection, placement of a mud slab or well compacted layer of crushed granular base course material (minimum 75 mm thickness) over the prepared foundation level is recommended to provide protection from disturbance.

6. A minimum strip footing width of 500 mm is recommended. A minimum dimension of 1,000 mm is recommended for square and rectangular footings.

7. If the subgrade soil is disturbed during excavation below the design depth, then the disturbed soil should be removed to an undisturbed, level surface. Fill, required to raise the subgrade elevation to the underside of the footings, should be concrete

8. Footings should not be constructed on desiccated, frozen or wet subgrade soil. Frost should not be allowed to penetrate beneath the footings prior to, during or after construction.

9. The finished grade should be landscaped to provide for positive site drainage away from the structure.

5.7 Concrete Raft Foundations

The following minimum recommendations should be incorporated into the design of a reinforced concrete raft foundation. Conceptual raft foundation details have been shown on Figure No. 1.

1. All deleterious and organic material should be removed from the raft footprint. After removal of any unsuitable material and/or overexcavation required to reach the design subgrade level, scarify and compact the surface of the subgrade to 96 percent of standard Proctor density at optimum moisture content.

2. Overexcavate and replace soft areas with structural granular fill placed and compacted in thin lifts (150 mm loose) to 96 percent of standard Proctor density at optimum moisture content. High-strength geogrid/geotextile may be required to provide soil stabilization and separation where soft/wet/loose soil conditions are encountered. The need for special measures (i.e., over-excavation, geotextile, geogrid, and/or additional gravel fill) in soft/wet/loose areas must be subject to review by the Geotechnical Consultant during field construction.

3. Subgrade fill, if required, should preferably consist of locally available sand soils or imported granular fill, placed in thin lifts (maximum 150 mm loose) and compacted to 96 percent of standard Proctor density at optimum moisture content.

4. If possible, grade the subgrade surface to promote drainage to the outer edges of the foundation (allowing overland drainage away from the foundation) with a minimum cross slope of 5 percent.

5. A minimum of 300 mm of granular base course fill is recommended beneath the underside of the raft (Saskatchewan Ministry of Highways and Infrastructure Type 33 aggregate or approved equivalent). The granular fill should extend laterally away from the edge of the raft a distance at least equal to the fill thickness. The granular fill should be placed in thin lifts (maximum 150 mm loose) and compacted to 98 percent of standard Proctor density at optimum moisture content.

6. The slab thickenings, bearing on compacted granular fill over the prepared subgrade soil, may be designed to exert an unfactored ULS bearing pressure of 250 kPa. The SLS bearing pressure to limit foundation settlements to 25 mm or less is 65 kPa. The estimated settlement is based on typical slab thickening dimensions of 1 m or less. If a lesser settlement is required and/or larger slab thickening dimension will be constructed, PMEL should be re-evaluate the recommended SLS bearing capacity.

7. Extruded polystyrene insulation is recommended alongside the thickened edge foundation to minimize potential movements due to frost. The insulation should be placed adjacent to the foundation and should be positively sloped to direct water away from the foundation. For heated buildings, a vertical sheet of insulation should also be placed above the horizontal insulation, extending up to the insulated exterior wall. For unheated structures, the insulation should extend beneath the entire floor slab area. Recommended insulation details (thickness, extents etc.) have been shown on Figure I. If insulation is not utilized, frost-related movements should be expected and must be accepted to the Owner.

FIGURE 1A:
GENERAL
INSULATED
FOUNDATION
CONCEPT

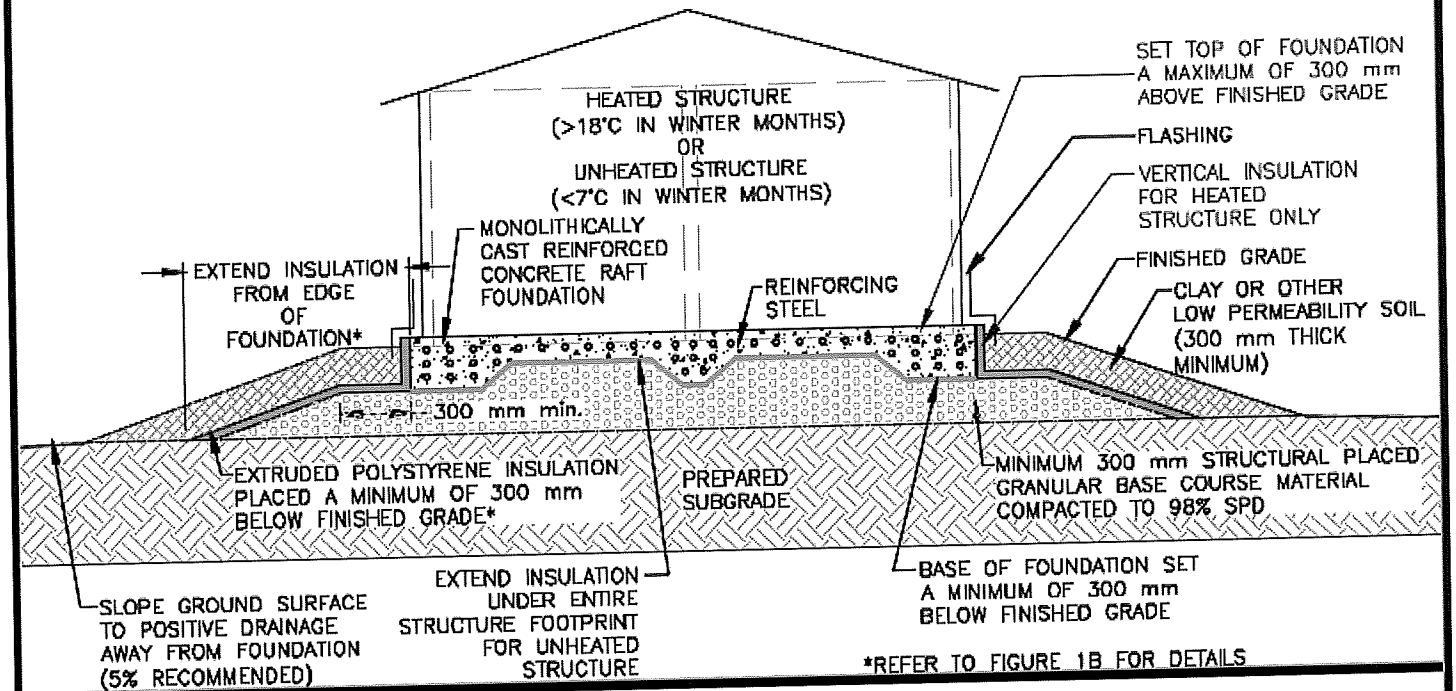
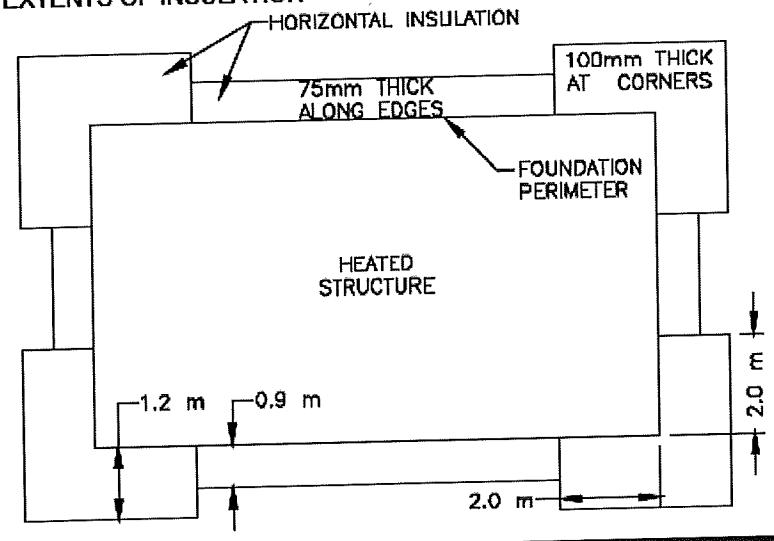


FIGURE 1B:
EXTENTS OF INSULATION



FOR UNHEATED BUILDING, INSULATION THICKNESS = 200 mm AND LATERAL EXTENT FROM FOUNDATION PERIMETER = 2.7 m; INSULATION MUST EXTEND UNDER THE ENTIRE STRUCTURE FOOTPRINT

NOTE:
1. THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

CONSULTING
GEOENVIRONMENTAL
GEOTECHNICAL
ENGINEERS

P. MACHIBRODA ENGINEERING LTD.

806 – 48th STREET EAST
SASKATOON, SK
S7K 3Y4

DRAWING TITLE:	CONCRETE RAFT FOUNDATION
PROJECT:	PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION SOUTH OF SASKATOON, SK
APPROVED BY: CZ	DRAWN BY: TP
DATE: JANUARY, 2022	SCALE: NOT TO SCALE
DRAWING NUMBER:	18682-FIGURE1

8. Reinforce the concrete slab and articulate the slab at regular intervals to provide for controlled cracking.

9. Separation joints should be used to isolate the raft from any structures/utilities that are not supported by the raft.

10. Provide positive site drainage away from the foundation.

11. The foundation should not be constructed on desiccated, wet, or frozen subgrade soil or base. Frost should not be allowed to penetrate beneath the foundation just prior to or during construction.

5.8 DEEP FOUNDATIONS

5.8.1 HELICAL SCREW PILES

Helical screw piles are installed by rotating a steel pipe, equipped with one or more helix flightings, into the ground. For single helix screw piles, pile capacity is derived from shearing resistance along the pile shaft (i.e., shaft resistance) as well as end bearing capacity of the helix. For multi-helix piles, pile capacity may be derived from the sum of the shearing resistance along the portion of pile shaft above the uppermost helix and end bearing capacity of each helix. The helical plates should be spaced a minimum of 3 helix diameters apart.

The ULS and SLS soil resistance values for design of screw piles have been presented below.

TABLE II SHAFT RESISTANCE (SCREW PILES)

Depth (m) [1]	Shaft Resistance (kPa)	
	Unfactored ULS	SLS
0 to 2	0	0
Below 2	25	10

[1] Depth below existing ground level.

TABLE III END BEARING RESISTANCE (SCREW PILES)

Depth (m) [1]	End Bearing Resistance (kPa)	
	Unfactored ULS	SLS
Below 5	650	225

[1] Depth below existing ground level.
[2] Torque monitoring must be conducted to confirm that soil conditions are as expected.

Notes:

1. For the purposes of this report, design depths have been referenced to existing grade. The structural engineer must consider finished grade elevation relative to existing grade. If existing grade is altered significantly, PMEL should be consulted to confirm the design parameters.

2. The uppermost (embedded) 2 m of the pile shaft should be neglected in terms of axial capacity.

3. Piles beneath a heated building (i.e., continuously ≥ 15°C) may be designed to have helixes based a minimum depth of 6 m below existing grade, provided the building envelope insulation is designed to allow heat loss to the foundation (i.e., uninsulated floor) and the piles will not be exposed to a prolonged period of freezing conditions prior to the initial heating of the building (i.e., during construction). Where insulation is placed beneath the floor slab, an uninsulated strip width of at least 1 m is recommended adjacent to all exterior grade beams/foundation caps.

4. In unheated areas and/or where heat loss from the building to the foundation is not allowed, screw piles should be based a minimum depth of 8 m below existing ground surface to provide protection from frost action. Alternately, strategically placed insulation and/or piles that incorporate a bond breaker over the pile shaft within the depth of frost penetration (i.e., outer polyethylene sleeve that is isolated from the shaft and allowed to move freely with potential ground movements) could be considered to minimize risk of frost jacking and reduce required pile lengths. PMEL can review potential alternatives upon request.

5. When determining the compressive shaft resistance of the pile shaft, the portion of the pile shaft within 1D above the uppermost helix should be discounted due to interaction effects between the pile shaft and helix. For piles subject to tensile loads, the zone of zero shaft resistance should be increased to 2D above the uppermost helix.

6. Compressive end bearing capacity may be calculated utilizing the effective soil contact area of the helix (i.e., overall cross-sectional area for the lowest helix, helix area minus shaft area for upper helixes). Piles subject to tensile loads should use the effective area of the helix (i.e., helix area minus shaft area) when determining uplift pile capacity.

7. A minimum centre-to-centre pile spacing of 2.5D is recommended, where D=helix diameter. Lesser spacings may be acceptable, but must be approved by the Geotechnical Consultant.

8. The helical plate shall be normal to the central shaft (within 3 degrees) over its entire length. Multiple helixes (if applicable) should be spaced at increments of the helix pitch to ensure that all helixes travel the same path during installation.

9. Continuous monitoring of the installation torque should be undertaken during installation to determine whether the screw pile has been damaged during installation and to monitor the consistency of the subsurface soils.

10. Screw piles should be designed on the basis of conventional static analysis using the resistance values presented above. Installation torque should be used for monitoring purposes only and not to determine pile capacity.

11. The installation of screw piles typically disturbs the upper portion of the soils, often resulting in poor to no contact with the adjacent soils in this zone. As such, additional measures may be required if screw piles are required to resist lateral loading (i.e., pre-boring and backfilling of the annular space with lean mix concrete, construction of a buried pile cap/grade beam over the screw pile, use of larger diameter pile shafts etc.). If screw piles are required to resist lateral loads, the design details should be reviewed with the Geotechnical Consultant.

12. A representative of the Geotechnical Consultant should inspect and document the installation of each screw pile on a continuous basis.

5.8.2 Pile Settlement

With regards to serviceability of pile foundations, assuming good construction practices are followed and the appropriate resistance factors are applied; the settlement of individual piles at the design load will be small and should be within tolerable limits. The estimated pile settlement at working loads should be in the order of 10 to 20 mm for screw piles.

The above is applicable to individual piles and small pile groups. Although not anticipated, foundation settlement should be evaluated where large pile groups are employed to carry the foundation load (i.e., breadth of foundation or pile cap is a similar dimension as depth of piles).

Pile foundations designed utilizing the provided SLS bearing capacities would perform similarly to pile foundations designed using the provided ULS capacities.

5.8.3 Lateral Thrust Forces

Pile deflection typically governs the design of laterally loaded piles. Subgrade reaction theory may be utilized to estimate lateral pile deflection. The estimated coefficients of horizontal subgrade reaction of the subgrade soils have been presented in Table IV.

TABLE IV ESTIMATED COEFFICIENTS OF HORIZONTAL SUBGRADE REACTION

Depth (m)	Coefficient of Horizontal Subgrade Reaction, Ks, (kN/m^3)
0 to 1.5D	0
1.5D to 2	3,500z/D
Below 2	6,000/D

Where D = pile diameter and z = depth (m). For large diameter piles (i.e. exceeding 1 m) the zone of zero horizontal subgrade reaction should not exceed 1.5 m.

For the purposes of this report, design depths have been referenced to existing grade. The structural engineer must consider finished grade elevation relative to existing grade. If existing grade is altered significantly, PMEL should be consulted to confirm the design parameters.

The response of a pile to lateral loads is highly nonlinear. Methods that assume linear behaviour, such as horizontal subgrade reaction theory, are only applicable where pile deflections are small, loading is static and pile materials are linear; these conditions do not exist in most cases and soil-pile interaction modeling (i.e., p-y method) is required to accurately model the pile behaviour. If a more detailed lateral analysis is deemed warranted, PMEL can model the interaction between the soil and the pile, in accordance with the p-y method. Specific pile details (i.e., loading, type, diameter, length, etc.) will be required in order to perform the analysis.

The installation of screw piles typically disturbs the upper portion of the soils, often resulting in poor to no contact with the adjacent soils in this zone. As such, additional measures may be required if screw piles are required to resist lateral loading (i.e., pre-boring and backfilling of the annular space with lean mix concrete, construction of a buried pile cap/grade beam over the screw pile, (use of larger diameter pile shafts) etc.). If screw piles are required to resist lateral loads, the design details should be reviewed with the Geotechnical Consultant.

5.8.4 Grade Beams and Pile Caps

Grade beams and pile caps should be reinforced at both top and bottom throughout their entire length/cross section. Grade beams and pile caps exposed to frost action should be constructed to allow for a minimum of 100 mm of net void space between the underside of the grade beam and the subgrade soil (compressible void form). The finished grade/floor finish adjacent to all pile caps and grade beams should be such that water runoff is not allowed to infiltrate and collect in the void space.

5.9 Foundation Drainage

The finished grade must be landscaped to provide for positive site drainage away from the proposed structure, and site grades should be maintained as high as feasible. A perimeter weeping tile drainage system (installed at the base of the perimeter foundation) is recommended to reduce the potential for external water infiltration below the foundation.

An internal sub-surface drainage system should be constructed below all basements and within all crawlspaces to allow for controlled collection and discharge of water that may accumulate below the basement/within the crawlspace.

Many drainage system configurations are possible, but generally consist of clean, drainage aggregate (less than 3% fines) in conjunction with grading the subgrade surface to collection points (i.e., sump pits) and/or utilizing perforated drainage pipes to transmit water to collection points. The drainage system should be positively sloped to sump pits equipped with automatic sump pumps (or drained by gravity) to discharge water a suitable location well away from the proposed structure. Non-woven geotextiles should be utilized to separate the drainage aggregate from the subgrade soils. The drainage pipes and clean drainage aggregate should be fully encapsulated in non-woven geotextile capable of transmitting a flow of not less than 50 litres per second per square metre (ASTM D-4491). The sub-surface drainage system should incorporate provisions for mitigation of radon gas (i.e., traps in lines entering the sump, sealed sumps, etc.). A backup power supply for the sump pump(s) is recommended in the event of a power outage. Details for drainage systems should be reviewed by the geotechnical consultant prior to finalizing the design.

5.10 Foundation Walls

Foundation retaining walls should be designed to resist lateral earth pressure exerted by the soil as well as the horizontal pressure induced by any surcharge loading. The surcharge loading should be calculated on the basis of actual loads.

Backfill should be uniformly placed and compacted to minimize settlements as much as practical while limiting development of compaction induced pressures on the wall to an acceptable level.

Where the existing soils are used to backfill the foundation walls, the lateral earth pressure may be calculated on the basis of an equivalent fluid pressure distribution of 16 kN/m^3 (add hydrostatic pressure if a functional drainage system is not installed).

Where clean granular fill (i.e., less than 5 percent material finer than 0.071 mm) is used to backfill the foundation walls, the lateral earth pressure may be calculated on the basis of an equivalent fluid pressure distribution of 10 kN/m^3 (add hydrostatic pressure if a functional drainage system is not installed). In this case, the slope of the clean, granular backfill material must be no steeper than 45 degrees as measured from the base of the wall.

To prevent hydrostatic pressures from developing behind the wall, a drainage system should be incorporated into the design of the wall. A perforated drainage pipe should be installed with the invert elevation at or below the base of the foundation. The perimeter drainage system should be drained to a sump pit(s). The sump pit(s) should be equipped with an automatic sump pump. The perforated drainage pipe should be at least 100 mm in diameter and installed on non-woven geotextile capable of transmitting a flow of not less than 50 litres per second per square metre (ASTM D-4491). The geotextile should be placed on naturally deposited, undisturbed soil or free-draining sand as may be required for leveling. The geotextile should be used to encapsulate at least 300 mm of clean, granular drainage aggregate above the invert of the drainage pipe. The clean drainage aggregate should meet the aggregate gradation requirements shown in Table V.

TABLE V CLEAN, DRAINAGE AGGREGATE

Grain Size (mm)	Percent Passing
25.9	100
9.5	50 – 95
5.0	35 – 70
2.0	20 – 45
0.425	0 – 20
0.150	0 – 8
0.071	0 – 3

All water collected in the drainage system must be discharged in accordance with local regulations.

If a drainage system is not installed at the base of the wall, the wall must also be designed to withstand hydrostatic pressures.

The uppermost 500 mm of the backfill should consist of clay or other low permeability material.

5.11 FLOORS

5.11.1 GRADE-SUPPORTED CONCRETE SLABS

Provided that some slab movements and cracking can be tolerated, the following minimum provisions should be incorporated into the design of conventional, heated, grade-supported, cast-in-place, at-grade reinforced concrete slabs subject to light loading.

1. Prepare the site in accordance with Section 5.2. Level and compact the upper 150 mm of subgrade soil to 96 percent of standard Proctor density at optimum moisture content.
2. Subgrade fill, if required, should preferably consist of imported granular material or locally available sand soils, placed in thin lifts (maximum 150 mm loose) and uniformly compacted to 96 percent of standard Proctor density at optimum moisture content.
3. Soft subgrade areas should be excavated and replaced with suitable soil compacted to 96 percent of standard Proctor density at optimum moisture content. High-strength geogrid/geotextile may be required to provide soil stabilization and separation where soft/wet soil conditions are encountered. The need for special measures (i.e., over-excavation, geotextile, geogrid, and/or additional gravel fill) in soft/wet areas must be subject to review by the Geotechnical Consultant during field construction.
4. To provide a level working surface and uniform subgrade support, provide a layer of crushed granular base course material beneath the slab (150 mm minimum).
5. All structural fill should be placed and uniformly compacted in thin lifts (maximum 150 mm, loose) to 98 percent of standard Proctor density at optimum moisture content.
6. Isolate the slab from foundation walls, columns, etc., by means of separation joints.
7. Reinforce the concrete slab and articulate the slab at regular intervals to provide for controlled cracking.
8. Provide positive site drainage away from the proposed structure.
9. Floor slabs should not be constructed on desiccated, wet, or frozen subgrade soil or base.
10. Frost should not be allowed to penetrate beneath the floor slab just prior to, during or after construction.
11. A soil gas membrane (i.e., radon gas and moisture resistant) should be installed between the underside of the floor slab and the granular fill.

If slab movements and cracking cannot be tolerated, the slabs should be structurally supported on piles (refer to Section 5.11.2).

5.11.2 STRUCTURAL FLOORS

It is anticipated that structural floors over crawlspaces may be constructed for some structures. The crawlspaces should be covered with a soil gas membrane (i.e., radon gas and moisture resistant), followed by 50 mm of sand or lean mix concrete to hold it tightly to the soil surface.

The crawl space should be forced-air ventilated during warm weather and heated during cold temperatures. The depth of the crawlspaces should be based at least 1 m above the groundwater table (refer to previous discussions) and a drainage system is recommended within the crawlspace (refer to Section 5.9).

5.11.3 Slabs Exposed to Freezing Conditions

Grade-supported concrete slabs exposed to freezing conditions (i.e., exterior slabs/sidewalks, slabs within unheated building areas, etc.) will be subject to differential movements associated with frost action. The potential for differential movements associated with frost action can be minimized by placing sub-horizontal extruded polystyrene insulation below the slabs/sidewalks. Where applicable, the insulation should butt-up to the grade beam to direct heat to the underside of the slab. The insulation should have a minimum thickness of 75 mm and should extend sub-horizontally to a minimum distance of 1.8 m beyond the outer edges of the slab. If differential movements cannot be tolerated, the slab should be structurally supported on piles.

5.11.4 Soil Gas (Radon) Mitigation

The following minimum provisions should be incorporated into the design of a subsurface depressurization system.

1. Provide a minimum of 150 mm of clean, crushed aggregate (permeable layer) beneath the underside of the slab. The permeable layer should be lightly compacted using light weight vibratory compaction equipment and should meet the following gradation.

TABLE VI AGGREGATE FOR PERMEABLE LAYER

Grain Size (mm)	Percent Passing
37.5	100
25	50 – 95
19	35 – 70
12.5	20 – 45
9.5	0 – 20
% Fracture (Minimum)	60

2. A rough-in for the potential for future soil gas mitigation is recommended (in accordance with NBCC 2015, 9.13.4.2). The rough-in consists of an inlet through the slab to allow for depressurization (venting) of a permeable layer placed below the floor slab. Encase the aggregate (i.e., top and bottom) with a non-woven geotextile (Nilex 4551 or equivalent). The geotextile will provide separation between the aggregate and underlying soils (to prevent mixing of materials). Placing geotextile between the aggregate and bottom of floor slab may aid in preventing damage to the vapour barrier. The geotextile should be placed as per the manufacturer's specifications.

3. A suction pit, measuring 1.2 m square and 200 mm deep, should be constructed beneath the floor slab in approximately the centre of the building footprint. Alternatively, perforated drainage pipe could be placed below the floor slab (minimum of three lines extending the length of the building). A 100 mm (minimum) diameter pipe should be connected to the suction pit or perforated drainage pipe, that extends through the floor slab and is stubbed off within the building interior.

4. To minimize the potential for soil gas entering the building, it is recommended that a soil gas membrane be placed below the floor slab (in direct contact with the floor slab) and that all drain pipes should be equipped with traps to prevent entry of radon and/or other soil gases through the floor drains (as per NBCC 2015).

5.12 Foundation Concrete

The results of water-soluble sulphate testing on soil samples recovered from the subject site have been summarized in Table VII.

TABLE VII WATER-SOLUBLE SULPHATE TEST RESULTS

Borehole No.	Depth (m)	Soil Type	Water Soluble Sulphate (%)	Class of Exposure	Degree of Sulphate Exposure
21-3	1.5	Clay	0.90	Severe	S-2
21-6	3.0	Clay	0.81	Severe	S-2
21-9	0.75	Silt	<0.05	Negligible	-
21-20	0.75	Silt	0.09	Negligible	-

An examination of Table VII revealed that the measured sulphate concentration of the tested soils was less than 0.05 percent to 0.90, which is considered negligible to severe in terms of potential degree of sulphate attack. As such, it is recommended to utilize sulphate resistant cement for all foundation concrete in contact with the subgrade soils. All concrete at this site should be manufactured in accordance with current CSA standards.

5.13 Traffic Structures

5.13.1 Design CBR

The subgrade soils near surface consisted predominately of sand. Silt was encountered near surface in four of the twenty boreholes. The Group Index and correlated soaked California Bearing Ratio (CBR) values for the sand and silt soils ranged from 4 (sandy silt) to 15 (sand, trace silt). Based on the results of the laboratory testing, a design soaked CBR value of 7 was utilized for design of the roadways.

It is understood that subgrade fill will be placed in some areas of the site. It is anticipated that the on-site subgrade will be utilized as fill. However, if imported fill (not consistent with the silt/sand subgrade encountered during our field investigation) is utilized, additional laboratory testing should be conducted to confirm the CBR of the imported fill. Based on the results of the laboratory testing, the proposed pavement structure may have to be modified.

5.13.2 Design Traffic Loading

BCL Ltd. has reported that the subdivision will be divided into approximately 130 lots with 2 access roads. It is understood that a Traffic Impact Assessment is in the process of being completed by KGS for the development. KGS reported, via email on January 13, 2022, that there will be a maximum number of 1300 vehicles per day on the roads.

The roadway design has been based off the design traffic assumptions presented in Table VIII. Based on the reported traffic volumes, a total N_{15} of 325,577 ESALs was calculated for the proposed Roadway. A detailed breakdown of the traffic volume calculation has been included in Appendix E.

TABLE VIII TRAFFIC INFORMATION

Item	Value	Note
Design Life	15 years	As per the RM of Corman Park Country Residential Paved Roads specification
Number of Lanes per direction	1	Two-way traffic - One lane per direction
Directional Split	50%	Traffic will travel equally in each direction.
Design AADT - Year 1	496	Approximate assumed value based on expected growth rate (low population at Year 0)
Design AADT - Year 15	1,300	As per email dated January 17, 2022, 1300 vehicles per day.
Percent Growth Rate	10% - Year 0 to 10	Year 10 is assumed to be build out of the development
	0% - Year 10 to 15	
Percent Commercial Truck Traffic	5% - Year 0 to 5	Years 0 to 5 – high percentage of truck traffic due to construction of residences
	3% - Year 5 to 10	Years 5 to 10 – construction assumed to slow as development is nearing build out
	0.5% - Year 10 to 15	Years 10 to 15 – few to no construction trucks, truck traffic consists mainly of garbage/recycling trucks, septic trucks, fire trucks, delivery trucks, etc.
Truck Traffic Distribution	90%/10%*	*Single Unit Trucks/Tractor Semi-Trailer Combinations
Bus Traffic Passes, Daily	8	It was reported that there will be 8 bus passes per day during the school year. It is estimated that there is approximately 40 weeks in the school year.
ESALs per Unit – Trucks	3.0/6.3*	*Single Unit Trucks/Tractor Semi-Trailer Combinations
ESALs per Unit – Buses	5	

5.13.3 Recommended Pavement Structure

The R.M. of Corman Park Country Residential Paved Road Construction Standard requires the roadway to be designed in accordance with the Saskatchewan Ministry of Highways and Infrastructure's Shell curve method.

Based on the CBR ratings and design traffic loading (as summarized in Sections 5.13.1 and 5.13.2), the following asphalt concrete pavement structure has been presented in Table IX.

TABLE IX THICKNESS DESIGN FOR PAVEMENT STRUCTURES

Pavement Structure	Thickness (mm)
Asphalt Concrete (150-200A)*	80
Granular Base(Min CBR = 65)	150
Granular Sub-Base (Min CBR = 20)	150 (see Note 1)
Geotextile / Geogrid**	As Required (see Note 1)
Prepared Subgrade	(600)
Total Thickness (mm)	**380**

*Asphalt Concrete type as per the R.M. of Corman Park Residential Paved Road Construction Standard.
** Combigrid 40/40, EasyGrid 4-150GC, or equivalent

Note:

1. It should be noted that silt soils are generally poor as subgrade support for roadways, and will have a CBR of less than 7. As such, it is recommended that a proof roll/visual subgrade review be conducted following completion of subgrade preparation/prior to placement of the sub-base layer. Where silt/soft soils are encountered, it is recommended that a geotextile/geogrid combination (such as Combigrid 40/40, EasyGrid 4-150GC, or equivalent) be placed between the subgrade and sub-base as it will provide subgrade reinforcement and extend/improve the performance of the structure. Where a geotextile is placed, the sub-base thickness should be increased to 200 mm to minimize potential for damage of the geotextile during placement of the sub-base fill.

5.13.4 Pavement Construction Recommendations

The following minimum recommendations should be incorporated into the design of the asphalt concrete pavement structures. It should be noted that the R.M. of Corman Park has roadway construction standards. Detailed construction specifications (subgrade preparation, material type and compaction specifications, etc.) have been outlined in the R.M. of Corman Park Country Residential Paved Road Construction Standard (www.rmcormanpark.ca/DocumentCenter/View/1812/Country-Residential-Paved-Road). As such, the pavement should be designed in accordance with both the recommendations provided below and the construction specifications provided in the R.M. Paved Road Construction Standard.

In the event there is a discrepancy between the recommendations presented in our report and the R.M. of Corman Park Construction Standards, PMEL should be notified to review our recommendations.

1. Prepare the site in accordance with the R.M. of Corman Park Country Residential Paved Road Construction Standard.

2. Subgrade fill, if required, may consist of imported granular material or locally available sand soils. Subgrade fill should be placed in thin lifts (150 mm loose, maximum) and compacted to 100 percent of standard Proctor density at optimum moisture content.

3. Level and compact the upper 600 mm of subgrade soil to 100 percent of standard Proctor density at optimum moisture content. Soft subgrade areas should be excavated and replaced with suitable soil compacted to 100 percent of standard Proctor density at optimum moisture content. The subgrade should be graded to promote drainage to the ditches. The surface of the subgrade should be smooth drum rolled to create a smooth surface prior to placement of the sub-base.

4. If encountered, all cobblestones/boulders having a dimension of greater than or equal to 8 cm shall be removed from the upper 150 mm of the subgrade.

5. It is recommended that a visual review/proof roll be conducted on the subgrade following preparation (i.e., leveling and compaction). Based on the results of the proof roll, over-excavation, high strength geotextile/geogrid, and/or additional granular fill may be required.

6. Sub-base fill should be placed in 120 mm (maximum) thick lifts. The subbase should be compacted to 100 percent of standard Proctor density at optimum moisture content. The granular base course material should meet the aggregate gradation requirements in Table X.

    a) Where geotextile/geogrid is utilized, a minimum initial sub-base lift thickness of 200 mm should be placed (by end dump method) over the geotextile/geogrid to reduce the potential for damage to the geotextile. Construction traffic should be restricted to travelling on the sub-base to avoid damage to the geogrid/geotextile and underlying subgrade. Heavy duty construction equipment capable of compacting the entire 200 mm lift of sub-base must be utilized for compaction of the sub-base layer.

7. All granular base course placed above the sub-base should be placed in thin lifts (150 mm loose) and compacted to 100 percent of standard Proctor density at optimum moisture content. The granular base course material should meet the aggregate gradation requirements in Table X.

8. A prime coat shall be placed on the finished final lift of Granular Base Course within 24 hours, weather permitting.

9. The asphalt concrete mix design and construction shall meet the specifications as outlined in the R.M. of Corman Park Country Residential Paved Road Construction Standard.

10. If the asphalt concrete will be placed in multiple lifts, it is recommended that the top lift of asphalt concrete be deferred by two years to allow opportunity to correct any settlement or initial pavement deficiencies/defects and to restore the roadway serviceability following the initial construction traffic.

11. Positive surface drainage is recommended to reduce the potential for moisture infiltration through the pavement structure.

12. Surface water should be prevented from seeping back under the outer edges of the traffic structure. Where possible, grades should be designed such that the granular materials can freely discharge into ditches.

TABLE X AGGREGATE GRADATION REQUIREMENTS

Grain Size (mm)	Percent Passing	
	Sub-Base Course*	Base-Course *
50.0	100	100
18.0	–	100
12.5	–	75 – 100
5.0	–	50 – 75
2.0	0 – 80	32 – 52
0.900	–	20 – 35
0.400	0 – 45	15 – 25
0.160	0 – 20	8 – 15
0.071	0 – 8	6 – 11
Plasticity Index (%)	0 – 6	0 – 6
% Fracture (Min)	–	50
Lightweight Pieces (Max,%)	–	5

*As per the R.M. of Corman Park Residential Paved Road Construction Standard

13. Periodic maintenance, such as crack sealing, will be required for asphalt concrete pavement.

If soil embankments are constructed, the following additional recommendations should be considered.

1. All common borrow used for embankment construction should consist of imported granular material or locally available sand soils. Silt soils should not be utilized as embankment fill.

2. Positive surface drainage is recommended to minimize the potential for moisture infiltration into the subgrade soil. Ditches and culverts should be provided where necessary to provide adequate site drainage. Surface water should be prevented from seeping back under the outer edges of the road structure. The embankments should be constructed with a shoulder height of at least 1.0 m above ditchbottom elevation.

3. For sand or granular fill borrow materials, embankment slopes should be no steeper than 3 Horizontal to 1 Vertical (3H : 1V). Similarly, ditch sideslopes should be no steeper than 3H : 1V.

4. Erosion protection is recommended for all embankment sideslopes. The slopes should be covered with topsoil and seeded to encourage vegetation growth. Alternately, erosion control products could be considered, but would be subject to prior approval by the RM of Corman Park and PMEL.

5. The final road grade should be elevated a minimum of 600 mm above the average terrain to minimize snow accumulation on the road.

5.13.5 Optional Construction Considerations

Placement of geotextile/geogrid (such as Combigrid 40/40, EasyGrid 4-150GC, or equivalent) between the subgrade and granular sub-base for the first 50 to 100 m south of Grasswood Road at each access approach may help reduce pavement damage related to differing pavement structures, stopping, turning, etc. Geogrid between the base and sub-base course could also be considered. If utilized, the geotextile/geogrid should be laid flat with no bunching and overlapped by a minimum of 600 mm. The use of higher strength asphalt concrete and/or increasing the asphalt concrete thickness could also be considered within the above-mentioned transition zone.

6 Limitations

The presentation of the summary of the borehole logs and foundation design recommendations has been completed as authorized. Twenty, 150 mm diameter boreholes were dry drilled using our continuous flight, solid stem auger drilling equipment. Borehole logs were compiled during test drilling which, we believe, were representative of the subsurface conditions at the borehole locations at the time of test drilling.

Four piezocone penetration tests were conducted during the field investigation. The inferred subsoil stratigraphy has been shown on the attached CPTu plots.

Variations in the subsurface conditions from that shown on the borehole logs/CPTu plots at locations other than the exact test locations should be anticipated. If conditions should differ from those reported here, then we should be notified immediately in order that we may examine the conditions in the field and reassess our recommendations in the light of any new findings.

The Terms of Reference for this geotechnical investigation did not include any environmental assessment of the site. No detectable evidence of environmentally sensitive materials such as hydrocarbon odour was detected during the actual time of the field test drilling program. If, on the basis of any knowledge, other than that formally communicated to us, there is reason to suspect that environmentally sensitive materials may exist, then additional boreholes should be drilled and samples recovered for chemical analysis.

The subsurface investigation necessitated the drilling of deep boreholes. The boreholes were backfilled with bentonite chips at the completion of test drilling. Please be advised that some settlement of the backfill materials will occur which may leave a depression or an open hole. It is the responsibility of the client to inspect the site and backfill, as required, to ensure that the ground surface at each Borehole location is maintained level with the existing grade.

It is recommended that the monitoring wells should be decommissioned once they are no longer needed. PMEL will not accept any future liability associated with inadequate decommissioning of monitoring wells. Costs for decommissioning the monitoring wells can be provided by PMEL upon request.

This report has been prepared for the exclusive use of 102015575 Saskatchewan Ltd. (Darren Hagen), BCL Engineering Ltd. and their agents for specific application to the proposed Edgemont Estates East residential subdivision to be constructed south of Saskatoon, Saskatchewan. It has been prepared in accordance with generally accepted geotechnical engineering practices and no other warranty, express or implied, is made.

Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, is the responsibility of such Third Party. Governing Agencies such as municipal, provincial, or federal agencies having jurisdictions with respect to this development and/or construction of the facilities described herein have full jurisdiction with respect to the described development. Any other unspecified subsequent development would be considered Third Party and would, therefore, require prior review by PMEL. PMEL accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

The acceptance of responsibility for the design/construction recommendations presented in this report with respect to the foundation system are contingent on adequate and/or full-time inspection (as required, based on site conditions at the time of construction) by a representative of the Geotechnical Consultant. PMEL will not accept any responsibility on this project for any unsatisfactory performance if adequate and/or full-time inspection is not performed by a representative of PMEL.

This report has been digitally secured with personal passwords to lock the document. Due to the possibility of digital modification, only those reports sent directly by PMEL can be relied upon without fault.

We trust that this report fulfills your requirements for this project. Should you require additional information, please contact us.

P. MACHIBRODA ENGINEERING LTD.

PROFESSIONAL ENGINEER
C.C. ZUBROWSKI
MEMBER 12138
2022-02-08
SASKATCHEWAN

Cory Zubrowski, P. Eng.

Association of Professional Engineers & Geoscientists of Saskatchewan
CERTIFICATE OF AUTHORIZATION
P. MACHIBRODA ENGINEERING LTD.
Number 172
Permission to Consult held by:

Discipline	Sk. Reg. No.	Signature
Geotechnical	12138	

2022-02-08

Jennifer Krasowski, P. Eng.

CZ/JK

DRAWINGS

P.MACHIBRODA
ENGINEERING LTD.

KEY PLAN
NOT TO SCALE

NOTE:
1. THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.
2. THIS DRAWING WAS COMPILED FROM GOOGLE EARTH PRO ©2021, IMAGE ©2021 DIGITALGLOBE. (IMAGERY DATE: 8/23/15).
3. THIS DRAWING WAS COMPILED FROM A PRELIMINARY DRAWING PROVIDED BY SCL ENGINEERING LTD.

LEGEND

- –PMEL BOREHOLE
- –BENCHMARK
- –PMEL BOREHOLE (MONITORING WELL INSTALLED)
- –PMEL PIEZOCONE PENETRATION TEST

P. MACHIBRODA ENGINEERING LTD.

CONSULTING
GEOENVIRONMENTAL
GEOTECHNICAL
ENGINEERS

806 – 48th STREET EAST
SASKATOON, SK
S7K 3Y4

DRAWING TITLE:
SITE PLAN
BOREHOLE AND PIEZOCONE LOCATIONS

PROJECT:
PROPOSED EDGEMOUNT ESTATES EAST
RESIDENTIAL SUBDIVISION, SOUTH OF SASKATOON, SK

APPROVED BY:	DRAWN BY:
CZ	TP
DATE: JANUARY, 2022	DRAWING NUMBER: 18682-1
SCALE: AS SHOWN	

KEY PLAN
NOT TO SCALE

NOTE:
1. THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.
2. THIS DRAWING WAS COMPILED FROM GOOGLE EARTH PRO ©2021, IMAGE ©2021 DIGITALGLOBE, (IMAGERY DATE: 08/23/15).

LEGEND

502.0 - GROUNDWATER ELEVATIONS (m) (JANUARY 10, 2022)

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CONSULTING
GEOENVIRONMENTAL
GEOTECHNICAL
ENGINEERS

806 – 48th STREET EAST
SASKATOON, SK
S7K 3Y4

DRAWING TITLE:
GROUNDWATER CONTOUR MAP

PROJECT:
PROPOSED EDGEMOUNT ESTATES EAST RESIDENTIAL SUBDIVISION, SOUTH OF SASKATOON, SK

APPROVED BY: CZ	DRAWN BY: TP
DATE: JANUARY, 2022	DRAWING NUMBER: 18682-1A
SCALE: AS SHOWN	

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-1

DRAWING NUMBER: 18682-2

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 507.22 DATE DRILLED: NOV 26/21

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			5.4						0
		SAND, silty, loose, poorly graded, fine grained, moist, dark brown.			5.2						
1		brown below 0.5 m.			5.3						1
2											2
3		wet, seepage, sloughing below 2.9 m.	☒	6	23.4						3
4		mottled brown and grey below 4.2 m.	☒	4	24.7						4
5		CLAY, some silt, stiff, highly plastic, moist, brown.			37.8					1.75	5
6											6
7											7
8											8
9											9
10											10
11											11
12											12

NOTES:
1. Borehole sloughed to 2.9 m Immediately After Drilling.

SHEET 1 OF 1

02-03-2022 Z:\2021 Projects\WE\WLOG\18682-GEO-SOUTH OF SASKATOON, SK\DWG\BH1-18682.bor

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-2

DRAWING NUMBER: 18682-3

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

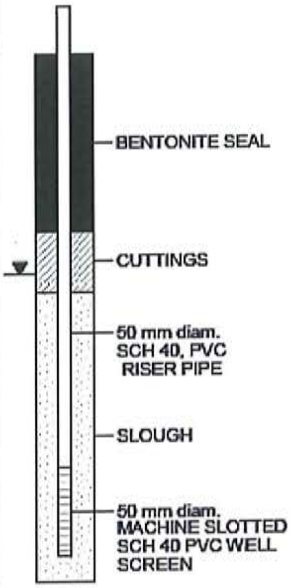
NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 506.61 DATE DRILLED: NOV 26/21

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			6.5					
1		SAND, silty, loose, poorly graded, fine grained, moist, brown.			7.8					
2		SILT, some clay, trace sand, soft to firm, low to medium plastic, moist, dark brown.	☒	3	22.0					
3		SAND, silty, loose, poorly graded, fine grained, wet, brown, seepage, sloughing.			23.5					
4		CLAY, some silt, stiff, highly plastic, moist, brown, oxide stained. stiff to very stiff below 4.2 m.	☒	12	33.9			18.6		
5										
6					39.0					2.0
7										
8										
9										
10										
11										
12										

MONITORING WELL: BH21-2
ELEV.: 506.66 m



NOTES:
1. Borehole sloughed to 2.7 m Immediately After Drilling.
2. Recorded Groundwater Level at 2.49 m on Jan 7/22.

SHEET 1 OF 1

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P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-3

DRAWING NUMBER: 18682-4

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 505.58 DATE DRILLED: NOV 26/21

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	SULPHATE CONTENT (%)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			12.8					
		SILT, sandy, trace clay, stiff, low plastic, moist, dark brown.			12.7					
1		brown below 0.5 m.								
		CLAY, some silt, stiff to very stiff, highly plastic, moist, brown, gypsum crystals.			26.9	60	19		0.902	
2										
		SILT, some sand, trace clay, firm, low plastic, moist, brown.								
3		wet, seepage, sloughing below 3.0 m.	☒	4	31.2					
		SAND, silty, loose to compact, poorly graded, fine grained, wet, brown, seepage, sloughing.								
4			☒	7	32.6					
5										
					28.5					
6										
7										
8										
9										
10										
11										
12										

DEPTH (m): 0 1 2 3 4 5 6 7 8 9 10 11 12

NOTES:
1. Borehole sloughed to 3.3 m Immediately After Drilling.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-4

DRAWING NUMBER: 18682-5

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

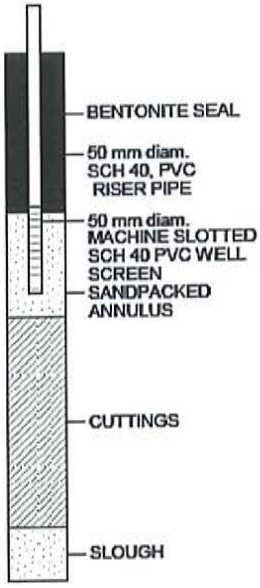
NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 504.89 DATE DRILLED: NOV 26/21

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			4.4					
					6.4					
1		SAND, silty, loose to compact, poorly graded, fine grained, moist, dark brown. brown below 0.4 m.	☒	9	6.3					
2										
3		wet, seepage, sloughing below 2.8 m.			27.3					2.0
		CLAY, some silt, stiff to very stiff, highly plastic, moist, brown, oxide stained, gypsum crystals.								
4			☒	10	37.7			18.6		
5										
6		SILT, trace sand, trace clay, firm, low to medium plastic, wet, brown, seepage, sloughing.			28.7					
7										
8										
9										
10										
11										
12										

MONITORING WELL: BH21-4
ELEV.: 505.60 m



NOTES:
1. Borehole sloughed to 5.4 m Immediately After Drilling.
2. Recorded Groundwater Level Dry on Jan 7/22.

SHEET 1 OF 1

02-03-2022 Z:\2021 Projects\NEWLOG\18682-GEO-SOUTH OF SASKATOON, SK\DWG\BH14-18682.bor

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-5

DRAWING NUMBER: 18682-6

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 504.51 DATE DRILLED: NOV 26/21

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			3.8					
		SAND, silty, loose, poorly graded, fine grained, moist, dark brown.			3.3					
1		brown below 0.6 m.			5.1					
2										
3		wet, seepage, sloughing below 3.0 m.	☒	7	22.6					
4										
			☒	6	23.9					
5										
6					25.6					
7										
8										
9										
10										
11										
12										

▽ (water level)

NOTES:
1. Borehole sloughed to 3.0 m Immediately After Drilling.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-6

DRAWING NUMBER: 18682-7

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

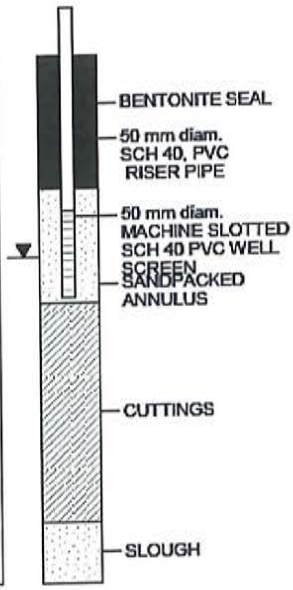
NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 503.51 DATE DRILLED: NOV 26/21

SAMPLE TYPE: ▨ CUTTINGS ⊠ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	SULPHATE CONTENT (%)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			3.5					
					4.4					
1		SAND, silty, loose to compact, poorly graded, fine grained, moist, brown.								
		wet, seepage, sloughing below 1.6 m.	⊠	7	22.6					
2										
3		CLAY, some silt, trace sand, stiff, medium plastic, moist, brown, oxide stained, gypsum crystals.			26.6	41	11		0.811	1.5
		silty, wet, seepage, sloughing 3.2 to 4.4 m.								
4		highly plastic below 4.4 m.								
5			⊠	9	37.6			18.1		
6		SILT, some sand, some clay, firm, low to medium plastic, wet, brown.			32.4					
7										
8										
9										
10										
11										
12										

MONITORING WELL: BH21-6
ELEV.: 504.61



NOTES:
1. Borehole sloughed to 5.3 m Immediately After Drilling.
2. Recorded Groundwater Level at 2.27 m on Jan 7/22.

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P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-7

DRAWING NUMBER: 18682-8

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 503.85 DATE DRILLED: NOV 30/21

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			4.6					
		SAND, silty, loose to compact, poorly graded, fine grained, moist, dark brown.			6.4					
1		brown below 0.3 m.			7.6					
2		wet, seepage, sloughing below 2.6 m.			24.4					
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

▽ 2.6 m

DEPTH (m): 0 1 2 3 4 5 6 7 8 9 10 11 12

NOTES:
1. Borehole sloughed to 2.6 m Immediately After Drilling.

SHEET 1 OF 1

02-08-2022 Z:\2021 Projects\NEW\LOG\18682-GEO-SOUTH OF SASKATOON, SK\DWG\BH7-18682.bor

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-8

DRAWING NUMBER: 18682-9

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 505.98 DATE DRILLED: NOV 30/21

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			4.7					
		SAND, silty, loose to compact, poorly graded, fine grained, moist, brown.			5.0					
1					5.8					
2										
3					12.9					

DEPTH (m): 0 1 2 3 4 5 6 7 8 9 10 11 12

NOTES:
1. Borehole open and dry Immediately After Drilling.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-9

DRAWING NUMBER: 18682-10

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 505.95 DATE DRILLED: NOV 30/21

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	SULPHATE CONTENT (%)	% FINES
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			26.9					
0.6		SILT, trace sand, trace clay, firm, low to medium plastic, moist, dark brown.			18.6	27	15		0.093	50.2
1		brown below 0.6 m.			19.0					
2		SAND, silty, loose to compact, poorly graded, fine grained, moist, brown. wet, seepage, sloughing below 2.1 m.			24.3					
3										

▽ 2.1

DEPTH (m): 0 1 2 3 4 5 6 7 8 9 10 11 12

NOTES:
1. Borehole sloughing to 2.3 m Immediately After Drilling.

SHEET 1 OF 1

02-08-2022 Z:\2021 Projects\NEW LOG\18682-GEO-SOUTH OF SASKATOON, SK\DWG\BH19-18682.bor

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-10

DRAWING NUMBER: 18682-11

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 507.33 DATE DRILLED: NOV 26/21

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		WATER LEVELS ▼ After Drilling ▽ During Drilling								
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			4.7					
					4.0					
1		SAND, silty, loose to compact, poorly graded, fine grained, moist, dark brown.								
		brown below 0.5 m.		7	11.8					
2										
		wet, seepage, sloughing below 2.7 m.			23.6					
3										
4										
		grey below 4.7 m.		4	25.4					
5										
					26.5					
6										
7										
8										
9										
10										
11										
12										

MONITORING WELL: BH21-10
ELEV.: 508.41

- BENTONITE SEAL
- 50 mm diam. SCH 40, PVC RISER PIPE
- SANDPACKED ANNULUS
- 50 mm diam. MACHINE SLOTTED SCH 40 PVC WELL SCREEN
- SLOUGH

DEPTH (m)

NOTES:
1. Borehole sloughed to 2.3 m Immediately After Drilling.
2. Recorded Groundwater Level at 2.82 m on Jan 7/22.

SHEET 1 OF 1

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P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-11

DRAWING NUMBER: 18682-12

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 506.32 DATE DRILLED: NOV 26/21

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			5.6					
		SAND, silty, loose to compact, poorly graded, fine grained, moist, brown.			7.4	23	20			
1										
			☒	10	13.8					
2		wet, seepage, sloughing below 2.7 m.			22.5					
3		SILT, some sand, trace clay, firm, low plastic, wet, brown, seepage, sloughing,								
4										
			☒	9	33.3					
5		some clay, trace sand, stiff, medium plastic, grey below 5.5 m.								
6					31.4					
7										
8										
9										
10										
11										
12										

▽ 2.7 m

NOTES:
1. Borehole sloughed to 2.7m Immediately After Drilling.

SHEET 1 OF 1

02-08-2022 2:30:21 Projects\NEW\LOG\18682-GEO-SOUTH OF SASKATOON, SK\DWG\BH11-18682.bor

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-12

DRAWING NUMBER: 18682-13

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

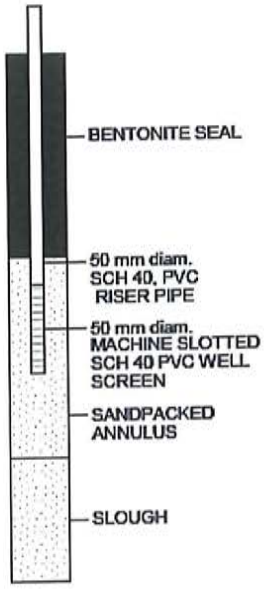
NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 505.98 DATE DRILLED: NOV 26/21

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			4.4					
					3.7					
1		SAND, silty, loose to compact, poorly graded, fine grained, moist, dark brown.			5.1					
		brown below 0.5 m.								
2										
3		wet, seepage, sloughing below 3.1 m.	☒	10	22.0					
4		silt seam, some clay, trace sand, firm , medium plastic, moist to wet, dark brown 4.2 to 4.6 m.	☒	9	26.2					
5		grey below 4.6 m.								
		olive grey below 5.3 m.			22.9					
6										
7										
8										
9										
10										
11										
12										

MONITORING WELL: BH21-12
ELEV.: 507.02



NOTES:
1. Borehole sloughed to 4.6 m Immediately After Drilling.
2. Recorded Groundwater Level Dry on Jan 7/22.

SHEET 1 OF 1

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P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-13

DRAWING NUMBER: 18682-14

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 506.12 DATE DRILLED: NOV 26/21

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			4.9						0
0.4		SAND, silty, compact, poorly graded, fine grained, moist, dark brown.			4.4						
1		brown below 0.6 m.									1
1.5			☒	11	5.9						
2											2
2.5					6.5					2.0	
3											3
4		moist to wet below 4.1 m.									4
4.6		CLAY, some silt, stiff to very stiff, highly plastic, moist, brown, oxide stained.	☒	9	36.9			18.3		2.0	
5											5
5.7		SAND, silty, loose to compact, poorly graded, fine grained, wet, brown, seepage, sloughing.			28.3						
6											6
7											7
8											8
9											9
10											10
11											11
12											12

▽

NOTES:
1. Borehole sloughed to 5.7 m Immediately After Drilling.

SHEET 1 OF 1

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P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-14

DRAWING NUMBER: 18682-15

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

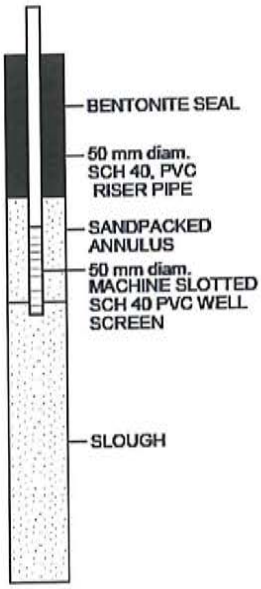
NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 504.36 DATE DRILLED: NOV 29/21

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			5.7					
					5.1					
1		SAND, silty, loose, poorly graded, fine grained, moist, dark brown. brown below 0.6 m.		4	18.6					
2										
3		wet, seepage, sloughing below 3.0 m.		3	37.8			17.6		
		CLAY, silty, soft to firm, medium plastic, moist, brown.								
4		sandy silt seam, wet, seepage, sloughing 3.3 to 3.6 m.			34.5					1.5
5		stiff, highly plastic below 4.2 m. grey below 4.8 m.								
6					34.8					1.5
7										
8										
9										
10										
11										
12										

MONITORING WELL: BH21-14
ELEV.: 505.39



DEPTH (m)

NOTES:
1. Borehole sloughed to 3.8 m Immediately After Drilling.
2. Recorded Groundwater Level Dry on Jan 7/22.

SHEET 1 OF 1

02-09-2022 Z:\2021 Projects\NEW LOG\18682-GEO-SOUTH OF SASKATOON, SK\DWG\BH14-18682.bor

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-15

DRAWING NUMBER: 18682-16

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 502.67 DATE DRILLED: NOV 29/21

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)	DEPTH (m)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			16.0						0
1		SAND, silty, loose, poorly graded, fine grained, moist, dark brown.			9.1						1
		brown below 0.6 m.									
2		wet, seepage, sloughing below 2.2 m.		5	22.0						2
3		mottled brown and grey below 3.1 m.		7	28.3						3
4					29.1						4
5											5
6		SILT, some clay, trace sand, firm, low to medium plastic, wet, brown, seepage, sloughing.			33.7						6
		grey below 5.8 m.									
7											7
8											8
9											9
10											10
11											11
12											12

NOTES:
1. Borehole sloughed to 2.2 m Immediately After Drilling.

SHEET 1 OF 1

02-09-2022 Z:\2021 Projects\NEW\LOG\18682-GEO-SOUTH OF SASKATOON, SK\DWG\BH15-18682.bor

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-16

DRAWING NUMBER: 18682-17

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 506.39 DATE DRILLED: NOV 29/21

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			5.4					
		SAND, silty, loose to compact, poorly graded, fine grained, moist, brown.			3.8					
1										
			☒	9	4.4					
2		some silt below 1.9 m.								
					5.7					
3										
4		oxide stained below 4.0 m.								
			☒	10	10.2					
5		wet, seepage, sloughing below 5.2 m.								
					28.1					
6										
7										
8										
9										
10										
11										
12										

▽ 5.2

DEPTH (m): 0 1 2 3 4 5 6 7 8 9 10 11 12

NOTES:
1. Borehole sloughed to 5.2 m Immediately After Drilling.

SHEET 1 OF 1

02-08-2022 Z:\2021 Projects\NEW\LOG\18682-GEO-SOUTH OF SASKATOON, SK\DWG\BH16-18682.bor

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-17

DRAWING NUMBER: 18682-18

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

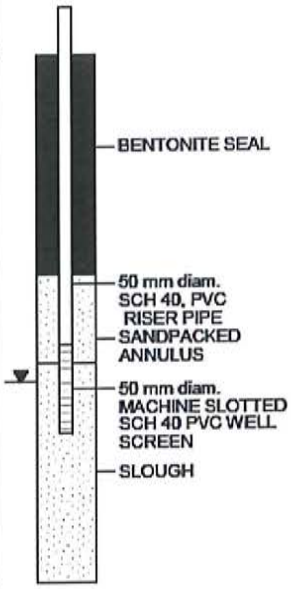
NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 503.77 DATE DRILLED: NOV 29/21

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			5.3					
					4.0					
1		SAND, silty, loose, poorly graded, fine grained, moist, dark brown.								
		brown below 0.4 m.								
		some silt below 1.2 m.		4	4.3					
2										
					6.2					
3		wet, seepage, sloughing below 3.2 m.								
4										
				3	28.2					
5										
					27.4					
6										
7										
8										
9										
10										
11										
12										

MONITORING WELL: BH21-17
ELEV.: 504.84



NOTES:
1. Borehole sloughed to 3.5 m Immediately After Drilling.
2. Recorded Groundwater Level at 3.82 m on Jan 10/22.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-18

DRAWING NUMBER: 18682-19

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 505.28 DATE DRILLED: NOV 29/21

SAMPLE TYPE: ☒ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/ 300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			5.7					
		SAND, silty, loose to compact, poorly graded, fine grained, moist, dark brown.			4.7					
1		brown below 0.5 m.			4.2					
2										
3					10.7					

DEPTH (m): 0 1 2 3 4 5 6 7 8 9 10 11 12

NOTES:
1. Borehole open and dry Immediately After Drilling.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-19

DRAWING NUMBER: 18682-20

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 502.25 DATE DRILLED: NOV 29/21

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	COMPRESSIVE STRENGTH (kPa)	% FINES
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			23.0					64.0
		SILT, some clay, trace sand, firm to stiff, medium plastic, moist, dark brown.			21.1					
1		brown below 0.6 m.								
		SAND, silty, loose to compact, poorly graded, fine grained, moist, brown.	☒	8	21.1					
2		loose below 2.2 m.								
		wet, seepage, sloughing below 2.7 m.	☒	3	32.4					
3										
4		grey below 4.2 m.			30.5					
5										
6		mottled grey with traces black, trace organic inclusions below 5.9 m.			31.7					
7										
8										
9										
10										
11										
12										

NOTES:
1. Borehole sloughed to 2.7 m Immediately After Drilling.

P.MACHIBRODA ENGINEERING LTD.

BOREHOLE 21-20

DRAWING NUMBER: 18682-21

PROJECT: PROPOSED EDGEMONT ESTATES EAST RESIDENTIAL SUBDIVISION

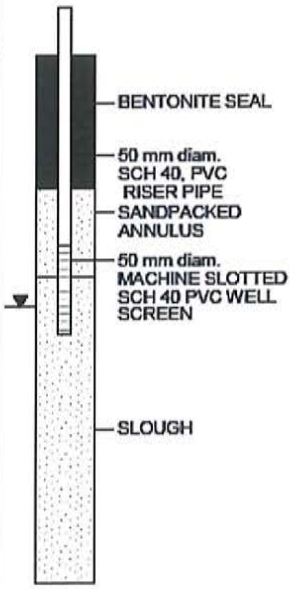
LOCATION: SOUTH OF SASKATOON, SK

NORTHING (m): N/A EASTING (m): N/A ELEVATION (m): 503.92 DATE DRILLED: NOV 29/21

SAMPLE TYPE: ☐ CUTTINGS ☒ SPLIT SPOON ■ SHELBY TUBE

WATER LEVELS
▼ After Drilling
▽ During Drilling

DEPTH (m)	STRATIGRAPHY	DESCRIPTION	SAMPLE TYPE	SPT (N) BLOWS/300 mm	WATER CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	UNIT WEIGHT (kN/m³)	SULPHATE CONTENT (%)	POCKET PEN. (kg/m²)
0		TOPSOIL, moist, dark brown, organics, rootlets, frozen.			14.7					
		SILT, sandy, clayey, firm to stiff, low to medium plastic, moist, dark brown.			11.1	30	12		<0.05	
1		brown below 0.3 m.		8	18.1					
2		SAND, silty, loose to compact, poorly graded, fine grained, moist, brown.								
3		loose, wet, grey, seepage, sloughing below 2.9 m.		5	29.8					
4					33.7					
5		SILT, trace sand, trace clay, firm, low plastic, wet, grey, seepage, sloughing.			32.1					
6										



DEPTH (m) 0 1 2 3 4 5 6 7 8 9 10 11 12

NOTES:
1. Borehole sloughed to 2.5 m Immediately After Drilling.
2. Recorded Groundwater Level at 2.96 m on Jan 10/22.

SHEET 1 OF 1

02-06-2022 Z:\2021 Projects\WELLOG\18682-GEO-SOUTH OF SASKATOON, SK\DWG\BH20-18682.bor

APPENDIX A

Explanation of Terms on
Borehole Logs

CLASSIFICATION OF SOILS

Coarse-Grained Soils: Soils containing particles that are visible to the naked eye. They include gravels and sands and are generally referred to as cohesionless or non-cohesive soils. Coarse-grained soils are soils having more than 50 percent of the dry weight larger than particle size 0.080 mm.

Fine-Grained Soils: Soils containing particles that are not visible to the naked eye. They include silts and clays. Fine-grained soils are soils having more than 50 percent of the dry weight smaller than particle size 0.080 mm.

Organic Soils: Soils containing a high natural organic content.

Soil Classification By Particle Size

Soil Type	Particles of Size
Clay	< 0.002 mm
Silt	0.002 – 0.060 mm
Sand	0.06 – 2.0 mm
Gravel	2.0 – 60 mm
Cobbles	60 – 200 mm
Boulders	>200 mm

TERMS DESCRIBING CONSISTENCY OR CONDITION

Coarse-grained soils: Described in terms of compactness condition and are often interpreted from the results of a Standard Penetration Test (SPT). The standard penetration test is described as the number of blows, N, required to drive a 51 mm outside diameter (O.D.) split barrel sampler into the soil a distance of 0.3 m (from 0.15 m to 0.45 m) with a 63.5 kg weight having a free fall of 0.76 m.

Compactness Condition	SPT N-Index (blows per 0.3 m)
Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	Over 50

Fine-Grained Soils: Classified in relation to undrained shear strength.

Consistency	Undrained Shear Strength (kPa)	N Value (Approximate)	Field Identification
Very Soft	<12	0-2	Easily penetrated several centimetres by the fist.
Soft	12-25	2-4	Easily penetrated several centimetres by the thumb.
Firm	25-50	4-8	Can be penetrated several centimetres by the thumb with moderate effort.
Stiff	50-100	8-15	Readily indented by the thumb, but penetrated only with great effort.
Very Stiff	100-200	15-30	Readily indented by the thumb nail.
Hard	>200	>30	Indented with difficulty by the thumbnail.

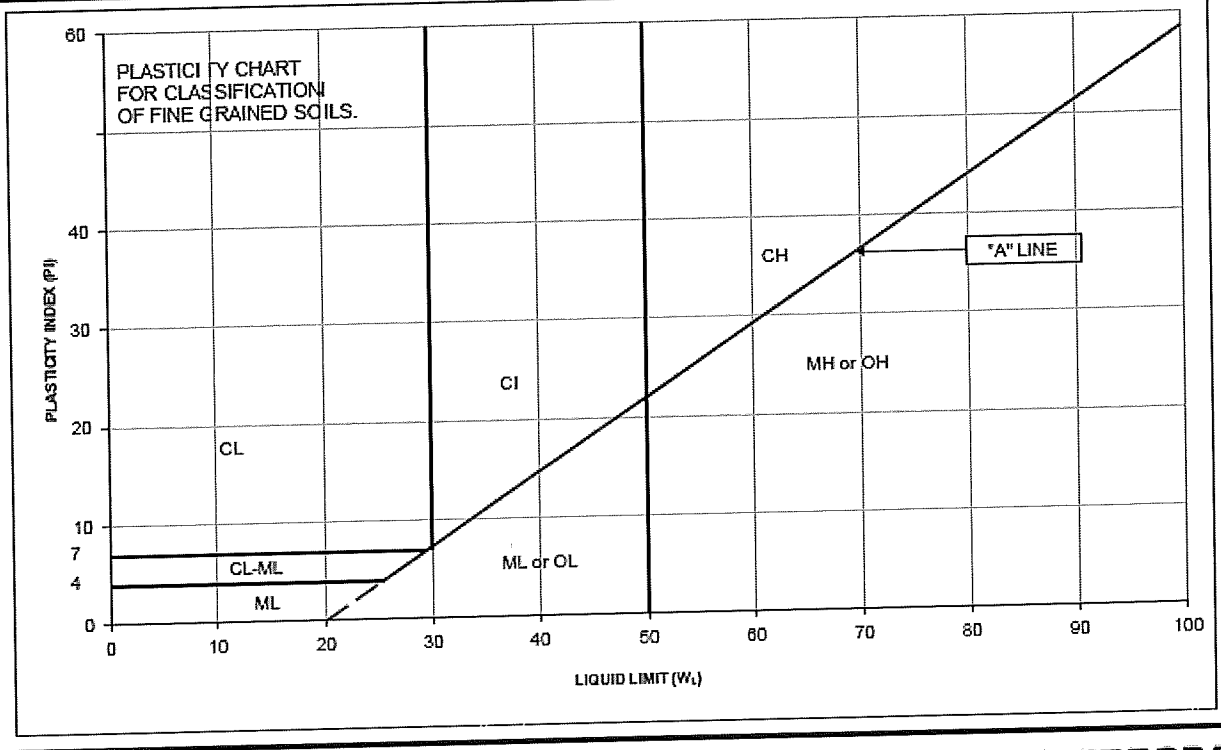
Organic Soils: Readily identified by colour, odour, spongy feel and frequently by fibrous texture.

DESCRIPTIVE TERMS COMMONLY USED TO CHARACTERIZE SOILS

Poorly Graded	- predominance of particles of one grain size.
Well Graded	- having no excess of particles in any size range with no intermediate sizes lacking.
Mottled	- marked with different coloured spots.
Nuggety	- structure consisting of small prismatic cubes.
Laminated	- structure consisting of thin layers of varying colour and texture.
Slickensided	- having inclined planes of weakness that are slick and glossy in appearance.
Fissured	- containing shrinkage cracks.
Fractured	- broken by randomly oriented interconnecting cracks in all 3 dimensions

SOIL CLASSIFICATION SYSTEM (MODIFIED U.S.C.)

MAJOR DIVISION			GROUP SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONG COLOUR OR ODOUR AND OFTEN FIBROUS TEXTURE
COARSE-GRAINED SOILS [MORE THAN HALF BY WEIGHT LARGER THAN NO. 200 SIEVE SIZE]	GRAVELS More than half coarse fraction larger than No. 4 sieve size	CLEAN GRAVELS	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES <5% FINES	$C_u = \frac{D_{60}}{D_{10}} > 4 \quad C_c = \frac{(D_{30})^2}{D_{60} \times D_{10}} = 1 \text{ to } 3$
			GP	POORLY-GRADED GRAVELS AND GRAVEL-SAND MIXTURES <5% FINES	NOT MEETING ALL ABOVE REQUIREMENTS FOR GW
		DIRTY GRAVELS	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES >12% FINES	ATTERBERG LIMITS BELOW "A" LINE OR PI < 4
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES >12% FINES	ATTERBERG LIMITS ABOVE "A" LINE WITH PI > 7
	SANDS More than half coarse fraction smaller than No. 4 sieve size	CLEAN SANDS	SW	WELL-GRADED SANDS, GRAVELLY SANDS MIXTURES <5% FINES	$C_u = \frac{D_{60}}{D_{10}} > 6 \quad C_c = \frac{(D_{30})^2}{D_{60} \times D_{10}} = 1 \text{ to } 3$
			SP	POORLY-GRADED SANDS OR GRAVELLY SANDS <5% FINES	NOT MEETING ALL GRADATION REQUIREMENTS FOR SW
		DIRTY SANDS	SM	SILTY SANDS, SAND-SILT MIXTURES >12% FINES	ATTERBERG LIMITS BELOW "A" LINE OR PI < 4
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES >12% FINES	ATTERBERG LIMITS ABOVE "A" LINE WITH PI >7
FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT PASSING NO. 200 SIEVE SIZE)	SILTS Below "A" line on plasticity chart; negligible organic content		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY	$W_L < 50$
			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS	$W_L > 50$
	CLAYS Above "A" line on plasticity chart; negligible organic content		CL	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS	$W_L < 30$
			CI	INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS	$W_L > 30 < 50$
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	$W_L > 50$
	ORGANIC SILTS & ORGANIC CLAYS Below "A" line on plasticity chart		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	$W_L < 50$
			OH	ORGANIC CLAYS OF HIGH PLASTICITY	$W_L > 50$



P.MACHIBRODA ENGINEERING LTD.

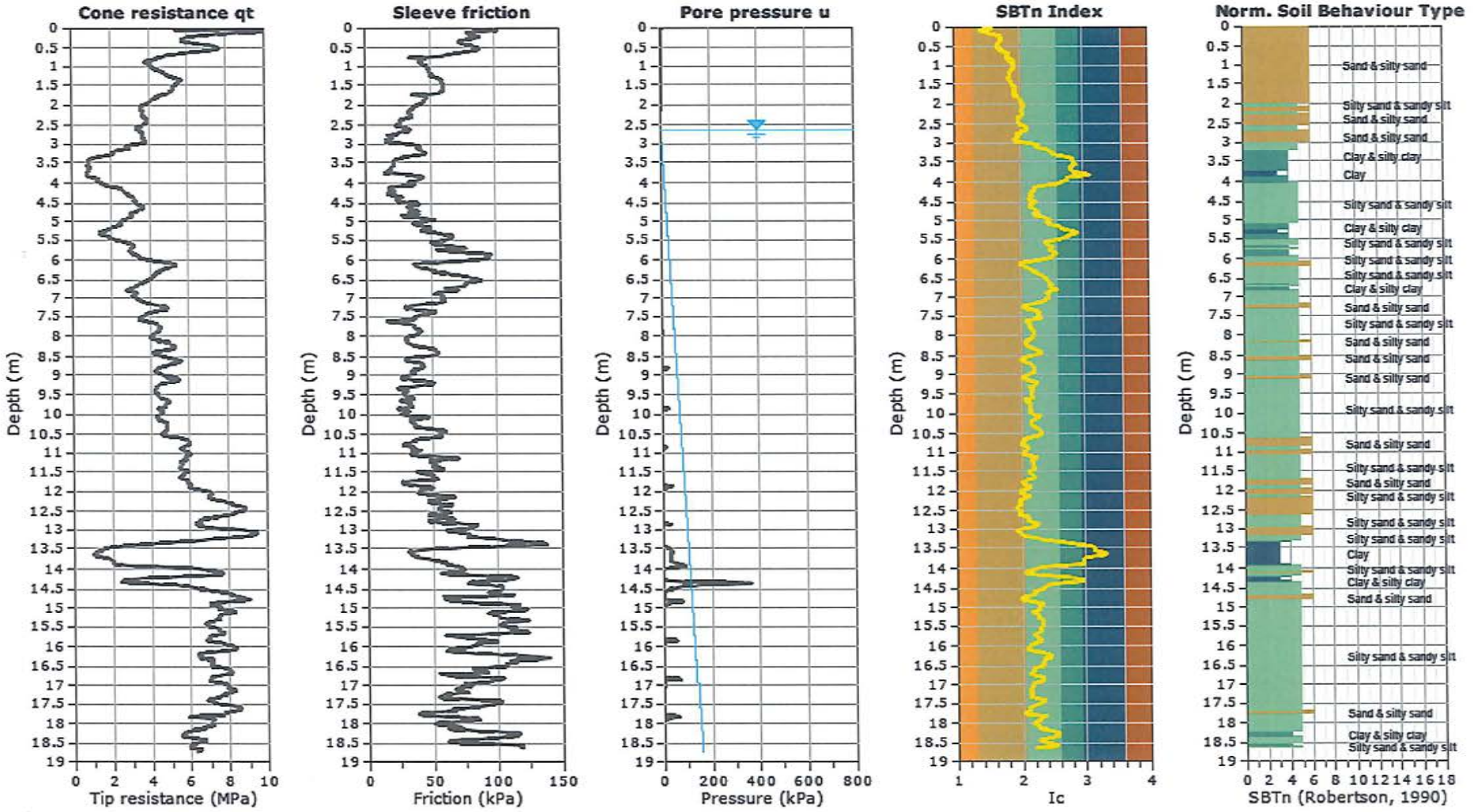
APPENDIX B

CPTu Plots

P. Machibroda Engineering Ltd.
806-48th Street East
Saskatoon, Saskatchewan S7K 3Y4
www.machibroda.com

Project: Proposed Edgemont Estates East Residential Subdivision
Location: South of Saskatoon, SK

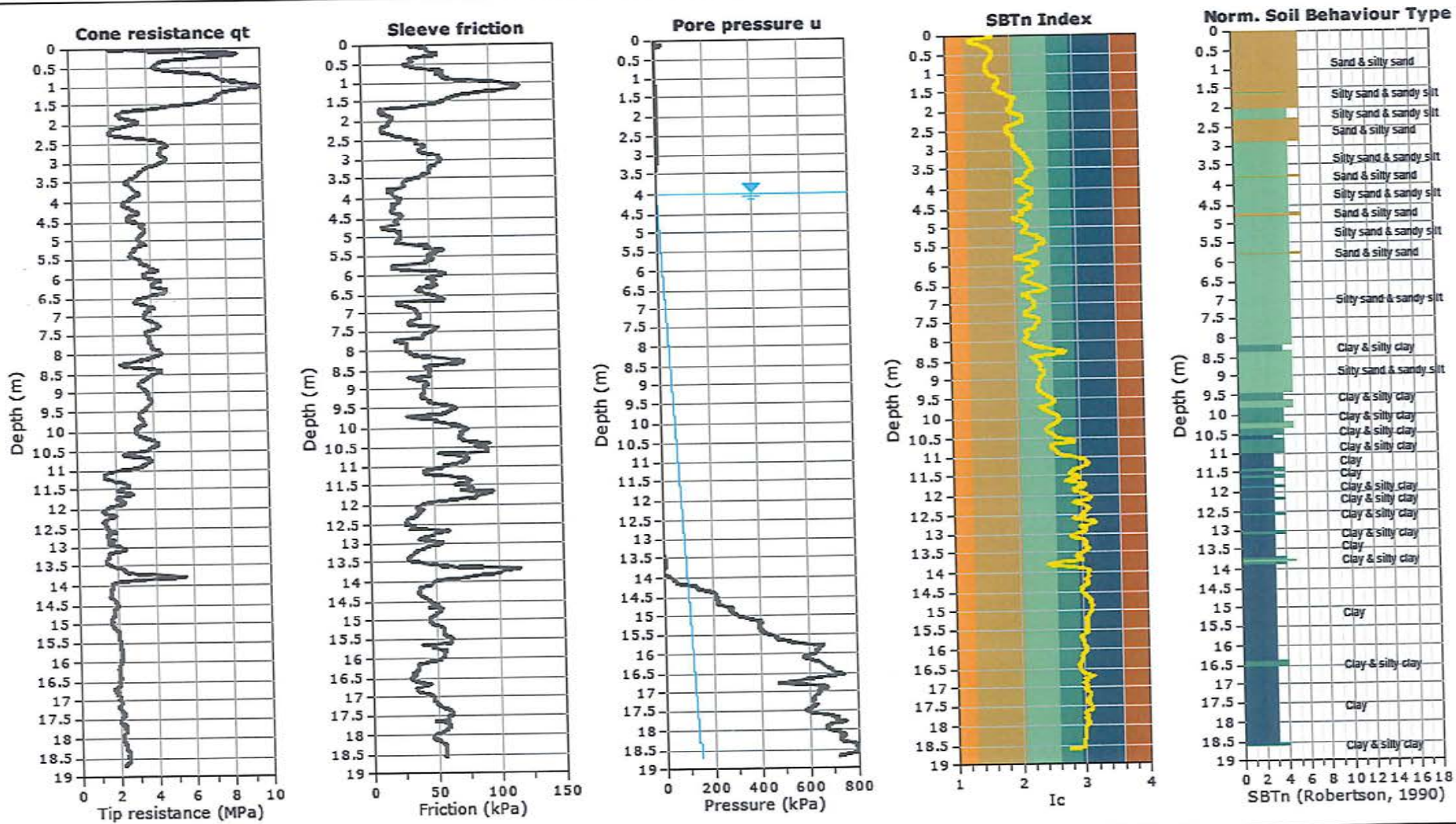
CPT: 21-7
Total depth: 18.74 m, Date: 11/29/2021
Surface Elevation: 503.90 m
Cone Type: Vertek 15 cm^2
Cone Operator: PMEL



P. Machibroda Engineering Ltd.
806-48th Street East
Saskatoon, Saskatchewan S7K 3Y4
www.machibroda.com

Project: Proposed Edgemont Estates East Residential Subdivision
Location: South of Saskatoon, SK

CPT: 21-8
Total depth: 18.70 m, Date: 11/29/2021
Surface Elevation: 506.00 m
Cone Type: Vertek 15 cm^2
Cone Operator: PMEL

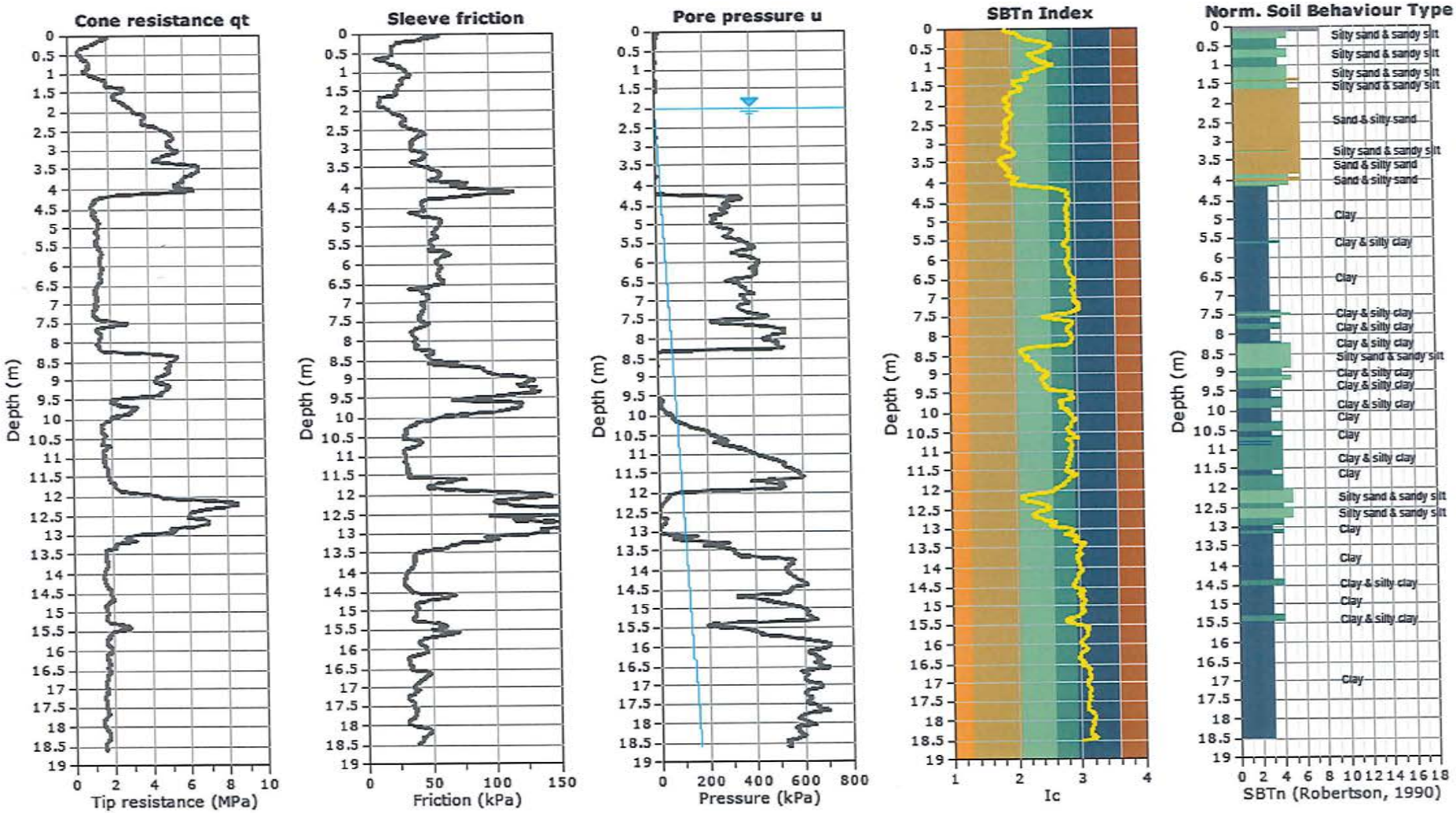


CPeT-IT v.2.0.2.7 - CPTU data presentation & interpretation software - Report created on: 1/12/2022, 2:13:12 PM
Project file: Y:\2021 Projects\18682 - Edgemont Estates East Subdivision\CPT\18682.cpt

P. Machibroda Engineering Ltd.
806-48th Street East
Saskatoon, Saskatchewan S7K 3Y4
www.machibroda.com

Project: Proposed Edgemont Estates East Residential Subdivision
Location: South of Saskatoon, SK

CPT: 21-9
Total depth: 18.60 m, Date: 11/29/2021
Surface Elevation: 506.00 m
Cone Type: Vertek 15 cm^2
Cone Operator: PMEL

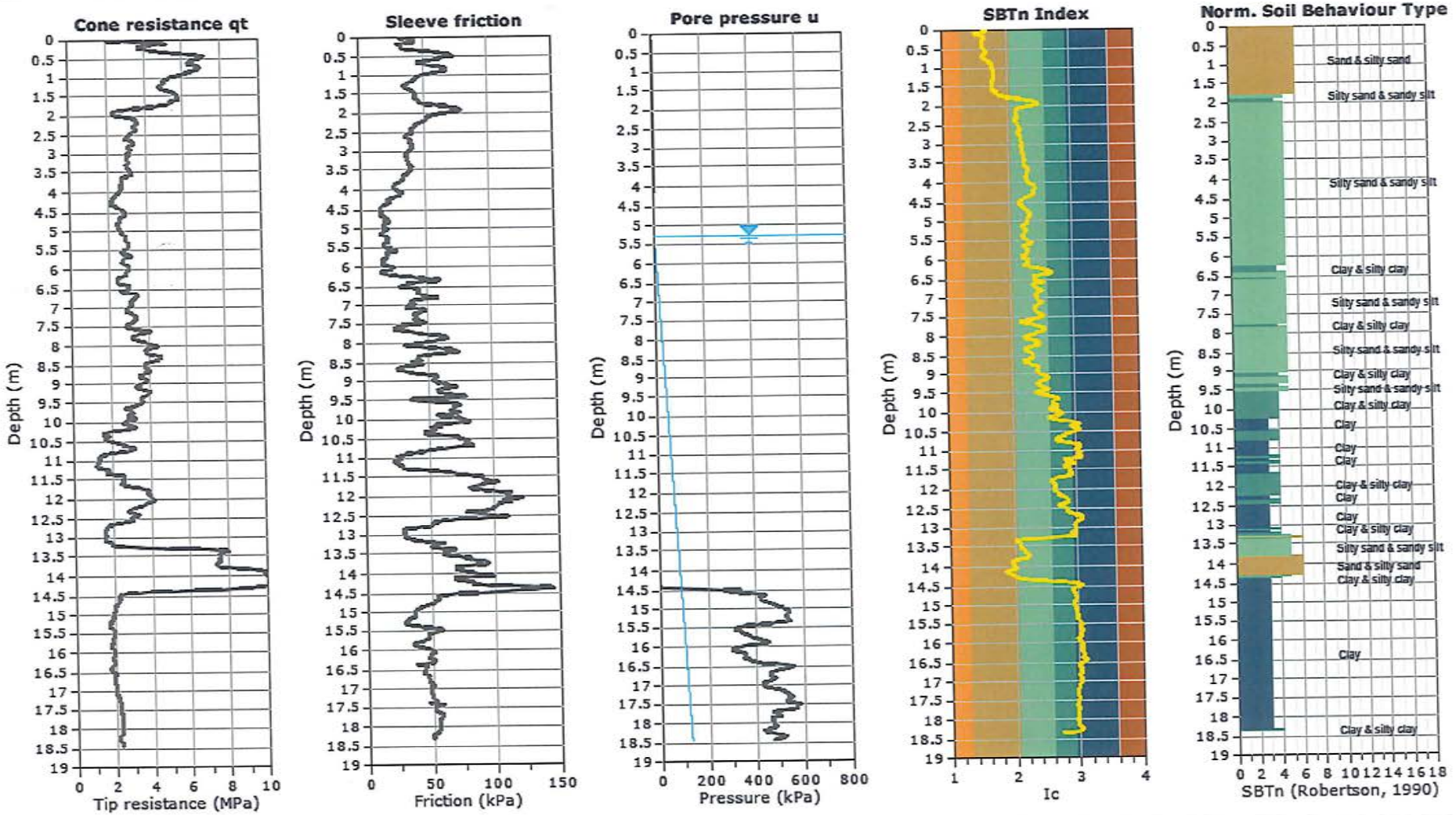


P. Machibroda Engineering Ltd.
806-48th Street East
Saskatoon, Saskatchewan S7K 3Y4
www.machibroda.com

CPT: 21-18

Total depth: 18.44 m, Date: 11/29/2021
Surface Elevation: 505.30 m
Cone Type: Vertek 15 cm^2
Cone Operator: PMEL

Project: Proposed Edgemont Estates East Residential Subdivision
Location: South of Saskatoon, SK



APPENDIX C

Grain Size Distribution Analysis
Test Results

P.MACHIBRODA ENGINEERING LTD.

ASTM C136: GRAIN SIZE ANALYSIS

Project: Edgemont Estates East Residential Subdivision
Location: South of Saskatoon, SK
Project No.: 18682
Date Tested: January 6, 2022
Borehole No: 21-1
Sample No.: 3
Depth: 1.5

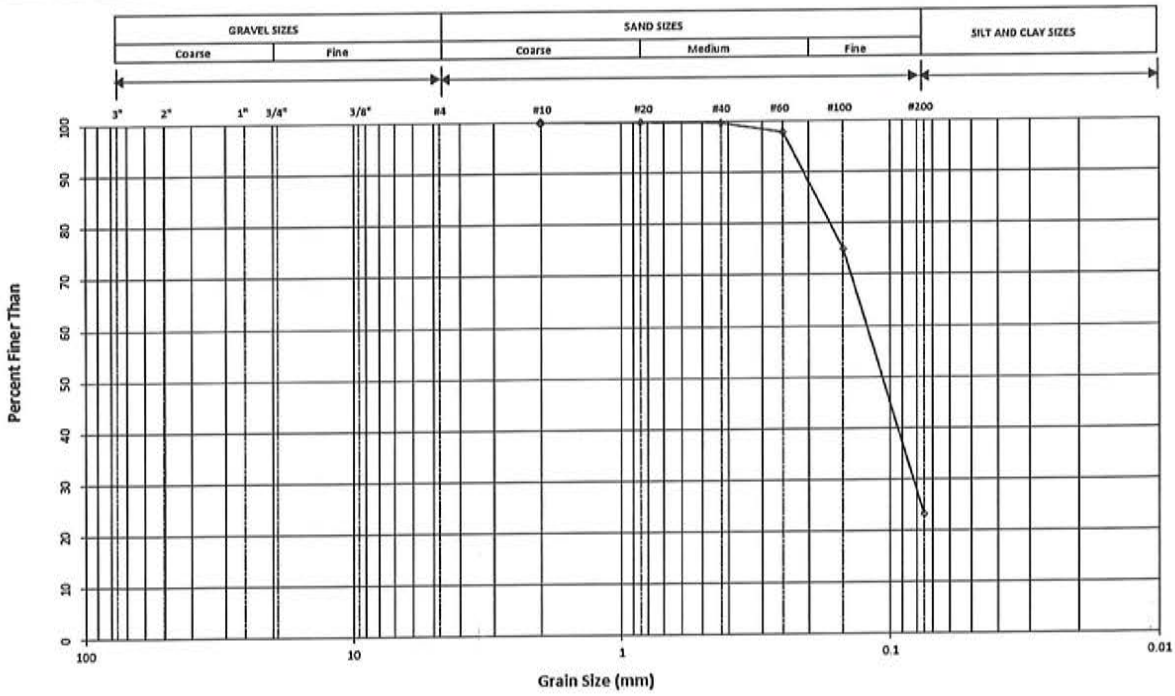
Sieve Analysis:

Sieve	Diameter mm	% Finer
	76.200	100
	63.500	100
	50.000	100
	37.500	100
	25.000	100
	19.000	100
	12.500	100
	9.500	100
	4.750	100
	2.000	100
	0.850	100
	0.425	100
	0.250	98
	0.150	75
	0.075	23

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt and Clay Sizes
0	77	23

Remarks:



CERTIFIED BY CCIL
Canadian Council of Independent Laboratories
For specific tests as listed on www.ccil.com

DRAWING NO.

Appendix C-1

WE CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH ASTM C136 AND C117 STANDARDS
P. MACHIBRODA ENGINEERING LTD.
PER Preston Schengerinth

APPROVED BY: RAY MACHIBRODA, REVISION NO. 2

DECEMBER 13, 2018

P.MACHIBRODA ENGINEERING LTD.

ASTM C136: GRAIN SIZE ANALYSIS

Project: Edgemont Estates East Residential Subdivision
Location: South of Saskatoon, SK
Project No.: 18682
Date Tested: January 6, 2022
Borehole No: 21-6
Sample No.: 57
Depth: 1.5-1.9

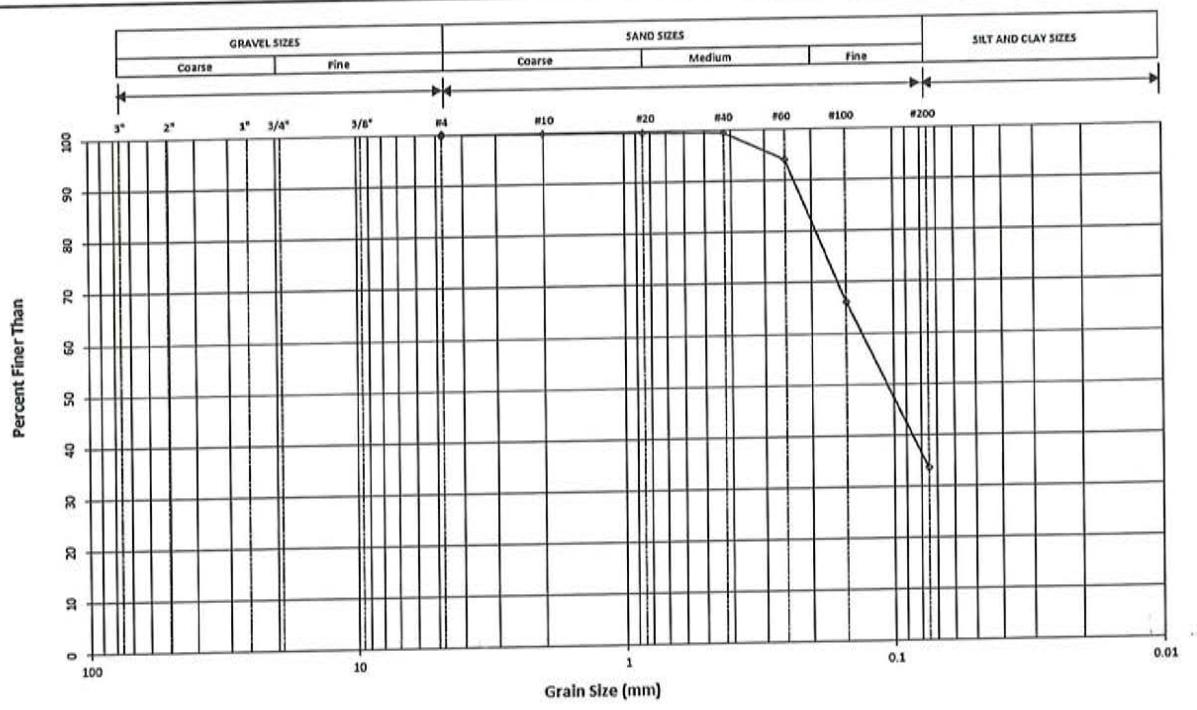
Sieve Analysis:

Sieve	Diameter mm	% Finer
	76.200	100
	63.500	100
	50.000	100
	37.500	100
	25.000	100
	19.000	100
	12.500	100
	9.500	100
	4.750	100
	2.000	100
	0.850	100
	0.425	100
	0.250	94
	0.150	66
	0.075	34

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt and Clay Sizes
0	66	34

Remarks:



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Appendix C-2

W/E CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH ASTM C136 AND C117 STANDARDS
P. MACHIBRODA ENGINEERING LTD.
PER

DECEMBER 13, 2018

APPROVED BY: RAY MACHIBRODA; REVISION NO. 2

P.MACHIBRODA ENGINEERING LTD.

ASTM C136: GRAIN SIZE ANALYSIS

Project: Edgemont Estates East Residential Subdivision
Location: South of Saskatoon, SK
Project No.: 18682
Date Tested: January 6, 2022
Borehole No: 21-7
Sample No.: 104
Depth: 3.0

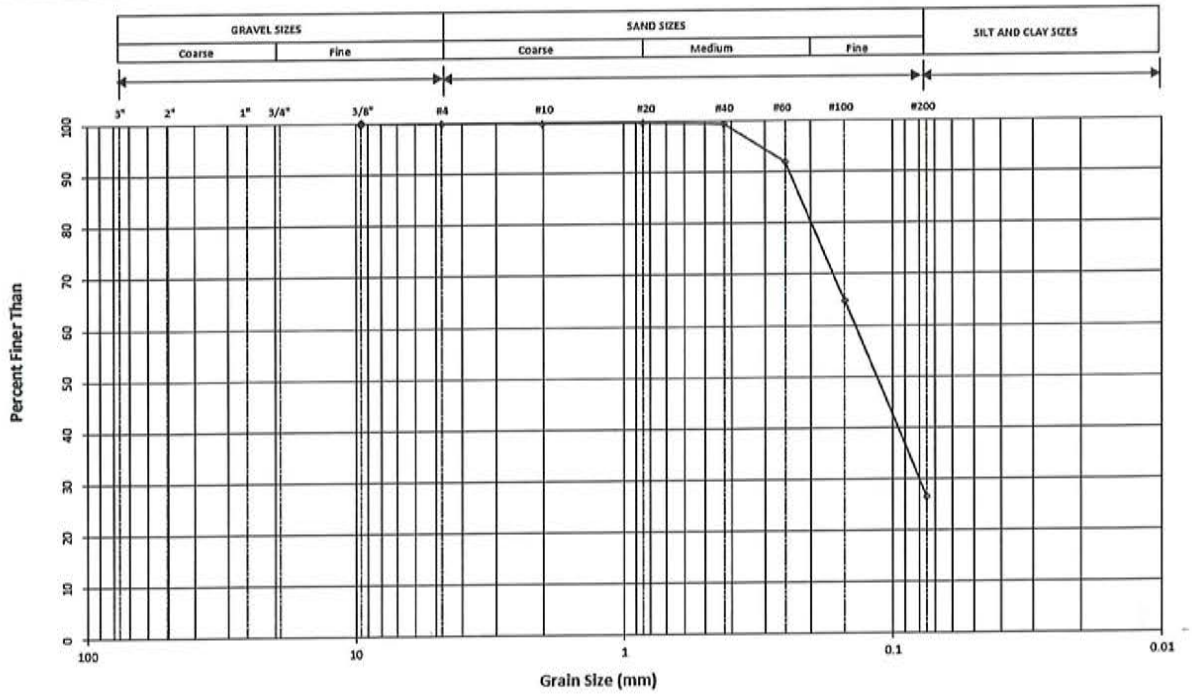
Sieve Analysis:

Sieve	Diameter mm	% Finer
	76.200	100
	63.500	100
	50.000	100
	37.500	100
	25.000	100
	19.000	100
	12.500	100
	9.500	100
	4.750	100
	2.000	100
	0.850	100
	0.425	99
	0.250	92
	0.150	65
	0.075	26

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt and Clay Sizes
0	73	27

Remarks:



CERTIFIED BY CCIL

DRAWING NO.

Appendix C-3

WE CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH ASTM C136 AND C117 STANDARDS
P. MACHIBRODA ENGINEERING LTD.
PER Preston Schengerlink

APPROVED BY: RAY MACHIBRODA; REVISION NO. 2

DECEMBER 13, 2018

P.MACHIBRODA ENGINEERING LTD.

AASHTO T 88: PARTICLE SIZE ANALYSIS OF SOILS

Project: Edgemont Estates East Residential Subdivision

Location: South of Saskatoon, SK

Project No.: 18682

Date Tested: January 5, 2022

Borehole No.: 21-8

Sample No.: 110

Depth (m): 0.8

Sieve Analysis:

Sieve	Diameter mm	% Finer
1.5"	38.1	100
1"	25.4	100
3/4"	19.1	100
1/2"	12.7	100
3/8"	9.5	100
# 4	4.75	100
# 10	2	100
# 20	0.85	100
# 40	0.425	99.5
#60	0.25	95.3
# 100	0.15	76.7
# 200	0.075	36.5

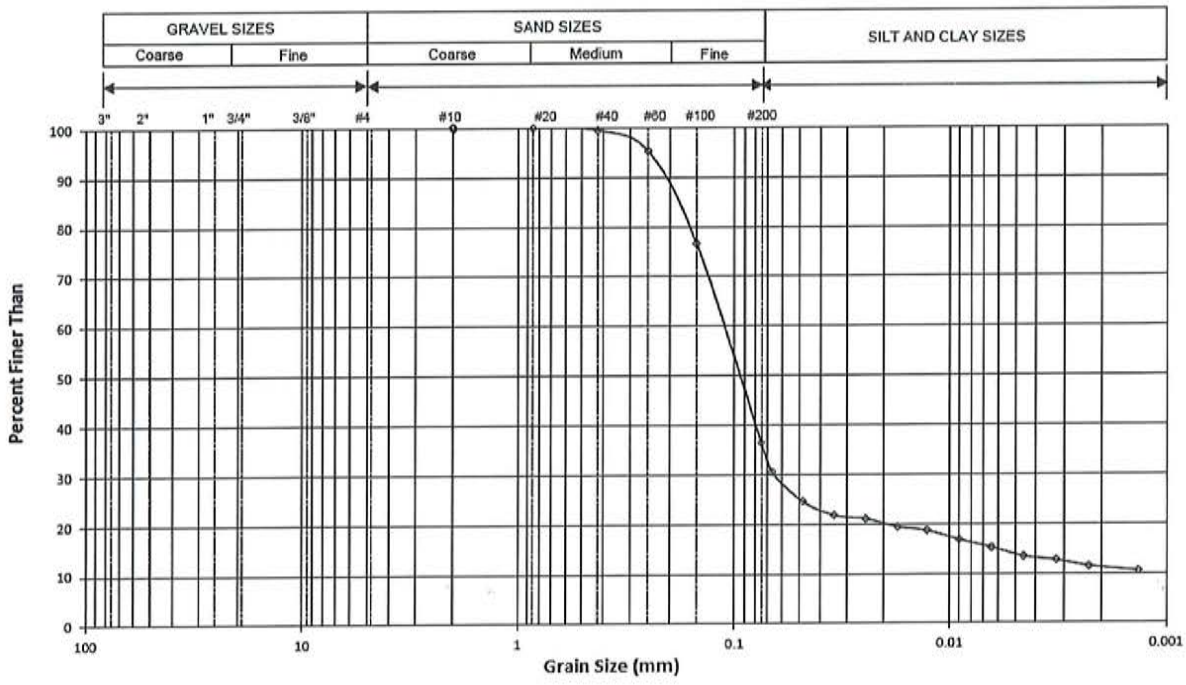
Hydrometer Analysis:

	Diameter mm	% Finer
Dispersing Agent:	0.0670	30.6
Sodium Hexametaphosphate	0.0482	24.6
	0.0344	21.8
	0.0244	21.1
	0.0173	19.5
	0.0127	18.7
	0.0090	16.8
	0.0064	15.2
	0.0046	13.5
	0.0032	12.7
	0.0023	11.5
	0.0013	10.5

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt Sizes	% Clay Sizes
0	63	26	11

Remarks:



CERTIFIED BY CCIL

Drawing No.

Appendix C-4

WE CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH AASHTO T 88 STANDARD
P. MACHIBRODA ENGINEERING LTD.
PER

P.MACHIBRODA ENGINEERING LTD.

ASTM C136: GRAIN SIZE ANALYSIS

Project: Edgemont Estates East Residential Subdivision
Location: South of Saskatoon, SK
Project No.: 18682
Date Tested: January 6, 2022
Borehole No: 21-11
Sample No.: 39
Depth: 1.5-1.9

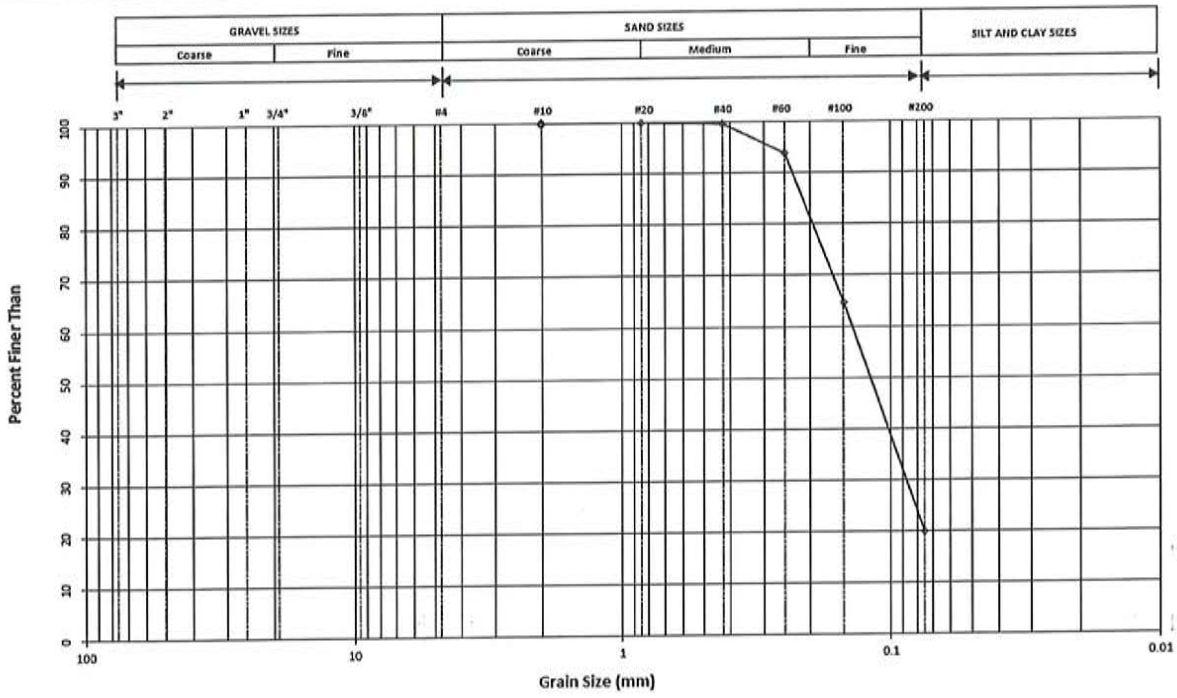
Sieve Analysis:

Sieve	Diameter mm	% Finer
	76.200	100
	63.500	100
	50.000	100
	37.500	100
	25.000	100
	19.000	100
	12.500	100
	9.500	100
	4.750	100
	2.000	100
	0.850	100
	0.425	100
	0.250	94
	0.150	65
	0.075	20

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt and Clay Sizes
0	80	20

Remarks:



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Appendix C-5

WE CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH ASTM C136 AND C117 ESTANDARDS
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PER

P.MACHIBRODA ENGINEERING LTD.

ASTM C136: GRAIN SIZE ANALYSIS

Project: Edgemont Estates East Residential Subdivision
Location: South of Saskatoon, SK
Project No.: 18682
Date Tested: January 6, 2022
Borehole No: 21-14
Sample No.: 69
Depth: 1.5-1.9

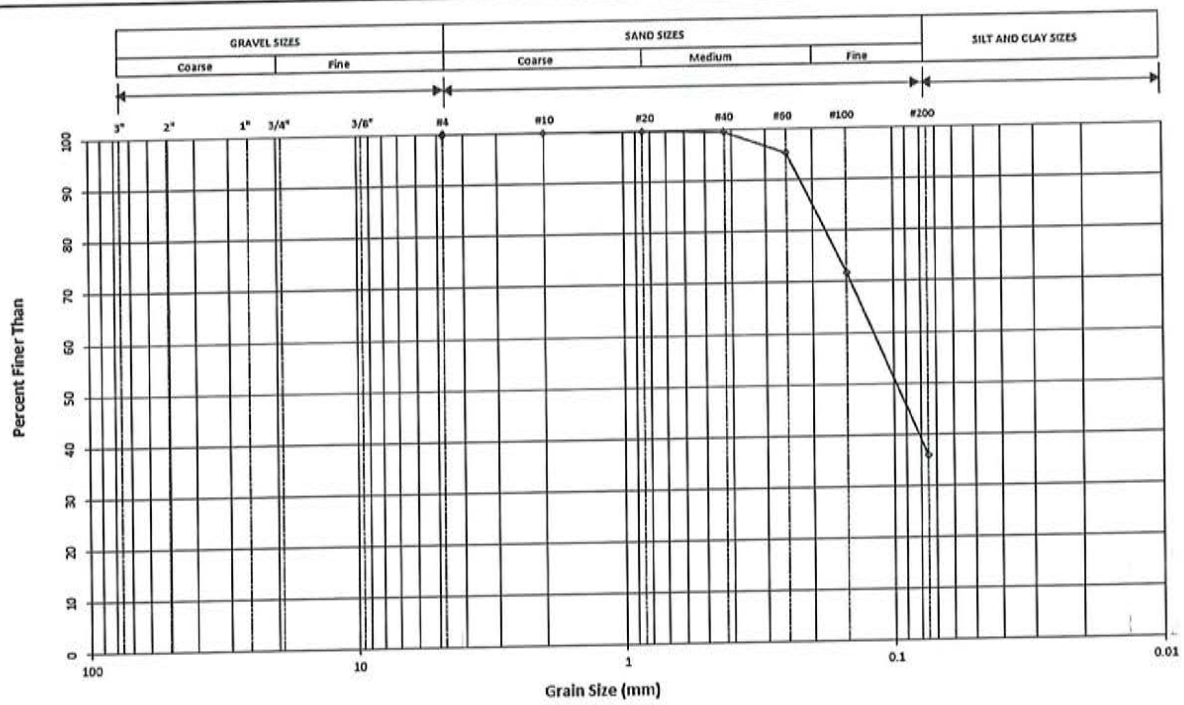
Sieve Analysis:

Sieve	Diameter mm	% Finer
	76.200	100
	63.500	100
	50.000	100
	37.500	100
	25.000	100
	19.000	100
	12.500	100
	9.500	100
	4.750	100
	2.000	100
	0.850	100
	0.425	100
	0.250	95
	0.150	72
	0.075	36

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt and Clay Sizes
0	64	36

Remarks:



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Appendix C-6

WE CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH ASTM C136 AND C117 STANDARDS
P. MACHIBRODA ENGINEERING LTD.
PER

DECEMBER 13, 2018

APPROVED BY: RAY MACHIBRODA, REVISION NO. 2

P.MACHIBRODA ENGINEERING LTD.

AASHTO T 88: PARTICLE SIZE ANALYSIS OF SOILS

Project: Edgemont Estates East Residential Subdivision
Location: South of Saskatoon, SK
Project No.: 18682
Date Tested: January 5, 2022
Borehole No.: 21-15
Sample No.: 62
Depth (m): 0.8

Sieve Analysis:

Sieve	Diameter mm	% Finer
1.5"	38.1	100
1"	25.4	100
3/4"	19.1	100
1/2"	12.7	100
3/8"	9.5	100
# 4	4.75	100
# 10	2	100
# 20	0.85	100
# 40	0.425	99.3
#60	0.25	88.8
# 100	0.15	49.0
# 200	0.075	17.6

Hydrometer Analysis:

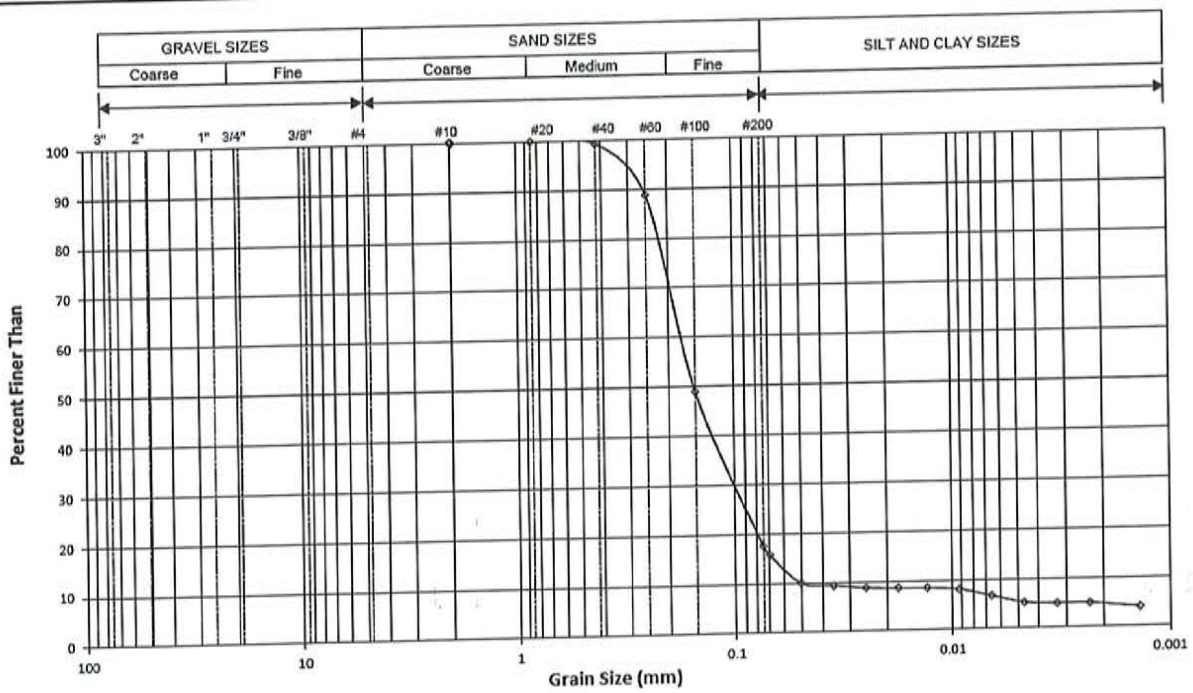
Dispersing Agent:
Sodium Hexametaphosphate

Diameter mm	% Finer
0.0700	15.7
0.0503	10.0
0.0357	9.4
0.0253	8.8
0.0179	8.6
0.0131	8.5
0.0092	8.1
0.0066	6.7
0.0047	5.3
0.0033	4.9
0.0023	4.9
0.0014	4.0

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt Sizes	% Clay Sizes
0	82	13	5

Remarks:



CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Drawing No.

Appendix C-7

WE CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH AASHTO T 88 STANDARD
P. MACHIBRODA ENGINEERING LTD.
PER

JANUARY 25, 2016

APPROVED BY: RAY MACHIBRODA; REVISION NO.5

P.MACHIBRODA ENGINEERING LTD.

ASTM C136: GRAIN SIZE ANALYSIS

Project: Edgemont Estates East Residential Subdivision
Location: South of Saskatoon, SK
Project No.: 18682
Date Tested: January 6, 2022
Borehole No: 21-17
Sample No.: 82
Depth: 3.0

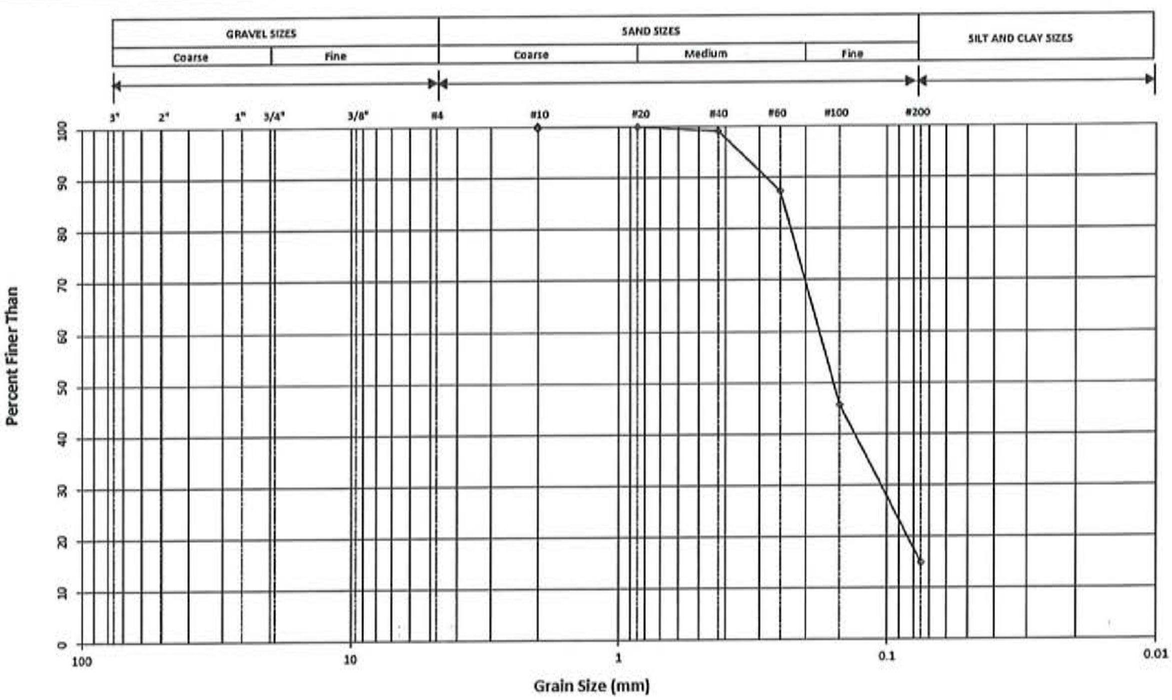
Sieve Analysis:

Sieve	Diameter mm	% Finer
	76.200	100
	63.500	100
	50.000	100
	37.500	100
	25.000	100
	19.000	100
	12.500	100
	9.500	100
	4.750	100
	2.000	100
	0.850	100
	0.425	99
	0.250	87
	0.150	46
	0.075	15

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt and Clay Sizes
0	85	15

Remarks:



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DRAWING NO.

Appendix C-8

WE CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH ASTM C136 AND C117 CSTANDARDS
P. MACHIBRODA ENGINEERING LTD.

PER [signature]

P.MACHIBRODA ENGINEERING LTD.

AASHTO T 88: PARTICLE SIZE ANALYSIS OF SOILS

Project: Edgemont Estates East Residential Subdivision

Location: South of Saskatoon, SK

Project No.: 18682

Date Tested: January 5, 2022

Borehole No.: 21-20

Sample No.: 92

Depth (m): 0.8

Sieve Analysis:

Sieve	Diameter mm	% Finer
1.5"	38.1	100
1"	25.4	100
3/4"	19.1	100
1/2"	12.7	100
3/8"	9.5	100
# 4	4.75	100
# 10	2	100
# 20	0.85	100
# 40	0.425	99.7
#60	0.25	97.5
# 100	0.15	87.8
# 200	0.075	66.0

Hydrometer Analysis:

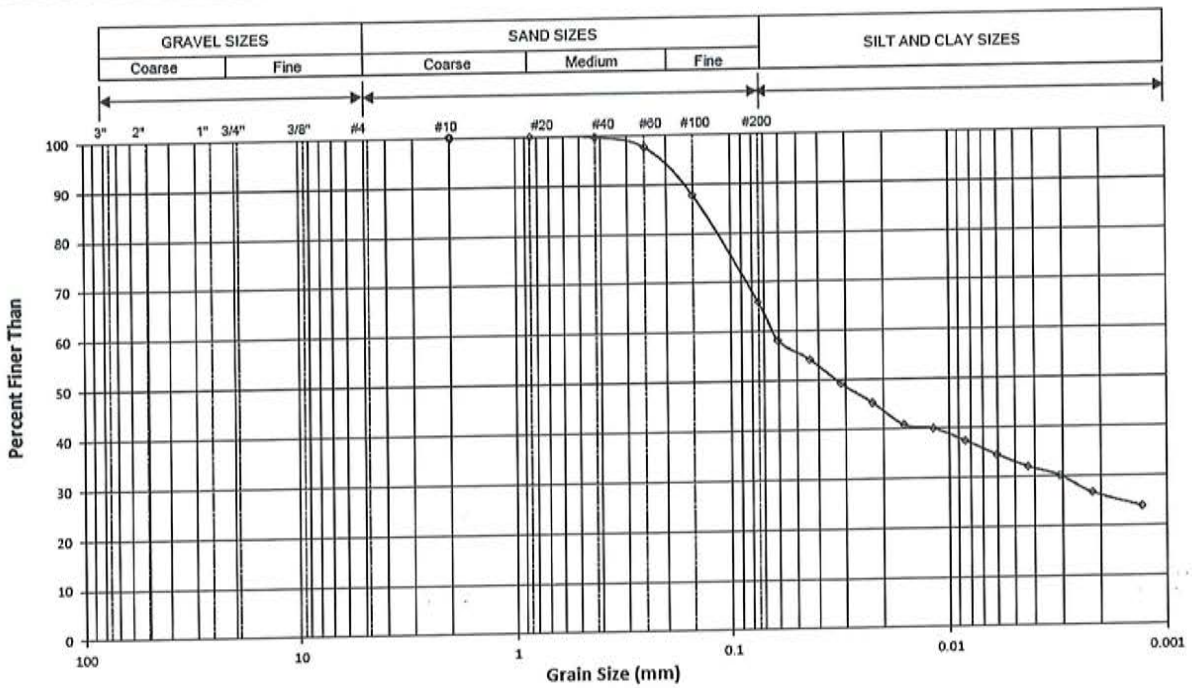
Dispersing Agent: *Sodium Hexametaphosphate*

Diameter mm	% Finer
0.0609	58.2
0.0437	54.3
0.0315	49.3
0.0226	45.3
0.0162	40.8
0.0119	40.0
0.0085	37.4
0.0061	34.5
0.0043	32.0
0.0031	30.1
0.0022	26.7
0.0013	23.8

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt Sizes	% Clay Sizes
0	34	40	26

Remarks:



CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Drawing No.

Appendix C-9

WE CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH AASHTO T 88 STANDARD
P. MACHIBRODA ENGINEERING LTD.

PER

JANUARY 21, 2016

APPROVED BY: RAY MACHIBRODA; REVISION NO.1

P.MACHIBRODA ENGINEERING LTD.

ASTM C136: GRAIN SIZE ANALYSIS

Project:	Edgemont Estates East Residential Subdivision
Location:	South of Saskatoon, SK
Project No.:	18682
Date Tested:	January 6, 2022
Borehole No:	21-20
Sample No.:	93
Depth:	1.5-1.9

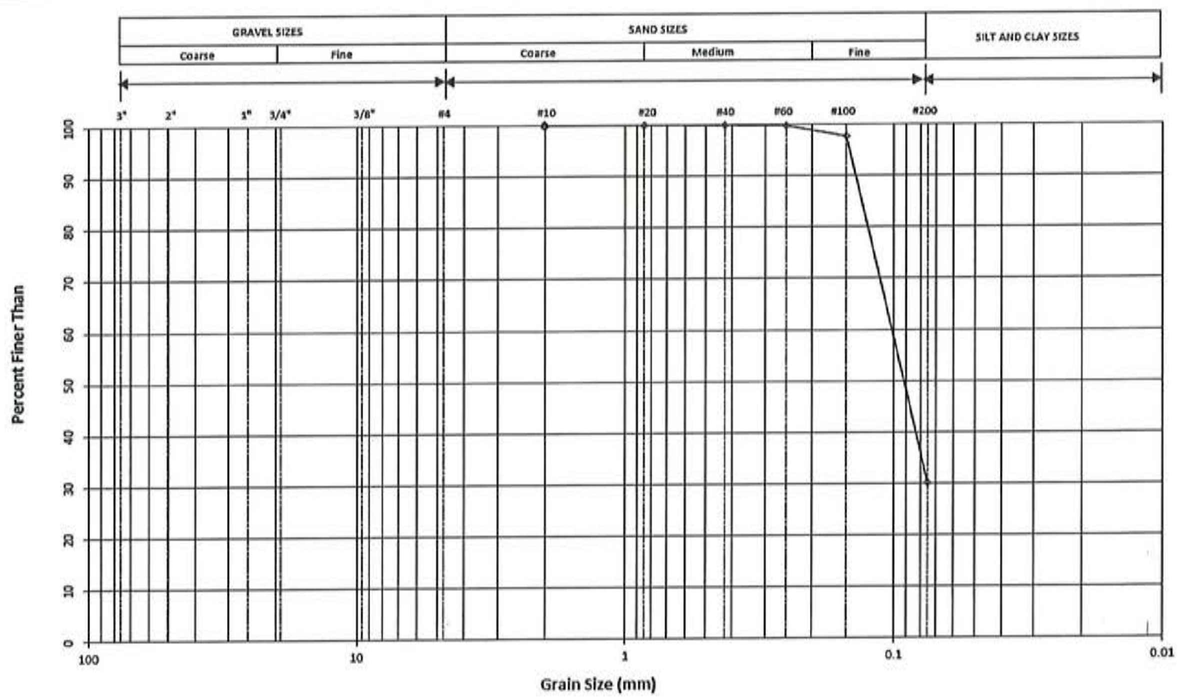
Sieve Analysis:

Sieve	Diameter mm	% Finer
	76.200	100
	63.500	100
	50.000	100
	37.500	100
	25.000	100
	19.000	100
	12.500	100
	9.500	100
	4.750	100
	2.000	100
	0.850	100
	0.425	100
	0.250	100
	0.150	98
	0.075	30

Material Description:

% Gravel Sizes	% Sand Sizes	% Silt and Clay Sizes
0	70	30

Remarks:



CERTIFIED BY CCIL

DRAWING NO.

Appendix C-10

WE CERTIFY TESTING PROCEDURES ARE IN ACCORDANCE WITH ASTM C136 AND C117 STANDARDS
P. MACHIBRODA ENGINEERING LTD.

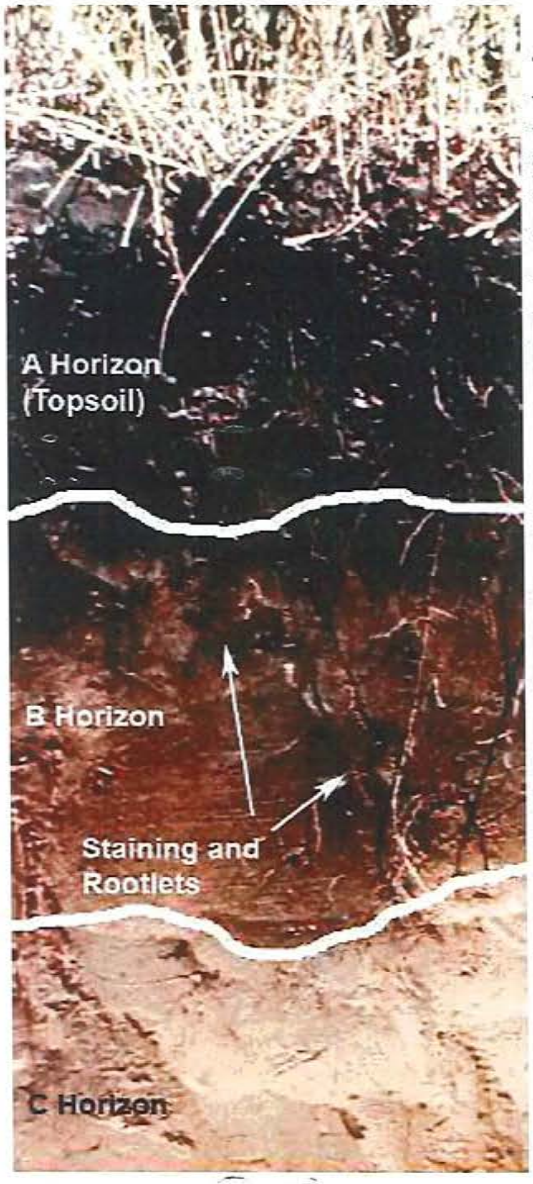
PER *[signature]*

APPROVED BY: RAY MACHIBRODA; REVISION NO. 2

DECEMBER 13, 2018

APPENDIX D

Topsoil, Organic Matter
and Organics



A Horizon

The A horizon is the topsoil layer of the soil strata. It is characterized by a build up of organic matter, and a lower unit weight than subsequent layers. The organic matter content of this layer is typically 4-10% by mass.

The colour of this horizon varies from dark black to brown, depending on surface vegetation and climatic conditions.

B Horizon

Typically reddish brown in colour and contains accumulations of matter that have been washed down from the A Horizon. The B horizon is generally composed of clay that has been washed out of the A Horizon, but can also contain iron, calcium and sodium deposits as well.

C Horizon

Unweathered parent soil.

Topsoil is a mixture of mineral soil and organic matter. The organic matter is developed from decaying biological material (leaves, grass, trees, animals, etc.) and contributes to the brown to black colour of the soil. Following the topsoil is the B horizon which is a transition layer, where staining from the overlying topsoil is common. This results in a darker colour of the soil immediately below the organic topsoil layer. Depending on the surface vegetation, rootlets may be present below the depth of topsoil. However it should be recognized that these rootlets are not the same as organic matter in topsoil.

Physically speaking in comparison to mineral soil, topsoil has a significantly lower bulk density and a lower unit weight as compared to the underlying parent soil. This is due to larger pore spaces and non mineral materials in the soil matrix. Along with lower density, topsoil is often spongy and colloidal/fibrous. The following figure is of a typical prairie soil. Each horizon is labelled accordingly to demonstrate a typical soil profile.

Reference

Henry L. 2003. Henry's Handbook of Soil and Water, Henry Perspectives, Saskatoon, SK.

APPENDIX E

Detailed Traffic
Structure Design

TRAFFIC INFORMATION

1) Design Traffic Loading (ESALs)

BCL Ltd. has reported that the subdivision will be divided into approximately 130 lots with 2 access roads. It is understood that a Traffic Impact Assessment is in the process of being completed by KGS for the development. KGS reported, via email on January 13, 2022, that there will be a maximum number of 1300 vehicles per day on the roads.

The roadway design has been based off the following design traffic loading assumptions.

TABLE E1 Traffic Volume

Item	Value	Note
Design Life	15 years	As per the RM of Corman Park Country Residential Paved Roads specification
Number of Lanes per direction	1	2 way traffic - 1 lane per direction
Directional Split	50%	Traffic will travel equally in each direction.
Design AADT - Year 1	496	Approximate assumed value based on expected growth rate (low population at Year 0)
Design AADT - Year 15	1,300	As per email dated January 17, 2022, 1300 vehicles per day.
Percent Growth Rate	10% - Year 0 to 10 0% - Year 10 to 15	Year 10 is assumed to be build out of the development
Percent Commercial Truck Traffic	5% - Year 0 to 5 3% - Year 5 to 10 0.5% - Year 10 to 15	Years 0 to 5 – high percentage of truck traffic due to construction of residences Years 5 to 10 – construction assumed to slow as development is nearing build out Years 10 to 15 – few to no construction trucks, truck traffic consists mainly of garbage/recycling trucks, septic trucks, fire trucks, delivery trucks, etc.
Truck Traffic Distribution	90%/10%	*Single Unit Trucks/Tractor Semi-Trailer Combinations
Bus Traffic Passes, Daily	8	It was reported that there will be 8 bus passes per day during the school year. It is estimated that there is approximately 40 weeks in the school year.
ESALs per Unit – Trucks	3.0/6.3*	*Single Unit Trucks/Tractor Semi-Trailer Combinations
ESALs per Unit – Buses	5	

Based on the above assumption, the following truck traffic volume is assumed to use the roadway over the design life:

TABLE E2 Cumulative Truck Traffic

Year	Growth Rate (per year)	AADT	AADT - Design Lane[2]	Percent Commercial Traffic	Total Trucks - Design Lane (per day)[3]	Total Trucks - Design Lane (per year)[4]	Cumulative Truck Traffic
0	10%	496	248.2	5%	12.4	4,529.7	4,529.7
1	10%	547	273.3	5%	13.7	4,987.4	9,517.0
2	10%	602	300.9	5%	15.0	5,491.3	15,008.4
3	10%	663	331.3	5%	16.6	6,046.2	21,054.6
4	10%	730	364.8	5%	18.2	6,657.2	27,711.8
5	10%	803	401.6	3%	12.0	4,398.0	32,109.8
6	10%	884	442.2	3%	13.3	4,842.4	36,952.2
7	10%	974	486.9	3%	14.6	5,331.7	42,283.9
8	10%	1,072	536.1	3%	16.1	5,870.5	48,154.3
9	10%	1,181	590.3	3%	17.7	6,463.7	54,618.0
10	0%	1,300	649.9	0.5%	3.2	1,186.1	55,804.1
11	0%	1,300	649.9	0.5%	3.2	1,186.1	56,990.3
12	0%	1,300	649.9	0.5%	3.2	1,186.1	58,176.4
13	0%	1,300	649.9	0.5%	3.2	1,186.1	59,362.5
14	0%	1,300	649.9	0.5%	3.2	1,186.1	60,548.7
15	0%	1,300	649.9	0.5%	3.2	1,186.1	61,734.8

Where:

[1] 'AADT' = AADT(20XX) * (1+Growth Rate)
[2] 'AADT-Design Lane' = 'AADT' * 'Directional Split' * 'Load Distribution Factor (Truck)'
[3] 'Total Trucks - Design Lane (per day)' = 'AADT - Design Lane' * 'Percent Commercial Traffic'
[4] 'Total Trucks - Design Lane (per year)' = 'Total Trucks - Design Lane' * 365

Load Equivalency Factor, LEF

TABLE E3 Weight ESALs, Commercial

Vehicle Type	Assumed Percent Vehicle Type	Corresponding ESALs per Unit (primary weights) - Based on DDSM
Single unit Trucks	90.0	3
Tractor Semi-Trailer Cominations	10.0	6.3
	Weighted ESALs =	3.33

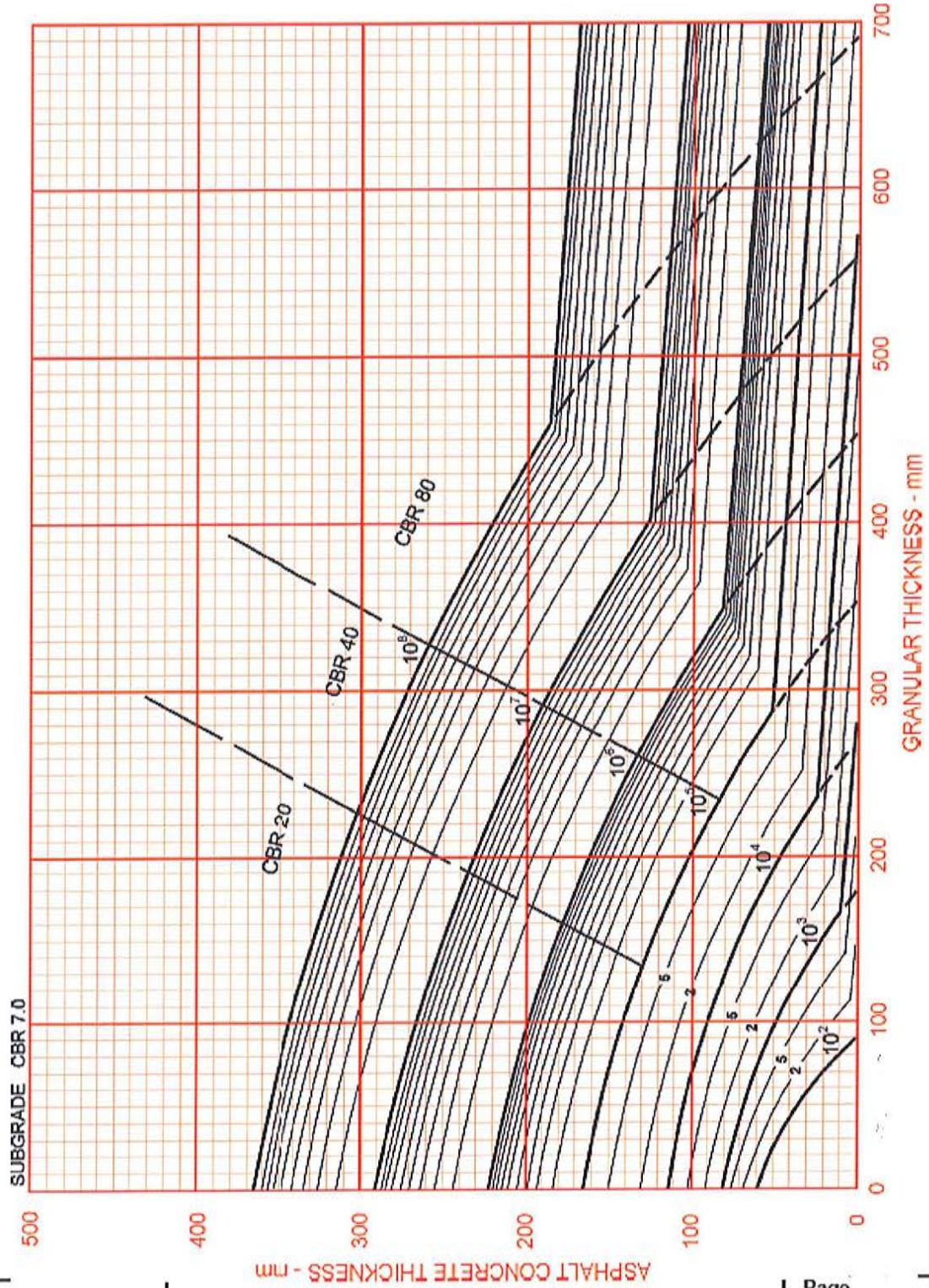
Bus Traffic

It was reported that there will be 8 bus passes per day per week day during the school year. It is estimated that there is approximately 40 weeks in the school year. As such, the following number of buses are assumed over the design life:

24000 buses/design life (8 bus passes per day*5 days/school week * 40 school weeks/year*15 years)

Design ESALS/lane

Commercial =	205,577	(Weighted ESALs * 15 Year Cumulative Truck Traffic from Table E2)
Buses =	120,000	(Bus ESAL from Table E1 *buses/design life)
Design ESALs/Lane =	325,577	


SUBGRADE CBR 7.0
CBR 20
CBR 40
CBR 80
10^8
10^7
10^6
10^5
10^4
10^3
10^2
5
2
5
2
5
2
0
100
200
300
400
500
600
700
GRANULAR THICKNESS - mm
0
100
200
300
400
500
ASPHALT CONCRETE THICKNESS - mm

APPENDIX F

SERVICING STUDY AND

CORRESPONDENCE FROM WATER SECURITY AGENCY

BCL ENGINEERING LTD.

EDGEMONT EAST
COUNTRY RESIDENTIAL SUBDIVISION
CONCEPT SERVICING REPORT

August 29, 2022
Job No. 260.52

EDGEMONT EAST
COUNTRY RESIDENTIAL SUBDIVISION
CONCEPT SERVICING REPORT

TABLE OF CONTENTS

EDGEMONT EAST
COUNTRY RESIDENTIAL SUBDIVISION

CONCEPT SERVICING REPORT

1. INTRODUCTION

This preliminary design report has been prepared to provide a design framework for the Edgemont East Country Residential Subdivision development, located within the R.M. of Corman Park. The development is comprised of 160 acres, occupying LSD 11, 14, 15 and 16, Sec 34 – Twp 36 – Rge 5 – W3M. At full build-out, Edgemont East will contain approximately 131 lots intended for single family homes. The preliminary concept plan was developed by Crosby Hanna and Associates, and included site layout, site access, and green space allocation. This report will discuss the location and terrain of the existing site, earthwork and site grading requirements, access infrastructure, stormwater management considerations, water and sewer servicing requirements, and staging considerations.

2. LAND DESCRIPTION

Edgemont East Estates consists of approximately 65.31 ha (160 acres) of land occupying LSD 11, 14, 15, and 16, Sec 34 – Twp 36 – Rge 5 – W3M. The site is bordered to the north by Grasswood Road and to the east by Preston Avenue. Primary access to the site will be provided by Grasswood Road. The land is undeveloped at this time, being used for agricultural purposes. There are no structures located on the land.

The plan of the proposed subdivision is shown on the following drawing. The plan of proposed subdivision indicates four phases of development, with details of each phase summarized below.

Table 2-1: Development Table

Item	All Phases	Phase I	Phase II	Phase III	Phase IV
Development Area (ha)	65.352	24.469	19.176	13.142	8.545
Park Space (ha)	7.515	4.828	1.955	0.732	0
Municipal Utility Space (ha)	0.654	0.654	0	0	0
Lot Area (excl. roads; ha)	44.574	14.055	13.777	9.992	6.754
Total Number of Lots	131	40	41	32	18
Average Lot Size (ha)	0.340	0.351	0.336	0.312	0.375

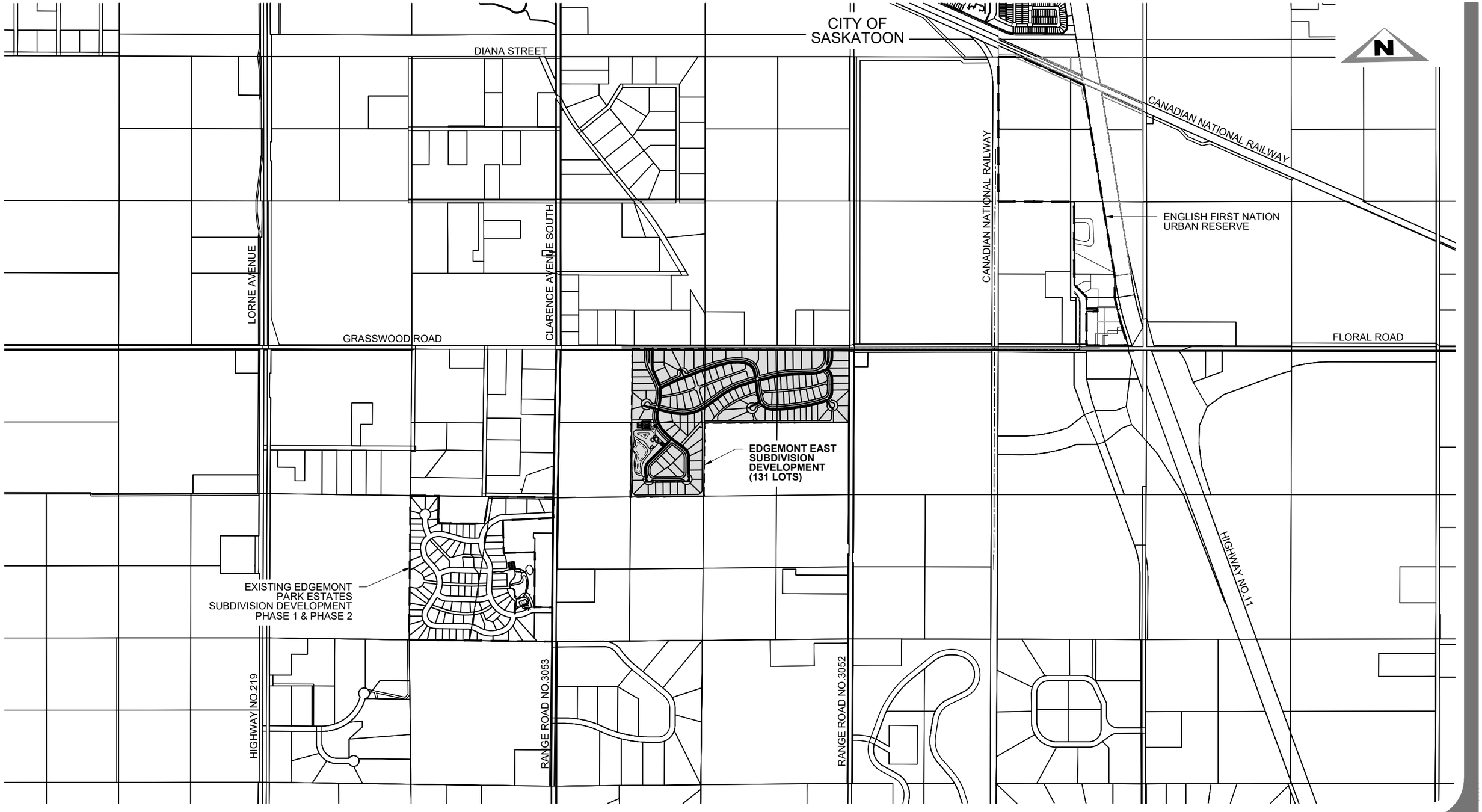


FIGURE 2.1 - LOCATION PLAN

CLIENT:
EDGEMONT EAST

PROJECT:
SUBDIVISION DEVELOPMENT

JOB NUMBER:
260.52

DATE:
2022/08/24

DRAWN:
K.M.N.

SCALE:
1:10000

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A geotechnical investigation of the development site was conducted by P. Machibroda Engineering Ltd. The field investigation was completed November 26th and 30th, 2021, with the report issued February 7th, 2022 (appended). Site conditions generally consist of organic topsoil (100 to 300 mm in depth), predominantly sand in 16 of 20 test holes, while four of the test holes encountered surficial silt. Groundwater was observed at depths ranging from 2.2 to 3.8 m below ground. The year 2021, particularly in the Saskatoon region, could be considered a dry year, where observations of existing sloughs and standing water tended to diminish towards the fall months. Ongoing monitoring of the groundwater table should continue, as noted within the geotechnical investigation.

3. SITE GRADING

The existing topography within the development is gently undulating, with pre-existing natural drainage to the southwest corner of the property. Elevations vary as much as 8.0 m. Typical elevations are in the order of 500.5 m in the southwest and 509.0 m in the northeast. Existing elevations are shown on Figure 3-1.

There does not appear to be any external influences or drainage corridors to enter into the development property. Should existing drainage paths be identified through the detailed design phases, they should be incorporated into the development, so as not to block off and affect any upstream users.

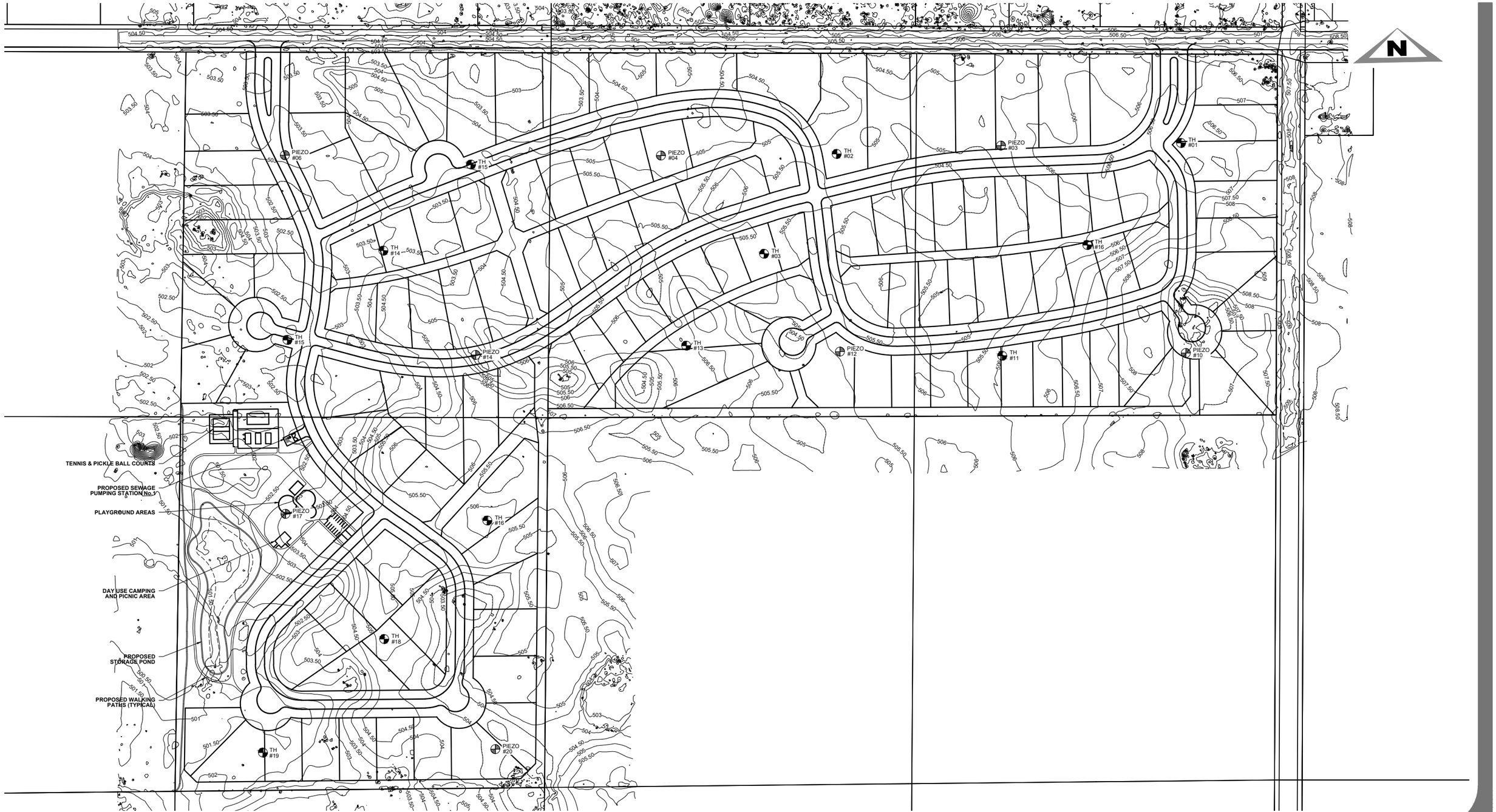

FIGURE 3.1 - EXISTING CONTOUR PLAN

CLIENT:
EDGEMONT EAST

DATE:
2022/08/24

PROJECT:
SUBDIVISION DEVELOPMENT

DRAWN:
K.M.N.

JOB NUMBER:
260.52

SCALE:
1:2000

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Internal drainage throughout the site shall be directed to the road right-of-ways, where it will be conveyed using the roadside ditches and culverts. Ditches and culverts shall be designed to be free-draining, yet provide adequate attenuation in a rainfall event. The longitudinal slope of the ditches averages 0.30%, depending on the location. Slopes within this range provide adequate drainage within a rural setting, accommodate some degree of vegetation overgrowth, and are not significantly affected by any rutting or debris accumulation that may occur between maintenance periods.

To accommodate external influences (adjacent lands) and appropriately capture internal lot drainage (rear lot drainage), the perimeter municipal reserve areas shall be designed to direct all drainage to the major networks, consisting of the roadway ditches or pond areas. This perimeter drainage is noted on the grading plan, with a minimum design slope in the order of 0.25%.

All site drainage will be contained within the boundaries and directed to the storm pond planned within the MR1 park space development. An earthen embankment along the western-most property line will be required to contain the stormwater runoff and appropriately manage all conditions.

The proposed grading plan is shown in Figure 3-2.

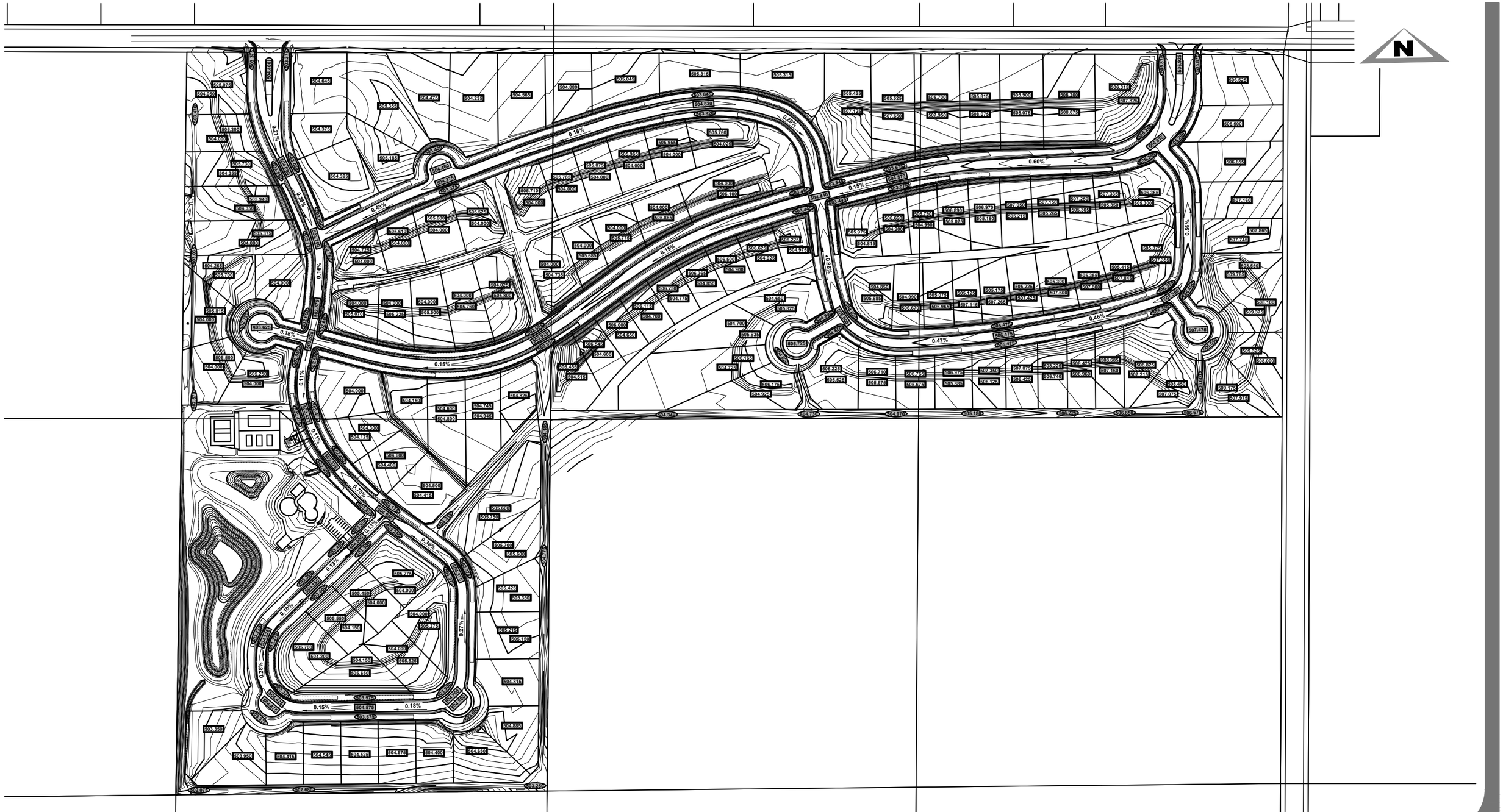

FIGURE 3.2 - PROPOSED GRADING PLAN

CLIENT:
EDGEMONT EAST

DATE:
2022/08/24

PROJECT:
SUBDIVISION DEVELOPMENT

DRAWN:
K.M.N.

JOB NUMBER:
260.52

SCALE:
1:2000

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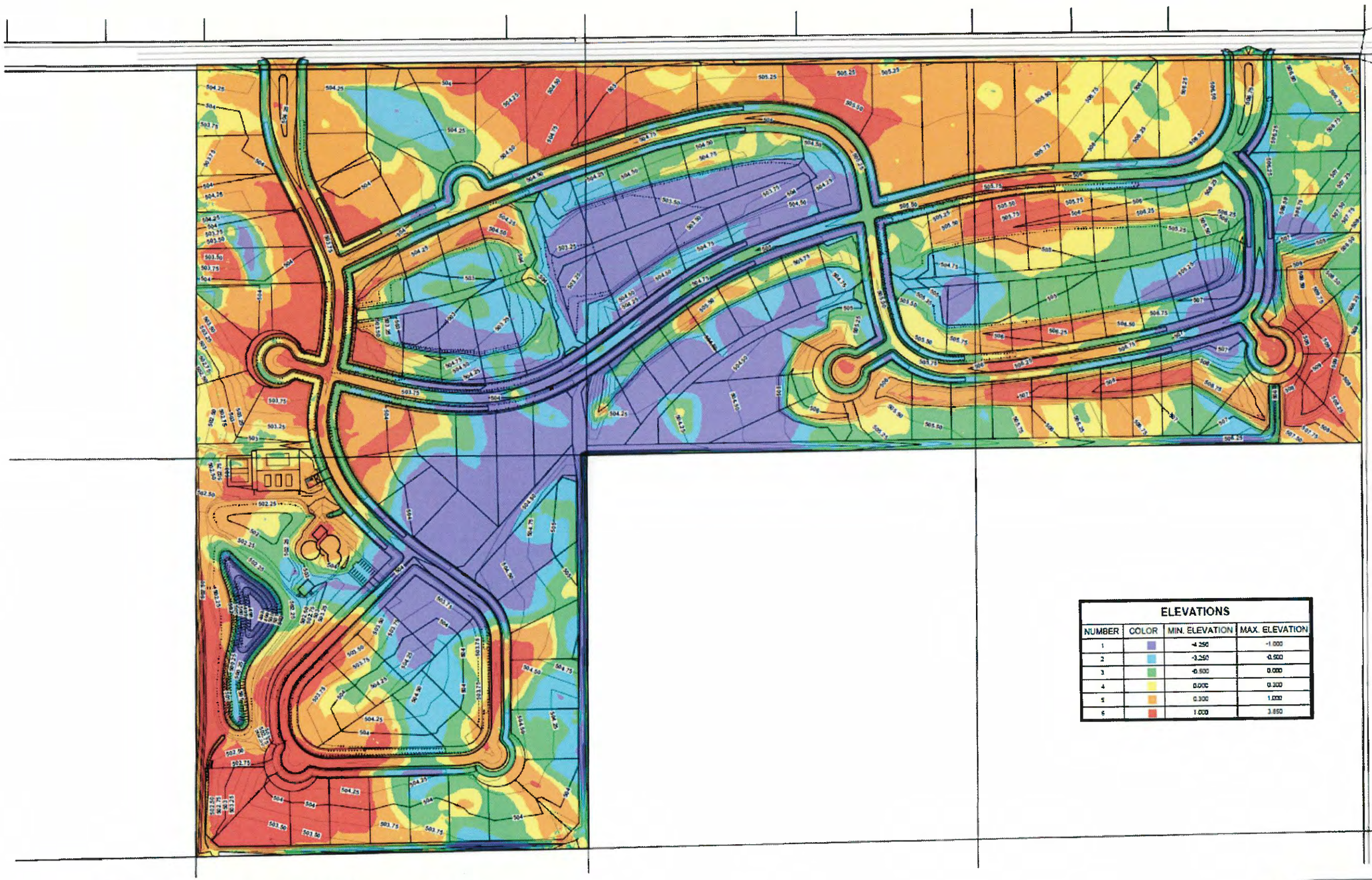
A surface model of the proposed site grading plan was generated to assess excavation and fill requirements of the graded site. Total earthwork requirements for the construction of the roadways, lots, and linear greenspaces, are projected to be in the order of 250,000 m^3. Earthwork requirements for excavation of the park space, pond, and construction of the embankment along the western property line, are projected to be in the order of 50,000 m^3. Earthwork requirements are shown in Figure 3-3.

Further refinement of the final lot grading will be required, considering excavation requirements (cut-fill balancing), market interests (conventional compared to walk-out style homes), and other internal considerations or discussion with the Development Team. However, such details will not influence the overall drainage and stormwater storage requirements of the development and can be further refined through the course of development.



ELEVATIONS			
NUMBER	COLOR	MIN. ELEVATION	MAX. ELEVATION
1		-4.250	-1.000
2		-3.250	-0.500
3		-0.500	0.000
4		0.000	0.300
5		0.300	1.000
6		1.000	3.850

FIGURE 3.3 - EXCAVATION REQUIREMENTS

CLIENT: EDGEMONT EAST

PROJECT: SUBDIVISION DEVELOPMENT

JOB NUMBER: 260.52

DATE: 2022/04/18

DRAWN: K.M.N.

SCALE: 1:2000

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4. ACCESS AND TRANSPORTATION

Access to the development will be obtained using two points of entry from Grasswood Road. A traffic impact assessment was prepared by KGS Group as part of the planning stages. BCL's cursory review of the site access and capacity of the surrounding roadway networks does not anticipate any issues. Further growth and development within the R.M. of Corman Park and City of Saskatoon may realize the need to upgrade roadways and intersections to accommodate traffic patterns.

Development features include a 30 m wide road right-of-way, widened to 48 m at each of the entrances. The widening is intended to accommodate entrance features, signage, and communal mailboxes, with additional parking lanes. To maintain R.M. development standards, the proposed road cross-section consists of a 7.4 m wide asphalt paved road surface with adjacent ditches. The standard road cross-section includes a 2% crown to shed water from the road surface. The proposed road structure, based on the geotechnical investigation, shall consist of 150 mm subbase, 150 mm base course, and 80 mm asphalt concrete.

The R.M. of Corman Park standard details are shown on Figures 4-1 and 4-2.

Figure 4-1: Typical Cross-Section Subgrade

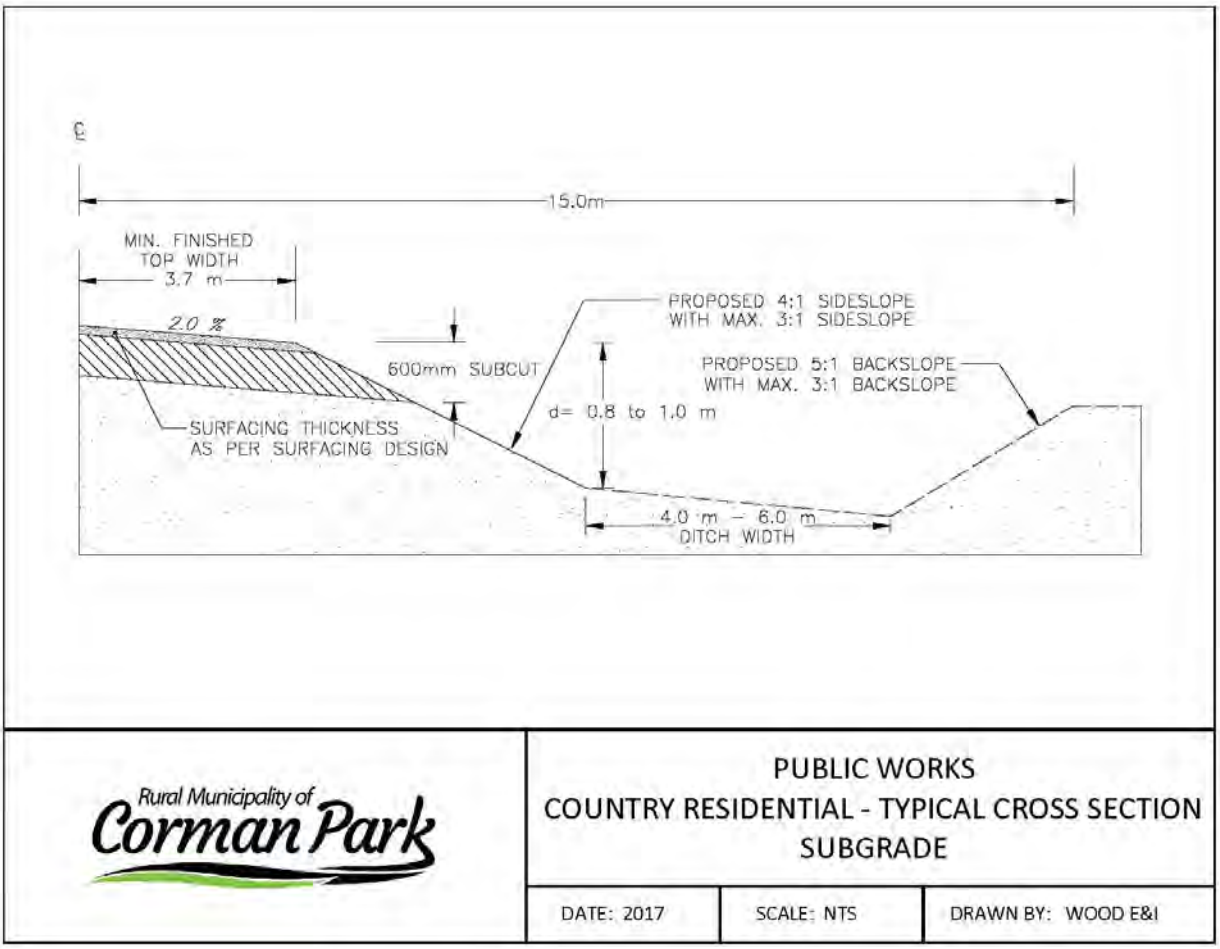
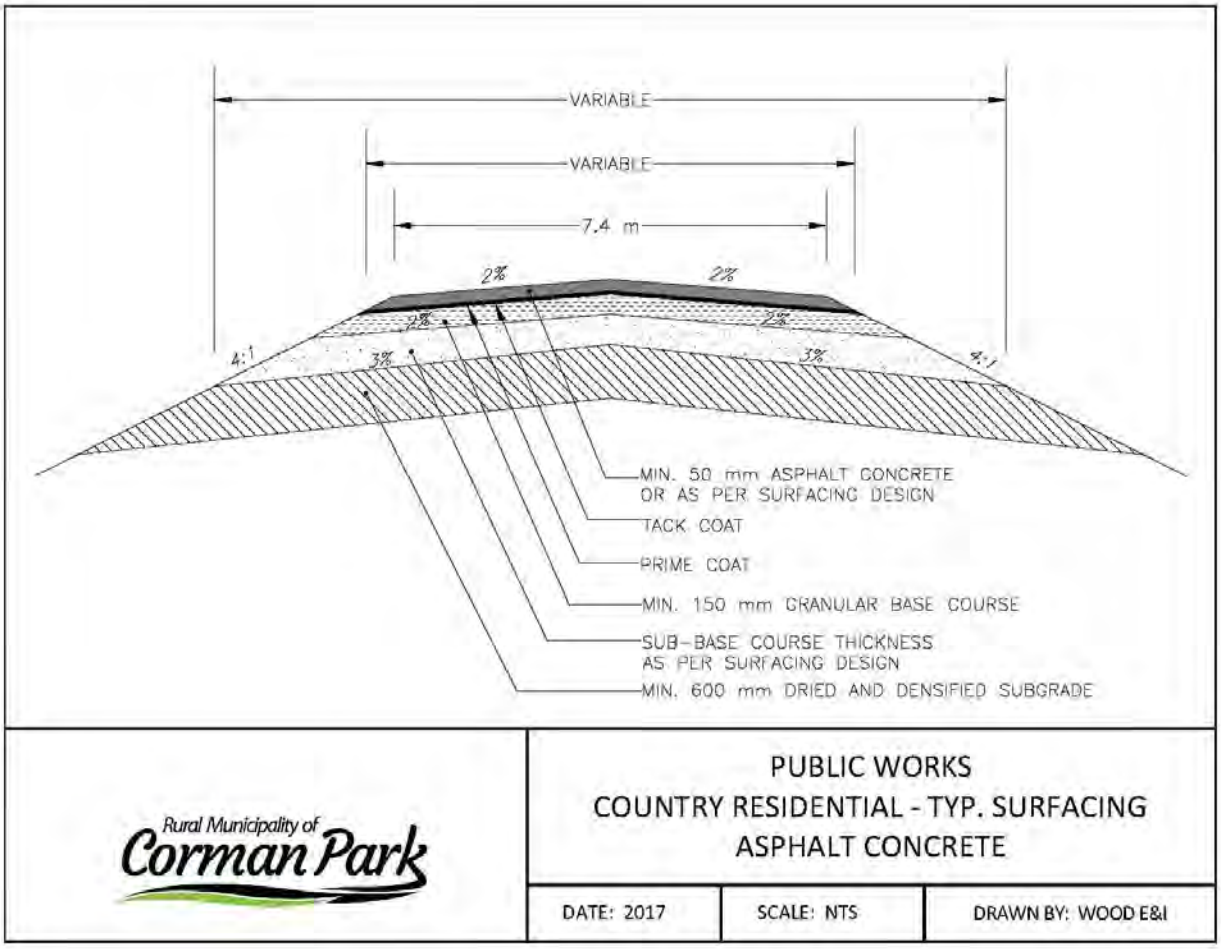


Figure 4-2: Country Residential Type Surfacing



5. STORMWATER MANAGEMENT

Stormwater management is an important component in the design and planning of residential developments. Infrastructure must be designed to protect assets within the development, while minimizing downstream impacts. On that note, the post-development runoff conditions must not exceed the pre-development runoff conditions. Wherever possible, development shall seek to improve stormwater management and related conditions within the area.

A typical stormwater management system is made up of major and minor components. Minor system components can include street gutters, catch basins, and storm sewers that convey stormwater to the point of receipt by major system components. The minor system is typically designed to handle smaller, more frequent storms such as 1:5 year events. Major system components include trunk sewers (greater than 1,200 mm diameter or larger), overland flow routes (ditches and swales) and retention/detention facilities. These components are intended to receive stormwater from the minor system and facilitate flows from rainfall events exceeding the capacity of the minor system.

Proposed stormwater infrastructure for the development is shown in Figure 5-1.

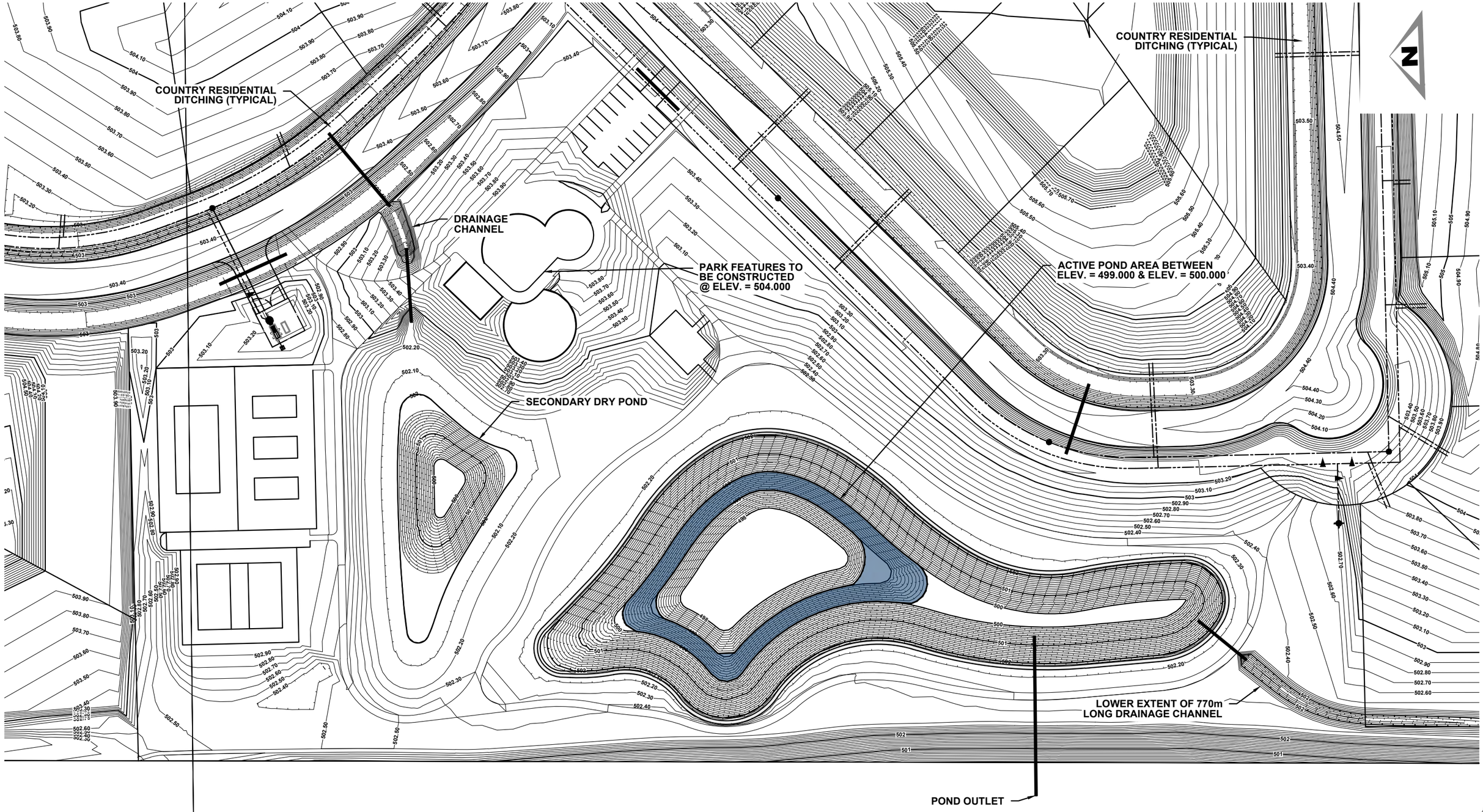


FIGURE 5.1 - PARK SPACE DETAILS

CLIENT: EDGEMONT EAST

DATE: 2022/08/24

PROJECT: SUBDIVISION DEVELOPMENT

DRAWN: K.M.N.

JOB NUMBER: 260.52

SCALE: 1:500

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Retention pond capacities and development runoff volumes, including any external influences, were modelled based on several storm events, with the ultimate capacity of the system based on a 1:100 year, 24 hour precipitation event. The design shall include an additional 25% capacity within the normal operating conditions and ensure that any extreme events can be adequately managed and not subject the development to property damage.

5.1 POND SIZING

Commonly, the Rational Method shall be used to derive the pre-development runoff conditions and provide estimates for the post-development stormwater generated upon completion of the development. Such calculations take into consideration the increased impermeable or semi-permeable surfaces that result from typical housing development.

To meet the requirements of the Water Security Agency, all developments must provide the necessary storage features to accommodate the 1:100 year rainfall event, with additional factors of safety for recurring events and changes in conditions. Outlet design must ensure that the post-development runoff conditions do not exceed the pre-development runoff conditions.

For the purposes of this study, a surface model was created to determine the drainage patterns, storage and resulting water elevations. The following design criteria have been used in the analysis:

- 1:100 year, 24 hour rainfall of 90 mm based on IDF curves for the City of Saskatoon, with 25% added to calculations, for a total of 110 mm of rainfall within a 24 hour period;
- pre-development runoff coefficient of 0.20;
- post-development runoff coefficient of 0.41, in accordance with the City of Saskatoon urban development standards.

It should be noted that a post-development runoff coefficient of 0.41 is representative of an urban development and is considered to be conservative for country residential development. Three examples of typical country residential yard sites, fully developed, are shown on Figures 5-2, 5-3 and 5-4, with the development areas delineated. These examples were used in conjunction with selected lots within the development, to demonstrate the post-development runoff coefficients in the calculations below. Table 5-1 provides the estimated post-development runoff coefficients that may be realized within the development. The example would be considered a common rural-type build, which may include primary dwellings, ancillary building, hardscaped driveway, and exterior patio and pool, with extensive landscaping and greenspace areas.

Table 5-1: Post-Development Runoff Coefficients						
Item	**Example 1 Lot 5 Block 7**		**Example 2 Lot 22 Block 5**		**Example 3 Average Lot**	
	Area	**C Factor**	**Area**	**C Factor**	**Area**	**C Factor**
Total Lot Area	0.393 ha (3,930 m^2)	0.20	0.745 ha (7,455 m^2)	0.20	0.340 ha (3,406 m^2)	0.95
Estimated House Size	438 m^2 (4,714 ft^2)	0.95	500 m^2 (5,400 ft^2)	0.95	411 m^2 (4,4230 ft^2)	0.95
Ancillary Building	n/a	0.95	188 m^2 (2,020 ft^2)	0.95	n/a	0.95
Driveway / Hardscaping	870 m^2 (9,364 ft^2)	0.90	1,280 m^2 (13,800 ft^2)	0.90	561 m^2 (6,040 ft^2)	0.90
Patio / Pool	n/a	0.75	241 m^2 (2,594 ft^2)	0.75	305 m^2 (3,282 ft^2)	0.75
Grass / Landscaping	2,622 m^2 (28,222 ft^2)	0.20	5,246 m^2 (56,500 ft^2)	0.20	2,129 m^2 (22,900 ft^2)	0.20
Post-Development C Factor	-	0.42	-	0.40	-	0.45

Similarly, a 7.4 m wide asphalt surface within a 30 m wide right-of-way realizes a post-development C Factor of 0.39. Considering the planned park space and municipal reserve areas throughout the development, a post-development C Factor of 0.41 is deemed appropriate. For reference, the *City of Saskatoon Design and Development Standards* suggests a runoff coefficient of 0.30 for single family residential homes.

Figure 5-2:

Figure 5-3:

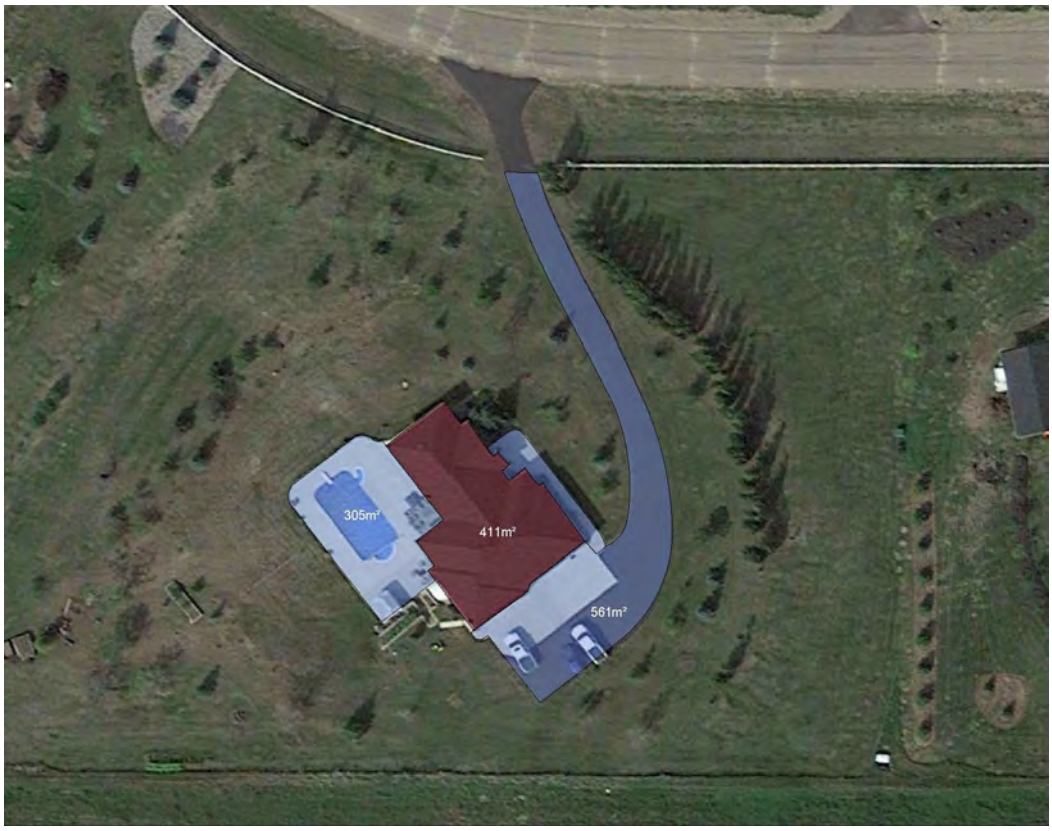


Figure 5-4:

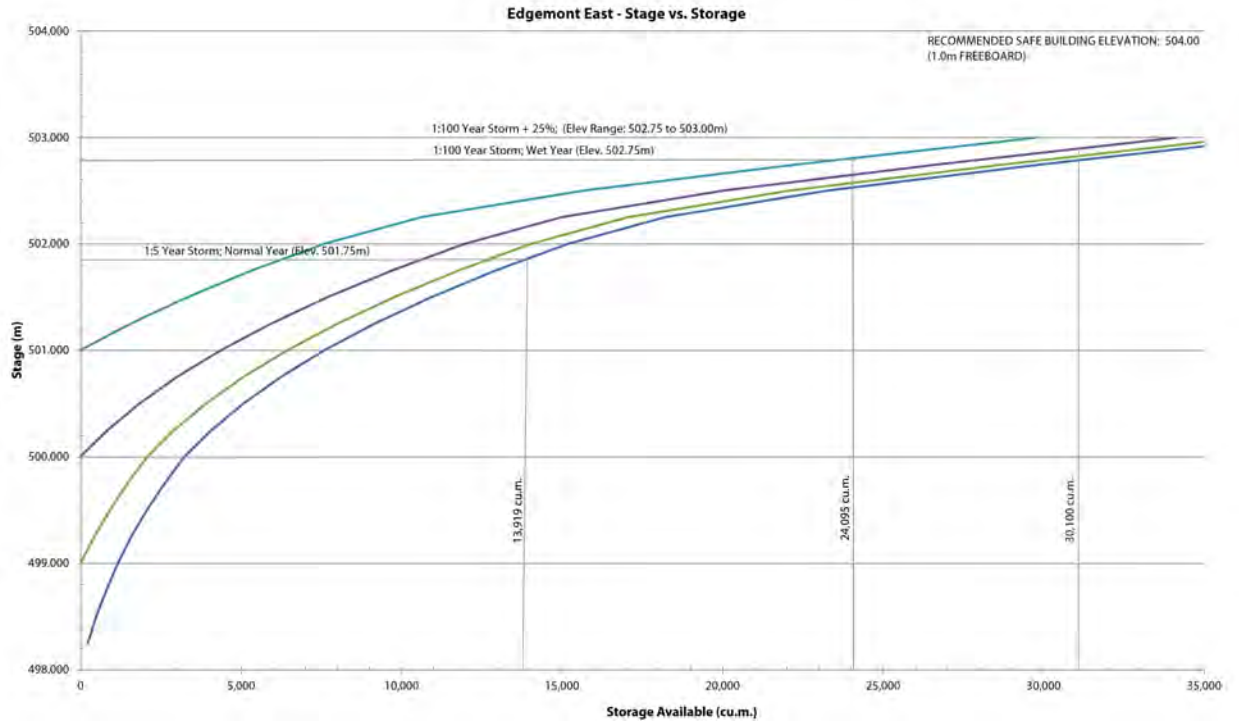
The storm pond design shall ensure that the pond is of reasonable size to accommodate routine and frequent storm events (i.e. 1:5 year events), as well as being manageable and appealing to park space users. Oversizing the active storm pond may realize conditions that are considered undesirable. However, the storm management facilities must also accommodate the extreme rainfall events, which could use additional area within the developed park space that will not be affected in such an event.

The following table demonstrates various storm events, based on the *City of Saskatoon Design and Development Standards*, 24 hour storm event.

Table 5-2: Return Period

		5 Year		25 Year		100 Year	
Development Area (m^2)	**C Factor**	**Amount (mm)**	**Volume (m^3)**	**Amount (mm)**	**Volume (m^3)**	**Amount (mm)**	**Volume (m^3)**
653,100	0.30	52	10,185	73	14,310	90	17,631
653,100	0.41	52	13,919	73	19,557	90	24,095

A Stage - Storage Curve has been generated to demonstrate the available stormwater storage capacity as the static water level increases within the development. It should be noted that the terrain of the development has many local areas situated on private lots that will retain water during rainfall events. These areas have not been included, as it is assumed that each lot will be landscaped to provide positive drainage to the ditch and stormwater network. The data represents the operation of the facility from an elevation of 498.0 m, corresponding to the groundwater elevations recorded during the 2021 geotechnical investigation. Modelling of the site from initial water elevations of 499.0 m, 500.0 m, and 501.0 m were also completed, representing what could be considered a wet year.



The pond area is designed to accommodate a typical 1:5 year return period, as indicated above. Maintenance and management of this area for regular storm events should be considered routine in nature, with a well-defined 'wet' area, pond peripherals, and ensuring vegetation selections can survive within the pond environment.

Following these events, the storm pond should return to the normal water levels within a 24 hour period, as described in Section 5.2 herein.

Storms of increased intensity will utilize more of the open park space areas for temporary storage. A 1:25 year return period will realize a local flood elevation of 502.25 m which will flood some of the fields and areas indicated in Figure 5.5. Pathways throughout the development will remain accessible.

A 1:100 year return period will realize a local flood elevation of 502.75 m. Some pathways, depending on their location, may become inundated and be temporarily out of service. However, major park space infrastructure (tennis courts, playgrounds, gazebos, etc.), will be constructed above these flood elevations.

A 1:100 year storm event, plus 25%, will realize a local flood elevation of 502.75 to 503.0 m. The extent of this event is indicated on Figure 5-2. This extreme event is used to derive the recommended safe building elevation of 504.0 m, which allows 1.0 m freeboard for all houses.

Following a 1:100 year storm event, the water levels are expected to return to normal within a 48 hour period.

5.2 POND OUTLET DETAILS

Controlling stormwater discharge from the development will include a controlled outlet at an elevation of 501.00 m. This outlet should be designed to release at a rate matching the pre-development runoff rates, estimated as follows:

$Q = 2.78\ ciA$
$Q = 2.78\ (0.20)\ (4.58\ mm/hr)\ (65.31\ ha)$
$Q = 166\ L/s\ (599\ m^3 / hr)$

Such flow rates would be limited by the use of a 300 mm dia. outlet pipe under all operating conditions. However, the use of a 200 mm outlet pipe would still provide a reasonable drain time of less than three days, for typical rainfall events. A secondary outlet of similar capacity should be provided at an elevation of 502.150 m. As a final safeguard, an overflow structure near an elevation of 503.0 m is recommended.

5.3 SAFE BUILDING ELEVATIONS

It is therefore recommended that a safe building elevation of 504.0 m be applied to the development, which would apply to any houses or permanent structures. Observing the safe building elevation is of particular importance within the southwest area of the development, where potential flood elevations could be realized. A careful review of the geotechnical investigation with respect to groundwater elevations should also be completed at the time of the home design to ensure all basement construction remains 1.0 m above the groundwater elevations at particular locations.

The SBE must be applied to the lowest foundation opening, however can be coordinated with the use of window wells or retaining walls as necessary.

5.4 MINOR SYSTEM

The minor system components such as gutters and storm sewers are not required, due to the nature of the development being a rural subdivision.

5.5 MAJOR SYSTEM

Major system components are required to facilitate runoff generated during a 1:100 year rainfall event. Proposed major system components include the overland drainage swales, ditching, and the receiving pond at the southwest end of the property.

The pond option shown is intended to function as a wet bottom facility. Groundwater elevations recorded during the recent geotechnical investigation were approximately 500.0 m in the area. The pond bottom elevation should be set at 498.0 m to maintain water within the facility and provide an available surcharge capacity. At typical groundwater levels the pond will maintain a fill level of approximately 2.0 m at the deepest location. At a flood limit of 501.75 m, the pond would provide a retention volume of approximately 13,900 m^3, meeting the 1:5 year return period.

Flood events beyond the 1:5 year storm event will utilize the additional park space, including the area immediately north of the storm pond. The extent of flooding as a result of the 1:25 year and 1:100 year storm events are shown on Figure 5-5.

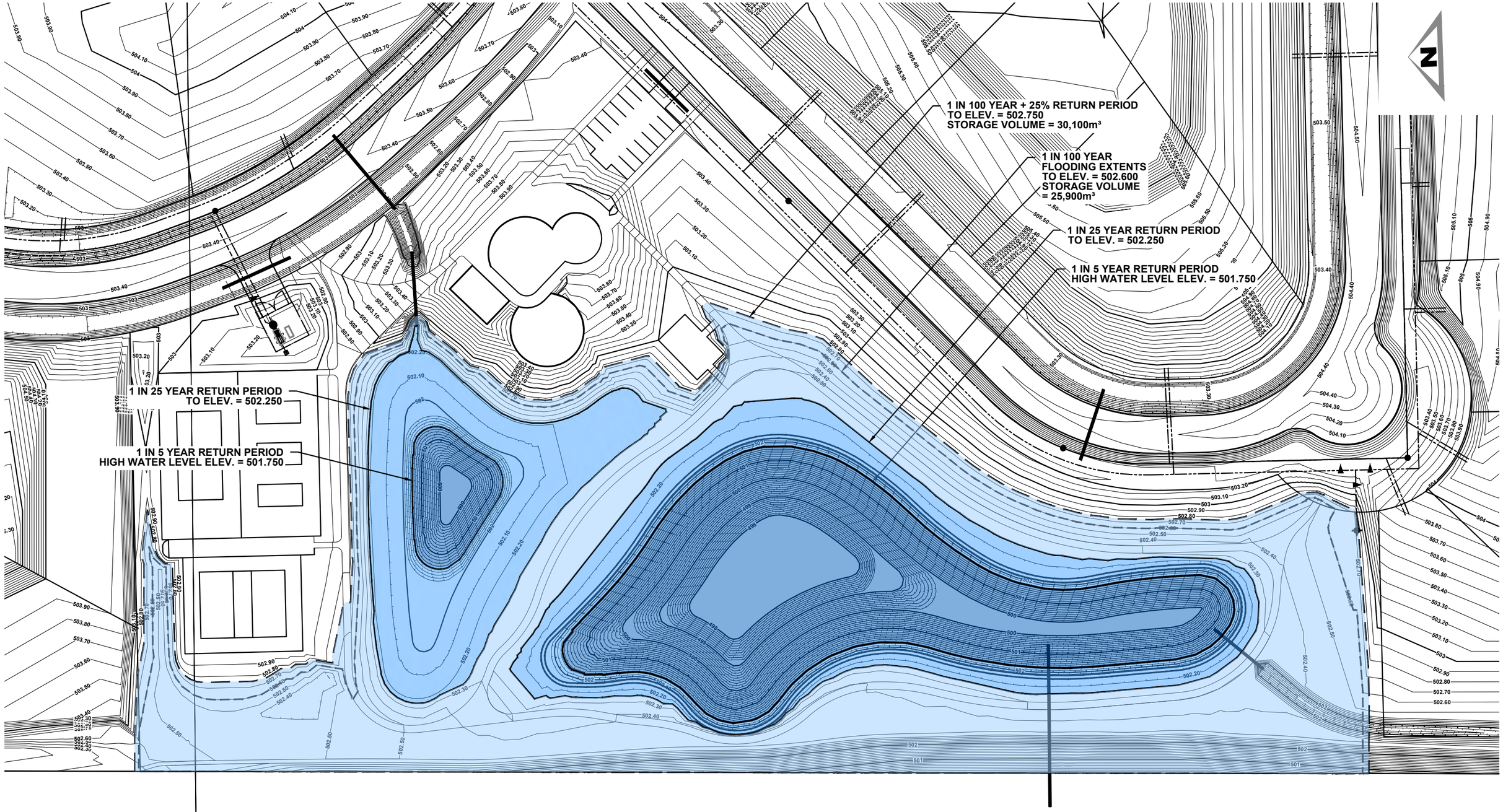


FIGURE 5.5 - FLOODING EXTENTS

CLIENT:
EDGEMONT EAST

DATE:
2022/08/24

PROJECT:
SUBDIVISION DEVELOPMENT

DRAWN:
K.M.N.

JOB NUMBER:
260.52

SCALE:
1:500

BCL ENGINEERING LTD.

| 200 - 302 WELLMAN LANE | SASKATOON, SK | S7T 0J1 |
| 1-306-477-2822 | www.bcl-eng.ca |

6. WASTEWATER COLLECTION AND DISPOSAL

Wastewater collection is a defining factor of Edgemont East. The intent of the development is to provide the highest level of service with a gravity sewer system. Therefore, the development requires an independent disposal system constructed to a high standard and comparable to any municipal system.

6.1 BACKGROUND

To determine wastewater infrastructure requirements for development, it is necessary to anticipate the future service population and subsequent sewage generation rates. As demonstrated in Section 3, full build-out is anticipated to yield approximately 131 lots with a housing density of 2.5 persons per unit, which results in a total population in the order of 330.

Sewage generation rates are a function of population and water consumption rates. Review of water consumption data for the City of Saskatoon indicates a typical usage rate of 450 Lcd within the past five years. These rates can be applied to anticipated populations in the development to project typical wastewater generation. Of course, wastewater generation rates vary widely over the course of a day. Therefore, wastewater infrastructure must be designed to facilitate peak flows. Using the Harmon Formula, a peaking factor in the order of 4.0 was deemed appropriate for a development of this size.

Table 6-1: Wastewater Infrastructure Requirements

Item	Phase I	Phase II	Phase III	Phase IV	Total
No. of Homes	38	42	32	19	131
Population Density (people/house)	2.5	2.5	2.5	2.5	2.5
Population Total	95	105	80	48	325
Per Capita Rate	450	450	450	450	450
Wastewater Generation (L/d)	42,750	47,250	36,000	21,375	147,375
Average Flow (L/s)	0.49	0.55	0.42	0.25	1.71
Peak Flow (L/s; P.F. = 4.0)	**1.98**	**2.19**	**1.67**	**0.99**	**6.82**

6.2 GRAVITY SEWER NETWORK

Wastewater collection for the development is proposed to be provided by a conventional gravity sewer network. The network collects to a proposed sewage pumping station located centrally within the development. Sanitary sewer infrastructure is shown in Figure 6-1. Details of the proposed gravity network are shown on the drawings (Appendix B).

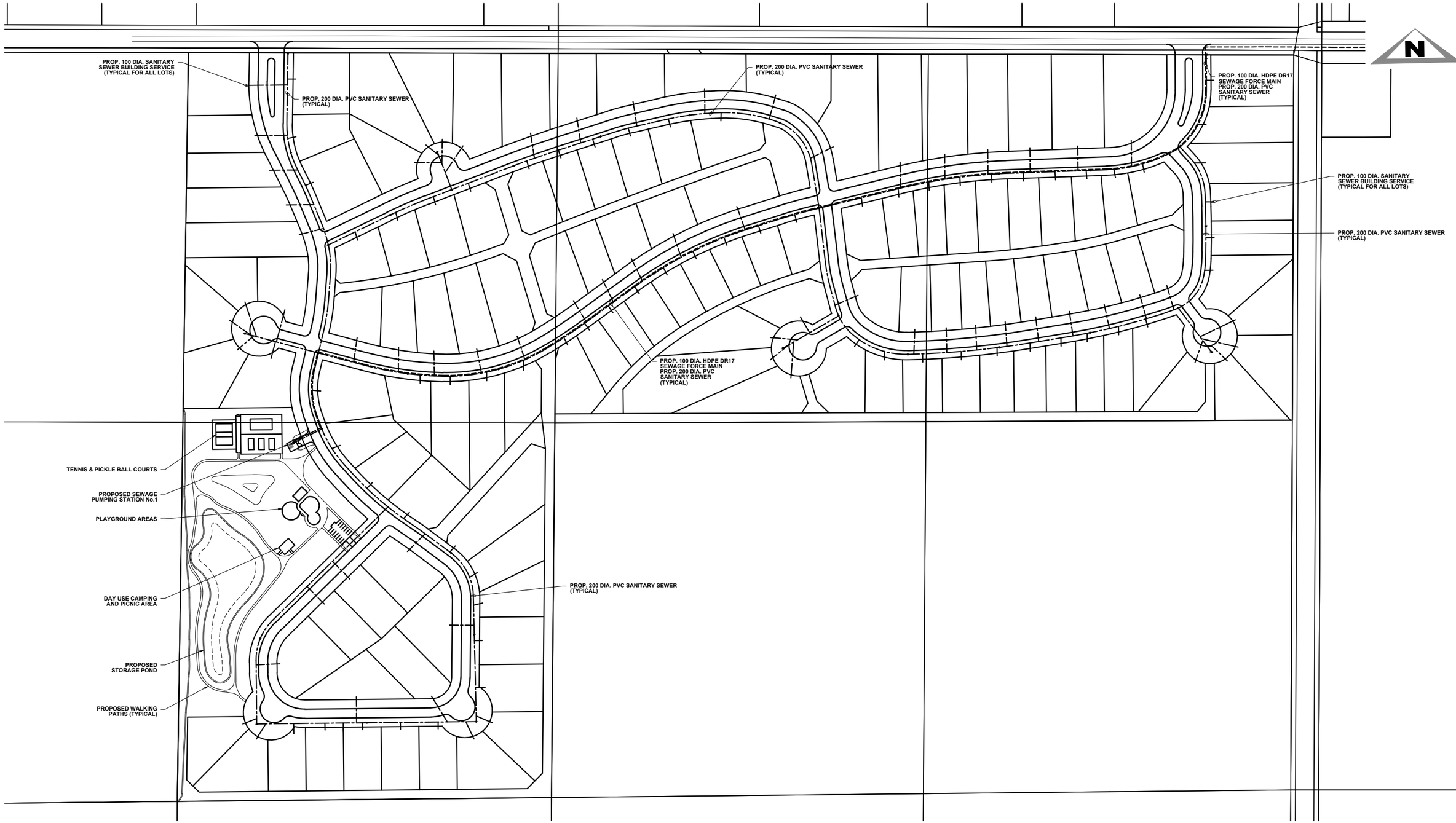


FIGURE 6.1 - SEWER SYSTEM

CLIENT:
EDGEMONT EAST

PROJECT:
SUBDIVISION DEVELOPMENT

JOB NUMBER:
260.52

DATE:
2022/08/24

DRAWN:
K.M.N.

SCALE:
1:2000

BCL ENGINEERING LTD.
| 200 - 302 WELLMAN LANE | SASKATOON, SK | S7T 0J1 |
| 1-306-477-2822 | www.bcl-eng.ca |

Sewer main sizing is based on the anticipated wastewater flows previously discussed. Following standard industry practice, the minimum sewer size is 200 mm diameter at a minimum slope of 0.4% to provide adequate cleansing velocities.

The system is designed with a minimum cover of 3.0 m to the top of pipe for frost protection and to facilitate gravity sewer service connections throughout the development. Service manholes are proposed at spacing not greater than 120 m intervals, and at all pipe intersections and deflections. The majority of network will be conventional depth (3.0 - 4.5 m). However, approximately 300 m of the proposed collection main will require installation at increased depth (4.5 - 5.5 m) as it nears the sewage pumping station. Positioning of the manholes and elevation of the frame and cover shall be coordinated with the anticipated flood conditions.

6.3 SEWAGE PUMPING STATION AND FORCE MAIN

There are no existing sewer facilities within the vicinity of the development. Therefore, a new collection point and sewage pumping facility will be required.

The collection location was selected based on several criteria, including:

- existing topography and proposed grading, in order to facilitate the gravity sewer network layouts and to limit overall station depth and subsequent construction cost;
- to facilitate phasing of the development.

As shown, the area serviceable by the sewage pumping station and force main extend to all boundaries of the development.

To facilitate development of the full serviceable area, the sewage pumping station depth would be in the order of 7.5 m from finished grade to lower foundation slab, which is considered a conventional depth for such facilities. Due to the water table elevation and sandy ground conditions, dewatering and shoring procedures will likely be required during construction. Effects of buoyancy should also be considered through the course of the design.

Approximately 750 m of force main is required to convey sewage from the pumping station to Grasswood Road. The force main connection would continue to the wastewater treatment facility currently under construction on the English River First Nation lands, near Highway 11 and Grasswood Road. Details for the sewage force main components extending along Grasswood Road to the wastewater treatment plant are currently being reviewed under a separate study, due to the potential regionalization of the system.

The sewage pumping station shall be generally comprised of a pre-manufactured fibreglass wet well, complete with integrated pump stands, process piping (check valves, plug valves, and metering), and provisions for access and maintenance (platforms, ladders, lifting davits). A duplex pump arrangement is recommended to provide full redundancy in the event of a pump failure or clog.

The station shall be designed to accommodate the peak loading conditions of 6.82 L/s, as indicated in Section 7.1. The condition point and operating pressure should be confirmed with the sewage force main design. The operating pressure will likely be in the order of 450 kPa.

Electrical systems shall generally include an automated control panel monitoring sewage levels within the wet well, complete with high level and alarm setpoints. High level conditions shall signal an alarm and attempt to run two pumps simultaneously. The system shall alternate each sewage pump to ensure even pump use and wear.

Backup systems shall include an autodialler system for alarm notifications, which is commonly cellular based, with several contacts programmed into the system. It is recommended that a standby generator be available to provide a backup power source in the event of a prolonged power outage. Power systems can also be monitored by the control systems, with alarm notifications as required. Such a system would become essential at or near full build-out.

7. WATER DISTRIBUTION

Water supply in the development includes a pressurized potable water connection to residences for domestic purposes. The proposed water distribution network is shown in Figure 7-1.

Several service providers are available within the immediate vicinity, including the Dundurn Rural Water Utility, Lost River Water Corporation, and SaskWater, all of which receive treated water supply from the City of Saskatoon through licencing agreements.

We understand that all service providers have confirmed their availability and interest in providing potable water supply to Edgemont East.

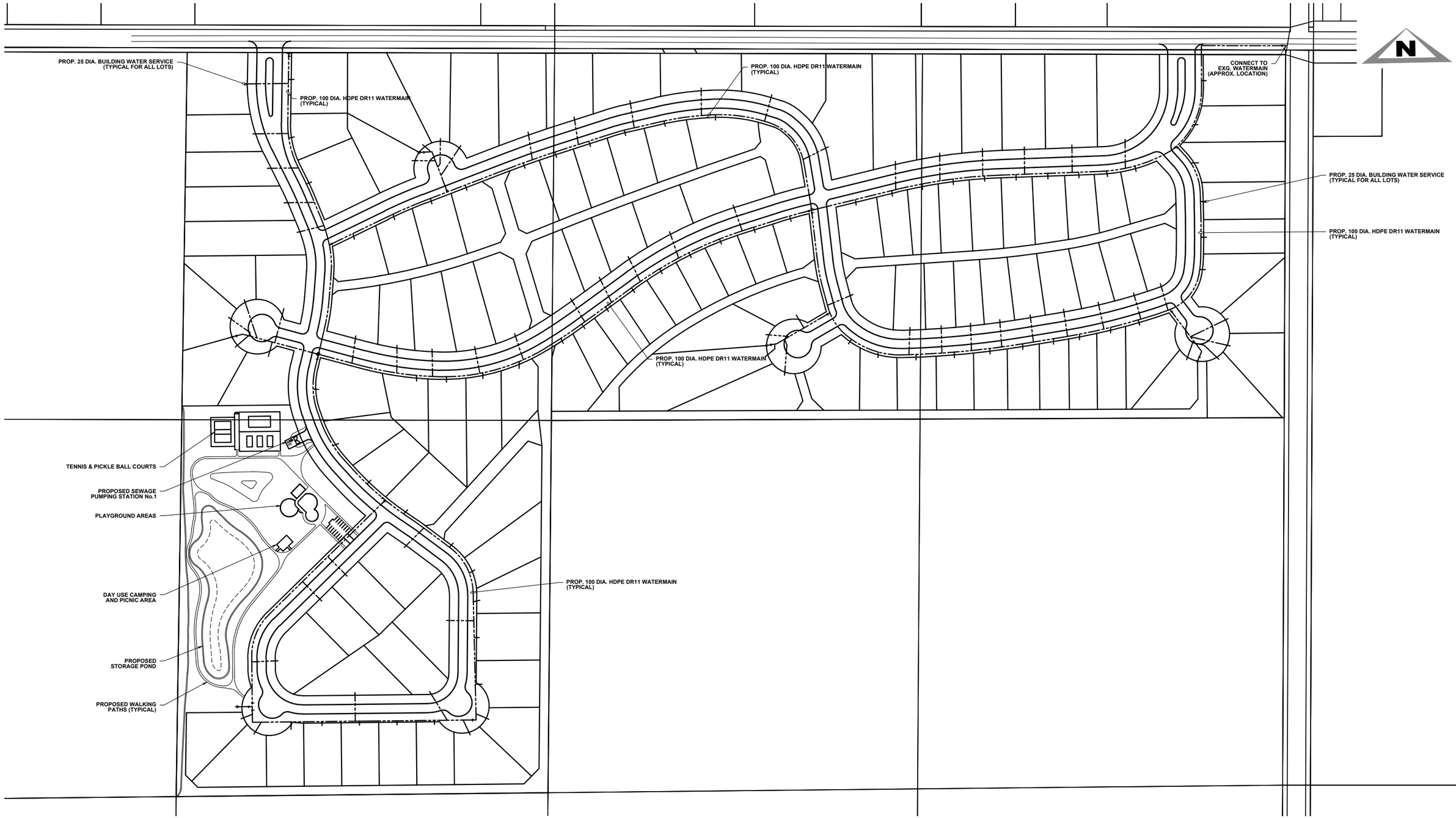


FIGURE 7.1 - WATER SYSTEM

CLIENT:
EDGEMONT EAST

PROJECT:
SUBDIVISION DEVELOPMENT

JOB NUMBER:
260.52

DATE:
2022/08/24

DRAWN:
K.M.N.

SCALE:
1:2000

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| 200 - 302 WELLMAN LANE | SASKATOON, SK | S7T 0J1 |
| 1-306-477-2822 | www.bcl-eng.ca |

8. PERMIT TO CONSTRUCT

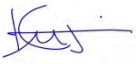
Design drawings related to the proposed water and sewer systems within the development are appended. An application for a *Permit to Construct* was submitted to the Water Security Agency. The permit was received August 23rd, 2022 and is appended for reference.

9. CONCLUSION

We trust that the information within this report meets your needs at this time. If you have any questions, please do not hesitate to contact our office.

Respectfully Submitted,

BCL ENGINEERING LTD.



K. J. Traves, P.Eng.

Water Security Agency

August 23, 2022

File: 21020-50/WW/Con/Pr/Edgemont Estates
21050-50/WWW/Con/Pr/Edgemont Estates

102015575 Saskatchewan Ltd.
217 Sturgeon Place
SASKATOON SK S7K 4C5

102015575 Saskatchewan Ltd.;

Re: Permit for Construction – Edgemont East Subdivision Watermain & Sewer main
Permit No. 00075333-00-00; 00075334-00-00;

Enclosed is a Permit for Construction of Waterworks or Sewage Works. The Water and Wastewater Unit of the Water Security Agency issues this permit on behalf of the Minister under the authority of *The Environmental Management and Protection Act, 2010* (EMPA) to 102015575 Saskatchewan Ltd. for construction of works located in the NW and NE of 34-35-05-W3. This permit allows for the construction of 3923 metres of 100mm HDPE DR17 watermain, 309 metres of 150mm HDPE DR17 watermain, 2975 metres of 200mm PVC SDR35 sewer main, 1110 metres of 250mm PVC SDR35 sewer main, one prepackaged sewage lift station, and all related appurtenances.

The construction of the approved works for 102015575 Saskatchewan Ltd. is to be completed in accordance with information provided to the Water Security Agency between July 8, 2022 and August 23, 2022, including:

(a) "Application for Permit for Construction of Waterworks or Sewage Works" dated July 7, 2022;
(b) Project drawings titled "Edgemont East Subdivision Development" prepared by BCL Engineering Ltd.;
(c) Any other application correspondence or information relating to this project that was received by the Water Security Agency.

It is the responsibility of 102015575 Saskatchewan Ltd. to follow the requirements set out in the attached permit and all referenced design standards and guideline documents. Failure to comply with any of the permit conditions may lead to the suspension or cancellation of this permit, or other appropriate enforcement action.

The following section provides additional details on portions of the attached permit, as well as other items relating to this project. Please note that all clauses listed in the Permit for Construction are of equal importance and must be adhered to regardless of whether they are discussed in this covering letter.

1. As discussed at the Aug 11, 2022 meeting, this project has not received approval from the Rural Municipality of Corman Park (RM) or Community Planning, Government Relations. Any construction on the site that is completed prior to obtaining RM or Community Planning approval is done at the developers own risk. As part of this permit, the distribution system shall not be connected to the water supply until the RM and Community Planning approvals are obtained.

2. All substances, materials or compounds that may come in contact with water in the waterworks being treated to be potable and water that is potable shall conform to ANSI/NSF Standard 61 for health effects and the products shall be certified for potable use by an accredited agency, such as NSF, CSA, UL, etc.

3. Please ensure that the watermain is sufficiently below the depth of frost penetration. The watermain shall be covered with sufficient earth cover or insulation to protect the pipe from freezing during the winter months.

4. A sufficient number of valves shall be provided on the watermain to minimize inconvenience and contamination during repairs.

5. A sewage lift station is a hazardous confined space. As such, a hazardous confined space entry plan must be prepared prior to any worker entering the space. Best practices include but are not limited to fall protection, continuous air quality monitoring, standby person, etc. Guidance on best practices can be found in the CSA standard Z1006-10. Any questions can be forwarded to Occupational Health and Safety at 1-800-567-7233.

6. As outlined in the EPB 503 Sewage Works Design Standard, the sewage lift station shall supply twelve air changes per hour in the wet well and six air changes per hour in the dry well for continuous ventilation and supply thirty air changes per hour in each the wet well and dry well for intermittent ventilation. Retention time should be minimized to not cause odour problems with the nearby residents.

7. Disruption to the existing wastewater works shall be minimized. During construction, please ensure that the incoming wastewater is diverted and/or properly disposed of. Your Environmental Project Officer (EPO) must be contacted prior to any planned bypass of the existing lift stations. If an emergency bypass is required, your EPO must be contacted immediately.

8. This permit does not grant any permission to the Permittee or others to enter or build on land that is not owned or controlled by the Permittee. Please ensure that land access and control is acquired for both the construction and ongoing maintenance of the installed works.

9. Copies of our EPB documents can be found online at: https://publications.saskatchewan.ca/#/categories/5426.

10. Please contact your Environmental Project Officer (EPO), Mr. Lee Reinhart, if you have any questions on disinfection or commissioning requirements. He may be contacted by phone at (306) 933-8367, or by email at Lee.Reinhart@wsask.ca.

11. **This project may require permits from other divisions of the Water Security Agency or from other agencies or regulators before construction may commence.** The issuance of a Permit for Construction indicates only that a project meets the construction requirements set out in *The Waterworks and Sewage Works Regulations,* and the applicable Water Security Agency construction

guidelines (found at the link above). The project must meet the requirements set out in other relevant acts, regulations, and codes, such as The National Building Code of Canada, Canadian Electric Code, etc. Please note that our review is not a detailed engineering review of the application.

12. You must contact your EPO **prior** to commencing construction. Upon completion of construction, you must notify the EPO of completion, and submit "**as-constructed**" drawings. For new treatment works, operation and maintenance manuals must be submitted to the EPO as well.

To report an emergency or upset condition, please contact either your EPO or the 24-hour Upset Report Line at 1-844-536-9494.

If you have any questions about this permit, please feel free to call me at (306) 787-9166 or email the Standards & Approvals Unit at WSA.EngineeringandApprovals@wsask.ca.

Sincerely,

Riley Garchinski

Riley Garchinski, B.A.Sc. Engineer-in-Training
Approvals Engineer-in-Training
Water and Wastewater
Science and Licensing Division
Water Security Agency

cc: Kevin Traves, BCL Engineering Ltd., Saskatoon
Senior Public Health Inspector, Saskatchewan Health Authority, Saskatoon Office
Lee Reinhart, Water Security Agency, Saskatoon

Enclosure

Water Security Agency

Permit for Construction of Waterworks or Sewage Works

Science and Licensing Division

Issued pursuant to Section 27 of
The Environmental Management and Protection Act, 2010

Permit No.
00075333-00-00
00075334-00-00

File: 21020-50/WW/Con/Pr/Edgemont Estates
21050-50/WWW/Con/Pr/Edgemont Estates

To: 102015575 Saskatchewan Ltd.; (Permittee).

PURSUANT to section 27(2)(a) of *The Environmental Management and Protection Act, 2010,* a permit for construction of works located in NW and NE of 34-35-05-W3 is issued in accordance with the attached Terms and Conditions. This permit allows for the construction of 3923 metres of 100mm HDPE DR17 watermain, 309 metres of 150mm HDPE DR17 watermain, 2975 metres of 200mm PVC SDR35 sewer main, 1110 metres of 250mm PVC SDR35 sewer main, one prepackaged sewage lift station, and all related appurtenances.

This Permit takes effect on the 23rd day of August 2022.

This Permit expires on the 23rd day of August 2025, unless cancelled or suspended before that date.

Issued for and on behalf of the Water Security Agency:

Justin Hay, P. Eng.
Acting Manager – Water & Wastewater
Science and Licensing Division
Water Security Agency

Terms and Conditions

Section One: Definitions

1.1 All words and phrases have the same definitions as set out in *The Environmental Management and Protection Act, 2010*, and *The Waterworks and Sewage Works Regulations*, as the case may be.

1.2 In this Permit:

(a) "Act" means *The Environmental Management and Protection Act, 2010;*
(b) "Regulations" means *The Waterworks and Sewage Works Regulations;*
(c) "Science & Licensing Division" means the Science & Licensing Division of the Water Security Agency;
(d) "Approvals Engineer" refers to the Approvals Engineer or Drinking Water Engineer of the Science & Licensing Division; and
(e) "Environmental Project Officer" refers to the Environmental Project Officer for the corresponding geographical administration area of the Science & Licensing Division.

Section Two: Construction

2.1 A copy of this cover letter and permit must be given to the person(s) supervising those performing the construction work, such as the contractor or employee.

2.2 Prior to commencing construction, the Permittee shall notify the Environmental Project Officer.

2.3 The construction of the approved works for 102015575 Saskatchewan Ltd.; is to be completed in accordance with information provided to the Water Security Agency between July 8, 2022 and August 23, 2022, including:

(a) "Application for Permit for Construction of Waterworks or Sewage Works" dated July 13, 2022;
(b) Project drawings titled "Edgemont East Subdivision Development" prepared by BCL Engineering Ltd.;
(c) Any other application correspondence or information relating to this project which were received by the Water Security Agency.

2.4 There shall be no changes to or deviations from the approved application materials without the prior written consent of the Water Security Agency. Any proposed change or deviation shall be submitted in writing to the Standards and Approvals Section of the Water Security Agency for approval.

2.5 As discussed at the Aug 11, 2022 meeting, this project has not received approval from the Rural Municipality of Corman Park (RM) or Community Planning, Government Relations. Any construction on the site that is completed prior to obtaining RM or Community Planning approval is done at the developers own risk. As part of this permit, the distribution system shall not be connected to the water supply until the RM and Community Planning approvals are obtained.

2.6 The Permittee shall ensure that all pipe, fittings and appurtenances conform to applicable standards or specifications issued by AWWA, CSA, CGSB or other acceptable references. Materials used for the construction, extension, or alteration of a water distribution works must comply with the latest versions of "NSF/ANSI Standard 61: Drinking Water System Components – Health Effects" and "NSF/ANSI 372: Drinking Water System Components – Lead Content."

2.7 The Permittee shall ensure that the new water system is pressure tested, disinfected following construction, and proven bacteriologically safe prior to operation. Verification of bacteriological safety must conform to the latest edition of the AWWA C651 "Disinfecting Water Mains" and Water Security Agency EPB 560A "Waterworks Start-up Standard." The Water Security Agency EPB 293 "Managing Wastes Generated by Water Treatment, Distribution, Maintenance, Repair and Extension" shall also be followed.

2.8 The Permittee shall ensure that the sewage pump station is equipped with mechanically forced air ventilation.

2.9 As outlined in the EPB 503 Sewage Works Design Standard, the sewage lift station shall supply twelve air changes per hour in the wet well and six air changes per hour in the dry well for continuous ventilation and supply thirty air changes per hour in each the wet well and dry well for intermittent ventilation.

2.10 The Permittee shall ensure that there is a hazardous confined space entry plan prepared prior to any worker entering hazardous confined space.

2.11 The Permittee shall contact the Environmental Project Officer prior to any planned and/or emergency bypass of the existing lift stations. If an emergency bypass is required, the Environmental Project Officer must be contacted immediately.

2.12 All land access and control agreements, easements, etc. shall be acquired by the Permittee prior to the commencement of any construction and on-going maintenance of the installed works.

2.13 The Permittee shall submit a post-construction report to the Water Security Agency within 60 days of the completion of the project.

2.14 The permitted works shall be in accordance with the Water Security Agency EPB 501 "Waterworks Design Standard", EPB 276 "Water Pipeline Design Guidelines" and EPB 503 "Sewage Works Design Standard."

2.15 Upon completion of construction, the Permittee shall:
(a) notify the Environmental Project Officer; and
(b) submit "as-constructed" drawings to the Approvals Engineer within 60 days of project commissioning; and
(c) submit operation and maintenance manuals for new upgrades to the Environmental Project Officer within 30 days of project commissioning.

Section Three: General

3.1 This Permit takes effect on the date shown on the Permit.

3.2 The Permittee shall complete construction of the works in accordance with the Permit by the date shown on the Permit.

3.3 If the Permittee is unable to complete the construction by the expiry date shown on the Permit, the Permittee shall advise the Approvals Engineer in writing, not less than thirty (30) days prior to the Permit expiry date, stating the reasons for non-completion and requesting an extension of the Permit.

3.4 This Permit is not an authorization or approval to operate the works without first obtaining a separate permit to do so in accordance with the Act and Regulations.

3.5 This Permit does not replace or supersede any approvals, licenses or authorizations that may be required from municipal, provincial, or federal legislation. The Permittee will maintain in force all such approvals, licenses or authorizations that may be required.

3.6 This approval is subject to cancellation, alteration or suspension as provided by the Act.

3.7 Where any notice or reporting is required to be given by the Permittee, it shall be provided to:

(a) in the case of the Approvals Engineer:
Science & Licensing Division
Water Security Agency
Park Plaza
300 - 2365 Albert Street
REGINA SK S4P 4K1
Telephone: (306) 787-0726
Fax: (306) 787-0780

(b) in the case of the Environmental Project Officer:
Science & Licensing Division
Water Security Agency
10 – 3904 Millar Ave.
SASKATOON SK S7P 0B1
Telephone: (306) 933-8367
Fax: (306) 933-6820

BCL ENGINEERING LTD.

EDGEMONT EAST

SUBDIVISION DEVELOPMENT

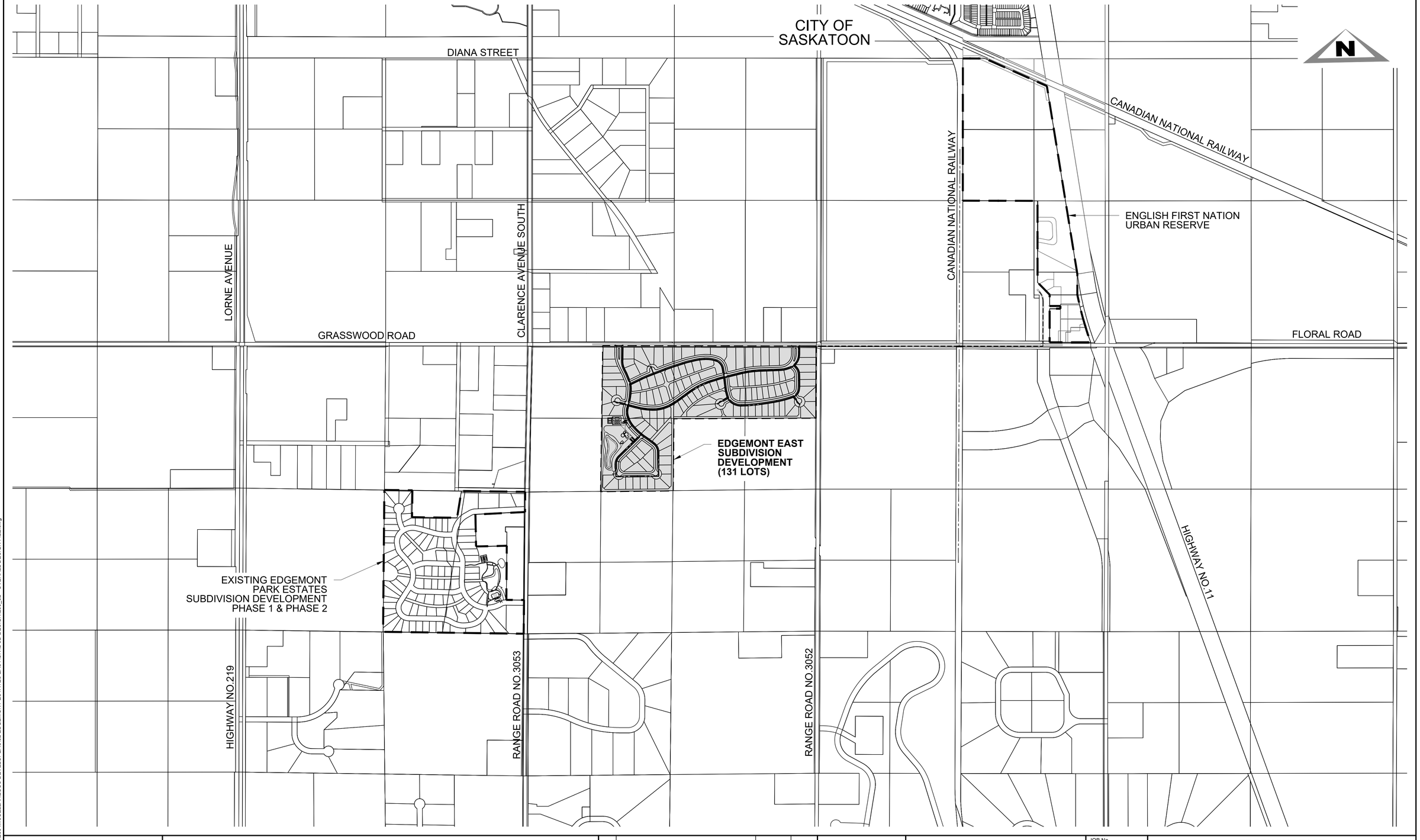
DRAWING INDEX

PROPOSED SUBDIVISION

PROP. SEWAGE FORCE MAIN

PROPOSED SEWAGE PUMPING STATION No. 1

SEWAGE PUMPING STATION No. 1 ELECTRICAL



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ASSOCIATION OF PROFESSIONAL ENGINEERS & GEOSCIENTISTS OF SASKATCHEWAN
CERTIFICATE OF AUTHORIZATION

BCL ENGINEERING LTD.

NUMBER C0312

PERMISSION TO CONSULT HELD BY:

DISCIPLINE	SASK. REG. No.	SIGNATURE
MUNICIPAL		

PRELIMINARY ONLY
NOT FOR CONSTRUCTION

0 500 1000 Meters

SCALES SHOWN REFER TO ANSI D PAPER SIZE.
SCALES TO BE DOUBLED FOR ANSI B PAPER SIZES.

No.	REVISION	DATE	BY
-			

STAMP

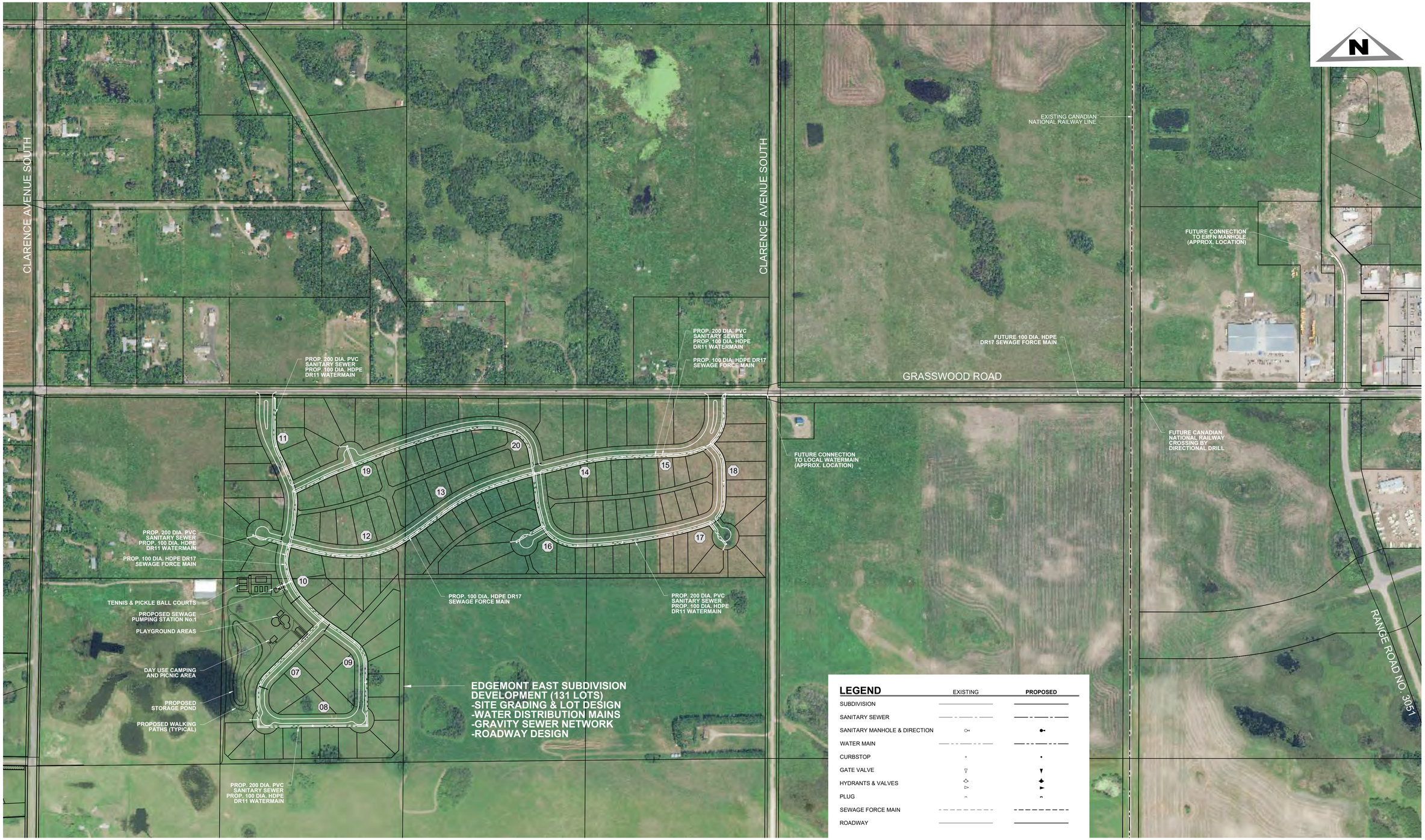
BCL ENGINEERING LTD.

JOB No.	260.52
DATE:	2022/06/14
DRAWN:	K.M.N.
CHECKED:	T.T.B.
DESIGNED:	K.J.T.

EDGEMONT EAST

SUBDIVISION DEVELOPMENT
KEY PLAN

SCALE:	REV. No.	DRAWING No.	SHEET:
1:10000	A		01 OF 35



LEGEND	EXISTING	PROPOSED
SUBDIVISION		
SANITARY SEWER		
SANITARY MANHOLE & DIRECTION		
WATER MAIN		
CURBSTOP		
GATE VALVE		
HYDRANTS & VALVES		
PLUG		
SEWAGE FORCE MAIN		
ROADWAY		

ASSOCIATION OF PROFESSIONAL ENGINEERS & GEOSCIENTISTS OF SASKATCHEWAN
CERTIFICATE OF AUTHORIZATION

BCL ENGINEERING LTD.

NUMBER C0312

PERMISSION TO CONSULT HELD BY:

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PRELIMINARY ONLY
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0 200 400 Meters

SCALES SHOWN REFER TO ANSI D PAPER SIZE.
SCALES TO BE DOUBLED FOR ANSI B PAPER SIZES.

No.	REVISION	DATE	BY
-			

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DRAWN:	K.M.N.
CHECKED:	T.T.B.
DESIGNED:	K.J.T.

EDGEMONT EAST

SUBDIVISION DEVELOPMENT LOCATION PLAN

SCALE:	REV. No.	DRAWING No.	SHEET:
1:4000	A		02 OF 35

2022/6/14 1:45:57 PM T:\dgn\260 MISCELLANEOUS DEVELOPERS\02 EDGEMONT ESTATES EAST\CIVIL 3D DESIGN\260_52 - OVERALL DESIGN FILE.dwg

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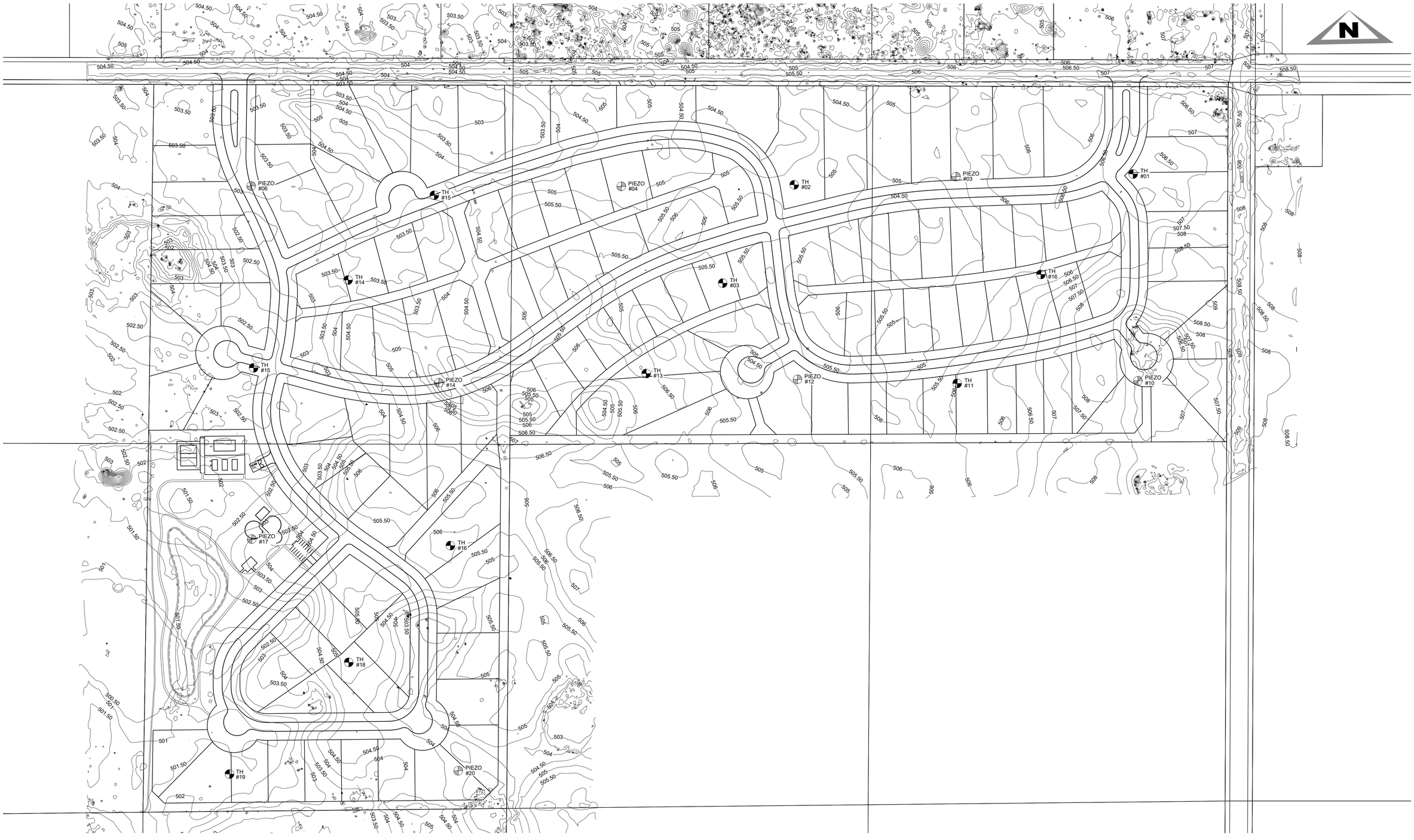
EDGEMONT EAST

SUBDIVISION DEVELOPMENT
EXISTING CONTOUR PLAN

SCALE: 1:2000 | REV. No. A | DRAWING No. | SHEET: 03 OF 35



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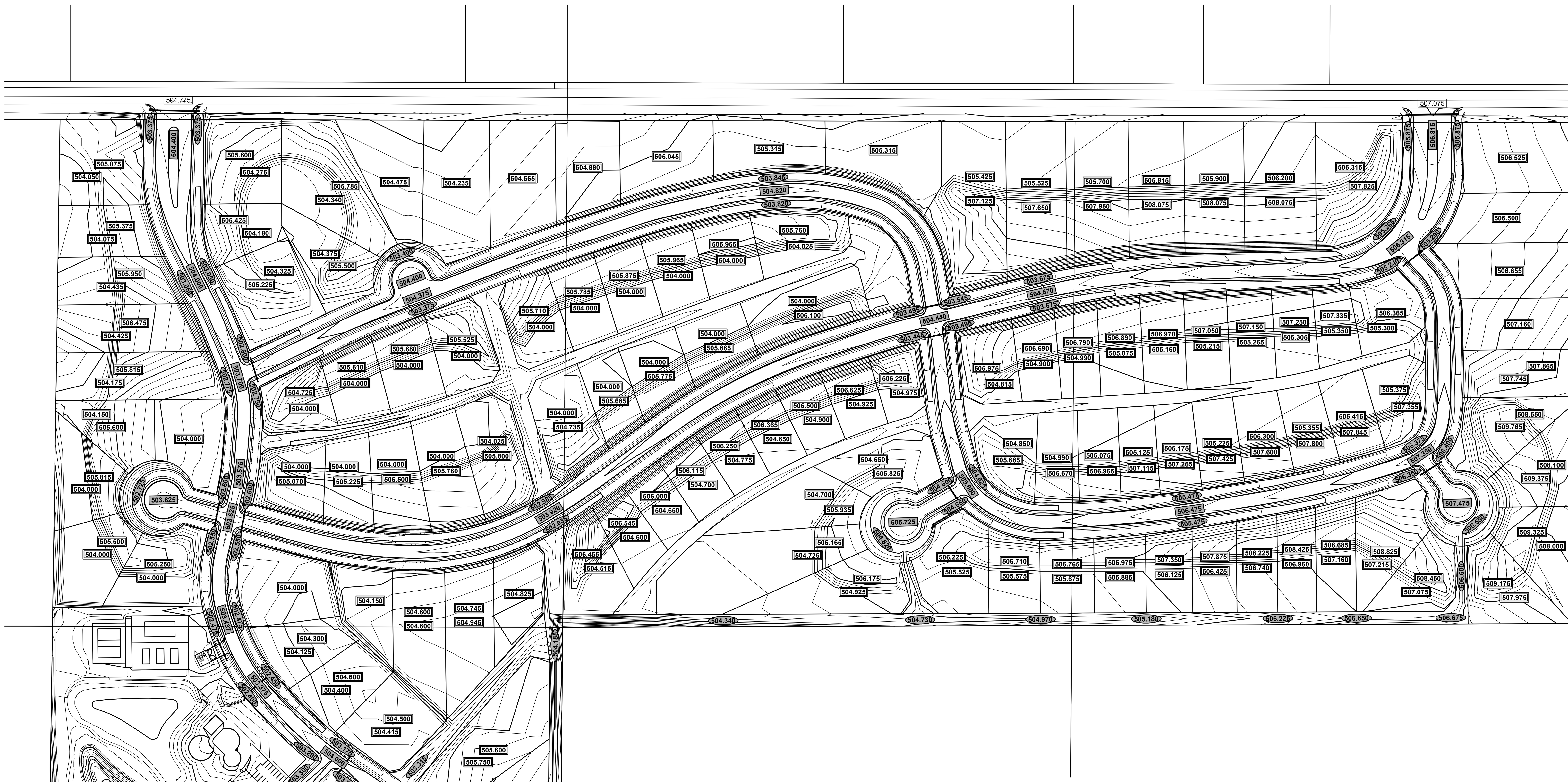
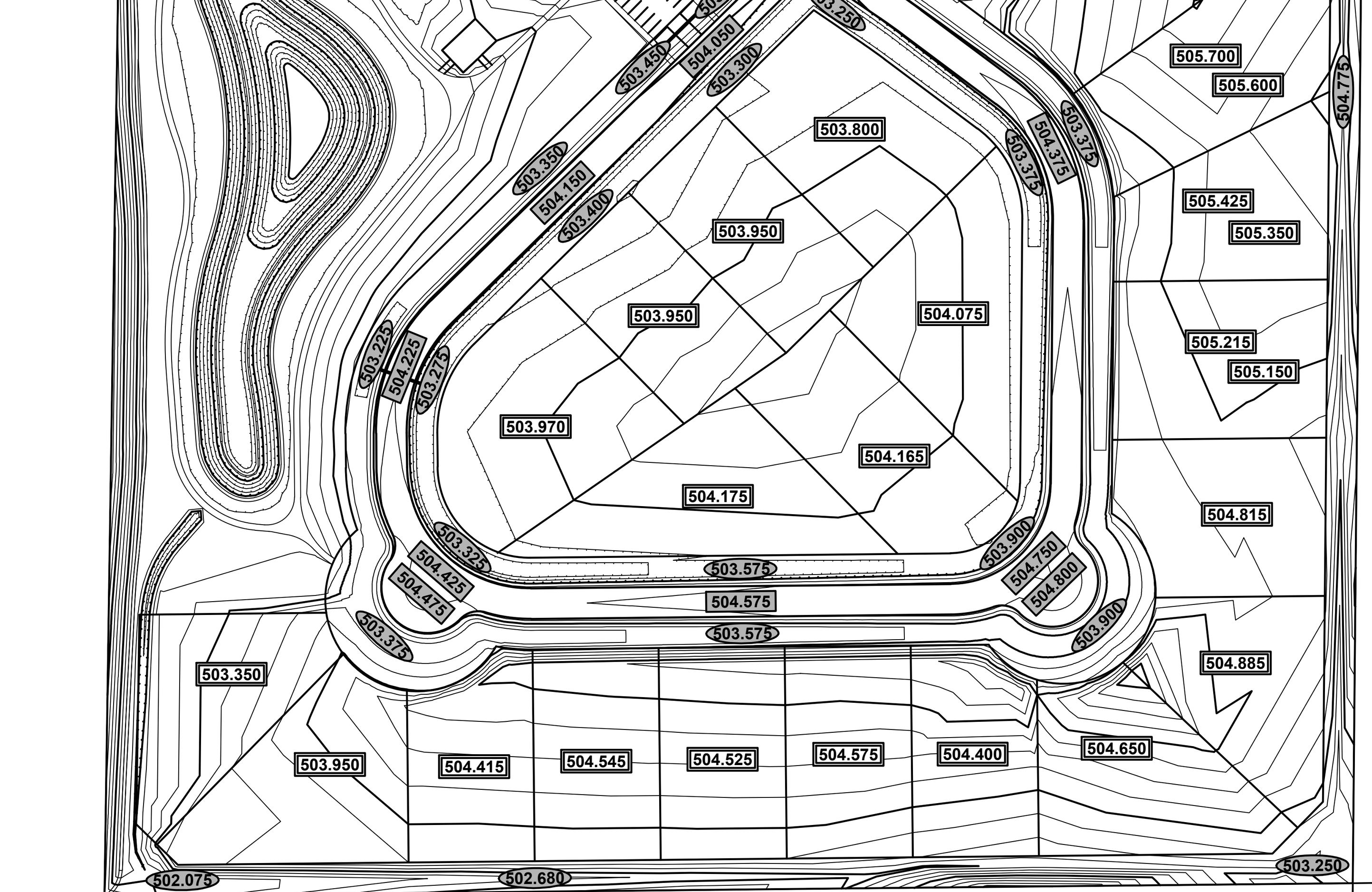
EDGEMONT EAST

SUBDIVISION DEVELOPMENT
EXISTING CONTOUR PLAN

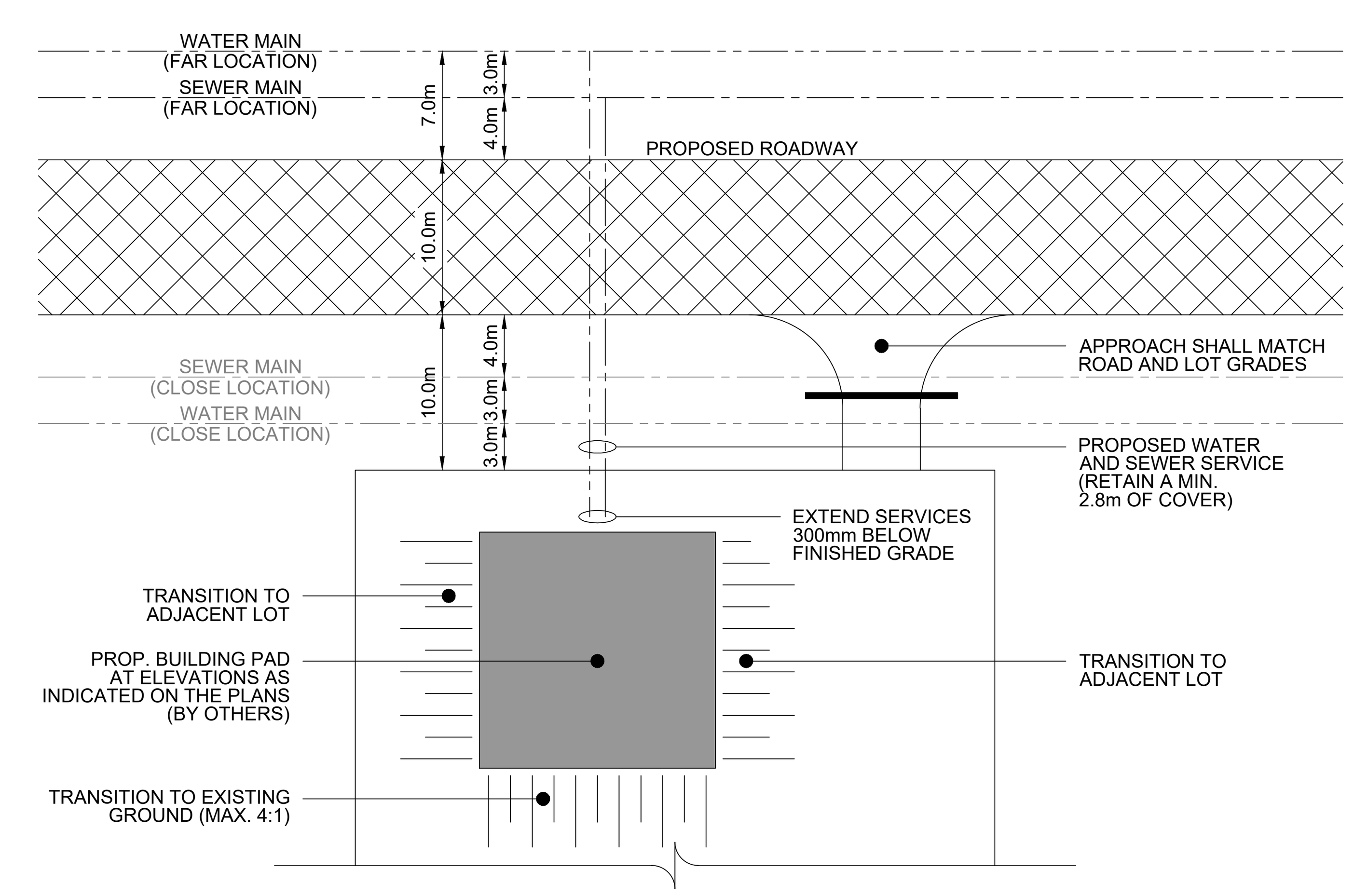
SCALE:	REV. No.	DRAWING No.	SHEET:
1:2000	A		04 OF 35





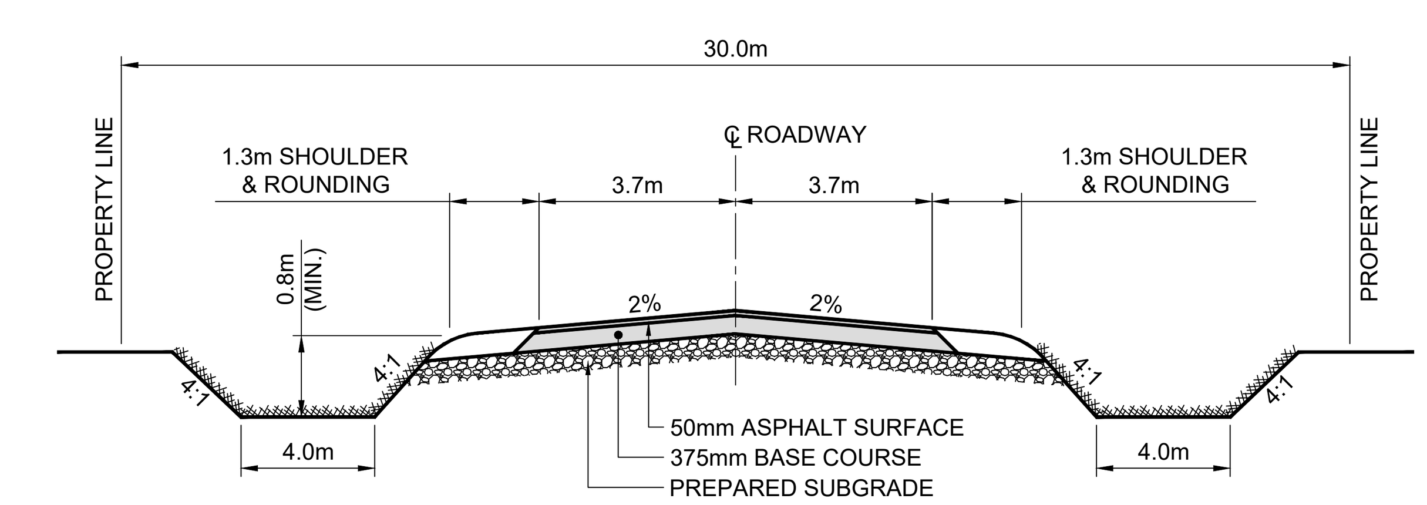
GRADING LEGEND

	EXISTING	PROPOSED
GRADE	3.0%	**3.0%**
DITCH ELEVATION	466.000	**466.000**
LOT ELEVATION	466.000	**466.000**
LOT CORNER ELEVATION	466.000	**466.000**
ROAD ELEVATION	466.000	**466.000**
SPOT ELEVATION	□466.000	■**466.000**
CULVERT		



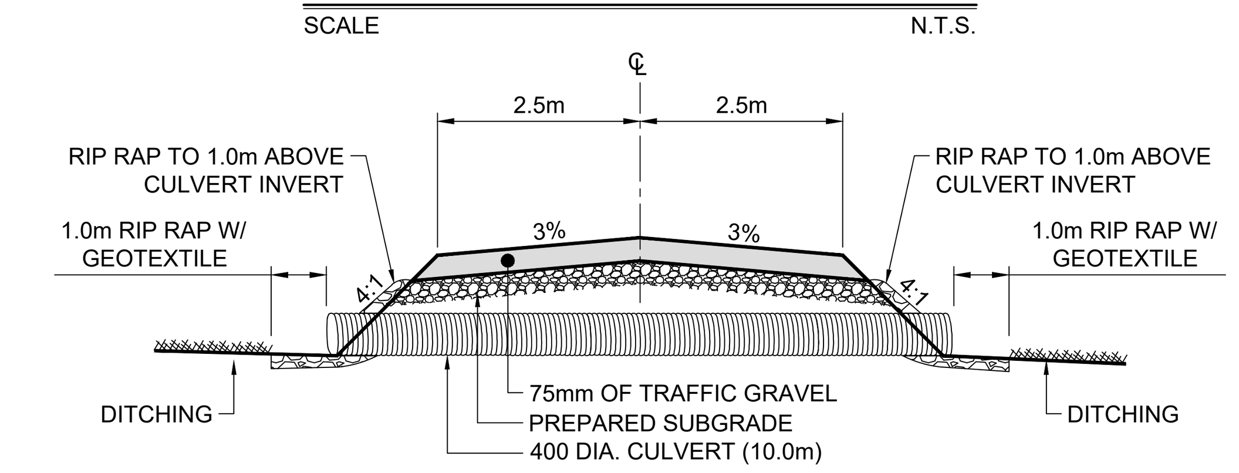
LOT GRADING DETAIL

SCALE N.T.S.



TYPICAL ROAD CROSS SECTION

SCALE N.T.S.



TYPICAL ROAD APPROACH

SCALE N.T.S.

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EDGEMONT EAST

SUBDIVISION DEVELOPMENT
PROPOSED GRADING PLAN

SCALE: 1:2000 | REV. No. A | DRAWING No. | SHEET: 05 OF 35

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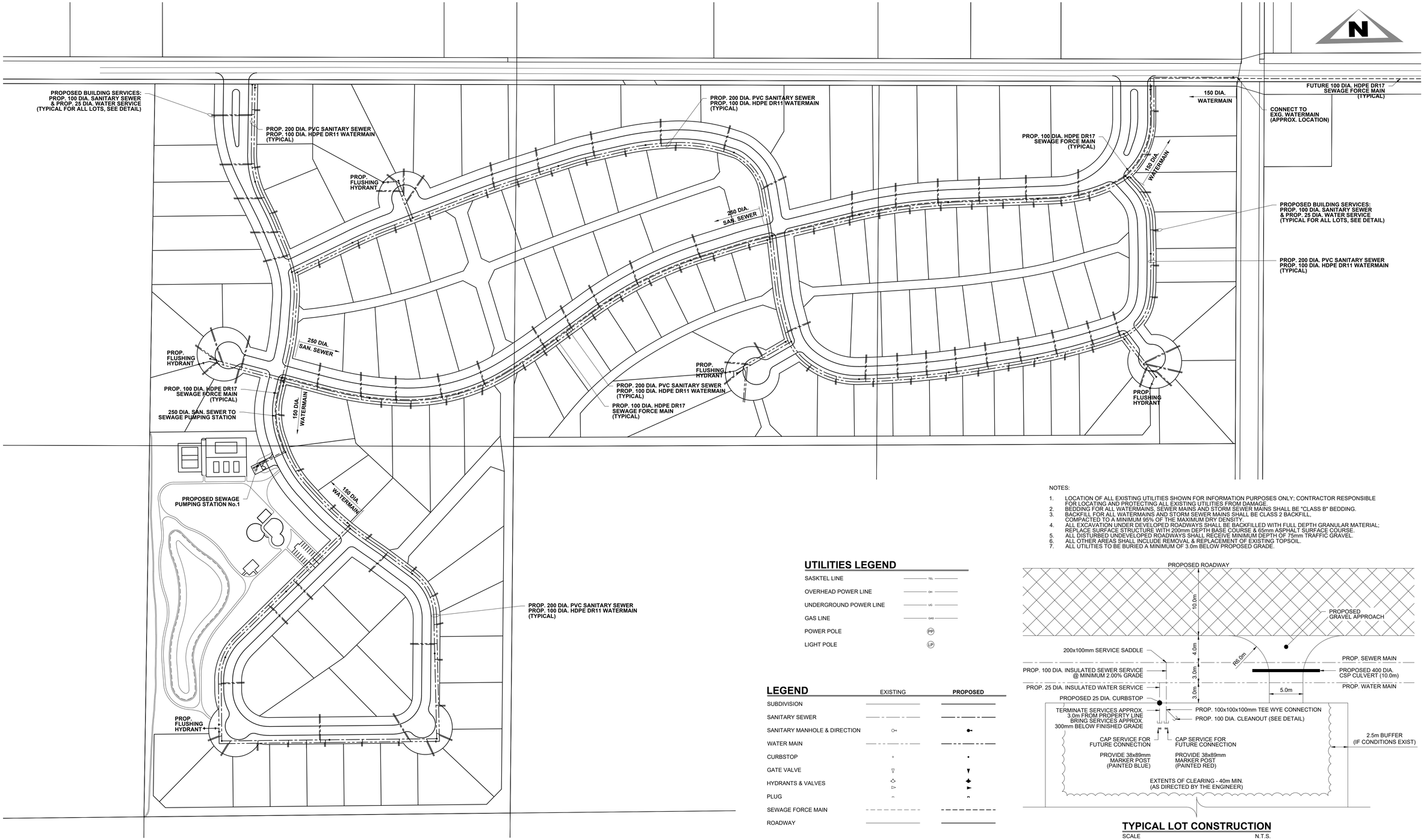

NOTES:

1. LOCATION OF ALL EXISTING UTILITIES SHOWN FOR INFORMATION PURPOSES ONLY; CONTRACTOR RESPONSIBLE FOR LOCATING AND PROTECTING ALL EXISTING UTILITIES FROM DAMAGE.
2. BEDDING FOR ALL WATERMAINS, SEWER MAINS AND STORM SEWER MAINS SHALL BE "CLASS B" BEDDING.
3. BACKFILL FOR ALL WATERMAINS AND STORM SEWER MAINS SHALL BE CLASS 2 BACKFILL, COMPACTED TO A MINIMUM 95% OF THE MAXIMUM DRY DENSITY.
4. ALL EXCAVATION UNDER DEVELOPED ROADWAYS SHALL BE BACKFILLED WITH FULL DEPTH GRANULAR MATERIAL; REPLACE SURFACE STRUCTURE WITH 200mm DEPTH BASE COURSE & 65mm ASPHALT SURFACE COURSE.
5. ALL DISTURBED UNDEVELOPED ROADWAYS SHALL RECEIVE MINIMUM DEPTH OF 75mm TRAFFIC GRAVEL.
6. ALL OTHER AREAS SHALL INCLUDE REMOVAL & REPLACEMENT OF EXISTING TOPSOIL.
7. ALL UTILITIES TO BE BURIED A MINIMUM OF 3.0m BELOW PROPOSED GRADE.

UTILITIES LEGEND

SASKTEL LINE	TEL
OVERHEAD POWER LINE	OH
UNDERGROUND POWER LINE	UG
GAS LINE	GAS
POWER POLE	PP
LIGHT POLE	LP

LEGEND

	EXISTING	PROPOSED
SUBDIVISION		
SANITARY SEWER		
SANITARY MANHOLE & DIRECTION		
WATER MAIN		
CURBSTOP		
GATE VALVE		
HYDRANTS & VALVES		
PLUG		
SEWAGE FORCE MAIN		
ROADWAY		

TYPICAL LOT CONSTRUCTION

SCALE N.T.S.

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0 100 200 Meters

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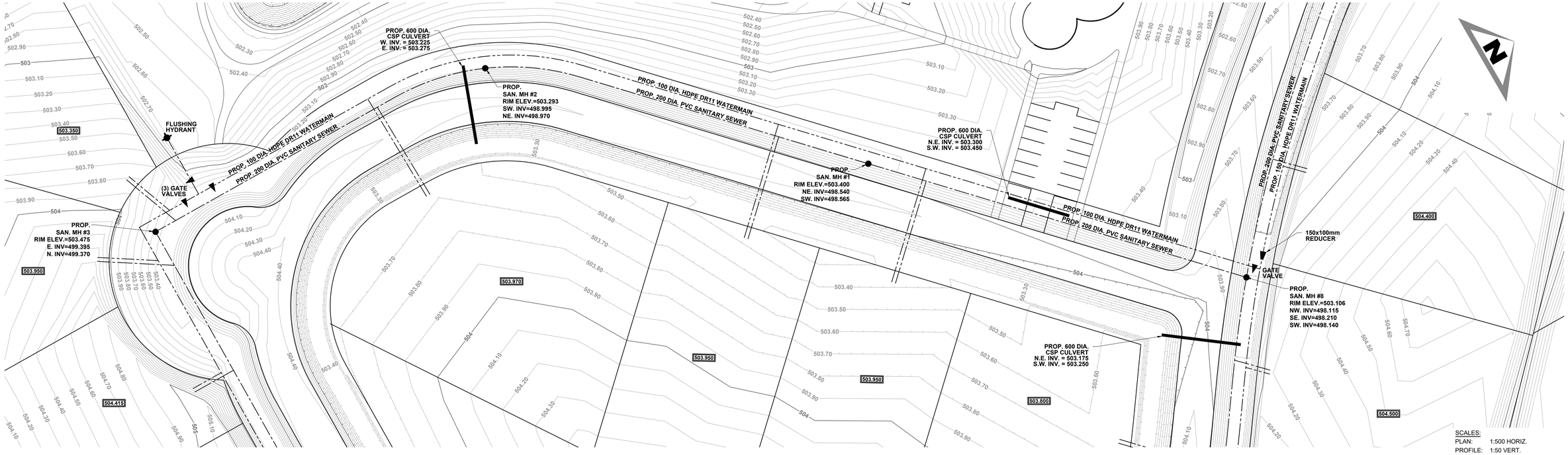
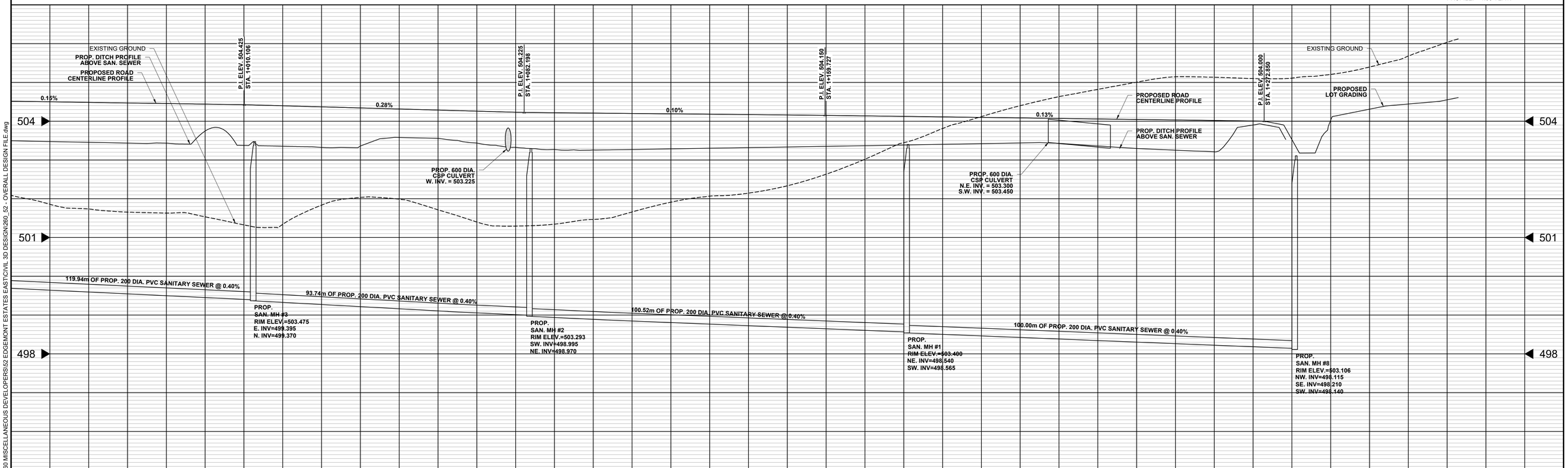
EDGEMONT EAST

SUBDIVISION DEVELOPMENT
WATER & SEWER PLAN

SCALE:	REV. No.	DRAWING No.	SHEET:
1:2000	A		06 OF 35





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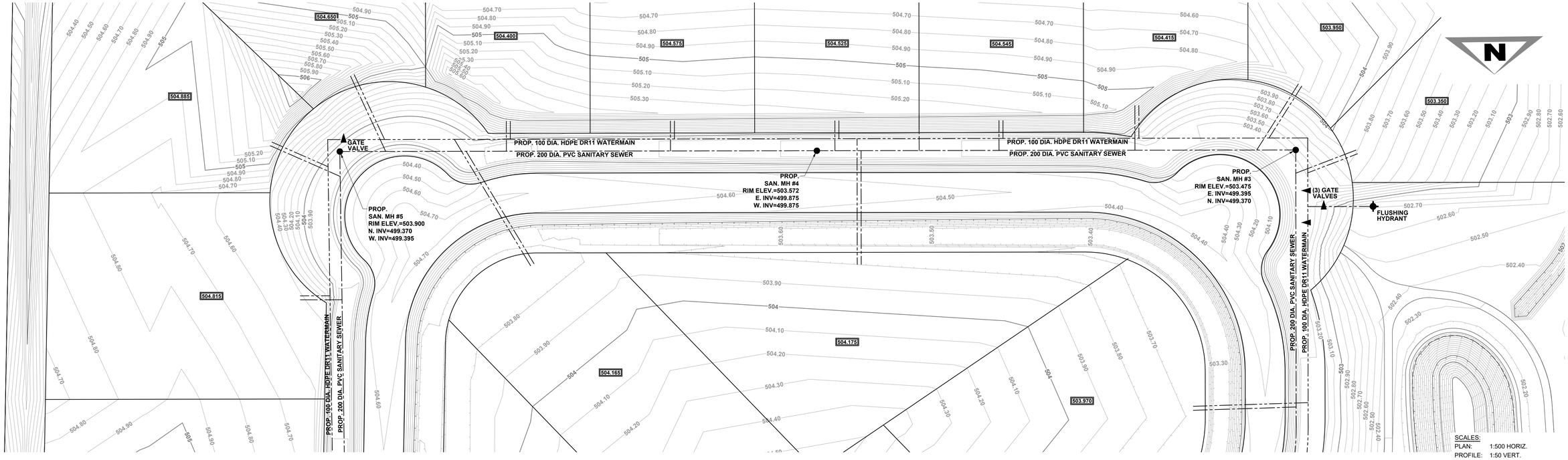
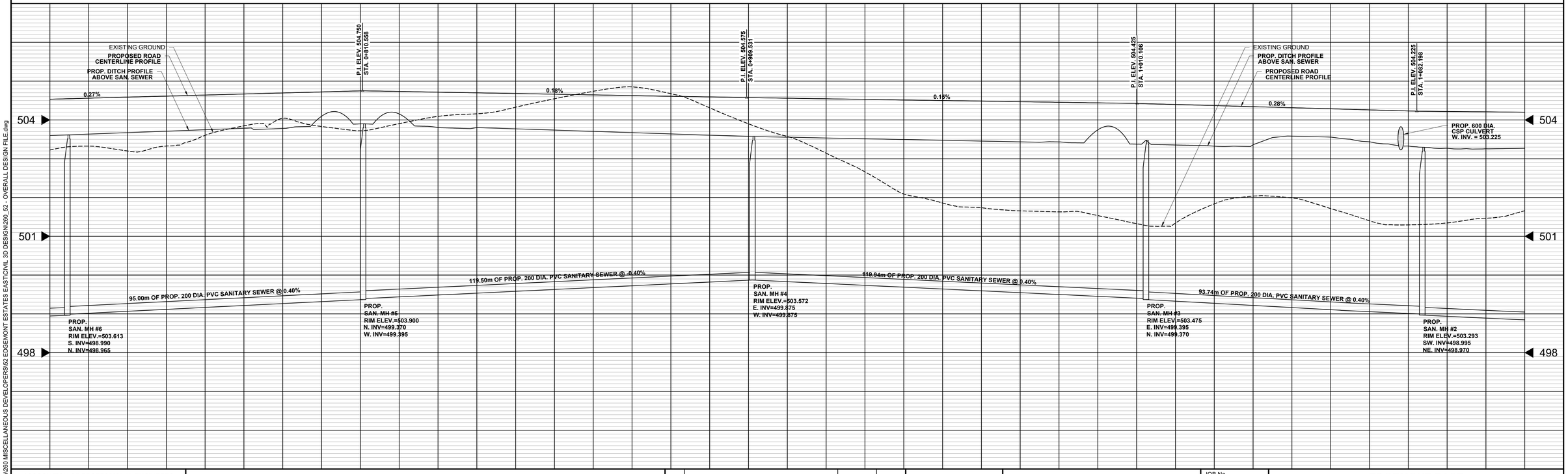
EDGEMONT EAST

SUBDIVISION DEVELOPMENT
PLAN & PROFILE

SCALE:	REV. No.	DRAWING No.	SHEET:
1:500	A		07 OF 35





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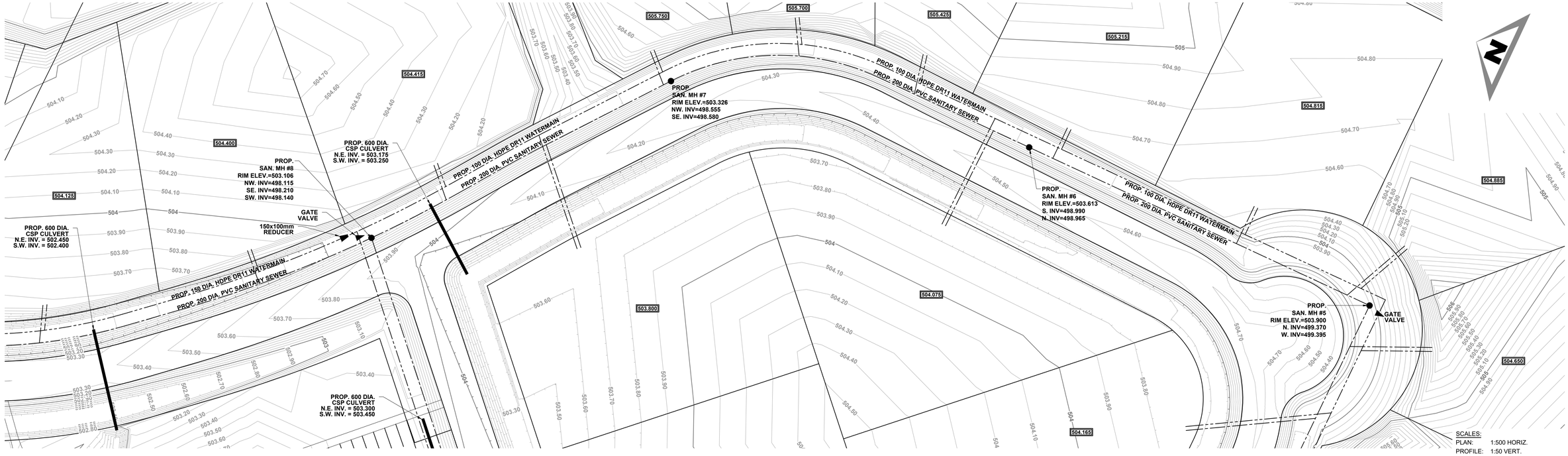
EDGEMONT EAST

SUBDIVISION DEVELOPMENT PLAN & PROFILE

SCALE:	REV. No.	DRAWING No.	SHEET:
1:500	A		08 OF 35



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EDGEMONT EAST

SUBDIVISION DEVELOPMENT
PLAN & PROFILE

SCALE:	REV. No.	DRAWING No.	SHEET:
1:500	A		09 OF 35

PROP. 600 DIA. CSP CULVERT N. INV. = 502.800 S. INV. = 502.750

GATE VALVE

PROP. SAN. MH #12 RIM ELEV.=502.888 NE. INV=498.450 S. INV=498.425 N. INV=499.200

PROP. 100 DIA. HDPE DR11 WATERMAIN

PROP. 200 DIA. PVC SANITARY SEWER

PROP. 600 DIA. CSP CULVERT N. INV. = 502.600 S. INV. = 502.550

PROP. 100 DIA. HDPE DR17 SEWAGE FORCE MAIN

PROP. 250 DIA. PVC SANITARY SEWER

PROP. 100 DIA. HDPE DR11 WATERMAIN

(3) GATE VALVES

150x100mm REDUCER

PROP. SAN. MH #10 RIM ELEV.=502.740 N. INV=497.945 S. INV=497.920 W. INV=498.945 E. INV=497.945

PROP. 150 DIA. HDPE DR11 WATERMAIN

PROP. 250 DIA. PVC SANITARY SEWER

PROP. 100 DIA. HDPE DR17 SEWAGE FORCE MAIN

PROP. 600 DIA. CSP CULVERT N. INV. = 502.460 S. INV. = 502.435

PROP. SAN. MH #9 RIM ELEV.=502.472 W. INV=497.665 S. INV=497.665 SW. INV=497.615

GATE VALVE

SANITARY NE. INV=497.520

PROP. S.P.S. No.1

PROP. SAN. MH #8 RIM ELEV.=503.106 NW. INV=498.115 SE. INV=498.210 SW. INV=498.140

PROP. 600 DIA. CSP CULVERT N.E. INV. = 503.175 S.W. INV. = 503.280

GATE VALVE

150x100mm REDUCER

PROP. 600 DIA. CSP CULVERT N.E. INV. = 502.450 S.W. INV. = 502.400

PROP. 150 DIA. HDPE DR11 WATERMAIN

PROP. 200 DIA. PVC SANITARY SEWER

PROP. 200 DIA PVC SANITARY SEWER

PROP. 100 DIA. HDPE DR11 WATERMAIN

PROP. 600 DIA. CSP CULVERT N.E. INV. = 503.300 S.W. INV. = 503.450

SCALES:
PLAN: 1:500 HORIZ.
PROFILE: 1:50 VERT.

P.I. ELEV. 503.700
STA. 0+230.084

EXISTING GROUND
PROPOSED ROAD CENTERLINE PROFILE
PROP. DITCH PROFILE ABOVE SAN. SEWER

P.I. ELEV. 503.575
STA. 0+307.528

P.I. ELEV. 503.525
STA. 0+345.193

P.I. ELEV. 503.437
STA. 0+425.914

P.I. ELEV. 503.375
STA. 0+484.333

P.I. ELEV. 504.000
STA. 0+588.147

504
501
498

0.16%
0.14%
0.11%
0.11%
0.75%

PROP. 600 DIA. CSP CULVERT N. INV. = 502.800 S. INV. = 502.750

PROP. 600 DIA. CSP CULVERT N. INV. = 502.600 S. INV. = 502.550

SEWAGE FORCE MAIN BEND

SEWAGE FORCE MAIN BEND

SEWAGE FORCE MAIN CONNECTION

PROP. 600 DIA. CSP CULVERT N.E. INV. = 502.450

PROP. 600 DIA. CSP CULVERT N.E. INV. = 503.175

PROP. 100 DIA. HDPE DR17 SEWAGE FORCE MAIN

CONNECT PROP. SEWAGE FORCE MAIN TO S.P.S. No.1 @ INV. ELEV. = 499.355

119.34m OF PROP. 200 DIA. PVC SANITARY SEWER @ 0.40%

85.00m OF PROP. 250 DIA. PVC SANITARY SEWER @ 0.30%

112.55m OF PROP. 200 DIA. PVC SANITARY SEWER @ 0.40%

200 DIA. PVC SANITARY SEWER

PROP. SAN. MH #12 RIM ELEV.=502.888 NE. INV=498.450 S. INV=498.425 N. INV=499.200

PROP. SAN. MH #10 RIM ELEV.=502.740 N. INV=497.945 S. INV=497.920 W. INV=498.945 E. INV=497.945

PROP. SAN. MH #9 RIM ELEV.=502.472 N. INV=497.665 S. INV=497.665 SW. INV=497.615

PROP. SAN. MH #8 RIM ELEV.=503.106 NW. INV=498.115 SE. INV=498.210 SW. INV=498.140

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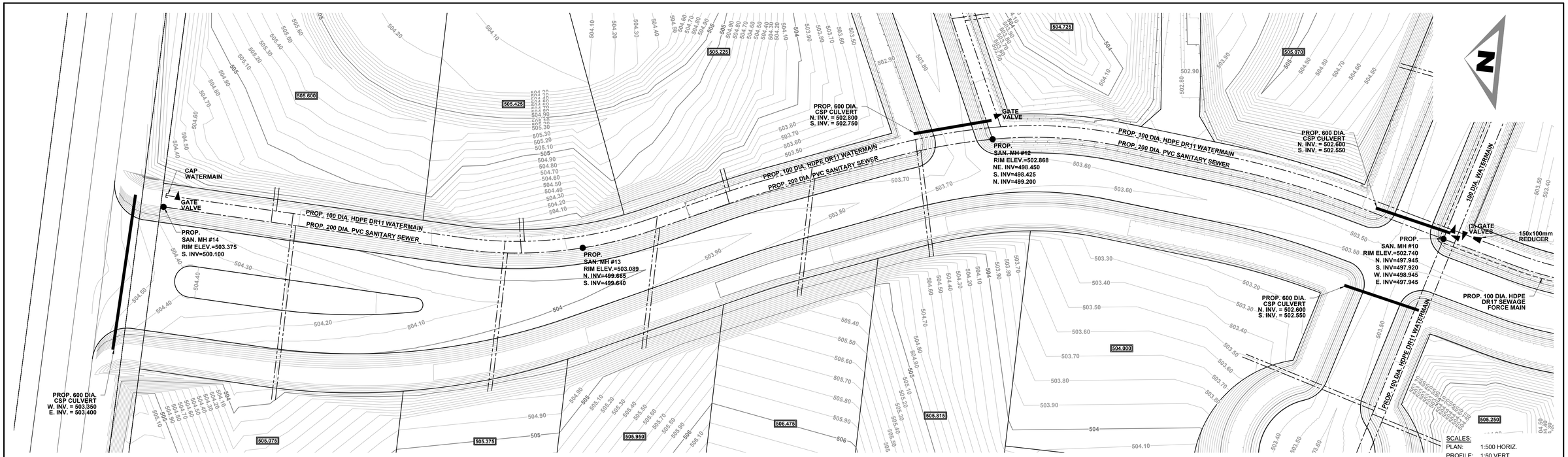
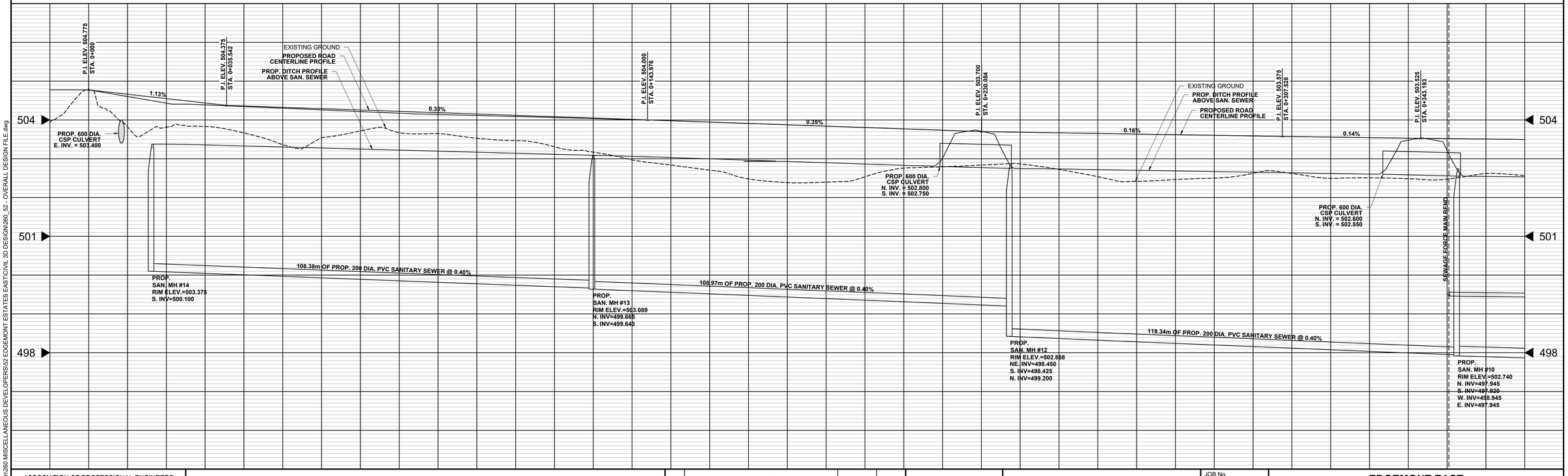
EDGEMONT EAST

SUBDIVISION DEVELOPMENT PLAN & PROFILE

SCALE:	REV. No.	DRAWING No.	SHEET:
1:500	A		10 OF 35





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EDGEMONT EAST

SUBDIVISION DEVELOPMENT
PLAN & PROFILE

SCALE:	REV. No.	DRAWING No.	SHEET:
1:500	A		11 OF 35

PROP. 600 DIA.
CSP CULVERT
N. INV. = 502.600
S. INV. = 502.550

PROP.
SAN. MH #11
RIM ELEV.=502.710
E. INV=499.277

FLUSHING HYDRANT

GATE VALVE

PROP. 200 DIA. PVC SANITARY SEWER

PROP. 100 DIA. HDPE DR11 WATERMAIN

PROP.
SAN. MH #10
RIM ELEV.=502.740
N. INV=497.945
S. INV=497.920
W. INV=498.945
E. INV=497.945

PROP. 600 DIA.
CSP CULVERT
N. INV. = 502.600
S. INV. = 502.550

(3) GATE VALVES

PROP. 250 DIA. PVC SANITARY SEWER

PROP. 100 DIA. HDPE DR11 WATERMAIN

150x100mm REDUCER

PROP. 100 DIA. HDPE DR17 SEWAGE FORCE MAIN

PROP. 250 DIA. PVC SANITARY SEWER

PROP. 150 DIA. HDPE DR11 WATERMAIN

PROP. 100 DIA. HDPE DR17 SEWAGE FORCE MAIN

PROP.
SAN. MH #15
RIM ELEV.=502.699
E. INV=498.270
W. INV=498.245

PROP. 250 DIA. PVC SANITARY SEWER

PROP. 100 DIA. HDPE DR11 WATERMAIN

PROP. 100 DIA. HDPE DR17 SEWAGE FORCE MAIN

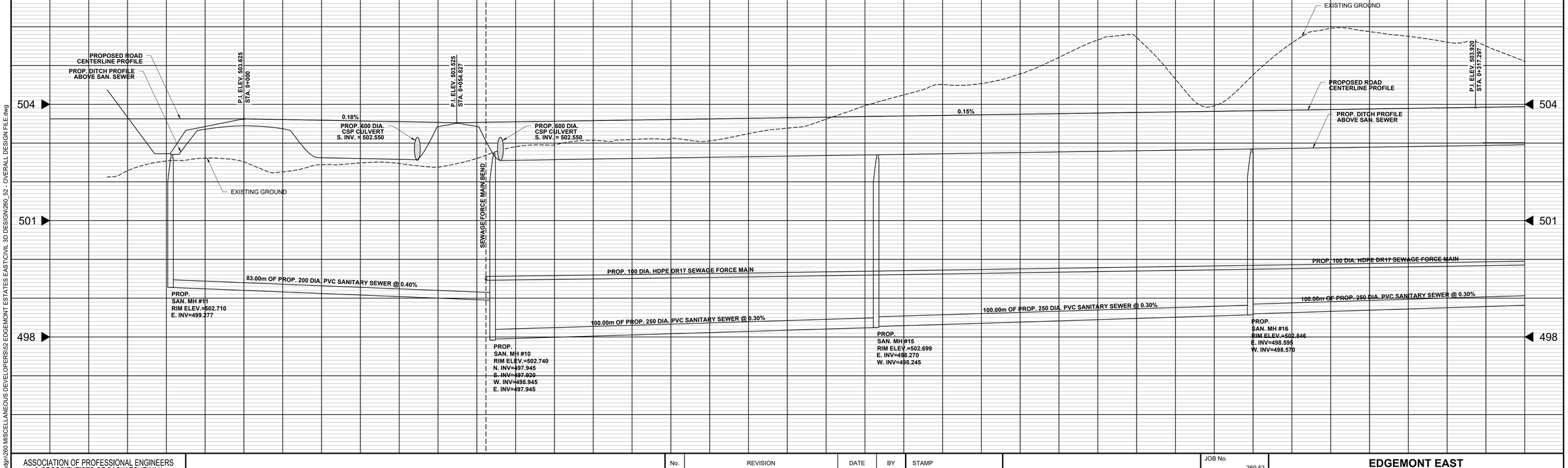
PROP.
SAN. MH #16
RIM ELEV.=502.846
E. INV=498.595
W. INV=498.570

PROP. 250 DIA. PVC SANITARY SEWER

PROP. 100 DIA. HDPE DR11 WATERMAIN

N

SCALES:
PLAN: 1:500 HORIZ.
PROFILE: 1:50 VERT.



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0 25 50 Meters

SCALES SHOWN REFER TO ANSI D PAPER SIZE.
SCALES TO BE DOUBLED FOR ANSI B PAPER SIZES.

No.	REVISION	DATE	BY
-			

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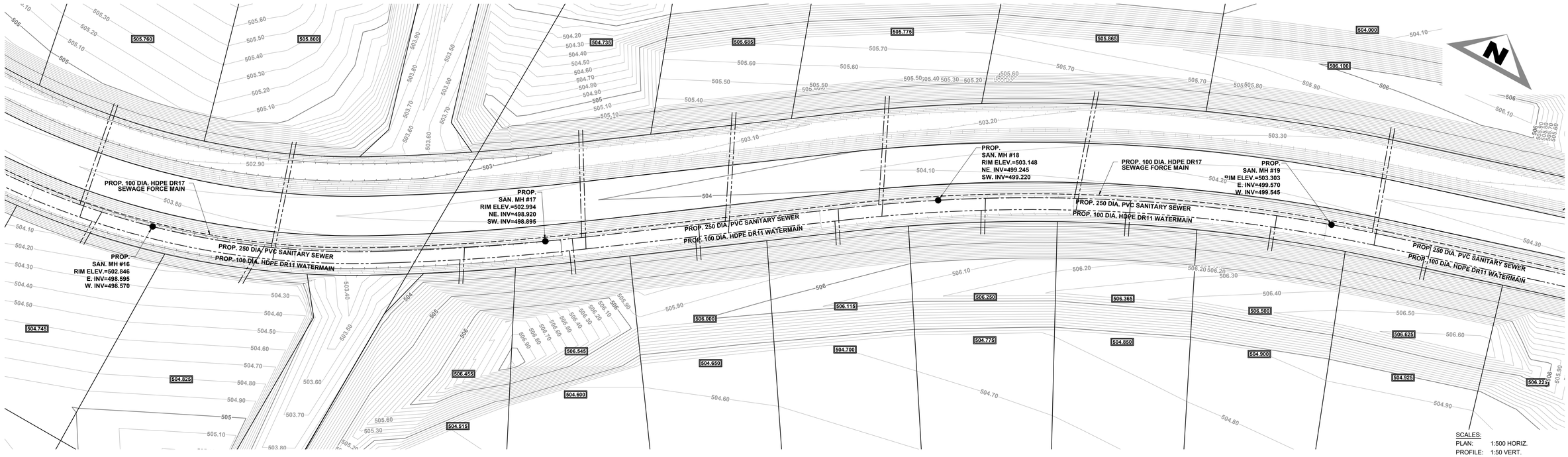
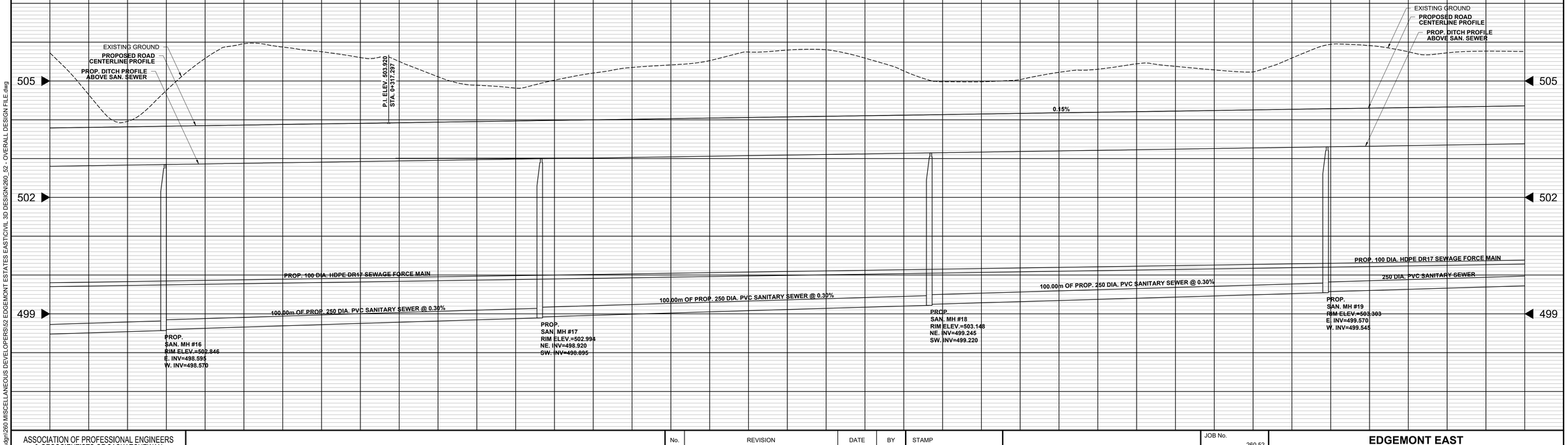
DATE:	2022/06/14
DRAWN:	K.M.N.
CHECKED:	T.T.B.
DESIGNED:	K.J.T.

EDGEMONT EAST

SUBDIVISION DEVELOPMENT PLAN & PROFILE

SCALE:	REV. No.	DRAWING No.	SHEET:
1:500	A		12 OF 35





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ASSOCIATION OF PROFESSIONAL ENGINEERS & GEOSCIENTISTS OF SASKATCHEWAN
CERTIFICATE OF AUTHORIZATION

BCL ENGINEERING LTD.

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EDGEMONT EAST

SUBDIVISION DEVELOPMENT
PLAN & PROFILE

SCALE:	REV. No.	DRAWING No.	SHEET:
1:500	A		13 OF 35

PROP. 600 DIA.
CSP CULVERT
W. INV. = 503.495
E. INV. = 503.545

PROP.
SAN. MH #20
RIM ELEV.=503.682
E. INV=499.880
W. INV=499.355
N. INV=499.880
S. INV=500.210

PROP.
SAN. MH #21
RIM ELEV.=503.690
E. INV=500.305
W. INV=500.280

PROP.
SAN. MH #22
RIM ELEV.=504.259
E. INV=500.730
W. INV=500.705

PROP.
SAN. MH #19
RIM ELEV.=503.303
E. INV=499.570
W. INV=499.545

PROP. 100 DIA. HDPE DR17
SEWAGE FORCE MAIN

PROP. 250 DIA. PVC SANITARY SEWER

PROP. 100 DIA. HDPE DR11 WATERMAIN

PROP. 200 DIA. PVC SANITARY SEWER

(3) GATE
VALVES

PROP. 600 DIA.
CSP CULVERT
W. INV. = 503.445
E. INV. = 503.495

SCALES:
PLAN: 1:500 HORIZ.
PROFILE: 1:50 VERT.

EXISTING GROUND
PROPOSED ROAD
CENTERLINE PROFILE
PROP. DITCH PROFILE
ABOVE SAN. SEWER

P.I. ELEV. 504.440
STA. 0+663.927

P.I. ELEV. 504.570
STA. 0+751.608

0.15%

0.60%

PROP. 600 DIA.
CSP CULVERT
W. INV. = 503.445
E. INV. = 503.495

PROP. 100 DIA. HDPE DR17 SEWAGE FORCE MAIN

94.56m OF PROP. 250 DIA. PVC SANITARY SEWER @ 0.30%

100.00m OF PROP. 200 DIA. PVC SANITARY SEWER @ 0.40%

100.00m OF PROP. 200 DIA. PVC SANITARY SEWER @ 0.40%

200 DIA. PVC SANITARY SEWER

PROP.
SAN. MH #19
RIM ELEV.=503.303
E. INV=499.570
W. INV=499.545

PROP.
SAN. MH #20
RIM ELEV.=503.682
E. INV=499.880
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PROP.
SAN. MH #22
RIM ELEV.=504.259
E. INV=500.730
W. INV=500.705

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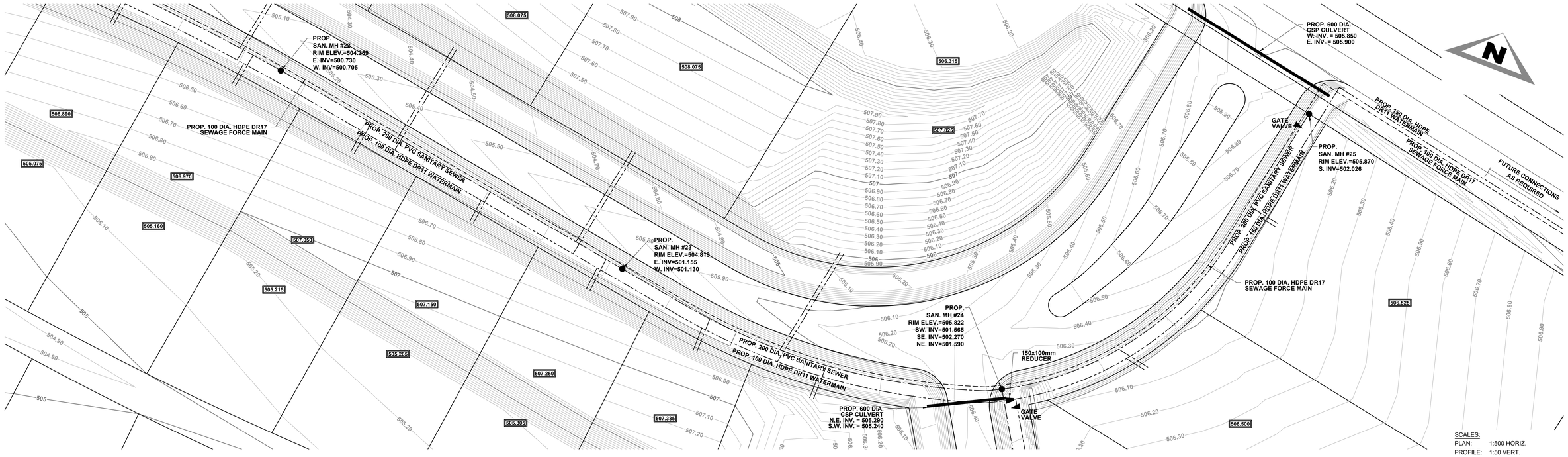
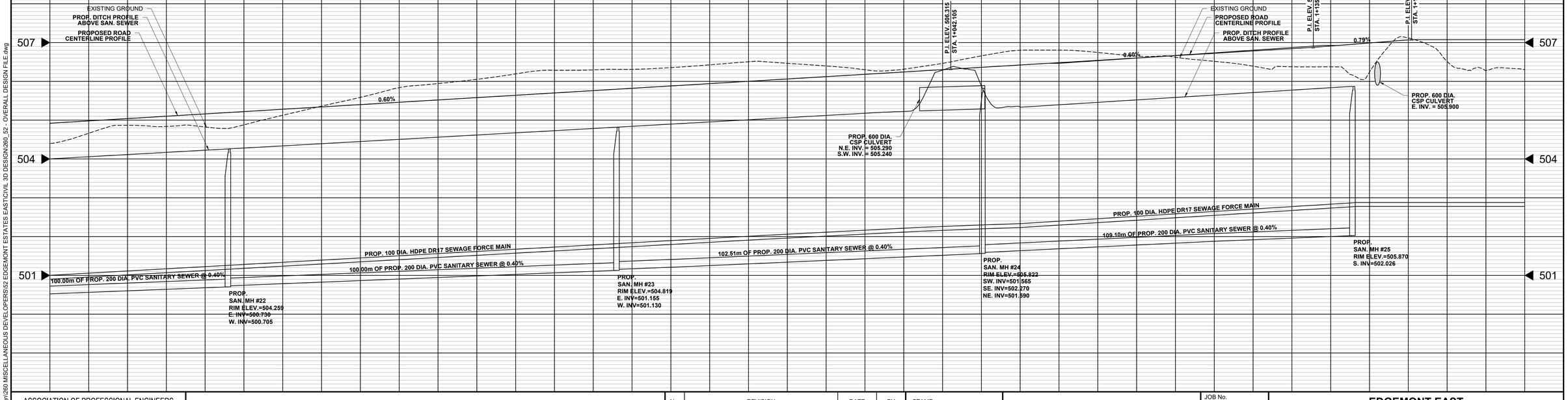
EDGEMONT EAST

SUBDIVISION DEVELOPMENT
PLAN & PROFILE

SCALE:	REV. No.	DRAWING No.	SHEET:
1:500	A		14 OF 35





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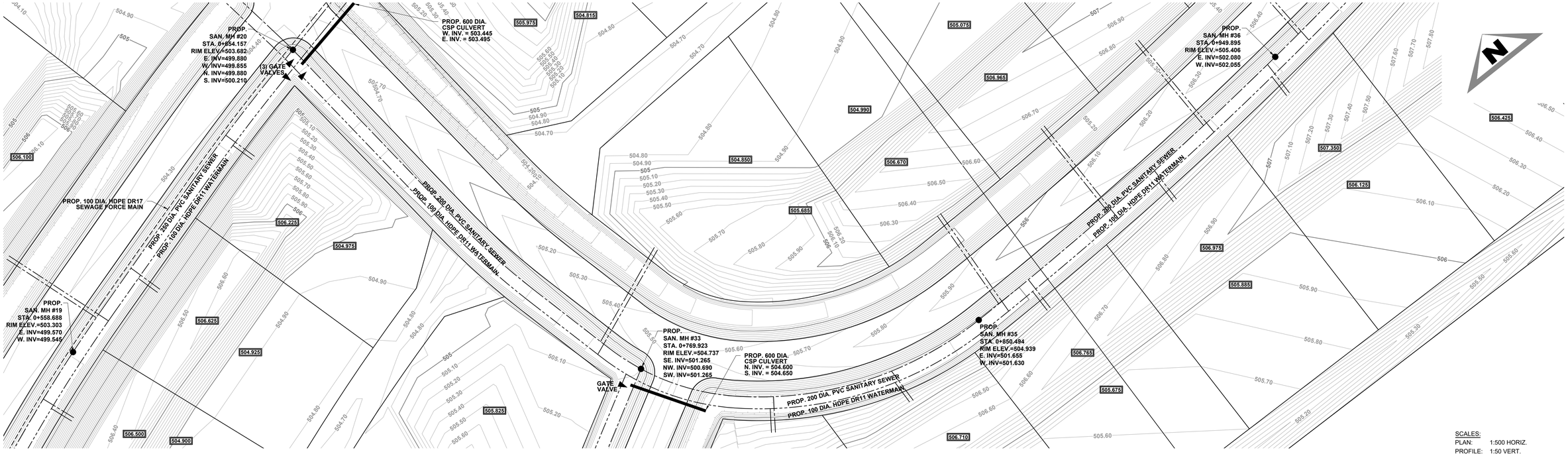
EDGEMONT EAST

SUBDIVISION DEVELOPMENT
PLAN & PROFILE

SCALE:	REV. No.	DRAWING No.	SHEET:
1:500	A		15 OF 35



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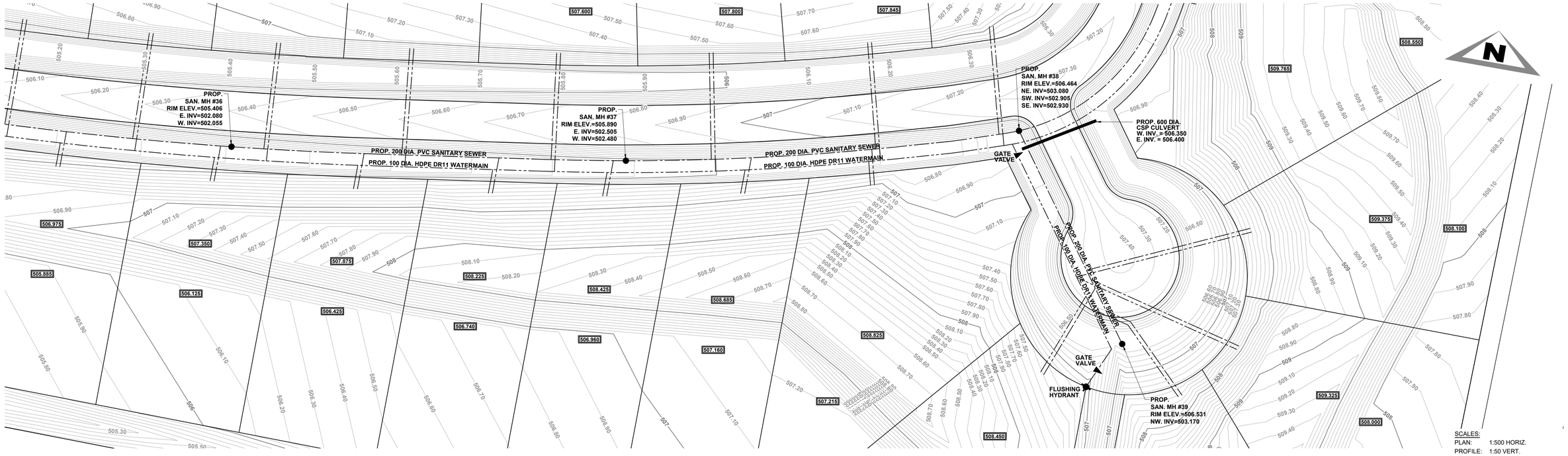
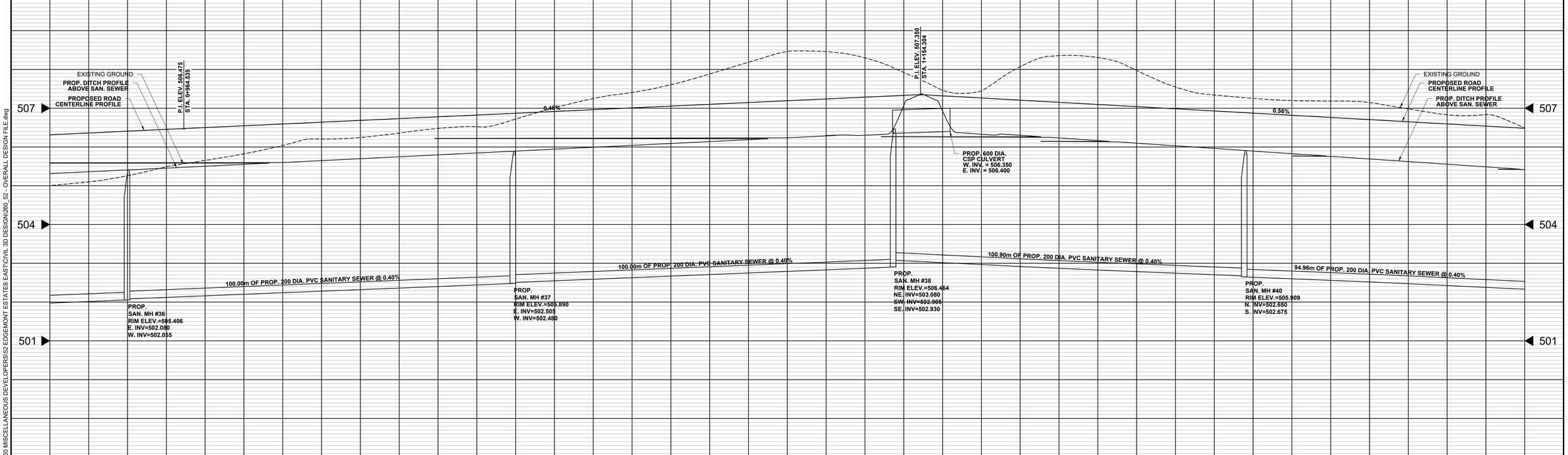
SUBDIVISION DEVELOPMENT PLAN & PROFILE

SCALE:	REV. No.	DRAWING No.	SHEET:
1:500	A		16 OF 35





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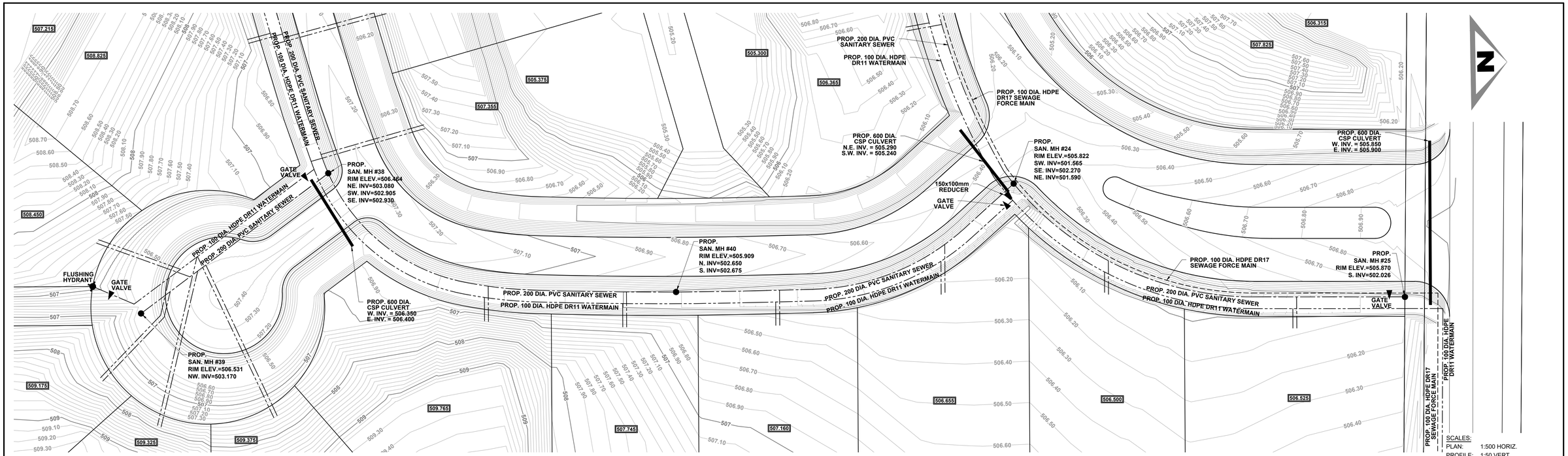

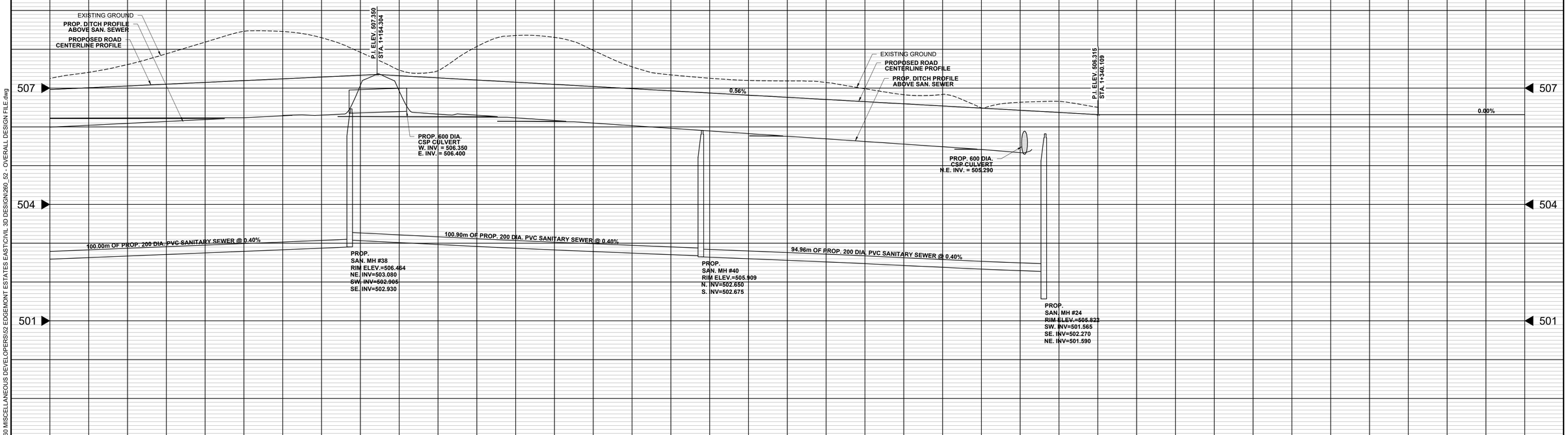

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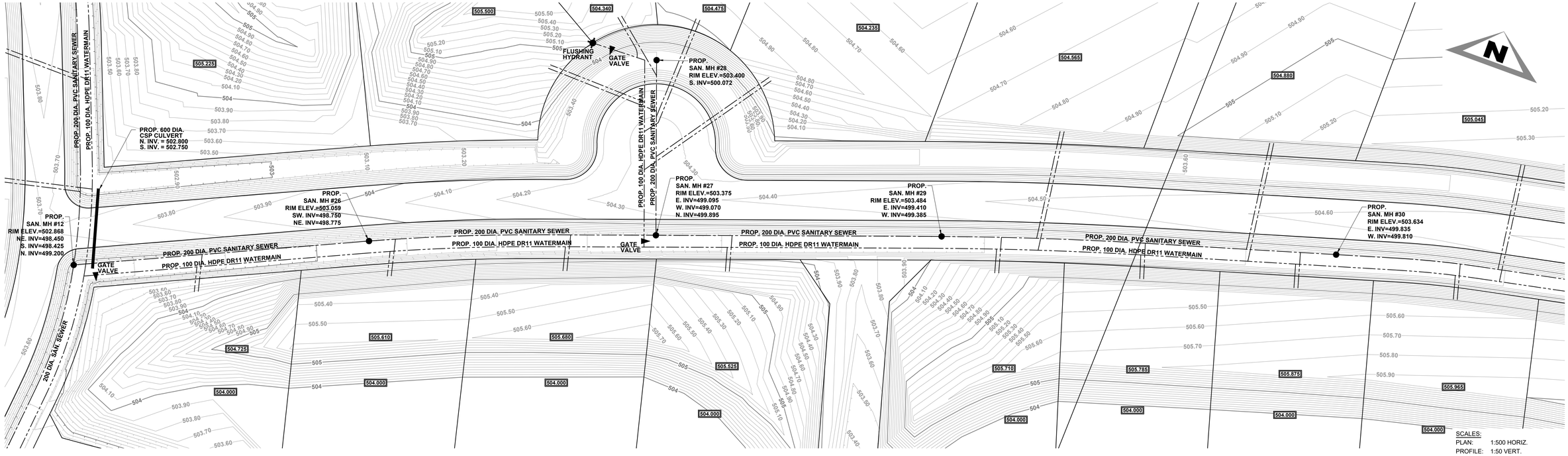

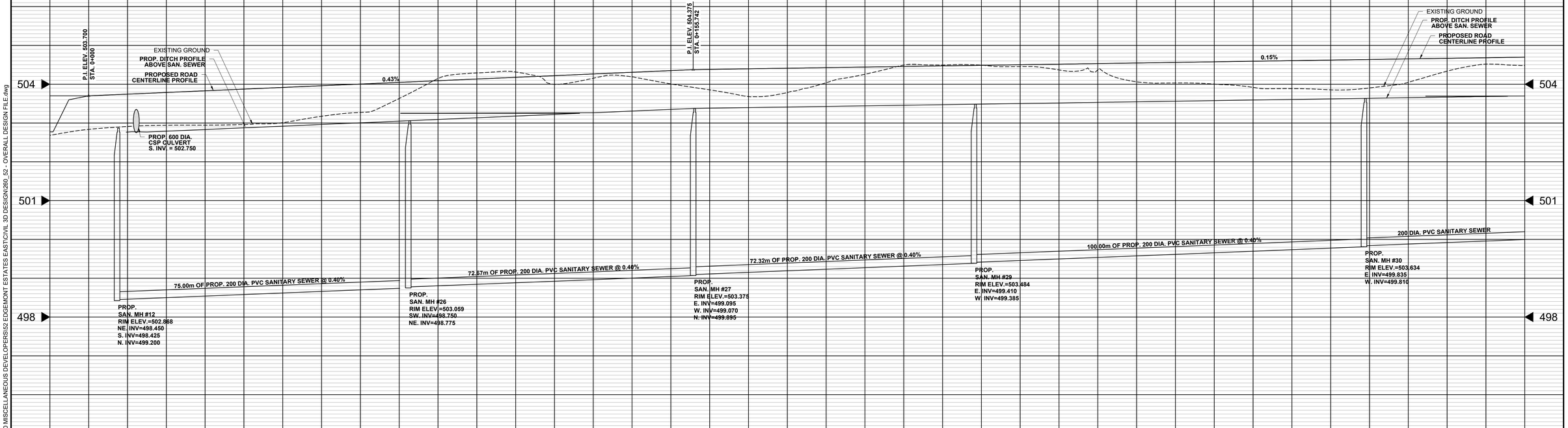

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SUBDIVISION DEVELOPMENT PLAN & PROFILE

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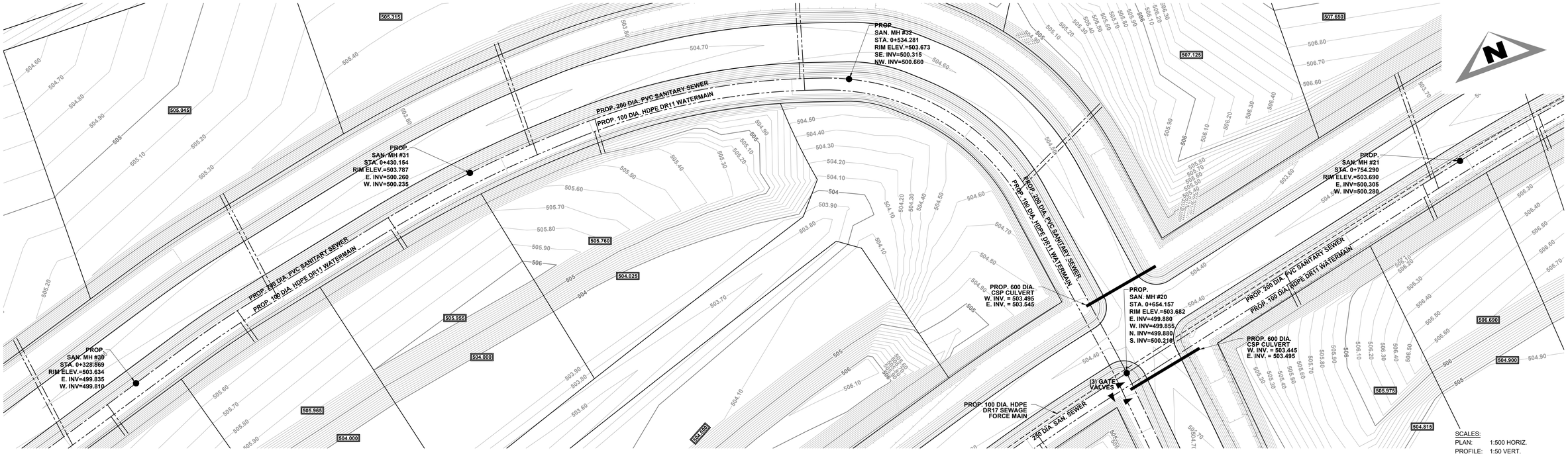

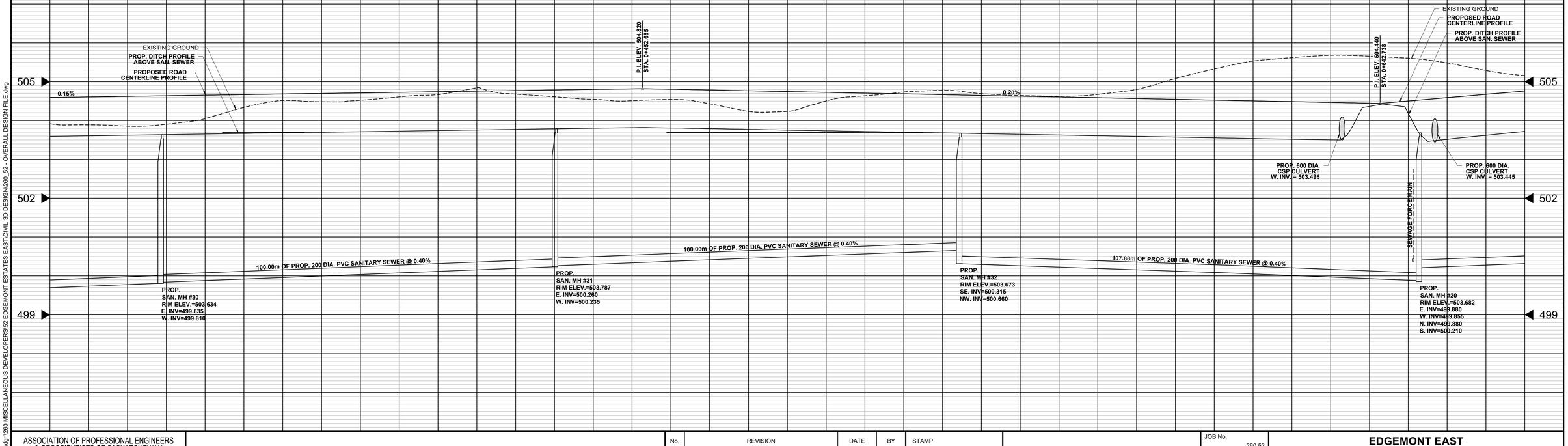

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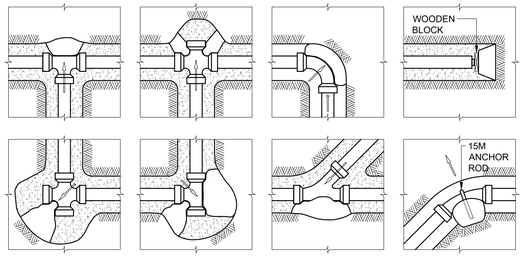
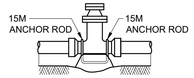


THRUST BLOCKS FOR FITTINGS



GATE VALVE ANCHORS

WORKING PRESSURE kPa	SIZE OF VALVE REQUIRING ANCHORAGE
345 - 690	300 AND UP
690 - 1035	200 AND UP
1035 - 1380	ALL SIZES

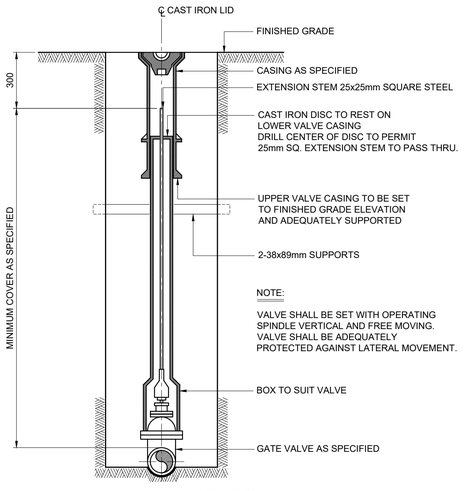
THRUST AT FITTINGS					
THRUST OF WATER PRESSURE					
PIPE SIZE	DEAD END OR TEE	90° BEND	45° BEND	22 1/2° BEND	11 1/2° BEND
100	.012	.018	.010	.005	.002
150	.025	.036	.019	.010	.005
200	.044	.062	.033	.017	.010
250	.071	.100	.054	.028	.014
300	.100	.141	.077	.039	.021
350	.135	.190	.105	.053	.026
400	.174	.248	.135	.068	.034

NOTE:
TO OBTAIN TOTAL THRUST AT FITTING MULTIPLY ABOVE VALUES BY MAXIMUM ALLOWABLE WORKING PRESSURE OF PIPE IN kPa

SAFE BEARING LOADS	
SOIL TYPE	SAFE BEARING LOAD kPa
SOFT CLAY	100
SAND OR HARD CLAY	250
SAND AND GRAVEL	400
SAND, GRAVEL CEMENTED WITH CLAY	500
SHALE	1000

SAMPLE CALCULATION:
FOR WORKING PRESSURE OF 1035 kPa AND 250 DIA. PIPE AT 45° (0.054m²) IN SOFT CLAY (100kPa)
AREA REQUIRED = $\frac{1035 \times 0.054}{100} = 0.559m^2$

REACTION BLOCKING & ANCHORAGE
SCALE N.T.S.



SECTION

GATE VALVE INSTALLATION
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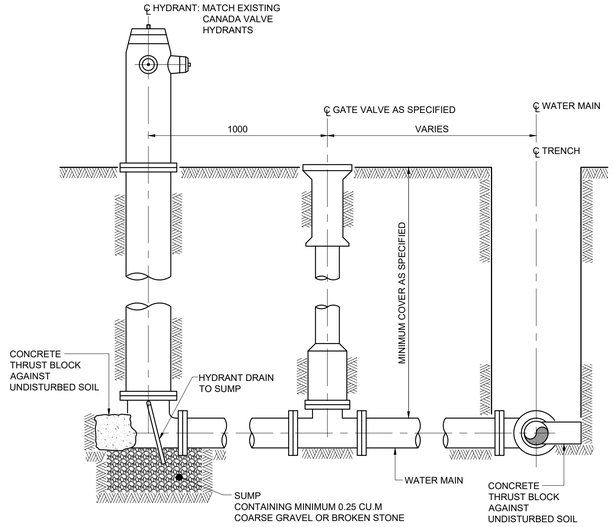

HYDRANT INSTALLATION
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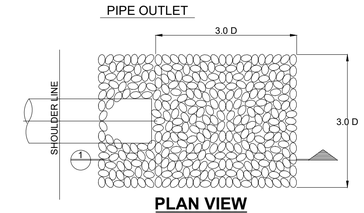
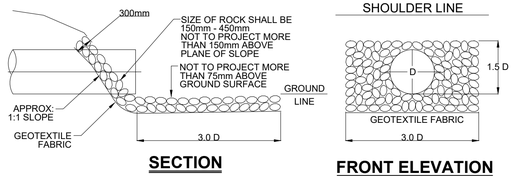


PLAN VIEW



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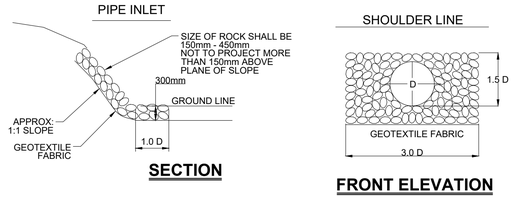
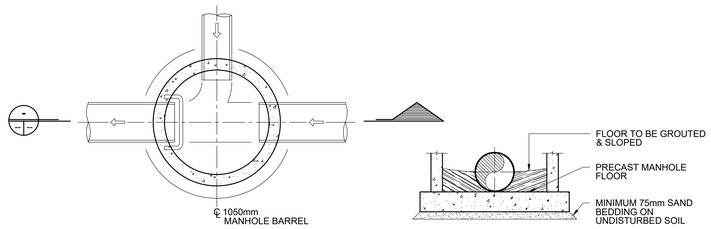
FRONT ELEVATION



SECTION

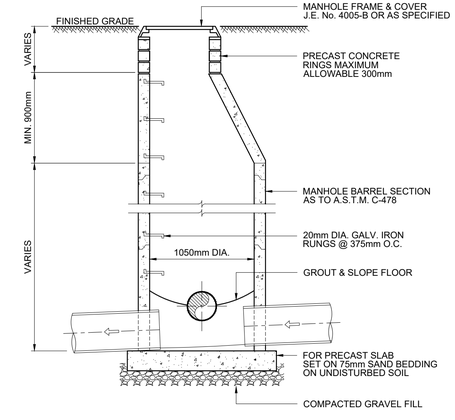
FRONT ELEVATION

HAND PLACED RIP RAP
SCALE N.T.S.



PLAN
SCALE N.T.S.

FLOOR DETAIL
SCALE 1:30



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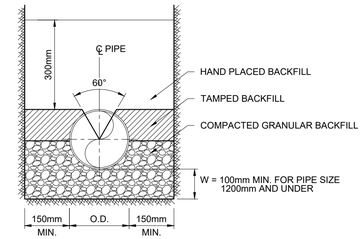
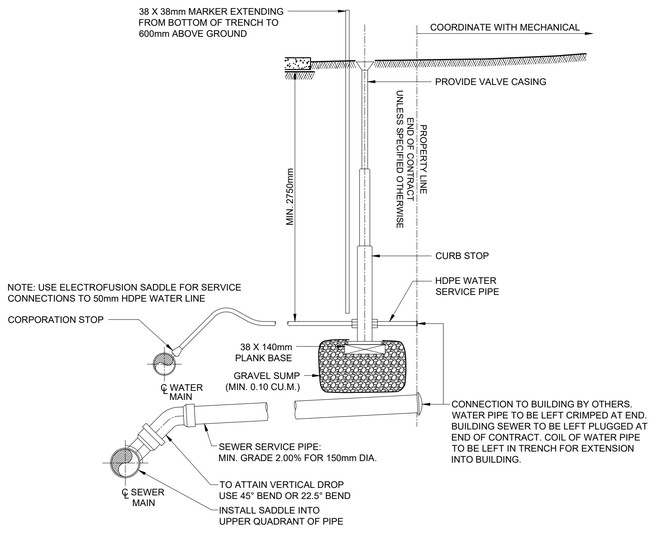
SCALE 1:30



CLASS "B" BEDDING
SCALE 1:10

NOTES:
1. MANHOLE TOP TO BE SET AS DIRECTED BY ENGINEER.
2. CEMENT MORTAR ALL JOINTS.
3. MAXIMUM SEWER SIZE 600mm



BUILDING SERVICES DETAIL
SCALE N.T.S.

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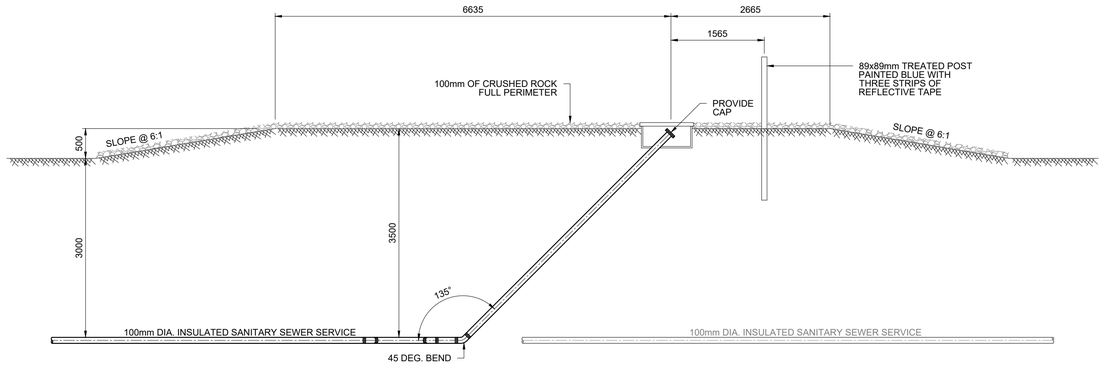
DESIGNED:	K.J.T.

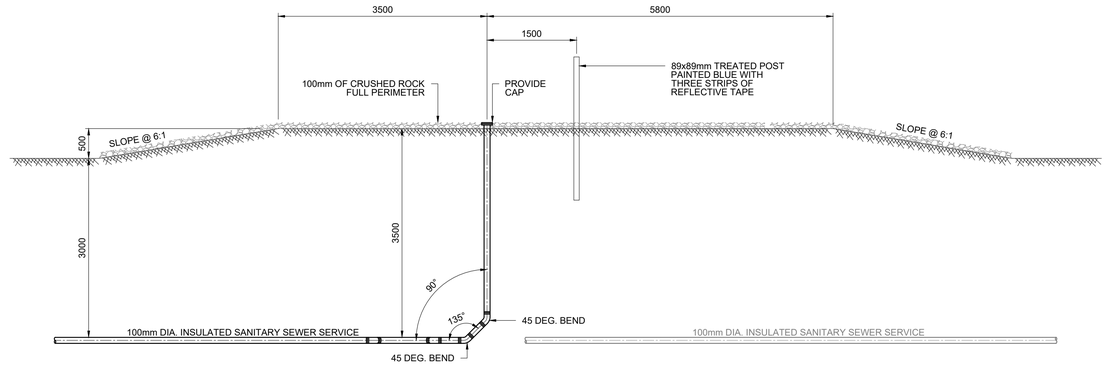
EDGEMONT EAST

SUBDIVISION DEVELOPMENT MISCELLANEOUS DETAILS

SCALE:	REV. No.	DRAWING No.	SHEET:
AS SHOWN	A		27 OF 35



SECTION
SCALE 1:50



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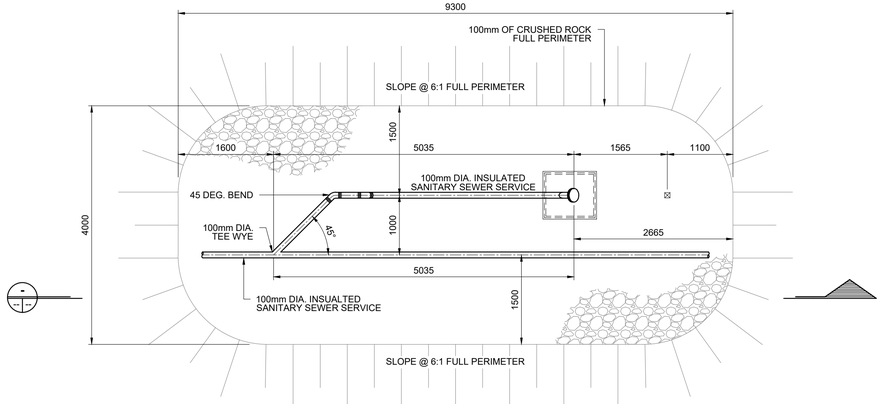
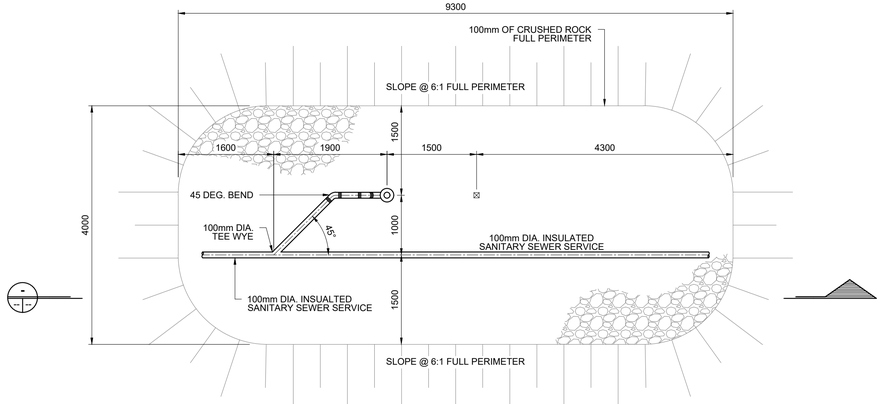


IN-LINE SEWER CLEANOUT DETAIL
SCALE N.T.S.



IN-LINE SEWER CLEANOUT DETAIL
SCALE N.T.S.

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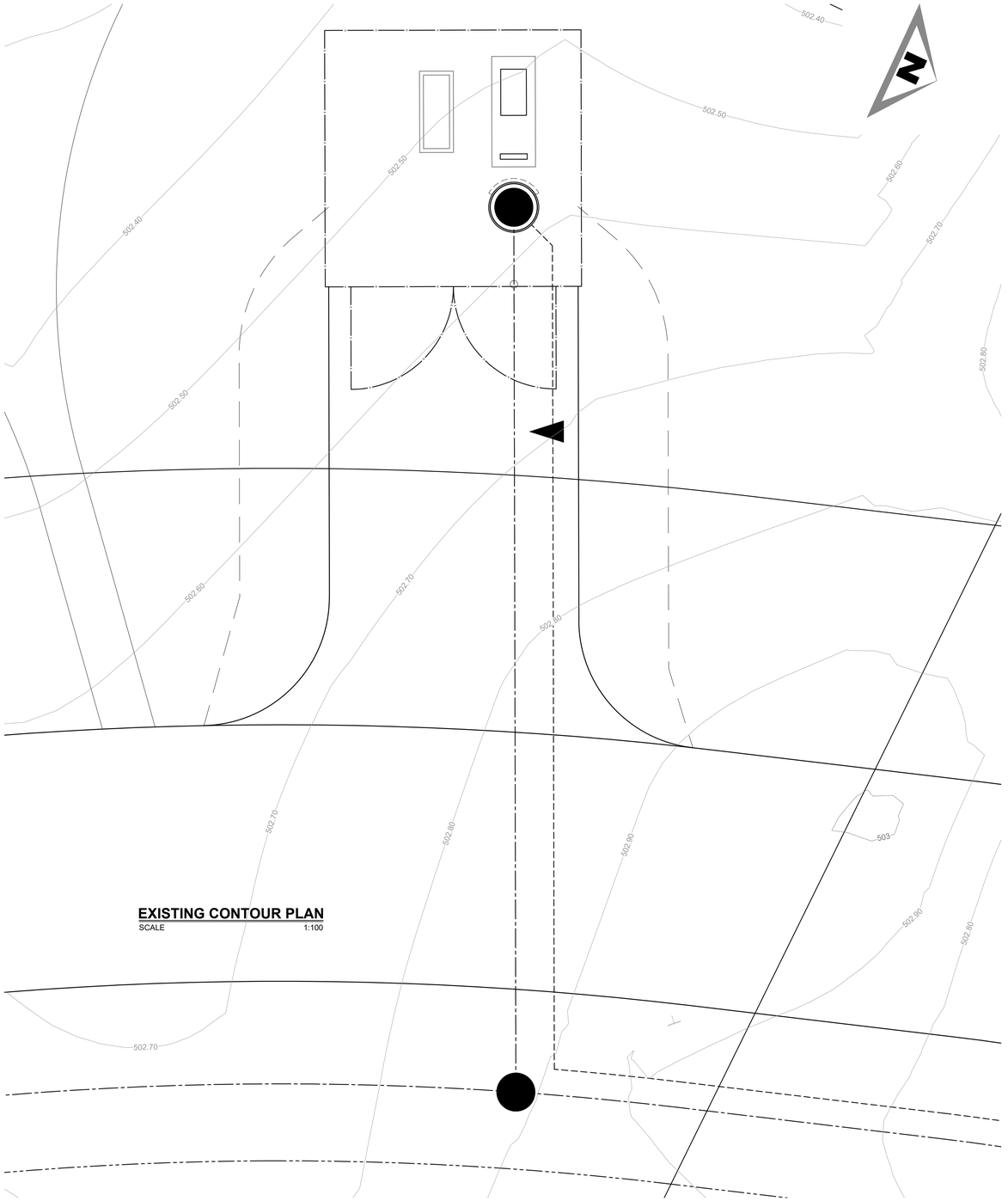
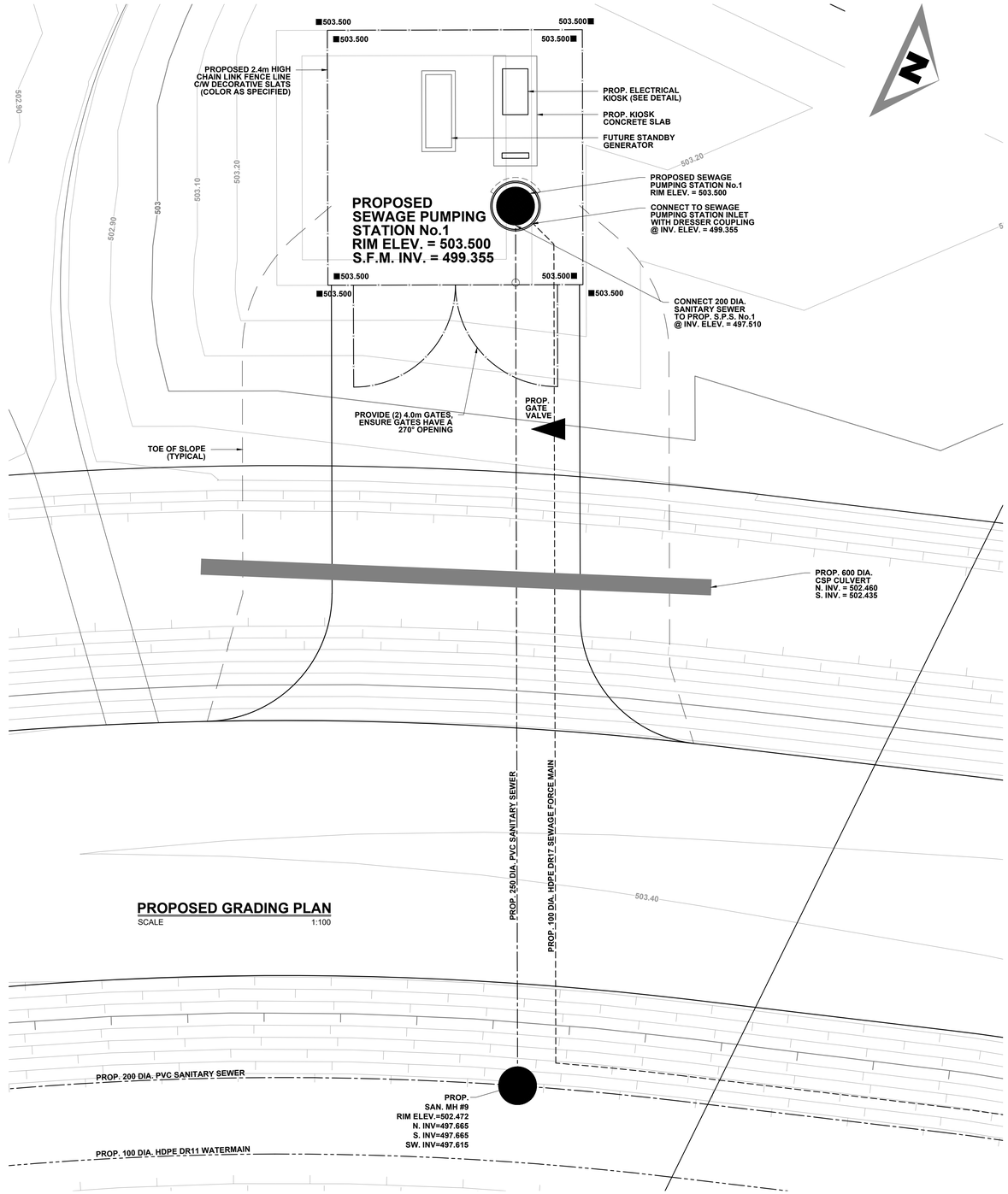
EDGEMONT EAST

SUBDIVISION DEVELOPMENT
MISCELLANEOUS DETAILS

SCALE:	REV. No.	DRAWING No.	SHEET:
AS SHOWN	A		28 OF 35



EXISTING CONTOUR PLAN
SCALE 1:100



PROPOSED GRADING PLAN
SCALE 1:100

T:\dgn\260 MISCELLANEOUS DEVELOPERS\52 EDGEMONT ESTATES EAST\CIVIL 3D DESIGN\260_52 - OVERALL DESIGN FILE.dwg
2022/8/14 1:59:48 PM

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0 5 10 Meters
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SCALES TO BE DOUBLED FOR ANSI B PAPER SIZES.

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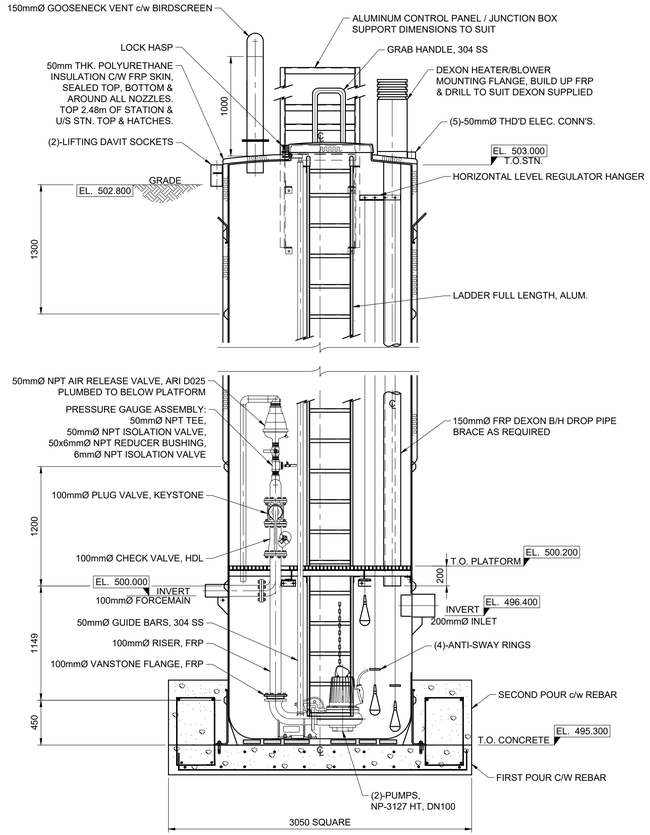
EDGEMONT EAST

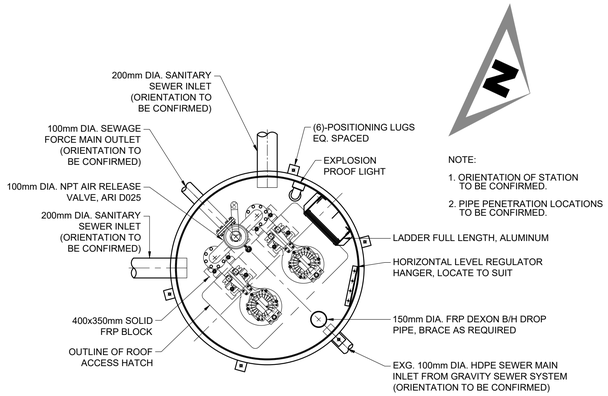
SUBDIVISION DEVELOPMENT
SEWAGE PUMPING STATION No.1
SITE PLAN

SCALE:	REV. No.	DRAWING No.	SHEET:
1:100	A		29 OF 35



SEWAGE PUMPING STATION DETAIL

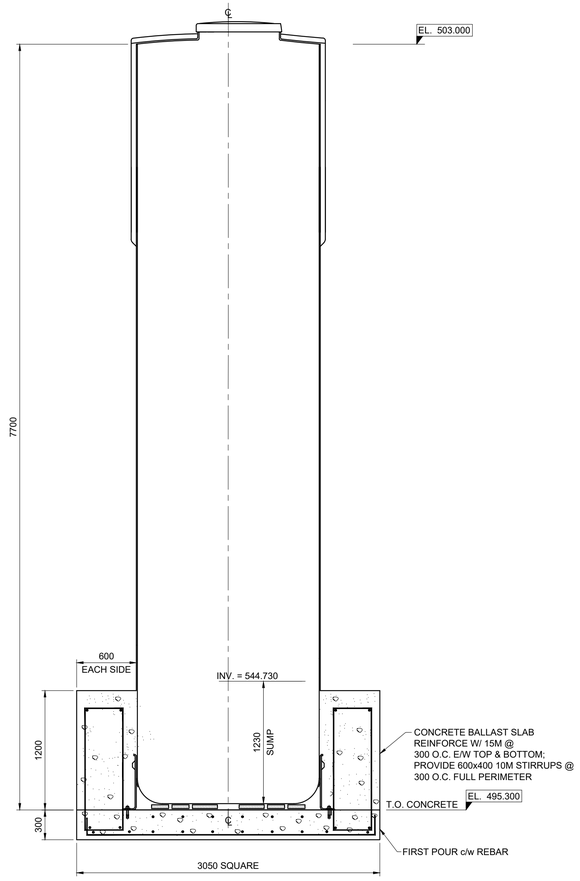
SCALE 1:30



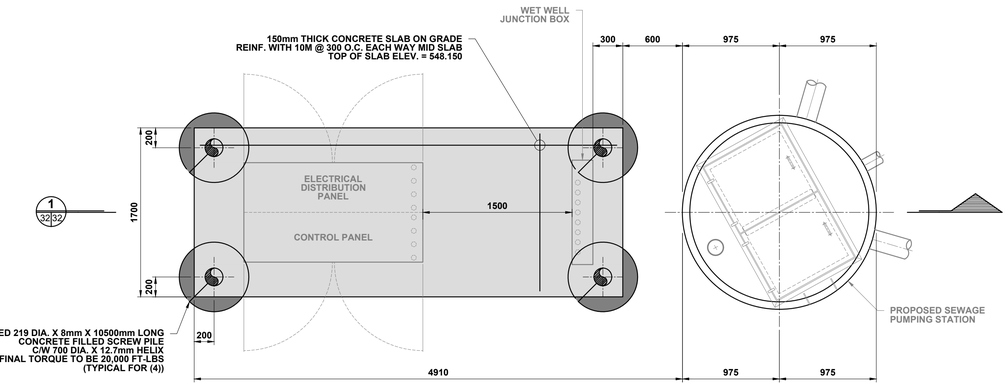
PLAN

NOTE:

1. ORIENTATION OF STATION TO BE CONFIRMED.
2. PIPE PENETRATION LOCATIONS TO BE CONFIRMED.

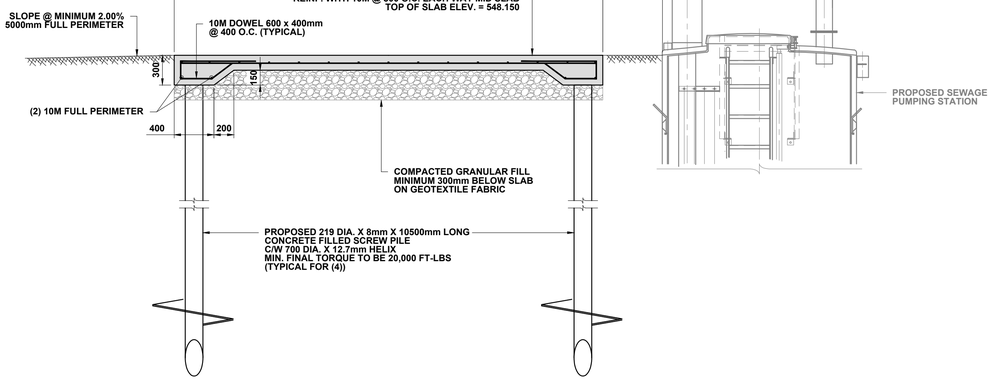


SECTION



KIOSK CONCRETE SLAB

SCALE 1:30



1/3232 SECTION

SCALE 1:30

NOTES:

1. ORIENTATION, ELEVATION, AND BEARING OF EXISTING AND PROPOSED INFLUENT LINES ARE TO BE CONFIRMED PRIOR TO STATION FABRICATION. CONTRACTOR IS RESPONSIBLE TO CONFIRM.
2. ALL NEW INFLUENT LINES SHALL BE FITTED WITH A GATE VALVE APPROX. 2.0m AWAY FROM BARREL (TO BE CONFIRMED).

2022/6/14 2:01:32 PM T:\dgn\260 MISCELLANEOUS DEVELOPERS\52 EDGEMONT ESTATES EAST\CIVIL 3D DESIGN\BUILDINGS\260_52 - SPS UPGRADES.dwg

ASSOCIATION OF PROFESSIONAL ENGINEERS & GEOSCIENTISTS OF SASKATCHEWAN CERTIFICATE OF AUTHORIZATION

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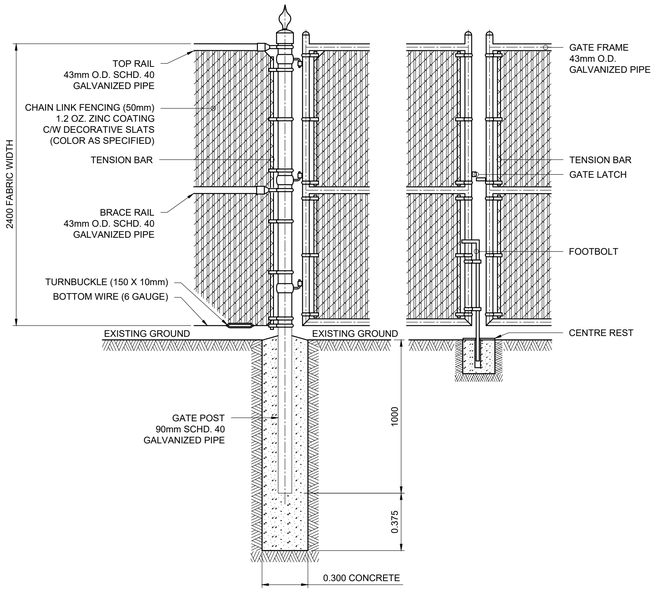
EDGEMONT EAST

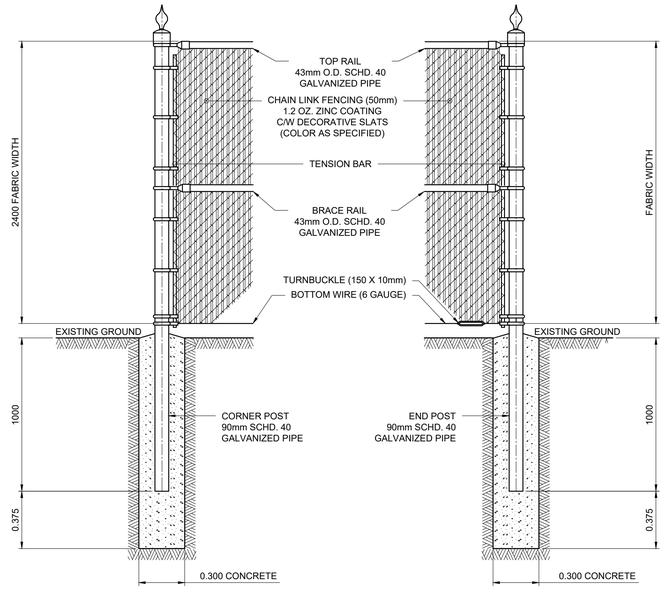
SUBDIVISION DEVELOPMENT
SEWAGE PUMPING STATION No.1
SECTIONS & DETAILS

SCALE:	REV. No.	DRAWING No.	SHEET:
1:30	A		30 OF 35



CHAIN LINK FENCING TYPICAL GATE POST

SCALE N.T.S.

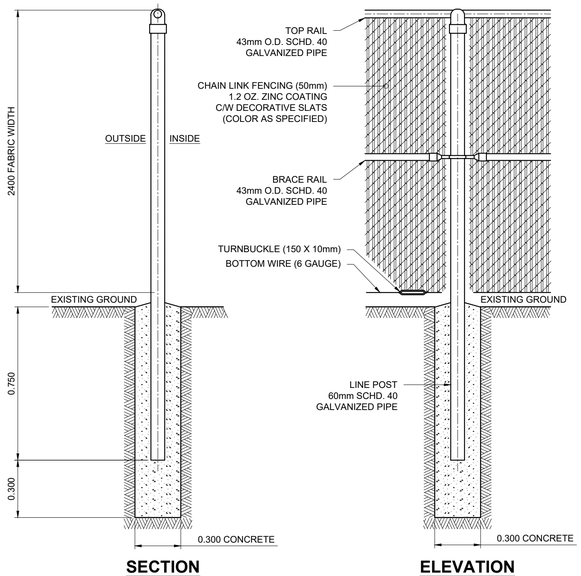


TYPICAL CORNER POST

TYPICAL END POST

CHAIN LINK FENCING TYPICAL CORNER & END POST

SCALE N.T.S.

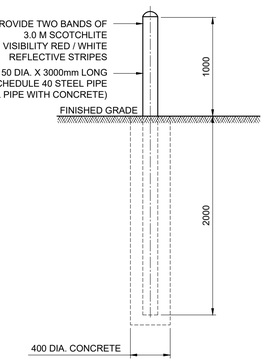


SECTION

ELEVATION

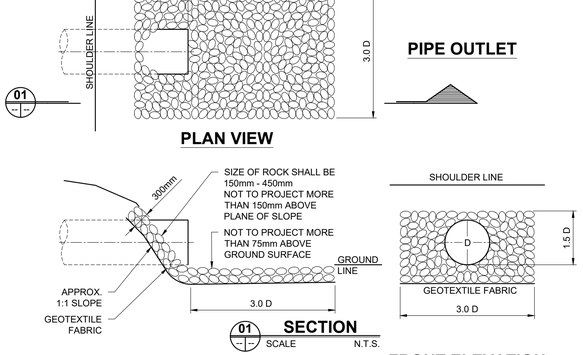
CHAIN LINK FENCING TYPICAL LINE POST

SCALE N.T.S.



BOLLARD DETAIL

SCALE N.T.S.



PIPE OUTLET

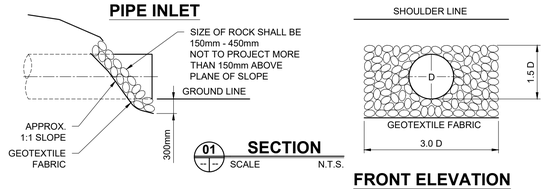
PLAN VIEW

SECTION

SCALE N.T.S.

FRONT ELEVATION

PIPE INLET



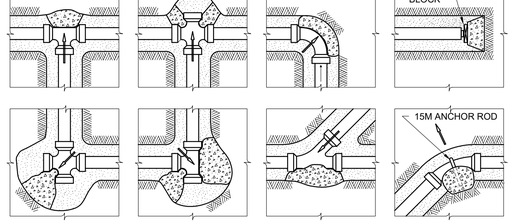
SECTION

SCALE N.T.S.

FRONT ELEVATION

HAND PLACED RIP RAP FOR CULVERTS

SCALE N.T.S.



WORKING PRESSURE kPa	SIZE OF VALVE REQUIRING ANCHORAGE
345 - 690	300 AND UP
690 - 1035	200 AND UP
1035 - 1380	ALL SIZES

THRUST AT FITTINGS						
THRUST OF WATER PRESSURE						
PIPE SIZE	DEAD END OR TEE	90° BEND	45° BEND	22 1/2° BEND	11 1/2° BEND
100	.012	.018	.010	.005	.002
150	.025	.036	.019	.010	.005
200	.044	.062	.033	.017	.010
250	.071	.100	.054	.028	.014
300	.100	.141	.077	.039	.021
350	.135	.190	.105	.053	.026
400	.174	.248	.135	.068	.034

NOTE:
TO OBTAIN TOTAL THRUST AT FITTING MULTIPLY ABOVE VALVES BY MAXIMUM ALLOWABLE WORKING PRESSURE OF PIPE kPa

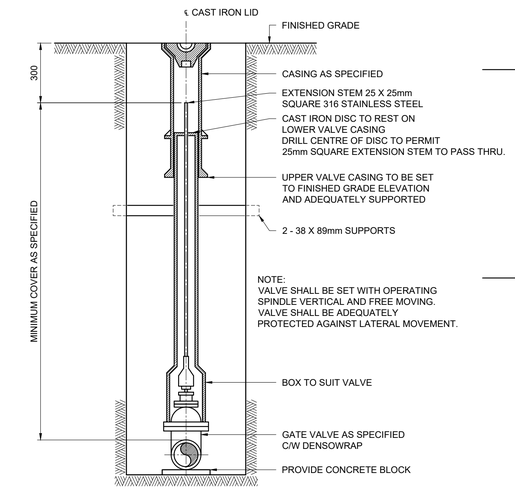
SAFE BEARING LOADS	
SOIL TYPE	SAFE BEARING LOAD kPa
SOFT CLAY	100
SAND OR HARD CLAY	250
SAND AND GRAVEL	400
SAND, GRAVEL CEMENTED WITH CLAY	500
SHALE	1000

SAMPLE CALCULATION:

FOR WORKING PRESSURE OF 1035 kPa AND 250 DIA. PIPE AT 45° (0.054m²) IN SOFT CLAY (100kPa)
AREA REQUIRED = $\frac{1035 \times 0.054}{100}$ = 0.559m²

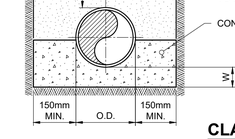
REACTION BLOCKING AND ANCHORAGE

SCALE N.T.S.



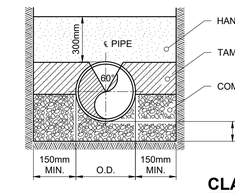
GATE VALVE INSTALLATION

SCALE N.T.S.

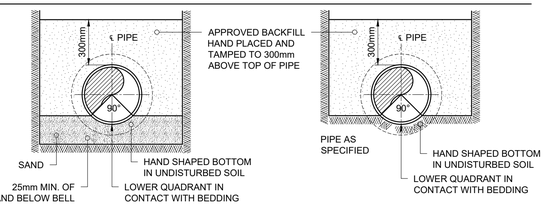


SIZE	W
150	100
200	100
250	100
300	100
380	100
450	125
525	125
600	150
675	175
750	200
825	200
900	225
975	225

CLASS "A" BEDDING



CLASS "B" BEDDING



CLASS "C" BEDDING

PIPE BEDDING

SCALE N.T.S.

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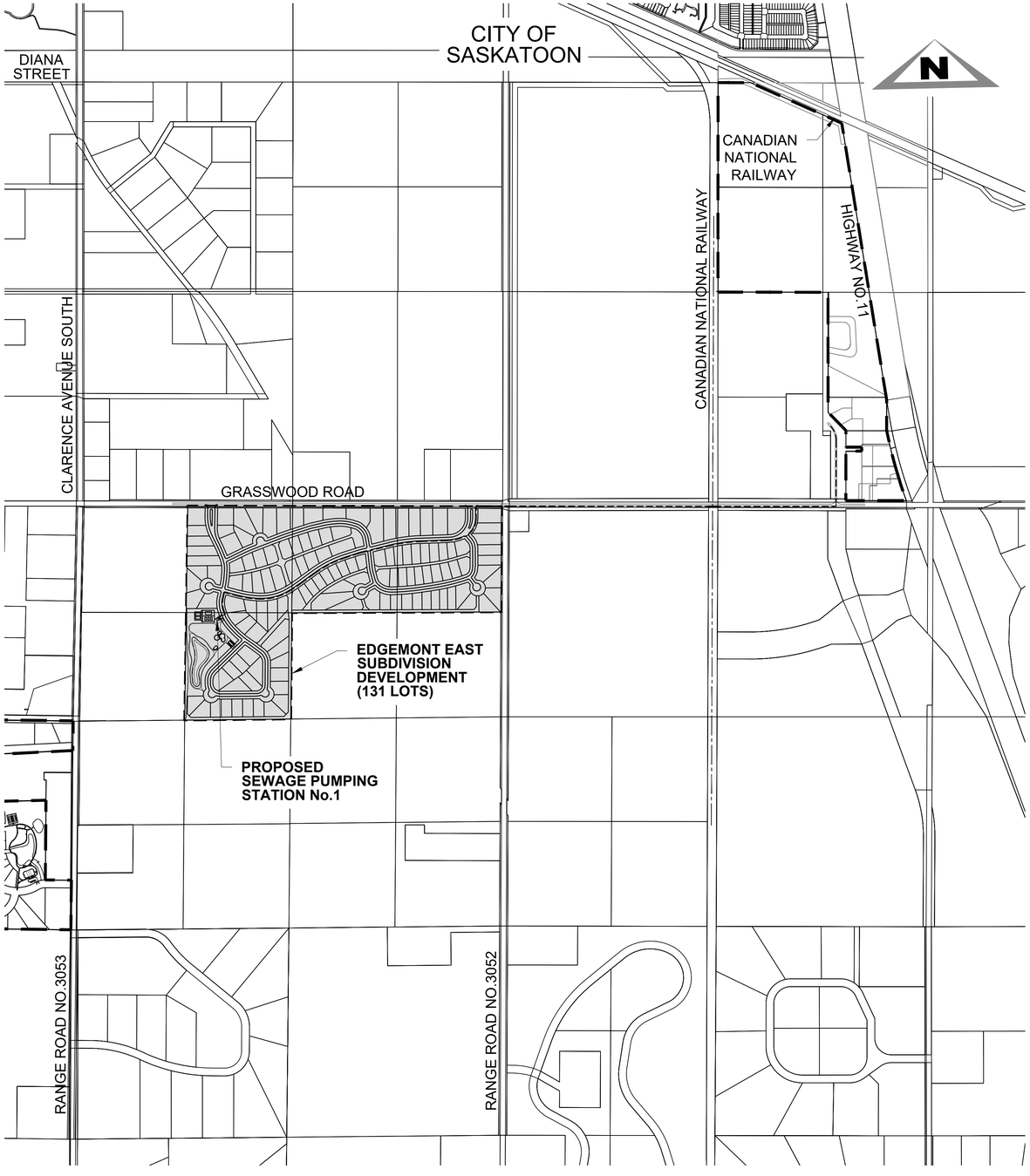
EDGEMONT EAST

SUBDIVISION DEVELOPMENT
SEWAGE PUMPING STATION No.1
MISCELLANEOUS DETAILS

SCALE:	REV. No.	DRAWING No.	SHEET:
AS SHOWN	A		31 OF 35



KEY PLAN
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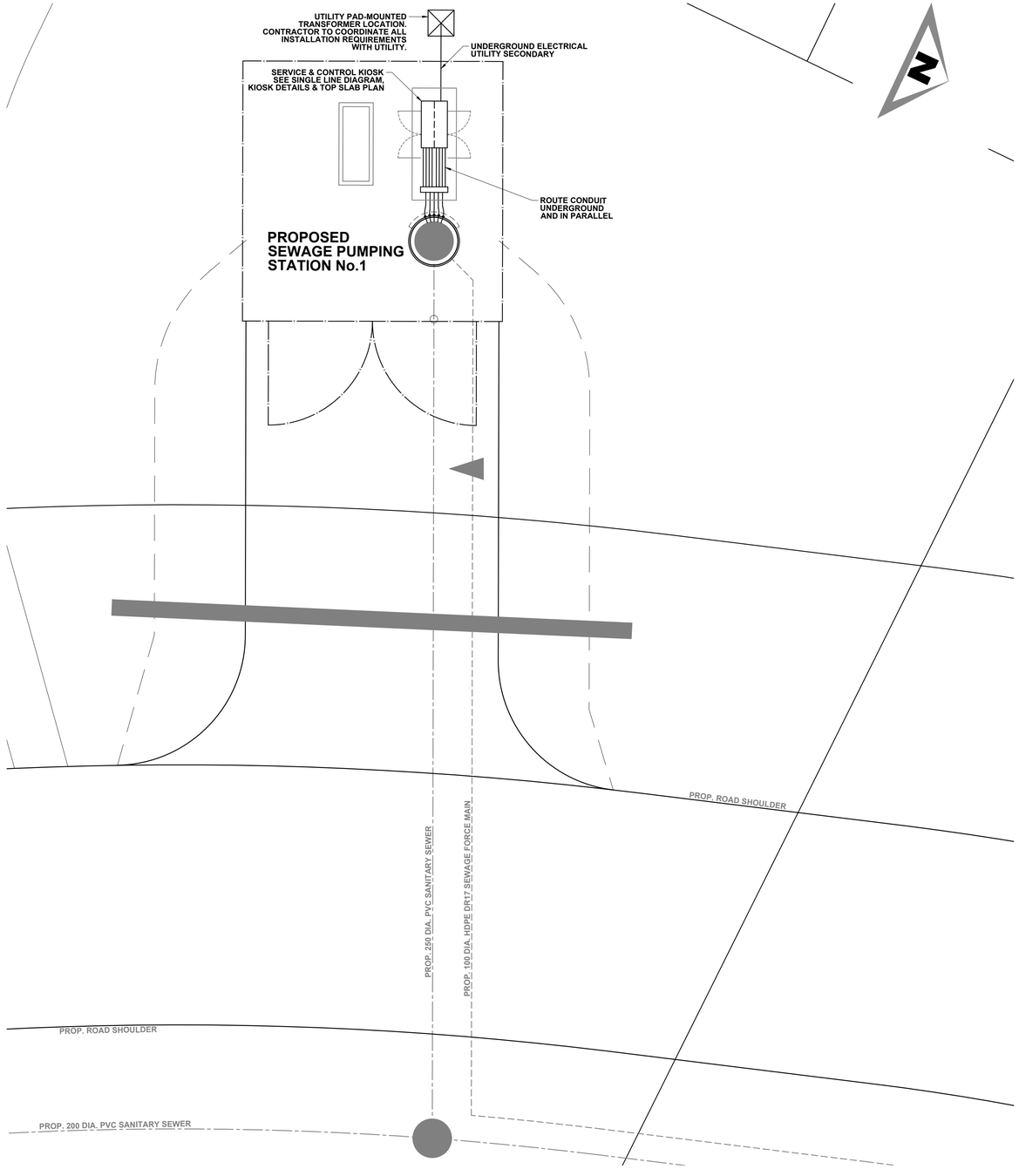

ELECTRICAL SITE PLAN
SCALE 1:100

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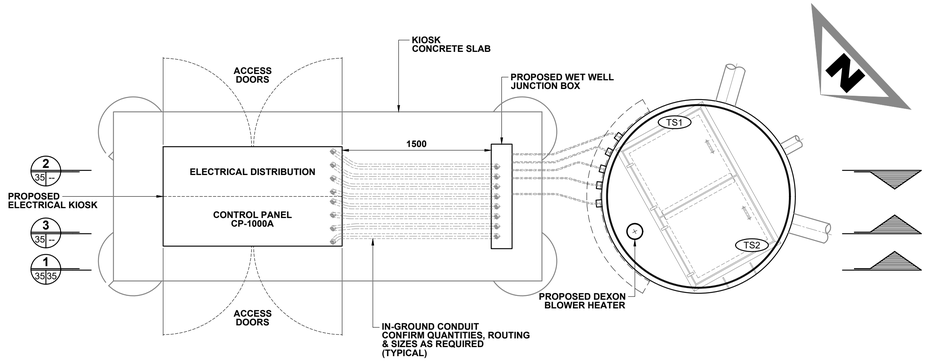
EDGEMONT EAST

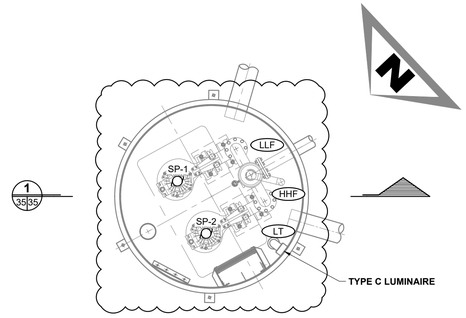
SUBDIVISION DEVELOPMENT
SEWAGE PUMPING STATION No.1
ELECTRICAL NO. 1

SCALE:	REV. No.	DRAWING No.	SHEET:
1:10000	A		32 OF 35



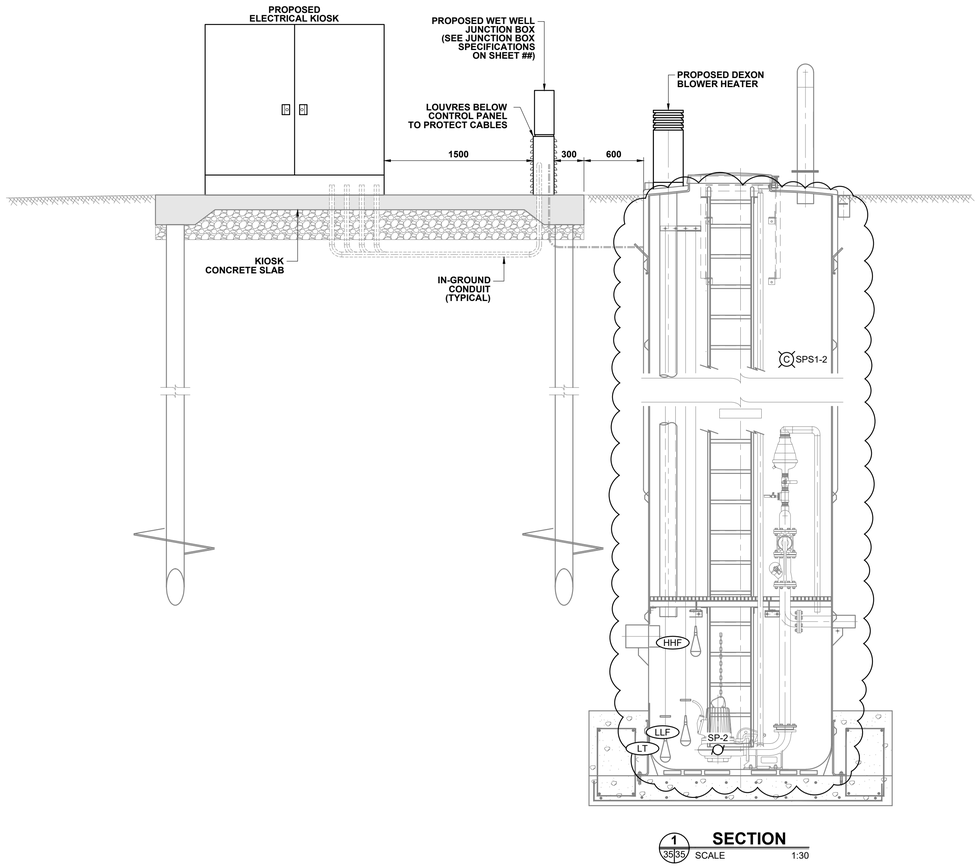
PLAN - TOP SLAB

SCALE 1:30



PLAN - BOTTOM SLAB

SCALE 1:30



1 SECTION

35 35 SCALE 1:30

NOTE:

PRECAST SEWAGE MANHOLE BARREL IS ZONE 1 HAZARDOUS, CATEGORY 2 CORROSIVE LOCATIONS. ALL WIRING TO COMPLY WITH CEC SECTION 18 & SECTION 22 RULES AND LOCAL AMENDMENTS.

LEGEND

	PROPOSED
RECEPTACLE (NEMA 5-15R)	CCT
COUNTER HEIGHT RECEPTACLE	CCT
RECEPTACLE (GROUND FAULT)	CCT
NEMA 5-15R (GF & COUNTER HEIGHT)	CCT
RECEPTACLE (NEMA 5-20R)	CCT
RECEPTACLE (208V)	CCT
DATA RECEPTACLE	# OF CABLES & PORTS
EXIT LIGHT	CCT
CEILING MOUNTED LIGHT	CCT
LINEAR LIGHT TYPE X (1.2m)	
LINEAR LIGHT TYPE X (2.4m)	
WALL MOUNTED LIGHT	CCT
SINGLE GANG SWITCH	
MOTOR	CCT
JUNCTION BOX	CCT
THERMOSTAT	
SPEED CONTROL	
INSTRUMENT LOCATION	
INSTRUMENT LOCATION TYPE 2	
EMERGENCY LIGHT BATTERY PACK	CCT BATT
EMERGENCY LIGHT REMOTE HEAD	RH-X

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DESIGNED:	S.K.J.

EDGEMONT EAST

SUBDIVISION DEVELOPMENT
SEWAGE PUMPING STATION No.1
ELECTRICAL NO. 2

SCALE:	REV. No.	DRAWING No.	SHEET:
AS SHOWN	A		33 OF 35

Maggie Schwab

From: Maggie Schwab
Sent: May 3, 2022 9:37 AM
To: Maggie Schwab
Subject: FW: R0270-22S RM of Corman Park No. 344
Attachments: 20220427_R0270-22S_RM_of_Corman_Park_Edgemont_Estates_East.pdf

From: "Widynowski, Damon GR" <damon.widynowski@gov.sk.ca>
Date: April 27, 2022 at 10:29:57 AM CST
To: Darren Hagen <durban@sasktel.net>
Subject: FW: R0270-22S RM of Corman Park No. 344

Good Morning Darren,

Please see the below and attached response from the Water Security Agency.

Thank you,

Damon Widynowski
Government of Saskatchewan
Planning Consultant
Community Planning, Ministry of Government Relations

978 – 122 3rd Avenue North
Saskatoon, Canada S7K 2H6
Bus: 306-933-5382
Fax: 306-933-7720

From: Lee Reinhart <Lee.Reinhart@wsask.ca>
Sent: Wednesday, April 27, 2022 10:09 AM
To: Widynowski, Damon GR <damon.widynowski@gov.sk.ca>
Cc: Caroline Wiebe <Caroline.Wiebe@wsask.ca>; Duncan Spenst <Duncan.Spenst@wsask.ca>; WSA EMMS Sub Reviews <emmssubreviews@wsask.ca>
Subject: RE: R0270-22S RM of Corman Park No. 344

Good Morning Damon,

The Environmental and Municipal Management Services Division of Water Security Agency will have no concerns with this application.

The developer is planning to connect to a treated water pipeline system that delivers potable water from the City of Saskatoon. The proposed wastewater system will be a gravity collection system that will send all effluent to the new wastewater treatment plant on the English River First Nation which is currently under construction.

Please see the attached for additional comments and feel free to contact me if you have any questions or concerns.

Regards,

Lee Reinhart
Environmental Project Officer
10 - 3904 Millar Avenue
Saskatoon, SK S7P 0B1
Cell: 306.230.3254 | Fax: 306.933.6820
wsask.ca | lee.reinhart@wsask.ca

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Water Security Agency

From: WSA EMMS Sub Reviews <emmssubreviews@wsask.ca>
Sent: Wednesday, April 20, 2022 8:09 AM
To: Lee Reinhart <Lee.Reinhart@wsask.ca>
Cc: Caroline Wiebe <Caroline.Wiebe@wsask.ca>; Duncan Spenst <Duncan.Spenst@wsask.ca>; WSA EMMS Sub Reviews <emmssubreviews@wsask.ca>
Subject: FW: R0270-22S RM of Corman Park No. 344

Good morning,

Please review the attached subdivision application and provide comments directly to *Damon Widynowski* as well as copying *Duncan Spenst* and Caroline Wiebe with Rural Water Services and emmssubreviews@wsask.ca.

Please note this subdivision application review is due *May 29, 2022*.

Jackie Fele
Administrative Assistant, Regulatory
10 - 3904 Millar Avenue
Saskatoon, SK S7P 0B1
Ph: 306.229.7455 | Fax: 306.933.6820
wsask.ca | jaclyn.fele@wsask.ca

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Water Security Agency

From: Widynowski, Damon GR <damon.widynowski@gov.sk.ca>
Sent: Tuesday, April 19, 2022 3:57 PM
To: (landservices@saskenergy.com) <landservices@saskenergy.com>; (land@saskpower.com) <land@saskpower.com>; sasktel.land@sasktel.com; Keith, Jeff ENV <Jeff.Keith@gov.sk.ca>; Anderson, Yvonne ED <Yvonne.Anderson@gov.sk.ca>; Roadside Central HI <roadside.central@gov.sk.ca>; Saskatoon Health REFERRALS (phioc@saskatoonhealthregion.ca) <phioc@saskatoonhealthregion.ca>; WSA EMMS Sub Reviews <emmssubreviews@wsask.ca>; Spencer McNie <Spencer.McNie@wsask.ca>; Caroline Wiebe <Caroline.Wiebe@wsask.ca>
Subject: R0270-22S RM of Corman Park No. 344

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RM of Corman Park No. 344
LS11 & LS14 Section 34-36-05-W3M
Proposed Lots 1 - 40 – Residential Use

Our File: 0270-22S

Hello,

Section 13 of *The Subdivision Regulations, 2014* (Regulations), requires us to send a copy of the attached application to your office as it is our opinion that your ministry or agency may be affected by the proposed subdivision.

The subdivision will create the new parcel(s) as identified within the bold dashed line; however, your comments and requirements will apply to **the land that is being subdivided**, ie. all of the source parcel, not just the land inside the bold dashed line.

We are seeking direction from your office to help confirm the suitability of this land for the intended use as outlined in section 14 of the Regulations.

We kindly request your comments, recommendation and/or reasoning behind that decision within 40 days of receipt of this email so that we may process this application accordingly. **We appreciate that timelines may be impacted by COVID-19.** Please advise if additional time or information is needed before you respond.

Thank you,

Damon Widynowski

Government of Saskatchewan
Planning Consultant
Community Planning, Ministry of Government Relations

978 – 122 3rd Avenue North
Saskatoon, Canada S7K 2H6
Bus: 306-933-5382
Fax: 306-933-7720

The Environmental & Municipal Management Services Division, of the Water Security Agency, would like to offer the following comments for this application: It states that the potable water supply will be delivering City of Saskatoon water to this proposed development. After speaking with the developer, water will be provided by a treated water pipeline system that is yet to be determined via a connection to an existing SaskWater treated pipeline system. There would be no concerns with the quality of this water supply but there may be a concern with the allocation/capacity of the supply from the SaskWater waterworks system and their agreement with the City of Saskatoon. SaskWater may have to be consulted on this as to whether or not they have the capacity to provide water to this subdivision, once fully completed. An application for a permit to construct, from the Water Security Agency's Engineering Approvals Unit will be required and possibly a Permit to Operate a Waterworks prior to going into operation.

The developer has stated that a gravity sewage works collection system is to be installed that will deliver sewage effluent to the new wastewater treatment plant on the English River First Nation near highway 11, that is currently under construction, for treatment. An application for a permit to construct, from the Water Security Agency's Engineering Approvals Unit will also be required for this work and a Permit to Operate a Sewage Works will be required prior to going into operation.

APPENDIX G

ERFN LETTER

Des Nëdhé Group
An English River First Nation Enterprise

August 30, 2022

Christopher Doll - DRAFT
Director Corporate Development
301-2555 Grasswood Road
Saskatoon SK S7T 0K1
chris.doll@desnedhe.com
306.270.9301

To Whom It May Concern:

Re: Edgemont East Development and Grasswood Wastewater Treatment Facility

Our wastewater treatment facility is nearing completion and we anticipate that we will be operational in September of 2022. Commissioning is ongoing and we do not anticipate any further delays. We will have SaskWater operating the plant on our behalf, and they are involved in the commissioning process.

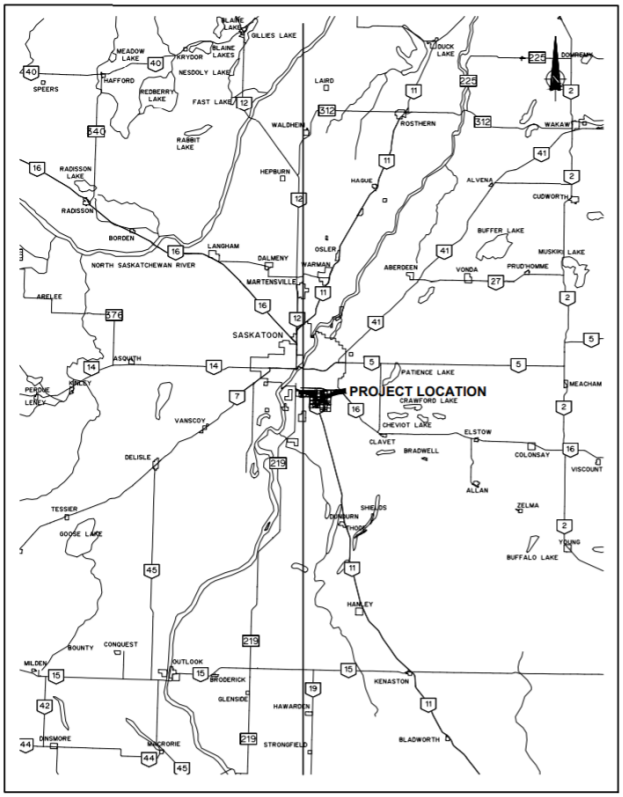
We have capacity and permitting to operate with a storage pond and irrigation for at least the next five years. We our examining discharge to the City of Saskatoon Preston Storm Sewer system, a change in outdated regulatory framework that will allow us to sell water directly to industrial users or to SaskWater as non-potable water, and irrigation to nearby farmlands for non-human consumption products.

We are examining ways to ensure that we can grow to up to 2500M 3 in daily capacity at our present location to service ourselves as well the RM of Corman Park and developers. The Edgemont East Development is critical to us as we launch our wastewater system and makes up approximately 20% of the anticipated volume in the first three years. Although supporting infrastructure is slated for completion next year, if Edgemont East has occupied housing before force mains and pump stations are developed, they will be able to access the wastewater treatment facility through trucking. We will develop agreements either through Des Nedhe Group (our development corporation) or through the RM of Corman Park that will ensure that there is capacity available for Edgemont East Development.

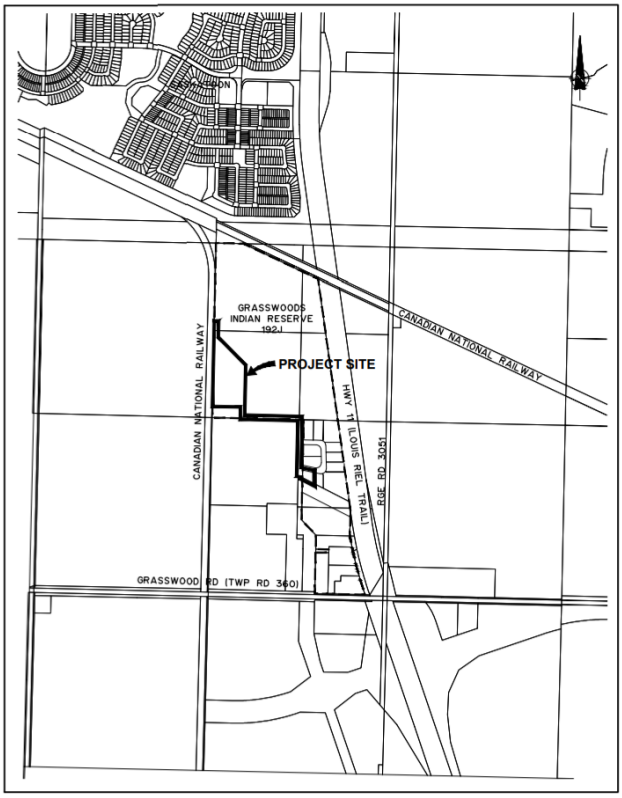
Location

The MBR will be located on English River First Nation reserve lands south of the City of Saskatoon and adjacent to Highway 11. The location map and site map can be found below.

Des Nëdhé Group



LOCATION PLAN
1:1000000



SITE PLAN
1:10000

Technology

The following description is provided by MPE.

In the Membrane Bioreactor MBR process technology is a physical barrier treatment process in addition to a biological process. Treatment involves applying a vacuum suction to draw water through the membrane. Particles larger than the membrane pore size (0.1 micron) are retained on the membrane surface. Water that passes through the membrane is considered filtered water.

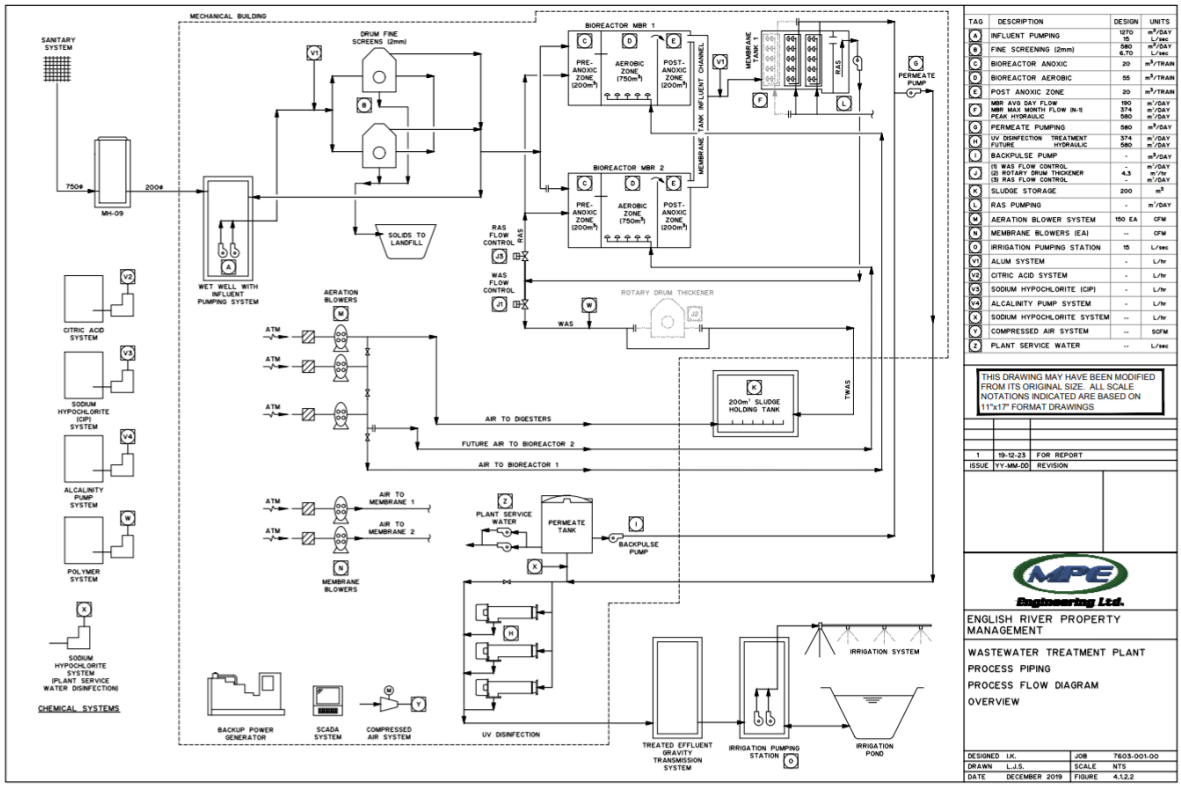
Due to the membrane pore size, MBR's require excellent pre-screening to eliminate larger objects and debris that could foul or damage the membrane. Subsequent to screening, water flows into a pre-anoxic tank. The water is mixed in the absence of oxygen to reduce nitrogen levels in the water.

Biological activity occurs in the aeration tank, where microorganisms degrade organic matter in the water and provide further removal of nutrients. The MBR can provide high levels of treatment including significant nutrient removal. In addition, some proprietary MBR systems have been proven to remove micro-organisms (E coli, fecal coliforms and total coliforms) to levels lower

Des Nëdhë Group

than regulation requirements. This is possible because the physical barriers are made up on pores which are smaller in size than micro-organisms.

Particle build-up on the membrane surface is controlled in three ways. Compressed air is introduced at the bottom of the membrane system, which removes retained particles from the membrane surface and maintains aerobic conditions. The system is also backwashed periodically by reversing the flow of the water through the membrane with small additions of chlorine to remove particle build-up. The system can be designed to introduce air at specific time intervals or when the monitoring system indicates a maximum pressure level is reached at the membrane surface. Chemical cleaning is also required approximately two to three times a year.



TAG	DESCRIPTION	DESIGN	UNITS
A	INFLUENT PUMPING	1270	m³/DAY
		15	L/sec
B	FINE SCREENING (2mm)	580	m³/DAY
		6.70	L/sec
C	BIOREACTOR ANOXIC	20	m³/TRAIN
D	BIOREACTOR AEROBIC	55	m³/TRAIN
E	POST ANOXIC ZONE	20	m³/TRAIN
F	MBR AVG DAY FLOW	190	m³/DAY
	MBR MAX MONTH FLOW (N-1)	374	m³/DAY
	PEAK HYDRAULIC	580	m³/DAY
G	PERMEATE PUMPING	580	m³/DAY
H	UV DISINFECTION TREATMENT	374	m³/DAY
	FUTURE HYDRAULIC	580	m³/DAY
I	BACKPULSE PUMP	-	m³/DAY
J	(1) WAS FLOW CONTROL	-	m³/DAY
	(2) ROTARY DRUM THICKENER	4.3	m³/hr
	(3) RAS FLOW CONTROL	-	m³/DAY
K	SLUDGE STORAGE	200	m³
L	RAS PUMPING	-	m³/DAY
M	AERATION BLOWER SYSTEM	150 EA	CFM
N	MEMBRANE BLOWERS (EA)	--	CFM
O	IRRIGATION PUMPING STATION	15	L/sec
V1	ALUM SYSTEM	-	L/hr
V2	CITRIC ACID SYSTEM	-	L/hr
V3	SODIUM HYPOCHLORITE (CIP)	-	L/hr
V4	ALCALINITY PUMP SYSTEM	-	L/hr
X	SODIUM HYPOCHLORITE SYSTEM	--	L/hr
Y	COMPRESSED AIR SYSTEM	--	SCFM
Z	PLANT SERVICE WATER	--	L/sec

ISSUE	YY-MM-DD	REVISION
1	19-12-23	FOR REPORT

DESIGNED	I.K.	JOB	7603-001-00
DRAWN	L.J.S.	SCALE	NTS
DATE	DECEMBER 2019	FIGURE	4.1.2.2

If you have any further questions, please do not hesitate to contact me.

Sincerely,

Christopher Doll

APPENDIX H

DELTA CONSTRUCTION LETTER

DELTA
CONSTRUCTION GROUP INC.

3627 KOCHAR AVE
SASKATOON SK S7P 0B8
PH: 306-955-3212
www.deltaconstruction.ca

Date: 21 July 2022

EDGEMONT ESTATES
ATTN: DARREN HAGEN

RE: WATER AND SEWER CONTRACT

Dear Mr. Darren,

This letter confirms that Delta Construction Group Inc. (General Contractor), will supply and install the water and sewer scope of works for the entire Edgemont East subdivision project located at the RM of Corman Park, SK. Delta will also be the utility provider for water and sewer for the 131 lots in Edgemont East.

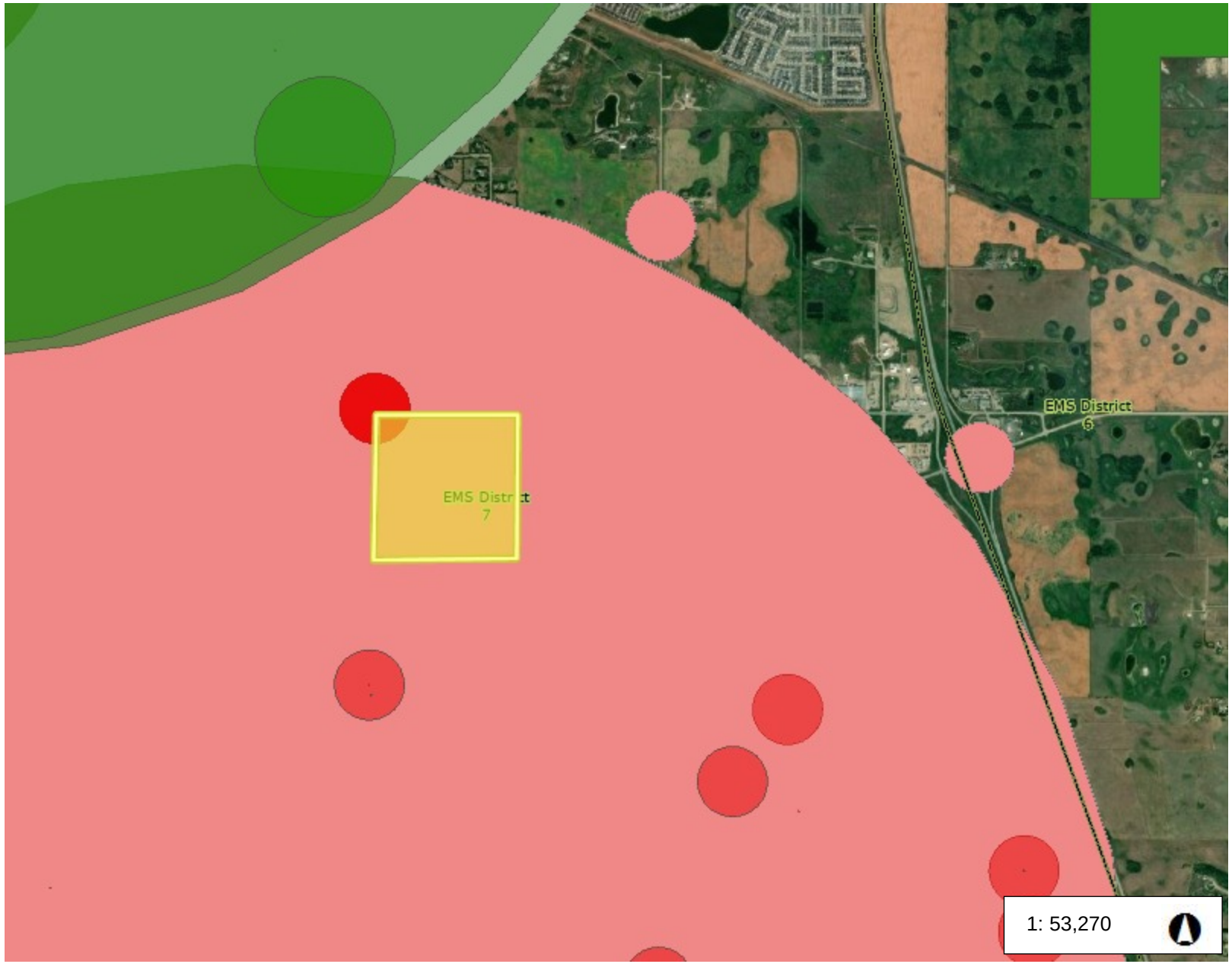
Sincerely,

Lee Warman
President
Delta Construction Group Inc.

APPENDIX I

HERITAGE AND ENVIRONMENTAL QUERIES

Edgemont East HabiSask Map



Legend

- Provincial Boundary
- Ecological Management Speci
- Rare and Endangered Species
  - Vertebrate Animal
  - Invertebrate Animal
  - Animal Assemblage
  - Vascular Plant
  - Nonvascular Plant
  - Other (Botanical)
  - Fungus
- Water Security Agency
- Game Preserve
- National Wildlife Area
- Migratory Bird Sanctuary
- Conservation Easements
- Crown Land Subdivisions
- Ecological Reserves
- Fish and Wildlife Development
- Former Federal Pastures
- Ramsar Wetland
- Reservior Development Areas
- Representative Areas
- Provincial Pastures
- Special Management Areas
- Wildlife Habitat Protection (WH
- Wildlife Refuge

Notes

2.7 0 1.35 2.7 Kilometers

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.
THIS MAP IS NOT TO BE USED FOR NAVIGATION

Saskatchewan

Developers' Online Screening Tool

Inquiry was made on May 3, 2022 at 9:28 AM

You are inquiring about the heritage sensitivity of the following land location:

Quarter-section:	NE
Section:	34
Township:	35
Range:	05
Meridian:	3

This quarter-section is NOT heritage sensitive.

It is not necessary to submit the project to the Heritage Conservation Branch for screening. These results can be printed for submission to other regulatory bodies (e.g. Saskatchewan Environment, Saskatchewan Energy and Resources). Please email **arms@gov.sk.ca** if you have any questions.

Refine Search | New Search | Log Out

Saskatchewan

Saskatchewan

Developers' Online Screening Tool

Inquiry was made on May 3, 2022 at 9:33 AM

You are inquiring about the heritage sensitivity of the following land location:

Quarter-section:	NW
Section:	34
Township:	35
Range:	05
Meridian:	3

This quarter-section is NOT heritage sensitive.

It is not necessary to submit the project to the Heritage Conservation Branch for screening. These results can be printed for submission to other regulatory bodies (e.g. Saskatchewan Environment, Saskatchewan Energy and Resources). Please email **arms@gov.sk.ca** if you have any questions.

Refine Search | New Search | Log Out

Saskatchewan

APPENDIX J

ARCHITECTURAL CONTROLS

Proposed Edgemont East Architectural Controls

Buildings:

In order to obtain a building permit, the Rural Municipality of Corman Park may require either a site-specific geotechnical report or a foundation design approved by a certified engineer.

Buildings must be a minimum of 1,600 square feet for bungalow, or 2,100 square feet for two-storey.

Any out-buildings, fences, and additional garages must match facade of the house and must be approved by the Edgemont East Building Committee prior to construction.

Foundations:

Foundations must be concrete or insulated block only.

Wood foundations are not permitted.

Height of Structure:

Roof pitch must be a minimum of 6/12 roof, or as approved by the Edgemont East Building Committee (including flat roof designs).

Structures must meet all Edgemont East Committee (EEBC) standards and National Building Code of Canada regulations and receive approval from EPEBC.

Approved Exterior Materials and Colours:

Building exteriors may be acrylic stucco, brick, or stone, with a minimum of 30% frontage and 4-foot returns.

Other such materials must be approved by the Edgemont East Building Committee.

Roofs:

Roofs must be asphalt shingle (minimum 30 years).

Clay, metal, or other such material will be considered but must be approved by the Edgemont Park Estates Building Committee.

Roof pitch must be a minimum of 6/12 roof, or as approved by the Edgemont East Building Committee (including flat roof designs).

Porches, Terraces and Decks:

Covered decks and front porches are allowed.

Porch, terrace, and deck material must be treated wood or wood composite.

Chimneys and Outdoor Fire Pits:

Chimneys and outdoor fire pits must meet National Building Code of Canada requirements and must be approved by the Edgemont East Building Committee.

Garages and Garage Doors:

At a minimum, garages must be double attached.

Changes to Original Plans or Additional Construction:

Changes to originally submitted plans and additional construction plans must be submitted to the Edgemont East Building Committee for approval.

All engineering costs will be owned by the contractor and be submitted with the plans for revision.

Setbacks:

All setback plans must be submitted to the Edgemont East Building Committee for approval.

Outdoor Storage:

All storage of vehicles, equipment, and machinery must be approved by the Edgemont East Building Committee (EEBC).

All applications for shipping containers may be considered for storage purposes only but must be approved by the EEBC.

Lighting:

All outdoor lighting must consist of “Dark-Sky Friendly” lighting, as defined by the International Dark-Sky Association and must be approved by the Edgemont East Building Committee.

Fencing:

All fencing must be approved for material, size, location, and colour by the Edgemont East Building Committee.

Timelines for Completion:

The start time is 2 years from the time of purchase and then a further 2 years to complete.

All homeowners are required to become a member in good standing of the Edgemont East Homeowners Association.

Note on Ready to Move and Mobile Homes:

All lots are for new home construction only. Ready-to-move (RTM) and mobile homes will not be accepted.

APPENDIX K

PUBLIC OPEN HOUSE INFORMATION

CROSBY HANNA & ASSOCIATES
LANDSCAPE ARCHITECTURE
COMMUNITY PLANNING

407C 1st Avenue North
Saskatoon SK S7K 1X5
www.crosbyhanna.ca

T (306) 665-3441
F (306) 652-9613

March 3, 2022

Dear Sir or Madam,

The intent of this letter is to inform you of a Public Open House that is scheduled for Wednesday March 30, 2022 regarding a proposed multiple parcel country residential development with an integrated recreational amenity entitled **Edgemont East**. The Development is located at:

- **LSD 11, 14, 15 and 16 in Section 34, Townhsip 35, Range 05, W3M**

The proposed development is located immediately west of Preston Avenue, south of Grasswood Road. We have included a map in this letter showing the location of the proposed development (See Map 1).

The Developer wishes to consult with neighbours and receive feedback regarding the proposed development. Following the public consultation, all feedback will be included in a presentation to RM Council, in conjunction with the Comprehensive Development Review, where all matters of land use integration, environmental and social considerations, and engineering infrastructure will be addressed.

Edgemont East features 131 residential lots in addition to an integrated recreational amenity (see Map 2). The recreational amenity includes tennis/pickleball courts, a beach volleyball court, picnic area, as well as walking/hiking trails and a children's play area.

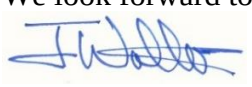
The public open house is scheduled for:

- **Wednesday March 30, 2022, from 5:30 to 7:30 PM (come-and-go)**
  The Glen at Crossmount
  #10 Glen Road, Corman Park, SK

The open house is a come-and-go event, intended to provide an opportunity for neighbours to discuss potential issues, possible solutions to those issues and to ask general questions. The developers and members of the design team will be present at the open house.

If you are unable to attend the open house, you may provide any comments or concerns via email to Jim Walters by Friday April 15, 2022 to jwalters@crosbyhanna.ca.

We look forward to seeing or hearing from you.



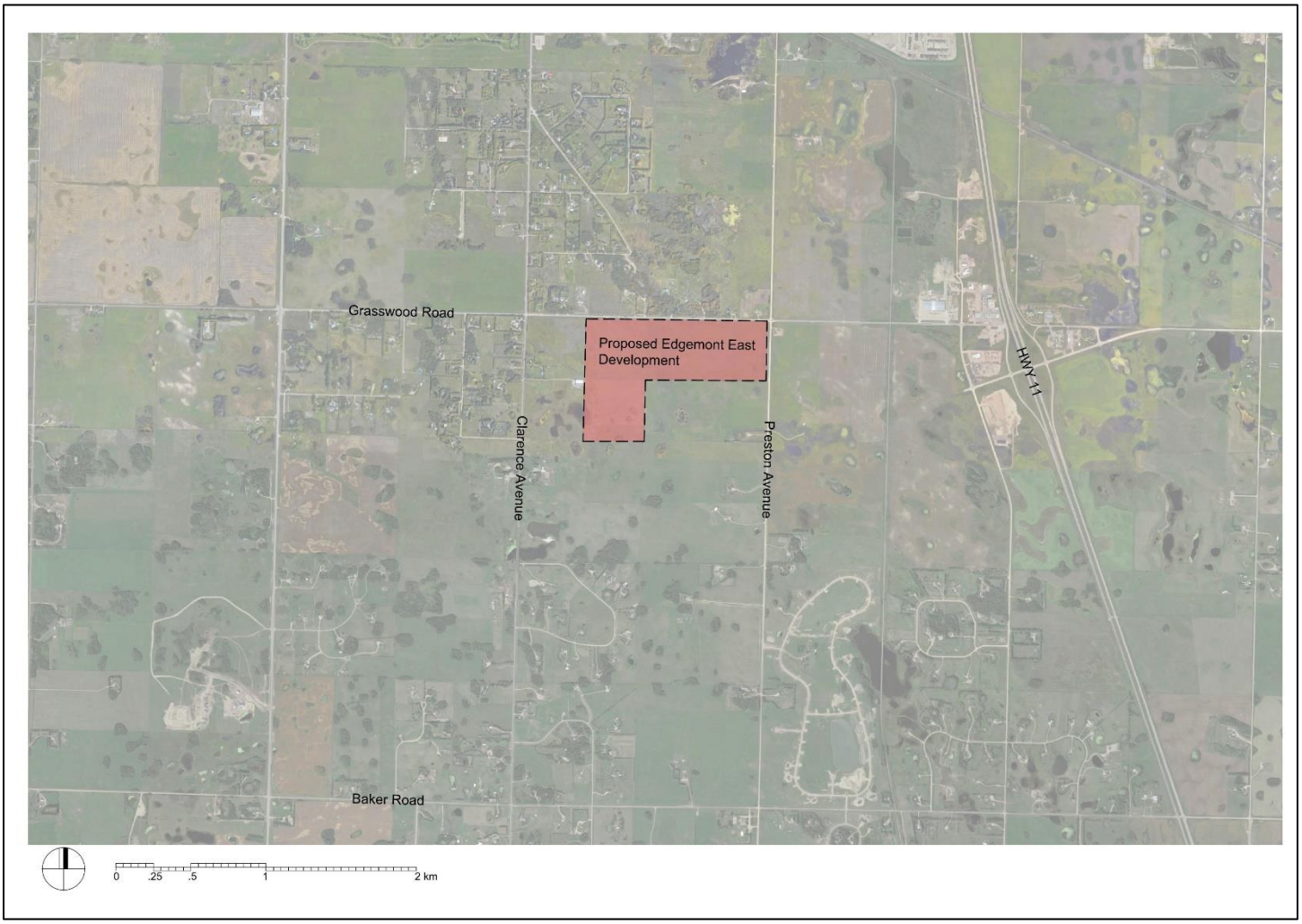
Jim Walters, RPP, MCIP
CROSBY HANNA & ASSOCIATES

CROSBY HANNA & ASSOCIATES
LANDSCAPE ARCHITECTURE
COMMUNITY PLANNING

407C 1st Avenue North
Saskatoon SK S7K 1X5
www.crosbyhanna.ca

T (306) 665-3441
F (306) 652-9613

MAP 1: LOCATION OF PROPOSED DEVELOPMENT



CROSBY HANNA & ASSOCIATES
LANDSCAPE ARCHITECTURE
COMMUNITY PLANNING

407C 1st Avenue North
Saskatoon SK S7K 1X5
www.crosbyhanna.ca

T (306) 665-3441
F (306) 652-9613

MAP 2: PROPOSED OVERALL CONCEPT DESIGN

SIGN-IN SHEET

EDGEMONT EAST ESTATES OPEN HOUSE

NAME	E-MAIL ADDRESS
DONNA HRYNUIK	[redacted]
DALE HRYNUIK	
DON SACHS	
Betty + Dale Gibbon	
Michelle Chuhantuk	
Tracy Harwood	
Debbie Troesch	
Leo Troesch	
Tammy + Randy Pshebylo	
Chelsey DaSilva	
Eugene Hritzak	
Dylan Starle	
Janet + Michael Raulyk	
KELLY DIAMOND McMillan.	
CRAIG MARTIN	

Maggie Schwab

From: Jim Walters
Sent: March 31, 2022 11:00 AM
To: Bjorkman, Lori SHA
Cc: Darren Hagen; Maggie Schwab; Adam Toth
Subject: RE: Edgemont East Development

Hi Lori, I have cc'd Darren Hagen (Developer), Maggie Schwab from my office and Adam Toth from the RM of Corman Park.

I am going to have to agree to disagree with you on the density of this development (lots sizes .33 acres – 1.5 acres). We believe these lots are appealing to people who want to move to the RM. The RM's zoning bylaw accommodates this lot size.

Potable water will be supplied by SaskWater via a local utility company. Wastewater will be collected and pumped to a new wastewater treatment plant north of the Jemini rink where it will be treated. No wastewater will be discharged into the soil. The recreation area will be constructed by the Developer and then maintained by a local community association made up of the residents of the development.

I hope this answers your technical questions. I will include your comments in our application package to the RM. We had an Open House last night and had mostly positive feedback. Thank you for your questions.

Jim Walters RPP MCIP
CROSBY HANNA & ASSOCIATES
407C 1st Ave N, Saskatoon, SK S7K 1X5
t : 306.665.3441
e : jwalters@crosbyhanna.ca
www.crosbyhanna.ca

From: Bjorkman, Lori SHA [redacted]
Sent: Tuesday, March 29, 2022 9:02 AM
To: Jim Walters <jwalters@crosbyhanna.ca>
Subject: Edgemont East Development

Good morning,

I live in Ashwood Estates just east of the proposed development and have so since 1995. I do have concerns about the proposed development.

Developments of these types (large in number and small in lots size) do not add to the rural feel that is so important to the area. It is merely bringing the city out of the city limits.

]There is so much wildlife in the area that is being pushed out. It is not unheard of to have moose, deer, rabbits, and coyotes as well as a variety of birds show up in my yard. Developments like this feel like the country is being pushed out of my acreage which is a large part of the appeal of this area. The peace that comes from sitting on my deck in the

evening is slowly being eroded by city lots moving to the country. This is a quality of life desired by those of us moving to the country.

I am not opposed to new developments that are not citified. Larger lots do not make the developer as much money as smaller ones, but it does take away the country feel of the area. The rec area plus 131 lots on what looks like a quarter section will be a very densely populated area. This is a huge impact on the environment as it presently stands.

This number of lots will also greatly increase traffic, noise and wear and tear on already challenged roads. This increase in vehicles coming in and out of the area doesn't seem like much on paper, but the reality is huge to those of us wanting to maintain a country feel with good roads that are adequate to not cause extra wear and tear on our vehicles.

How will the water be supplied as well as sewage removed? How large will the lots sizes be? Who will be responsible to maintain upkeep on the recreational part once the developer has been in and out. Who is the developer and why was that not listed on the letter?

I look forward to hearing from you,

Lori Bjorkman, RN, BSN, MN
Manager – Inpatient Pediatrics/Pediatric Sleep Lab/Pediatric Hemodialysis
JPCH - Office 2393 – Saskatoon
Saskatchewan Health Authority [redacted]

The Saskatchewan Health Authority works in the spirit of truth and reconciliation, acknowledging Saskatchewan as the traditional territory of First Nations and Métis People.

Maggie Schwab

From: Jim Walters
Sent: March 18, 2022 12:14 PM
To: Sheldon Giesbrecht
Cc: Darren Hagen; Maggie Schwab; Kevin Traves
Subject: Re: Edgemont East

Hi Sheldon, thanks for the question.

Wastewater is going to be collected by a communal system then pumped to a sewage treatment plant to the east, just north of Jemini. There will be no discharge into the soil.

Jim Walters, RPP, MCIP
Crosby Hanna & Associates
407C 1st Avenue North
Saskatoon SK
306-665-3441

> On Mar 18, 2022, at 10:10 AM, Sheldon Giesbrecht [redacted] > wrote:
>
> Good morning Jim. I was if you could provide me with the septic plan is for the proposed Edgemont East development.
>
> Thank You
> Sheldon Giesbrecht

Maggie Schwab

From: Jim Walters
Sent: April 14, 2022 5:21 PM
To: Chelsey DaSilva
Cc: Darren Hagen; Maggie Schwab; Adam Toth
Subject: Re: Edgemont East

Hi Chelsey, thanks for your email. Just letting you know I received it.

Jim Walters, RPP, MCIP
Crosby Hanna & Associates
407C 1st Avenue North
Saskatoon SK
306-665-3441

On Apr 14, 2022, at 4:10 PM, Chelsey DaSilva [redacted] > wrote:

Good day,

I am e-mailing in regards to the proposed project entitled Edgemont East. After attending the open house in late March and gathering some information from the nearby school, I would like to share my concerns with this project and its proposed higher density.

Increased class sizes / school enrolment

To date, South Corman Park School has experienced a steady growth rate as seen in the following data:

2018 -2019: 124.5 students
2019-2020: 129 students
2020-2021: 131 students
2021-2022: 149 students
2022-2023: a projection of 157 students

It is evident that the school is experiencing steady growth regardless of this project and will continue to grow with the other surrounding developments which are not yet completed; Grasswood Estates and Edgemont mainly. With a projected 100 extra students from Edgemont East alone, the school will reach capacity in such an expedited manner that it will only negatively impact the current students. When a large influx of students is experienced, the school is forced to increase student numbers per class which eliminates the individualized education that so many families came to this school for, or students are put into portables which reduces their access to the gym and other services. Further to this, it is my understanding that if a kindergarten to grade 6 expansion is needed due to high enrolment numbers in the future, that the chance of a grade 7 and grade 8 expansion will be nearly impossible. Many of South Corman Park School's families are hoping that they do not have to send their children to Clavet or other schools as it is an extremely long bus ride; if Edgemont East is approved then the children who currently attend the school will be negatively effected as the grade 7 and 8 expansion will not be of priority to the division.

Increased traffic

With two developments in the vicinity, this area has already experienced an enormous influx of traffic. The current residents of this area moved out of the city to enjoy a slower and quieter lifestyle. A project with such a high-density will bring unwanted traffic to neighbouring roads in addition to the already high wait time at the entrance and exit areas. The intersection of Township Road 360 and Highway 11 is already a dangerous issue that needs addressing before higher traffic loads are welcomed.

Noise disturbance and visual eyesore

Since there has been no pre-established trees or visual obstruction for this project, it will force current residents to endure years of construction noise and heavy machinery. This project requires earthmoving and piped sewage which is no quick feat; once the land is developed it will take years for the lots to be sold off and completely developed. With so many surrounding houses, many people will be directly affected for years to come and push them out of the homes they love due to the noise disturbance. Living across from a construction site is not the dream that so many people thought they would have when moving out here.

Small lot sizes which are not aligned with the acreage style of living

Corman Park states that one of its goals is "balanced and orderly growth." Edgemont East would tip the scale beyond balance as the south of Saskatoon has already experienced heavy growth with the other developments in the area. It is obvious that this is prime land that will be developed in some nature, however the issue comes with the density of this proposed project. Corman Park forced all current residents to abide by its subdivision rules when going through the process; so it is extremely frustrating when developers are allowed to throw these subdivision bylaws to the way-side and force as many lots possible into a small footprint. Edgemont East is simply putting lipstick on a pig; you can try to dress it up by calling it "acreage living," but it really is nothing more than larger city sized lots.

Loss of naturalized land and habitat

Smart rural planning allows for pockets of naturalized land. This ensures that wildlife and vegetation can continue to grow and benefit the current residents. If Corman Park allows these projects to overrun these naturalized areas, there will be nothing that differentiates us from the city; it will simply become an extension of city living. Developing the land in accordance to the pre-existing bylaws which allows 3 properties in an 80 acre section (a 70 acre parcel, 5 acre parcel, and another 5 acre parcel) would ensure that the land is still developed but in a way that respects the land and not exploiting it.

"Just because you can, doesn't mean you should."

To complete my letter, I would like to echo the very goals that Corman Park has on their webpage:

- Maintaining the agricultural character of the municipality
- Achieving balanced and orderly growth
- Enhancing and diversifying the lifestyle of residents
- Maintaining natural features
- Sound environmental management
- Planning in the rural-urban fringe
- Sound administration of land use planning and development

Edgemont East does not align with any of these goals and brings nothing of benefit to the current residents who have already made this area their home. This project will force current residents out of the area and allow these higher-populated communities to take over. The individualized education that our children deserve will be gone when the school becomes overpopulated. Corman Park has made a commitment to its residents by vocalizing these goals and therefore has an obligation to follow through with them. It can not pick and choose when to follow the very goals that they established.

Sincerely,
Chelsey DaSilva

Maggie Schwab

From: Maggie Schwab
Sent: May 3, 2022 9:22 AM
To: Maggie Schwab
Subject: FW: Edgemont East Development Concerns

Begin forwarded message:

From: Dale [redacted]
Date: April 4, 2022 at 1:15:54 PM CST
To: Jim Walters <jwalters@crosbyhanna.ca>
Cc: jharwood@rmcormanpark.ca
Subject: Edgemont East Development Concerns

Jim,

It was nice to see you at the open house at Crossmount. As discussed earlier our biggest concern with the Edgemont East development is that drainage water from the site stay within its boundaries. It is our intention to carefully review the plans for the retention pond and runoff ditches once the CDR is made public. We may have a private consultant review them as well. As all of the water table testing was done in 2021, which was a significant drought year we are concerned that the dimensions of the retention pond that have been shared with us will not be adequate. We have seen significant variations in the water level on both ours and the Edgemont East development area from year to year. As such we believe that either further testing should be done or additional allowance be made over and above the 1 in a 100 plus 25% calculation that has been used to determine the required volume of the retention pond. In addition, we will be requesting written assurance from the RM of Corman Park that in the event that the retention pond is not adequate to contain any future runoff, they will compensate us for any damage or remediation work required on our land or property.

Will we get notification from the RM office that the CDR is available for review or will you be letting us know?

Sincerely,
Dale and Betty Gibbon

WELCOME

The purpose of this open house is:

To present residents with information pertaining to a proposed multiparcel country residential development with an integrated recreational amenity in the NE and NW 1/4 of Section 34 Township 35, Range 5 W3M. This development is known as Edgemont East.

This is an informal, come-and-go event. You are encouraged to review these boards and to raise any questions, comments or concerns you may have to the developer and members of the design team.

Your feedback is very important. Please fill out the feedback form and leave it with us when you're done. It will be important to help us assess community feedback to the proposed development.

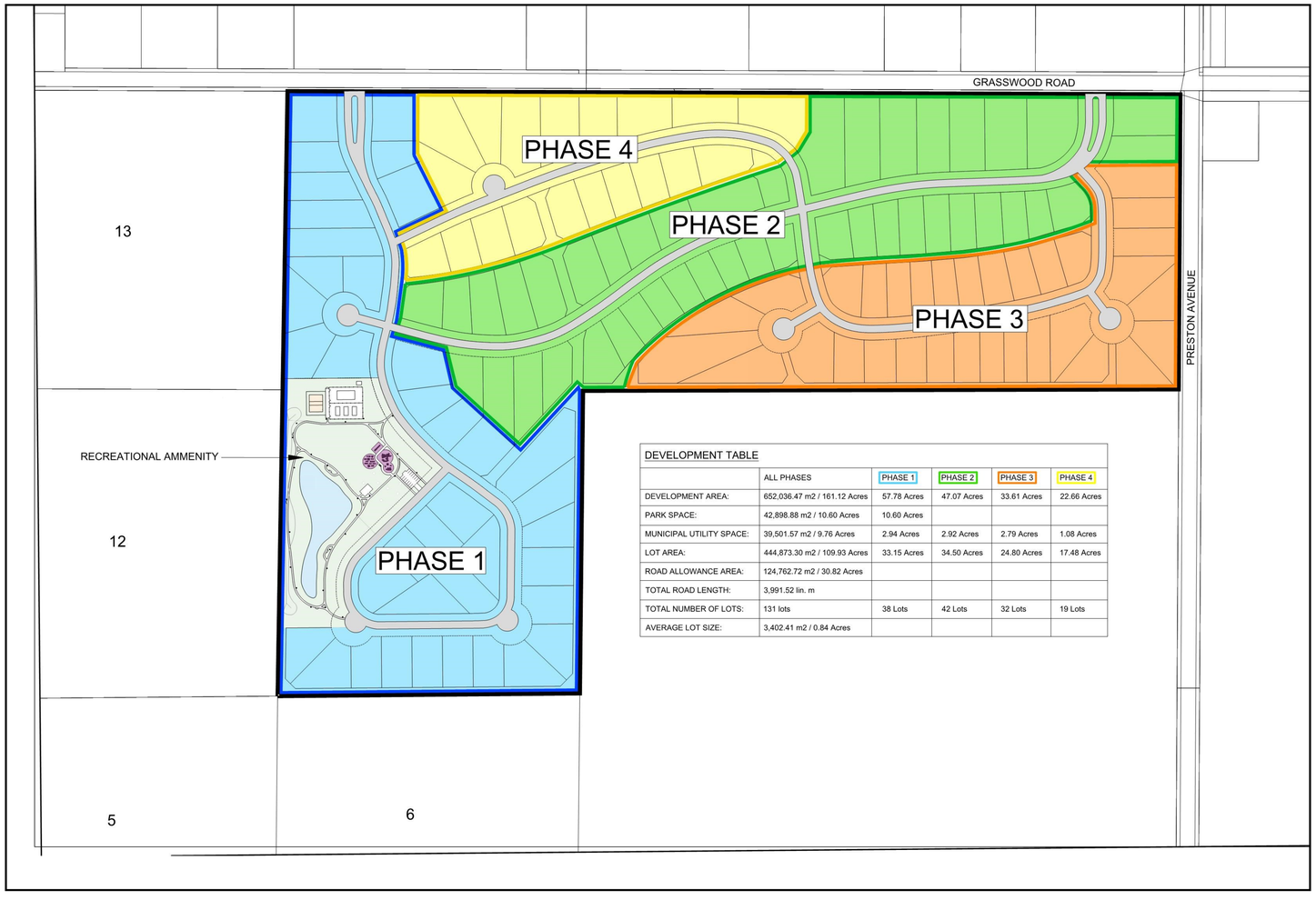
The process:

- Following public input, the Developer will submit a Comprehensive Development Review (CDR) and rezoning application to the Council of the RM of Corman Park. A subdivision application will be concurrently submitted to Community Planning.
- The purpose of developing a CDR is to ensure that all engineering, environmental, servicing, and community issues/concerns/priorities are addressed.

CROSBY HANNA & ASSOCIATES
LANDSCAPE ARCHITECTURE AND PLANNING

Introduction to the Development

- **Edgemont East** is a multiparcel country residential development with an integrated recreational amenity.
- The proposed development is located on the NE and NW 1/4 Section 34, Township 35, Range 5, W3M, west of Preston Avenue and south of Grasswood Road.
- It is proposed that the development be undertaken in four phases.



DEVELOPMENT TABLE

	ALL PHASES	PHASE 1	PHASE 2	PHASE 3	PHASE 4
DEVELOPMENT AREA:	652,036.47 m2 / 161.12 Acres	57.78 Acres	47.07 Acres	33.61 Acres	22.66 Acres
PARK SPACE:	42,898.88 m2 / 10.60 Acres	10.60 Acres			
MUNICIPAL UTILITY SPACE:	39,501.57 m2 / 9.76 Acres	2.94 Acres	2.92 Acres	2.79 Acres	1.08 Acres
LOT AREA:	444,873.30 m2 / 109.93 Acres	33.15 Acres	34.50 Acres	24.80 Acres	17.48 Acres
ROAD ALLOWANCE AREA:	124,762.72 m2 / 30.82 Acres				
TOTAL ROAD LENGTH:	3,991.52 lin. m				
TOTAL NUMBER OF LOTS:	131 lots	38 Lots	42 Lots	32 Lots	19 Lots
AVERAGE LOT SIZE:	3,402.41 m2 / 0.84 Acres				

Proposed Edgemont East Development

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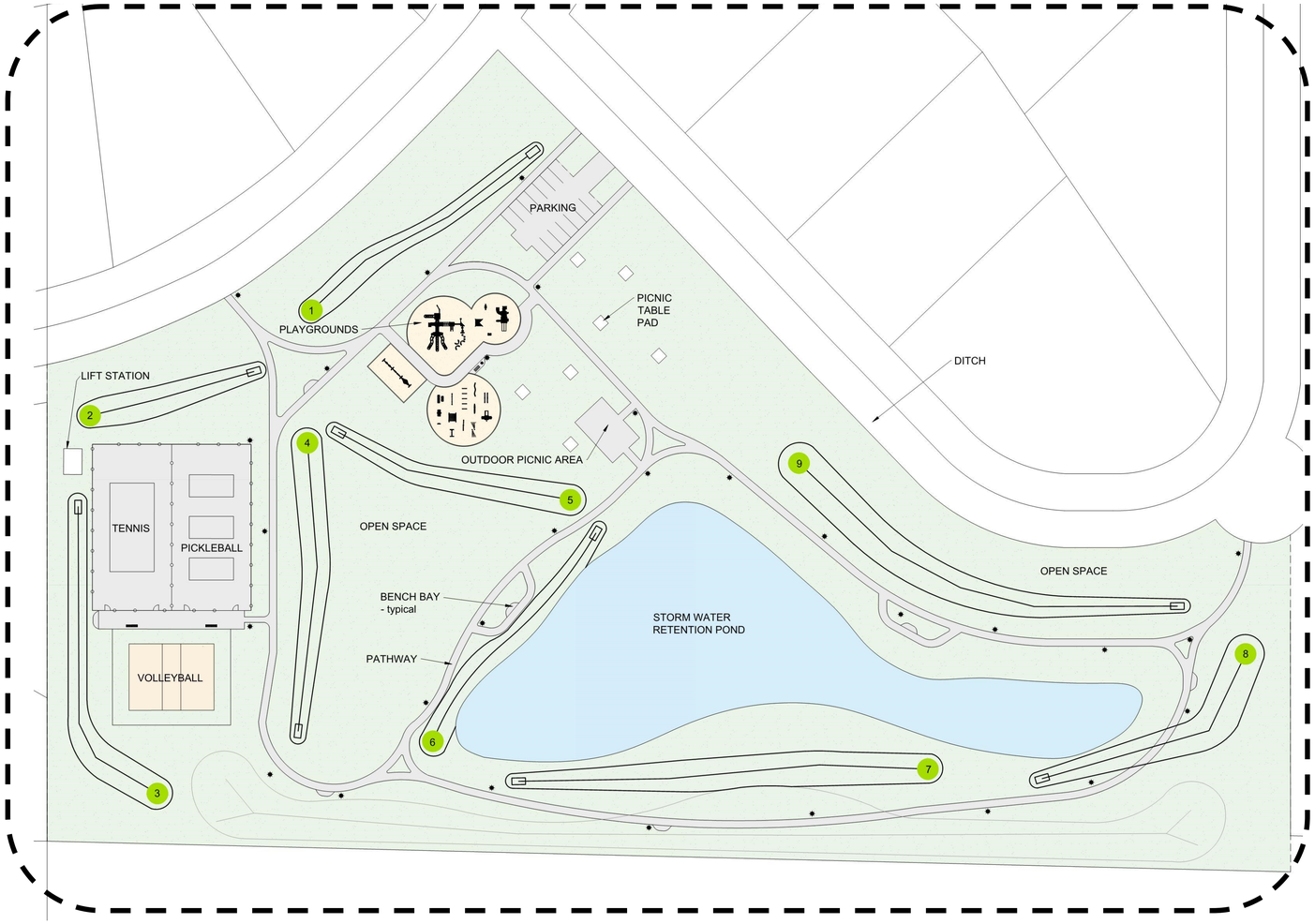
LANDSCAPE ARCHITECTURE AND PLANNING

FEATURES

- This development is set apart from other developments in the region for various reasons, including:
- Integrated recreational amenity featuring:
  - Children's Playgrounds;
  - Beach Volleyball Court;
  - Tennis Courts;
  - Pickleball Courts;
  - Paved Walking Trails;
  - Disc Golf.
- Communal septic system.
- Drainage will be handled on site.



Proposed Edgemont East Development

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LANDSCAPE ARCHITECTURE AND PLANNING

16	X	18	19	20	P	B	A	S.E.¼ Sec.3-36-5-W.3Mer.	D	S.E.¼ Sec.3-36-5-W.3Mer.	S.W.¼ Sec.2-36-5-W.3Mer.
PLAN 101896577	PLAN 101896375	PLAN		102051302	PLAN G447	PLAN 101455871	PLAN 101455860		PLAN 101455848		
							PLAN 87S43187				

EDGEMONT ESTATES EAST

ROAD ALLOWANCE

PLAN 63S10930

LS13
Sec.34-36-5-W.3Mer.

LS10
Sec.34-36-5-W.3Mer.

LS9
Sec.34-36-5-W.3Mer.

LS5
Sec.34-36-5-W.3Mer.

LS6
Sec.34-36-5-W.3Mer.

LS7
Sec.34-36-5-W.3Mer.

34
35-5-3

MUNICIPAL RESERVE MR1 (Playground) 5.606 ha. 13.852 ac.

MUNICIPAL RESERVE MR2

MUNICIPAL RESERVE MR3

MUNICIPAL RESERVE MR4

(Recreation Area)

(Drainage Pond)

A
PLAN 102038172

PLAN 84S12629

PLAN 61S19399

ROAD ALLOWANCE

N.W.¼ Sec.35-35-5-W.3Mer.

C
PLAN 102093094

Planning Authority Approval

PHASE 1 (38 Lots)

PHASE 2 (42 Lots)

PHASE 3 (32 Lots)

PHASE 4 (19 Lots)

By : _____
SASKATCHEWAN LAND SURVEYOR

EXAMINED : EDGEMONT EAST DEVELOPMENT CORP. (Developer)

Date: _____, A.D. 2022.

PLAN OF PROPOSED SUBDIVISION
SHOWING
SURFACE SUBDIVISION
OF ALL OF
LS 11, LS 14, LS 15 & LS 16
SEC. 34-TWP.35-RGE.5-W.3rd Mer.
R.M. of CORMAN PARK No. 344
SASKATCHEWAN

BY : M.G. RADOUX, S.L.S.

SCALE 1 : 2000

NOTES
- Portion to be surveyed is outlined by a heavy broken line and contains 65.31 Hectares more or less.
- Measurements are in metres and decimals thereof.
- Distance dimensions are approximate and may vary by ±5.0 metres.
- All roads within proposed development are 30.0m.

No.	Date	Revision	Rev. By	Chd. By

Drawn By:	Checked By:	Date:	File No.	Drawing Name:	Rev.	
gmm	mgr	March 29, 2022	SA221517	SA221517DEV.dwg	0	Meridian Surveys Ltd.

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LANDSCAPE ARCHITECTURE AND PLANNING

Drainage, Potable Water and Traffic

Drainage:

- The proposed subdivision layout maintains the natural low-lying areas, designating them as Municipal Reserve.
- The roadway network will be used to direct runoff to these low-lying areas, where water will be temporarily stored in a storm pond sized to accommodate the complete development.
- A combination of infiltration and runoff will be used to manage the stormwater, similar to the natural state of the land.

Traffic:

- A Traffic Impact Assessment (TIA) was undertaken in January, 2022 by KGS Group.
- Combined with an annual 5.0% background growth in the region, it was concluded that both intersections to the development are expected to operate at acceptable conditions during morning and peak hour at full buildout.
- Total volumes associated with the development are expected to be as follows:
    - AM Peak Hour New Trips In: 24 Vehicles, AM Peak Hour New Trips Out: 74 Vehicles
    - PM Peak Hour New Trips In: 82 Vehicles, PM Peak Hour New Trips Out: 49 Vehicles

- Clarence Avenue and Grasswood Road are anticipated to operate acceptably during the morning and afternoon peak hours with minimal queuing (2-4 vehicles) on each approach during peak commute times.

Potable Water:

- Potable Water from the City of Saskatoon will be made available through SaskWater.

Crosby Hanna & Associates
Landscape Architecture and Planning

Wastewater Treatment

Wastewater Treatment

- Wastewater generated at the development will be collected by a communal system and pumped to a sewage treatment plant to the east and north of the Jemini Arena.

Recreation

- Recreational opportunities will be plentiful for people for all ages and abilities and has been well thought out, as it provides occasions for year-round use.
- Proposed recreational components consist of dedicated tennis courts and pickleball courts, children's playgrounds, beach volleyball court, disc golf, paved walking trails, as well as potential options for cross country ski trails.

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LANDSCAPE ARCHITECTURE AND PLANNING