


TITLE: CITY OF BRANDON CEMETERY EXPANSION MASTER PLAN			
PRESENTERS: Perry Roque Director of Community Services Heidi Redman Lees and Associates Daniel Burns Burns Maendel Consulting Engineers		Page 1 of 3	
DIVISION: Operational Services Division Community Services Department		ATTACHMENTS: 1. City of Brandon-Cemetery Expansion Master Plan	
CLEARANCES: <i>Original Signed By</i> T. E. Snure Engineering Department		DATE: June 24, 2015	
APPROVALS:			
<i>Original Signed By</i> <u>R. Sage</u> General Manager		<i>Original Signed By</i> <u>S. Hildebrand</u> City Manager	
<u>June 29, 2015</u> Date		<u>June 30, 2015</u> Date	

SUMMARY OF HISTORY/DISCUSSION:

The City of Brandon commissioned LEES+ Associates to prepare a Cemetery Expansion Master Plan including a thorough review of the existing cemetery lands and the expansion of the cemetery onto adjacent lands at 1200 Aberdeen Avenue and 900 Balmoral Avenue. The objective of this master plan report is to provide the City with a plan for the cemetery that will enhance land drainage capacity and accommodate cemetery expansion to serve the needs of the local community. The plan provides clear guidance for the City to continue providing quality cemetery services to Brandon and area residents over the next 25-75 years.

The Cemetery Needs Analysis (2000) and Cemetery Master Plan (2008) documents established the need for additional space and a range of interment options to serve City residents. To meet this need, the City has secured 1200 Aberdeen Avenue which adjoins the eastern boundary of the cemetery. The intent of this land acquisition was for enhancing drainage in the area and accommodating cemetery expansion. The proposed expansion area includes 900 Balmoral Avenue which will be integrated with the cemetery site as an area for land drainage enhancements and passive recreation uses. The proximity of 1200 Aberdeen Avenue is ideal for cemetery expansion and enables a seamless transition with the existing cemetery.

Nonetheless, the expansion site is encumbered: the site is included on Manitoba’s Designated Impacted Site. A Review and Risk Assessment was carried out by Burns Maendel in 2010 acting for the City, prior to the City securing the land. Part of the site is also a primary land drainage collection and flow through point for the City. Burns Maendel was retained by LEES+ Associates to carry out preliminary and conceptual drainage design for this project.

Public Open House

The consultants held a public open house and meetings with the following community stakeholders.

Community Stakeholders

Royal Canadian Legion
Army, Navy & Air Force Veterans in Canada
U.N. Peacekeepers
Brockie-Donovan Funeral & Cremation Services
Memories Chapel
Brandon Ministerial Association
Brandon Islamic Centre
Brandon Friendship Centre
Brandon Heritage Advisory Committee Representatives
City of Brandon Neighbourhood Representatives

Team Members

The City Administration members of the committee were:

City of Brandon Staff

Perry Roque, Director of Community Services
Sandy Jasper, Cemetery Administrator
Ted Snure, City Engineer

Consultant Team

Erik Lees, Principal, LEES+ Associates
Heidi Redman, Senior Associate, LEES+ Associates
Jennifer Thibert, Business Manager, LEES+ Associates
Ann Glas, Associate, LEES+ Associates

Daniel Burns, Principal, Burns Maendal Consulting Engineers Ltd.
Ryan Johnston, Engineer, Burns Maendal Consulting Engineers Ltd.
Corinne Robinson, Engineer, Burns Maendal Consulting Engineers Ltd.

This Cemetery Expansion Master Plan provides the City of Brandon with a roadmap to enhance land drainage in the area and to accommodate cemetery expansion. The Master Plan has been built on a rigorous review of demographic and industry trends and projections, in combination with a groundwater and soils investigation to inform cemetery and land drainage design on the site.

Key highlights from the Master Plan include recommendations for a land drainage plan to enhance surface drainage for the area and accommodate drainage needs for the cemetery, a phased program of expansion of new burial areas, ceremonial areas, and amenities at 1200 Aberdeen.

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CEMETERY EXPANSION MASTER PLAN**

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The priority capital projects for the next five years include implementation of the land drainage works, tree planting, and expansion of the Veterans' Precinct, followed by the first phase of cemetery expansion. The Master Plan report presents a suite of information and recommendations that in combination equips the City of Brandon with a plan for the future development of the cemetery to ensure there will be appropriate inventory and cemetery services to serve the needs of Brandon and area residents for years to come.

RECOMMENDATION:

That the City of Brandon Cemetery Expansion Master Plan, attached to the report of the Director of Community Services dated June 24, 2015, be adopted.



City of Brandon Cemetery Expansion Master Plan

July 8, 2015

Submitted by:



LEES+Associates
Landscape Architects and Planners



BURNS MAENDEL
CONSULTING ENGINEERS LTD.



E. Lees & Associates Consulting Ltd.

ACKNOWLEDGEMENTS

We would like to thank those who contributed to the creation of this Cemetery Expansion Master Plan:

CITY OF BRANDON STAFF

Perry Roque, Director of Community Services

Sandy Jasper, Cemetery Administrator

Ted Snure, City Engineer

COMMUNITY STAKEHOLDERS

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Corinne Robinson, Engineer, Burns Maendal Consulting Engineers Ltd.

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APPROVED BY: ERIK LEES

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1 INTRODUCTION

The City of Brandon commissioned LEES+Associates to prepare a Cemetery Expansion Master Plan including a thorough review of the existing cemetery lands and the expansion of the cemetery onto adjacent lands at 1200 Aberdeen Avenue and 900 Balmoral Avenue. The objective of this master plan report is to provide the City with a plan for the cemetery that will enhance land drainage capacity and accommodate cemetery expansion to serve the needs of the local community. The plan provides clear guidance for the City to continue providing quality cemetery services to Brandon and area residents for years to come.

1.1.1 REGIONAL CONTEXT

The City of Brandon was incorporated in 1882. Today as Manitoba's second largest city it is a progressive center and major hub for the surrounding agricultural area. The City population was 46,061 as of 2011 (Statistics Canada Census). The City is positioned on the banks of the Assiniboine River, with a generally flat and rolling terrain that lies within the prairie aspen parkland ecoregion.

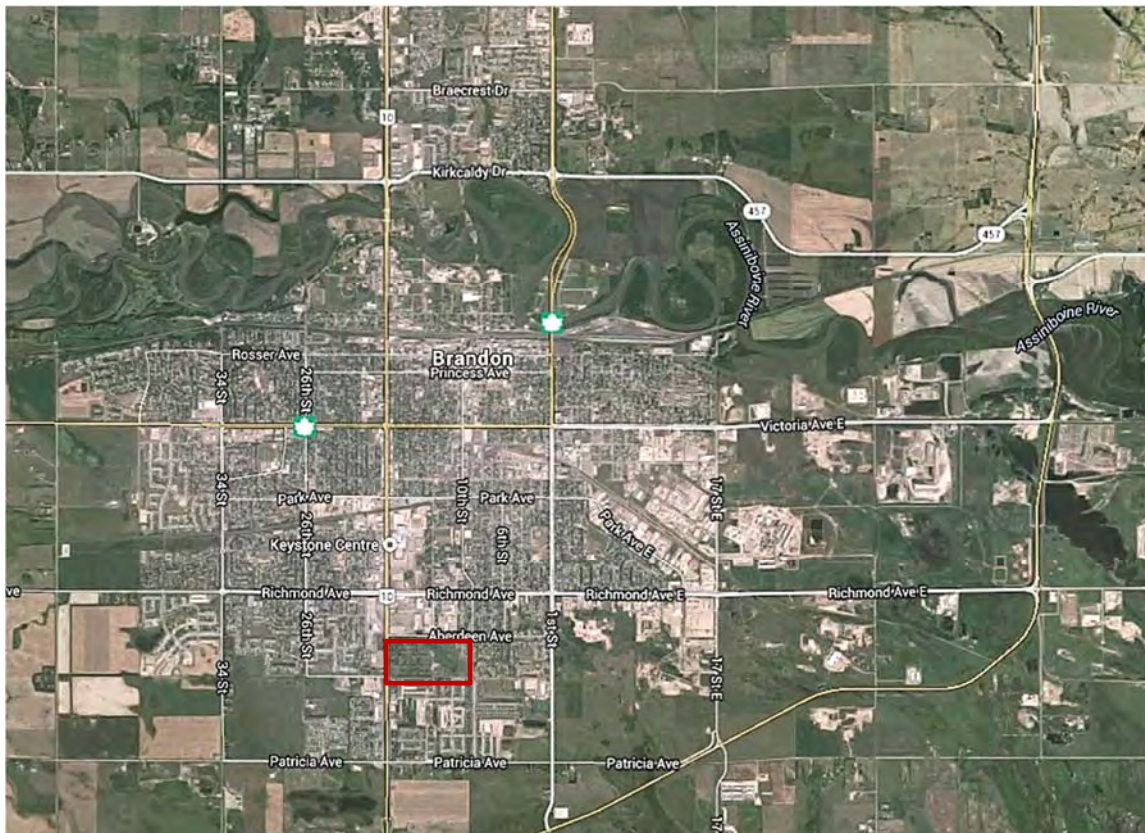


Figure 1. City of Brandon, Manitoba and Cemetery Site Location, Source: Google Earth.

1.1.2 CEMETERY SITE OVERVIEW

The Brandon Municipal Cemetery was established in 1882 as a Catholic Cemetery, and was acquired by the City in 1906. Today the cemetery is bordered on the west by 18th Street with Brandon Shopper's Mall and Bnai Israel Jewish Cemetery beyond. To the north the cemetery is bounded by Aberdeen Avenue with its shopping malls and industrial uses. To the south lies extensive residential development. Immediately east of the cemetery lies 1200 Aberdeen Avenue or the former Gulf / Conoco property.



Figure 2: City of Brandon Cemetery, Source: City of Brandon.

1.1.3 PROJECT SCOPE - CEMETERY EXPANSION

The Cemetery Needs Analysis (2000) and Cemetery Master Plan (2008) documents established the need for additional space and a range of interment options to serve City residents. To meet this need, the City has secured 1200 Aberdeen Avenue which adjoins the eastern boundary of the cemetery. The intent of this land acquisition was for enhancing drainage in the area and accommodating cemetery expansion. The proposed expansion area includes 900 Balmoral Avenue which will be integrated with the cemetery site as an area for land drainage enhancements and passive recreation uses.

The proximity of 1200 Aberdeen Avenue is ideal for cemetery expansion and enables a seamless transition from the existing cemetery. Nonetheless, the expansion site is encumbered: the site is included on Manitoba's Designated Impacted Site. Part of the site is also a primary land drainage collection and flow through point for the City. A Review and Risk Assessment was carried out by Burns Maendel in 2010 acting for the City. Burns Maendel was retained by LEES+Associates to carry out preliminary and conceptual drainage design for this project.

2 DEMOGRAPHIC AND TRENDS ANALYSIS

This chapter identifies the age, population, death and burial trends that affect cemetery land capacity and service options at the Brandon Cemetery.

2.1 DEMOGRAPHIC PROFILE

The graphs in this section provide an overview of the **age, religious and ethnic distribution** of the City of Brandon and Province.

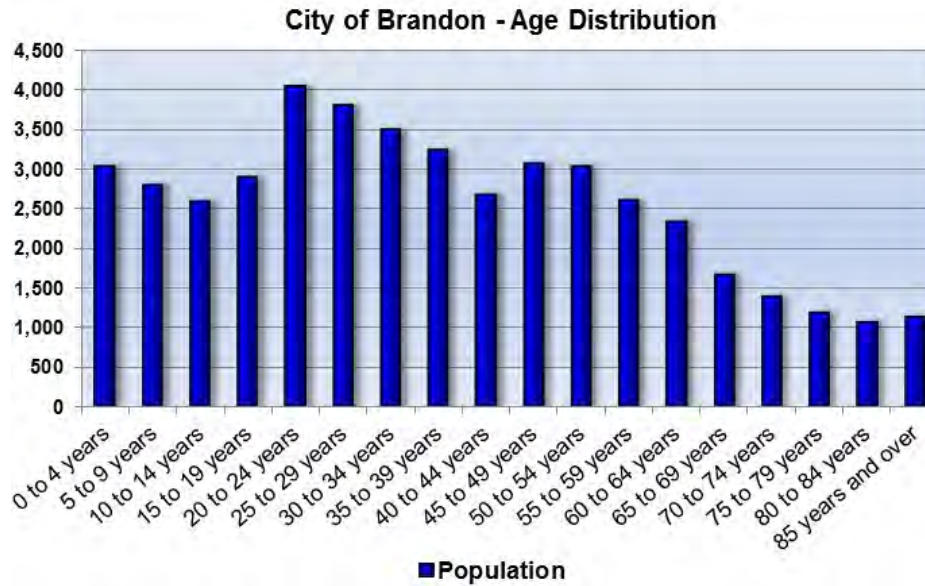


Figure 3: City of Brandon Age Distribution, Source: Statistics Canada, 2011 Census.

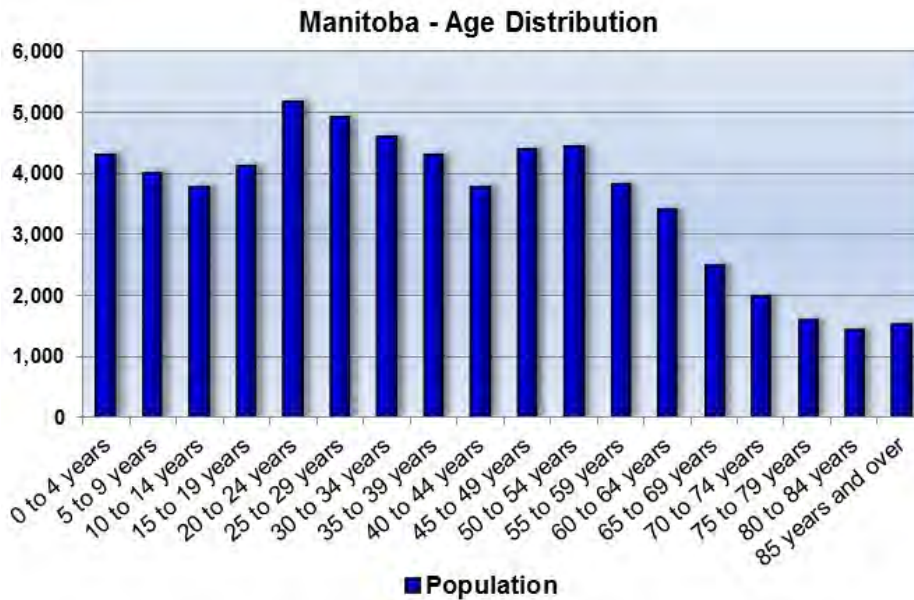


Figure 4: Province of Manitoba Distribution, Source: Statistics Canada, 2011 Census.

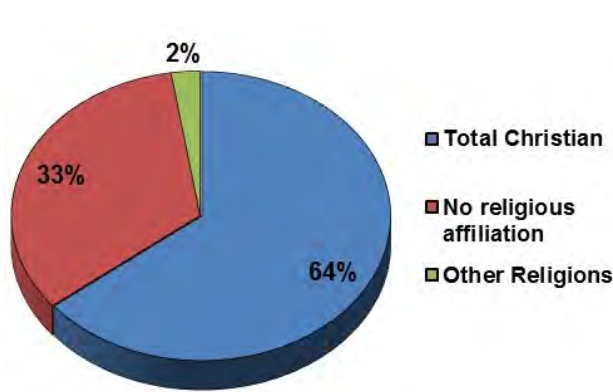


Figure 6: City of Brandon Religious Profile
Source: Statistics Canada, 2011 Census, National Household Survey.

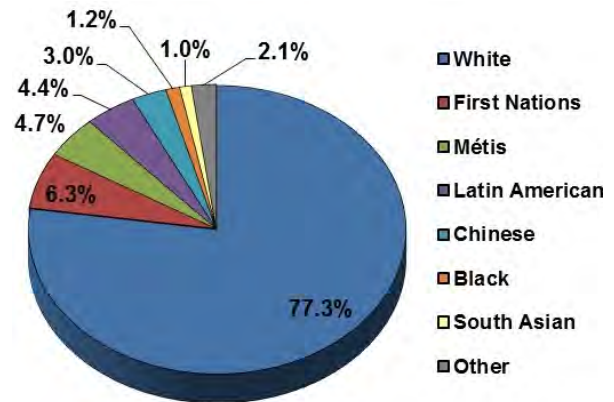


Figure 5: City of Brandon Ethnic Profile,
Source: Statistics Canada, 2011 Census, National Household Survey.

In summary:

- The median age in the City is 35.6 and in Manitoba is 36.4;
- Thirty-three percent of the City’s population does not have a religious affiliation;
- The most prevalent religion in the City is Christianity at 64%, and
- “Other religions” aside from Christianity include Muslim, Hindu and Jewish faiths.

According to the Manitoba Statistics Bureau, the City of Brandon’s **population growth rate** has been **1.7% per year** over the past decade, faster than the Provincial growth rate of 1.1%.

The City of Brandon’s **death rate** is assumed to be similar to the Province of Manitoba’s death rate of **8.2 deaths per 1,000 population**. Death rates have been decreasing slightly in the Province of Manitoba over the past decade.

2.2 DISPOSITION TRENDS

Disposition is the way in which human remains are transformed after the event of death, in preparation for any formal viewing or visitation, ritual, rite, service or ceremony. Final disposition in this analysis means the full casket burial or interment of the cremated remains.

Canadian disposition trends indicate that cremation is becoming the preferred option nationwide. The average rate of cremation in Canada has increased from 52% in 2003 to 66% in 2013, and is expected to continue to rise in most provinces (including Manitoba).

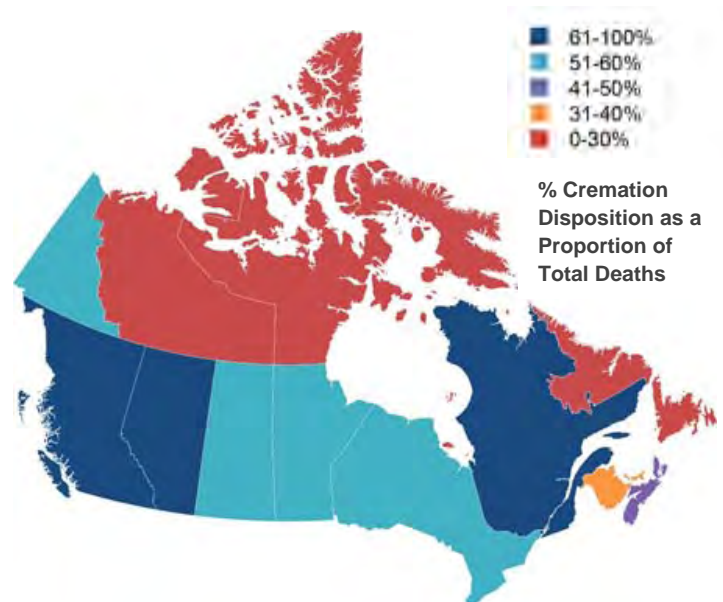


Figure 7: Canadian Rates of Cremation, Source: Cremation Association of North America, customized by LEES+Associates.

Historically, the average annual rate of cremation rate in Manitoba has been slightly below the average annual rate of cremation across Canada. The historic cremation rate in Manitoba was:

- **54%** in 2006;
- **61%** in 2011, and
- **63%** in 2014.

According to the Cremation Association of North America (CANA), cremation rates in Manitoba have historically been increasing by about 2% per year. CANA predicts that the rate of cremation in Manitoba will rise to **67% by 2018**.

In this Demographic and Trend Analysis, it is assumed that City of Brandon cremation rates are and will be the same as those in the Province of Manitoba as a whole.

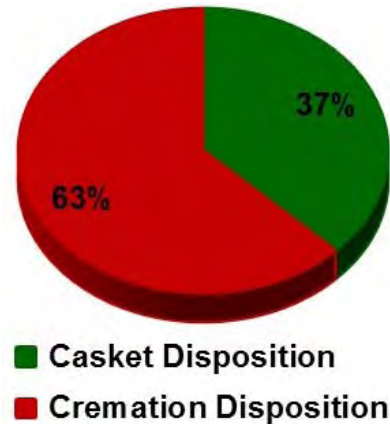


Figure 8: Proportion of Cremations versus Casket Burials in City of Brandon, Source: Cremation Association of North America.

2.3 BRANDON CEMETERY PRE-NEED SALES TRENDS

Families purchase a grave at the City Cemetery when a resident dies (“at-need”) or alternatively, residents may choose to purchase a grave before they die (“pre-need”.) This report uses interment and lot sales data from the City of Brandon Cemetery records.

From 2010 to 2014, the City of Brandon Cemetery accommodated:

- 649 interments of cremated remains;
- 226 lots sales for cremated remains;
- 338 interments of caskets, and
- 230 lot sales for caskets;

Therefore, from 2010 to 2014 the City of Brandon Cemetery experienced:

- An at-need to pre-need casket plot sales ratio of **1.00 : 1.08**, and
- An at-need to pre-need cremation plot sales ratio of **1.00 : 1.43**.

The City of Brandon at-need to pre-need plot sales ratios are **higher** than other Canadian municipal cemeteries. Municipal cemeteries with a non-aggressive marketing strategy and no dedicated sales representative, average a **1.00 : 0.50** ratio for at-need to pre-need sales. North American private operators generate up to **1.00 : 1.50** at-need to pre-need sales ratios, driven by significant investment and an aggressive approach to sales and marketing.

However, even with a high at-need to pre-need plot sales ratio, the number of interments (averaging 200 per year from 2010 to 2014) has still consistently exceeded the number of plot sales (averaging 90 per year from 2010 to 2014). This suggests the City of Brandon Cemetery has a large number of plots that have been sold but are not presently filled.

These pre-purchased plots at the City of Brandon can be expected to play a significant role in meeting the communities’ future interment need over the next 100 years and beyond.

2.4 HISTORIC COMMUNITY USE

The extent to which residents in an area choose to be buried in a local cemetery system is known as the market capture.

Canadian cemeteries (municipal and religious) generally experience the following standard **market capture rates** under conditions of low to medium competition intensity:

- **80-90%** of **casket** interments by all local cemeteries, and
- **10-20%** of **cremated remains** interments by all local cemeteries.

These rates are based on our firm’s experience and market research of Canadian cemeteries over the last 17 years. From 2010 to 2014, the City of Brandon Cemetery experienced:

- **43%** market capture of the community’s **casket burial**;
- **54%** market capture of the community’s **cremated remains interments**, and
- **50% total market capture** of all City of Brandon interments.

The following graph summarizes the City’s historic cemetery market.

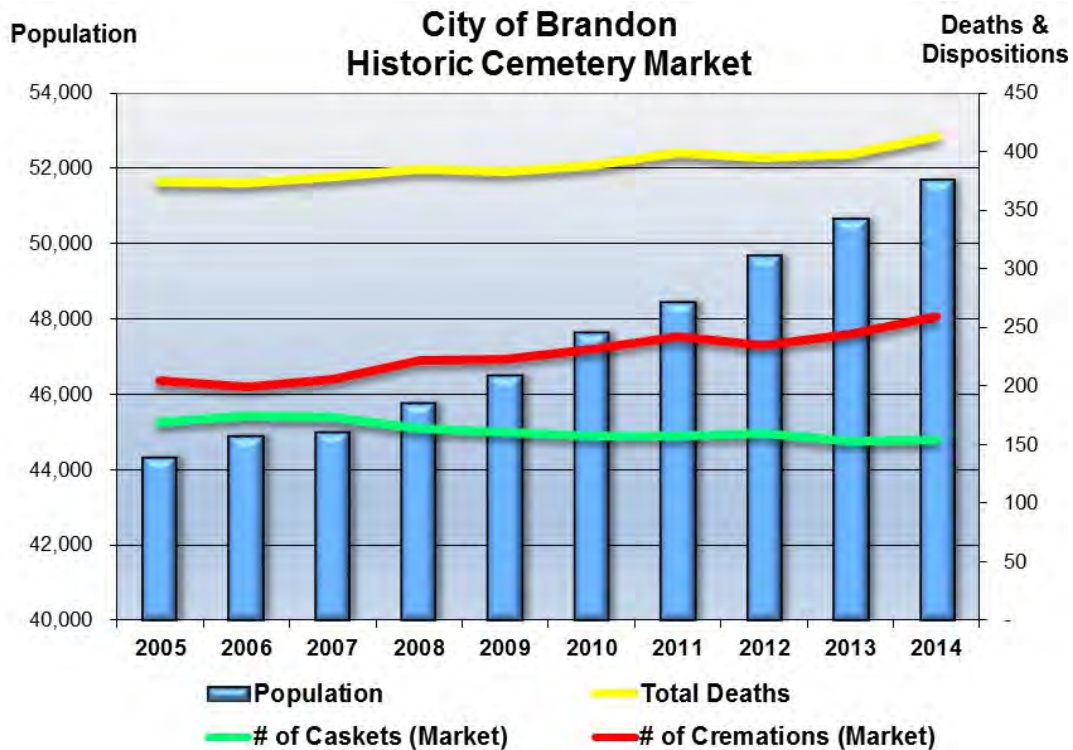


Figure 9: City of Brandon Historic Cemetery Market, Source: LEES+Associates.

The following graph summarizes the City’s historic cemetery market capture.

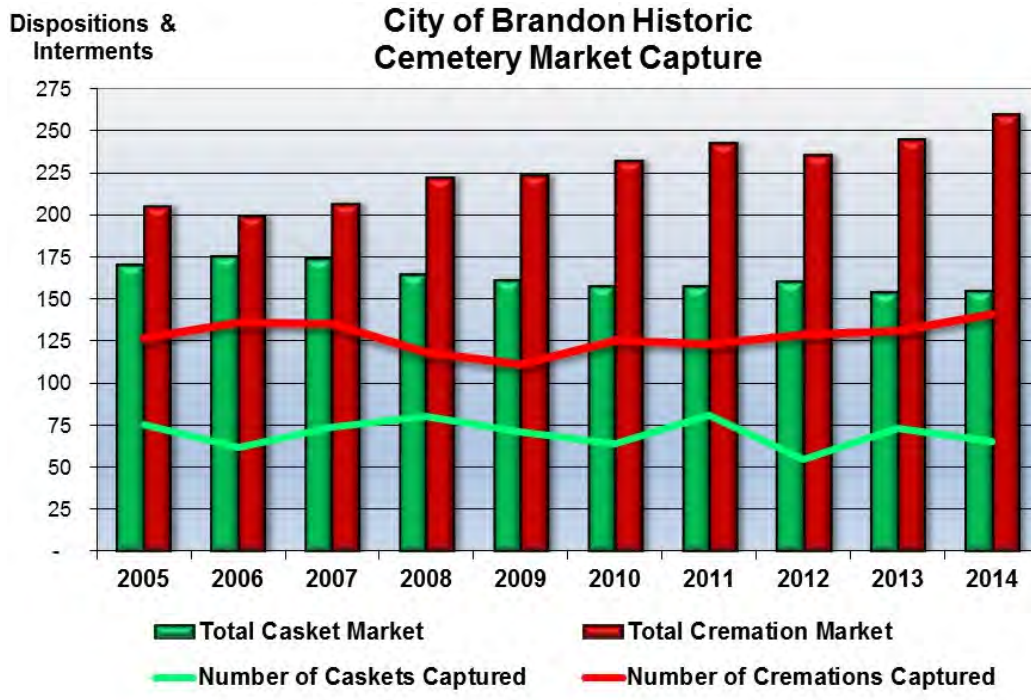


Figure 10: City of Brandon Historic Cemetery Market Capture, Source: LEES+Associates.

2.5 FUTURE COMMUNITY USE

If the historic rate of population growth continues, the City of Brandon will grow to 79,000 in 25 years.

As the large Baby Boomer generation (born from 1946 to 1964) dies, there will also be an increase in the City of Brandon’s death rate and a corresponding demand for funeral and cemetery services. The oldest Baby Boomer turned 68 in 2014.

In 2026, the first of the Boomers will reach 80 years, the anticipated average lifespan for this group. There will be an increase before this time, as those less fortunate in this cohort begin to die. Death rates will increase during the passing of the Baby Boomers, likely starting around 2018-20 and extending out to 2040-45.

Due to the passing of the Baby Boomer generation the average number of deaths per year in the City of Brandon is expected to rise from the historic **390 deaths per year** over the past decade, to a future **570 deaths per year** over the upcoming 25 year period, peaking at 688 deaths in 2039.

The following graph summarizes the future cemetery market expected for the City of Brandon Cemetery over the next 25 years.

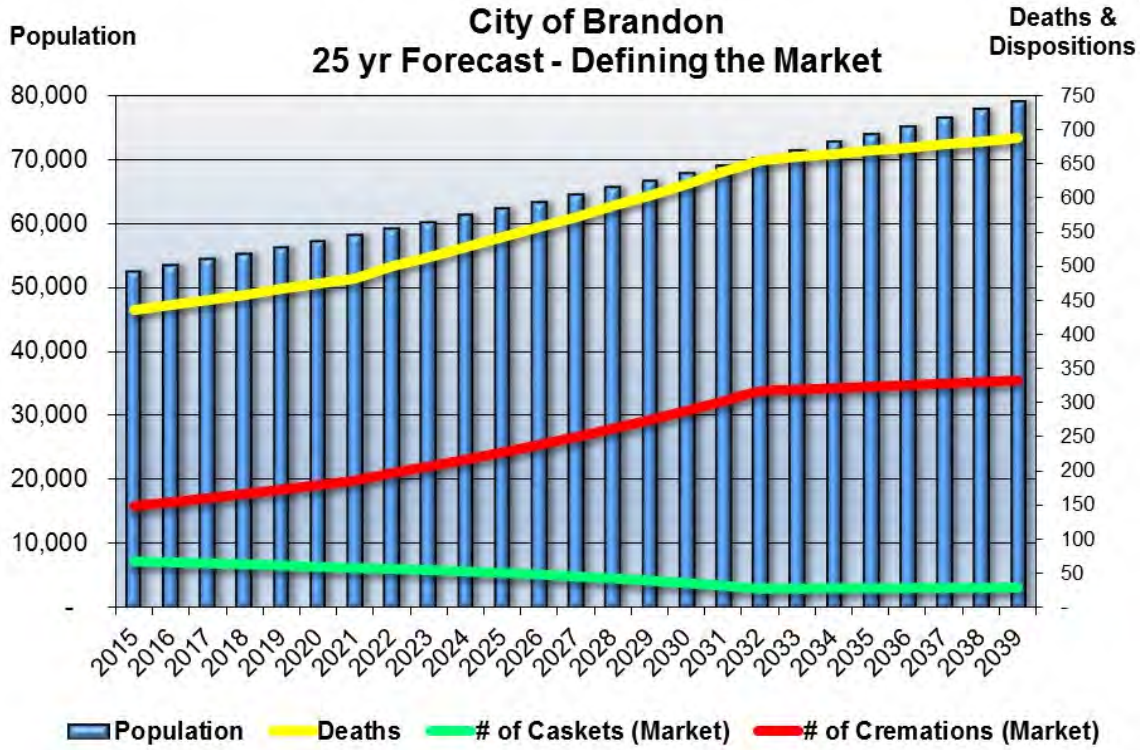


Figure 11: 25 Year Forecast of City of Brandon Deaths and Dispositions, Source: LEES+Associates.

The following graph summarizes the future cemetery interment activity that can be expected for the City of Brandon Cemetery over the next 25 years.

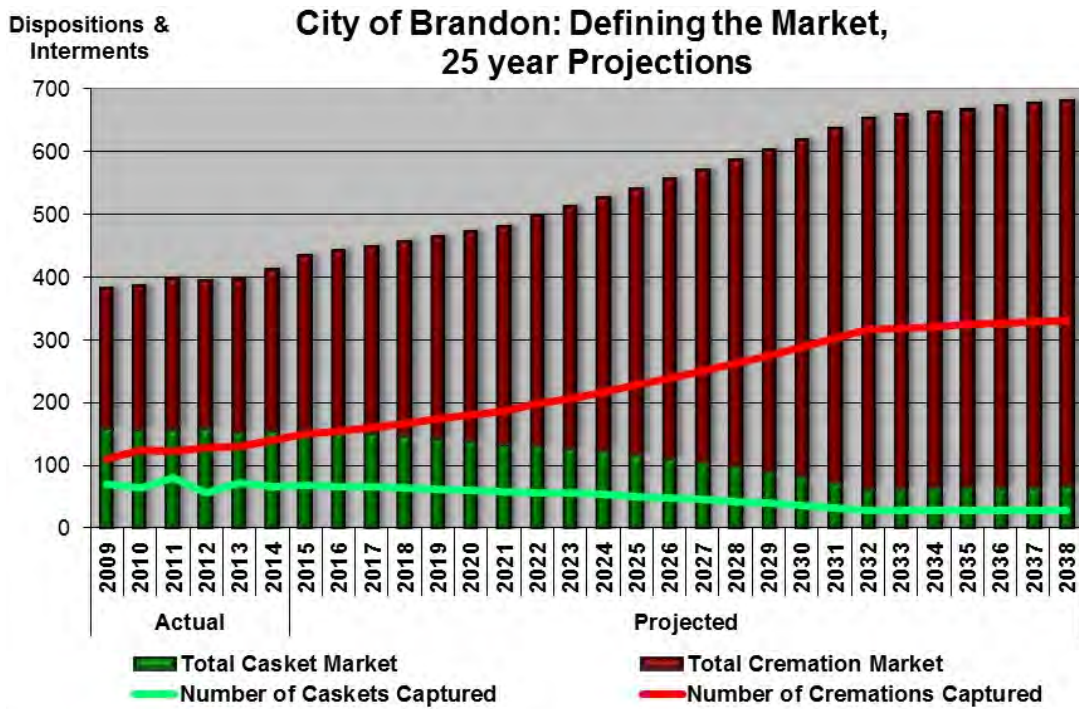
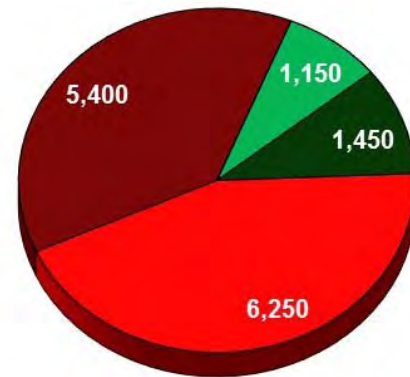


Figure 12: 25 Year Forecast of Cemetery Activity + Market Capture for the City of Brandon, Source: LEES+Associates.

The City can expect approximately 14,250 deaths in the municipality over the next 25 years. Of these deaths, 11,650 residents will choose cremation and 2,600 residents will choose traditional casket burial.

However, only 7,400 of these deaths are expected to be interred at the City of Brandon Cemetery over the next 25 years. Of these interments, 6,250 residents will inter cremated remains and 1,150 will choose traditional casket burial.

The adjacent graph identifies where the forecasted deaths are expected to be accommodated. Unregulated areas refers to the many different places or structures where an urn with cremated remains may be kept or scattered on non-sanctioned interment grounds.



- Caskets Captured by the City Cemetery
- Caskets Lost to Other Cemeteries
- Cremations Captured by the City Cemetery
- Cremations Lost to Unregulated Areas

Figure 13: Distribution of Deaths in the City of Brandon over 25 Years, Source: LEES+Associates.

2.6 KEY FINDINGS:

DEMOGRAPHIC + TRENDS ANALYSIS

Key findings that emerged from this analysis for the City of Brandon Cemetery include:

- The population in the City is growing steadily at a rate of about 1.7% per year;
- The City of Brandon population is only slightly younger than the Province of Manitoba as a whole, and is expected to have approximately the same death rate.
- The City of Brandon and Province of Manitoba have a slightly lower cremation rate than the average cremation rate across Canada. The rate of cremation is steadily increasing across the Province of Manitoba;
- The City of Brandon Cemetery casket market capture was below average compared to the industry standard market capture rate of casket burials from 2010 to 2014;
- The City of Brandon Cemetery cremation market capture was above average compared to the industry standard market capture rate of casket burials from 2010 to 2014;
- In the next 25 years, Brandon's death rate will increase to as high as 9.3 per 1,000, due to the passing of the large Baby Boomer generation. There will be approximately 14,250 deaths in the City of Brandon in this period;
- In the next 25 years, 2,600 deaths in Brandon will result in casket burial (18% of deaths), and 6,250 of these casket burials (54%) will be interred in the City Cemetery, and
- In the next 25 years, 11,650 deaths in Brandon will result in cremation (82% of deaths), and 1,150 of these cremations (44%) will be interred in the City Cemetery.

3 LAND NEEDS ANALYSIS

This chapter provides the City with direction on how it can meet the community's needs for burial and cemetery lot sales for the next 25 years. Questions addressed in this section are:

- What is the interment inventory in the existing developed sections of Brandon Municipal Cemetery?
- How long will the remaining, existing traditional in-ground casket and cremation grave and niche inventory serve the demand for these type of interments?
- How many additional traditional in-ground casket and cremation graves and niches are needed to meet the projected demand over the next 25 years?
- How much additional capacity could be developed (infilled) within the City's existing cemetery land? How much additional capacity could be developed within the City's cemetery expansion land parcel? and
- By developing additional capacity, how long can the City's cemetery provide traditional in-ground casket and cremation interment options?

This analysis assumes that community use and historic sales trends will not change and that the cemetery will continue to provide its existing products and services, with no changes to its offerings. Increasing the attractiveness of the cemetery through greater products and service diversity, marketing, community engagement; and customer service improvements would impact future community use of the City Cemetery, and subsequently could increase rate of land use.

3.1 SHORT TERM 5 YEAR FUTURE DEMAND

Assuming historical sales patterns do not change in the next 5 years, the City of Brandon Cemetery is expected to experience an **annual average** of:

- 68 casket burials per year;
- 46 casket plots sold per year;
- 130 cremated remains interred in niches and in-ground lots per year;
- 13 cremation plots sold per year, and
- 32 cremation niches sold per year.

Assuming historical sales patterns do not change over the next 5 years, the City of Brandon Cemetery is expected to experience a **total** of:

- 325 casket burials;
- 220 casket plots sold;
- 800 cremated remains interred;
- 80 cremation plots sold, and
- 200 cremation niches sold.

3.2 LONG TERM 25 YEAR FUTURE DEMAND VERSUS EXISTING INVENTORY

In the next 25 years, future demand patterns are expected to shift significantly as the increasing demand in cremation services becomes more accentuated.

The table below shows the existing inventory at the Brandon Cemetery before expansion, compared to the long term future need (expected plot sales and interment demand), and an estimate of time before existing inventory is entirely sold.

Cemetery Lot Type	Inventory Available for Sale	25 Year Interment Demand	25 Year Plot Sales Demand	Inventory Sales Time Remaining
Traditional Casket Lots	831	1,130	770	15 years
In-Ground Cremation Lots	219	1,810	635	10 years
Cremation Niches in Columbaria	491	4,435	1,540	10 years

Table 1: Comparison of Existing Inventory to Projected Demand at the Status Quo Market Capture Rate. Source: City of Brandon Cemetery Inventory Report and LEES+Associates' Demographic Analysis.

The inventory projection in the above table is correlated to plot sales demand. It is assumed that some plots will accommodate multiple interments and that some residents at the City of Brandon Cemetery will be interred in pre-purchased graves and niches that are no longer available for sale and are not included in the City of Brandon's existing cemetery report.

Based on historic trends from 2010 to 2014 and projected market changes, there are **10 to 15 years of inventory** remaining for both cremation and casket interment plots and niche sales.



Figure 14: Veteran Section 5 at the City of Brandon Cemetery, Source: LEES+Associates.

3.3 LONG TERM 25 YEAR FUTURE DEMAND VERSUS TOTAL NEW CAPACITY

Traditional in-ground casket and cremation burial capacity can be expanded by:

- Developing new lots in the acquired land parcel at 1200 Aberdeen Avenue, and
- Adopting an infill strategy within the existing developed Cemetery area.

The following tables identify the amount of new inventory anticipated on the acquired parcel of land at 1200 Aberdeen (Table 2), and from infill within the existing developed cemetery area (Table 3).

New Land Acquired	New Full-Sized Lots in Expansion Parcel	New Niches
10 hectares	7,600	1,150

Table 2: Expansion Lands – Potential Inventory Summary, Source: LEES+Associates.

Infill Opportunities	New Casket Lots	New Cremation Lots	New Niches
Veterans’ Precinct	80	500	200
Other In-fill	1,150	0	600

Table 3: Existing Cemetery In-fill – Potential Inventory Summary, Source: LEES+Associates.

Refer to drawing 5 in Appendix A for an illustration of the infill opportunities within the existing developed cemetery.

The table below shows the total projected inventory balance at the Brandon Cemetery (including existing lots, infill opportunities and the new inventory from the cemetery expansion) based on the proposed cemetery expansion design, compared to the long term future need (expected plot sales and interment demand), and an estimate of time before the inventory is entirely sold.

Cemetery Lot Type	Total Capacity	25 Year Interment Demand	25 Year Plot Sales Demand	Inventory Sales Life
Traditional Casket Lots (existing inventory and infill)	2,061	1,130	770	45 years
Cremation Lots (existing inventory and infill)	719	1,810	635	27 years
Cremation Niches in Columbaria (existing inventory and infill)	2,441	4,435	1,540	27 years
Expansion Lots (allocated to Casket/Cremation as needed)	7,600			100+ years

Table 4: Comparison of Total Capacity to Projected Demand at the Status Quo Market Capture Rate. Source: City of Brandon Cemetery Inventory Report and LEES+Associates’ Demographic Analysis.

Based on historic trends from 2010 to 2014 and projected market changes, after the cemetery’s expansion there will be more than 100 years of inventory for both cremation and casket

interment plots (assuming that some of the expansion lots are dedicated to meet the expected increase in cremation demand) and niche sales. This analysis assumes that in place of one full-sized casket lot, four dedicated cremation lots could be accommodated.

While the cemetery expansion lands are projected to serve the community for the next 100 years, the City should nonetheless ensure that future community plans include a provision for future cemetery space, as the community expands and develops and land pressures grow over time. This could include reclaiming lands with previous burials such as the old Brandon Mental Health Centre. Incorporating cemetery land planning into the long-term vision for the community will ensure that the community's needs are met when the expansion lands reaches capacity.



Figure 15. Cross of Sacrifice at the City of Brandon Cemetery (Source: LEES+Associates)

3.4 KEY FINDINGS: LAND NEEDS ANALYSIS

Key findings that emerged from this land needs analysis are that the City of Brandon Cemetery:

- Will sell all existing cremation lots and columbaria niches within about **10 years**;
- Will sell all existing traditional casket lots within about **15 years**;
- Will sell all cremation lots and columbaria niches developed through in-fill opportunities in the existing cemetery within about **27 years**,

- Will sell all traditional casket lots developed through in-fill opportunities in the existing cemetery within about **45 years**, and
- Will sell all lots within its total capacity (after expansion) in more than **100 years**.

3.5 RECOMMENDATIONS: LAND NEEDS ASSESSMENT

It is recommended that the City of Brandon:

- Develop infill opportunities on existing cemetery land;
- Develop burial plots on the acquired land parcel at 1200 Aberdeen Avenue as per the Cemetery Concept Plan in this report;
- Prioritize the development of additional cremation lot sites;
- Add and install new columbaria and other cremation interment options (scattering gardens, family vessels, etc.) to the City’s cemetery inventory. This will decrease the high demand and pressure on the use of land for the in-ground burial of cremated remains, and
- Ensure future community planning processes include a long-term vision for securing and retaining future land for cemetery purposes to ensure the community’s long-term needs are met when the existing site reaches capacity.

4 SITE ANALYSIS

On February 19, 2015, LEES+Associates, Burns Maendel and members of the City's Project Team visited the Brandon Cemetery and adjacent expansion lands. From this site analysis a series of opportunities and constraints for the development and enhancement of the cemetery were determined. Those key elements are as follows. The Site Analysis Plan accompanying this chapter is located in **Appendix A**.

4.1 OPPORTUNITIES

- There were several opportunities for casket and cremation infill identified during the site visit within the existing developed portions of the cemetery.
- The existing Veterans' gate now in disuse and neglected and could be refurbished and relocated to a more prominent location.
- Wayfinding at the cemetery could be improved through new entry signage on 18th Street, and improved section markers identifying burial areas in the cemetery.
- An escarpment separates the existing cemetery and expansion lands, providing views and topographic interest.
- Future road upgrades planned for Aberdeen Ave present an opportunity to create new secondary vehicle access to the expansion lands.
- While the existing cemetery office building remains adequate for Staff to perform their roles, it could be renovated with expanded washroom and family room to improve its function as the administrative headquarters and customer service hub of the cemetery.
- The existing material storage area is large and could be relocated and reduced in size while still serving the operational needs of the cemetery.

4.2 CONSTRAINTS

- The existing maintenance building is small and does not provide adequate heated space to store equipment in the winter. This means longer mobilization times, and equipment is often left running in winter months.
- An old crematorium on the cemetery site is no longer in operation and now utilized as a workshop and for storage. The building is worn but has been retained due to possible asbestos and the expense entailed with its removal.
- Industrial lands are located to the north of site, requiring buffering from noise and poor views.

- Significant portions of the expansion lands must be dedicated to drainage infrastructure in order to enhance surface water drainage in the area, and accommodate land drainage needs for the cemetery.
- The expansion lands will require grading and land sculpting to address shallow groundwater conditions in low lying areas to accommodate full depth burial.



Figure 16. Cemetery expansion lands at 1200 Aberdeen, looking towards the existing cemetery, (Source: LEES+Associates).

5 GROUNDWATER AND SOILS INVESTIGATION

This chapter will review the results of the groundwater drilling program conducted to determine the depth to groundwater throughout the proposed cemetery expansion lands. The investigative work will be used to select the best location for interment styles as well as during the design of drainage features.

5.1 PREVIOUS GROUNDWATER AND SOIL INVESTIGATIONS

Previous groundwater and soils investigations were completed by M.J. O’Conner & Associates (1985), AMEC (2002 & 2003), Golder Associates (2008), and BMCE (2010). As part of these studies several monitoring wells were established throughout the expansion lands for groundwater testing and measurements. The reports were reviewed with respect to historic groundwater readings for the proposed cemetery expansion lands. The groundwater readings were compared with measurements from our testing program and it was determined that they correlated with the results that were obtained. The direct comparison of the groundwater readings was difficult as various local datums were used and some of the wells were found to be missing or removed. Groundwater flow in all of the reports completed was determined to be in the southeasterly direction.

5.2 GROUNDWATER INVESTIGATION

In order to establish groundwater elevation throughout the properties at 1200 Aberdeen Ave and 900 Balmoral Ave, a groundwater exploration program was developed. BMCE first reviewed the existing survey of the property to identify the locations of the existing monitoring wells. Further review of the topographic survey included on drawing C1.1 in **Appendix B** also assisted in the strategic placement of additional boreholes to get a representative groundwater level throughout the site. Through discussions with the City of Brandon it was determined that two potential infill areas, Section 21 and the Veterans’ Section Expansion, have problems with high groundwater. BMCE reviewed both locations and determined that an additional monitoring well needed to be established in the Veterans’ Expansion Section to monitor groundwater conditions. The program consisted of reading the water levels in the nine (9) existing monitoring wells throughout the site and supplementing those readings with six (6) additional boreholes to provide a more comprehensive representation of groundwater levels throughout the cemetery expansion lands as well as the southwest corner of the existing cemetery. A site plan detailing the location of all existing monitoring wells and new bore holes is included on drawing C1.2 in **Appendix B**.

On March 16, 2015, Burns Maendel Consulting Engineers supervised the drilling of six (6) boreholes with five on the proposed expansion lands and one in the Veterans’ Expansion Section in the existing cemetery. The five holes on the proposed expansion lands were drilled until groundwater was encountered, while the one in the Veterans Expansion Section was drilled to a

depth of 2.70m. A monitoring well complete with a flush mount surface cap was installed on the well located in this section for ongoing monitoring.

Once drilling was completed a groundwater depth reading was recorded for each location. Subsequent measurements were taken on March 16, 2015 and March 17, 2015 to ensure that the groundwater levels in the holes had stabilized following the drilling. A summary of the groundwater measurements can be found in the table below. The detailed drill logs for each of the bore holes completed by BMCE have also been provided in **Appendix B**.

Monitoring Well / Bore Hole	Ground Elevation (m)	Groundwater Elevation (m)	Groundwater Depth Below Ground (m)
MW 1	392.98	391.07	1.91
MW 2	394.22	390.90	3.32
MW 3	392.06	390.33	1.73
MW 4	393.23	390.02	3.21
MW 5	395.73	392.25	3.48
MW 6	391.96	390.80	1.16
MW 8	391.52	390.09	1.44
MW 9	391.66	389.99	1.67
MW 10	391.48	389.85	1.63
BH 1	392.42	390.80	1.62
BH 2	391.93	390.64	1.29
BH 3	391.81	389.01	2.80
BH 4	392.84	390.72	2.12
BH 5	391.46	389.96	1.50
BH 6 (New MW)	397.96	396.66	1.30

Table 5: Summary of Groundwater Elevation Measurements from Site Investigation, Source: BMCE.

Due to the high ground water conditions and the proposed land drainage improvements, it was determined that an additional set of readings should be taken to determine the summer groundwater conditions. Monitoring well level readings were taken by the City of Brandon on June 5, 2015. The readings are shown in the table below.

Monitoring Well / Bore Hole	Ground Elevation (m)	Groundwater Elevation (m)	Groundwater Depth Below Ground (m)	Elevation change from Mar 17, 2015 (m)
MW 1	392.98	391.80	1.18	+0.73
MW 2	394.22	391.60	2.62	+0.70
MW 3	392.06	390.63	1.43	+0.30
MW 4	393.23	390.16	3.07	+0.14
MW 5	395.73	392.78	2.95	+0.53
MW 6	391.96	391.62	0.34	+0.82
MW 8	391.52	390.91	0.61	+0.83
MW 9	391.66	390.76	0.90	+0.77
MW 10	391.48	390.58	0.90	+0.73

Table 6: Summary of Groundwater Elevation Measurements, Source: City of Brandon.

The readings provided by the City of Brandon reveal groundwater levels which are significantly higher than measured on March 17, 2015. It is recommended that the City of Brandon continue to measure levels in these wells on at least a quarterly frequency moving forward to aid in the development of a final design which will be compatible with the high groundwater conditions and constructible in this area.

5.3 GROUNDWATER CONCLUSIONS

The results of the groundwater investigation correlate with previous reports which show groundwater flow in the southeasterly direction across the 1200 Aberdeen Ave and 900 Balmoral Ave properties. Generally in the low lying areas of the property, groundwater is very shallow and at a depth of down to 1.5m below the existing ground surface. The northeast corner of the property is higher ground and thus deeper to the groundwater level. It is recommended that ongoing monitoring of the groundwater levels on site be completed on at least a quarterly basis to develop a groundwater baseline to be utilized in final design of the drainage infrastructure.

A large portion of the proposed expansion may not be suitable for in ground full depth burial as groundwater levels are high. Burials of this type will need to be strategically placed on the site in order to reduce the chances of interferences with groundwater. During the planning and design for the retention pond and associated drainage infrastructure, groundwater will need to be taken into account. If a dry pond is desired then a separation of the pond bottom from the groundwater level will need to be maintained.

The potential infill areas located in Section 21 and the Veterans’ Expansion Section of the existing cemetery were also reviewed. It was determined that groundwater levels in both areas are shallow and remediation will be required to utilize the space for regular depth burials. One form of remediation would be to raise the existing ground surface up to provide the additional depth needed to accommodate the burials. The Veterans’ Expansion Section is the optimal location to expand

the Veterans' area that is currently almost at capacity. The drainage plan will address both of these areas and possible remediation measures to allow for utilization of existing lands.



Figure 17: Section 19, City of Brandon Cemetery, Source: LEES+Associates.

6 CEMETERY LAND DRAINAGE PLAN

The purpose of this section is to outline the master drainage plan for the proposed cemetery expansion lands as well as discuss possible options to remediate land currently unusable within the existing cemetery property due to high groundwater levels.

6.1 REVIEW EXISTING DOCUMENTATION

A previous report titled *City of Brandon Southeast Drainage Basin Stormwater Study* completed by UMA Engineering Ltd. in April 2003, and Addendum 1 in June 2005 are the guiding documents for the development of land drainage infrastructure in this area. The model of the stormwater systems for the southeast corner of Brandon has been evolving as the land has developed and has changed since this study was published. As such it will be important to review any proposed stormwater system changes with the most current model to ensure the proper functioning of the system.

6.2 DRAINAGE PLAN DEVELOPMENT

The purpose of the drainage plan is to provide a conceptual implementation of the drainage infrastructure as outlined in the original UMA report taking into account the restrictions of the site and the proposed expansion. Following a review of the original report and the associated addendum it was evident that the volume of the pond outlined in the model would not be feasible within the site. Through further discussions with the City of Brandon and their land drainage infrastructure modeling consultant, it was determined that the pond had been downsized to a more manageable volume during subsequent iterations of the model.

The City of Brandon intended for the retention pond to be located in the 900 Balmoral Ave property and extend into a linear pond along the existing low lying channel to the northwest. Due to the groundwater contamination present on site it was also determined that the pond should be designed as a dry pond to reduce the likelihood of contaminant transfer between ground and surface water. After a review of the groundwater level results it was determined that this pond would be very shallow and the desired volume of storage would no longer be attainable on the site. With these constraints the pond was designed to have the largest volume which could practically be contained within the Balmoral land.

6.3 RECOMMENDATIONS

The following items are recommended to be implemented as part of the Cemetery Master Plan:

- Establish a new retention pond located at 900 Balmoral Ave and extend to the northwest onto 1200 Aberdeen Ave;
- Regrade and provide proper drainage for the cemetery expansion;

- Install a land drainage sewer system along Aberdeen Avenue;
- Remediate and develop the Veterans' Section expansion of the existing cemetery;
- Remediate and redevelop Section 21 of the existing cemetery, and
- Install a land drainage sewer system along 10th Street and Balmoral Avenue.

The following sections will go into more detail and explanation for the recommendations made as part of the cemetery drainage for the Master Plan.

6.3.1 RETENTION POND

It is recommended that a new land drainage dry pond be established on the 900 Balmoral property and extend to the northwest along the existing low lying channel. The proposed pond is shown on drawing C1.3 in **Appendix C**. The pond is shallow with 7:1 side slopes and a dry bottom maintaining a minimum of 0.3m separation from groundwater levels as measured in March 2015. In order to increase the retention volume a 0.6m high berm was built up around the perimeter of the pond in order to maintain a 0.6m freeboard. A conceptual cross section through the pond has been included on drawing C3.1 in **Appendix C**.

The linear channel shown meandering to the northwest was designed with a 10.0m wide bottom with a maximum of 7:1 side slopes. This channel originates at the new land drainage outfall structure which is the termination point of the Aberdeen Avenue land drainage system. The channel is connected to the pond with a culvert under the west berm. The culvert connection provides means to cross under the existing Manitoba Hydro buried power line that is along the western side of the Balmoral parcel. A conceptual cross section of the proposed channel has been included on drawing C3.1 in **Appendix C**.

The proposed pond and linear channel will back up to a high water level of 391.50m and have a maximum water surface area as shown in blue on drawing C1.3 in **Appendix C**. At the high water level the total storage provided by the detention areas is approximately 14,700m³. An emergency overflow would be provided in the berm in the southeast corner to prevent uncontrolled overtopping of the perimeter berms in the extreme events.

The conceptual design was developed by maximizing the amount of storage available on the site while taking into account groundwater levels, buried utilities, and other boundary conditions. Verification of the proposed retention pond system was completed by Tetra Tech WEI Inc., the engineering consultant retained by the City of Brandon to model the land drainage system in this area. A draft analysis and modeling report was completed and is included in **Appendix H**. Conceptual modeling completed at this stage in the design does demonstrate improvement of conditions within the system compared to the current infrastructure, however the system is unable to attain the level of service originally anticipated in the Southeast Drainage Master Plan. Further analysis, optimization, and modeling will need to be completed throughout the preliminary and final design stages prior to construction of this infrastructure.

The total material to be excavated during the construction of the pond is approximately 16,500 m³ with 1,300 m³ being placed and compacted into the perimeter berm, and the remaining 15,200m³

becoming common fill in the low area in the northwest corner of the expansion lands. The quantities are based on a conceptual surface model for the pond excavation and a common fill up to 393.5m in the low area. These quantities would need to be refined and confirmed prior to final design and construction.

The pond is proposed to be constructed as Phase 1 of the cemetery expansion. The City of Brandon has identified land drainage infrastructure in this area as a high priority item that needs to be addressed as soon as possible. It is important to note that other recommendations such as the installation of the Aberdeen land drainage sewer and the filling of the low area in the northwest corner of the proposed expansion lands should be completed simultaneously with the pond construction to utilize available fill and implement the complete drainage system to service the area.

6.3.2 CEMETERY EXPANSION GRADING

During the expansion of the cemetery, grading will need to be completed in order to maintain proper drainage throughout the site. Grading will be ongoing throughout all phases of the cemetery development. In general all grading of the proposed expansion lands will promote positive drainage to the new retention pond and drainage channel established in Phase 1. It is recommended that a grading plan with design grades form an integral part of any construction activities as part of the cemetery expansion. Maintaining proper grades throughout all stages of planning, design and construction will reduce any future drainage problems.

6.3.3 LAND DRAINAGE SEWER – ABERDEEN AVENUE

It is recommended that a land drainage sewer along Aberdeen Avenue be installed as was originally proposed by UMA in their report to service the lands immediately north of Aberdeen Ave between 18th Street and 10th Street. This system would connect to an existing culvert acting as an outlet for the retention pond by the Sobeys store and also convey flows from the culvert at the 13th Street intersection. The implementation of this system would also allow the flows to be piped to a new outlet structure. The conceptual layout of the system is shown on drawing C1.3 in **Appendix C**. By piping the water underground instead of utilizing drainage swales, additional land can be reclaimed for cemetery use. As well, the low lying area where these flows currently pass through in the northwest corner of the expansion site can be backfilled to sufficient depth to provide additional lands for cemetery development.

The installation of the land drainage sewer along Aberdeen also will allow for the installation of a new catch basin as part of the Section 21 redevelopment to improve drainage in that area. Once this system is installed in Aberdeen Avenue, any future development of this street into a full urban section would be easily implemented.

It is recommended that the Aberdeen Avenue land drainage system be included in the Phase 1 of the cemetery expansion so that it can be completed with the construction of the retention pond and the linear channel.

6.3.4 VETERANS' SECTION EXPANSION

Currently the grassed area south of the Veterans' Section (Section 32) has not been utilized due to high groundwater conditions in the area. The groundwater in this area is currently at an

approximate depth of 1.3m from ground surface. There are two options for the development of this section with one being a cremation only area and the other being regular depth casket burials.

For the section to be utilized for cremation burials it would require a minimum depth to groundwater of approximately 1.0m. Since groundwater is at a greater depth than that currently, the section is already suitable for expansion of the Veterans' Section if only cremation burials are permitted.

In order for regular depth casket burials to be accommodated within this section several measures will need to be implemented. It is recommended that an underdrain system be installed in this section at an approximate elevation of 396.25m which would potentially lower the groundwater within this section by approximately 0.40m. Following a review of the existing grading on the site it was determined that the section could be filled and raised approximately 0.3m to 0.9m and regraded to drain to the north. To accommodate the new drainage pattern and to drain the underdrain system a new land drainage system extension as shown on drawing C1.3 in **Appendix C** will need to be installed. Conceptually these improvements could increase the depth to groundwater in this section to approximately 1.9m or more below the ground surface. Final design of this proposed concept to confirm its feasibility will need to be completed prior to construction.

Due to the need for Veterans' space within the cemetery, it is recommended that if the City chooses to proceed with regular depth casket burials that the Veterans' Section Expansion be part of the Phase 1 drainage works in the Cemetery Master Plan.

6.3.5 SECTION 21 REDEVELOPMENT

Section 21 of the existing cemetery is located in the northeast corner adjacent to the service entrance along Aberdeen Avenue. Currently only the southwest corner of this section is utilized where the ground surface is at the highest elevation. The remaining portion experiences high groundwater levels and surface water drainage challenges which discourage its use. In order to redevelop this area for use it is proposed to raise the unsold plot areas up with fill material. By building up this section with fill it would provide additional separation from the high groundwater levels and an opportunity to improve the land drainage characteristics of this area. This fill material could be borrowed from the construction of the new retention pond located on the proposed expansion lands.

A culvert is located adjacent section 21 which crosses the cemetery's Aberdeen entrance and drains to the existing surface water flow path. As part of the proposed site grading it has been recommended that the low lying area and ditches be filled on the eastern side of the Aberdeen entrance as part of Phase 1. A new land drainage system for this area would need to be developed in order to convey flows currently passed through the culvert. It is proposed that a catch basin be installed in this area and connected to the proposed land drainage system to be installed under Aberdeen Avenue also proposed to occur as part of Phase 1. A conceptual plan for proposed land drainage system and fill areas has been provided on drawing C1.3 in **Appendix C**. The ability to move this catch basin would also allow additional flexibility during the final design of the grading and surface drainage features in this area of the cemetery.

6.3.6 LAND DRAINAGE SEWER – 10TH STREET AND BALMORAL AVENUE

Land drainage sewer installation along 10th Street and Balmoral Avenue was identified as an improvement in the UMA report to alleviate problems in the area with the existing surface drainage infrastructure. During the stakeholders consultation with the community members these areas were also identified as problem areas which the area residents were concerned with.

It is recommended that as part of the implementation of the storm water retention pond in the Balmoral Avenue property that a land drainage sewer be established as per the recommendations and concepts contained in the Southeast Drainage Master Plan. A conceptual layout of these improvements has been included on drawing C1.3 in **Appendix C** in the immediate vicinity of the proposed pond to demonstrate continuity between the Cemetery and Southeast Drainage Master Plans.

7 CEMETERY EXPANSION PLAN

This chapter outlines the key recommendations for optimization of the existing cemetery lands as well as proposed features for the cemetery expansion onto the land at 1200 Aberdeen Ave. Drawings illustrating the proposed cemetery concept and key features are included in **Appendix A**. This chapter is organized under the following headings:

- Existing Cemetery & Infill
- Cemetery Expansion
- Operational Components

7.1 EXISTING CEMETERY & INFILL

The existing cemetery has several opportunities for infill of additional burial plots, as well as enhanced wayfinding to improve the visitor experience. The following sections go into more detail and explanation of the recommendations to optimize the existing cemetery lands.

7.1.1 VETERANS' SECTION EXPANSION

It is recommended that the existing Veterans War Cemetery be enhanced and expanded into a "Veterans' Precinct." This would include enhancement of the area around the cross of sacrifice for ceremonies including refurbishment and relocation of the existing Veterans' gate to form the entrance of the processional route to the cenotaph. The enhanced processional route will retain existing trees and provide a defined walking path to accommodate processions of three abreast. New interment options proposed include casket infill to the grassed area northwest of the cenotaph currently used for marshalling on Decoration Day. This area would provide casket interment for up to 80 plots. Infill to the area south of Section 32 is also recommended, as an in-ground cremation only section, or with some casket interment pending implementation of an underdrain system and regarding as described in Section 6.3.4. The creation of a cremation walk with Veterans' columbaria lining the processional route to the cenotaph is also proposed. A conceptual cross section through the Veteran's Section Expansion (south of Section 32) is included on drawing 3 in **Appendix A**. A concept plan illustrating the proposed Veterans' Precinct is shown on drawing 5 in **Appendix A**.

7.1.2 OTHER INFILL AREAS

Other potential areas for infill in the existing developed sections of the cemetery include:

- The redevelopment of Section 21 – this will require further detail design and drainage improvements described in section 6.3.5.
- Expansion of casket interment into the area east of Section 51. This could be undertaken immediately as test pits undertaken by City Staff have confirmed digable soils in this location.

- The existing materials storage area could be converted to an in-ground burial area over time pending a soil assessment to confirm soils are adequate for casket interment.
- Unused plots in the existing lawn section (Section 52) could be re-assigned to accommodate upright markers.
- A renovation of the customer service precinct (discussed in section 7.3.2) could include infill of columbaria units through the design of a cremation garden east of the Cemetery Office, and expansion of the existing columbaria plaza to build on the success of the existing columbaria units. Potential areas for infill are noted on drawing 5 in **Appendix A**.

7.1.3 WAYFINDING

Wayfinding to and within the cemetery could be enhanced by locating a new highly visible entry sign on 18th Street, locating maps and cemetery information in a wayfinding kiosk near the main entrance, and installing consistent and well defined section markers throughout the cemetery. Locating bollards at the entrance to all City trails within the cemetery would help identify these as “pedestrian/bike only” pathways and prevent vehicles from accessing these routes.

7.2 CEMETERY EXPANSION

The following sections describe key recommendations for new burial, amenity and landscape areas designed for the expansion of the cemetery onto the lands at 1200 Aberdeen Ave.

7.2.1 CENTRAL GATHERING SPACE

The central gathering space will provide a multi-functional space for both quiet reflection and outdoor ceremonies. The circular shape reflects the traditions of the local aboriginal community, while grassed amphitheatre seating built into a berm provides seating. Informal and formal community and cemetery events could also be held in this space, as a way of further integrating the cemetery as an important open space within the City. The central gathering space will include a memorial wall for commemoration of community heroes either integrated as a berm/retaining wall feature or as part of the open air pavilion. A conceptual cross section through the central gathering space, pavilion and pond has been included on drawing 3 in **Appendix A**.

7.2.2 OPEN AIR PAVILION

An open air pavilion is proposed to be integrated into the central gathering space in order to increase use of the space throughout the seasons. The pavilion would be a key feature of the cemetery expansion acting as a flexible, non-denominational space that could be used for quiet reflection, passive recreation, events, pipe ceremonies or as an outdoor chapel.

7.2.3 MUSLIM SECTION

There is demand from within the Muslim community in Brandon for interment options that require some burial areas to have specific characteristics not currently available at the Brandon Cemetery or at other cemeteries in the area. This includes a designated area, or areas, where graves are oriented to the northeast towards mecca. Development of a Muslim burial area is recommended

as part of the cemetery expansion to facilitate and respect the particular interment practices of the Muslim community. The Muslim section should include an initial 25 plots for traditional casket interment, with future expansion pending need. The proposed Muslim section is located in the Phase 1 expansion area.

7.2.4 GREEN BURIAL AREA

Green burial (also known as “natural burial,” “country burial” and “woodland burial”) is emerging as a new, full body interment option that the City of Brandon should consider. While green burial represents a small portion of the overall market in Canada, trends indicate demand is increasing. Feedback from the funeral directors and faith groups suggests there is a growing interest in green burial in Brandon. On the Public Open House questionnaire 74% of respondents indicated they would consider green burial if it were made available at the Brandon Cemetery. The recently established Green Burial Society of Canada (GBSC) has a growing membership participating in the Green Burial Council certification system.

Generally, green burial is defined as traditional earth burial incorporating at least two of the following elements: no embalming; use of a simple casket or shroud; does not include use of concrete grave liners; simple memorialization, and some aspect of habitat or ecosystem enhancement.

The existing copse of trees in the southern section of the expansion lands provides an ideal location for a green burial section as part of the cemetery expansion. It is recommended that the City commit to developing 12 to 25 plots in this section initially, with expansion as demand for this type of interment grows. Additional information on green burial is provided in **Appendix G**.

7.2.5 CHILDREN’S PLAY

It is recommended that the space between the central gathering area and the retention pond be allocated for development of a children’s play area. The play area would have an emphasis on nature play elements such as boulders, sand, logs, berms and other natural climbing features rather than traditional play structures. Located at the edge of the cemetery expansion lands, the play area would be adjacent to the new retention pond providing opportunities for passive and active recreation for the neighbouring community.

7.2.6 CREMATION WALK

A cremation walk is proposed in the expansion area along the base of the existing escarpment. The cremation walk would include a range of interment options for cremated remains including in-ground cremation plots, family vessels, community columbaria and family columbaria. A conceptual cross section through the cremation walk has been included on drawing 3 in **Appendix A**.

7.2.7 CREMATION GARDENS

It is recommended that cremation gardens be developed in each phase of the cemetery expansion in order to accommodate the rising cremation rate, and the growing consumer demand for a variety of cremation options. Key locations for future cremation gardens include along the cremation walk, east of the central gathering space, and within the renovated customer service precinct. Cremation

gardens typically include a variety of cremation interment including options such as community and family columbaria, and family vessels. In-ground cremation interment should be prioritized in sections of the cemetery expansion identified as having high groundwater, and not appropriate for casket interment.

7.2.8 MEMORIAL GROVE

A memorial grove is proposed in the northwest section of the expansion lands adjacent to Aberdeen Ave. This section was identified as area of concern in previous environmental studies as is unsuitable for in-ground burial. The memorial grove will provide an opportunity for families to commemorate or memorialize a loved one through sponsorship of a memorial tree, as well as areas for scattering ashes. A conceptual cross section through the memorial grove has been included on drawing 3 in **Appendix A**.

7.2.9 FIELD OF HONOUR

The Field of Honour provides an area for future interment of Veterans after the expanded Veterans' Precinct reaches capacity. It is recommended that further consultation with the Veterans' groups take place prior to detailed design and construction in order to determine the future needs of the Veterans' in this area for amenities such as flag poles, processional routes, or other ceremonial features.

7.2.10 PERIMETER STRATEGY

A double row of trees is proposed along Aberdeen Ave as well as along the eastern boundary of 1200 Aberdeen Ave in order to reinforce the cemetery boundary and provide a visual buffer to adjacent land uses. In addition, a gently sloped, grassed earth berm of 2-3m is proposed to both visually screen and mitigate noise from industrial activities along this stretch of Aberdeen Ave. A perimeter fence for the cemetery is not recommended, and was not identified as a priority in the consultation sessions. A treed perimeter will control views into the cemetery, and allow for "eyes on the cemetery" increasing safety.

7.2.11 PLANTING

A tree planting program is recommended as one of the highest Phase 1 priorities in order to establish a canopy of trees as early as possible on the expansion lands. The establishment of mature trees on the expansion lands will serve to enhance the attractiveness and comfort of the new site to families and visitors. It is recommended that the existing escarpment be vegetated with naturalized plantings to stabilize and enhance the escarpment as an aesthetic but low maintenance feature. Planting of trees and horticultural features was identified during the stakeholder interviews and Public Open House as one of the top features to be prioritized in the expansion plan.

7.2.12 ACCESS AND CIRCULATION

A hierarchy of circulation routes is proposed for the expansion lands including: primary two-way vehicular roads, secondary access roads, and trails. Two new vehicular access points off Aberdeen Ave are proposed to access the expansion lands at 1200 Aberdeen – one of these is proposed as a gate controlled access for service and maintenance vehicles only, and the second is proposed

as new secondary entrance to the cemetery. The existing unimproved lane in the northeast corner of the site will remain as a back lane providing access to the Manitoba Hydro power lines.

A conceptual diagram illustrating proposed access and circulation through the expansion lands has been included on drawing 4 in **Appendix A**.

7.2.13 FUNERAL PROCESSIONS

Based on the site review and stakeholder feedback it is recommended that the main entrance off 18th Street and central roadway leading east to the cemetery office remain as the main processional route through the cemetery. This beautiful tree lined roadway provides a strong sense of arrival and allows for a decompression as visitors enter the cemetery. This central roadway is proposed to extend east into the expansion lands acting as the main spine of the cemetery. A conceptual diagram illustrating the proposed funeral processional route through the expansion lands has been included on drawing 4 in **Appendix A**.

7.2.14 TRAILS

A network of trails is proposed throughout the expansion lands to provide pedestrian connectivity as well as passive and active recreation opportunities in the cemetery. The trails will provide a connection from Magnolia Drive to Aberdeen Ave along the drainage channel, formalizing an existing demand line on the 1200 Aberdeen lands and integrating with the trail network proposed in the City of Brandon Green Space Master Plan. At the Public Open House walking trails were identified as one of the top three features desired as part of the cemetery expansion. Conceptual cross sections through the proposed drainage channel, trail, and pond perimeter trail are included on drawing 3 in **Appendix A**.

7.3 OPERATIONAL COMPONENTS

7.3.1 RELOCATED WORKS YARD

The existing maintenance building should be expanded in the short term, and replaced in the longer term with a larger facility that will better meet the needs of the operational crews. A maintenance building with a three-bay garage is recommended in order to provide storage for a truck, loader and lawn mowers, as well as centralized materials storage. As part of the cemetery expansion the works yard should be relocated closer to Aberdeen Avenue in order to facilitate access for large vehicles and trucks delivering soil and other materials to the cemetery. Further confirmation of contamination levels in the northwest corner of the 1200 Aberdeen property should be undertaken prior to confirming the exact location for the new works yard. It is recommended that the relocated works yard include a materials storage area reduced from its current size and screened from view. The City should plan for the long-term demolition of the old crematorium building once a new works yard is constructed.

7.3.2 CUSTOMER SERVICE PRECINCT

A customer service precinct should be developed to include a renovated Cemetery Office where Staff can better receive pre-need customers or bereaved families. As part of the office renovation

the City could consider the addition of an indoor columbarium, pending a business case to confirm local interest and demand for this form of interment. The customer service precinct would also include the development of a contemplative outdoor space and cremation garden east of the Cemetery Office capitalizing on views towards 1200 Aberdeen, and an expansion of the existing columbaria plaza to build on the success of the existing columbaria units.

7.4 RECOMMENDATIONS

The following is a summary of recommendations to be implemented as part of the cemetery expansion plan.

7.4.1 EXISTING CEMETERY LANDS

- Enhance the Veterans' Precinct to include a processional route to the cenotaph and an expansion of casket and cremation interment capacity in the Veterans' section.
- Develop infill within the existing cemetery lands including the redevelopment of Section 21, and traditional casket interment to the area east of Section 52.
- Enhance wayfinding in the cemetery with a new entrance sign on 18th Street, a wayfinding kiosk, and integrated section markers across the site.

7.4.2 CEMETERY EXPANSION

- Develop a range of cremated remains interment options in the cemetery expansion including a scattering garden, cremation walk and cremation gardens.
- Expand the range of in-ground casket interment options provided at the cemetery to include a Muslim section, a green burial section.
- Provide new options for memorialization including a memorial wall and a memorial grove.
- Provide passive recreation opportunities in the cemetery expansion through construction of trails and a children's nature play area.
- Enhance the cemetery expansion lands through planting of trees and horticultural features.

7.4.3 OPERATIONAL COMPONENTS

- Relocate the works yard in proximity to the Aberdeen Ave entrance, to include a maintenance building with a 3 bay garage and a materials storage area.
- Create a customer service precinct including a renovated cemetery office, contemplative cremation garden and expanded columbaria plaza.
- Demolish the existing crematorium building currently used for storage.

8 CEMETERY BYLAW REVIEW

8.1 METHODOLOGY

Our team has reviewed the City of Brandon Cemetery Bylaw No. 6632 in conjunction with the Manitoba Cemeteries Act (C.C.S.M.c.C30) and the relevant Provincial Regulations.

8.1.1 KEY FINDINGS

The existing Cemetery Bylaw, now 15 years old, is no longer meeting today’s burial needs and customer care. While some sections of the bylaw are adequate, many areas require clarification and expansion to meet the needs of the community and ensure compliance with the current Manitoba legislation, which was last updated in 2013.

The City should prioritize comprehensive revisions to the bylaw on the following issues in order to meet the current needs of the community and to address future growth, cultural and burial practices. This will improve customer service and prevent potential misunderstandings between the City, the families, Veterans, suppliers, funeral directors and other community partners in the future.

8.1.2 INTRODUCTION

The Introduction Section should be expanded to provide clarity around the purpose of the bylaw. By stating that the bylaw is in accordance with all of the Provincial acts, listed at the beginning of the bylaw, all references to “in accordance (or pursuant) to the Cemeteries Act” can be removed.

8.1.3 DEFINITIONS

The City should consider updating and expanding the Definitions Section of the bylaw for further clarity and enhanced communication with the community with respect to cemetery and funeral industry terminologies.

An updated Definitions Section will provide a more user friendly, concise and clear interpretation of the bylaw, by linking the wording of the Provincial Cemeteries Act and its definitions to the common terms used by the cemeteries and its administration.

8.1.4 OWNERSHIP PRIORITY

The bylaw should include a guideline with regard to ownership priorities or designated next of kin – this information is necessary to establish legal rights as generations pass and family members come to the Cemetery to use/reuse family owned interment sites.

8.1.5 ENFORCEMENT

Clarity around enforcement of the bylaw should be provided through addition of Enforcement Sections which describe enforcement of the Rules and Regulations of the Cemetery, special cases, and supervision and control of persons and activities in the Cemetery. Participants at the

stakeholder meetings in February 2015 also supported the need for clarity around enforcement of the bylaw.

An Error Correction Section and Disclaimer Section should be added to address future occasions where the Bylaw is challenged, for example an error in a plot sale.

8.1.6 MONUMENTS

The dimensions and guidelines for monuments and markers should be removed from the general body of the bylaw and provided in a separate schedule. This would allow for monument size requirements to be easily addressed or changed without having to make changes to the bylaw.

The detailed schedule of monument dimension and descriptions can be provided to monument suppliers while a short, abbreviated description on monuments could be made available to families as they purchase the appropriate burial space.

A working spreadsheet listing all cemetery sections, the type of marker allowed and the minimum and maximum size allowed, would permit this information to be easily and clearly passed on to the customer/plot purchaser.

Department of Veterans' Affairs (DVA) marker regulations should be removed from the bylaw and mentioned as "in accordance with the regulations of the Field of Honour as set by DVA." Memorial suppliers can refer directly to DVA regulations for monument height, depth and font requirements.

8.1.7 GRAVE COVERS

We recommend permission to use of grave covers on new graves be removed as grave covers can pose safety implications for visitors, staff and equipment due to settlement of the ground beneath the covers, and subsequent breaking.

8.1.8 BURIAL RECEPTACLES

The bylaw should be updated to include a wider variety of approved grave liner or vault options for both lawn and double depth burial, and to permit interment in a shroud at the discretion of the Cemetery Administration. These recommendations were supported by several representatives at the stakeholder meetings in order to expand the range of affordable, environmentally friendly and culturally appropriate options available.

8.1.9 ORNAMENTATION

Stronger language in the bylaw emphasizing the importance of safety would add clarity for the community with respect to the cemetery rules concerning ornamentation.

8.1.10 VETERAN BURIAL

The City's Cemetery Bylaw requires updating to reflect present day and future Veterans' needs. The current bylaw limits interment in the Veterans' Cemetery to those "who saw active service with His Majesty's Forces." This definition combined with a diminishing inventory, has limited burials within the historic Veterans' sections which were established as a War Cemetery in 1916. This issue continues to be of vital importance to both local Veteran organizations and the City.

We understand that the City is committed to updating the definition for Veteran Burial in the bylaw in concert with an expansion of interment space and creation a new Veterans' Field of Honour to ensure that the community's Veterans are honoured and recognized for years to come. To achieve this, we recommend an update of the Definition of Veteran in the bylaw to be in accordance with the Department of Veteran's Affairs Canada.

We have provided below suggested language to update the bylaw's terms for Veteran Burial and recommend that the City seek further feedback from the community with regard to the nuances of this definition as well other issues to be considered in the creation of a new Field of Honour such as interment of a Veteran's spouse, sequence of burial, double depth, interest in side by side casket burial of the Veteran and spouse, and possible charging for Veteran's plots in the future.

SUGGESTED BYLAW LANGUAGE FOR VETERAN BURIAL

"Veteran" means a former member of Her Majesty's Armed Forces as determined by the Department of Veteran's Affairs Canada.

Veteran Burial: Areas set aside in the Cemeteries known as the "Field of Honour" and reserved for burial of service and ex-service men and women of the Armed Forces shall be subject to special provisions as set forth in the Cemetery Regulations. No spouse of a Veteran will be allowed to be buried in or adjacent to the veteran's space prior to the burial of the Veteran.

Veteran Restriction: In the Field of Honour, the Veteran must be already buried, if permission is to be given to inter the cremated remains of a spouse in the same space. In Fields of Honour that allow side by side burials of caskets of the Veteran and spouse, the Veteran must be already buried in the casket if the spouse is to be buried. In the Field of Honour only approved DVA monuments shall be placed or constructed for the Veteran. If a spouse is also buried the monument must be the same size, material and style of the approved monument for the sake of continuity in the area.

Burial information: For Veterans in a Field of Honour, the regimental and service number.

8.2 RECOMMENDATIONS

The implementation of new interment options and the future cemetery expansion presents an ideal opportunity for the City to update or rewrite the cemetery bylaw. The following recommended changes should be incorporated into the rewrite to ensure the bylaw is user friendly, uses current language, reflects the present day and future needs of the community, and is brought in line with Provincial definitions, guidelines and regulations.

- Create an updated, more user-friendly bylaw format that has a narrative 'flow' between sections; a proposed Table of Contents is included in **Appendix F**;
- Update and expand upon the Definitions section;
- Add clarification around legalities of Ownership;

- Provide clarity on enforcement of the bylaw;
- Move monument size requirements to a separate appendix;
- Adopt language to phase out the use of grave covers;
- Increase the range of approved burial containers including grave liner and vault options;
- Incorporate clarifying details concerning ornamentation at the Cemetery emphasizing the importance of safety;
- Adopt a new definition of Veteran and policy for the new Field of Honour, and
- Seek further feedback from the community on new definitions to be included in the bylaw.

9 PHASING PLAN

It is recommended that the land drainage and cemetery expansion be delivered in phases. The proposed site changes are prioritized into two phases, with associated timeframes as shown in the following diagram. Development of land drainage infrastructure and expansion of the Veterans' Section have been identified as high priority items that need to be addressed as soon as possible. The key elements to be prioritized in the phasing include:

PHASE 1 (1 - 5 YEARS) - TOP PRIORITIES TO INCLUDE:

- Land drainage infrastructure and pond;
- Veterans' Precinct expansion;
- Tree planting and walking trails;
- Muslim section;
- Cremation gardens;
- Central gathering space, and
- Green burial area.

PHASE 2 (5+ YEARS) - TOP PRIORITIES TO INCLUDE:

- Veterans' Field of Honour;
- New secondary entrance and processional route, and
- Relocated works yard and renovated office / customer service precinct.

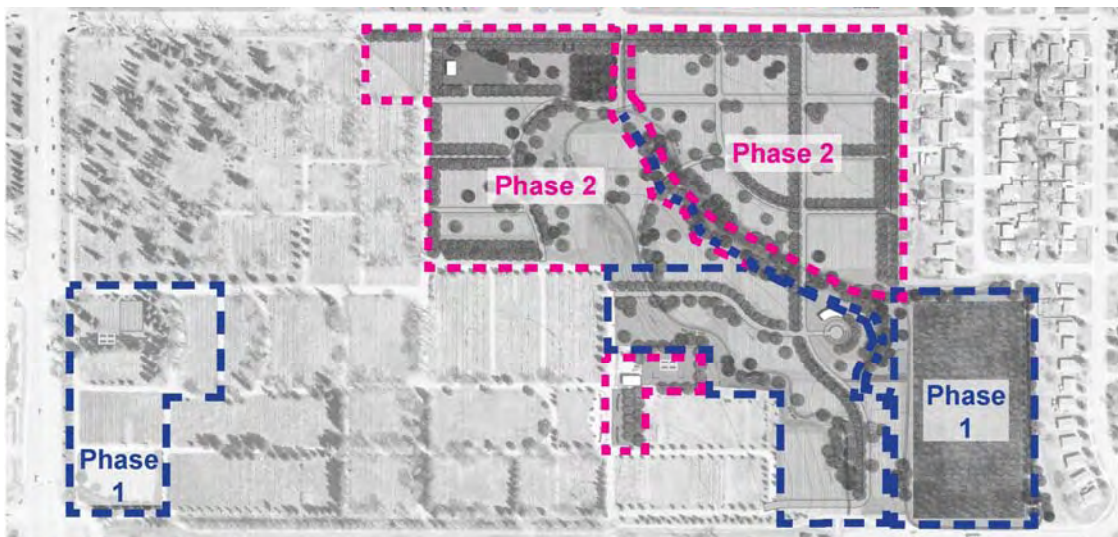


Figure 18. Proposed Phasing Plan

10 COST ESTIMATE

A conceptual estimate of capital costs for the proposed land drainage enhancements and cemetery expansion is presented in the table below. Note the cost estimate does not include costing for the cemetery office renovation or demolition of the crematorium building.

Estimate of Costs		Based on: Master Plan drawings dated July 8, 2015
		ESTIMATED ALLOWANCE
PHASE 1		\$1,561,577.50
1.0	Tree Planting (incl. allowance for deciduous and coniferous trees)	\$ 486,000.00
2.0	Veterans' Precinct (incl. columbaria, refurbished gate, trees, pathway)	\$ 108,040.00
3.0	Retention Pond Construction (incl. pond and channel excavation, berms, culverts and pipe outfall)	\$ 543,787.50
4.0	Site Grading (incl. allowance for miscellaneous site grading)	\$ 100,000.00
5.0	Aberdeen LDS (incl. 1200mm diameter manholes, 600mm PVC pipe, replacement of bike path)	\$ 153,750.00
6.0	10th Street LDS Connection (incl. 1200mm diameter concrete pipe, 1800mm diameter manholes)	\$ 170,000.00
PHASE 2		\$2,171,272.50
7.0	Soft Landscape (incl. ornamental planting, grass seeding)	\$ 301,250.00
8.0	Central Gathering Space (incl., memorial wall, amphitheatre seating, open air pavilion, children's play)	\$ 311,000.00
9.0	Hardscape and Paving (incl. roads and pathways)	\$ 440,000.00
10.0	Signage & Wayfinding (incl. kiosk, entry sign, section and plot markers)	\$ 107,000.00
11.0	Green Burial Area (incl. memorial stones, wild flower mix)	\$ 29,600.00
12.0	Cremation Gardens (incl. columbaria, family vessels)	\$ 551,400.00
13.0	Works Yard (incl. 3 bay garage, materials storage, gates, fencing)	\$ 404,000.00
14.0	Section 21 Redevelopment (incl. topsoil stripping, imported fill, catch basin, 300mm dia PVC pipe, seeding)	\$ 27,022.50
	SUBTOTAL	\$ 3,732,850.00
	DESIGN & ENG (@ 15%)	\$ 559,927.50
	CONTINGENCY (@ 35%)	\$ 1,306,497.50
	TOTAL:	\$ 5,599,275.00
15.0	Optional: Veterans' Section Expansion (incl. underdrain and re-grading for traditional casket burial south of section 32)	\$ 130,515.63

11 CONCLUSION

This Cemetery Expansion Master Plan provides the City of Brandon with a roadmap to enhance land drainage in the area and to accommodate cemetery expansion.

The master planning process engaged a spectrum of stakeholders including City Staff, Council, Veterans' groups, local funeral homes, cultural and faith groups, First Nations and Métis community, heritage advisory committee members, and area residents.

The Master Plan has been built on a rigorous review of demographic and industry trends and projections, in combination with a groundwater and soils investigation to inform cemetery and land drainage design on the site.

Key highlights from the Master Plan include recommendations for a land drainage plan to enhance surface water drainage for the area and accommodate drainage needs for the cemetery, a phased program of expansion of new burial areas, ceremonial areas, and amenities at 1200 Aberdeen, and the implementation of an infill strategy (with new lots) in developed sections of the cemetery. These proposals are accompanied by a cost estimate (concept level) for implementation.

The priority capital projects for the next five years include implementation of the land drainage works, tree planting, and expansion of the Veterans' Precinct, followed by the first phase of the cemetery expansion including the Muslim section, cremation gardens, green burial area, walking trails and central gathering space.

This Master Plan report presents a suite of information and recommendations that in combination, equips the City of Brandon with a road map for the future development of the cemetery to ensure that there will be appropriate inventory and cemetery services to serve the needs of Brandon and area residents for years to come.

12 APPENDIX

- 1 **Appendix A** - Site Analysis and Concept Plans
- 2 **Appendix B** - Soil Logs, Site Topography and Borehole Locations
- 3 **Appendix C** - Conceptual Drainage Plan and Cross Sections
- 4 **Appendix D** - Consultation Summary
- 5 **Appendix E** - Glossary of Cemetery Terms
- 6 **Appendix F** - Bylaw Proposed Format
- 7 **Appendix G** - Green Burial
- 8 **Appendix H** - Tetra Tech Stormwater Analysis

APPENDIX A: SITE ANALYSIS AND CONCEPT PLANS

1 - SITE ANALYSIS

July 8 2015



2 - CONCEPT PLAN

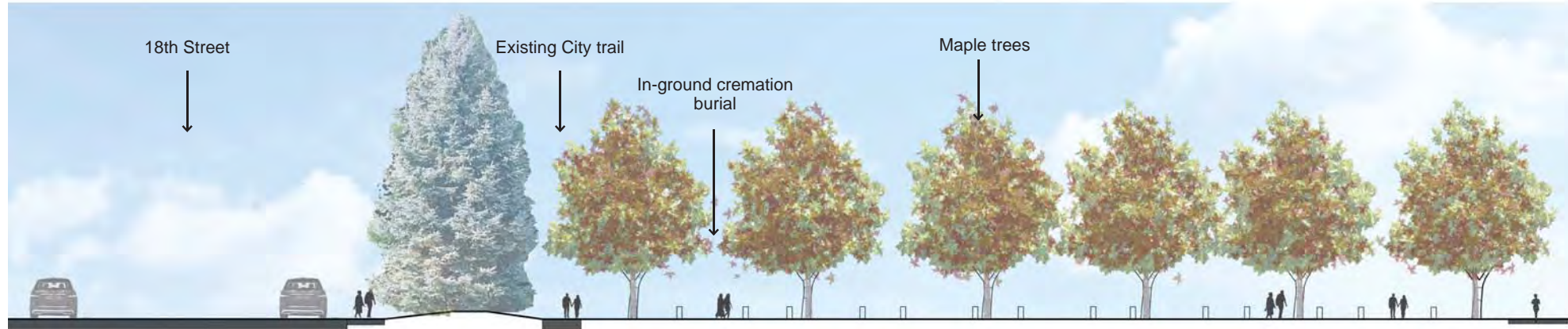
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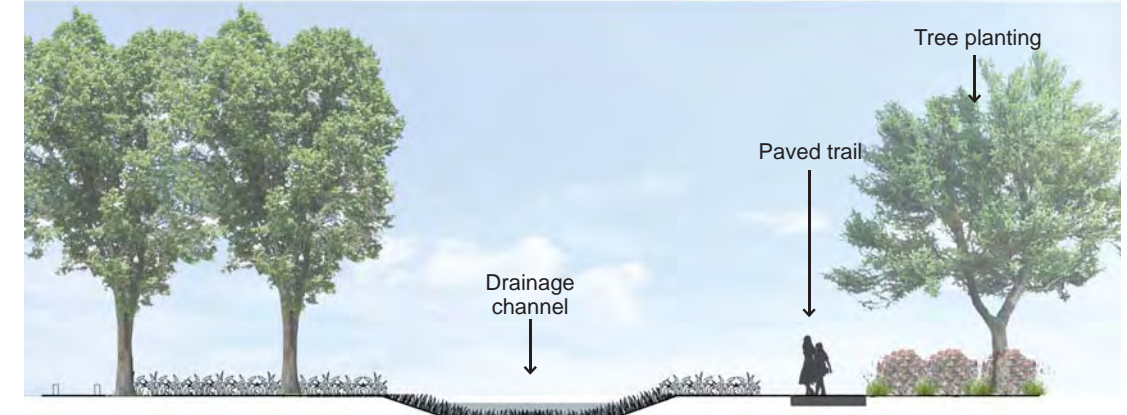
At full build out, the expanded cemetery is expected to serve the community for the next 100+ years.

3 - SECTIONS

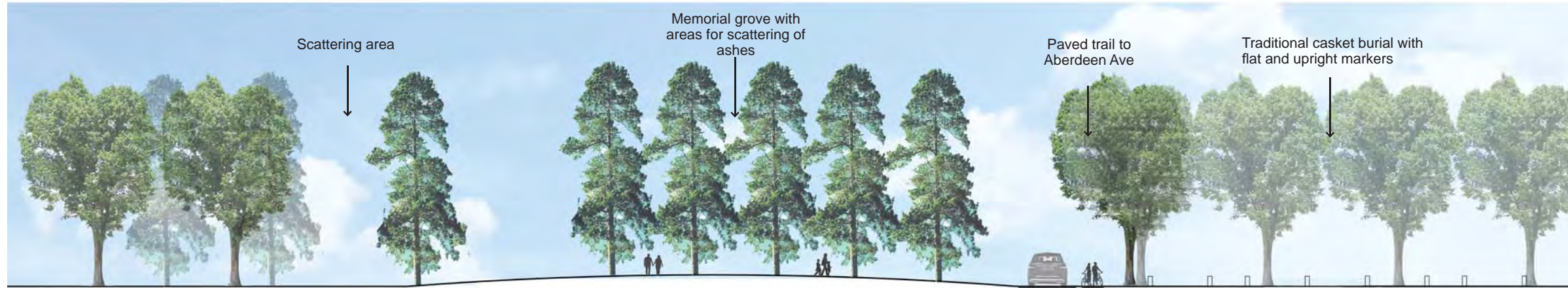
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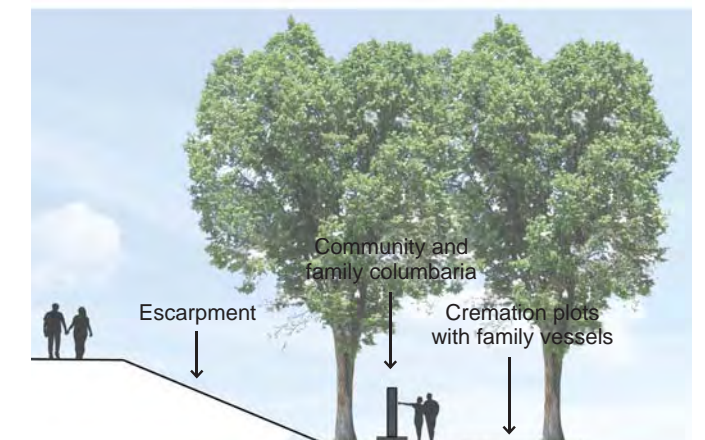
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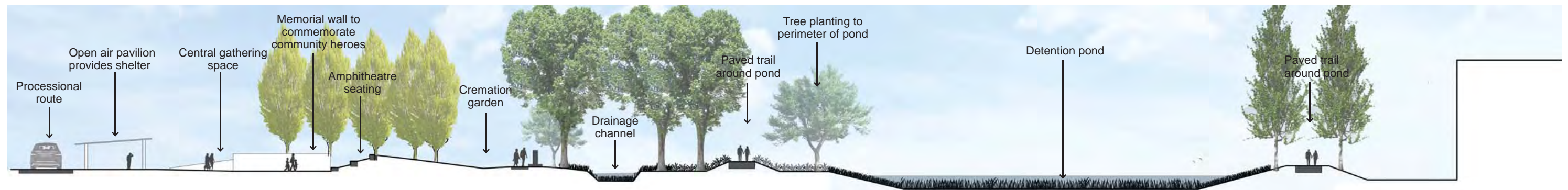
SECTION **B-BB**: DRAINAGE SWALE AND TRAIL (1:200)



SECTION **C-CC**: MEMORIAL GROVE (1:200)



SECTION **D-DD**: CREMATION WALK

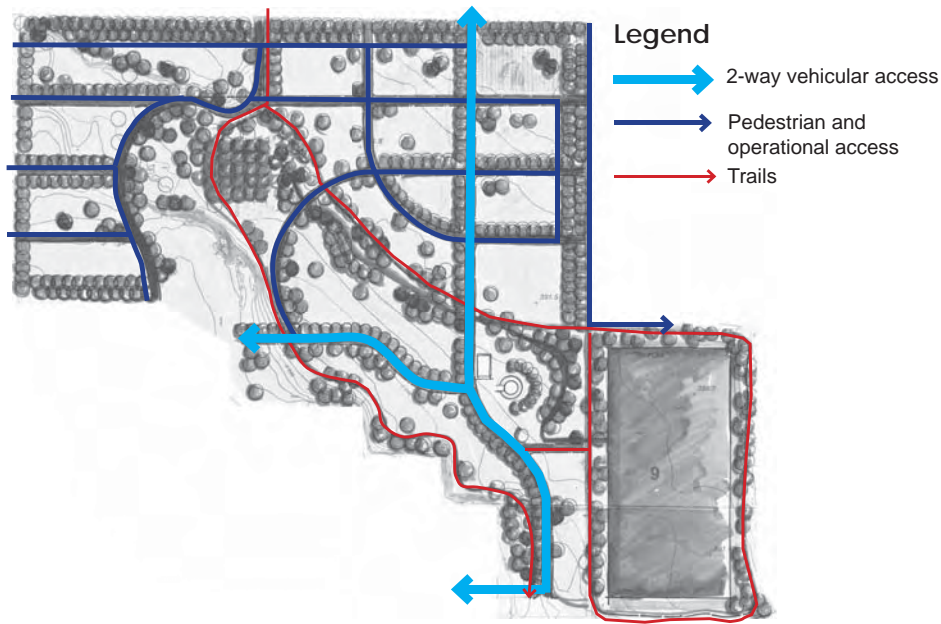


SECTION **E-EE**: PAVILION, CENTRAL GATHERING SPACE AND POND (1:200)

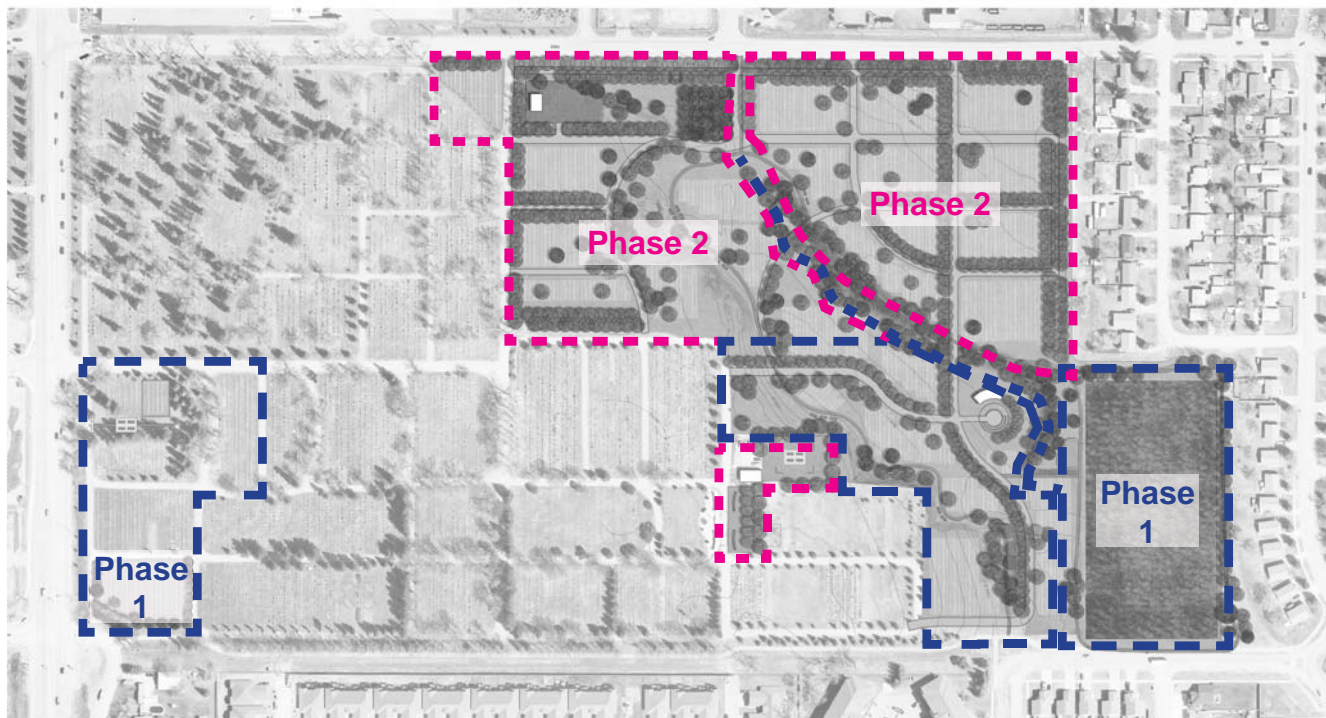
Example of Funeral Procession Route



Access and Circulation



Proposed Phasing



Phase 1

Priorities to include:

- Land drainage and pond
- Veterans' area expansion
- Tree planting and trails
- Muslim section
- Cremation gardens
- Central gathering space
- Green burial area

1 - 5 Years

Phase 2

Priorities to include:

- Veterans' Field of Honour
- Secondary entrance
- Processional route
- Relocated Works Yard
- Customer Service Precinct

5+ Years



Central gathering space



Amphitheatre seating



Children's play



Green burial area



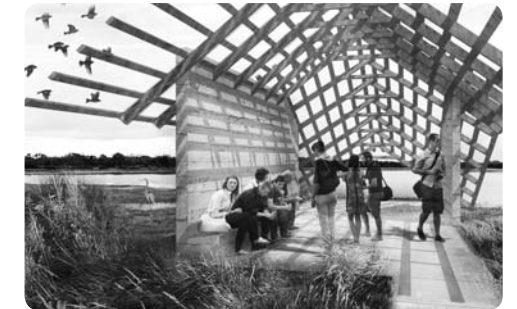
Cremation garden with urns



Memorial grove



Open air pavilion with memorial wall



Open air pavilion



Drainage channel



Walking paths

5 - VETERANS' PRECINCT CONCEPT & INFILL OPPORTUNITIES

July 8 2015



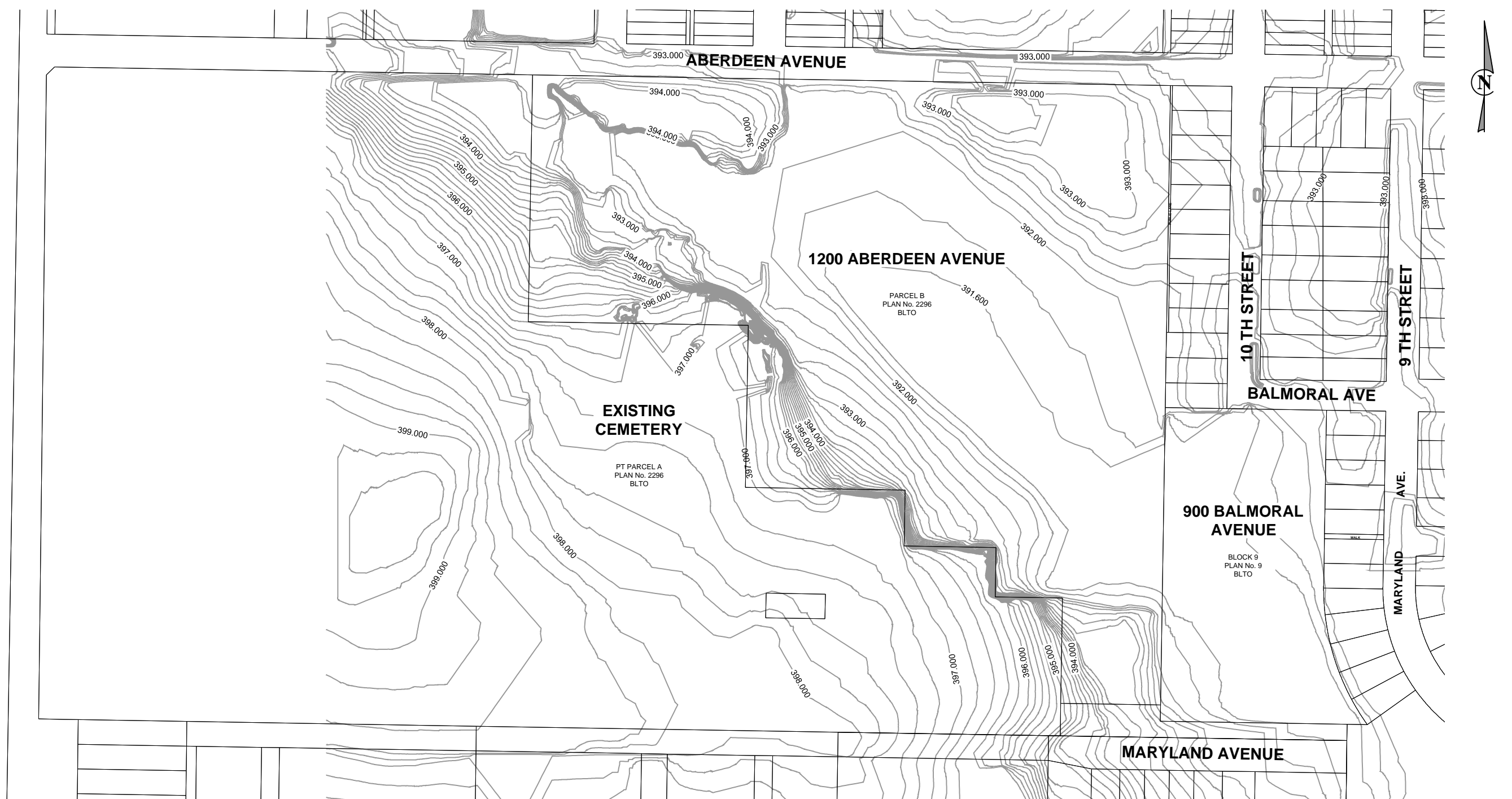
APPENDIX B: SOIL LOGS, SITE TOPOGRAPHY AND BOREHOLE LOCATIONS



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A	JUNE 16, 2015	RJ	CR	ISSUED FOR CLIENT REVIEW
REVISIONS				

PRELIMINARY
 FOR REVIEW AND COMMENT ONLY

DESIGNED BY: RJ	REVIEWED BY: DAB	PROJECT NAME: LEES + ASSOCIATES CEMETERY EXPANSION MASTER PLAN BRANDON, MB	DRAWING TITLE: BOREHOLE LOCATIONS
DRAWN BY: CR		 BURNS MAENDEL CONSULTING ENGINEERS LTD.	PROJECT NUMBER: BMCE-172:30
PROJECT START DATE: JAN 28, 2015			
PLOT SIZE: A1 (594x841)		SCALE: 1:1250	DRAWING NO.: C1.2



NO.	DATE	APP.	BY	DESCRIPTION
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A	JUNE 16, 2015	RJ	CR	ISSUED FOR CLIENT REVIEW
REVISIONS				

PRELIMINARY
 FOR REVIEW AND COMMENT ONLY

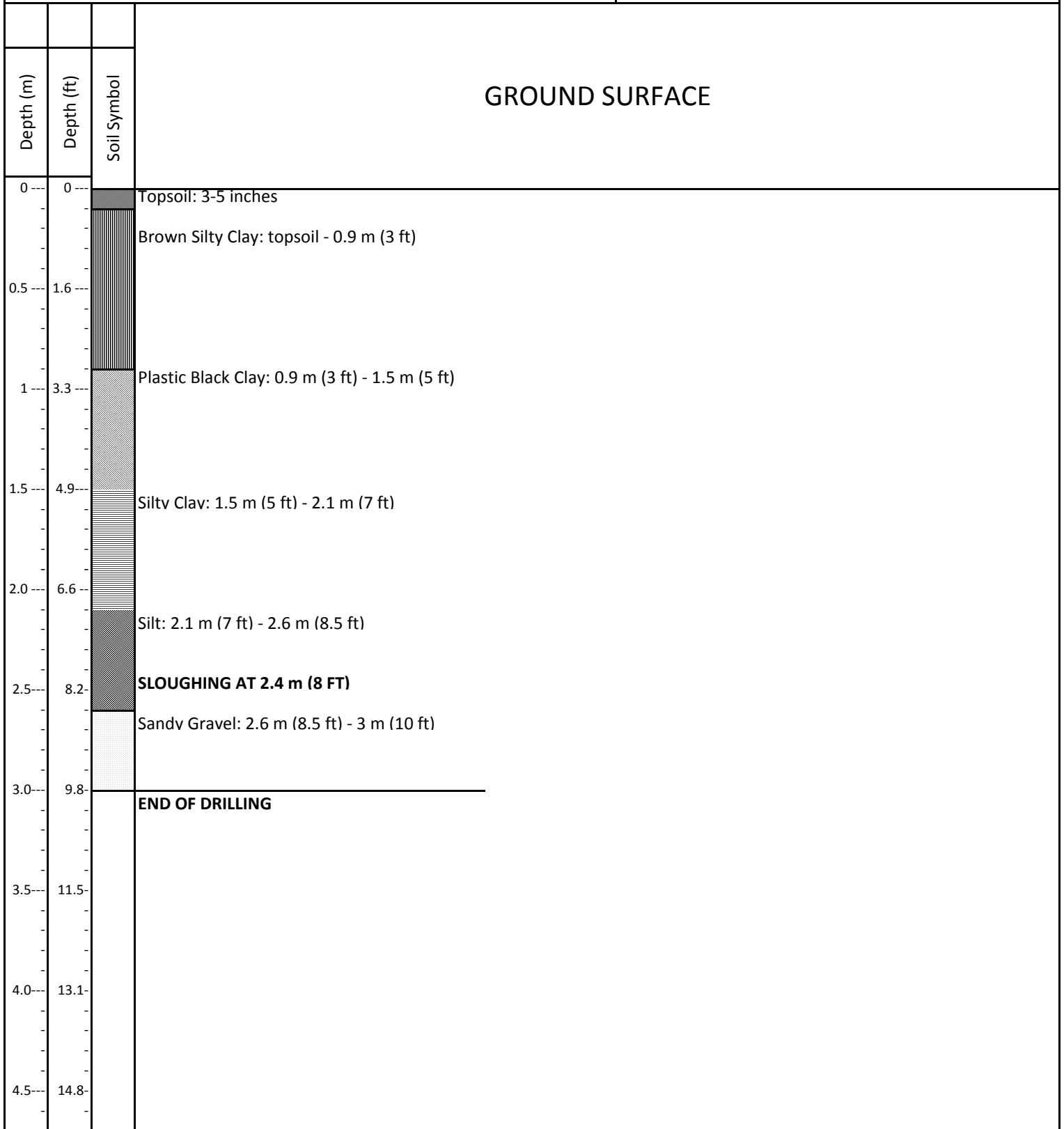
DESIGNED BY: RJ
 REVIEWED BY: DAB
 DRAWN BY: CR
 PROJECT START DATE: JAN 28, 2015
 PLOT SIZE: A1 (594x841)
 SCALE: 1:1250

PROJECT NAME:
LEES + ASSOCIATES
 CEMETERY EXPANSION MASTER PLAN
 BRANDON, MB

1331 Princess Ave.
 Brandon, Manitoba
 R7A 0R4
 Tel: (204) 728-7364
 Fax: (204) 728-4418

DRAWING TITLE:
SITE TOPOGRAPHY

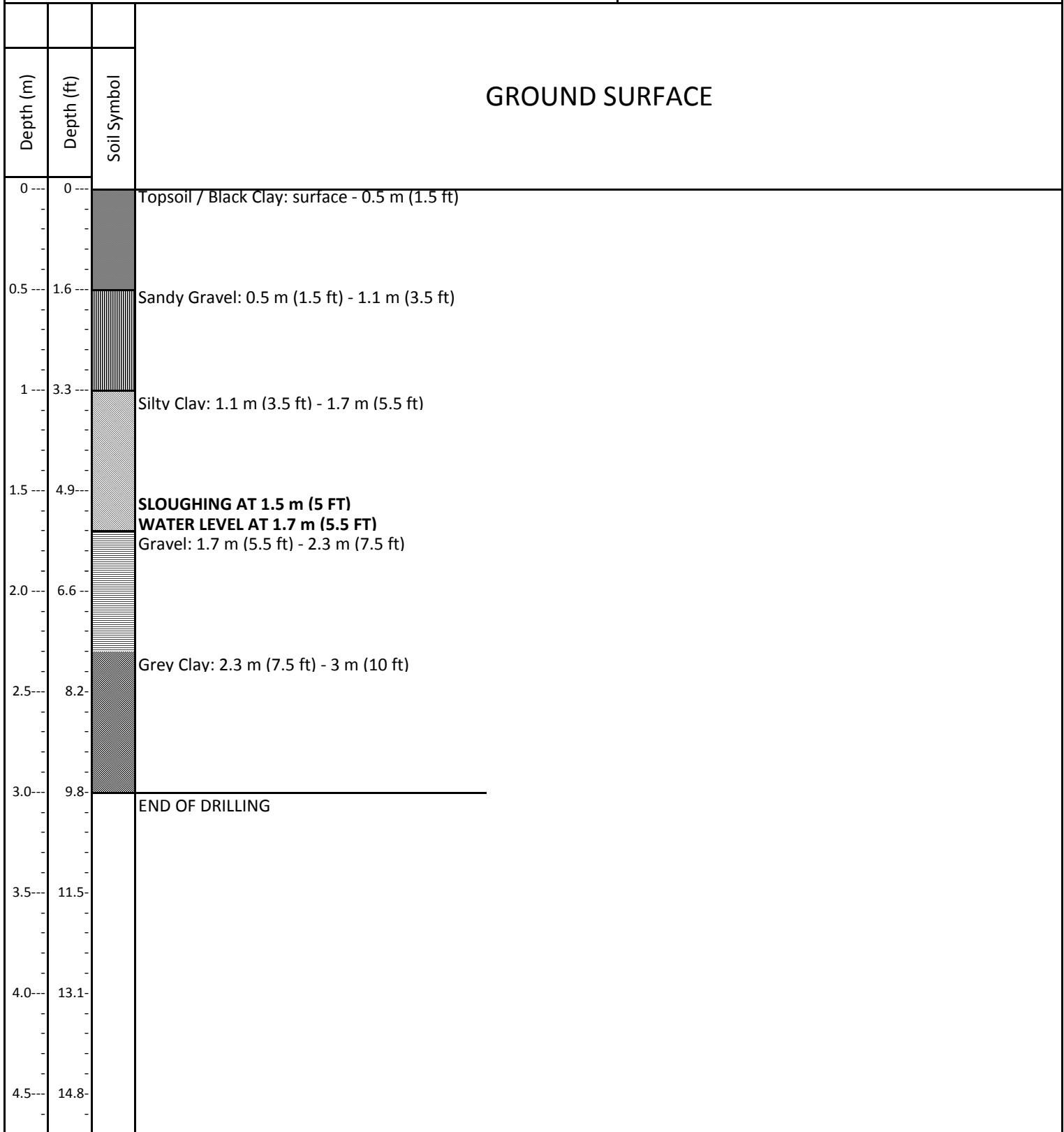
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Reviewed by: D.B.			Auger Size: 125mm solid stem				Completion Elevation:					
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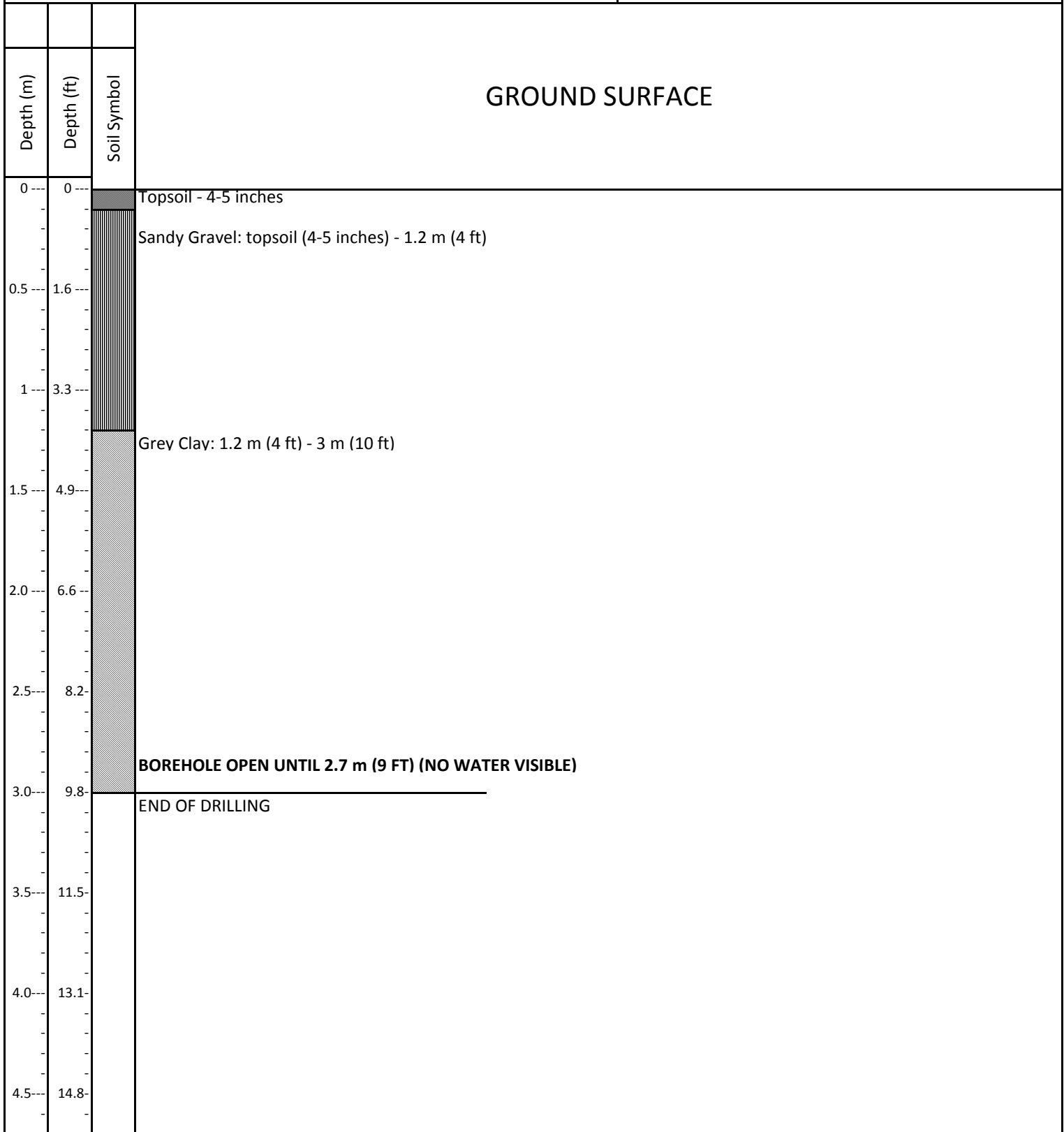
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Project #	BMCE14-172
Location	Brandon Cemetery
Hole #	2



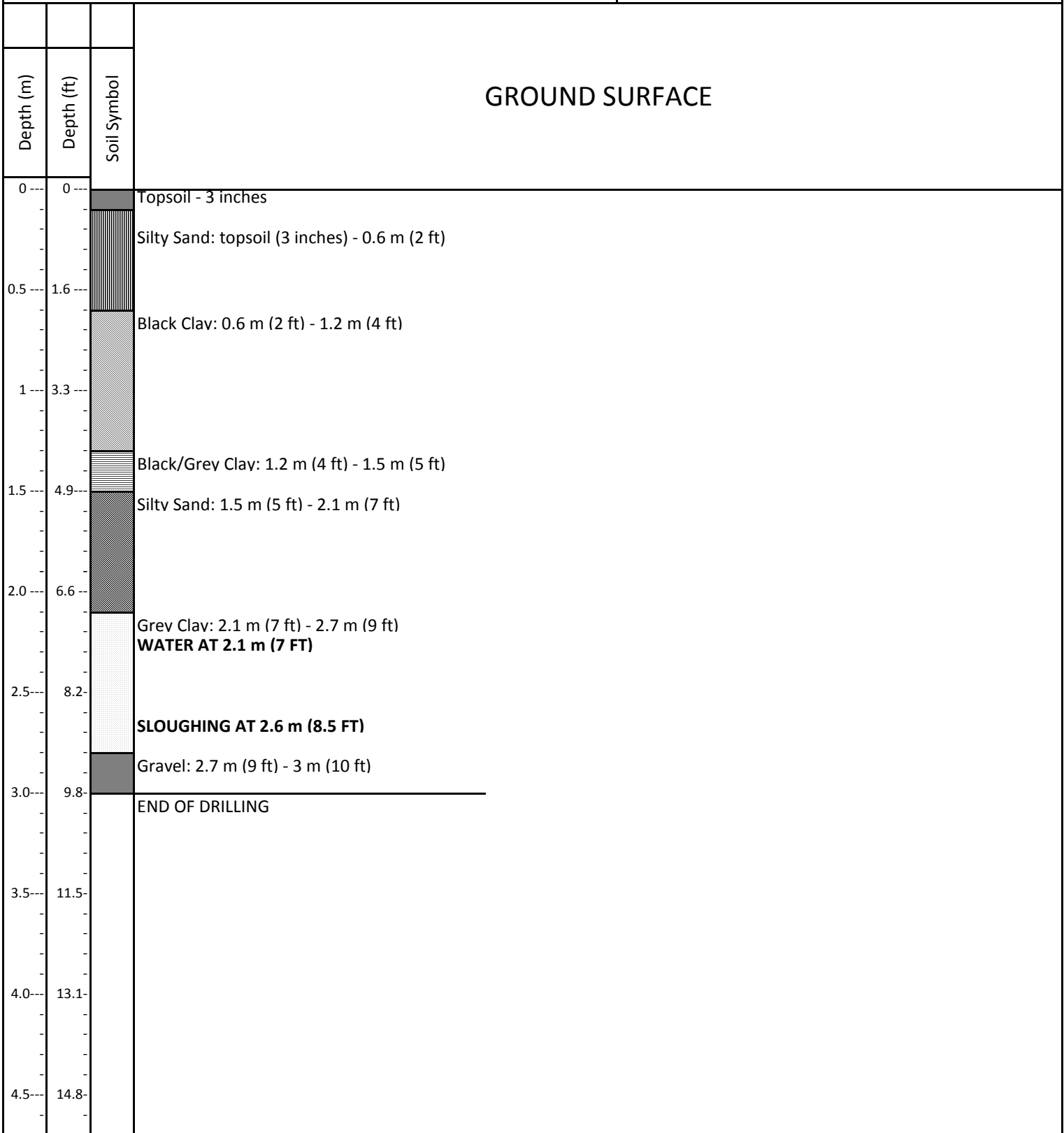
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Date	16-Mar-15
Client	City of Brandon
Project #	BMCE14-172
Location	Brandon Cemetery
Hole #	3



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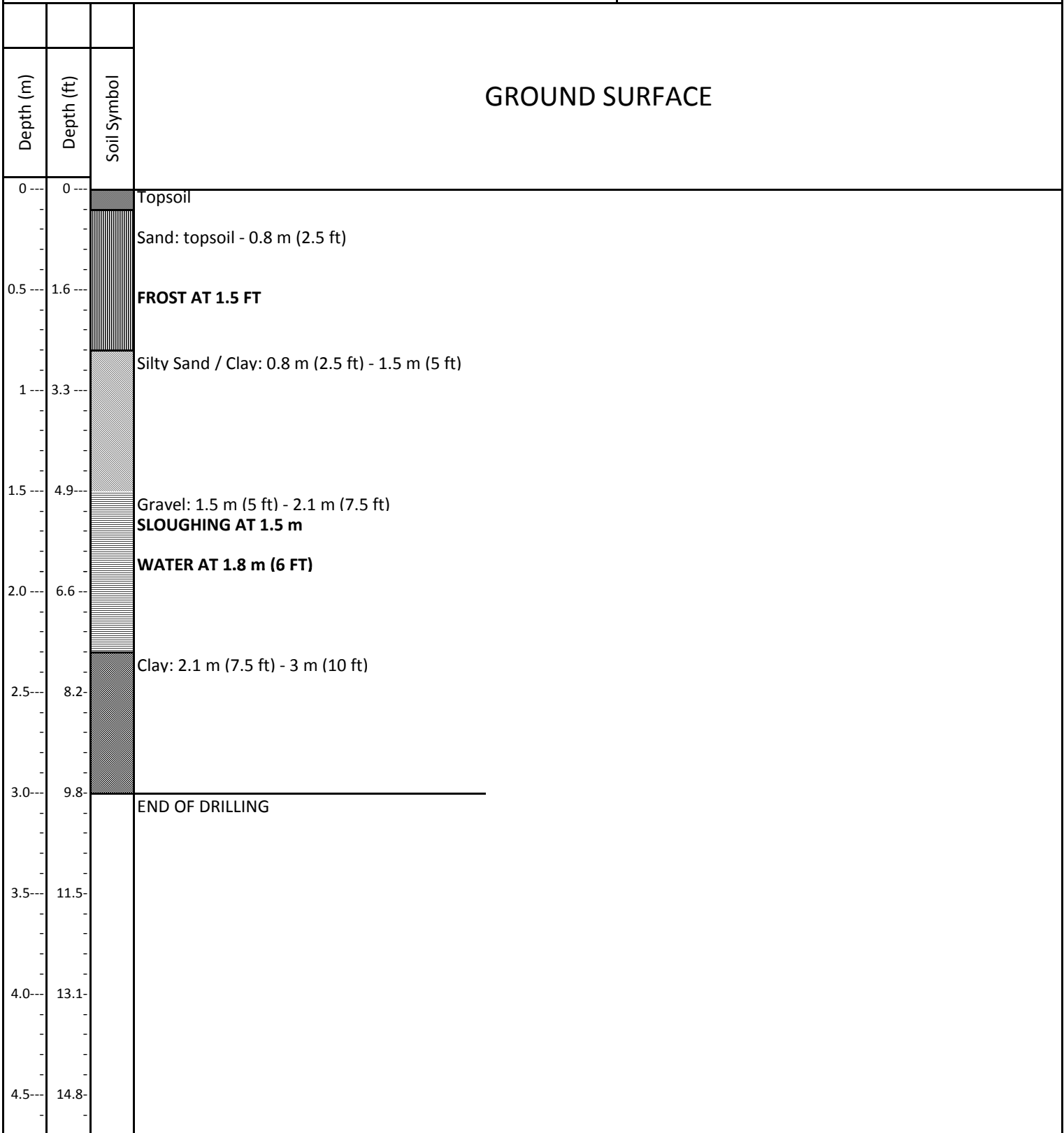


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BURNS MAENDEL
CONSULTING ENGINEERS LTD.

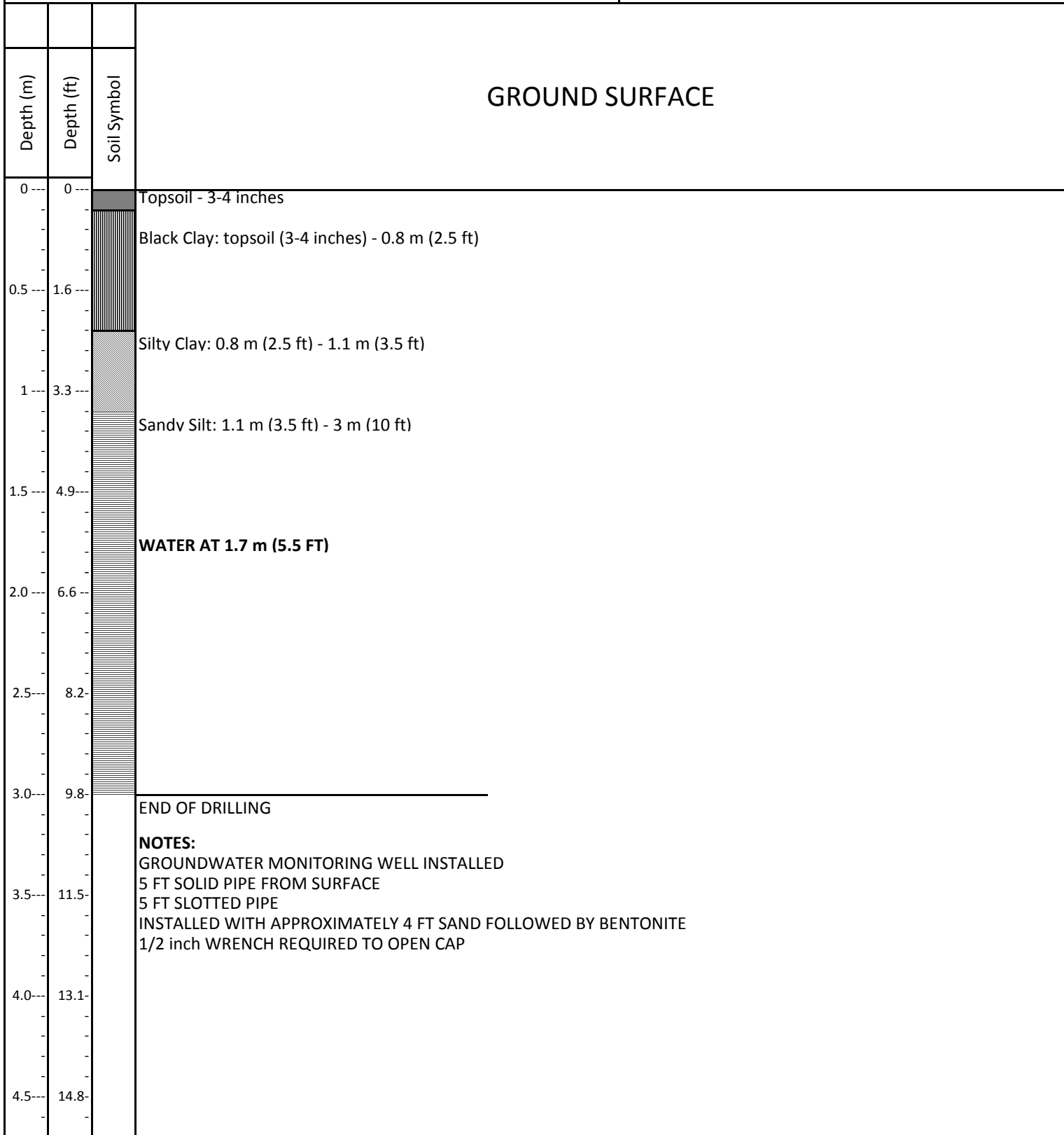
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 Client City of Brandon
 Project # BMCE14-172
 Location Brandon Cemetery
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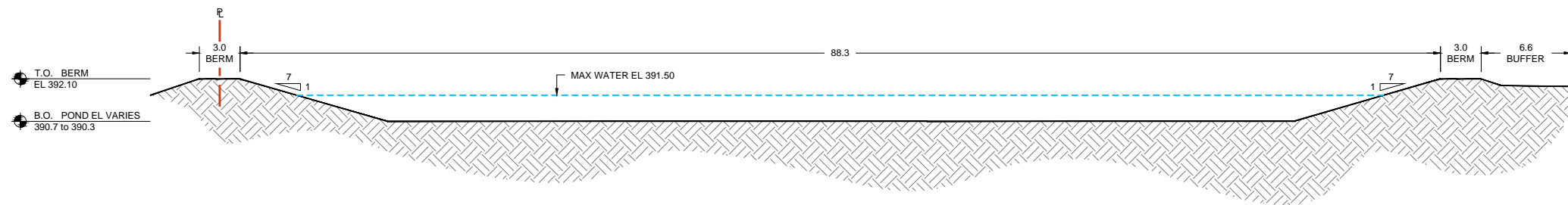


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Client	City of Brandon
Project #	BMCE14-172
Location	Brandon Cemetery
MW #	6

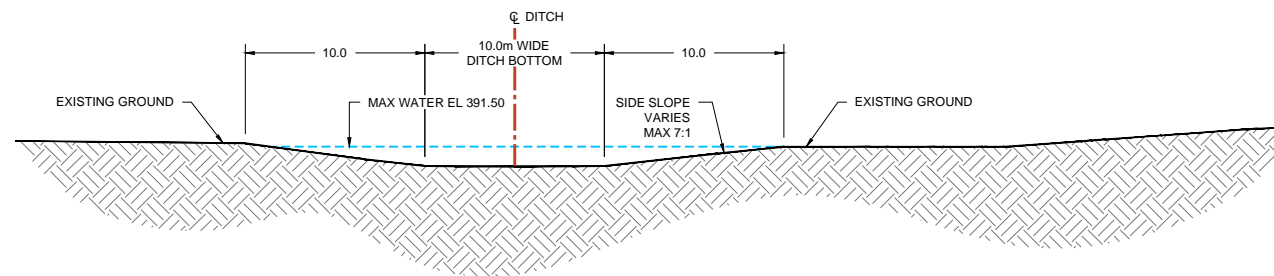


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APPENDIX C: CONCEPTUAL DRAINAGE PLAN AND CROSS SECTIONS



1 PROPOSED POND CROSS SECTION
 SCALE: HOR = 1:200
 VERT = 1:100

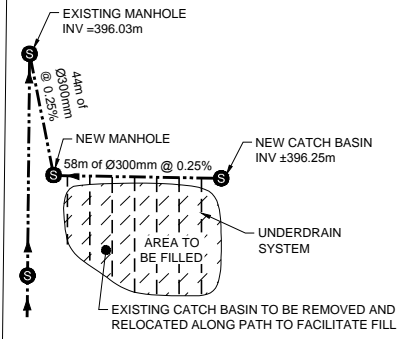
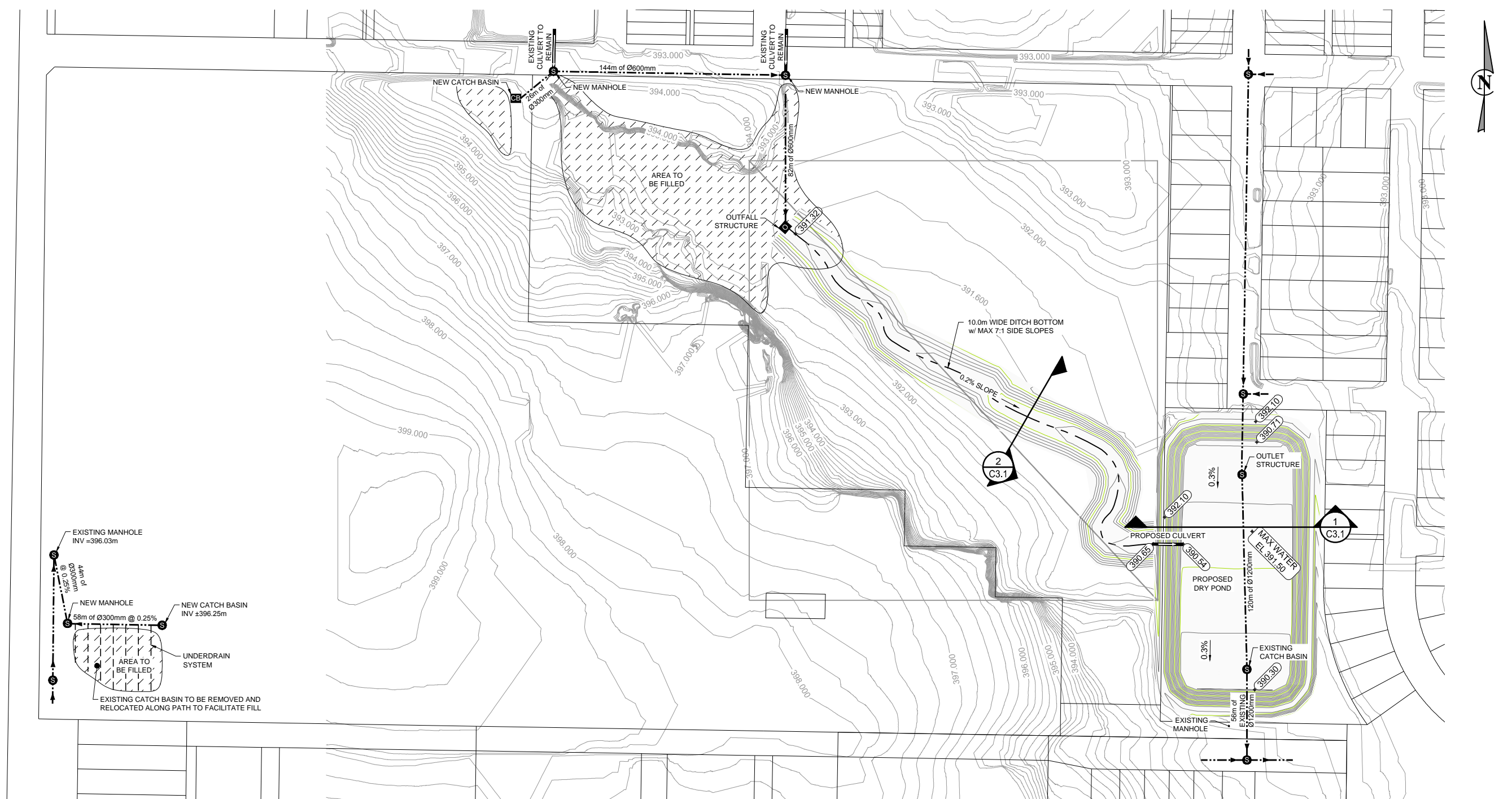


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REVISIONS				

PRELIMINARY
 FOR REVIEW AND COMMENT ONLY

DESIGNED BY: RJ	REVIEWED BY: DAB	PROJECT NAME: LEES + ASSOCIATES CEMETERY EXPANSION MASTER PLAN BRANDON, MB	DRAWING TITLE: PROPOSED CROSS SECTIONS
DRAWN BY: CR		 BURNS MAENDEL CONSULTING ENGINEERS LTD.	PROJECT NUMBER: BMCE-172:30
PROJECT START DATE: JAN 28, 2015			
PLOT SIZE: A1 (594x841)		1331 Princess Ave. Brandon, Manitoba R7A 0R4	Tel: (204) 728-7364 Fax: (204) 728-4418
SCALE: AS NOTED			



NO.	DATE	APP.	BY	DESCRIPTION
B	JUNE 16, 2015	RJ	CR	ISSUED FOR CLIENT REVIEW
A	MAY 26, 2015	DAB	CR	ISSUED FOR INFORMATION
REVISIONS				

PRELIMINARY
 FOR REVIEW AND COMMENT ONLY

DESIGNED BY: RJ
 DRAWN BY: CR
 PROJECT START DATE: JAN 28, 2015
 PLOT SIZE: A1 (594x841)
 SCALE: 1:1250

REVIEWED BY: DAB

PROJECT NAME:
LEES + ASSOCIATES
CEMETERY EXPANSION MASTER PLAN
BRANDON, MB



1331 Princess Ave.
 Brandon, Manitoba
 R7A 0R4
 Tel: (204) 728-7364
 Fax: (204) 728-4418

DRAWING TITLE:
CONCEPTUAL DRAINAGE

PROJECT NUMBER: **BMCE-172:30**
 DRAWING NO.: **C1.3**

APPENDIX D: CONSULTATION SUMMARY

In order to bring forward core issues and identify key opportunities and constraints related to the cemetery system, consultations were held with City Staff, stakeholder representatives and the public, including:

1. City of Brandon Staff Workshop: Engineering, Traffic, Planning, Treasury, Parks, Community Services, Public Works Departments
2. Community Stakeholder Interviews: Veterans groups, funeral homes, cultural and faith groups, First Nations and Métis community, heritage advisory committee, and cemetery neighbours.
3. Public Consultation: Public Open House and online questionnaire.

The following is a summary of key findings that emerged during the consultations.

#1 – MEETING WITH VETERANS' GROUPS

Date: February 19, 2015

Location: A.R. McDiarmid Civic Building

Attending:

City of Brandon: Perry Roque (Director of Community Services), Sandy Jasper (Cemetery Administrator), Ted Snure (City Engineer), Councillor Barry Cullen

Stakeholder Representatives: Danny Hadow (U.N. Peacekeepers); A.R. (Al) Dunham (Army, Navy & Air Force Veterans in Canada); Garry Andrew (Legion Branch 3), Roy Pierunek (Legion Branch 247)

Cemetery Consultants: Erik Lees, Heidi Redman (LEES+Associates)

Key Messages from Veterans:

1. A priority for Veterans is to establish a new veterans' section in the expansion area; this section would be accessible to all veterans including RCMP and merchant marines.
2. There are approximately 90 veterans still living in the area who served in conflict, including many post-Korea veterans. There are approximately 70 plots remaining in the current Veterans' section. The group estimated at least 800-900 total veterans in the Brandon area.
3. Timing is of the essence as veterans are passing away now, and need to be assured of a space to be interred. Additional space will likely be required in 3 years, if not sooner.
4. Suggestion that some additional plots could be squeezed in around the cross of sacrifice, or through closure of redundant roads, however space needs to be retained for ceremonies. Ceremonies typically include a procession from the cemetery office to the Veterans' section.

5. The existing Veterans' gate is no longer used as an entry, as there is no longer an entry at this location from 18th Street. The gate could be relocated as a feature in the new Veterans area.
6. Preference is for new Veterans' section to be located in 1 area, and not separate sections.
7. New Veterans' area should include cremated remains areas and columbaria.
8. Cemetery bylaw need to be updated with new policies to address interment of Veterans in the cemetery. This process is underway as part of this plan but will ultimately need to be approved by Council.
9. The following questions were discussed regarding possible policies for the new Veterans' area. These are the types of policies and definitions that could ultimately be addressed in a new cemetery bylaw and will be discussed further at the Open House:
 - a. Should burial in the Veterans' area include interment of the non-serving spouse?
 - b. How many interments may occur in 1 plot (i.e., 1 casket and 3 cremations)? What about interment of cremated remains of other family members (i.e., children, parents, or a second spouse)?
 - c. What if the spouse dies first?
 - d. Would Veterans be okay with paying to be interred in the new Veterans' area?

#2 – MEETING WITH FUNERAL HOMES

Date: February 19, 2015

Location: A.R. McDiarmid Civic Building

Attending:

City of Brandon: Perry Roque (Director of Community Services), Sandy Jasper (Cemetery Administrator), Ted Snure (City Engineer)

Stakeholder Representatives: Ken Gold (Brockie Donovan); Brent Buchanan, Greg Hildebrand (Memories Chapel)

Cemetery Consultants: Erik Lees, Heidi Redman (LEES+Associates)

Key Messages from Funeral Home Representatives:

1. Water is rarely encountered in graves, although there are some localized drainage issues in the old section (section 21), especially during spring runoff.
2. Interest in a “nature walk” along drainage channel, including green burial and urns.
3. Hearing increased interest in green burial from families. Funeral Directors would like to be involved in defining “green burial” for Brandon. Does it involve a casket, shroud, GPS?
4. A variety of new interment options would help modernize the cemetery and make it more self-sustaining. Interest in scattering garden with permanent memorialization, a Veterans columbarium, an ossuary with memorialization on a memorial wall, memorialization for those interred elsewhere, and an indoor columbarium.
5. Interest in a new children’s section (should be more family friendly, and “softer”), with different options available for parents.
6. Families have shown very little interest in mausolea.
7. Families are concerned about cost, which is a driver for choosing cremation.
8. Need more clarity and enforcement of the cemetery bylaw.
9. The cemetery bylaw should be updated to include vault options (for lawn and double depth) other than concrete, as there are cheaper and more durable options available.
10. Some interest in a pet section (need to check the provincial cemetery legislation). This could be a separate section not in the cemetery.
11. Funeral access is primarily via 18th Street, however Aberdeen access could be improved visually, and/or a new access provided to the expansion area.
12. The cemetery should be welcoming to members of all the cultural groups in Brandon.

#3 – MEETING WITH FAITH GROUPS / HERITAGE

Date: February 19, 2015

Location: A.R. McDiarmid Civic Building

Attending:

City of Brandon: Perry Roque (Director of Community Services), Sandy Jasper (Cemetery Administrator), Ted Snure (City Engineer), Richard Greer and Angie Veilleux (Community Development Coordinators)

Stakeholder Representatives: Dean Nigel Packwood (Brandon Ministerial Association); Dr. Fiaz Ahmad, Dr. Mohammad Abidullah (Brandon Islamic Centre)

Cemetery Consultants: Erik Lees, Heidi Redman (LEES+Associates)

Key Messages from Faith Groups / Heritage Committee Representatives:

1. Brandon Islamic community is estimated at 250 people currently and growing.
2. Islamic Centre would like a new section for Islamic community in cemetery expansion, the size of this area will be determined.
3. Islamic burial tradition includes burial with a shroud and involves minimal memorialization (often there is no headstone, or a simple, flat headstone). The body is interred with the head tilted to the right towards Mecca (Northeast). The cemetery bylaw should accommodate burial with a shroud.
4. Ministerial Association representatives noted an interest for scattering in a natural environment, with option for memorialization. Expansion should also include more columbaria.
5. A celebration hall at the cemetery would be useful for faith/cultural groups. This could be an outdoor gathering space with an open structure.
6. Interest in green burial is expected to grow in the community.
7. Cemetery should accommodate different faiths. Brandon includes residents from Ukrainian, Chinese, Latin American and Filipino communities. Elements of importance for local Metis and First Nations should be reflected in cemetery. Many members of Sikh and Hindu community in Brandon currently go to Winnipeg.
8. Interest to build on current cemetery programming which includes gospel in the graveyard (since 2006), the Chinese Head Tax Memorial ceremony, and Remembrance Day activities (No Stone Left Alone).

#4 – MEETING WITH NEIGHBOURHOOD REPS

Date: February 19, 2015

Location: A.R. McDiarmid Civic Building

Attending:

City of Brandon: Perry Roque (Director of Community Services), Sandy Jasper (Cemetery Administrator), Ted Snure (City Engineer)

Neighbourhood Representatives: Steve, Joyce, Lynn, Dot, Gord, Steve, Carol, Tricia, Reg, Melissa, Ted, Paul, Councillor Ron Brown, Councillor Kris Desjarlais (Municipal Heritage Advisory Committee)

Cemetery Consultants: Erik Lees, Heidi Redman (LEES+Associates); Ryan Johnston (Burns Maendel)

Key Messages from Neighbourhood Reps:

1. Creating an effective drainage plan to ensure that water from the cemetery will not impact any residential properties is a primary concern for neighbourhood residents.
2. Drainage from cemetery roads across pathway is a concern for residents of The Landing.
3. Creating habitat should also be a priority for cemetery expansion lands, as wildlife (including geese, deer, and ducks) currently use expansion lands.
4. Cemetery boundary - a treed buffer is preferred over a fence along the cemetery boundary.
5. A treed buffer or tree memorial along Aberdeen would help mitigate noise arising from sandblasting operation across Aberdeen.
6. Dogs should be limited to walking path.

#5 – WORKSHOP WITH CITY STAFF

Date: February 20, 2015

Location: A.R. McDiarmid Civic Building

Attending:

City of Brandon: Perry Roque (Director of Community Services), Sandy Jasper (Cemetery Administrator), Ted Snure (City Engineer)

City Staff Representatives: Ryan Nickel, Alexia Stangherlin, Val Rochelle, Esther Bryan, Bryce Wilson, Tanya Marshall, Travis Campbell, Kent Bednorski, Jeff Perkins, Rod Paterson, Scott Hildebrand

Cemetery Consultants: Erik Lees, Heidi Redman (LEES+Associates)

Key Messages from City Staff:

1. Support for idea of cemetery supporting a recreational aspect. The Greenspace Plan includes recommendations that could be incorporated.
2. Make water an amenity, and use native trees.
3. Cemetery should represent First Nations and new Canadians. Would like to see aboriginal art, and use of circles, and meandering paths to honour local First Nations.
4. Keep the cemetery as a respectful place.
5. Increased space for the Veterans' area is a priority.
6. A building, such as an all-season pavilion would be a good amenity – possible on a cement pad, with posts and glass.
7. Include an open field for picnics, and contemplation. Possible integration of a play structure with emphasis on experiential play (using sand, logs, rocks)?
8. Possible x-country ski circuit in winter?
9. Important not to development too much inventory too soon.
10. There is already a pet cemetery outside the City limits.
11. The City needs to look at the care fund, and consider developing a business plan to move the cemetery proactively towards cost recovery.
12. More young people are using the existing cemetery for walking, due to adjacent residential development. This provides good "soft security."
13. A washroom, electrical access and water are needed for green space events.
14. Cemetery needs a bigger equipment shed.
15. A second meeting with Operations would be useful during Open House visit to review draft plans.

#6 – MEETING WITH ABORIGINAL GROUPS

Date: April 2, 2015

Location: Councillor’s meeting room and by telephone

Attending:

City of Brandon: Sandy Jasper (Cemetery Administrator), Ted Snure (City Engineer)

Stakeholder Representatives: Richard Greer, Frank Tacan, Elizabeth Cook (Brandon Friendship Centre), Jason Gobeil (Aboriginal Community Coordinator)

Cemetery Consultants: Erik Lees, Heidi Redman (LEES+Associates)

Key Messages from Aboriginal Groups:

1. Members of the First Nations community are often buried on reserve.
2. Ceremonies include an annual feast held in the summer to honour ancestors. This is usually held at the gravesite. Prayer cloths are put up to be left all year.
3. Cemeteries are highly respected places culturally, and vandalism rarely occurs. It is important to respect what is already in the existing cemetery to honour those buried there.
4. Would like to see more curves and circles in the new section, with less squares.
5. Ideally burial areas are in quiet areas away from busy roadways and traffic. Trees, (particularly evergreen) can help to cut down noise.
6. Fence around cemetery should be white in respect of spirits, or open (i.e., no fence).
7. It is important to honour First Nations Veterans. A pipe ceremony is often held for important members of the community. Tobacco, sage and cedar are used for the pipe ceremony.
8. Horse riders or buggies following behind the hearse could also be desirable as a part of the procession to the gravesite to honour important members of the community.
9. A space for ceremonial practices is important. Ideally any building or gathering space does not have squares or corners.
10. Ceremonies have not changes for centuries, and are unlikely to change in the future, although the most important thing is to respect and honour what a person wants for burial.
11. The type of interment varies according to individual wishes, although traditional casket burial is the most common form of interment.
12. The Métis community largely follows the Christianity belief.
13. On the new land it should be a priority to establish tree planting, and create quiet spaces.
14. It is appreciated that the City is reaching out to communities in Brandon to be included in the process and plans for the new cemetery.

#7 – MEETING WITH BRANDON ISLAMIC CENTRE

Date: April 2, 2015

Location: Councillor's meeting room and by telephone

Attending:

City of Brandon: Sandy Jasper (Cemetery Administrator), Ted Snure (City Engineer)

Stakeholder Representatives: Dr. Mohammad Abidullah, Dr. Faiz Ahmad (Brandon Islamic Centre)

Cemetery Consultants: Heidi Redman (LEES+Associates)

Key Messages from Brandon Islamic Centre:

1. Some sort of buffer or demarcation of the Muslim burial area would be desirable.
2. A distinct infant section is not required. Men, women and children can all be interred in the same area. Sequence of burials does not matter.
3. The goal is to ensure that all members of the community are served in a respectful manner.
4. Burial ceremonies are very simple – they involve 2-3 people lowering the body, followed by filling of the grave and incantations.
5. Graves are often left unidentified, or marked with a simple, flat headstone. Adornment is kept to a minimum; simplicity is important. A communal prayer stone is not required.

#8 – MEETING WITH VETERANS’ GROUPS

Date: June 9, 2015

Location: Councillor’s meeting room and by telephone

Attending:

City of Brandon: Perry Roque (Director of Community Services), Sandy Jasper (Cemetery Administrator), Ted Snure (City Engineer)

Stakeholder Representatives: Tom Gibson (U.N. Peacekeepers); A.R. (Al) Dunham (Army, Navy & Air Force Veterans in Canada); Roy Pierunek (Legion Branch 247);

Cemetery Consultants: Heidi Redman (LEES+Associates)

Regrets: Barb Andrew (Legion Branch 3) – provided input post meeting

Key Messages from Veterans:

1. Veterans were overall very pleased with the proposed expansion and enhancements of the Veterans’ Precinct including refurbishment and relocation of the Veterans Gate as the processional entrance to a new columbaria walk in front of the cenotaph.
2. For ceremonial purposes the processional walkway should be a minimum of width to accommodate three people walking side by side.
3. Those organizing and attending the recent Decoration Day confirmed the vacant space in front of the cross of sacrifice would be an ideal location for casket expansion.
4. Columbaria proposed along processional route to the cenotaph (in section 26) should be sized and located to fit between existing trees.
5. The expanded Veterans’ area would serve Veterans for a decade or more. It was suggested that the City do another consultation with Veterans prior to the design/construction of the new Field of Honour to determine the need for amenities such as flagpoles, processional routes, gates, etc.

#9 – PUBLIC OPEN HOUSE & QUESTIONNAIRE

Date: May 26, 2015 @ 7:00 PM

Location: McDiarmid Civic Complex

Attending: A total of 29 people signed in to the Public Open House event on May 26, 2015. A total of 23 completed questionnaires were received either in person or completed on-line via the City website.



Figure 19. Public Open House event, May 26, 2015

QUESTIONNAIRE SUMMARY

The following is a summary of key highlights from the Open House questionnaire. A full summary of questionnaire responses follows this summary.

Question 1: What is your overall impression of the Brandon Municipal Cemetery expansion concept design?

Over 95% percent of respondents provided a positive response to the concept indicating it is a well thought out design that addresses cultural, environmental and community needs.

Question 2: What are the top 3 features that you think the City should include in the cemetery expansion?

The top three features respondents would like to see included in the expansion include:

1. Enhanced drainage (75% very important)
2. Expanded walking trails to open up the cemetery to the community (58% very important)
3. Trees and horticultural features (67% very important)

Approximately 70% or respondents felt that a space designated for a children's play area was either somewhat important or not important.

Question 4: Are there any additional specific religious, cultural or secular practices that you would like to see accommodated at the cemetery?

Respondents expressed a desire for the central gathering space to be cross-denominational and appropriate for use by all cemetery users and not geared towards any specific religion.

Additional Findings:

- 38% of respondents are neighbours of the cemetery.
- Open and welcoming park elements are desired.
- 74% of respondents would consider Green Burial, if it were made available at Brandon Cemetery.
- 75% of respondents have heard of the Gossip in the Graveyard event, and 55% have an interest in attending.
- 72% of respondents stated that burial in the new Veterans' area should include interment of a non-serving spouse.
- 42% of Veteran respondents would be willing to pay for a burial plot in the new Field of Honour.
- Some respondents believe that Veteran offices should pay for Veteran plots.
- 57% percent of Veteran respondents would not be willing to pay for a burial plot in the new Field of Honour.
- Some respondents believe that a non-serving spouse should likely pay for a plot but any Veteran should not.

City of Brandon - Cemetery Expansion Master Plan

Q1 What is your overall impression of the Brandon Municipal Cemetery expansion concept design?

Answered: 23 Skipped: 2

#	Responses	Date
1	I like the design. I give it thumbs up.	6/5/2015 11:46 AM
2	Seems to be very well thought out. Impressive.	6/2/2015 11:50 AM
3	The expansion concept is a good executed design that will enhance the city's perception and the general municipal cemetery outlook. It is very diverse attending to all cultural,environmental and general needs.	6/1/2015 3:57 PM
4	Good.	6/1/2015 2:18 PM
5	I like that the Veteran area is on going.	6/1/2015 2:07 PM
6	Not very good because Veterans are not being asked. I am very disappointed in this. How can you have a concept with an old by-law? Stop the world war.	6/1/2015 2:05 PM
7	The proposed expansion has some interesting and unique concepts which would certainly be unique.	6/1/2015 1:44 PM
8	Vey well thought out.	6/1/2015 1:37 PM
9	Very nicely laid out.	6/1/2015 1:35 PM
10	So far so good. I like the retention pond, but drainage still an issue on 9th and 10th streets.	6/1/2015 1:22 PM
11	Like what I see.	6/1/2015 1:11 PM
12	Vey well designed.	6/1/2015 1:09 PM
13	Very impressed.	6/1/2015 1:06 PM
14	Good design.	6/1/2015 1:02 PM
15	Very good	5/31/2015 5:41 PM
16	very good	5/31/2015 3:21 PM
17	Beautifully planned project. Addresses the community needs.	5/31/2015 11:29 AM
18	I would say ecellent	5/31/2015 10:09 AM
19	excellent, I could not attend but i heard from one of my community member(Dr. Ahmed) good thing about the meeting and design. i saw the plan look very good and our islamic community proud of the area given to them which 2500 Square meters	5/29/2015 7:48 AM
20	It looks quite good.	5/28/2015 8:29 PM
21	I believe the cemetery expansion concept is achievable and has many merits	5/28/2015 6:20 AM
22	It looks nice.	5/28/2015 5:58 AM
23	Like many City of Brandon plans, it looks impressive, contains no cost estimates and I have serious doubts that it will actually come to fruition in any way that resembles the concept drawings.	5/27/2015 7:03 AM

City of Brandon - Cemetery Expansion Master Plan

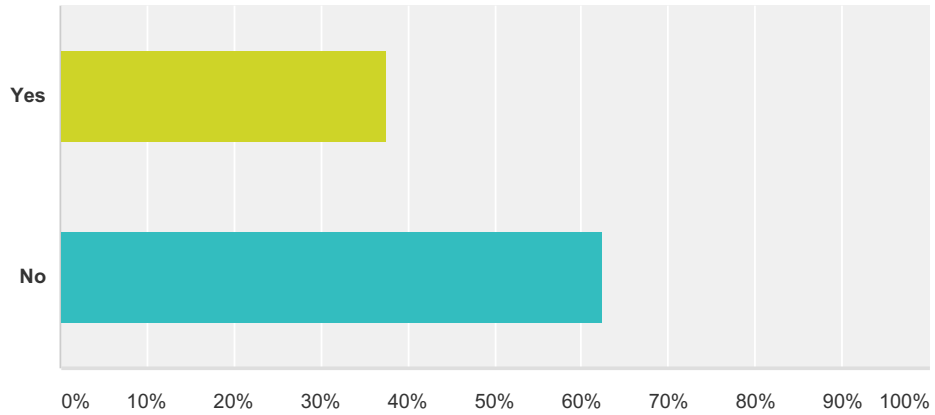
Q2 What are the top 3 features that you think the City should include in the cemetery expansion?

Answered: 21 Skipped: 4

#	Responses	Date
1	the central gathering space be made cross denominational area where any faith can gather to have a prayer for the dead (with no specific religious symbols present within the area).	6/5/2015 11:46 AM
2	Integrate with green space and community usage. Accommodate all faiths and non-faiths. Thoughtful traffic considerations to be a good neighbour.	6/2/2015 11:50 AM
3	1. Diversifying community cemetery section 2. Expanding the range of interment options to serve the community 3. Beautifying the cemetery, adding to the environment cleanness	6/1/2015 3:57 PM
4	Restrict unnecessary pedestrian thoroughfare from Crocus Plains.	6/1/2015 2:18 PM
5	Veteran area; Green space; Gathering area.	6/1/2015 2:07 PM
6	First, fix the bylaw and make sure that everyone understands the by-law and to make it clear this is not a war cemetery. There are no war cemetery in Canada.	6/1/2015 2:05 PM
7	Area of contemplation; Additional space for recreation.	6/1/2015 1:44 PM
8	Walking path; Many trees; Child's play area.	6/1/2015 1:37 PM
9	Scattering garden with memorial wall; Green space for traditional burial; Cremation space for biodegradable urns.	6/1/2015 1:35 PM
10	Better drainage; Quiet, well treed areas for sitting and walking; Area for memorial to loved ones.	6/1/2015 1:22 PM
11	Walking path lighting; Very good drainage.	6/1/2015 1:09 PM
12	Trees; Walking paths; Easy access.	6/1/2015 1:06 PM
13	Trees Landscaping	6/1/2015 1:02 PM
14	NA	5/31/2015 5:41 PM
15	overall very good	5/31/2015 3:21 PM
16	Looks very good.	5/31/2015 11:29 AM
17	the way how i heard and saw i will trusting our city for every thing.	5/29/2015 7:48 AM
18	I like the way its already laid out in the planning stages.	5/28/2015 8:29 PM
19	I think there is an opportunity to provide easy access to grave locations through a computer program. Also I would like to see if there can be an on site or on line florist for those visiting the cemetery	5/28/2015 6:20 AM
20	Fencing around the area. Night lighting. Parking.	5/28/2015 5:58 AM
21	1. Green burial areas (I see they are there, but needs to be reinforced as an option) 2. Close the 18th Street vehicle entrance (it makes no sense to have so many lengthy processions attempting left-hand-turns there) 3. Expanded walking trails to open up the cemetery to the community.	5/27/2015 7:03 AM

Q3 Are you a neighbour of the cemetery?

Answered: 24 Skipped: 1



Answer Choices	Responses
Yes	37.50% 9
No	62.50% 15
Total	24

#	If yes, do you have any additional suggestions to enhance the cemetery's connection to the neighbourhood?	Date
1	Chain link fence to enclose cemetery.	6/1/2015 2:18 PM
2	Yes, to make it more like a family park with amenities for small children.	6/1/2015 1:35 PM
3	Be sure to do more swale behind White Ash Dr. on cemetery side of fence running east.	6/1/2015 1:22 PM
4	None.	6/1/2015 1:11 PM
5	Street lights along walking path.	6/1/2015 1:09 PM
6	No	5/31/2015 5:41 PM
7	Aberdeen is an extremely busy street. Funeral processions entering and exiting the cemetery onto Aberdeen are going to create traffic flow problems. Current access already is a problem, e.g. Canadian Tire, 13th..	5/28/2015 5:58 AM
8	I'm not a neighbour, but why wouldn't I also have ideas to enhance the connections? 1) Access from Blamoral, which is a quiet street perfect for cemetery access 2) slow traffic on Aberdeen (possibly a traffic circle at 13th Street which would also be the entrance to the cemetery)	5/27/2015 7:03 AM

City of Brandon - Cemetery Expansion Master Plan

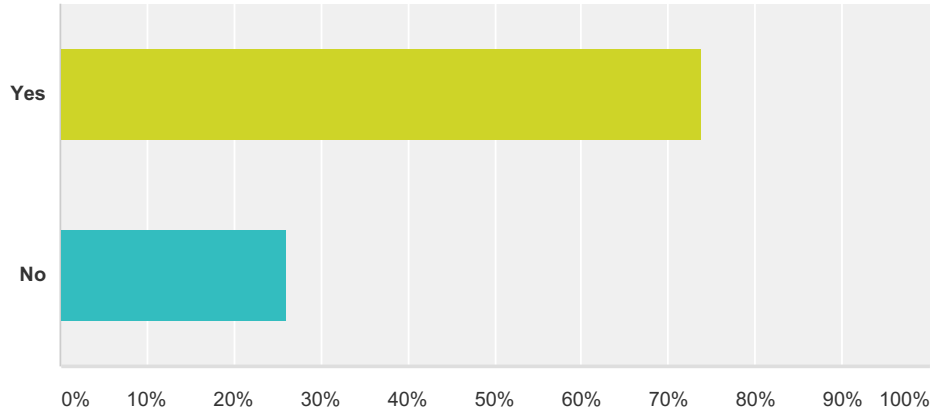
Q4 Are there any additional specific religious, cultural or secular practices that you would like to see accommodated at the cemetery?

Answered: 13 Skipped: 12

#	Responses	Date
1	Prayer of any faith be allowed within the central gathering place (with no specific religion symbol of any faith prominent)	6/5/2015 11:48 AM
2	As per community needs. As per need .	6/1/2015 4:01 PM
3	No.	6/1/2015 2:18 PM
4	No. We like the "mix" as it is now.	6/1/2015 1:23 PM
5	No.	6/1/2015 1:12 PM
6	No	5/31/2015 5:45 PM
7	nothing specific	5/31/2015 3:32 PM
8	All the citizens pay due federal, provincial and city taxes and therefore, the city should try its best to accommodate the needs of all the citizens in the best possible way. This is a new cemetery and the city should entertain and accommodate any further suggestions from different groups, if any.	5/31/2015 11:33 AM
9	given you ask for this Q again you are amazing. thank you	5/29/2015 7:50 AM
10	No	5/28/2015 8:30 PM
11	Scatter grounds, floral gardens	5/28/2015 6:21 AM
12	no	5/27/2015 12:28 PM
13	I think the cemetery, or portions of it, should feel open and welcoming, like a park. I would like to see people enjoying the cemetery, not always being contemplative and somber.	5/27/2015 7:04 AM

Q5 Green Burial is an interment option that involves no embalming, and burial in a simple biodegradable casket or container. Would you consider Green Burial if it were made available at Brandon Cemetery?

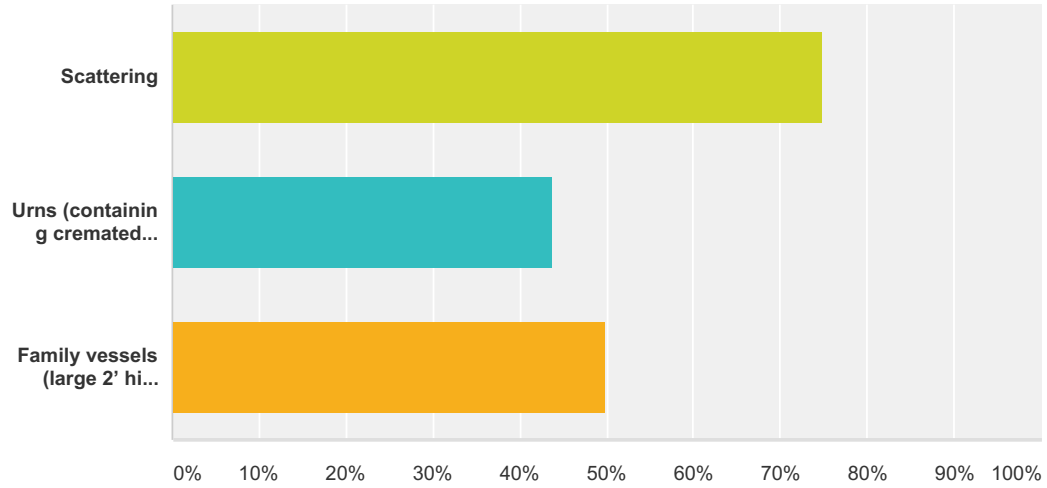
Answered: 23 Skipped: 2



Answer Choices	Responses
Yes	73.91% 17
No	26.09% 6
Total	23

Q6 Would you consider one or more of the following options for cremated remains interment if they were made available?

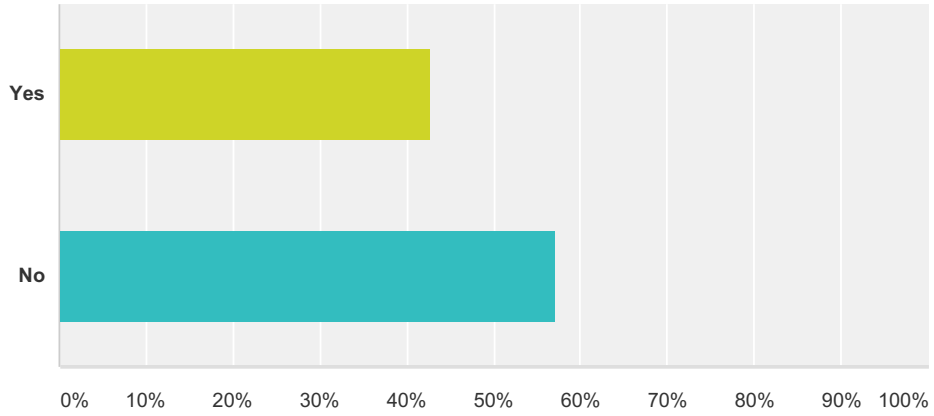
Answered: 16 Skipped: 9



Answer Choices	Responses	
Scattering	75.00%	12
Urns (containing cremated remains above ground)	43.75%	7
Family vessels (large 2' high vessels in which multiple urns are nested or remains are comingled)	50.00%	8
Total Respondents: 16		

Q7 Is a memorial wall an option your family might chose for commemoration of loved ones, possibly even memorializing those buried elsewhere?

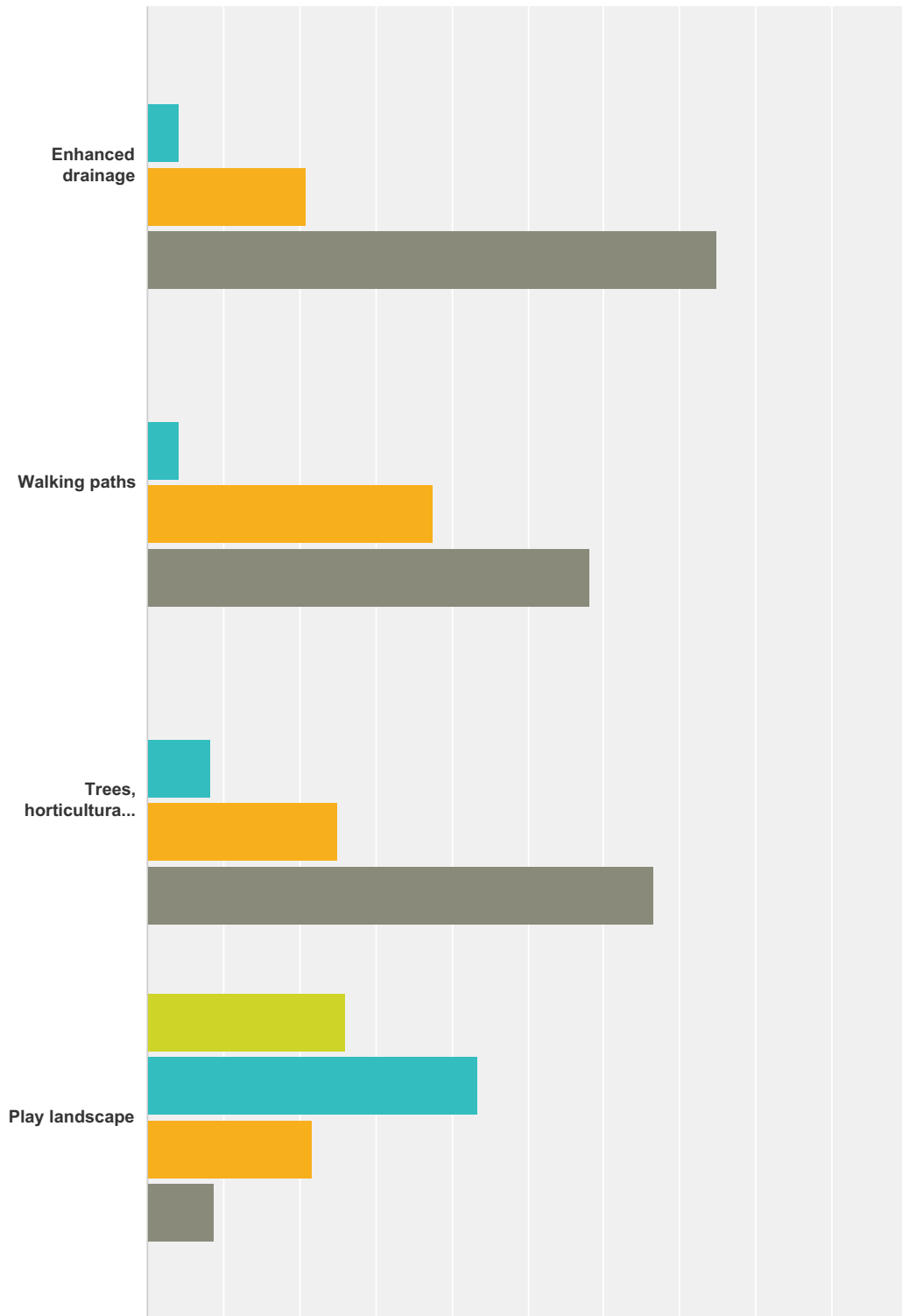
Answered: 21 Skipped: 4



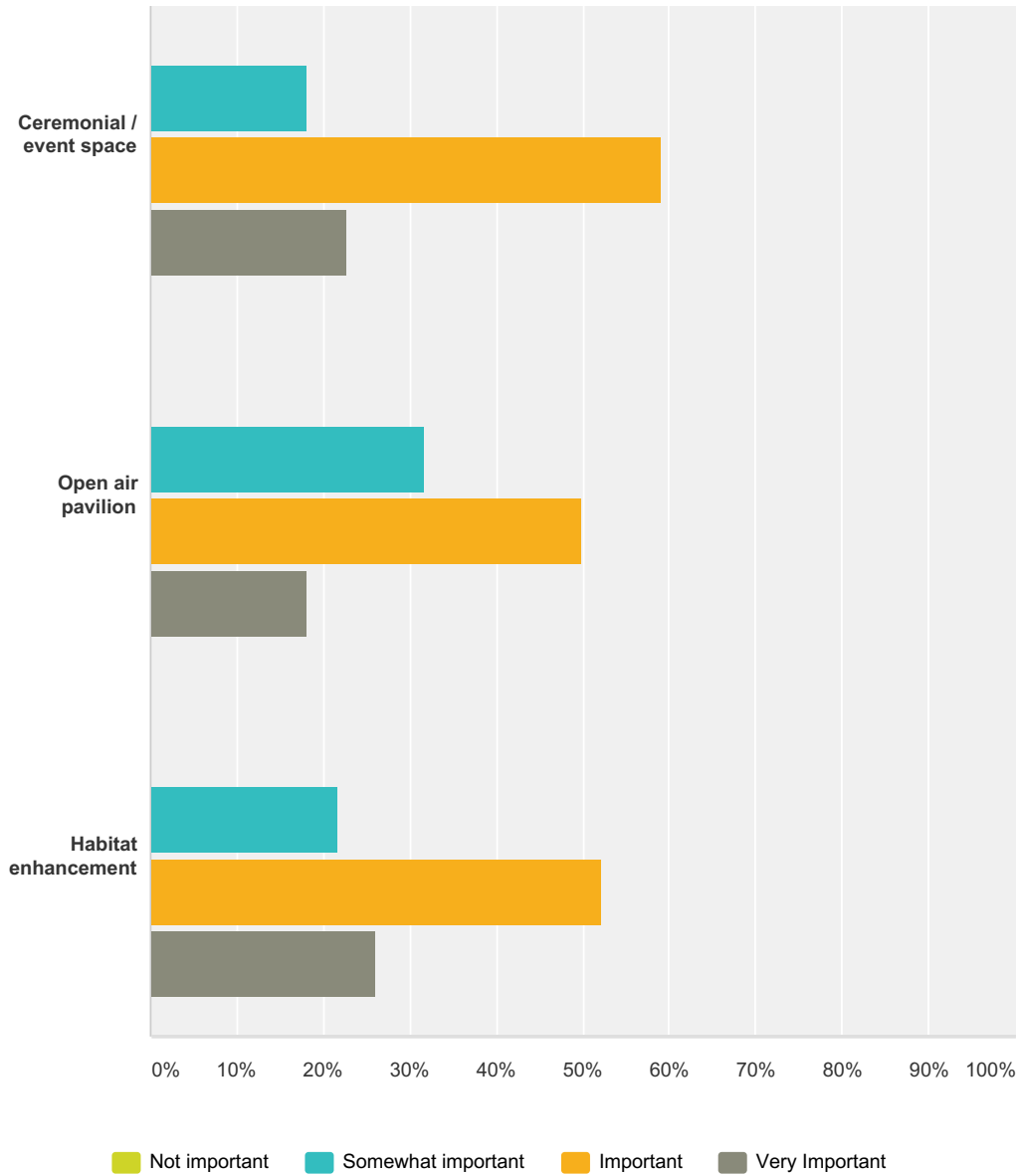
Answer Choices	Responses
Yes	42.86% 9
No	57.14% 12
Total	21

Q8 The cemetery expansion is intended to accommodate a wide variety of uses and beliefs, including acting as an extension of the community's green space. What are the MOST IMPORTANT amenities you would like to see in the new cemetery?

Answered: 24 Skipped: 1



City of Brandon - Cemetery Expansion Master Plan



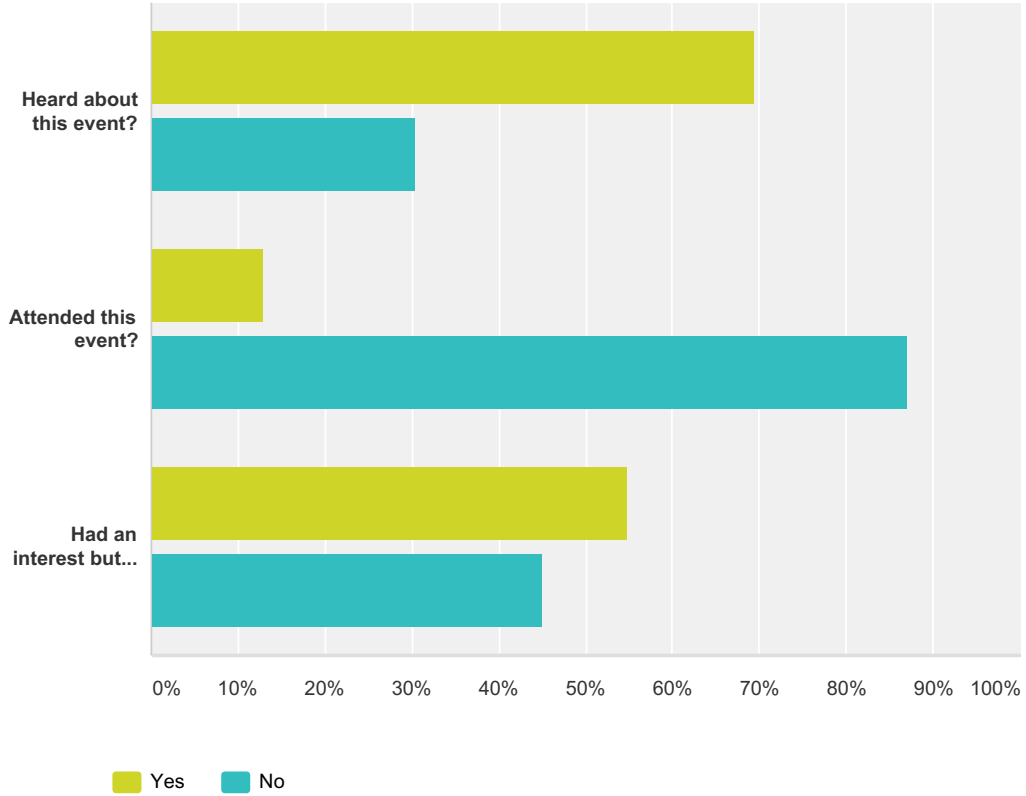
	Not important	Somewhat important	Important	Very Important	Total
Enhanced drainage	0.00% 0	4.17% 1	20.83% 5	75.00% 18	24
Walking paths	0.00% 0	4.17% 1	37.50% 9	58.33% 14	24
Trees, horticultural features	0.00% 0	8.33% 2	25.00% 6	66.67% 16	24
Play landscape	26.09% 6	43.48% 10	21.74% 5	8.70% 2	23
Ceremonial / event space	0.00% 0	18.18% 4	59.09% 13	22.73% 5	22
Open air pavilion	0.00% 0	31.82% 7	50.00% 11	18.18% 4	22
Habitat enhancement	0.00% 0	21.74% 5	52.17% 12	26.09% 6	23

City of Brandon - Cemetery Expansion Master Plan

#	Other (please specify)	Date
1	The ceremonial event space should be secular so that it can comfortably be used by various groups.	5/31/2015 11:36 AM
2	I do not believe a full blown playground or structure should be included	5/28/2015 6:23 AM

Q9 The Gossip in the Graveyard history tour takes place annually at Brandon Cemetery. Have you:

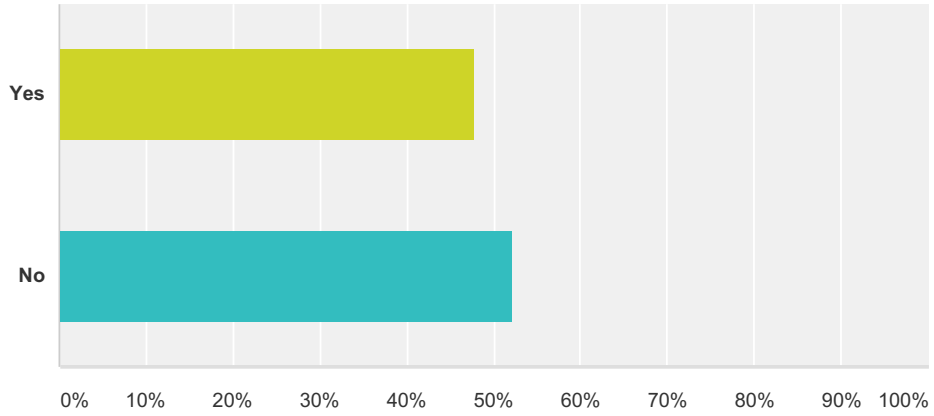
Answered: 24 Skipped: 1



	Yes	No	Total
Heard about this event?	69.57% 16	30.43% 7	23
Attended this event?	13.04% 3	86.96% 20	23
Had an interest but have never attended?	55.00% 11	45.00% 9	20

Q10 Would other community events at the cemetery such as music, candle-lighting services or 'Night for All Souls' appeal to you?

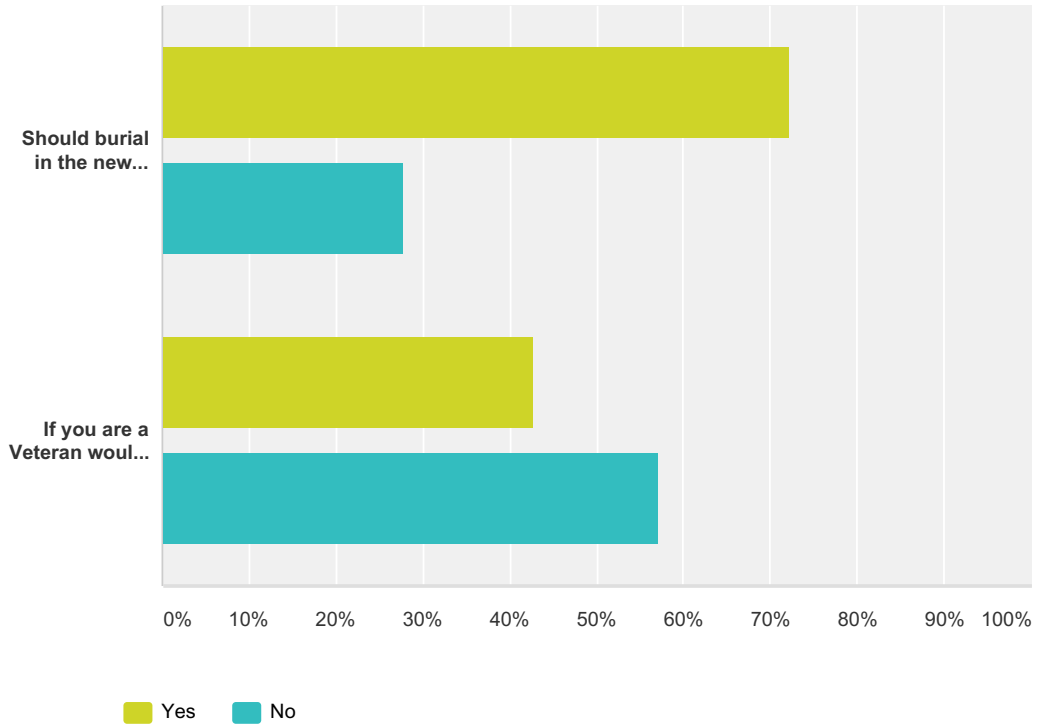
Answered: 23 Skipped: 2



Answer Choices	Responses	
Yes	47.83%	11
No	52.17%	12
Total		23

Q11 The Cemetery Bylaw is currently being reviewed in order to better meet the present day and future needs of the community. This includes the redefinition of Veteran to include all military, and creation of a new Field of Honour as part of the cemetery expansion.

Answered: 18 Skipped: 7



	Yes	No	Total
Should burial in the new Veterans' area include interment of a non-serving spouse?	72.22% 13	27.78% 5	18
If you are a Veteran would you be willing to pay for a burial plot in the new Field of Honour?	42.86% 3	57.14% 4	7

City of Brandon - Cemetery Expansion Master Plan

Q12 Do you have any additional comments?

Answered: 7 Skipped: 18

#	Responses	Date
1	I do think that Veteran offices should pay for the Veteran plots.	6/1/2015 2:10 PM
2	You can get start from the federal government to keep up with ground maintenance. This is a huge pool of funding available for this.	6/1/2015 2:05 PM
3	Non-serving spouse should likely pay for plot but any Veteran should not. "Field of Honor" is a good idea.	6/1/2015 1:26 PM
4	A few street lights.	6/1/2015 1:14 PM
5	No	5/31/2015 5:48 PM
6	very good extention plan.	5/31/2015 3:33 PM
7	Am not a veteran, but the survey doesn't allow me to make the distinction between "Not a veteran" and "Am a veteran, but not willing to pay"	5/27/2015 7:05 AM

APPENDIX E: GLOSSARY OF CEMETERY TERMS

Adapted from various sources by LEES+Associates

AT-NEED	<ul style="list-style-type: none">▪ At the time of, or immediately following, death.▪ Usually refers to the time of purchase of funeral or cemetery services.
BOOK OF MEMORIES	<ul style="list-style-type: none">▪ Plaque with list of names of the deceased who typically are located in areas not readily accessible.▪ A type of memorial monument.
BURIAL	<ul style="list-style-type: none">▪ One form of interment.▪ The placement of human or cremated remains in a grave.
BURIAL LINER	<ul style="list-style-type: none">▪ Similar to a burial vault, however, unlike a vault it only covers the top and sides of the casket
BURIAL PERMIT	<ul style="list-style-type: none">▪ A legal document issued by a regulatory authority authorizing final disposition of human remains.
BURIAL VAULT	<ul style="list-style-type: none">▪ A protective, sealable outer receptacle, into which a casket or urn is placed, designed to restrict the entrance of gravesite elements into the casket or urn.
BYLAWS	<ul style="list-style-type: none">▪ The written regulations, rules or laws governing the organization, management and operation of a cemetery, mausoleum, columbarium or crematorium.
CARE FUND (also known as PERPETUAL CARE FUND or MAINTENANCE FUND)	<ul style="list-style-type: none">▪ An irrevocable trust fund established, held and administered in accordance with applicable law, with the income from the fund to be used for the upkeep and repair of a cemetery, mausoleum or columbarium.
CASKET	<ul style="list-style-type: none">▪ A rigid container usually constructed of wood, metal or similar material, ornamented and lined with fabric, designed for the encasement of human remains.
CASKET ENTOMBMENT	<ul style="list-style-type: none">▪ When a casket is interred in a mausoleum.

CEMETERY SERVICES	<ul style="list-style-type: none">▪ The disposition of human remains by interment or cremation and includes the supply of goods incidental to the provision of such service, but does not include the sale of lots.
COLUMBARIUM (plural: COLUMBARIA)	<ul style="list-style-type: none">▪ A structure, building, an area in a structure or building that contains, as an integral part of the structure or building or as a freestanding sections, niches for the inurnment of cremated remains.▪ Can be “Individual”, “Family” or “Community”, based on the number of niches, and how they are sold.
COMMEMORATION	<ul style="list-style-type: none">▪ A ceremony, service or symbol of memory for a person/people or event
COMINGLING	<ul style="list-style-type: none">▪ The mixing of the cremated remains of more than one deceased person.
CONTAINER	<ul style="list-style-type: none">▪ A self-contained receptacle or enclosure other than a casket, made of rigid cardboard, pressed wood or other similar material that is of sufficient strength to hold and conveniently transport human remains, but does not include a metal or fiber glass casket, or receptacle or enclosure made of plastic or similar substance, or a pouch or bag.
CREMATED REMAINS	<ul style="list-style-type: none">▪ The human bone fragments that remain after cremation that may also include the residue of any other materials cremated with the human remains.
CREMATION	<ul style="list-style-type: none">▪ The irreversible reduction of human remains to bone fragments through the application of flame and intense heat; in some jurisdictions this may include the repositioning or movement of the body during the process to complete the cremation; and the manual or mechanical reduction of the bone fragments after removal from the cremation chamber.
CREMATION LOT	<ul style="list-style-type: none">▪ A space used, or intended to be used, specifically for the interment of cremated remains.▪ Typically, a smaller than full-sized lot.

CREMATORIUM	<ul style="list-style-type: none">▪ The building or part of a building that is fitted with approved appliances for the purpose of cremation human remains and includes everything incidental or ancillary to it.
CRIB GRAVE	<ul style="list-style-type: none">▪ A grave lot surrounded by a small picket fence.
CRYPT	<ul style="list-style-type: none">▪ One kind of lot.▪ Typically, a space in a mausoleum used or intended to be used for the entombment of human remains.
DEATH CERTIFICATE	<ul style="list-style-type: none">▪ A legal document certifying the vital statistics pertaining to the life and death of a deceased person.
DIRECT (or IMMEDIATE) DISPOSITION	<ul style="list-style-type: none">▪ The final disposition of human remains without any formal viewing or visitation, ritual, rite, service or ceremony.
DISINTERMENT	<ul style="list-style-type: none">▪ The removal of human remains, along with the casket or container or any remaining portion of the casket or container holding the remains, from the lot in which the remains had been interred.
DOUBLE DEPTH LOT	<ul style="list-style-type: none">▪ A lot dug at extra depth at the time of the interment of the first casket to allow for the accommodation of a second interment at regular depth.
EASEMENT	<ul style="list-style-type: none">▪ The right acquired, whether or not supported by a certificate, to interment in a lot.
ENTOMBMENT	<ul style="list-style-type: none">▪ One form of interment.▪ The placement of human remains in a mausoleum crypt.
FAMILY COLUMBARIUM	<ul style="list-style-type: none">▪ See columbarium
FAMILY ESTATE LOTS	<ul style="list-style-type: none">▪ A family estate lot contains 6-12 lots together.
FAMILY VESSEL	<ul style="list-style-type: none">▪ A large urn for several cremated remains. Remains may be comingled or may be contained in smaller, individual urns, held within the larger vessel.
FLAT MARKER	<ul style="list-style-type: none">▪ A grave marker set flush with the ground.
FUNERAL SERVICES	<ul style="list-style-type: none">▪ The arrangements, care and preparation of human remains for interment, cremation or other disposition and includes the supply of goods incidental to the

- arrangements, care and preparation, but does not include the sale of lots.
- GRAVE**
- One kind of lot.
 - A portion of ground in a cemetery, used or intended to be used, for the burial of human remains or cremated remains.
- GRAVE LINER**
- A fiberglass or concrete structure installed over a casket once it has been placed in the grave.
- GRAVE MARKER**
- Can be in-ground (flat) or upright.
- GREEN BURIAL**
- A more environmentally conscious alternative to “traditional burial.” Typically includes:
 - a. no embalming;
 - b. burial directly in the ground, without a grave liner or vault;
 - c. a fully biodegradable burial container (casket or shroud);
 - d. interment sites planted with indigenous ground cover, and
 - e. no individual grave markers.
- INTERMENT**
- Disposition by:
 - a. burial of human remains or cremated remains in a grave;
 - b. entombment of human remains in a mausoleum, crypt, or;
 - c. inurnment of cremated remains in a columbarium niche.
- INURNMENT**
- One form of cremated remains interment.
 - The process of placing cremated remains in a receptacle including, but not limited to, an urn and placing the urn into a niche.
- LAWN CRYPT**
- A concrete or other durable and rigid outer receptacle installed in a grave prior to burial.

- LOT
- A space used, or intended to be used, for the interment of human remains or cremated remains under a right of interment and includes a grave, crypt, niche or plot.
- LOT HOLDER
- The person in whose name the right of interment in a lot is registered in the records of a cemetery and, where the interment has taken place, includes the person who has legally acquired ancillary rights to the lot.
- MAUSOLEUM
(plural: MAUSOLEA)
- MAUSOLEUM CRYPT
- A structure or building that contains interior or exterior crypts designed for the entombment of human remains.
 - A chamber of a mausoleum or sufficient size for entombment of human remains.
- MEMORIAL
- A product, meeting the bylaw standard of a cemetery, used or intended to be used to identify a lot or to memorialize a deceased person interred or to be interred in a lot, including but not limited to:
 - a. a marker, headstone, tombstone monument, plaque, tablet or plate on a lot; or
 - b. a tablet inscription, lettering or ornamentation on a crypt or niche front, or
 - c. a tree, boulder or other feature so identified;
 - A ceremony, rite or ritual commemorating the life of a deceased individual without the human remains being present.
- NECESSARIUM
- Necessaria are stations located throughout a cemetery for filling vases and disposing of garbage. They often provide watering cans, flower vases, a rake and hand tools. They should be located within 60m from all graves.
- NICHE
- One kind of lot.
 - A space, usually within a columbarium, for placing a receptacle containing cremated remains.
- OSSUARY
- A vessel for the interment of two or more cremated remains.
 - Typically, the cremated remains are comingled

OUTER CONTAINER	<ul style="list-style-type: none">▪ A receptacle, which is designed for placement in a lot to accept the placement of a casket or urn.
PERPETUAL CARE FUND (also known as CARE FUND or MAINTENANCE FUND)	<ul style="list-style-type: none">▪ An irrevocable trust fund established, held and administered in accordance with applicable law, with the income from the fund to be used for the upkeep and repair of a cemetery, mausoleum or columbarium.
PRE-NEED	<ul style="list-style-type: none">▪ Any time prior to death.▪ Usually refers to the time of purchase of funeral or cemetery services.▪ “Pre-need planning” refers to the process of making arrangements and/or entering into contracts regarding future cemetery services for one or more persons who are still alive at the time.
REGISTRAR	<ul style="list-style-type: none">▪ The person responsible for the administration and enforcement of applicable laws and regulations relating to cemetery and funeral services. In Manitoba, this is governed by the Funeral Board of Manitoba.
SCATTERING	<ul style="list-style-type: none">▪ The irreversible dispersal of cremated remains over land or water, or comingling in a defined area in a cemetery.
SCATTERING GARDEN	<ul style="list-style-type: none">▪ An area within a cemetery, usually providing an attractive natural or ornamental setting, dedicated to the scattering of cremated remains.
SPIRIT HOUSE	<ul style="list-style-type: none">▪ A wooden shelter over a grave to house the spirit of the dead, typical of many aboriginal cemeteries in Canada.
UPRIGHT MARKER	<ul style="list-style-type: none">▪ A grave marker that is not flush with the ground, is mounted on a footing and intended to be visible over the surrounding finished grade.
URN	<ul style="list-style-type: none">▪ A receptacle for holding cremated remains.

APPENDIX F: PROPOSED BYLAW FORMAT

<p>I. Introduction</p>	<p>14. Burial Receptacle</p>	<p>VIII. Cemetery Operation and Maintenance</p>
<p>II. Definitions</p>	<p>15. Suitable Container</p>	<p>1. General Maintenance</p>
<p>III. Administration of the Cemeteries</p>	<p>16. Further Usage</p>	<p>2. Authority</p>
<p>1. Application</p>	<p>17. Funeral Services</p>	<p>3. Floral Arrangements</p>
<p>2. Non-Limitation</p>	<p>18. Casket Opening</p>	<p>4. Floral Timelines</p>
<p>3. Amendments</p>	<p>19. Veteran Burial</p>	<p>5. Landscaping</p>
<p>4. Special Cases</p>	<p>20. Veteran Expenses</p>	<p>6. Memorial Programs</p>
<p>5. Error Correction</p>	<p>21. Indigent Burial</p>	<p>7. Personal Responsibilities</p>
<p>6. Disclaimer</p>	<p>22. Disinterment Permission</p>	<p>8. Authorization of Work</p>
<p>7. Admission</p>	<p>23. Disinterment Requirements</p>	<p>9. Times of Work</p>
<p>8. Enforcement</p>	<p>24. Disinterment Restriction</p>	<p>10. Liability</p>
<p>IV. Sale and Ownership of Plots</p>	<p>25. Disinterment Procedures</p>	<p>11. Access</p>
<p>1. Responsibilities</p>	<p>VI. Lot Burial Options</p>	<p>12. Vehicle</p>
<p>2. Address Change</p>	<p>1. Casket Burial Number</p>	<p>13. Activities</p>
<p>3. Cost</p>	<p>2. Double Depth</p>	<p>14. Behaviour</p>
<p>4. Easement</p>	<p>3. Total Burial Number</p>	<p>15. Injury</p>
<p>5. Hold Request</p>	<p>4. Cremains in Full Size Plot</p>	<p>16. Fire Arms</p>
<p>6. Documentation</p>	<p>5. Existing Occupied Plots</p>	<p>17. Hours</p>
<p>7. Subdivide</p>	<p>6. Unauthorized Additional Burial</p>	<p>18. Memorial Services</p>
<p>8. Cancellation</p>	<p>7. Veteran Restriction</p>	<p>19. Rule Information</p>
<p>9. Refunds</p>	<p>VII. Markers and Monuments</p>	<p>20. Enforcement</p>
<p>10. Error Correction</p>	<p>1. Regulations</p>	<p>21. Changes</p>
<p>11. Replacement</p>	<p>2. Material Specifications</p>	<p>IX. Flowers and Decorations</p>
<p>12. Resale</p>	<p>3. Permits</p>	<p>1. Purpose</p>
<p>13. Reclamation</p>	<p>4. Authorization</p>	<p>2. Planting</p>
<p>14. Replot</p>	<p>5. Plot Costs</p>	<p>3. Authorized Vases</p>
<p>15. Inheritance</p>	<p>6. Section Guidelines</p>	<p>4. Seasonal Memorialization</p>
<p>16. Ownership Priority</p>	<p>7. Additional Memorialization</p>	<p>5. Burial Flowers</p>
<p>V. Burial/ Interment/ Disinterment</p>	<p>8. Liability</p>	<p>6. Seasonal Decorations</p>
<p>1. Authorization</p>	<p>9. Contractors</p>	<p>7. Retrieval</p>
<p>2. Space User</p>	<p>10. Installation</p>	<p>8. Authorization</p>
<p>3. Responsibilities</p>	<p>11. Preneed Memorialization</p>	<p>9. Liability</p>
<p>4. Burial Information</p>	<p>12. Grave Covers, Vaults, Crypt, Curbing</p>	<p>10. Enforcement</p>
<p>5. Documentation</p>	<p>13. Grave Identification</p>	<p>X. Lawn Crypts & Columbarium</p>
<p>6. Ownership Proof</p>	<p>14. Removal, Alteration, Additions</p>	<p>1. Crypt Package</p>
<p>7. Burial Restriction</p>	<p>15. Repair</p>	<p>2. Niche Package</p>
<p>8. Notice</p>	<p>16. Removal</p>	<p>3. Interment Number</p>
<p>9. Information</p>	<p>17. Safety</p>	<p>4. Perpetual Care Funds</p>
<p>10. Schedule Times</p>	<p>18. Work Times</p>	<p>5. Granite Inscriptions</p>
<p>11. Scheduling</p>	<p>19. Liability</p>	<p>6. Resale</p>
<p>12. Rescheduling</p>	<p>20. Owner Responsibility</p>	<p>7. Burial Authorization</p>
<p>13. Overtime</p>		<p>8. Regulation</p>
		<p>9. Vandalism</p>

APPENDIX G: GREEN BURIAL

Green burial typically appeals to families who are considering cremation but may have concerns about the carbon footprint imposed by this process. People who wish to make a personal statement about their commitment to the environment are often interested in green burial.

Public interest in this type of interment is growing in Canada. The first and largest green burial site currently operating within a public cemetery in Canada is the Woodlands section at Royal Oak Burial Park near Victoria, BC. This site opened in late 2008 and has since sold over 70 at-need and 100 pre-need lots. Offering green burial is advantageous in terms of its marketing value; print, TV and radio media are very attuned to stories about green burial. Stephen Olson, Executive Director of Royal Oak Burial Park in Victoria, BC attests to the promotional value of the green burial initiative at his cemetery.¹

Green burial areas can yield the same capacity, revenue and profit margin per lot as traditional burial grounds. Over the long term, maintenance is less costly since a green burial area is expected to “return to nature,” if not simply appear as more naturalistic and less manicured.

Offering this type of interment is unlikely to require significant capital investment, and could increase the inventory of in-ground burial sites by designating green burial lots as an enhanced use of an edge location or buffer zone in the cemetery.

Since green burial allows for slightly shallower excavations (of about 1.2m/ 4’ depth) compared with the 1.8m/6’ depth of conventional burials, smaller equipment may be used for grave excavation and groundwater is less of an issue. Green burial lots do not require the removal of excavated soils or the replanting and maintenance of turf grass. As a result, sites that would otherwise be challenging to develop as conventional graves can be good candidates for green burial.



Figure 21: Typical Green Burial Service, Source: LEES+Associates.



Figure 20: Typical green burial communal marker, Source: LEES+Associates.

¹ CTV News, 'More people opting for 'The Green Goodbye'', February 20, 2013 (<http://bc.ctvnews.ca/more-people-opting-for-the-green-goodbye-1.1158345>)

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VIA EMAIL: t.snure@brandon.ca

Mr. Ted Snure, P.Eng.
City of Brandon
Engineering Department
638 Princess Avenue
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Dear Mr. Snure

**Subject City of Brandon Cemetery Expansion Master Plan
Stormwater Analysis**

This report describes the analysis done to assess the impact of modifications to a proposed stormwater drainage system in the Southeast Drainage Basin as part of the development of the Cemetery Expansion Master Plan. The report includes:

- A brief introduction and background.
- A summary of design criteria used.
- A review of options for modifications to the proposed drainage system.
- Other system modifications that may be done to decrease the impact of the proposed system changes in or near the Cemetery Expansion.
- Description of the system modification and stormwater analysis.
- Overview of the risk of hydrocarbon contamination.
- A few design and construction considerations for the proposed works.
- A summary of recommendations.

INTRODUCTION

The development of the Cemetery Expansion Master Plan must consider drainage of the Cemetery lands themselves as well as integration with the overall drainage concept for the Southeast Drainage basin.

Drainage from the existing pond ("Sobeys pond") serving the 18th Street east side commercial lands (Canadian Tire, Sobeys, etc.) and from nearby Aberdeen Avenue catch basins is currently routed to a field drain across the Cemetery expansion site. A proposed linear pond (Pond P1) connecting the Sobeys pond and serving the residential neighbourhood south of Richmond Avenue and west of 6th Street and future residential lands (that have subsequently been developed) south and west of Maryland Avenue and 9th Street was envisioned as part of the April 2003 study "Southeast Drainage Basin Stormwater Study" prepared by UMA Engineering. The Pond P1 footprint was later reduced due to avoid work on hydrocarbon impacted lands as part of a June 2005 Addendum I to the "Southeast Drainage Basin Stormwater Study" also prepared by UMA Engineering. The pond was limited to the lands between Balmoral Avenue and Maryland Avenue south of 10th Street, and a control weir manhole was installed at Maryland Avenue and Sycamore Drive to maintain the permanent water level in Pond P1. Construction of a sewer on Aberdeen Avenue from the Sobeys Pond to 10th Street was proposed as a means of rerouting flow around the impacted lands.

The construction of Pond P1 as envisioned was complicated by hydrocarbon impacted soils and high groundwater. The land proposed for the reduced size Pond P1 is available, but the pond may not be constructed as deep as desired to minimize earthwork below the upper groundwater level and to avoid mobilizing the hydrocarbon plume. However, replacement of an existing field drain with a wide channel as both for stormwater and as a landscape feature has been proposed by Burns Maendel Consulting Engineers Ltd. (BMCE) in their functional design of site servicing for the Cemetery Expansion Master Plan. This channel will be shallow but have considerable footprint area storage in addition to the shallow Pond P1.

Concepts for the Cemetery Expansion are shown as **Figure 1** (Overall Concept developed by Lees & Associates and BMCE) and **Figure 2** (Conceptual Drainage developed by BMCE).

Modification to the proposed area drainage system was investigated to assess and mitigate the impact of these changes on the desired system performance. A hydrologic and hydraulic model of the drainage system using the EPA Stormwater Management Model (SWMM) version 4 software was originally developed in 2001 for the 2003 and 2005 studies. This model has been ported to a newer version 5.022 of EPA SWMM and continuously modified over the past 10 years to reflect the buildout of the area lands and react to changes in the proposed developments. This model was used to assess the performance of various alternatives.

STORMWATER DESIGN CRITERIA

The stormwater design criteria developed as part of the April 2003 study have been used as a guideline, as follows:

Design Rainfall Intensity-Duration-Frequency (IDF) curves

Developed from Environment Canada IDF data for Brandon Canadian Department of Agriculture (CDA) Station 5010485 from 1960-1985 data. This IDF data was preferred to the Brandon Airport (Station 5010480) IDF because it is considerably more severe. The Environment Canada IDF data was fit to three parameter IDF equations for the 2003 study.

Design Rainstorms

Standard design rainstorms for Brandon were used for this study. These storms are theoretical Chicago type design rainstorms for various return periods developed as part of the 2003 study using the Brandon CDA IDF curves, 31% storm advancement factor and 2.4 mm/hr minimum intensity cut-off.

Design Flow

Design flow as runoff from lands within the storm sewer service area would typically be developed using the Rational Method. However, for this work the hydrologic routines of the SWMM model were used and assuming the catchment runoff characteristics as described in the 2003 study report.

Pipe Capacity Design

Pipes were assumed to be laid at minimum slope not less than that computed using the Manning formula with Manning Roughness $n=0.013$ and full flow velocity of 0.91 m/s (3 fps). This velocity provides for resuspension of settled and transportation of suspended grit and solids.

Maximum velocity of flow in pipes is specified, but preferably less than 4.5 m/s with suitable erosion protection at inlets and outlets and manhole wall impact protection provided as necessary.

Minor Design Event for Piped Storm Sewers

5 year return, unless the piping is considered to be part of a trunk (major conveyance) system.

Major Design Event for Ponds and Major Conveyances

25 year return minimum, preferably 100 year return. Note that the 100 year return rainstorm was originally recommended for the sizing of stormwater retention in the Southeast Drainage Basin, but this was subsequently reduced to 25 year return due to the various restrictions caused from the system being developed without an outlet and reduction in available land dedication for storage as originally planned. The 25 or 100 year design basis for ponds does not necessarily require the entire runoff volume to be stored, and outflow is permitted based on capacity provided by the downstream receiving system and performance confirmed by hydraulic modelling.

Design Basis for Ponds

The design water level during the 100 year return rainfall (or 25 year rainfall for retrofit situations) was originally envisioned as 1.2 to 1.5m rise above normal water level in a wet bottom pond or above the bottom of a dry bottom pond, plus a nominal 0.6m freeboard allowance. The design normal water level of a wet bottom pond or the bottom of a dry pond was assumed to be 2.5m to 3.0m below ground level, based on:

- 1.8m normal water level (NWL) to freeboard level, plus.
- Approximately 0.3-0.6m of high end buffer between the low ground at the high end of the system and maximum 5 year return design hydraulic grade line elevation, plus.
- Approximately 0.6m of hydraulic drop (slope) between the high end of the system and the pond outlet.

The permanent water depth in wet bottom ponds was assumed to be 2.5 m to maintain the centre of the pond free of emergent vegetation. The shallow Dry Pond version of Pond PI will not meet this criteria.

MODIFICATIONS TO EXISTING PROPOSED DRAINAGE SYSTEM

Pond PI construction is undesirable due to high groundwater and contamination migration from Conoco site. Several alternatives to avoid or mitigate this problem are presented below:

Alternative I - Omit Pond PI, do nothing

Pros

- No cost.
- No impact on groundwater regime.

Cons

- No improvement to drainage of lands between Richmond Avenue and Aberdeen Avenue, and low capacity roadside ditches would remain.

This is not a feasible option since this portion of the City would continue to have a low level of service. It may take many years to construct a piped land drainage system in the neighbourhood, but the ultimate servicing to City standard should be planned and capacity provided.

Alternative 2 – Omit Pond PI, route drainage elsewhere

Pros

- No impact on groundwater regime.

Cons

- Drain East to 1st Street. There is a natural high point (on both Aberdeen Ave. and Ottawa Ave.) near 6th Street, so the most favourable option is to route lands west of 6th Street to 9th or 10th Street as originally planned. Routing drainage towards 1st Street from as far west of the Sobeys Pond or 10th Street would require deep excavation near 6th Street and a downstream receiving system would need to be constructed near 1st Street. A pothole / marsh area near the former Zenith Paving property would be a good candidate for a pond (“Zenith Pond”).
- Drain north to Richmond Avenue. Only a small diameter piped system exists on Richmond Ave., and would need to be replaced to accommodate additional lands at an acceptable level of service. Richmond Ave. is an arterial roadway, so sewer construction would cause significant traffic disruption. This system would drain to a branch of the overloaded 1st Street trunk system, or to the proposed Zenith Pond or deepening of the current dry pond on the southwest corner of 1st Street and Richmond Ave.

This plan depends upon an alternate system being developed. While the Zenith Pond is a likely future addition to the drainage system, and is compatible with either a connection to the 1st Street trunk system (possibly as high end relief) or the ultimate development of a new outlet to the Assiniboine River east along Richmond then north to the river east of the Manitoba Hydro Brandon Generating Station, the full development of this system is likely many years away from construction.

Alternative 3 – Build shallow Pond PI above groundwater level

A shallow, dry bottom pond would be constructed on the Pond PI site. The pond would be ‘on line’, conveying flow from the proposed Cemetery Drain and from a future land drainage sewer system serving the lands north of Balmoral Avenue. A low level pipe is recommended to drain the future land drain sewer system constructed in the upstream lands. The proposed pond bottom is too high for these lands to drain by gravity because of the depth of pipe burial and slope of pipes. Drainage of a piped sewer system through a dry pond is also not ideal because the dry pond would typically be frozen during the late winter melt or watermain breaks, and during the spring thaw.

Pros

- Solves groundwater migration problem.
- Limited excavation (and construction dewatering) required.

Cons

- Less HGL drop available from upstream lands, so oversizing of sewers required to decrease HGL slope would be required.
- Considerable additional pond area required to equal storage volume.

This is a feasible solution that merits investigation using the SWMM model.

Alternative 4 – Build small pond P1 as planned, line with membrane or Clay liner

Pros

- System is constructed as originally envisioned.

Cons

- Difficult construction requiring considerable dewatering.
- Potential for mobilization of contaminated groundwater during construction.
- Additional cost for liner.

This is the status-quo and is the proposed system currently implemented in the existing version of the SWMM model.

OTHER SYSTEM MODIFICATIONS

A pond planned for the southeast corner of Tracey Street and Sycamore Drive (Dry Pond 5, known as Pond DP5) may not be constructed due to changes in land ownership. This pond was introduced to mitigate the reduction in available storage volume caused by the shrinking of Pond P1. However, the pond is located further upstream within the catchment near newer developments on Tracey Street and Sycamore Drive and also serves lands on the west side of 18th Street. The land near Tracey and Sycamore is higher than the land near Pond P1 (i.e. ground 395.0, and dry pond bottom of 392.0 m at DP5 vs. NWL 389.2 m and low ground 391.4 m at Pond P1). A control structure was planned as part of the Tracey pond construction as a means of reducing the peak flow routed downstream to the Pond P1 area, but was not constructed.

Area sewers have been sized assuming the Tracey pond will ultimately be in place, so downstream sewer replacement for increased capacity or contributing area reduction must be done to accommodate the reduction in available storage capacity.

Renewing relatively new sewers is not palatable, so the most feasible option is to sever lands west of 18th Street and rerouted to a new drainage district south of Patricia. The trunk sewer serving these lands can be constructed in the west side ditch between 18th Street and the service road, and the lands south of Patricia have not yet been developed so accommodating this flow diversion is currently possible with no throw-away work.

The stormwater analysis investigated the implications of deleting the Tracey pond (Pond DP5) and diverting stormwater from the lands west of 18th Street elsewhere.

ANALYSIS

This section describes the modifications to the proposed stormwater system and model results.

System Modifications

The system was modified represent the new proposal for Pond P1 as a shallow dry bottom pond, add the proposed Cemetery Channel, and interconnect to existing and proposed stormwater systems. These modifications are described below.

Shallow Version of Pond P1

The reduced footprint Pond P1 presented in the June 2005 study had a NWL of 389.2 m (surface area 23,660 sq m), a high water level of 390.419 m (NWL plus 1.219 m / 4 feet) and an

active storage volume of 35,400 cu m. The pond was proposed as a wet pond with bottom at 386.7 m (2.5 m deep) to allow upstream sewers to drain.

It is desirable to maintain the elevation of the dry pond bottom nominally above the groundwater level. February 2015 groundwater levels at monitoring wells and boreholes were provided by BMCE and June 2015 groundwater levels at the Monitoring wells provided by the City. The preliminary plan prepared by BMCE set the low pond bottom nominally 0.3m above the February 2015 groundwater level of nearby monitoring wells and boreholes with minimum elevation of 390.3 m at the south end. However, this is below the June 2015 groundwater level.

Groundwater elevations near the Pond PI site were noted as follows:

Table I – Groundwater Levels (depths below ground) near Pond PI Site

Location	Ground	Feb 2015	June 2015
MW 9 (west of PI site, north of field drain)	391.66m	389.99m (-1.67m)	390.76m (-0.90m)
MW 10 (west of PI site, south of field drain)	391.48m	389.95m (-1.53m)	390.58m (-0.90m)
Borehole 5 (middle of Pond PI site)	391.46m	389.96m (-1.50m)	n/a

Groundwater levels were notably 0.6 – 0.7 m higher in June compared with February, possibly due to rainfall infiltration. The upper groundwater level is believed to follow the natural Coulee drainage path towards the southeast. The low ground near Pond PI was assumed to be at elevation 391.4 m in the 2003 study. The June 2015 high groundwater level is only about 0.9 m below the ground surface, and higher than the proposed high water level in the concept for Pond PI.

An investigation of historic groundwater monitoring is required to assess if the June 2015 levels are abnormally high or typical. The dry bottom pond PI was initially modelled using BMCE's conceptual grades of 390.3 m (south end) and 390.71 m (north end), and a sensitivity analysis done to assess the impact of raising the bond bottom to 390.60 m (south end) and 390.71 m (north end). The preferred option would be to set the dry pond bottom as close as possible to the annual low groundwater level to gain as much storage as possible. Water sampling has not identified contamination in the southwest corner of the site near the proposed pond. The risk of hydrocarbon contamination based on past water quality monitoring was reviewed by Mr. Brent Horning, P.Eng., Hydrogeologist and is discussed in a later section of this report.

Construction of a dry pond with bottom elevation (or wet pond with normal water level) below the historic high groundwater level will cause increased mobilization of the impacted groundwater from the northwest corner of the Cemetery Expansion site towards the pond. However, the water quality observed in the impacted areas does not pose a risk to human health or the environment. The impacted groundwater is not suitable for drinking water, but would not pose a risk for human contact and would not kill vegetation. The impacted groundwater has similar hydrocarbon concentrations that would be observed in stormwater runoff from an asphalt parking lot. Based on the assessment, constructing the pond bottom below the high groundwater level does not present a concern (except for construction logistics), and constructing a membrane or clay liner for groundwater isolation is not warranted.

The footprint of Pond PI was modified to maximize the area within the boundaries of Balmoral Avenue right of way (north), 9th Street west side rear lot line (east), Magnolia Drive / Maryland Avenue right of way (south) and the south projecting of the 10th Street west side rear lot line and Manitoba Hydro easement (west). A 6 m buffer at existing ground level around the above

buffer was assumed for future pathways and tree planting. The dry bottom pond was assumed to have 7:1 sideslopes for slope stability.

The pond itself was modelled as two sections of trapezoidal channel (10 m bottom, 7:1 sideslopes) with a storage node installed at the middle of the dry pond and Cemetery Channel outlet capturing the remainder of the storage volume. The assumed pond bottom area was 10,200 sq m and maximum level of 15,100 sq m at elevation 392.10 m. Various model alternatives investigated raising or eliminating the pond entirely.

Outlet of Future System from North

A future storm sewer system serving the lands between 10th and 6th Street with sub-trunk sewers on Ottawa Avenue and Aberdeen Avenue was proposed in the 2003 study. To drain this system, it is necessary to install a storm sewer beneath the floor of the Dry Pond PI, beginning at the proposed 1200 mm sewer with invert elevation 389.144 m at the intersection of 10th Street and Balmoral Avenue.

The 1200 mm 10th Street sewer could either be installed on 10th Street (between Balmoral and Aberdeen), or run along an alignment west of the 10th Street west back lane. The 10th Street alignment is preferred even though its construction would require the full reconstruction of the impacted block of 10th Street since the pipe must run along 10th Street north of Aberdeen Avenue, could conflict with a hydro conduit bank near the west back lane alignment, and would require additional piping to route from 10th Street to the west back lane along Aberdeen Avenue (and back to the 10th Street alignment within the Pond PI site).

The pipe running beneath the Dry Pond was assumed to be part of the trunk system and set as a 1500 mm diameter pipe. High level overflow into the Dry Pond from the surcharged sewer system would be by two inlet structures located at the north and south ends of the Dry Pond. This pipe should be buried with the minimum 1.5m cover (measured to the pipe crown) as recommended for protection against disturbance and active soil movement due to freeze-thaw.

Hydraulic Control

A north control structure consisting of an orifice plate located on the south (downstream) outlet of the north inlet was investigated to force flow to be routed up into the pond, however this had a negative effect on the future upstream system and was deleted.

The Pond PI outlet was originally intended to be controlled by a weir manhole located at the northeast intersection of Magnolia Drive and Sycamore Drive. The manhole was constructed in 2007 is shown on **Figure 3** (City of Brandon Drawing SS-1378A, Rev 3 Jan 2015). The weir elevation was set to the original Pond PI Normal Water Level = 388.6 m (as-built 388.765 m), with invert of the downstream 1500 mm sewer set to elevation 388.6 m (as-built 388.966 m). This weir will now be too deep to impact the Dry Pond PI alternative, and since it is lower than the outlet pipe serves no purpose.

A new downstream control structure is required to utilize the Dry Pond PI storage. This structure would be located south of the south inlet, and include a 2.0m wide weir wall at pond bottom elevation 390.60 m (or 390.90 m for raised bottom alternative) plus a 300 mm orifice in the bottom of the weir wall near the pipe invert. The weir would cause backup water into the pond, and the orifice would allow the pond and pipe to drain down to the 388.765 m invert elevation of the downstream Magnolia Drive sewer. The orifice should be installed at or near the system invert to aid in pumped dewatering of the system from the Magnolia Drive and Sycamore Drive control structure. A conceptual sketch showing a profile view of the proposed control structure is shown as **Figure 4**.

Note that a 65 m long section of 1500 mm pipe was installed to the north of the Magnolia-Sycamore control structure and a field catch basin installed in 2007. This pipe was graded to drain towards the wet pond version of PI and will retain about 0.4 m of water if pumped dry at Magnolia Drive. It is expected that a portion of this pipe would be removed (and reused) when Dry Pond PI and the new control manhole are constructed.

Future storm sewers upstream of the pond were upsized using the SWMM model to permit only a few minutes of high end flooding during the peak of the 5 year return design rainstorm.

Cemetery Channel and Upstream Piped System

A small piped system was added on Aberdeen between the Sobey's Pond outlet and 13th Street, and routed into the Cemetery expansion site. This system is sized to accommodate shallow piped drainage from Aberdeen Avenue, 14th Street and 13th Street.

A new 10 m wide channel with nominal 7:1 sideslopes and 0.2% longitudinal slope was added between the upstream piped system outlet and the middle of Pond PI. The channel includes 3 culvert crossings based on crossing two internal roadways from the Lees and Associates conceptual plan plus a culvert undercrossing beneath a Manitoba Hydro conduit on the west side of Dry Pond PI.

Modeled Results

The current version of the Southeast Drainage Basin model is shown as **Figure 5**. A closer view of the centre of the Southeast Drainage Basin model between 1st and 18th Streets south to Richmond Avenue is shown as **Figure 6**. Note that the model was extended and modified as new developments were added to the system generally as a method of assessing how the proposed additions would function, but the model does not necessarily reflect the as-constructed system. A close-up view of the modified model reflecting the proposed Cemetery drainage and Dry Pond PI is shown as **Figure 7**.

The system response and tweaking of pipes and controls was investigated using the 25 year design rainstorm. Once the desired preliminary sizing was established, the system high ends were inspected using the 5 year design rainstorm and pipe sizes adjusted to minimize high end flooding. Note that SWMM models typically exhibit a few moments of high end flooding that is not observed in Rational Method analysis, so instantaneous flooding of 5 minute or less duration is typically disregarded.

The instantaneous peak hydraulic profile from the Sobey's Pond through the Cemetery Channel and Dry Pond PI and downstream to the 9th Street Traffic Circle in response to a 25 year storm is shown as **Figure 8**. Note the (desired) backup provided by the Cemetery roadway culverts, and flooding of Aberdeen Avenue since this exceeds the design basis.

The instantaneous peak in the future storm sewer system from the intersection of 6th Street and Aberdeen Avenue through the pipe beneath Dry Pond PI and downstream to the 9th Street Traffic Circle in response to a 25 year storm is shown as **Figure 9**. The response of the base case of Dry Pond PI (bottom elevations of 390.3 m south, 390.5 m middle, 390.71 m north) due to various design storms is shown on **Figure 10**.

The 25 year response to varying the anticipated ultimate buildout of the future parts of the system is shown for Dry Pond PI (**Figure 11**) and the existing downstream control structure at Magnolia and Sycamore Drives (**Figure 12**). These conditions include:

- Elimination of Dry Pond PI entirely (since it is relatively high in elevation and does not provide much storage).

- Elimination of Dry Pond DP 5 (Tracey Pond), in the event of a problem with the change in land ownership.
- Severing of the proposed connection to the west side of 18th Street, and rerouting of these lands to a new system draining south of Patricia Ave.

Figure 11 shows that Dry Pond PI will flood to ground in all options where the pond is eliminated. The Cemetery Channel is simply not large enough to provide the storage required, and constructing Dry Pond PI is warranted.

Figure 12 shows that the most significant impact is the removal of 42 ha of lands from west of 18th Street. If these lands are eliminated then levels at the control structure are significantly reduced following the initial flow spike. If Tracey Dry Pond is eliminated, then the initial spike will pass through the control structure and backflow into Dry Pond PI. The downstream open channel will also experience higher level and flow for an additional time of about 1 hour.

The hydraulic impact of raising the floor of Dry Pond PI from 390.5 m (at the middle of the pond, based on the conceptual design sloping from 390.71 m at the north end to 390.30 m at the south end) and changing the weir elevation is shown on **Figure 13**. This could be done to maintain the pond bottom elevation at/above the June 2015 high groundwater level. The results are summarized below:

Table 2 – Dry Pond PI Response to 25 year Rainstorm

Pond Bottom Elevation (m)	Weir Elevation (m)	Peak HGL (m)	Notes
390.50	390.6	390.86	Recommended
390.65	390.6	390.94	
390.65	390.9	391.10	

HYDROCARBON CONTAMINATION RISK

Various on-site environmental borehole drilling programs were undertaken on the proposed cemetery expansion site between 1985 and 2010. These site assessments determined that the subsurface stratigraphy is primarily a fine sand to 3 or 4 m below grade, followed by a clay till down to at least 9 m below grade. There is also an area of apparent fill material which was deposited into a historic slough area along the north edge of the site. This fill material reportedly originated from the adjacent historic refinery site, and was suspected of containing petroleum hydrocarbon impacted materials.

Reports of possible petroleum hydrocarbon type odours and staining to the subsurface soil in various locations across the proposed cemetery expansion site were generally from the base of the sand/ top of the clay, but associated analytical laboratory sample results indicated that most of these areas have only low, below guideline residual petroleum hydrocarbon concentrations in the soil. The fill material along the north edge of the site was, however, found to contain petroleum hydrocarbon concentrations in soil in excess of the applicable environmental site assessment guidelines.

Groundwater in the sand and clay units is generally found at 1 to 2 m below grade, and is expected to flow in a southeasterly direction at a rate of about 1 m/ year. Historical

groundwater monitoring over the period from 1985 to 2010, showed that any dissolved hydrocarbon impacts to groundwater were only in the wells along the north edge of the site, in the immediate vicinity of the contaminated backfill soil. No hydrocarbon impacts were identified near the southwest corner of the site near the proposed Dry Pond PI.

Based on the estimated length of time since the impacted fill materials was placed on this site (>40 years), if any significant contaminant was seeping out from the soil, it would be expected that the resulting impacted groundwater would have now created a plume length in the tens of metres. In the absence of any significant size to the observed on-site impacted groundwater area, it does not appear that this contaminated soil contains a significant volume of residual petroleum hydrocarbon impacts that could be acting as a source of contaminant migration.

The contaminated soil and groundwater conditions were the subject of a risk assessment process, performed in 2009-2010, which did not find that the subsurface contamination was a risk to human health or the environment. Based on our review of the historical site assessment and site monitoring information available, it is Tetra Tech's opinion that we are in agreement with this conclusion. Environmental contamination is therefore not likely to be an issue with regards to the future redevelopment of the site for expansion of the Brandon cemetery, except along the northern edge of the site where any earth works would require off-site disposal of any petroleum hydrocarbon contaminated soil encountered at an appropriate soil treatment facility, and possibly the use of geosynthetic liners to isolate underground utilities from the historic contaminated fill or the use of nitrile pipe gaskets.

DESIGN AND CONSTRUCTION CONSIDERATIONS

Several design and construction considerations are listed below for various elements of the proposed land drainage system:

Cemetery Channel Culverts

The Cemetery Channel will include 3 culvert crossings. The culverts would ideally be constructed using reinforced concrete pipe for longevity, and include precast end sections with inclined inlet type bar screens. Inlet type bar screens (with parallel vertical bars only, constructed at a minimum 1:1 and preferable 2 horizontal to 1 vertical incline, and including few or no horizontal bars) are recommended on both ends of each culvert because of the potential for reverse flow to meet requirements for human safety and debris shedding.

The culverts were nominally sized as 600 mm (two road crossings) and 900 mm (hydro undercrossing and outlet into dry pond PI). This reduced culvert sizing helps to maintain storage within the channel, and should be investigated during design.

Dry Pond PI

Dry ponds have the potential to become unmaintainable mud holes if not constructed in a manner so the floor will drain and the soil substrate dry enough for upland vegetation to survive. Since the proposed Dry Pond PI will have partial flow-through as an online pond, the pond should have a defined low flow channel. The preferred bottom configuration for this type of pond includes crossfall at 1% (preferable 2%) to a 300 mm deep central low flow channel. The low flow channel would typically be constructed with minimum ditch standards including 1.0 m bottom width and 4:1 sideslopes, and would be permitted to infill with vegetation and meander naturally.

Maximizing the pond storage is recommended. Setting the pond bottom to the average 390.5 m (390.3 m at south end) as designed by BMCE will accomplish this and we agree with the proposed design. The assessment of contamination impact risk concluded that the contaminant concentrations are low, and do not warrant raising the pond bottom above the high June 2015 groundwater level.

A pipe installed below Dry Pond PI is necessary to convey low flow from a proposed piped land drainage system to be developed north of Balmoral Ave. A 1500 mm diameter pipe was assumed based on matching the performance of the 2005 study, but this pipe size could be refined by conducting additional preliminary design of the land drainage system serving the upstream catchment. Nominal minimum 1.5 m cover over the pipe crown and the use of concrete pipe are recommended.

Depending upon the time of the year that construction is undertaken, construction of the pond may require groundwater dewatering. However, construction of the sewer beneath the pond will require dewatering, which may be discharged to the downstream drainage system. Late fall construction is recommended when groundwater levels are expected to be at their lowest and while the downstream open channel drainage system that will receive dewatering flow is unfrozen.

Dry Pond Inlets

The connection of the two inlets between the Dry Pond invert and the 1500 mm pipe running beneath the pond should ideally be constructed offline to the pipe as a means of freezing protection to the pipe below. The pipe will drain to elevation 388.966 m as controlled by the east outlet pipe of the downstream control structure located in the northeast intersection of Magnolia Drive and Sycamore Drive intersection.

The hydraulics of the interconnection between the pipe and the inlet structures has not been investigated, but should be larger than a typical catch basin lead (say 600 mm). The inlet grates should be positioned near the pond edge and include either ditch inlet grates or inclined inlet type bar screens for human safety and debris shedding.

Dry Pond Control Structure

The control structure was envisioned as a weir manhole with low flow orifice. A minimum 2100 mm diameter manhole with weir sill set to elevation 390.6 m and 300 mm low flow orifice constructed at the Dry Pond undercrossing pipe invert (approximately 387.1 m). The orifice may be constructed as custom sized hole in a metal plate to allow for post-installation modifications. A control valve (knife gate, sluice gate) is not recommended due to constant submergence and freeze-thaw.

A minimum 0.5m headspace over the weir sill is recommended for high flow, requiring the underside of the manhole top slab to be no lower than elevation 391.1 m. Two standard manhole risers with frames and covers would be required to access both sides of the weir wall.

Existing Magnolia and Sycamore Control Structure

The weir wall in this manhole no longer serves a purpose, and was installed with a sill elevation lower than the invert of the (east) outlet pipe due to construction difficulties. The weir should either be raised to nominally above the outlet pipe invert to facilitate pumped dewatering, or the weir wall should be removed entirely to allow clear access to the manhole interior. Alternately, a metal plate weir may be installed on the outlet pipe and set to an elevation 100-150 mm above

the pipe invert, and a catch basin installed in the boulevard east of the control structure and connected to the east outlet pipe. The plate weir would raise the static water level in the upstream system, but this would result in greater utilization of the dry pond but few other impacts. The new catch basin would be used to receive pumped discharge when dewatering the system from the control structure, and the plate weir would minimize the volume of backflow from the dewatering operation into the control structure. The pumped discharge could also be pumped onto the Magnolia Drive pavement during warm season dewatering, and permitted to drain to curb and gutter inlet catchbasins east of the Sycamore intersection.

System Maintenance

Draining the majority of the system may be done by pumping from the existing northeast intersection Magnolia Drive and Sycamore Drive control structure. The north outlet pipe connecting the structure to Dry Pond PI was installed sloping north (towards the previous concept for West Pond PI), so the system must be dewatered in a couple of steps, as follows:

1. At the northeast intersection Magnolia Drive and Sycamore Drive control structure, pump the manhole into the downstream catch basin (if installed) on onto the Magnolia Drive pavement. The total volume to be dewatered is estimated to be about 480 cu m if the system is static at 388.966 m. This will leave approximately 0.4 m or less water in the north outlet pipe, or about 25 cu m of volume. The 1500 mm pipes are large enough to be cleaned manually.
2. At the new control manhole, vacuum or pump the remaining water left in the north-south interconnecting pipe. If the orifice is plugged, it may be necessary to pump each side of the weir wall separately. A volume of only 25 cu m would be pumped, so pumping onto the Magnolia Drive pavement would be acceptable.

RECOMMENDATIONS

A stormwater model for the Southeast Drainage Basin was modified to investigate the hydraulic performance of new infrastructure to be constructed as part of the Cemetery Expansion. A summary of the findings and recommendations is as follows:

1. Construction of both the open channel through the Cemetery expansion and Dry Pond PI is required to accommodate the 25 year runoff volume.
2. Constructing the Cemetery Channel with 0.2% longitudinal slope, 10 m wide bottom and 7:1 sideslopes as proposed by BMCE will provide significant storage. The sideslopes may be varies for landscape interest. Construction of a low flow channel along one side of the larger channel with 2% crossfall on the bottom is recommended to contain weed growth and facilitate annual mowing of the channel bottom. A small land drainage sewer system would interconnect the existing Sobey's pond, Aberdeen Ave. and nearby pavement drainage, and route the drainage around an area of hydrocarbon impacted soil near the northwest corner of the Cemetery Expansion site.
3. Culverts on the Cemetery Channel should include inlet type bar screens on both upstream and downstream ends.
4. Constructing the Dry Pond bottom with bottom graded from elevation 390.71 m (north) to 390.3 m (south) with 7:1 sideslopes as proposed by BMCE is suitable. A dry pond cross-section with low flow channel 0.3m deep constructed to the elevations listed above. To

maximize storage, this low flow channel should be constructed below the dry pond bottom elevation. The pond bottom above the low flow channel should be constructed with crossfall towards the low flow channel to maintain a dry, vegetated bottom. A minimum 2% crossfall is recommended to avoid wet spots.

5. Existing hydrocarbon contamination of soil and groundwater near the northwest corner of the expansion site is not deemed to pose a risk to human health or the environment, and would not preclude construction of the dry pond. An additional round of groundwater quality testing is warranted to confirm that current conditions are consistent with historical observations. Additional groundwater depth measurements are warranted to provide a better understanding of seasonal fluctuations and as a basis for estimating construction dewatering requirements.
6. Construction of an undercrossing pipe beneath the dry pond will permit the construction of a normal land drainage sewer system north of Balmoral Ave. This future system would only flood into the Dry Pond PI during extreme rainfall, and not during minor flow events or spring thaws so the upstream system should not be subject to plugging due to freezing. This pipe was sized as 1500 mm with 1.5 m minimum cover, both subject to refinement during further analysis and design. Groundwater dewatering will be required to install this pipe. The use of self-ballasting concrete pipe is recommended for this shallow installation.
7. Two high capacity inlet/outlets will be used to connect the Dry Pond with the undercrossing pipe, to be constructed at the north and south ends of the pond bottom. These could be catch basins with high capacity ditch inlet grates on inclined grates, and should include sumps and large diameter (600 mm) connections to the undercrossing sewer.
8. The existing control manhole located in the northeast intersection of Magnolia and Sycamore Drives has no function. Modifications including removing the weir wall and installing a plate weir across the (east) outlet pipe are recommended to aid in operations. Dewatering of the system for maintenance and sediment removal would primarily be done from this location.
9. A new control manhole is required near the south end of Dry Pond PI. The structure was assumed to be a 2100 mm manhole with internal weir wall with sill elevation 390.6 m, 0.5 m of headspace above the weir sill, 300 mm diameter orifice near the manhole invert, and double manhole access to either side of the weir wall.

Tetra Tech WEI Inc. (Tetra Tech) would like to thank you for the opportunity to continue to provide stormwater engineering services to the City.

Prepared by

TETRA TECH WEI INC.



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Municipal Design Engineer

KM/ac

cc: D. Burns, Burns Maendel Consulting Engineers

Attachments:

- Figure 1 – Cemetery Expansion Master Plan Concept
- Figure 2 – Conceptual Drainage for Cemetery Expansion
- Figure 3 – Drawing SS-1378A showing Magnolia and Sycamore control structure
- Figure 4 – Sketch of conceptual new control structure for Dry Pond DPI
- Figure 5 – Southeast Drainage Basin – 2015 Model Extents
- Figure 6 – View of Model between 1st and 18th Streets
- Figure 7 – View of Model near Cemetery
- Figure 8 – Profile from Sobey's Pond through Cemetery Channel
- Figure 9 – Profile from 6th and Aberdeen through Dry Pond DPI
- Figure 10 – Dry Pond DPI response to various design storms
- Figure 11 – Cemetery Pond Response to various conditions
- Figure 12 – Response at downstream control structure at Magnolia and Sycamore to various conditions
- Figure 13 – Impact of Raising Dry Pond DPI bottom level

Email Attachment:

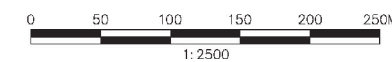
Updated SWMM Model Input File



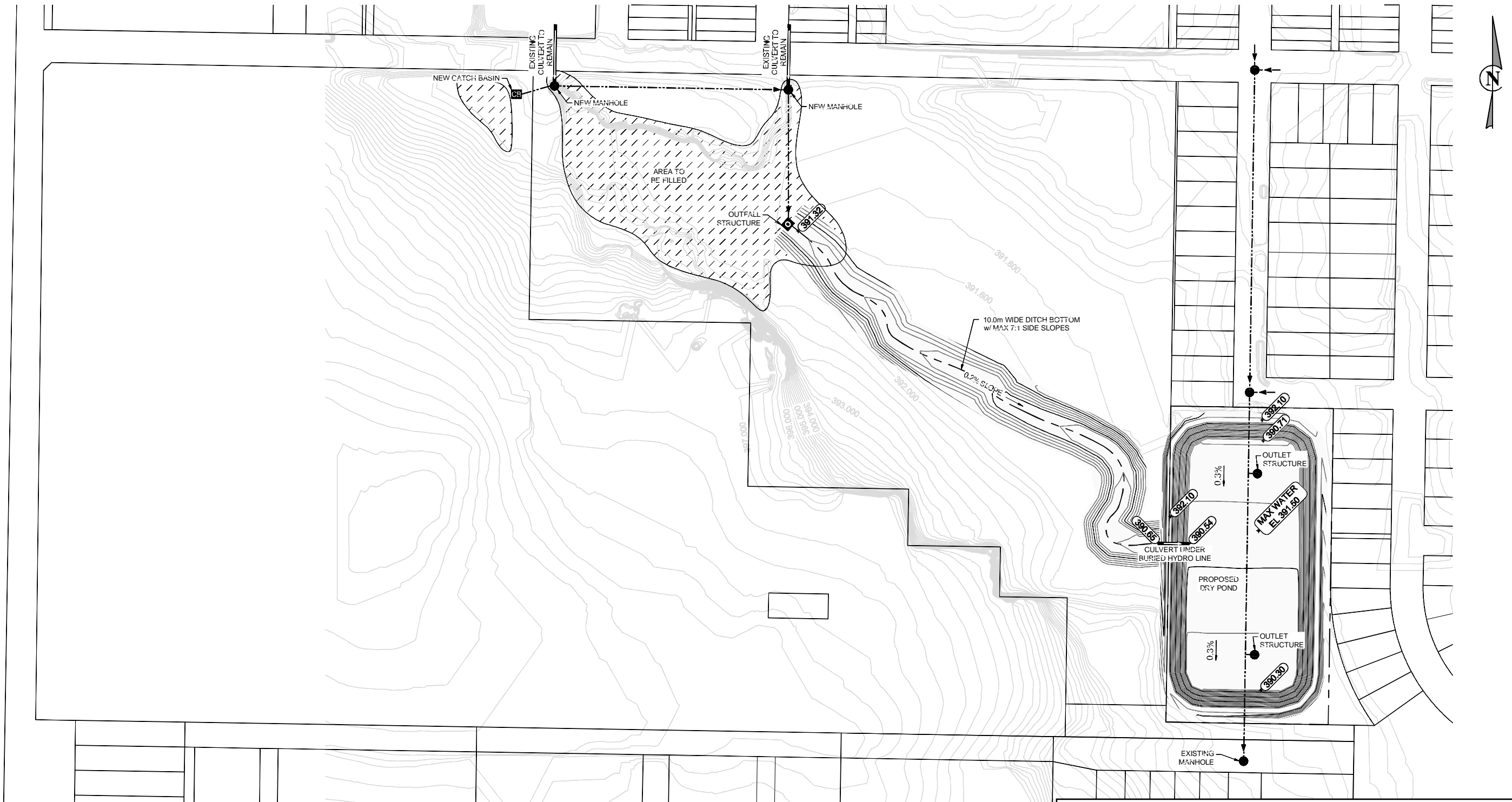
Veterans' section expansion

**City of Brandon Cemetery Expansion Master Plan
Stormwater Analysis for Facility Expansion
Tetra Tech**

Figure 1 – Cemetery Expansion Master Plan Concept



At full build out, the expanded cemetery is expected to serve the community for the next 100+ years.



City of Brandon Cemetery Expansion Master Plan
 Stormwater Analysis
 Tetra Tech
 Figure 2 - Conceptual Drainage

NO.	DATE	APP.	BY	DESCRIPTION
A	MAY 26, 2015	DAB	CR	ISSUED FOR INFORMATION
REVISIONS				

PRELIMINARY
 FOR REVIEW AND COMMENT ONLY

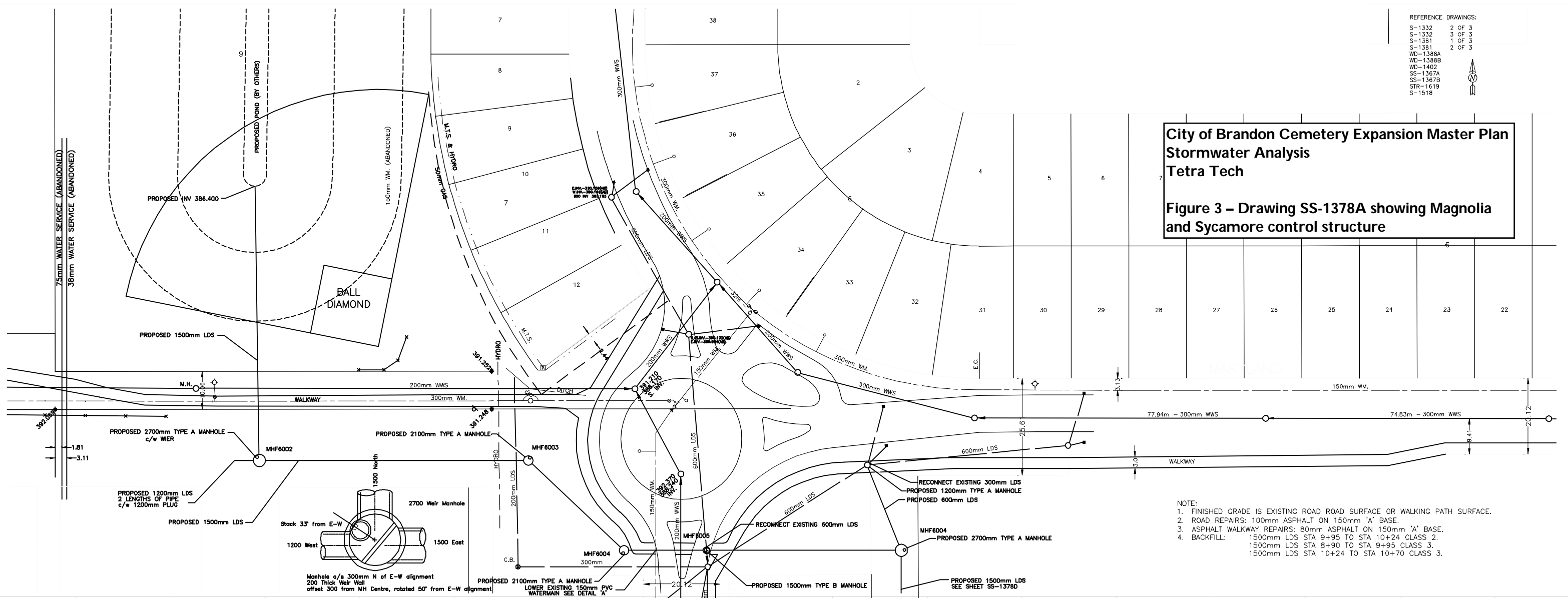
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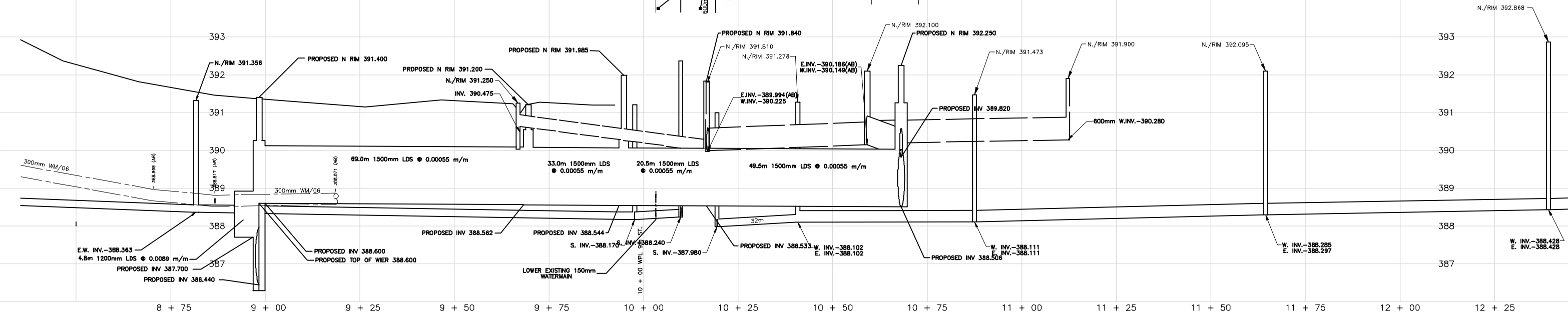
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S-1332	3 OF 3
S-1381	1 OF 3
S-1381	2 OF 3
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WD-1388B	
WD-1402	
SS-1367A	
SS-1367B	
STR-1619	
S-1518	

City of Brandon Cemetery Expansion Master Plan
Stormwater Analysis
Tetra Tech

Figure 3 - Drawing SS-1378A showing Magnolia and Sycamore control structure



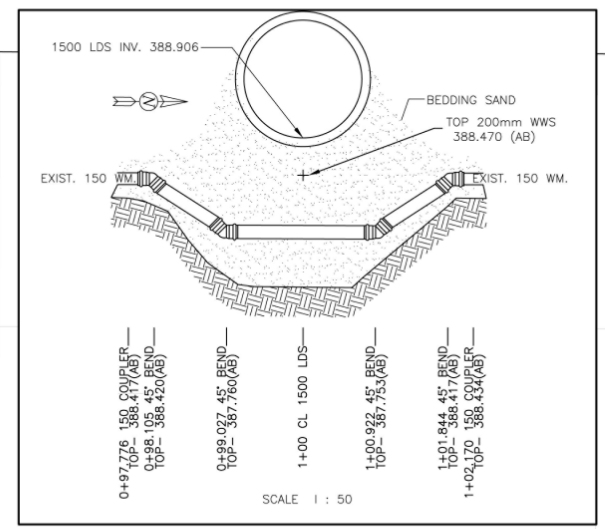
- NOTE:
1. FINISHED GRADE IS EXISTING ROAD ROAD SURFACE OR WALKING PATH SURFACE.
 2. ROAD REPAIRS: 100mm ASPHALT ON 150mm 'A' BASE.
 3. ASPHALT WALKWAY REPAIRS: 80mm ASPHALT ON 150mm 'A' BASE.
 4. BACKFILL: 1500mm LDS STA 9+95 TO STA 10+24 CLASS 2.
1500mm LDS STA 8+90 TO STA 9+95 CLASS 3.
1500mm LDS STA 10+24 TO STA 10+70 CLASS 3.



REVISED AS CONSTRUCTED EXTENT OF REVISION: FIRM PREPARING REVISIONS: INSTALLATION DATE: CONTRACTOR:	ENGINEERS SEAL 150 W.M. WATERMAIN HYDRANT VALVE VALVE PIT STORM SEWER CURB DOMESTIC SEWER MANHOLE CATCH BASIN GAS	150 W.M. HYDRO M.T.S. TELEGRAPH TRAFFIC SIGNAL CURB SIDEWALK EDGE OF PAVEMENT PROPERTY LINE DITCH SURVEY BAR ELEVATION	150 W.M. WATERMAIN HYDRANT, VALVE STORM SEWER DOMESTIC SEWER CURB NORTH OR WEST GUTTER SOUTH OR EAST GUTTER NORTH OR WEST SWK. SOUTH OR EAST SWK. NORTH OR WEST E. SOUTH OR EAST E.	NORTH OR WEST DITCH SOUTH OR EAST DITCH	NOTE: - LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.	B.M. ELEV. 1. ISSUED FOR TENDER 07/04/10 S.H. NO. REVISIONS DATE BY	ENGINEERS SEAL PLAN & PROFILE FOR LDS ON MARYLAND 9th & MARYLAND EAST TO RETENTION POND DESIGNED S.H. DRAWN B.J.K. CHECKED S.H. APPROVED I.C. DATE JANUARY 15, 2007 DWS. NO. SS-1378A SCALE HOR: 1 : 500 VERT: 1 : 50 FIELD NOTES FILE NO. SHEET 1 OF 4	
	EXISTING	LEGEND - PLAN	PROPOSED	EXISTING			LEGEND - PROFILE	PROPOSED
	EXISTING	LEGEND - PLAN	PROPOSED	EXISTING			LEGEND - PROFILE	PROPOSED

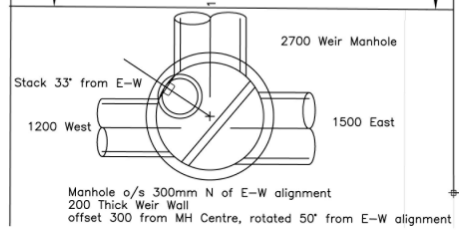
City of Brandon Cemetery Expansion Master Plan Stormwater Analysis Tetra Tech

Figure 3 - Drawing SS-1378A_R3 Magnolia and Sycamore Control Structure

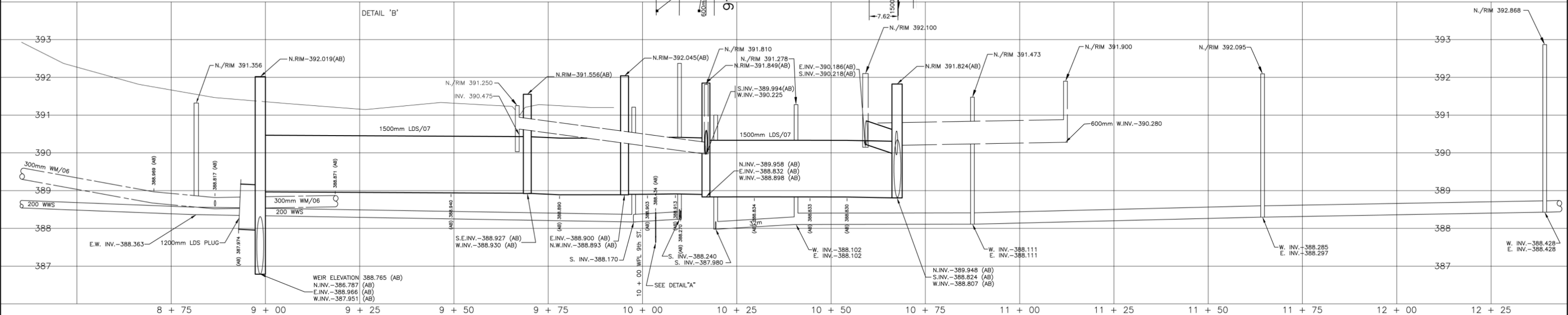


DETAIL 'A'
MARYLAND

- NOTE:
1. FINISHED GRADE IS EXISTING ROAD SURFACE OR WALKING PATH SURFACE.
 2. ROAD REPAIRS: 100mm ASPHALT ON 150mm 'A' BASE.
 3. ASPHALT WALKWAY REPAIRS: 80mm ASPHALT ON 150mm 'A' BASE.
 4. BACKFILL: 1500mm LDS STA 9+95 TO STA 10+24 CLASS 2.
1500mm LDS STA 8+90 TO STA 9+95 CLASS 3.
1500mm LDS STA 10+24 TO STA 10+70 CLASS 3.



DETAIL 'B'



REVISED AS CONSTRUCTED
EXTENT OF REVISION:
1500 LDS INSTALLATION

CITY OF BRANDON
FIRM PREPARING REVISIONS
AUG. 2007
INSTALLATION DATE
CLUMMING & DOBBIE
CONTRACTOR

ENGINEERS SEAL

150 W.M.	WATERMAIN	150 W.M.	HYDRO	150 W.M.	WATERMAIN	150 W.M.	NORTH OR WEST DITCH
○	HYDRANT	●	M.T.S.	○	HYDRANT - VALVE	○	SOUTH OR EAST DITCH
○	VALVE	○	TELEGRAPH	○	STORM SEWER	○	
○	VALVE PIT	○	TRAFFIC SIGNAL	○	DOMESTIC SEWER	○	
○	STORM SEWER	○	CURB	○	Q PROFILE	○	
○	DOMESTIC SEWER	○	SIDEWALK	○	NORTH OR WEST GUTTER	○	
○	MANHOLE	○	EDGE OF PAVEMENT	○	SOUTH OR EAST GUTTER	○	
○	CATCH BASIN	○	PROPERTY LINE	○	NORTH OR WEST SWK.	○	
○	CULVERT	○	DITCH	○	SOUTH OR EAST SWK.	○	
○	GAS	○	SURVEY BAR	○	NORTH OR WEST R.	○	
○		○	ELEVATION	○	SOUTH OR EAST R.	○	
○	EXISTING	○	LEGEND - PLAN	○	EXISTING	○	LEGEND - PROFILE
○	PROPOSED	○	EXISTING	○	PROPOSED	○	PROPOSED

NOTE: -
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

B.M. ELEV.	NO.	REVISIONS	DATE	BY
	3	LDS MANHOLE WEIR AS-BUILTS	JAN/15	JS
	2	1500 LDS AS-BUILTS	JAN/08	DW
	1.	ISSUED FOR TENDER	07/04/10	S.H.

ENGINEERS SEAL

9th & PROFILE FOR LDS ON MARYLAND
9th & MARYLAND EAST TO RETENTION POND

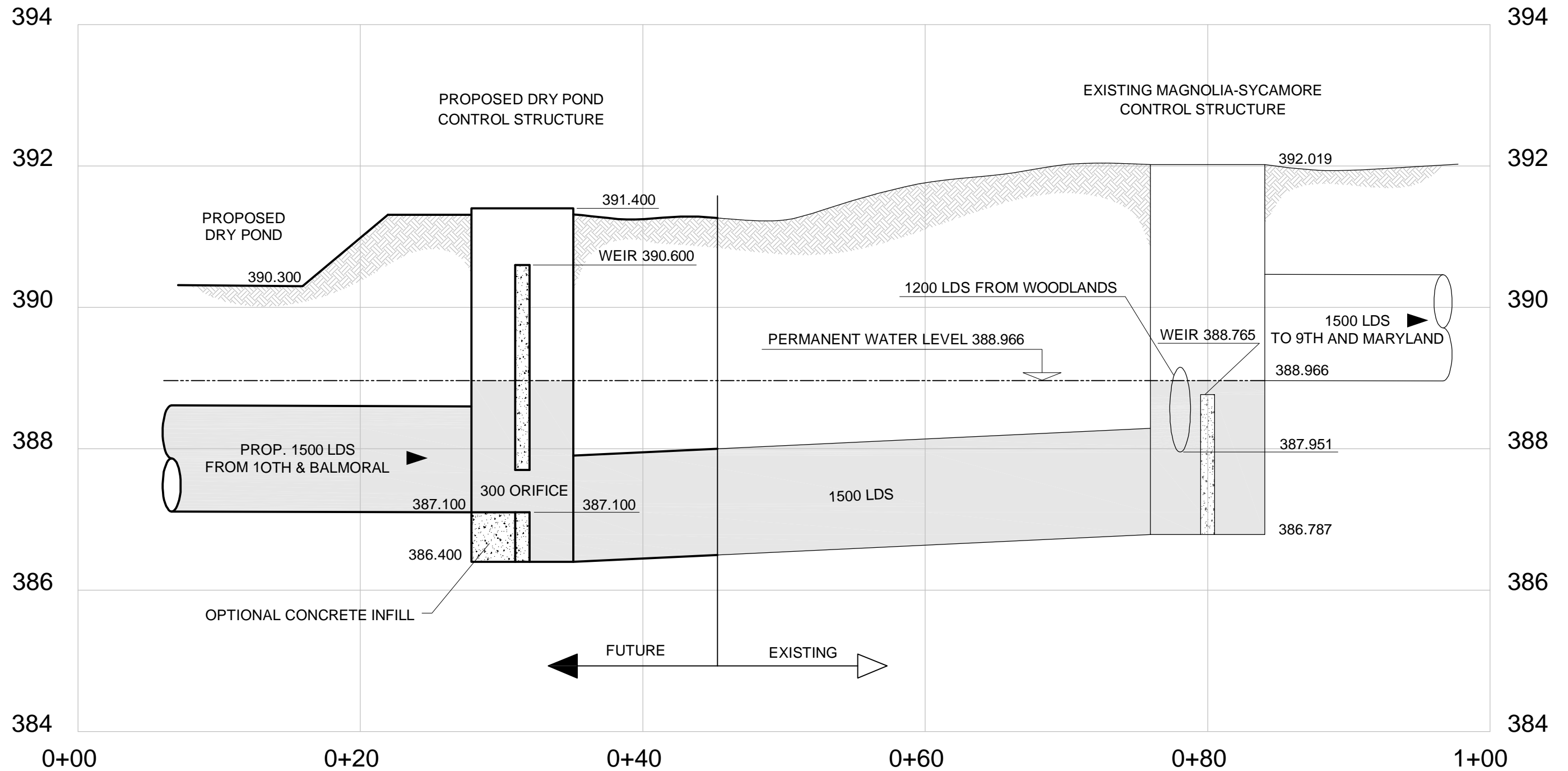
DESIGNED S.H.
DRAWN B.J.K.
CHECKED S.H.
APPROVED I.C.

CITY OF BRANDON
DEPARTMENT OF ENGINEERING

DATE JANUARY 15, 2007
DWG. NO. SS-1378A
SCALE HOR. 1 : 500
VERT. 1 : 50

FIELD NOTES
FILE NO.

REV. SHEET 1 OF 4

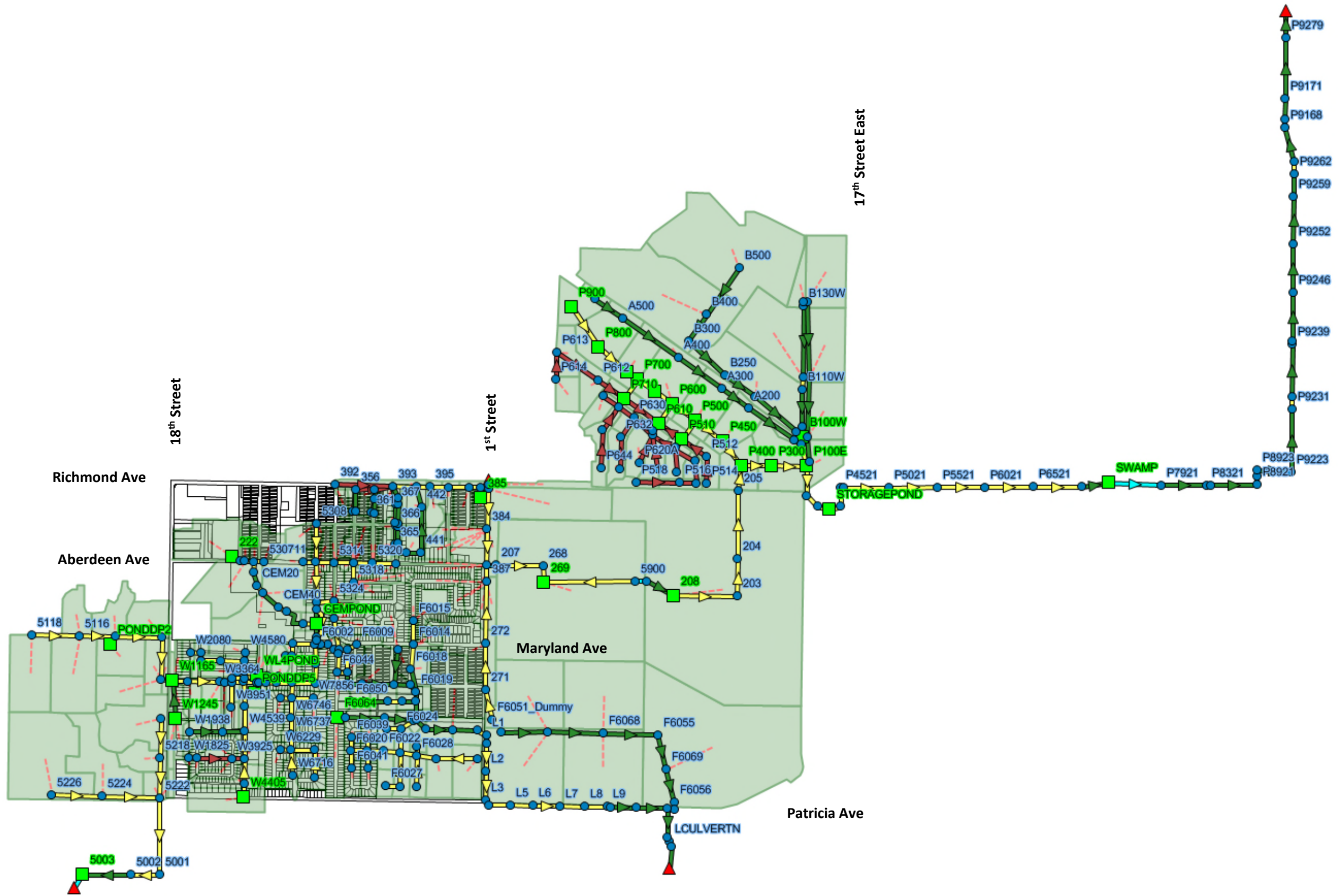


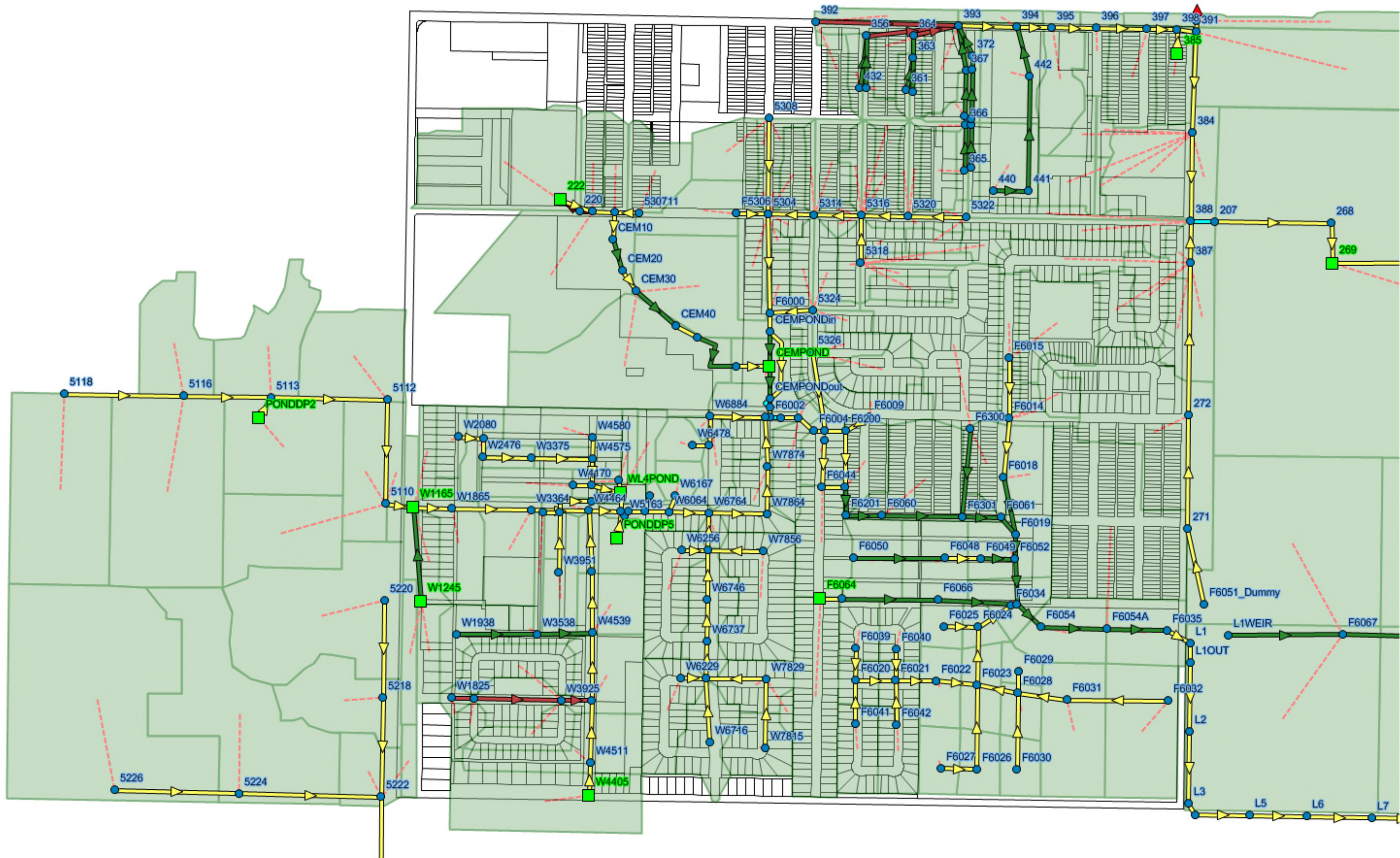
A3 (432 x 279)

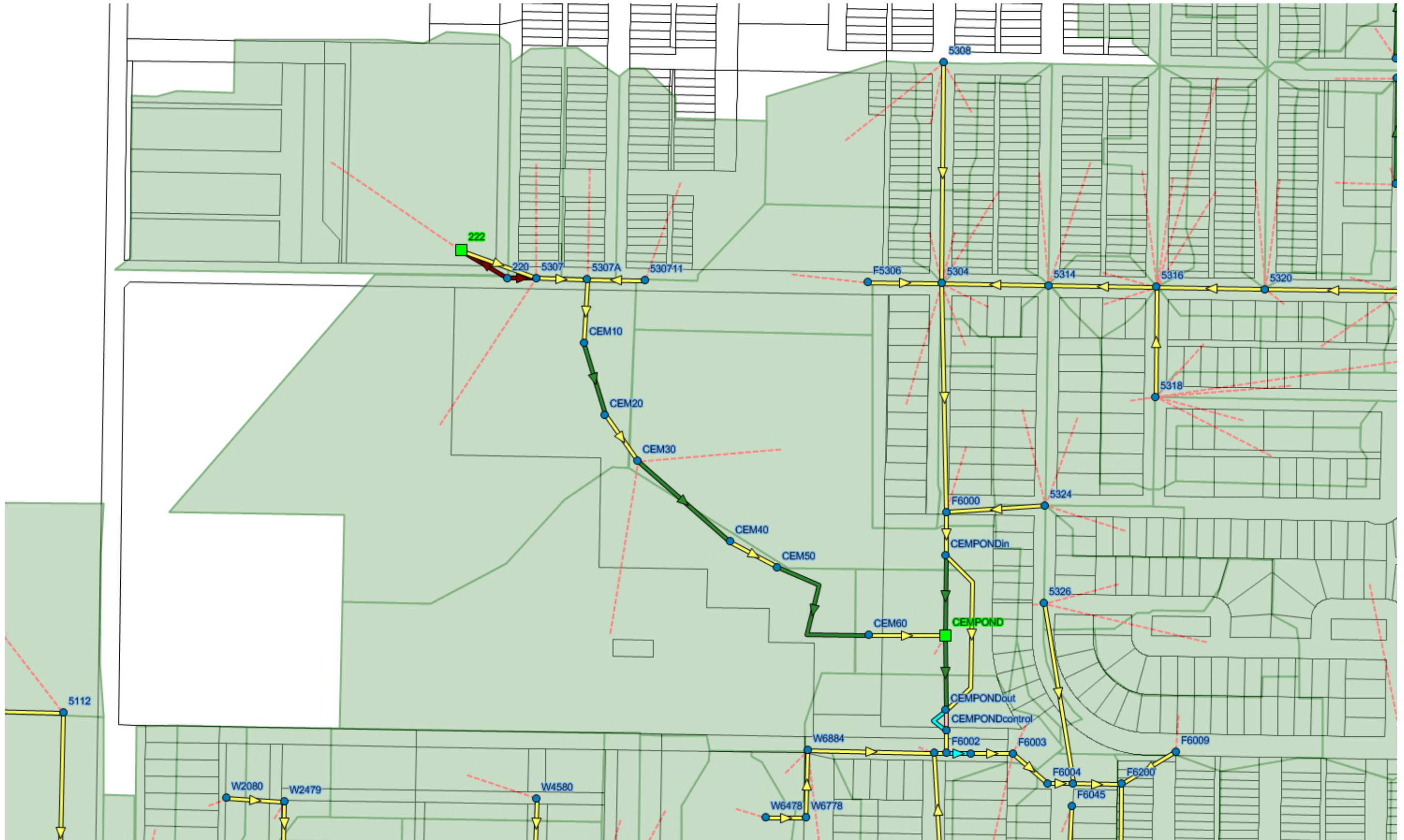
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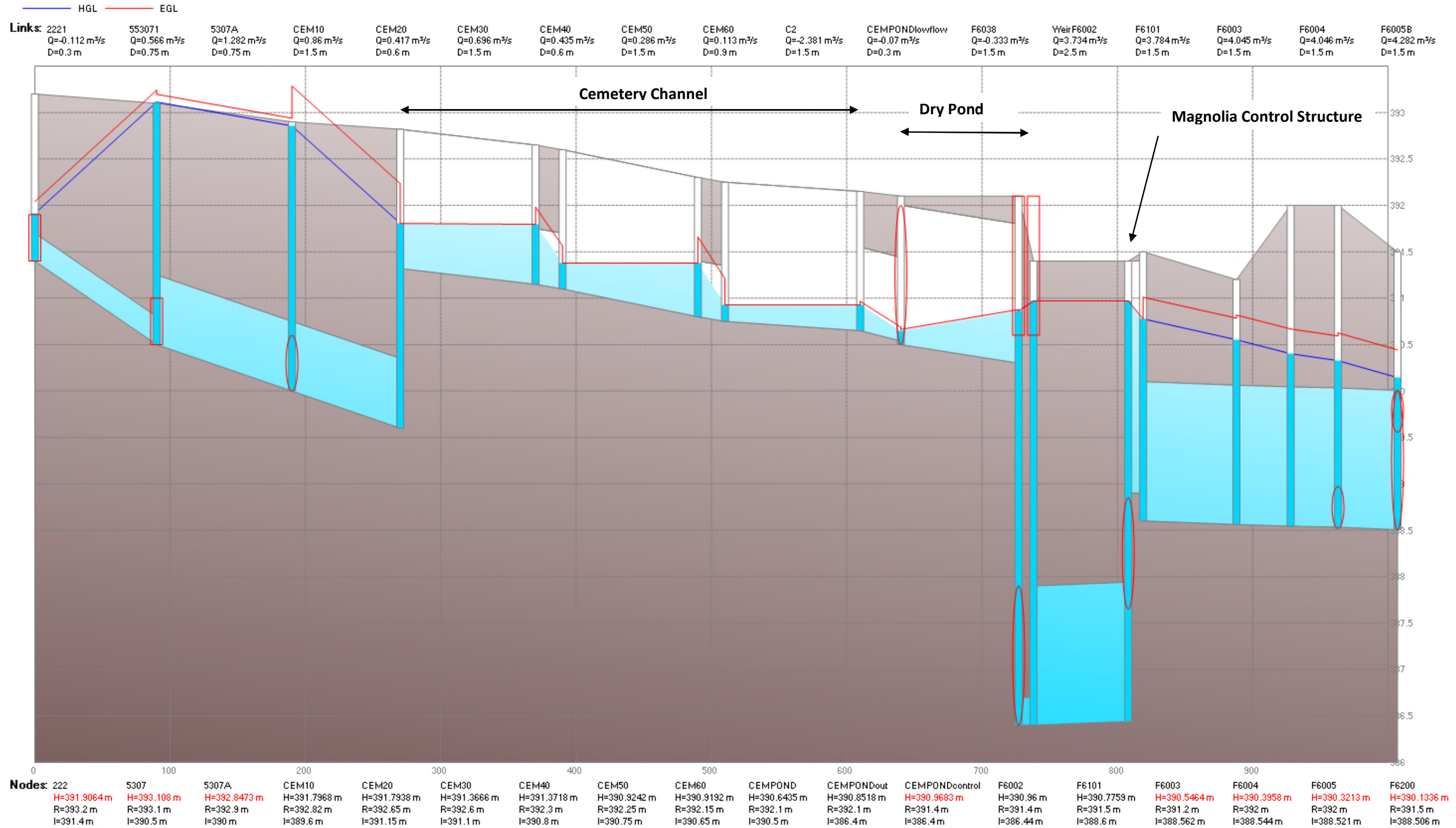
PROJECT: CEMETERY EXPANSION MASTER PLAN			
DRAWING DESCRIPTION: FIGURE 4 PROPOSED CONTROL STRUCTURE FOR DRY POND P1			
DESIGNED BY: TRC	DRAWN BY: TRC	DRAWING NO. 1504060100-SKT-C0001	
REVIEWED BY: KJM	SCALE: NTS	REV.	



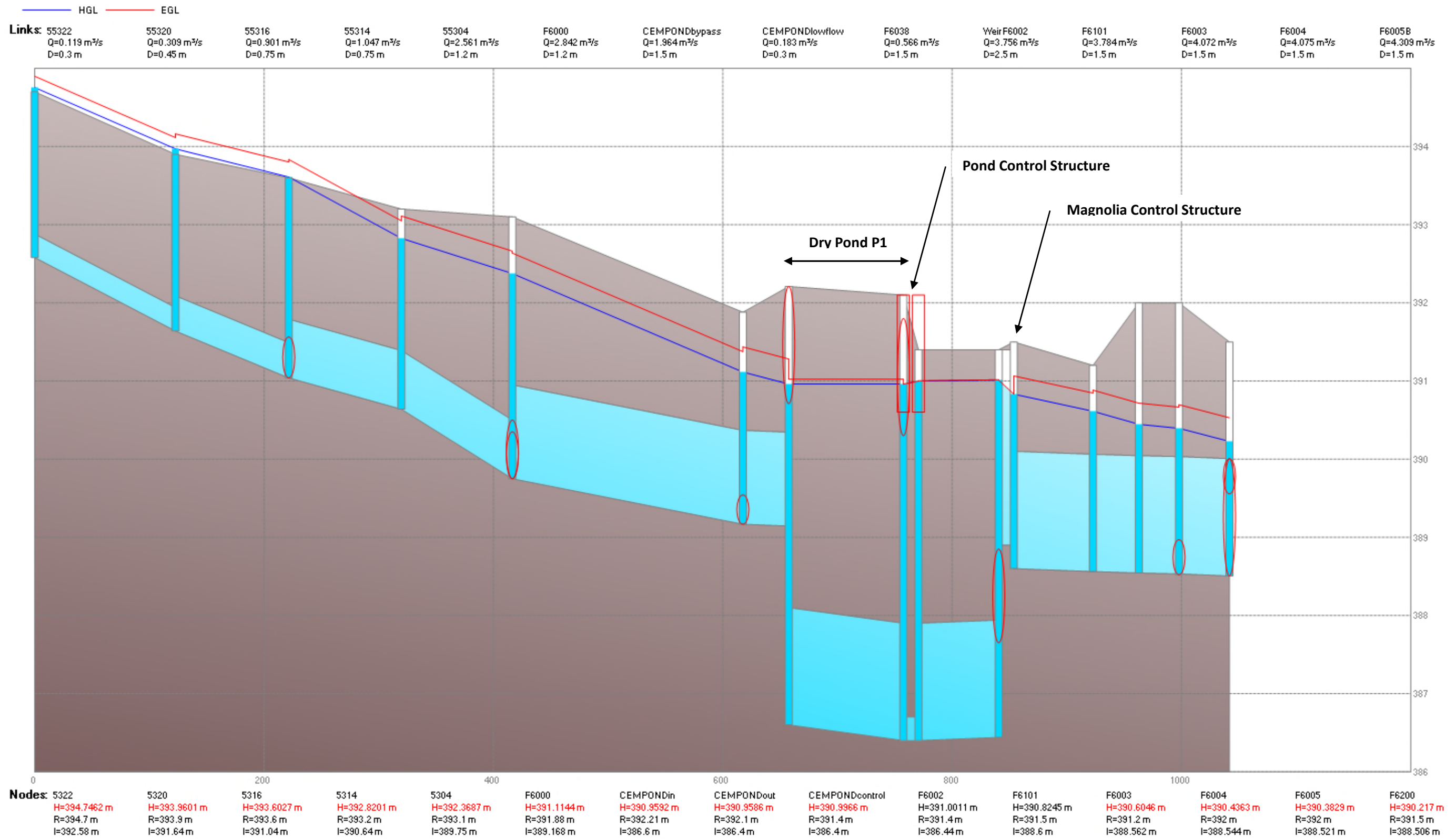




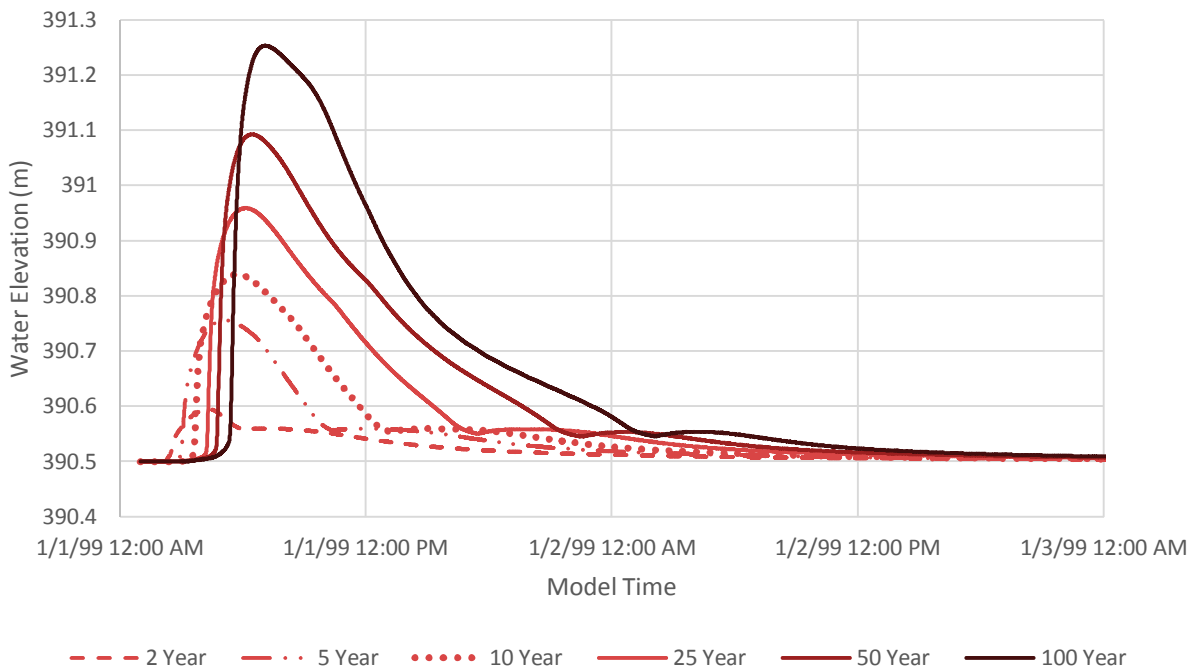
Model Profile from Sobey's Pond to 9th Street Traffic Circle (25 Year Rainstorm)



Model Profile from 6th and Aberdeen to 9th Street Traffic Circle (25 Year Rainstorm)



Pond P1 Model Depth



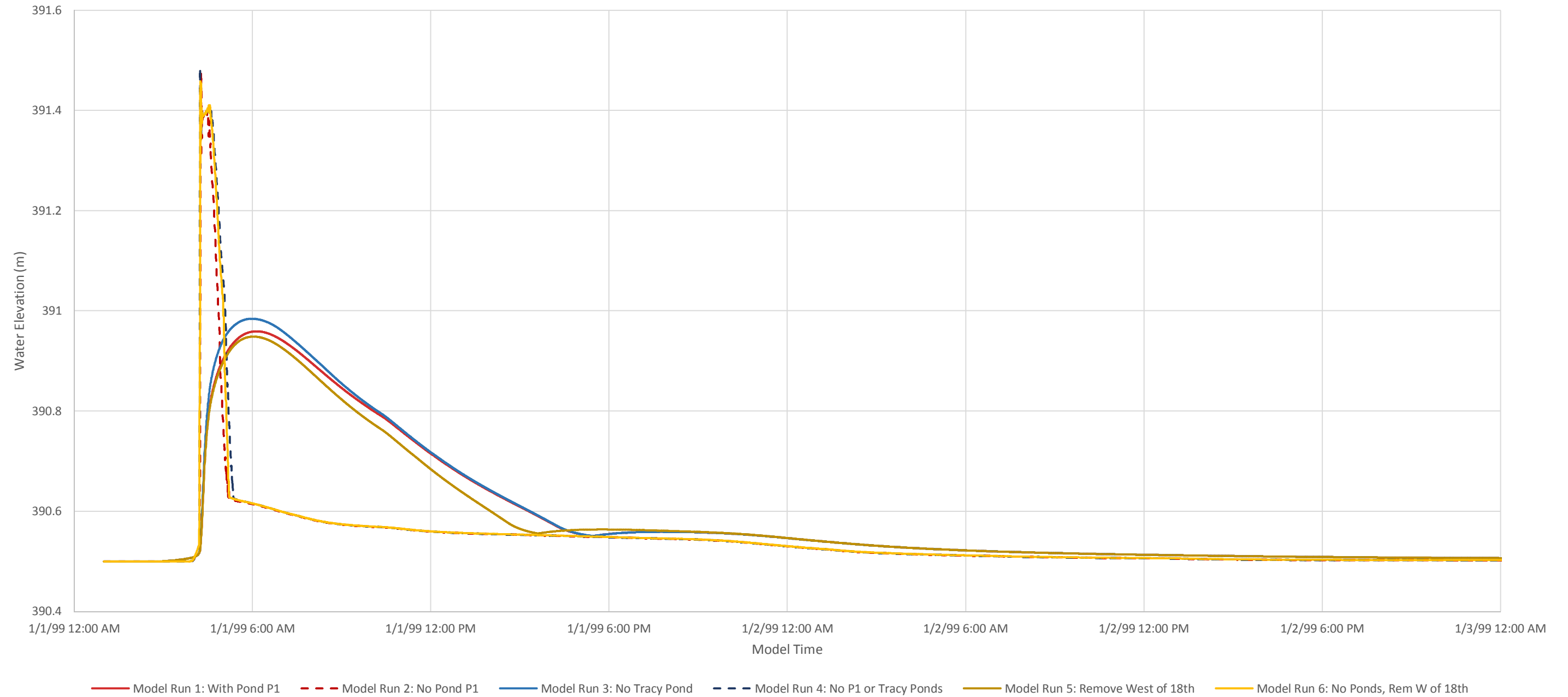
Elevations:

- Pond Bottom Elevation: 390.500m
- 2 Year Storm: Maximum Depth – 390.596m (0.096m deep)
- 5 Year Storm: Maximum Depth – 390.757m (0.257m deep)
- 10 Year Storm: Maximum Depth – 390.840m (0.340m deep)
- 25 Year Storm: Maximum Depth – 390.959m (0.459m deep)
- 50 Year Storm: Maximum Depth – 391.093m (0.593m deep)
- 100 Year Storm: Maximum Depth – 391.254m (0.754m deep)
- Pond Dyke Elevation: 392.100 (1.600 deep)
- 10th and Balmoral Intersection: 392.300

Notes:

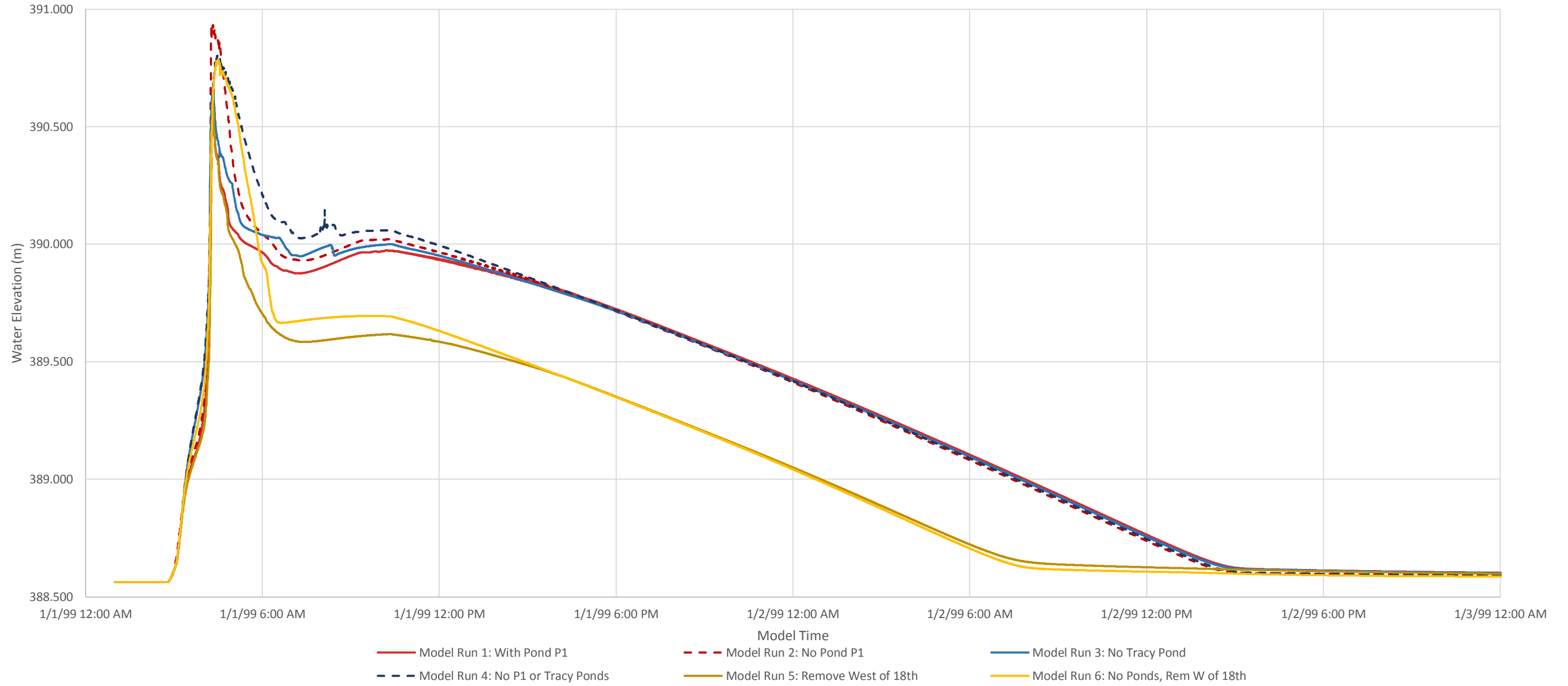
- Model Includes lands west of 18th Street and Tracey Pond
- Pond Control weir set at 390.600m
- Pond low flow orifice set as a diameter of 0.300m
- Only runoff through the cemetery ditch makes it into pond during a 2 year storm;
- A small amount of runoff (0.06m of driving head) makes it into the pond during a 5 year storm from the 10th Street trunk, the remainder flows through the bypass pipe.

Model Node CEMPOND (Pond P1) 25 Year Design Rainstorm



MODEL RUN	POND P1	TRACY POND	LANDS WEST OF 18 TH STREET
1	YES	YES	YES
2	NO	YES	YES
3	YES	NO	YES
4	NO	NO	YES
5	YES	YES	NO
6	NO	NO	NO

Model Node F6003 Downstream of Magnolia Drive Weir (25 Year Design Rainstorm)



MODEL RUN	POND P1	TRACY POND	LANDS WEST OF 18 TH STREET
1	YES	YES	YES
2	NO	YES	YES
3	YES	NO	YES
4	NO	NO	YES
5	YES	YES	NO
6	NO	NO	NO

