Environment Act Proposal Form

Manitoba
Conservation and Water Stewardship

Name of the development:
Parkland Mill Group Inc.

Type of development per Classes of Development Regulation (Manitoba Regulation 164/88):
Class 1

Legal name of the applicant:
Parkland Mill Group Incorporated

Mailing address of the applicant: Box 185 Ethelbert

Contact Person: Pauline Fondeur, Vice President

City: Ethelbert Province: Manitoba Postal Code: R0L 0T0

Phone Number: 204 422 4033 Fax: 204 422 8709 email: trkermom10_4@hotr

Location of the development: Ethelbert, Manitoba

Contact Person: Pauline Fondeur, Vice President

Street Address: NW 30-29-21 W

Legal Description: NW 1/4 of section 30-29-21 WPM

City/Town: Ethelbert Province: Manitoba Postal Code: R0L 0T0

Phone Number: 204 422 4033 Fax: 204 422 8709 email: trkermom10_4@hotı

Name of proponent contact person for purposes of the environmental assessment:
Pauline Fondeur, Vice President

Phone: 204 422 4033 Fax: 204 422 8709	Mailing address: Box 25 Grp 5 RR2 Station Main Ste. Anne, Manitoba, R5H 1R2

Email address: trkermom10_4@hotmail.com

Webpage address:

Date: October 5, 2015	Signature of proponent, or corporate principal of corporate proponent: *Pauline Fondeur* Printed name: Pauline Fondeur

Environmental Act Proposal

1. Cover Letter

To: Environmental Approvals Branch

Parkland Mills Group Inc. (PMG) was incorporated in 2015 after several meetings between local producers of buckwheat, flour mill operators and the Manitoba provincial government. The goal of PMG is to build a "state of the art", 90 tonne per day, certified Gluten Free buckwheat flour processing mill in the center of the Parkland region in Manitoba, Canada (see attachment B for project details). This mill will become a leading supplier of premium 100 percent Gluten-Free, buckwheat-based products for the North American food industry. The mill will have the added logistical advantage of being located in the Parkland region which is responsible for producing over 70 percent of Canada's total annual buckwheat production. The buckwheat produced in the Parkland area has been recognized by export customers and consumers as the highest quality available and is regularly sought after by US and Japanese importers.

The "Gluten Free" market segment has recorded a phenomenal 44 percent market growth for the period 2011 – 2013. This market has gained significant traction since the recognition of celiac intolerance by leading world health organizations. Major food companies such as Dominos Pizza, H.J. Heinz, and Nature's Path Foods offer a variety of gluten free products and the new products are continually being introduced. Currently the global gluten free market accounts for just over 1 percent of the total natural health market segment and is growing as more consumers are opting for a gluten free lifestyle. According to USDA[1] estimates, the current natural health market segment generates $12.4 billion USD globally and will rise to $15.6 billion during the period of 2013 – 2016. North America currently represents about 59% of the market. In Canada alone the gluten free market has been estimated at $450 million in 2012[2] or approximately 4 percent of the total market.

PMG proposes to construct a new GF Buckwheat production facility within the Manitoba Parkland region (refer to appendix A for survey map) and is seeking approval under the Manitoba Environmental Act.

Signed: Parkland Mills Group Board of Directors

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[1] United States Food and Drug Administration

[2] Statistics Canada; "Gluten Free" Claims in the Market Place, Agriculture & Agri-food Canada April, 2014

2. Description of Proposed Development

The Certificate of title for the land rights along with legal title to the land is Fyk Soba Inc. (refer to appendix B). Fyk Soba Inc. is owned and operated by Don Fyk (president) and is a sitting member of the board for PMG Inc.

The land on the proposed site has been cleared and used as agricultural production land. With approval from the local municipal council the land has been approved for commercial development (refer to Appendix C).

PMG proposes to build a 90,000 square foot multi-storey (2 levels) facility for the specific purpose of processing buckwheat into value added bulk food ingredient products in a certified[3] gluten free (GF) environment. The types of products the facility will produce are premium buckwheat flour, buckwheat pearls, roasted buckwheat, and husks.

Facility planning has started as of April, 2015 and will be completed October, 2015. Surveys for building the foundations and concrete floor are complete and are expected to be completed by the end of October, 2015. Construction of the facility will begin November, 2015 and will be completed by the end of the first quarter (Q1) of 2016. Commissioning and operational start-up is scheduled for the second quarter (Q2) of 2016. It is expected that this facility will have an economic life span of 35 years.

The facility will be situated on a 120 acre section of land within the Parkland region in Manitoba. The facility has access to 1 provincial road and the other to a PTH that are (R- tack) heavy truck certified. Electrical 3 Phase service will be provided by Manitoba Hydro and the proposed build site, has an onsite, deep well. Surrounding the facility will be five (5) grain holding silos, truck yard, loading and unloading docks. The facility will contain the following equipment to be used in production; (3) conveyors, (1) de-stoner, (1) cleaning, (1) de-huller, (1) polisher, (2) roasters, and (1) bulk packaging.

3. Existing Environment in the Project Area

The Rural Municipality (RM) of Ethelbert[4] covers an area of 184,320 square acres of land (approximately 8 townships) east of the Duck Mountain. Ethelbert is the main population and agriculture service centre in the municipality with smaller concentrations of people in Garland and Mink Creek.

The climate in the southern half of the municipality can be related to weather data from Dauphin while climatic conditions north of Ethelbert (there is a local weather station located in the town) are best described by data from Swan River. The mean annual temperature at Dauphin is 1.7°C and the mean annual precipitation is 492 mm while Swan River has a mean annual temperature of 1.4°C and average precipitation of 499 mm.

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[3] Canadian Regulations "Gluten Free" definition 2014

[4] Rural Municipality of Ethelbert Information Bulletin 99-43 Land Resource Unit Brandon Resource Centre Report March, 2000

The average frost-free period in the southern area is 112 days and degree-days above 5°C average 1580. Ethelbert has an average frost-free period of 109 days with 1486 degree-days above 5°C. The seasonal moisture deficit calculated for the period between May and September is just under 200 mm in the Duck Mountain Upland and slightly greater than 200 mm in the remainder of the municipality.

The proposed build site is situated on variable textured alluvium Class 2-3 agricultural land bordered by grasslands[5]. The texture of the surrounding ground has been graded as course along with fair irrigation suitability despite the "drainage class imperfect" rating for the surrounding area.

The proposed build site is not located near any protected lands, heritage resources, nor posses any socioeconomic risks to the surrounding area.

4. Environment and Human Health Effects of Proposed Development

This construction of the PMG facility will not pose a threat to the surrounding wildlife and/or forestry. The only emissions from this facility will be normal heating and cooling emissions from day to day operations. Waste water management will be controlled via a self contained septic system that will hold waste water.

No hazardous materials or fuels/solvents will be stored on site as there are none required in any of the PMG facility processes.

The only onsite potential human health and safety issues that might arise other than the hazards of machine operations, are the level(s) of dust created by the flour milling process. State of the art dust control measures will be utilized to contain and control all dust and dust emissions. However since the flour is 100 percent natural and biodegradable there is no risk to the environment. Modern milling machines however are optimized to keep dust levels to a safe minimum. Other issues may result from the operation of heavy machinery in the other food processing areas. These can be mitigated through employee training and adopting a Risk Management Framework (RMF) to identify and address potential workplace hazards.
A letter was sent to all citizens within a one (1) mile radius of the proposed mill site to voice their concerns.

On June 11th 2015, the R.M. of Ethelbert held a public hearing and consultation meeting for anyone having issues regarding the construction of a buckwheat processing facility. Three ratepayers attended. One of the concerned raised was how tall the building was going to be because of possible bird migration and the potential for birds striking the building. The other concern was what kind of flowers and shrubs we anticipated on planting around the building if any.

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[5] **Grasslands** - areas of native or tame grasses may contain scattered stands of shrubs.

5. Mitigation Measures and Residual Environmental Effects

The project's proposed environmental and risk mitigation practices will use the Risk Management Framework model (RMF). This model consists of four (4) distinct steps the identification, assessment, corrective action (risk mitigation), and reassessment of the risk.

During the build phase of the project, the contractor will follow strict provincial guidelines concerning the possibility of heavy equipment fuel, oil, and or lubricant spills resulting from normal operations and maintenance on site.
The contractor shall be COR Certified.

All Manitoba workplace health and safety regulations will be followed during the construction of the facility and during operations. In the event there is a gap in onsite safety or the environment, additional training will be provided either by the contractor or the PMG team, or Manitoba Heavy Construction Association.

6. Follow up Plans, including Monitoring and Reporting

Throughout the entire project the RMF will be utilized as the core tool to asses and manage environmental and human health risks. The responsibility of the process will be assigned to an onsite risk management expert retain through either PMG or the project contractor that shall be COR certified.

Part of the RMF plan will be to establish and maintain comprehensive documentation regarding all identified risk(s) the subsequent resolutions, and follow ups. This documentation process will be used in helping establish the facilities future ISO rating in food manufacturing.

Appendix A Title

STATUS OF TITLE

The Property Registry
A Service Provider for the Province of Manitoba

Title Number 2803649/6
Title Status Accepted
Client File PLESIUK ETAL/FYK (1275-15)

1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION

FYK SDBA INC.

IS REGISTERED OWNER SUBJECT TO SUCH ENTRIES RECORDED HEREON
IN THE FOLLOWING DESCRIBED LAND:

THE NW 1/4 OF SECTION 30-29-21 WPM
EXC ROAD PLANS 1791 AND 2961 DLTO

The land in this title is, unless the margin indicates otherwise, declared to be subject to the reservations and exceptions set out in section 28 of The Real Property Act.

2. ACTIVE INSTRUMENTS

Instrument Type: Caveat
Registration Number: 28702/6
Instrument Status: Accepted

Registration Date: 1969-03-28
From/By: MANITOBA TELEPHONE SYSTEM
To:

Amount:
Notes: AFF. PART
Description: no description

Instrument Type: Caveat
Registration Number: 28706/6
Instrument Status: Accepted

Registration Date: 1969-03-28
From/By: THE MANITOBA TELEPHONE SYSTEM
To:

Amount:
Notes: AFF. PART
Description: No description

Instrument Type:	Caveat
Registration Number:	95-4246/6
Instrument Status:	Accepted
Registration Date:	1995-09-06
From/By:	MANITOBA TELEPHONE SYSTEM
To:	
Amount:	
Notes:	AFF PT EOS E PL 32651
Description:	No description

3. **ADDRESSES FOR SERVICE**

FYK SOBA INC
P.O. BOX 4
GARLAND MB
R0L 0W0

4. **TITLE NOTES**

No title notes

5. **LAND TITLES DISTRICT**

Dauphin

6. **DUPLICATE TITLE INFORMATION**

Duplicate not produced

7. **FROM TITLE NUMBERS**

2553911/6 All

8. **REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS**

No real property application or grant information

9. **ORIGINATING INSTRUMENTS**

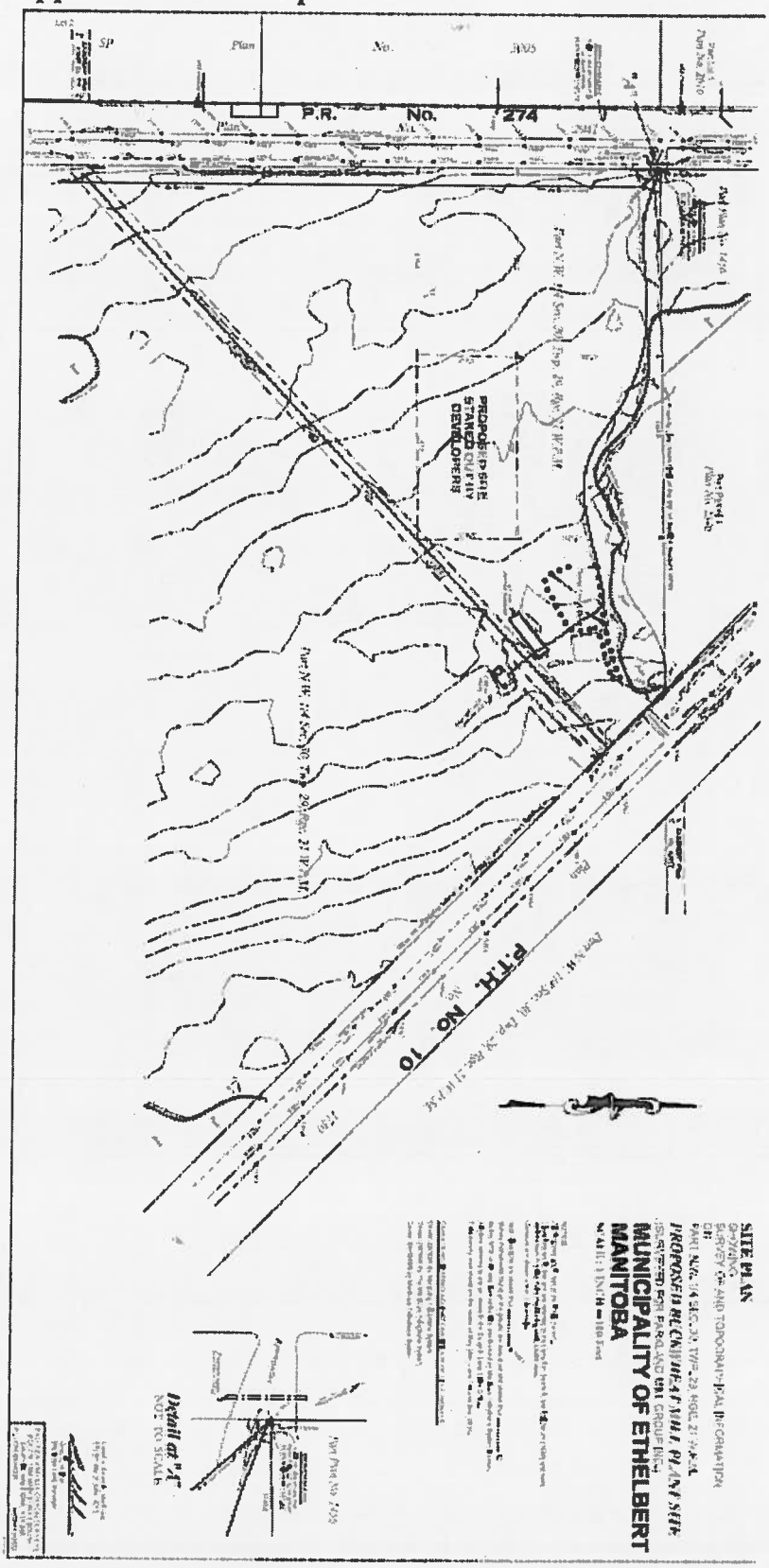
Instrument Type:	Transfer Of Land
Registration Number:	1104699/6
Registration Date:	2015-09-29
From/By:	MICHAEL PLESIUK AND NIKKI LEE PLESIUK
To:	FYK SOBA INC.
Consideration:	$325,000.00

10. **LAND INDEX**

NW 30 29 21W
EX RP 1730 & 2941

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE SYSTEM OF TITLE NUMBER 2803649/6

Appendix B Area Map



Appendix C Council Resolution

Municipality of Ethelbert

Certified Resolution Form

Date: March 12, 2015

Resolution No. 137-15

MOVED by Council Member: **Shawnalee Semchyshyn**

SECONDED by Council Member: **Arlene Rehaluk**

WHEREAS ratepayer, Don Fyk has approached Council with a proposal for the establishment of a buckwheat milling plant that may potentially be located in the Municipality of Ethelbert, and

WHEREAS, this would be the first ever Gluten Free Milling Facility in Canada, and would be an economic boost to the entire community and surrounding areas and producers, and

WHEREAS President of Fyk Soba, Don Fyk is requesting a five year tax concession from municipal Council, to aid in the projects financial establishment; and

WHEREAS Council supports the project in its entirety and wishes to secure the plant within the municipal limits, generating new tax revenues for the municipality,

THEREFORE BE IT RESOLVED that Council agrees to provide Fyk Soba & partners with a concession less the school taxes upon further progress of the development plan, and

BE IT FURTHER RESOLVED that the file be forwarded to PARC for further investigation.

The Rural Municipality of Ethelbert

Loretta Wyszkiewicz

Chief Administrative Officer

For 5 CARRIED

Against 0

Abstained ____

Art Potoroka

Reeve

Appendix D Building R Values

Summary – Prescriptive Requirements

Climate Zone 7A and 7B

Roofs & Exposed Floors	U=0.162	(R-35)
Walls	U=0.210	(R-27)
Below-Grade Walls	U=0.284	(R-20)
Floors (No Radiant Heat)	U=0.757 for 1.2m	(R-7.5, 4'0" perimeter)
Floors (Radiant Heat)	U=0.757 (R-7.5)	Full Area

Climate Zone 8

Roofs & Exposed Floors	U=0.142	(R-40)
Walls	U=0.183	(R-31)
Below-Grade Walls	U=0.210	(R-27)
Floors (All)	U=0.379 for full area	(R-15)

amec foster wheeler

GEOTECHNICAL INVESTIGATION
PROPOSED PROCESSING FACILITY
NW 30-29-21W
ETHELBERT, MANITOBA

Submitted to:

Parkland Mill Group Inc.
BOX 185
Ethelbert, MB
ROL 0T0

Attention: Mr. Don Fyk, President

Submitted by:

Amec Foster Wheeler Environment & Infrastructure
440 Dovercourt Drive
Winnipeg, Manitoba
R3Y 1N4

28 July 2015

Amec Foster Wheeler File #WX17686

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Amec Foster Wheeler Environment & Infrastructure is committed to achieving sustainability through balancing economic growth, social responsibility and environmental protection. Learn more at: http://amecfw.com/aboutus/sustainability.htm.

1.0 INTRODUCTION

As authorized by Mr. Don Fyk, President of Parkland Mills Group, Amec Foster Wheeler Environment & Infrastructure (Amec Foster Wheeler), completed a geotechnical investigation at the site of a proposed new processing facility at NW 30-29-21W, near Ethelbert, Manitoba. The site location is shown on Figure 1.

The scope of work for the geotechnical investigation was provided in Amec Foster Wheeler Proposal WPG2015.250, dated 25 May 2015. The purpose of the geotechnical investigation was to evaluate the soil and groundwater conditions at the site and on this basis, provide geotechnical recommendations for design and construction of foundations, floor slabs and granular traffic surfaces.

2.0 PROPOSED DEVELOPMENT

Based on an email sent to Amec Foster Wheeler by Mr. Darren Eddie, P. Eng., it is understood that the structure will be approximately 90,000 to 120,000 square feet in size (8360 to 11150 m^2) and will likely be a pre-engineered steel structure supported on a deep pile foundation. Spread footings are also under consideration as an option. The facility will have grade supported concrete slabs, portions of which will support processing equipment. Driveways and parking will be included and are expected to have asphalt and granular traffic surfaces. Foundation loads have not been provided. It is understood that the building will likely be one to two storeys high, and it is assumed that the building will be heated full time. Based on a sketched plan provided by Mr. Eddie, the proposed development will include a truck route and a parking lot, assumed to be granular and asphalt pavement surfaced.

3.0 SITE CONDITIONS

At the time of the investigation, the site consisted of a relatively flat lying agricultural field. A house and apiary were present to the northeast of the proposed development and a stand of trees was situated to the north. The site is bounded by Highway 274 to the west, Highway 10 to the northeast, and agricultural land to the south.

4.0 GEOTECHNICAL INVESTIGATION

A test hole drilling program was completed on 9 June 2015 and consisted of seventeen (17) test holes, TH01 to TH17. The test hole locations were based on the sketch provided. The approximate test hole locations are shown on Figure 1 and were laid out using a handheld GPS, based on the sketch provided, and on a survey plan provided by Mr. Fyk. Amec Foster Wheeler supervised the test hole drilling, which was conducted by Maple Leaf Drilling Ltd. of Winnipeg, Manitoba, using a track-mounted Acker Renegade geotechnical drill rig equipped with 125 mm diameter solid stem augers.

Prior to drilling, Amec Foster Wheeler contacted the various public and private utility locators to determine the location of any underground utilities at the site and to clear the test hole locations for drilling.

Test holes TH01 to TH13 were located within the proposed building footprint, and TH14 to TH17 were located in the truck route and parking areas. TH01 to TH08 and TH13 were advanced to practical auger refusal, which was met at depths of 4.8 m to 7.9 m from grade. Test holes TH09 to TH12, and TH14 to TH17 were terminated at 3.0 to 5.0 m from grade.

During drilling, Amec Foster Wheeler field personnel visually classified the observed soils according to the Modified Unified Soil Classification System. Groundwater and drilling conditions, as well as other pertinent subsurface observations, were also recorded at the time of the investigation. Disturbed soil samples were taken at regular intervals from the auger cuttings and pocket penetrometer tests were completed on soil cuttings to assess the relative undrained shear strength of the cohesive soils encountered. Standard penetration testing (SPT) was undertaken in conjunction with split spoon sampling. The number of blows required to advance the sampler through a depth interval of 300 mm was recorded as the SPT 'N' value and is provided on the logs.

The test holes were left open for approximately ten minutes after completion of drilling to observe short-term groundwater seepage and sloughing conditions, and were then backfilled with auger cuttings and bentonite.

Test hole logs were prepared to record the description and the relative position of the various soil strata, location of samples obtained, survey data, and results of the field and laboratory tests, and are presented in the test hole logs, Figures 2 to 18.

4.1 SUBSURFACE CONDITIONS

The soil stratigraphy encountered was generally as noted below, in descending order from the ground surface at the test holes:

- Topsoil
- Sand
- Clay
- Clay Shale

Topsoil

Topsoil was present at the ground surface at every test hole and was approximately 100 to 150 mm thick.

Clay was present below the topsoil at two locations. At TH17, a layer of organic clay was noted and was silty, sandy, low plastic, damp, friable and mottled brown/grey. At TH13, there was a

silty, high plastic clay layer that was moist, soft and grey, with abundant sand layers.

Sand

Below the topsoil, and below the clay layers where present, a sand layer was encountered and extended to depths of 0.6 to 2.0 m from grade. The sand was silty with trace clay, and was poorly graded, fine to coarse grained, moist, inferred as compact, and grey to brown. Occasional oxidation inclusions, organic clay inclusions, rootlets and trace gravel were also variably present.

Clay

A thin clay layer was present below the sand in TH03, TH05, TH06, TH07, TH13, and TH15. The clay was silty with trace sand and gravel, high plastic, damp to moist, stiff, and brown to grey. Occasional silt, sulphate and oxidation inclusions were also variably present.

Clay Shale

Below the sand or clay, a layer of clay shale was encountered and extended to the termination depths, including practical auger refusal at 4.8 to 7.9 m from grade. The clay shale was generally silty with trace sand and gravel, and was high plastic, damp, dark grey and hard although was occasionally stiff in the upper portions. SPT values in the clay shale were 15 to 99.

A detailed description of the soil profile encountered at each test hole location can be found in the test hole logs.

4.2 SLOUGHING AND SEEPAGE

The test holes were left open for about 10 minutes after drilling completion to observe short-term seepage and sloughing conditions. Seepage and sloughing were encountered in some test holes, generally originating from the bottom of the shallow sand layer. Table 1 summarizes the short term sloughing and seepage conditions.

Table 1: Sloughing and Seepage Conditions

Test Hole ID	During Drilling			Before Backfilling	
	Depth Drilled (m)	Depth of Sloughing (m)	Depth of Seepage (m)	Depth to Bottom of Hole (m)	Water Level (m)
TH01	4.8*	NA	1.5	5.0	4.4
TH02	7.7*	0.3 to 1.5	1.4	6.7	6.7
TH03	6.4*	1.2	1.4	6.1	4.9
TH04	7.9*	NA	1.2	7.9	2.1
TH05	5.0*	NA	NA	5.0	NA
TH06	5.0*	0.3 to 1.5	1.5	2.1	1.5
TH07	5.0*	NA	NA	5.0	NA
TH08	4.8*	NA	NA	4.8	NA
TH09	3.5	NA	NA	3.5	NA
TH10	3.0	NA	NA	3.0	NA
TH11	3.0	NA	NA	3.0	NA
TH12	4.9	2.0	NA	2.3	NA
TH13	6.5*	NA	1.4	6.5	5.9
TH14	3.4	1.8	1.8	3.4	2.0
TH15	3.5	NA	NA	3.5	NA
TH16	3.5	NA	NA	3.5	NA
TH17	3.0	NA	NA	3.0	NA

*- Auger Refusal

Only short-term seepage and sloughing conditions were observed. Ground water levels can fluctuate annually, seasonally or as a result of construction activity, in particular where a shallow confined sand layer is present, such as is the case at this location. Higher water levels within the sand should be anticipated at some times.

4.3 LABORATORY TESTING

All soil samples obtained during the field investigation were labelled, sealed to limit moisture loss and transported to Amec Foster Wheeler's Winnipeg office for further visual examination and

laboratory testing.

Soil samples transported to the laboratory were visually examined by Amec Foster Wheeler's project engineer to supplement and confirm the field classifications. Select samples were tested to determine their natural moisture contents, Atterberg limits and water soluble sulphate content. The results of the moisture content, Atterberg limit tests and water soluble sulphates tests are included on the test hole logs.

5.0 GEOTECHNICAL RECOMMENDATIONS

5.1 GENERAL

Based on the subsurface soil and groundwater conditions encountered on site, shallow footings and cast-in-place concrete end bearing piles (caissons), either straight shaft or belled, are considered to be suitable foundation options and are preferred. Driven steel piles could also be considered, however shallow refusal is considered likely and there may be significant installation issues. Therefore, unless required due to large foundation loads, steel piles are not recommended.

Where either caissons or shallow footings are used, the contractor should be prepared to manage potential sloughing and seepage, with temporary steel sleeving and pumps for caissons, and using a system of slopes, trenches, sumps and pumps for footing excavations. For caissons end bearing in the clay shale, it will be critical to maintain the pile bases in a dry state until concrete is placed, to prevent softening of the shale.

The following sections provide recommendations for design and construction of cast-in-place concrete piles, spread footings, drainage, and frost protection measures. Recommendations for vertical compressive and uplift loads are provided using Ultimate Limit State (ULS) and Service Limit States (SLS) analysis, in accordance with the Manitoba Building Code and the current National Building Code.

5.2 CAST-IN-PLACE CONCRETE END BEARING PILES

Cast-in-place concrete end bearing piles, either straight shaft or belled and deriving their compressive resistance primarily from end bearing in the hard clay shale, are considered suitable for support of the proposed structure. It should be noted that sleeving will likely be required to seal off potential sloughing and seepage from the shallow sand layer and from possible seepage within the shale zone depending on the depth of the pile.

5.2.1 Axial Compressive Resistance: Cast-In-Place Concrete Belled Piles

The ultimate vertical compressive axial capacity of a single, drilled, cast-in-place concrete pile supported on hard clay shale may be determined using the ultimate end bearing values provided in Table 2.

Table 2: Ultimate Pile Resistance Values in Compression, Cast-in-Place Concrete Belled Piles

Depth Below Existing Grade (m)	Ultimate End Bearing (kPa)
0 to 3	–
3 to 6	1700

To obtain the factored geotechnical resistance at the ultimate limit state (ULS) for axial compressive loading conditions, the ultimate resistance values should be multiplied by a geotechnical resistance factor Φ of 0.4. The ultimate values provided apply to end bearing in the clay shale. The design values provided assume a mechanically cleaned and inspected surface.

5.2.2 Serviceability Limit State – Cast-in-Place Concrete Belled Piles

Provided that appropriate construction practices are followed, a maximum pile displacement equal to 0.25 to 1.0% of the pile bell diameter, plus the elastic shortening of the pile due to the compressive load acting on the pile, is estimated for drilled cast-in-place concrete belled piles designed according to the parameters defined in Table 2. Under these conditions, and provided that the settlement range for a given bell size is tolerable, the serviceability limit state (SLS) pile resistance may be taken to be equal to the factored geotechnical resistance at the ULS.

5.2.3 Design and Installation – Cast-in-Place Concrete Piles

In the case of belled or straight shaft concrete end-bearing piles, the following design and construction procedures should be adopted:

1. The weight of the embedded portion of the pile may be neglected in the design.
2. A minimum shaft diameter of 400 mm is recommended. Where bells are used, the ratio of the pile bell diameter to pile shaft diameter should not exceed 3, and the bell splay angle forming the roof of the bell, as measured from the vertical, should not exceed 35 degrees.
3. The bases of end bearing piles must be thoroughly cleaned of all loosened materials and seepage accumulations. Should loosened soil remain on the base after repeated attempts of mechanical cleaning with drilling tools, hand cleaning will be required. Where hand cleaning and down-hole inspection is required, the minimum shaft diameter must be 760 mm in order to accommodate the casing needed to access the bell. Full length sleeving would also be required and all excavation and piling operations must comply with the requirements of the Manitoba Workplace Safety and Health Act and Guidelines.
4. Piles within small groups of two or three piles can be considered to act individually as single piles in vertical compression, provided the pile spacing is a minimum of 3.0 pile or bell diameters. For closer spacing or greater numbers of piles in a group, a group reduction factor may be required, and this office should be contacted to review the

proposed layout.

5. Each pile should be suitably reinforced and designed by a structural engineer to resist applicable loading conditions.
6. A void space, a minimum of 100 mm thick, should be constructed using a compressible and biodegradable material, below all piles caps and grade beams to accommodate movements of the underlying soil. Where piles are in unheated locations, a void thickness of 150 mm should be used.
7. Temporary steel casings should be used as needed in each pile bore to control potential seepage and sloughing conditions from the upper sand fill layer, and from any permeable layers encountered in the shale. The temporary steel casing should be installed in the augered bore to control sloughing and groundwater seepage such that the pile concrete is cast in clean, dry holes. The level of fresh concrete inside the casing must be maintained above the caving or seepage zone as the casing is withdrawn, and should be maintained sufficiently high to balance pressures inside and outside of the casing to prevent collapse of the sidewall into the pile bore.
8. Piles should be poured as soon as practical after completion of drilling to reduce the potential for seepage and basal instability, and to reduce the potential for squeezing of the borehole. Concrete should be poured in accordance with the latest edition of Canadian Standards Association A23.1 (Concrete Materials and Methods of Concrete Construction).
9. If groundwater enters the pile bore, the water should be pumped out and the pile bore should be cleaned out to the previously bored depth. If water in the pile bore cannot be pumped out, and provided the pile bore remains open below the water level, concrete can be placed underwater using the tremie method from the bottom of the pile, displacing all water and any slough upwards from the pile bore.
10. To limit the potential for caving in the pile bores, the excavation of adjacent piles within three pile base diameters (edge-to-edge) should be deferred until the concrete in the constructed pile has set.

An Amec Foster Wheeler representative should be on site during the entire period of pile installation to confirm that soil conditions are consistent with those encountered in the geotechnical investigation, and that construction procedures are in keeping with recommended practices.

5.2.4 Tensile (Uplift) Resistance (Single Cast-in-Place Concrete Belled Pile)

The unfactored (ultimate) soil component of the uplift resistance of a belled pile can be considered as the "pullout" resistance of a cylindrical mass of soil projected above the circumference of the bell. The resistance will include the shear forces in the soil as the pile is lifted, and the combined effective weight of the pile and soil above the bell. For short term uplift load conditions, the unfactored uplift resistance of a belled pile may be determined by the following:

$$P_{ult} = \pi C_m B D + \frac{\pi}{4}\gamma' B^2 D$$

Where:

P_{ult}	=	Unfactored (ultimate) uplift resistance (kN)
B	=	Diameter of bell (m)
D	=	Depth of pile embedment (m)
γ'	=	Effective unit weight of soil (use $\gamma' = 19$ kN/m^3 above the groundwater table and $\gamma' = 9.2$ kN/m^3 below the groundwater table)
C_m	=	mobilized soil cohesion, use $C_m = 69$ kPa, applicable below the depth of frost (2.5 m) and any sand.

The first term of the above equation is the soil-to-soil frictional resistance, whereas the second term is the weight of soil and pile, and conservatively assuming that the pile concrete density equals that of the soil. Based on the test hole logs, the groundwater level can be assumed to be below the test hole depths and therefore the non-buoyant soil unit weight can be used.

Based on the *2010 National Building Code of Canada* (NBCC 2010), a geotechnical resistance factor, $\Phi = 0.3$ should be applied to the unfactored geotechnical tensile resistance of the pile to obtain the factored geotechnical resistance at the Ultimate Limit State (ULS) for tensile loading conditions. Frost design considerations are discussed in Section 5.4.

No uplift resistance should be assumed for any portion of the pile installed through fill or within the depth of seasonal frost. This office should be contacted if long term sustained uplift resistance is required.

5.2.5 Tensile (Uplift) Resistance (Single Cast-in-Place Concrete Straight Shaft Pile)

The unfactored (ultimate) soil component of the uplift resistance of a straight shaft pile is developed in the shear forces in the soil as the pile is lifted, and the effective weight of the pile, applied over the effective embedment depth, which can be taken as the pile length below sand or frost depth. The first term in the equation in Section 5.2.4 can be used to determine shear forces developed between the soil and concrete pile.

Based on the *2010 National Building Code of Canada* (NBCC 2010), a geotechnical resistance factor, $\Phi = 0.3$ should be applied to the unfactored geotechnical tensile resistance of the pile to obtain the factored geotechnical resistance at the Ultimate Limit State (ULS) for tensile loading conditions. Frost design considerations are discussed in Section 5.4.

5.3 SHALLOW SPREAD FOOTINGS

Shallow footings are considered suitable provided unheated footings are installed below the depth of seasonal frost penetration, i.e. to a minimum of 2.4 m; and interior footings are installed to a minimum depth of 1.5 m.

5.3.1 Shallow Spread Footings - Limiting Soil Stresses

An ultimate bearing pressure, q_{ult}, of 830 kPa may be assumed for initial design of a square or

strip footing founded on undisturbed very stiff to hard clay shale, based at a depth of at least 1.5 m below finished grade, and having a bearing width between 0.6 and 2.0 m.

A geotechnical resistance factor of $\Phi = 0.5$ should be applied to q_{ult} to obtain the available factored geotechnical resistance at the Ultimate Limit State (ULS), in accordance with the National Building Code.

5.3.2 Shallow Spread Footings - Limiting Settlements

To limit maximum total and differential settlements to typical values of 25 and 12 mm, respectively, a serviceability limit state bearing pressure of 400 kPa can be assumed for bearing widths up to 2.0 m and based at least 1.5 m below final grade, provided appropriate construction practices are used. For settlement analysis, load factors are not to be used for assessing acceptable bearing pressures.

5.3.3 Shallow Spread and Strip Footings – Design and Installation

Square or strip footings can be designed and constructed according to the following recommendations:

1. Excavate to final design bearing elevation, further ensuring that all organic, fill and soft to firm soils are removed. Footings that will be situated in unheated areas should be founded below the design frost penetration depth, which can be assumed as 2.4 m; or should be insulated to minimize the effects of frost heave. Amec Foster Wheeler can provide recommendations for insulation on request, once the structural design details are known. Regardless of whether they are in an unheated location, all footings should be based in very stiff to hard clay shale.
2. All softened, weakened, loosened and disturbed soils should be removed from the bearing surface, and during excavation and cleaning, care should be taken to ensure that the bearing surface is not disturbed or subjected to frost, inundation or excessive drying or wetting conditions. Final preparation of the bearing surfaces should be done by hand to remove all disturbed soils.
3. Once the bearing surface has been suitably prepared, it should be inspected by qualified geotechnical personnel to verify the suitability of the proposed bearing soils, confirm that the bearing soils are uniform and not affected by frost or disturbance, and confirm that the soils encountered are consistent with the conditions noted in this report.
4. The footing bearing surfaces should be protected from frost prior to, during and after concrete placement.
5. As soon as practical following approval of the bearing surface by qualified geotechnical personnel, the steel re-bar and concrete should be placed.
6. Footings should be steel reinforced and suitably designed by a structural engineer to act as a rigid foundation. Regardless of bearing capacity considerations, all footings should have a minimum width of 0.6 m.

7. All excavations shall be in accordance with the Manitoba Workplace Health and Safety Act and Guidelines. Special attention to this should be made where footings are extended to below the depth of frost penetration.
8. Where grade beams are used, a minimum 100 and 150 mm thick void form will be required under all grade beams within heated and unheated areas, respectively. The void material should be a low compressive strength, biodegradable, cardboard material.
9. The footing excavations should be backfilled with pre-approved native sand compacted in maximum 150 mm thick lifts to a minimum of 95% standard Proctor maximum dry density (SPMDD, ASTM D698). Some of the excavated materials, such as organic clay, sand with a high silt content, or soft silty clay may be prone to softening and disturbance and therefore may not be preferred. Alternatively, a granular subbase compacted to 98% SPMDD (Manitoba Infrastructure and Transportation Class C) should be used.

5.4 FROST DESIGN CONSIDERATIONS

5.4.1 Frost Penetration Depth

The upper stratigraphy at the test hole locations is considered to be highly frost susceptible in the presence of water, and as such, frost effects should be considered for foundations or surface structures sensitive to movement. A design frost penetration may be assumed as 2.4 m below final grade where regular snow or vegetative ground cover is not expected.

If necessary, the depth of frost penetration (and thus frost effects) may potentially be reduced by installing insulation. Amec Foster Wheeler can provide more detailed insulation recommendations for specific development conditions upon request. Uplift forces due to frost action should be handled separately from those resulting from either short term transient loads or sustained structural loads.

5.4.2 Pile Foundations

Frost forces applied to pile foundations include adfreeze pressures acting along the pile shafts and pile caps within the depth of frost penetration. If pile caps are used and extend beyond the perimeter of the underlying pile, then frost heave forces acting on the undersides of the pile caps, as well as on any connecting supports (i.e. lateral tie between the piles) may also need to be considered.

5.4.2.1 Adfreeze Stresses

Resistance to adfreeze and frost heave forces will be provided by the sustained vertical loads on the foundation, the buoyant weight of the foundation and dead weight of the structure, and the soil uplift resistance component provided by the length of the pile extending below the depth of frost penetration.

Piles located in permanently unheated areas must have a minimum embedded length of 8 m. Where pile lengths of less than 8 m are anticipated within unheated areas, either pile bells should be considered, or the piles should be insulated or isolated from the surrounding soil.

5.4.2.2 Frost Heave

To reduce the potential for frost heave, a compressible and biodegradable void-forming product should be installed beneath the underside of any grade beams or pile caps as well as any other structural element located within the depth of frost penetration. If non-biodegradable void forms are used, the pressure exerted by the compressed material on the bottom of the foundation elements should be included in uplift calculations. The recommended minimum void thickness is 150 mm in areas exposed to frost.

5.5 FOUNDATION CONCRETE

Foundation concrete should be designed, specified and constructed in accordance with concrete exposure classifications outlined in the latest revision of CSA standard A23.1, Concrete Materials and Methods of Concrete Construction. In addition, all concrete must be supplied in accordance with current Manitoba and National Building Code requirements.

The water soluble sulphate concentrations of five soil samples from the site were determined by Amec Foster Wheeler, in accordance with CSA A23.2-3B 9.1. The test results indicated that the samples contained 0.05% to 0.45% water soluble sulphates. On the basis of the test results and in accordance with Table 3, CAN/CSA-A23.1, the exposure classification of concrete exposed to soils at this site should be taken as severe, exposure class S-2. Table 2 of CAN/CSA-A23.1 requires CSA Type HS or HSb cement to be used in foundation concrete exposed to the soils at this site. Based on exposure requirements, foundation concrete should have a minimum specified 28-day compressive strength of 32 MPa and a maximum water/cement ratio of 0.45, in accordance with CAN/CSA-A23.1. Concrete strength requirements should, however, be checked against the structural requirements of the project and the potential for chemical attack. Concrete exposed to freeze-thaw cycles should be adequately air entrained to improve freeze-thaw durability in accordance with Table 4, CSA-A23.1, and air entrainment should be incorporated into any concrete elements that are exposed to freeze-thaw to enhance its durability.

Structural and other considerations may necessitate additional requirements for subsurface concrete mix designs.

6.0 CONCRETE FLOOR SLABS

6.1 PERFORMANCE CONSIDERATIONS

Lightly loaded, grade supported concrete slabs constructed on the native sand at the site are considered to be suitable to support typical floor loadings and would be expected to perform relatively well, with total and differential settlements expected to be less than 25 mm. Soft clay and sand layers were present near the ground surface in TH13 and accordingly, removal and replacement of the soft clay is likely to be necessary in some locations to facilitate construction and to promote satisfactory performance of grade supported slabs.

6.2 SUBGRADE PREPARATION AND BASE COURSE

Grade supported floor slabs should be constructed in accordance to the following recommendations:

1. Excavate to final design elevation, which should be taken as the elevation of the underside of the concrete slab minus the thickness of base and subbase. Further excavate as required to remove any organic soils, soft or weakened soils or fill soils if present. Care should be taken to prevent disturbance of the subgrade. Based on the test hole logs, a minimum stripping depth of 100 mm is suggested and is best accomplished with a smooth bucket excavator which will reduce the potential for disturbance of the sand layer.
2. During excavation and clearing, care should be taken to ensure that the subgrade surface is not subject to frost, inundation or heavy equipment. All loosened and disturbed soils should be removed from the final bearing surface as directed by the engineer.
3. Once the subgrade has been suitably prepared, it should be inspected by qualified geotechnical personnel to confirm that the sub-soils encountered are consistent with those as identified in this report.
4. Upon achieving the design subgrade elevation, the subgrade should be compacted to a minimum of 95% of SPMDD to remove the effects of the excavation process and in order to provide a more uniform subgrade surface. Given the potential for water to be present in the lower sand zones, non-vibratory compaction methods should be used.
5. Subgrade preparation and compaction work should be undertaken during non-freezing conditions.
6. Under slab granular fill should consist of a minimum of 150 mm of granular sub-base (MIT Granular C-base) followed by 150 mm of compacted granular base course (MIT Granular A-base), each compacted to a minimum of 100% of SPMDD. Where additional fill is required to reach the final design grade, additional sub-base material should be placed and compacted to 98% of SPMDD in maximum lift thicknesses of 150 mm.
7. A polyethylene vapour barrier can be placed directly below the floor slab to limit moisture migration through the slab. It should be noted that curing problems and curling of the slab at the edges might be encountered where the concrete slab is cast directly on the poly. Alternatively, where moisture migration through the slab is tolerable, the poly vapour barrier can be omitted.

To limit the effects of slab movements on the building structure, the following provisions are also recommended:

- Design equipment and partition walls bearing on the slab with a minimum 100 mm void space to minimize the potential for structural damage if slab movements occur.
- Provide control joints at regular intervals in the slab to reduce random cracking.

- Construct the floor independent of structural elements through the use of isolation joints.

6.3 DRAINAGE AND SUBDRAINAGE

Drainage adjacent to the building should promote runoff away from the structure. Site grading should provide positive drainage away from structure at a minimum gradient of 4 percent for landscaped areas within 3 m of the perimeter of the building; and at a minimum gradient of 3 percent for all pavement areas and landscaped areas outside of 3 m of the building perimeter, to improve long-term drainage and to reduce the potential for moisture percolation to the foundation elements.

Excavations at the perimeter of the building (grade beams, etc.) should be backfilled with well-compacted fill, topped with a clay cap a minimum of 0.6 m thick to limit surface water infiltration below structures and slabs. In landscaped areas, the clay cap should extend over and beyond granular backfills, to reduce infiltration through backfills and into zones slabs or grade beams. Pavement abutting structural components should be sealed with an asphaltic tack coat or flexible seal to minimize surface water infiltration below the main floor.

All downspouts from the roof should be discharged well away from the building and proper measures (e.g. splashguards) should be provided where necessary to prevent erosion and ponding of water.

7.0 FLEXIBLE PAVEMENT AND GRANULAR TRAFFIC SURFACES

The soil profile at the parking lot and driveway test holes, TH14 to TH17, primarily consisted of silty sand underlain by clay shale, however low plastic organic clay was encountered at TH17 and extended to about 0.6 m from grade. The silty sand is considered to be highly frost susceptible and prone to softening after heavy rain events or following spring thaw. To enhance the performance of the pavement structure, the traffic surface should be maintained as high as practical above the surrounding grades. Proper drainage is critical to the performance of the pavement structure, particularly where gravel surfaces are used. The traffic surface elevation should be a minimum of 1 m above the bottom of nearby drainage ditches.

The following design input parameters were assumed and utilized under the AASHTO design method to provide a new granular traffic structure for the site:

- ESAL's per year = 120,000
- 20 year design period for unpaved conditions
- initial serviceability = 4.2
- terminal serviceability = 2.0
- reliability for new construction = 85%
- overall standard deviation = 0.45
- design effective subgrade resilient modulus = 50 MPa

The design effective subgrade resilient modulus has been selected based on soil conditions and engineering judgement.

The recommended structure for a gravel surfaced parking area, prepared on a subgrade as provided below, is provided in Table 3:

Table 3: Granular Traffic Surface Design Sections

Material	Standard Duty	Heavy Duty	Compaction Required
Base Course	150 mm	180 mm	100% of Standard Proctor
Subbase	150 mm	290mm	98% of Standard Proctor
Total Thickness	**300 mm**	**470 mm**	**NA**

Asphalt pavement design sections recommended for truck traffic and car parking, and constructed on a subgrade prepared as noted below, are summarized in Table 4.

Table 4: Asphalt Pavement Design Sections

Material	Standard Duty	Heavy Duty	Compaction Required
Asphalt	65 mm	80 mm	98% of Marshall Density
Base Course	100 mm	150 mm	100% of Standard Proctor
Subbase	150 mm	150 mm	98% of Standard Proctor
Total Thickness	**315 mm**	**380 mm**	**NA**

Once the subbase and base courses are tested and approved, paving should begin as soon as practical. A regularly scheduled maintenance program should be initiated following construction to repair any cracks that may develop.

Subgrade and base preparation recommendations are provided below.:

1. Excavate to design subgrade elevation, which should be taken as the underside of pavement, if used, minus the thicknesses of base and subbase. Further ensure that all organic soils as well as any softened, weak, loose and/or disturbed soils are removed from the final subgrade surface. The exposed subgrade is expected to consist of loose to compact sand.
2. Once the subgrade surface has been suitably prepared, it should be inspected by

competent and knowledgeable geotechnical personnel to identify any soft or weak zones. The sand subgrade is considered to be prone to disturbance with potential rutting and pushing under construction traffic. Where the area appears suitable, a proofroll should be conducted to detect any soft or weak areas. Any soft or weak areas identified should be replaced or repaired as required prior to the placement of any fill materials. It is recommended that a budget be carried for localized repair with sub-excavation of up to 400 mm, and replacement with a geotextile and bridging layer.

3. Upon achieving the design subgrade elevation, the subgrade should be compacted to a minimum of 95% of SPMDD to remove the effects of the excavation process and in order to provide a more uniform subgrade surface. Given the potential for water to be present in the lower sand zones, non-vibratory compaction methods should be used.
4. The subgrade should be protected from frost, desiccation and inundation prior to and during construction.
5. The subgrade for both granular and asphalt traffic surfaces should be covered with a strong, nonwoven and permeable geotextile to act as a separator. Granular fill should consist of granular base and subbase placed to the thickness and compaction requirements summarized in the above Table. The base and subbase should be placed and compacted in lifts not exceeding 150 mm thick. All granular materials should meet the gradation and quality requirements of Manitoba Infrastructure and Transportation (MIT) Construction Specifications.
6. Any additional fill material required to meet final grades should consist of additional subbase materials placed in maximum 150 mm thick lifts and uniformly compacted to 98% of SPMDD.
7. All perimeter ditches should be a minimum of 1 m deep (i.e. below the granular traffic surface) and should be drained to a positive outlet.
8. The finished surface should have a minimum cross slope gradient of two (2) per cent.

Regular maintenance (regrading, gravel replenishment, etc.) should be undertaken on granular traffic surfaces. As well, consideration should be given to restricting parking lot use during critical periods such as spring thaw.

Adequate drainage and final surface slopes (i.e. at the subgrade and finish pavement levels), and a program of regular pavement inspection and maintenance over the long term, should be ensured to prolong the life span of the pavement structure and to improve the overall performance of the pavement surface. Maintenance should include prompt sealing of cracks as they occur, and filling of potholes in the pavement.

It is recommended that concrete pads be placed at all locations where heavy static wheel loads may exist, such as at delivery areas or garbage container pickup areas.

8.0 TESTING AND CONSTRUCTION MONITORING

The engineering design recommendations presented within this report are based on the assumptions that an adequate level of construction monitoring will be provided during construction, and that construction will be undertaken in accordance with all applicable codes and regulations. Construction should be performed according to generally accepted industry standards of care. An adequate level of construction monitoring is considered to be:

1. For earthworks and pavement: - Full-time monitoring and compaction testing.
2. For deep foundations: - Design review and full-time monitoring during construction.
3. For concrete construction: - Testing of plastic and hardened concrete in accordance with CSA A23.1 and A23.2.

Amec Foster Wheeler can provide CSA-certified concrete testing services on request. Amec Foster Wheeler requests the opportunity to review the design drawings, and the installation of the foundations, to confirm that the geotechnical recommendations have been correctly interpreted. Amec Foster Wheeler would be pleased to provide any further information that may be needed during design and to advise on the geotechnical aspects of specifications for inclusion in contract documents.

9.0 CLOSURE

The findings and recommendations of this report were based on the results of field and laboratory investigations, combined with an interpolation of soil and groundwater conditions between test hole locations. If conditions are encountered that appear to be different from those shown by the test holes drilled at this site and described in this report, or if the assumptions stated herein are not in keeping with the design, this office should be notified in order that the recommendations can be reviewed and adjusted, if necessary.

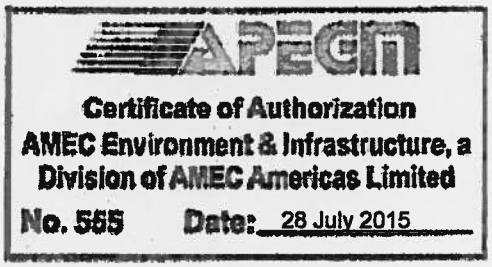
The site investigation was conducted for the sole purpose of identifying geotechnical conditions at the project site. Although no environmental issues were identified during the fieldwork, this does not indicate that no such issues exist. If the owner or other parties have any concern regarding the presence of environmental issues, then an appropriate level environmental assessment should be conducted.

Soil conditions, by their nature, can be highly variable across a site. The placement of fill and prior construction activities on a site can contribute to the variability especially for near surface soil conditions. A contingency should always be included in any construction budget to allow for the possibility of variation in soil conditions, which may result in modification of the design and construction procedures.

This report was prepared exclusively for Parkland Mill Group Inc. and their agents for the proposed development as described in the report. The data and recommendations provided herein should not be used for any other purpose, or by any other parties, without review and written advice from Amec Foster Wheeler. The findings and recommendations of this report were prepared in accordance with generally accepted professional engineering principles and practice. No other warranty, expressed or implied, is given.

Yours truly,

Amec Foster Wheeler Environment & Infrastructure,
A Division of Amec Foster Wheeler Americas Limited



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Robert Brown P. Eng.
Geotechnical Engineer

Reviewed By:

Harley Pankratz, P. Eng.
Vice President; Eastern Prairies/Northern Alberta

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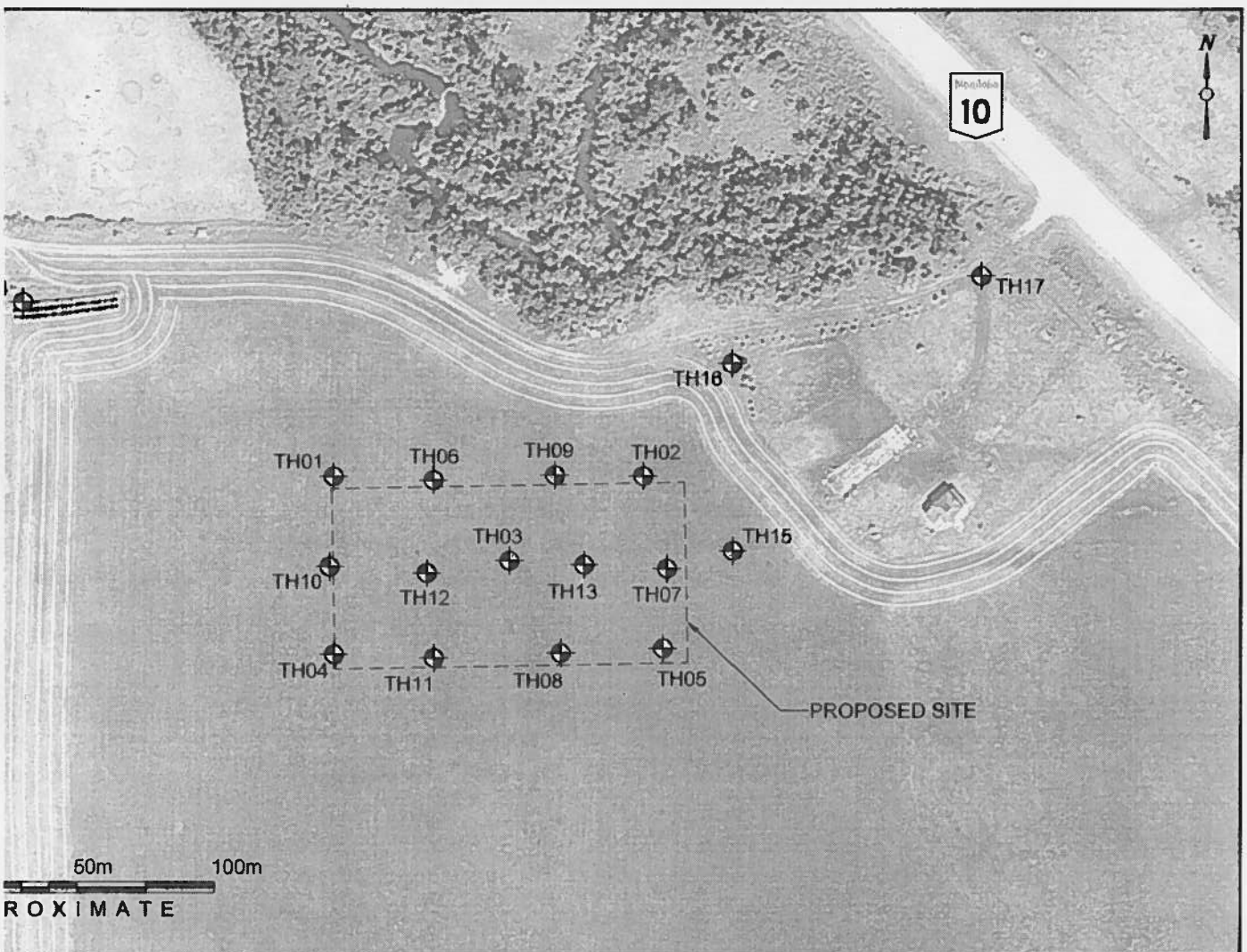
wheeler

FIGURES



CLIENT: PARKLAND MILL GROUP INC.	DWN BY: MD	GEOTECHNICAL INVESTIGATION PROPOSED PROCESSING FACILITY NW 30-29-21W ETHELBERT, MANITOBA	DATE: JUNE 2015
	CHKD BY: RB		PROJECT NO: WX17678
Amec Foster Wheeler Environment & Infrastructure 440 DOVERCOURT DRIVE WINNIPEG, MANITOBA R3Y 1N4 PHONE: 204.488.2997 FAX:204.489.8261	DATUM: NAD83		REV. NO.: A
amec foster wheeler	PROJECTION: UTM Zone 14 U	SITE AND TEST HOLE LOCATION PLAN	FIGURE NO: FIGURE 1
	SCALE: AS SHOWN		

PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH01
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

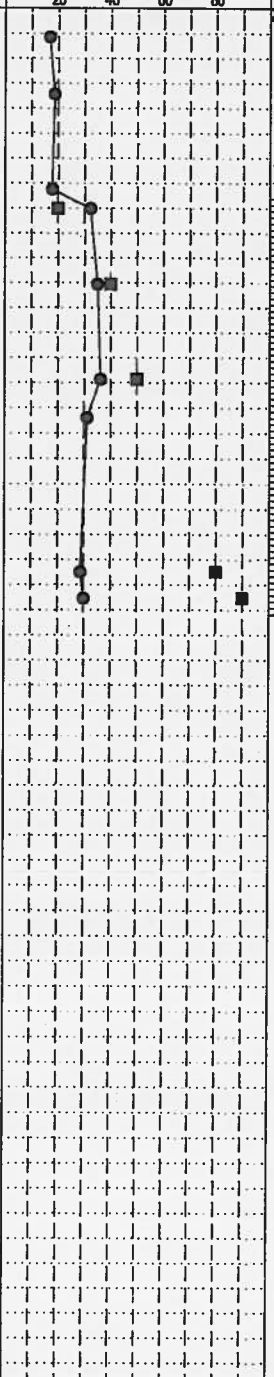
SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0			TOPSOIL - 100mm thick					0
			SAND - silty, trace clay, poorly graded, fine grained, compact (inferred), moist, light grey with brown, occasional oxidation inclusions, occasional black organic clay inclusions		1			
1		SM			2			1
			- fine to coarse grained, trace gravel below 1.2m					
			- very moist to wet below 1.4m		3			
			CLAY (SHALE) - silty, trace sand, trace gravel to 3.0m, high plastic, damp, stiff, dark grey, occasional silt inclusions, occasional sulphate inclusions		4			
2			- hard below 2.1m		5			2
3		CH			8			3
					7	83/280		
4								4
					8			
					9	93/270	Sample #8 @ 4.6m: Water Soluble Sulphate Content=0.15%	
5			PRACTICAL AUGER REFUSAL AT 4.8m					5
			Notes:					
			- No sloughing with seepage below 1.5m during drilling.					
			- Water level was 4.4m below grade upon completion of drilling.					
			- Test hole backfilled with auger cuttings and bentonite.					
6								6
7								7
8								8
9								9
10								10
11								

WX17676 ETHELBERT PROCESSING FACILITY.GPJ 15-07-28 02:50 PM (GEOTECHNICAL - REVISED)

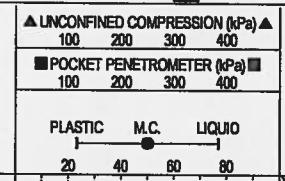
Amec Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

LOGGED BY: DC	COMPLETION DEPTH: 4.8 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
Figure No. 2	Page 1 of 1

PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH02
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0			TOPSOIL - 150mm thick					0
			SAND - silty, trace clay, fine grained, poorly graded, moist, compact (inferred), light greyish brown		1			
					2			
					3			
1		SM	- occasional clay inclusions below 0.8m					1
			- wet below 1.4m		4			
			CLAY (SHALE) - silty, trace sand, high plastic, damp, very stiff, dark grey		5			
2					6			2
			- hard below 2.5m					
3					7			3
4								4
		CL-CI			8			
					9	83/270		
5			- moist, soft below 5.0m		10			5
6					11			6
					12	81		
7								7
					13			
			- damp, very dense, hard below 7.6m		14	50/75	Sample #13 @ 7.6m: Water Soluble Sulphate Content=0.23%	
8			PRACTICAL AUGER REFUSAL AT 7.7m					8
			Notes:					
			- Sloughing occurred from 0.3m to 1.5m and seepage occurred at 1.4m during drilling.					
			- Test hole remained open to 6.7m and water level was inferred at 6.7m below grade upon completion of drilling.					
9			- Test hole backfilled with auger cuttings and bentonite.					9
10								10
11								

WX17676 ETHELBERT PROCESSING FACILITY.GPJ 15-07-28 02:50 PM (GEOTECHNICAL - REVISED)

Amec Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

LOGGED BY: DC	COMPLETION DEPTH: 7.7 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
Figure No. 3	Page 1 of 1

PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH03
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS
0			TOPSOIL - 100mm thick		1		
			SAND - silty, some organic clay, poorly graded, fine grained, moist, compact (inferred), mottled grey/black				
		SM	- and silt, mottled grey/brown below 0.65m		2		
1							
		CH	- wet at 1.4m		3		
			CLAY - silty, trace sand, trace gravel, high plastic, damp, stiff, brown, frequent oxidation inclusions, occasional silt inclusions		4		
2			CLAY (SHALE) - silty, trace sand, trace gravel, high plastic, damp, stiff, dark grey		5		
			- very stiff below 2.1m				
					6		
3			- hard below 3.0m		7	71	
		CH					
4					8		
					9	89/290	
5							
					10		
6					11	84/280	SPT @ 6.1m: Sampler was filled with sloughed-in sand Sample #10 @ 6.1m: Water Soluble Sulphate Content=0.18%
			PRACTICAL AUGER REFUSAL AT 6.4m Notes: - Sloughing occurred below 1.2m and seepage occurred at 1.4m during drilling. - Test hole remained open to 6.1m and water level was 4.9m below grade upon completion of drilling. - Test hole backfilled with auger cuttings and bentonite.				
7							
8							
9							
10							
11							

Depth (m) duplicate: 1 2 3 4 5 6 7 8 9 10

WX17676 ETHELBERT PROCESSING FACILITY.GPJ 15-07-28 02:50 PM (GEOTECHNICAL - REVISED)

Amec Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

LOGGED BY: DC	COMPLETION DEPTH: 6.4 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
Figure No. 4	Page 1 of 1

PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH04
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0			TOPSOIL - 100mm thick					0
		SM	SAND - silty, trace organic clay, trace gravel, poorly graded, fine to coarse grained, moist, loose (inferred), mottled grey/black, occasional roots		1			
1			- light grey, moist, no roots or organic inclusions, some black sand inclusions below 0.6m		2			1
			- very moist to wet below 1.2m		3			
2			CLAY (SHALE) - silty, high plastic, damp, hard, dark grey, trace sand		4			2
					5			
3					6			3
					7	62	Sample #6 @ 3.1m: Water Soluble Sulphate Content=0.05%	
4								4
		CH			8			
5					9	86/280		5
					10			
6					11	86/250		6
					12			
7					13	87/240		7
8			PRACTICAL AUGER REFUSAL AT 7.9m					8
			Notes:					
9			- No sloughing with seepage below 1.2m during drilling.					9
			- Water level was 2.1m below grade upon completion of drilling.					
10			- Test hole backfilled with auger cuttings and bentonite.					10
11								

WX17676 ETHELBERT PROCESSING FACILITY.GPJ 15-07-28 02:50 PM (GEOTECHNICAL - REVISED)

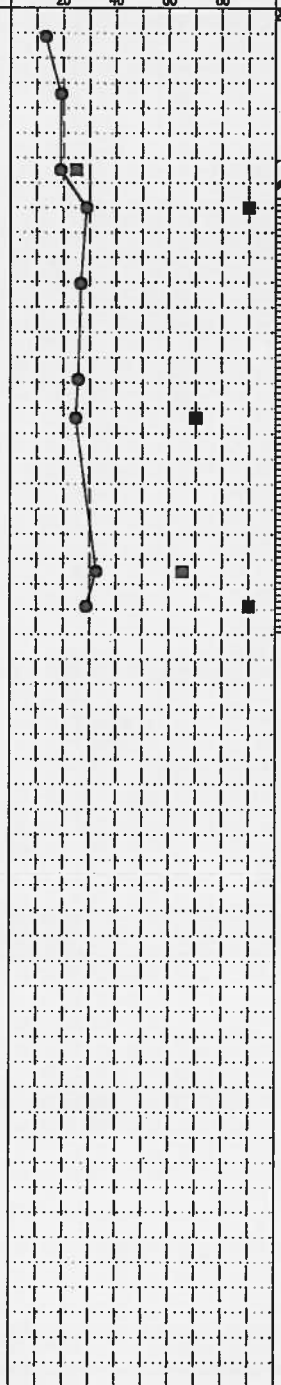
Amec Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

LOGGED BY: DC	COMPLETION DEPTH: 7.9 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
Figure No. 5	Page 1 of 1

PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH05
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0			TOPSOIL - 100mm thick					0
			SAND - silty, poorly graded, fine to coarse grained, moist, compact (inferred), light brownish grey, occasional rootlets		1			
		SM	- trace gravel, trace clay, occasional oxidation inclusions, occasional clay inclusions below 0.6m		2			
1								1
		CH	CLAY - silty, trace sand, trace gravel, high plastic, damp, stiff, grey, occasional oxidation inclusions, occasional silt inclusions, occasional sand inclusions		3			
					4			
			CLAY (SHALE) - silty, high plastic, damp, hard, dark grey					
2			- friable below 2.1m		5			2
					6			
3		CH			7	94/280		3
4								4
					8			
					9	98/250	Sample #8 @ 4.6m: Water Soluble Sulphate Content=0.45%	
5			PRACTICAL AUGER REFUSAL AT 5.0m					5
			Notes:					
			- No sloughing or seepage during drilling.					
			- Test hole backfilled with auger cuttings and bentonite.					
6								6
7								7
8								8
9								9
10								10
11								

WX17678 ETHELBERT PROCESSING FACILITY.GPJ 15-07-28 02:50 PM (GEOTECHNICAL - REVISED)

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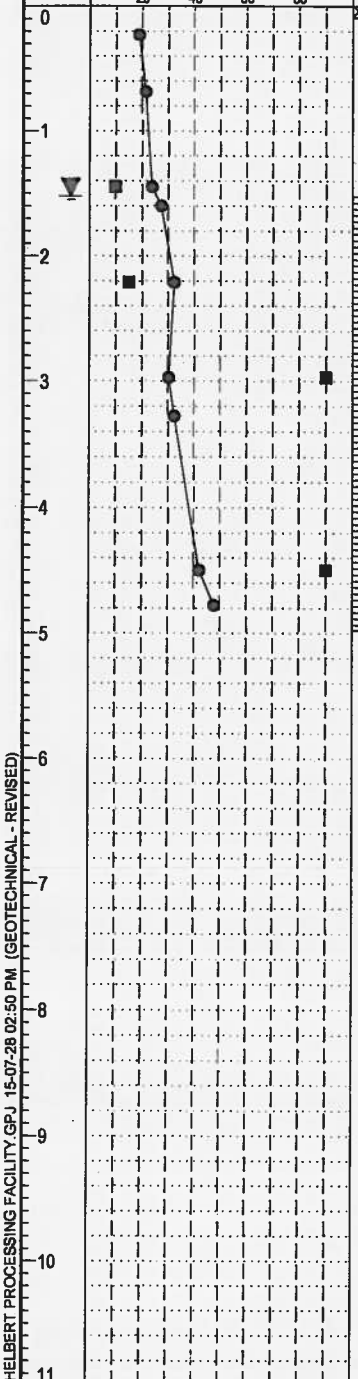
LOGGED BY: DC	COMPLETION DEPTH: 5 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
Figure No. 6	Page 1 of 1

PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH06
CLIENT: Parkland Mill Group inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS
0			TOPSOIL - 100mm thick				
		SM	SAND - silty, trace clay, poorly graded, fine to medium grained, moist, compact (inferred), greyish brown, occasional clay inclusions to 0.6m		1		
			- trace gravel below 0.6m		2		
1			- some clay inclusions, brown, firm below 1.2m		3		
			CLAY (SHALE) - silty, trace sand. high plastic, damp, firm to stiff, dark grey		4		
2					5		
			- trace gravel below 2.7m		6		
3		CH	- hard below 3.0m		7	95/280	
			- moist below 3.7m				
4					8		
					9	96/250	
5			PRACTICAL AUGER REFUSAL AT 5.0m Notes: - Sloughing occurred from 0.3m to 1.5m, and seepage occurred at 1.5m during drilling. - Test hole remained open to 2.1m and water level was 1.5m below grade upon completion of drilling. - Test hole backfilled with auger cuttings and bentonite.				
6							
7							
8							
9							
10							
11							

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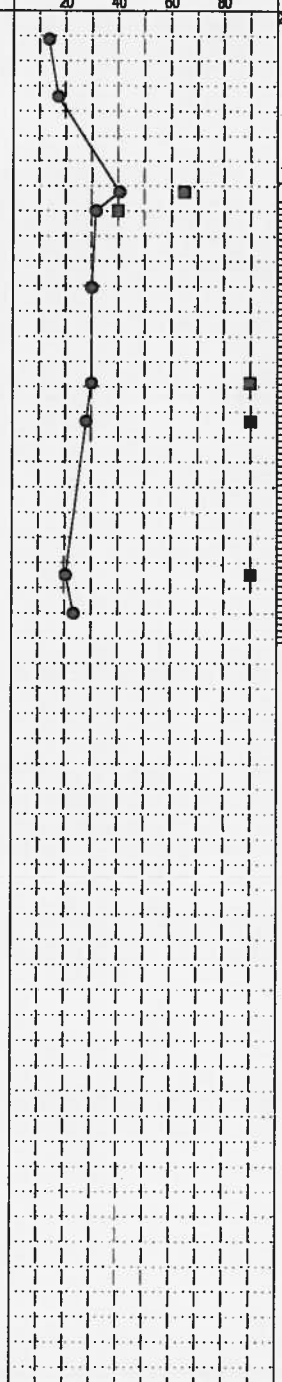
LOGGED BY: DC	COMPLETION DEPTH: 5 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
Figure No. 7	Page 1 of 1

PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH07
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS
0			TOPSOIL - 100mm thick				
		SM	SAND - silty, poorly graded, fine to coarse grained, moist, compact (inferred), mottled brown/black, occasional rootlets to 0.6m, occasional oxidation inclusions, occasional organic clay inclusions to 0.6m		1		
1			- mottled brown/grey, trace gravel, occasional clay inclusions below 0.6m		2		
		CH	CLAY - silty, trace sand, trace gravel, high plastic, damp, very stiff, grey, occasional silt inclusions, occasional sulphate inclusions		3		
					4		
2			CLAY (SHALE) - silty, high plastic, damp, very stiff, dark grey, occasional silt inclusions		5		
3			- hard below 2.9m		6		
		CH			7	76	
4							
					8		
5					9	86	
			PRACTICAL AUGER REFUSAL AT 5.0m Notes: - No sloughing or seepage during drilling. - Test hole backfilled with auger cuttings and bentonite.				
6							
7							
8							
9							
10							
11							

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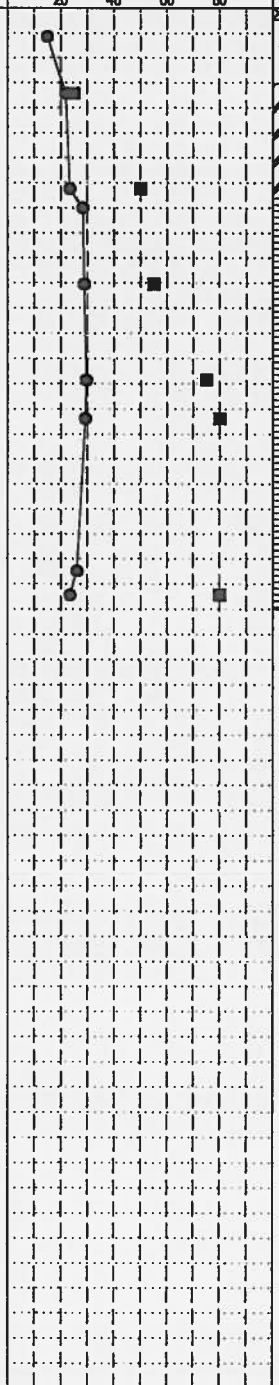
LOGGED BY: DC	COMPLETION DEPTH: 5 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
Figure No. 8	Page 1 of 1

PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: **TH08**
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube; No Recovery; SPT (N); Grab Sample; Split-Pen; Core

BACKFILL TYPE: Bentonite; Pea Gravel; Drill Cuttings; Grout; Slough; Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0			TOPSOIL - 100mm thick					0
		SM	SAND - silty, trace gravel, poorly graded, fine to coarse grained, moist, compact (inferred), light brownish grey, occasional oxidation inclusions		1			
					2			
1		CH	CLAY - silty, trace sand, high plastic, damp, stiff, grey, occasional silt inclusions, occasional oxidation					1
			- very stiff below 1.2m		3			
			CLAY (SHALE) - silty, high plastic, damp, hard, dark grey		4			
2					5			2
					6			
3		CH			7	92/290		3
4					8			4
			- friable (powdery after disturbance) below 4.6m		9	91/230		
5			PRACTICAL AUGER REFUSAL AT 4.8m Notes: - No sloughing or seepage during drilling. - Test hole backfilled with auger cuttings and bentonite.					5
6								6
7								7
8								8
9								9
10								10
11								

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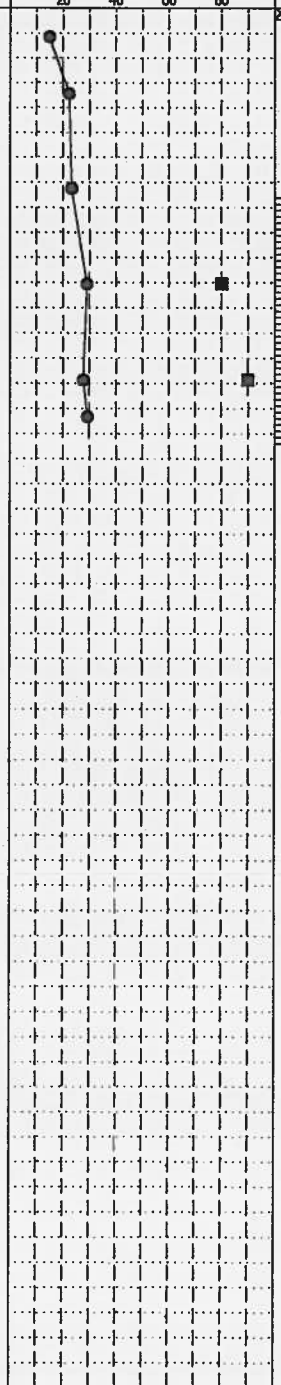
LOGGED BY: DC	COMPLETION DEPTH: 4.8 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
Figure No. 9	Page 1 of 1

PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH09
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS
0			TOPSOIL - 100mm thick				
		SM	SAND - silty, trace organic clay to 0.6m, poorly graded, fine to medium grained, moist, compact (inferred), light greyish brown, occasional roots		1		
1			- trace gravel below 0.6m		2		
			- occasional clay inclusions, grey below 1.2m		3		
2			CLAY (SHALE) - silty, trace sand, high plastic, damp, hard, dark grey		4		
		CH			5		
3					6	90/280	
			TEST HOLE TERMINATED AT 3.5m				
4			Notes:				
			- No sloughing or seepage during drilling.				
5			- Test hole backfilled with auger cuttings and bentonite.				
6							
7							
8							
9							
10							
11							

Depth (m) duplicated at footer.

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LOGGED BY: DC	COMPLETION DEPTH: 3.5 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
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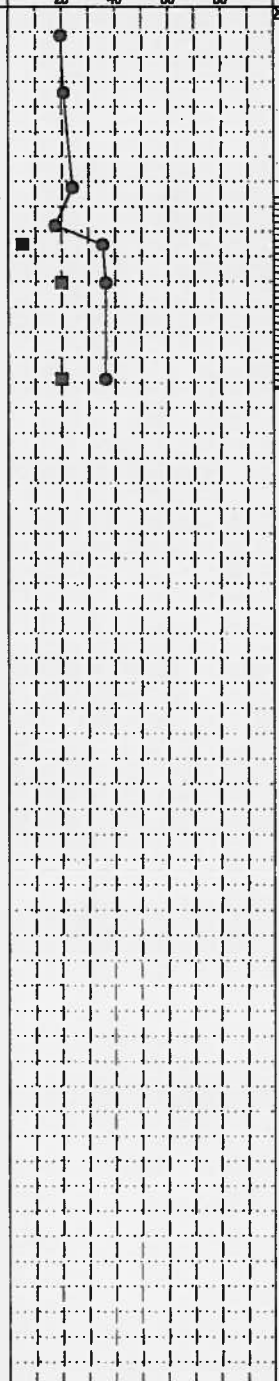
PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH10
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS
0			TOPSOIL - 100mm thick				
			SAND - silty, poorly graded, trace clay, fine to coarse grained, moist, compact (inferred), mottled grey		1		
1		SM	- light grey below 0.6m		2		
			- some clay, trace gravel, damp to moist, brown below 1.2m		3		
2			CLAY (SHALE) - silty, trace sand, trace gravel, medium plastic, damp, very stiff, dark grey		4	21	
					5		
		CH			6		
3					7		
			TEST HOLE TERMINATED AT 3.0m				
			Notes:				
			- No sloughing or seepage during drilling.				
			- Test hole backfilled with auger cuttings and bentonite.				
4							
5							
6							
7							
8							
9							
10							

Depth (m) duplicated: 0 1 2 3 4 5 6 7 8 9 10

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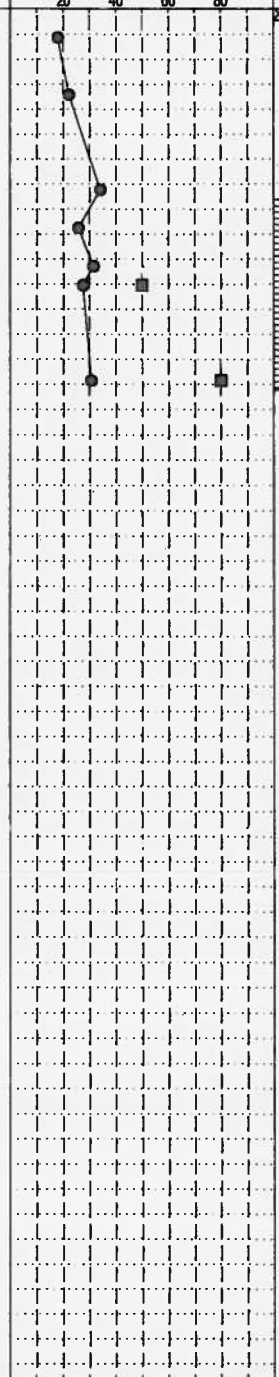
LOGGED BY: DC	COMPLETION DEPTH: 3 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
Figure No. 11	Page 1 of 1

PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH11
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0			TOPSOIL - 100mm thick		1			0
			SAND - silty, trace gravel, poorly graded, fine to coarse grained, moist, compact (Inferred), light brownish grey					
		SM	- damp to moist below 0.6m		2			
1								1
			- trace clay, brown, moist to wet below 1.2m		3			
			CLAY (SHALE) - silty, high plastic, damp, very stiff, dark grey		4	17		
2					5			2
		CH			6			
			- hard below 2.9m		7			
3			TEST HOLE TERMINATED AT 3.0m					3
			Notes:					
			- No sloughing or seepage during drilling.					
			- Test hole backfilled with auger cuttings and bentonite.					
4								4
5								5
6								6
7								7
8								8
9								9
10								10
11								

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LOGGED BY: DC	COMPLETION DEPTH: 3 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
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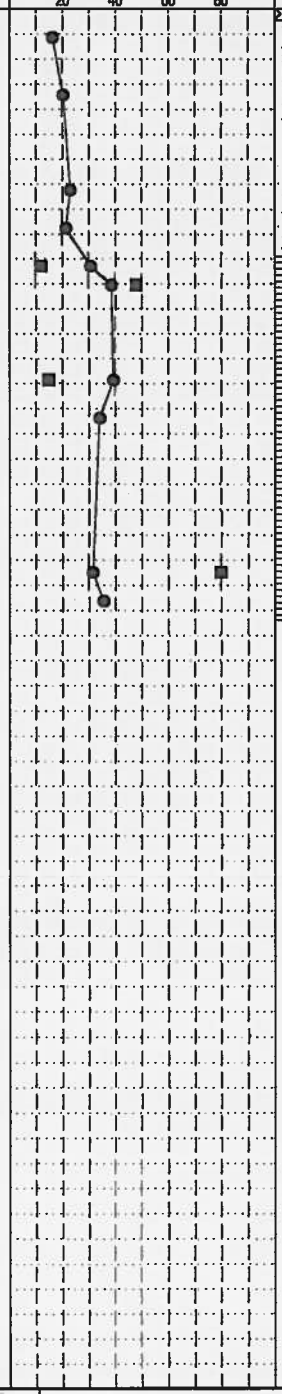
PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH12
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand



Depth (m)	SOIL SYMBOL	USCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0			TOPSOIL - 100mm thick					0
			SAND - silty, trace clay, poorly graded, fine grained, moist, compact (inferred), brown, occasional rootlets		1			
			- grey, occasional oxidation inclusions, occasional organic clay inclusions below 0.6m		2			
1		SM						1
			- wet, trace gravel, mottled grey/brown below 1.4m		3			
					4	21		
2			CLAY (SHALE) - silty, trace sand, trace gravel, high plastic, damp, firm, dark grey, occasional oxidation inclusions		5			2
			- hard below 2.3m		6			
					7			
3					8	83/280		3
		CH						
4					9			4
					10	88/290		
5			TEST HOLE TERMINATED AT 4.9m					5
			Notes:					
			- Sloughing encountered at 2.0m with no seepage during drilling.					
			- Test hole remained open to 2.3m upon completion of drilling.					
6			- Test hole backfilled with auger cuttings and bentonite.					6
7								7
8								8
9								9
10								10
11								

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LOGGED BY: DC	COMPLETION DEPTH: 4.9 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
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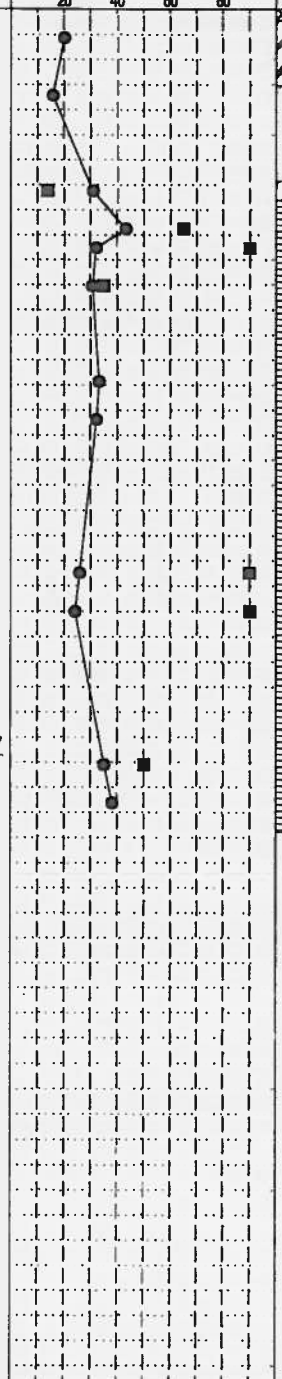
PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: **TH13**
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS
0			TOPSOIL - 100mm thick				
		CH	CLAY - silty, high plastic, moist, soft, grey, abundant sand layers		1		
1		SM	SAND - silty, trace clay, trace gravel, poorly graded, fine to coarse grained, moist, compact (inferred), brownish grey		2		
		CH	CLAY - silty, trace sand, trace gravel, high plastic, damp to moist, firm, grey, occasional oxidation inclusions, occasional silt inclusions		3		
					4	20	
2			CLAY (SHALE) - silty, trace sand, trace gravel, high plastic, damp, hard, dark grey		5		
					6		
					7		
3					8	30	
		CH					
4					9		
					10	99/230	
5							
6					11		
			- friable below 6.1m		12	75/290	
			PRACTICAL AUGER REFUSAL AT 6.6m				
7			Notes: - No sloughing with seepage encountered at 1.4m during drilling. - Water level was 5.9m below grade upon completion of drilling. - Test hole backfilled with auger cuttings and bentonite.				
8							
9							
10							
11							

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LOGGED BY: DC	COMPLETION DEPTH: 6.6 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
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PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH14
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0			TOPSOIL - 100mm thick					0
			SAND - silty, poorly graded, fine to coarse grained, moist, compact (Inferred), mottled grey, occasional clay inclusions		1			
			- trace gravel, light brown, damp to moist below 0.6m		2			
1		SM						1
			- very moist to wet, occasional oxidation inclusions below 1.2m		3			
					4			
2			CLAY (SHALE) - silty, trace sand, trace gravel, high plastic, damp, stiff, dark grey		5			2
		CH						
3			- hard below 2.9m		6			3
					7	98/230		
			TEST HOLE TERMINATED AT 3.4m					
			Notes:					
			- Sloughing and seepage encountered below 1.8m during drilling.					
			- Test hole remained open to 3.4m and water level was 2.0m below grade upon completion of drilling.					
			- Test hole backfilled with auger cuttings and bentonite.					
4								4
5								5
6								6
7								7
8								8
9								9
10								10
11								

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REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
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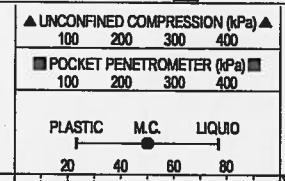
PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH15
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand



Depth (m)	SOIL SYMBOL	USCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0			TOPSOIL - 100mm thick					0
			SAND - silty, trace clay, trace gravel, poorly graded, fine to coarse grained, damp, compact (inferred), dark grey		1			
		SM	- moist, brown below 0.6m		2			
1								1
		CH	CLAY - silty, trace sand, high plastic, damp, very stiff, grey, occasional sand inclusions, occasional silt inclusions, occasional oxidation inclusions		3			
					4			
2			CLAY (SHALE) - silty, trace fine sand, high plastic, damp, very stiff, dark grey		5			2
		CH						
					6			
3			- hard below 3.0m		7	80/290		3
			TEST HOLE TERMINATED AT 3.5m					
			Notes:					
			- No sloughing or seepage during drilling.					
			- Test hole backfilled with auger cuttings and bentonite.					
4								4
5								5
6								6
7								7
8								8
9								9
10								10
11								

WX17676 ETHELBERT PROCESSING FACILITY.GPJ 15-07-28 02:50 PM (GEOTECHNICAL - REVISED)

Amec Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

LOGGED BY: DC	COMPLETION DEPTH: 3.5 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
Figure No. 16	Page 1 of 1

PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH16
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand

▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400

■ POCKET PENETROMETER (kPa) ■ 100 200 300 400

PLASTIC M.C. LIQUID 20 40 60 80

Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	Depth (m)
0			TOPSOIL - 100mm thick					0
			SAND - silty, poorly graded, fine to coarse grained, moist, compact (inferred), mottled brown/grey, occasional organic clay inclusions		1			
1		SM	- occasional oxidation inclusions below 0.6m		2			1
			- trace gravel, trace clay below 1.2m		3			
2			CLAY (SHALE) - silty, high plastic, damp, hard, dark grey		4			2
		CH	- friable below 2.1m		5			
3					6			3
					7	46		
4			TEST HOLE TERMINATED AT 3.5m					4
5			Notes:					5
6			- No sloughing or seepage during drilling.					6
7			- Test hole backfilled with auger cuttings and bentonite.					7
8								8
9								9
10								10
11								

WX17676 ETHELBERT PROCESSING FACILITY.GPJ 15-07-28 02:50 PM (GEOTECHNICAL - REVISED)

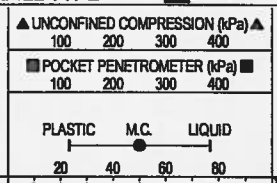
Amec Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

LOGGED BY: DC	COMPLETION DEPTH: 3.5 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
Figure No. 17	Page 1 of 1

PROJECT: WX17676	EXCAVATED BY: Maple Leaf Drilling Ltd.	TEST PIT NO: TH17
CLIENT: Parkland Mill Group Inc.	EXCAVATION TYPE: Track Mounted Acker Renegade	PROJECT NO: WX17676
LOCATION: Ethelbert, Manitoba	EXCAVATION METHOD: 125mm SSA	ELEVATION:

SAMPLE TYPE: Shelby Tube | No Recovery | SPT (N) | Grab Sample | Split-Pen | Core

BACKFILL TYPE: Bentonite | Pea Gravel | Drill Cuttings | Grout | Slough | Sand



Depth (m)	SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS
0			TOPSOIL - 100mm thick				
		OL	ORGANIC CLAY - silty, sandy, trace gravel, low plastic, damp, friable, mottled brown/grey		1		
			SAND - silty, trace gravel, poorly graded, fine to coarse grained, moist, compact (inferred), mottled grey		2		
1		SM			3		
			CLAY (SHALE) - silty, trace sand, high plastic, damp, very stiff, dark grey		4	17	
2		CH	- friable hard below 2.1m		5		
3					6		
			TEST HOLE TERMINATED AT 3.0m				
			Notes:				
			- No sloughing or seepage during drilling.				
			- Test hole backfilled with auger cuttings and bentonite.				
4							
5							
6							
7							
8							
9							
10							
11							

Depth (m) duplicated at footer.

WX17676 ETHELBERT PROCESSING FACILITY.GPJ 15-07-28 02:50 PM (GEOTECHNICAL - REVISED)

Amec Foster Wheeler Environment and Infrastructure
Winnipeg, Manitoba

LOGGED BY: DC	COMPLETION DEPTH: 3 m
REVIEWED BY: RB	COMPLETION DATE: June 9, 2015
Figure No. 18	Page 1 of 1

Beshada, Eshetu (CWS)

From: don fyk [mailto:fyksoba@mymts.net]
Sent: October-29-15 10:14 PM
To: Beshada, Eshetu (CWS)
Cc: don fyk
Subject: Fwd: dust control

As per you request, please find the information enclosed a brief description from Scott Thiessen of ArrowCorp, Winnipeg at the bottom of the page to Don. (airflow operations)

To address your questions regarding the equipment we will use for dust collection.

At the various stages of our operation, un-loading, conveying, and cleaning, we will utilize the cyclone system. It is efficient enough to remove 95% of the dust that may be produced in these phases. The air will be recirculated at whatever volumes are required because these areas of the building will not be heated. They will remain at atmospheric or outdoor temperature throughout the year. Find enclosed a drawing and a company brochure regarding this equipment. At this stage of the business plan, we are not incorporating any flour milling operation. However, if we did, we would utilize the Reverse Air technology.

Once we are further into the building we will utilize the state of the art “Reverse Air” dust collector. This equipment is 99% efficient and may be used in a heated room where air will not have to be exchanged with outside air thus leaving the building temperature consistent, and free of any contaminants. This system will be installed in the polishing, de-hulling, processing and packaging chain. If necessary we will install them in other service areas of the facility as well, including warehousing. The remaining products, screenings or tailings will be disposed off as cattle feed.

The cleanup dust that we will have to dispose off will be incorporated into various areas of our fields that require some form of fibre or dirt. It will be transported in covered trucks, spread over the field and incorporated back into the soil.
I hope I have been able to answer all your questions.
Feel free to contact myself at anytime.
Thank you.

Best Regards.
Don Fyk for Pauline Fondeur

Begin forwarded message:

From: "Scott Thiessen" <sthiessen@arrowcorp.com>
Date: October 29, 2015 at 11:57:54 AM CDT
To: <fyksoba@mymts.net>
Subject: dust control

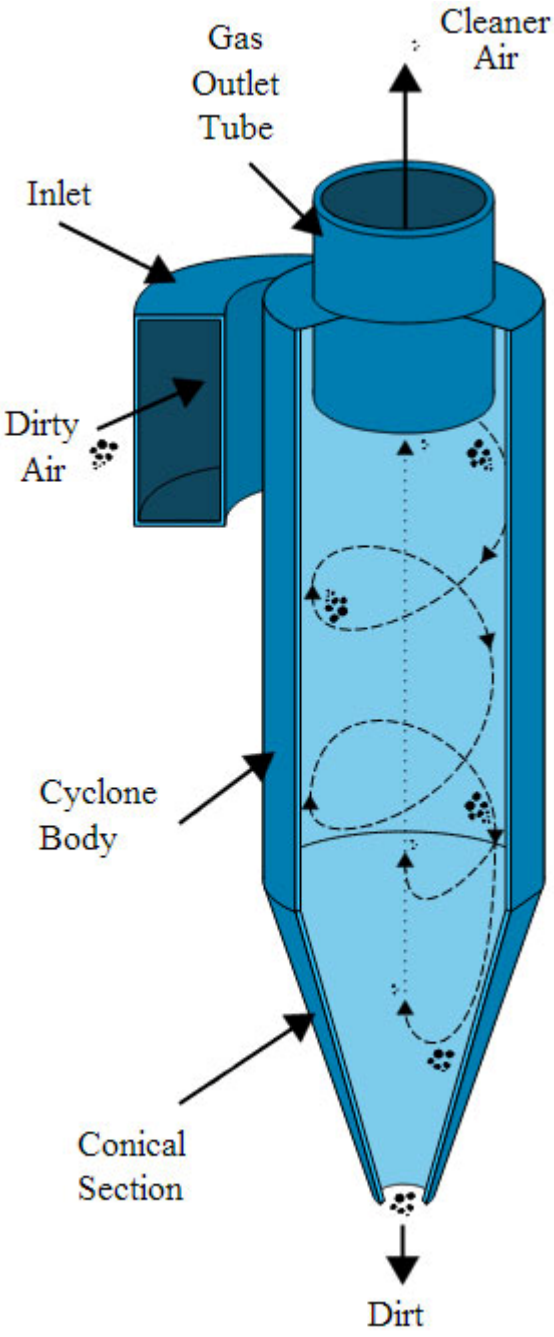
Hi Don
Hope this helps.

That is, airflow and particle travel is not a short distance from inlet to outlet. Airflow starts at the inlet and follows along a downwards helical path until it reaches the bottom of the conical section. The vertical upwards return flow towards the vacuum outlet starts at the center of the cyclone near the bottom.

The heaviest debris – wood chips, shavings, and such – quickly fall to the bottom of the separator. These larger particles collide with the cyclone walls, lose speed, and gravity helps pull them down towards the collection container.

Lighter and medium-sized particles continue on the helical airflow path along the walls of the cyclone or separator. At the bottom of the cyclone the conical section helps to further separate medium-sized particles from the airflow.

Some lighter particles will remain in the helical airflow, some will be separated with the medium-sized particles. The smaller radius of the taper means a greater wall-hugging force that keeps the smaller particles away form the center.



Particle size (Stokes Eq. Dia.)	% Collection (by weight) at zero dust load	% Collection (by weight) at specific dust load
1.25	14.36	32.20
3.75	73.40	78.94
6.25	85.03	88.14
8.75	90.56	92.52
11.25	93.78	95.08
13.75	95.89	96.75

BAGHOUSE FILTERS

Fabric filters collect particles with sizes ranging from submicron to several hundred microns in diameter at efficiencies generally in excess of 99 or 99.9 percent. The layer of

dust, or dust cake, collected on the fabric is primarily responsible for such high efficiency.

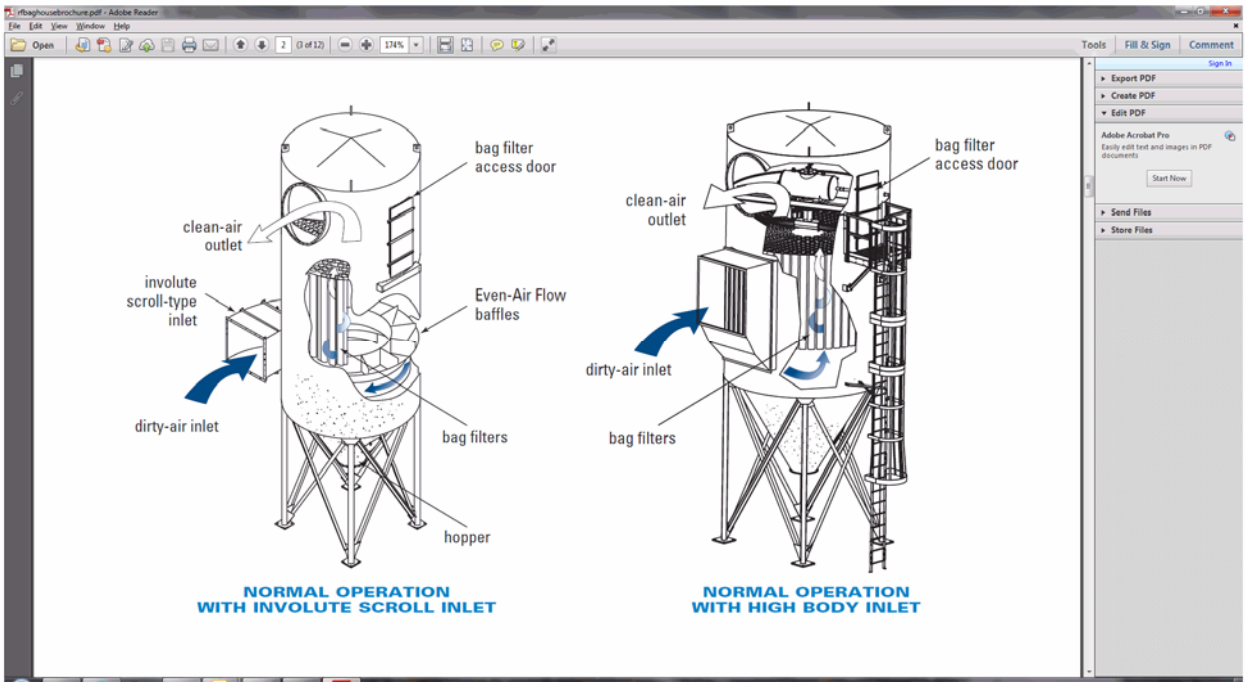
Costs

Cyclone for 15000 CFM $ 29,000.00

Bag House for 15000 CFM $ 74,730.00

Regards,

Scott Thiessen
ArrowCorp Inc.
61 Airport Rd.
Winnipeg, Mb Canada
R3H 0V5
204-632-1000 EXT 228


bag filter
access door
clean-air
outlet
involute
scroll-type
inlet
Even-Air Flow
baffles
dirty-air inlet
bag filters
hopper
NORMAL OPERATION
WITH INVOLUTE SCROLL INLET
bag filter
access door
clean-air
outlet
dirty-air inlet
bag filters
NORMAL OPERATION
WITH HIGH BODY INLET

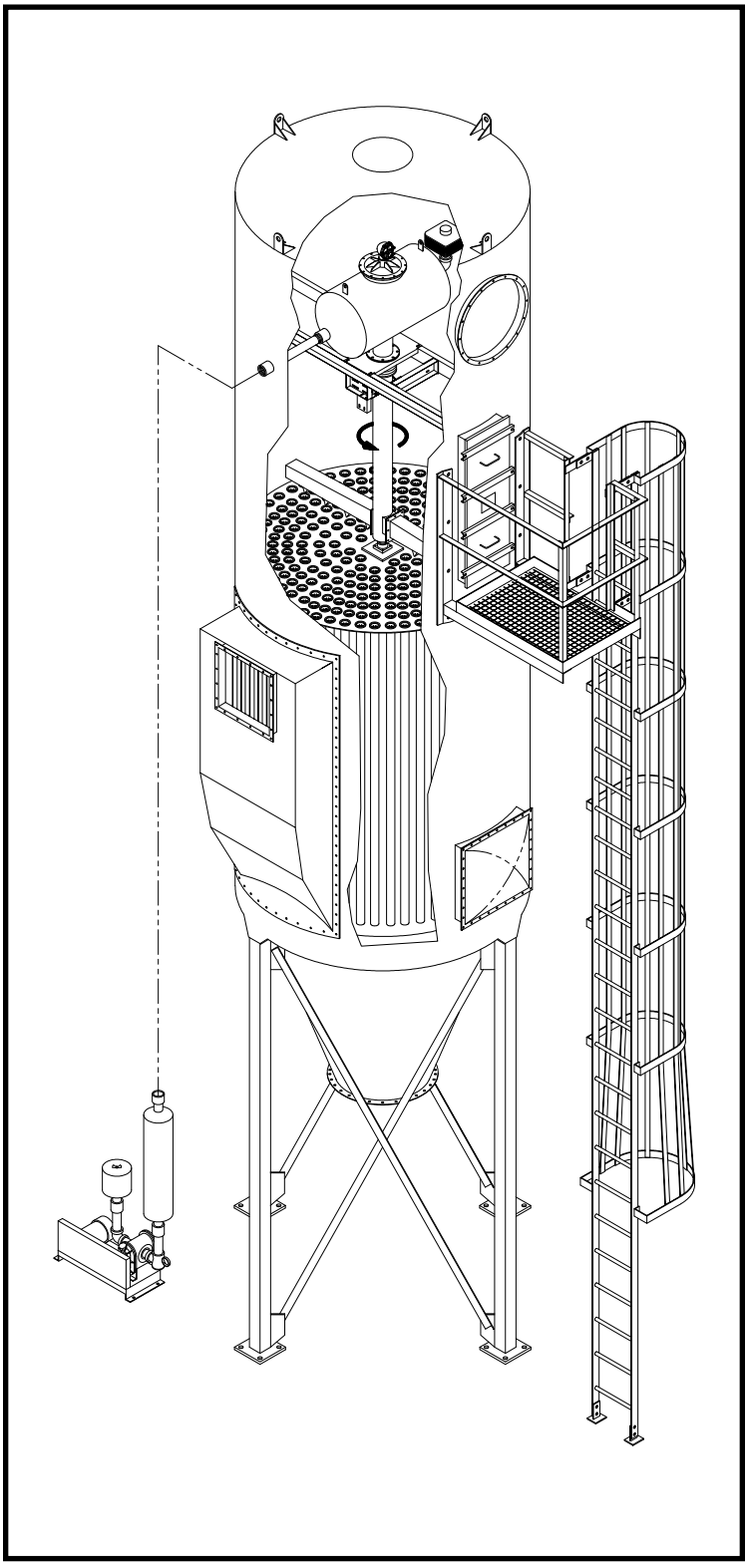
HVP™ & SWF™

Reverse-Air Dust Collectors

CAMCORP

Unique Design & Engineering
Approaches for Dust Collection
and Pneumatic Conveying

HVP™ Series Dust Collector



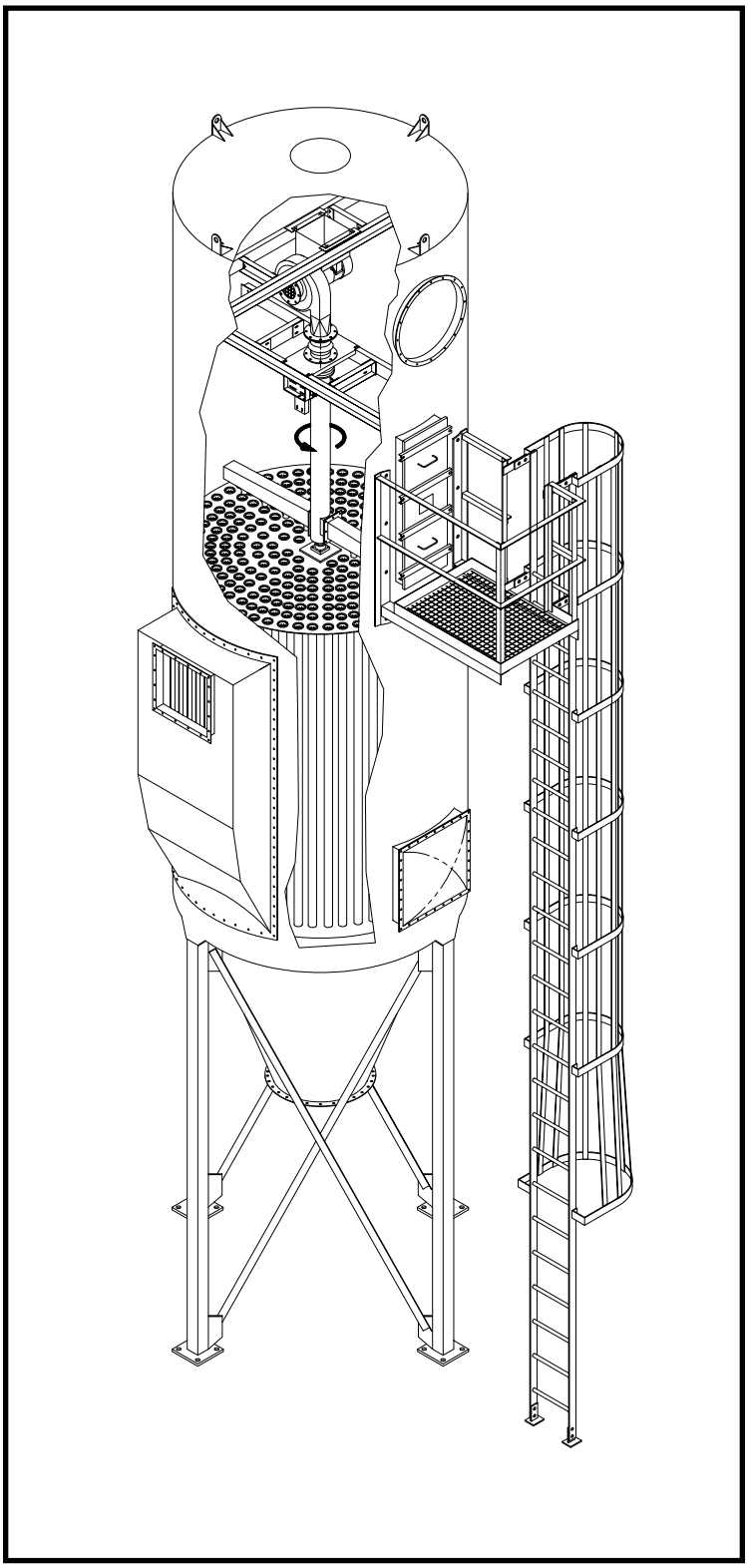
CAMCORP's HVP™ Series Reverse Air Filter is a continuous duty, medium-pressure, self-cleaning dust collector designed to operate economically and effectively (without the need for costly plant compressed air) on a wide-range of dry particulate removal applications.

Standard Features

- *All-welded housing to reduce set-up time and minimize installation costs.*
- *Heavy-duty carbon steel construction rated at +/- 20" W.C.*
- *Exterior and clean air plenum interior primed and finish painted CAMCORP white industrial enamel.*
- *Walk-in clean air plenum with hinged access door provides convenient access to filter bags and internal cleaning system components.*
- *Tool-free bag/cage installation/removal is quick and easy.*
- *Energy efficient medium-pressure-air (8 to 10 PSI) bag cleaning system utilizes a rotary lobe positive displacement blower, air accumulator tank with diaphragm valve, solenoid valve, adjustable timer and rotating cleaning air manifold.*
- *Standard round clean-air exhaust outlet (square or rectangular optional), each sized as required.*
- *Selection of inlet designs available. (High entry inlet with formed staggered channel baffles illustrated).*
- *Conical hopper with 60-degree side slope, access port and flanged discharge.*
- *Pursuant to size and clearance requirements: Structural supports welded to the all-welded housing are available to reduce set-up time and minimize installation costs.*

CAMCORP's **SWF**™ Series Reverse Air Filter is a continuous duty, low-pressure, self-cleaning dust collector designed to operate economically and effectively (without the need for costly plant compressed air) on a wide-range of dry particulate removal applications.

SWF™ Series Dust Collector



Standard Features

- *All-welded housing to reduce set-up time and minimize installation costs.*
- *Heavy-duty carbon steel construction rated at +/- 20" W.C.*
- *Exterior and clean air plenum interior primed and finish painted CAMCORP white industrial enamel.*
- *Walk-in clean air plenum with hinged access door provides convenient access to filter bags and internal cleaning system components.*
- *Tool-free bag/cage installation/removal is quick and easy.*
- *Energy efficient low-pressure-air bag cleaning system utilizes an internally-mounted centrifugal pressure blower fan and rotating cleaning air manifold. Optional: Externally-mounted centrifugal pressure blower fan designs also available.*
- *Standard round clean-air exhaust outlet (square or rectangular optional), each sized as required.*
- *Selection of inlet designs available. (High entry inlet with formed staggered channel baffles illustrated).*
- *Conical hopper with 60-degree side slope, access port and flanged discharge.*
- *Pursuant to size and clearance requirements: Structural supports welded to the all-welded housing are available to reduce set-up time and minimize installation costs.*

CAMCORP

Model 12HVP368 on Wood Dust - Lumber Industry

(2) Model 12SWF368 on Rock Dust - Aggregate Industry

Model 10SWF504 on Paper Dust
Paper Products Industry

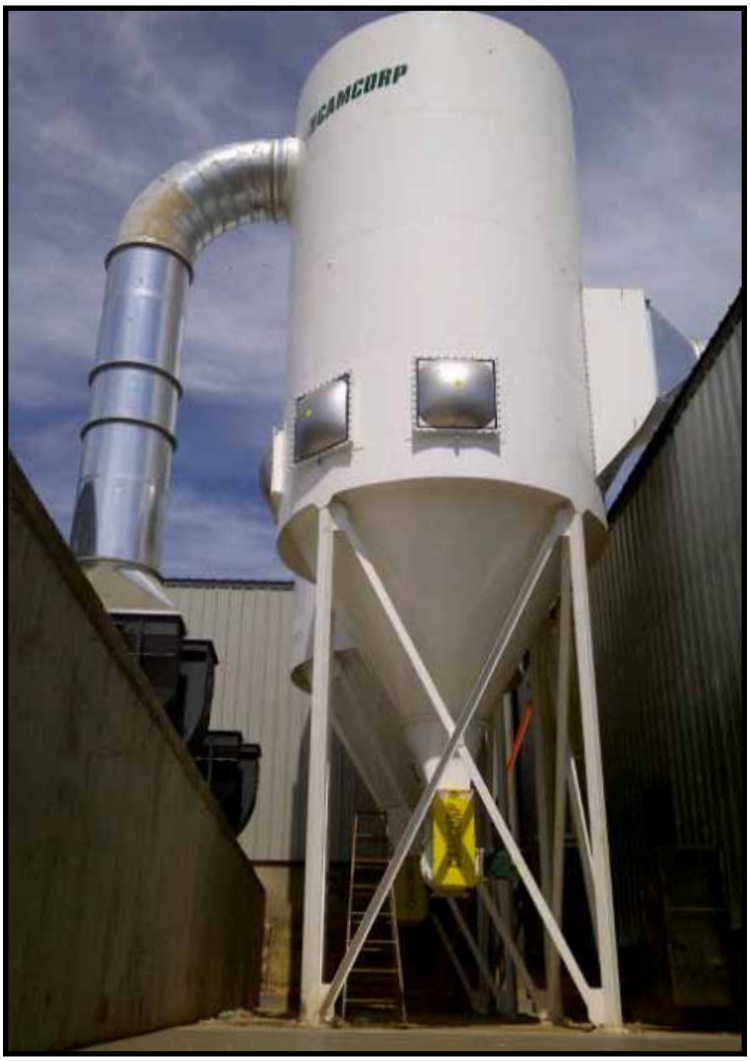
Model 10SWFP292 on Paper Trim - Printing Industry

Model 10HVP1648 on Wood Dust - Recycling Industry
24' Diameter & Sectionalized for Field Assembly

(3) Model 10HVP256 on Rice Dust - Food Industry

Model 12SWF504 on Grain Dust - Grain Industry

Model 10SWF152 on Soybean Dust - Seed Industry



Model 10SWF504 on Feed Dust - Feed Industry

Model 10SWF256 & 10SWF312 on Corn Dust
Ethanol Industry

Model 12HVP312 on Corn Dust - Ethanol Industry

Model 10SWF504 on Paper Dust - Packaging Industry

Options and Accessories

- *Flanged or sectionalized construction*
- *Stainless steel construction*
- *Custom paint colors*
- *Exotic paints and coatings*
- *Tangential, involute or custom inlets*
- *Wide selection of bag filter medias*
- *Pleated filter elements*
- *Grounding*
- *Explosion Venting*
- *Sprinkler kits*
- *Internal service light*
- *Quick inspection viewport*
- *Hopper access doors*
- *Water drain*
- *Structural supports / Skirt support*
- *70-degree side slope hopper*
- *Platforms and ladders*
- *Live-bottom anti-bridging augers*
- *Rotary valves*
- *Slide gates / drum cover kits*
- *Dust bins*
- *Fans, dampers and silencers*
- *Photohelic or Magnehelic gauges*
- *Motor starters / electrical control panels*
- *NEMA 7/9 Explosion Proof electricals*
- *Thermocouples*
- *Flow monitors*
- *Pressure transducers*
- *Emissions monitors*
- *Dust level probes*
- *High temperature designs*
- *High pressure / vacuum ratings*
- *Bin vent style*
- *Wide bag spacing*

Principle Industries Served

- *Agriculture*
- *Brewing*
- *Cement*
- *Chemical*
- *Coal*
- *Ethanol*
- *Feed*
- *Fly Ash*
- *Food Processing*
- *Foundry*
- *Grain & Corn*
- *Iron & Metals*
- *Milling & Baking*
- *Mining & Minerals*
- *Pet Food*
- *Plastic*
- *Pulp & Paper*
- *Recycling*
- *Rice*
- *Rock Products*
- *Seed*
- *Soybean*
- *Sunflower*
- *Woodworking*

CAMCORP's **HVP**™ & **SWF**™ Series Reverse Air Filters are the premium choice for processing and manufacturing industries where high air volumes and heavy dust loading are common. **CAMCORP** leads the industry with the most standard sizes and customizable configurations available to solve virtually all dust collection challenges. Capacities range to over 250,000 CFM.

HVP™ & SWF™

Reverse-Air Dust Collectors

www.CAMCORPINC.com

CAMCORP

9732 Pflumm Road
Lenexa, KS 66215

Phone: 913-831-0740
Fax: 913-831-9271
E-mail: info@camcorpinc.com