APPENDIX 3

Phase I Environmental Site Assessment - Public Safety Building & Civic Centre Parkade

Phase II Environmental Site Assessment - Public Safety Building & Civic Centre Parkade

PHASE I ENVIRONMENTAL SITE ASSESSMENT

PUBLIC SAFETY BUILDING &
CIVIC CENTER PARKADE

151 & 171 PRINCESS STREET
WINNIPEG, MANITOBA

Submitted to:

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EXECUTIVE SUMMARY

AMEC Environment & Infrastructure, a division of AMEC Americas Limited ("AMEC"), was retained by Ms. Tracy L. Stople of the City of Winnipeg ("Client") to conduct a Phase I Environmental Site Assessment (ESA) of the Public Safety Building and Civic Center Parkade located at 151 & 171 Princess Street, in Winnipeg, Manitoba (the "Site"). Currently, the Site is owned and operated by the City of Winnipeg.

The purpose of the Phase I ESA was to identify actual or potential environmental concerns at the Site. The Phase I ESA methodology consisted of a review of selected historical and current information pertaining to the Site and surrounding properties; an inspection of the Site on 7 July 2013 to identify practices or circumstances that may present potential environmental liabilities; and interviews with personnel familiar with the Site. Site observations were of a visual, walk-through type and did not include sampling or testing, a process consistent with the industry standard.

Based on the environmental assessment conducted, the following areas of actual or potential environmental concerns (APECs) were identified at the Site:

APEC 1: AMECs historical review of the Site indicates that an automotive fuel station / auto service center, with associated underground storage tanks, was formally located at the northeast corner of the Site from prior to 1946 until 1965, prior to the development of the current Site buildings. Potential contaminants of concern associated with automotive service shops and fuel stations generally include petroleum products such as gasoline and diesel fuel, solvents,, waste oils and other lubricates and other automotive fluids such as anti-freeze and battery fluids.

APEC 2: AMEC's historical review of the Site indicates that, Rynolds Printing Co. occupied middle section of the Site (293 Market Avenue) between 1930 and 1935. A printing company was also illustrated in this building in the 1964 FIPs. Given that this property was formally located on the portion of the Site that was excavated for the development of the basement of the Civic Center Parkade, impacts to the Site as a result of the printing companies at this location are consider to be low. It is expected that if soil contamination was present, that the contaminated soils would have been taken off site during the construction of the Civic Center basement.

APEC 3: The City of Winnipeg reported to AMEC at the time of the Site inspection that a portion of the basement level of the Site buildings was formally utilized to service garage for police vehicles. AMEC observed the remnants of an inferred hoist which was encased in concrete in this general area. Further, given that there are floor drains throughout the former service area, there is a potential for chemicals and other automotive related maintenance fluids to have entered the drain system.

APEC 4: According to Manitoba Conservation and Water Stewardship (MCWS) a 2270 L underground storage tank is current located on Site. At the time of the

inspection, AMEC observed the fill cap for an underground tank within the flower bed located along side the north side of the northeast ramp. While the City of Winnipeg was unable to confirm this was the location of the tank, they reported that it should be in that general area of the Site. Historically, based on a draft report provided to AMEC, an underground diesel storage tank was formerly located in this area of the Site. Petroleum hydrocarbon impacted soils associated with the former were identified and remediated in this area, however residual impacts reported remain.

In addition to the onsite APECs, AMEC identified the following APECs located adjacent to or neighbouring the Site which are an APEC to the Site:

APEC 5: Review of the Henderson Street Directories indicates that an auto wrecking company occupied the southwest corner of the intersection of William Avenue and Princess Street, located approximately 35 m southwest of the Site, between 1940 and 1945.

APEC 6: Review of Fire Insurance Plans indicated that a machine shop and auto body manufactures shop were located along the north Site of James Street located approximately 20 m north of the Site in 1917. The 1946 and 1964 Fire Insurance Plans of the area re-labelled the machine shop to 'Vulcanizing - Princes Tires Service', and the automotive manufacturing building was no longer occupied by the auto body manufactures shop. Given that these properties were not listed in the Henderson Street Directories it is unknown to AMEC how long these properties operated for.

Based on the APECs listed above, AMEC recommends a Phase II ESA to assess for potential for subsurface impacts.

The following items may require additional attention:

- Potential asbestos containing materials (ACMs) including mortar associated with brick / masonry, grout and mortar associated with ceramic tile, roofing materials and mastics, sealants, adhesives and mastics, and gypsum board joint compound were not included in the Site's Asbestos Inventories provided to AMEC for review. ACMs are known to be present at the Site;
- Potential polychlorinated biphenyls (PCBs) in light ballasts and other equipment;
- Potential lead containing paints (LCPs) throughout the building;
- Potential mercury in fluorescent lamps and other building equipment;
- Potential ozone depleting substances in refrigeration and cooling equipment; and
- Water damage was observed in several areas of the Site building, with significant water damage observed in the basement of the Site building located beneath the Civic Center Parkade. While no suspect visible mould (SVG) was observed, SVG may be present in areas not observed or may occur at a later date if the water issues are not addressed.

Based on the findings of the assessment, and given that a completed asbestos survey has not been completed on Site, AMEC recommends that a designated substance survey (DSS) be

conducted given the potential for disturbance of these materials in the future. It should be noted that Provincial Regulations regarding suspected asbestos containing material, until confirmed to be non-asbestos material, requires an inventory of such materials and the preparation of an asbestos control plan for the protection of the workplace.

A summary of the on-site environmental issues assessed as part of the Site inspection and addressed in this report are presented below:

Site	151 & 171 Princess Street
Environmental Issue	**Comments**
Air Emissions	There were no sources of air emissions observed on Site at the time of the inspection, apart from standard heating and cooling equipment.
Asbestos Containing Materials (ACMs)	Asbestos inventory documents were provided to AMEC for viewing for both 151 and 171 Princess Street. As indicated in the asbestos inventory sheets ACMs are currently present located within both of the Site buildings. AMEC also observed labelling of ACMs throughout the Site building at the time of the inspection. Some potential ACMs that were observed within the Site buildings but were not included in the asbestos inventory documents include; • Mortar associated with brick / masonry; • Grout and mortar associated with ceramic tile; • Roofing materials and mastics; • Mastics, sealants and adhesives; and • Gypsum board joint compound.
Polychlorinated Biphenyls (PCBs)	Fluorescent tube light fixtures were observed throughout the Site building. As the building was constructed prior to the ban on PCBs, there is a potential that the dielectric fluid in the fluorescent light ballasts that were not upgraded during the 1999 to 2007 renovations to contain PCBs. PCB containing light ballasts must be handled as hazardous waste and cannot be disposed of in a commercial dumpster. It was reported to AMEC that two transformer vaults are located on the Site. However, AMEC was unable to access the vaults at the time of the inspection. There is a potential for the transformers within these values to contain PCBs. Additional PCBs which may be present within the building, but which were not observed or reported during the Site inspection, may include mechanical oils, lubricants, hydraulic equipment, paints and caulking material.
Lead Containing Paints (LCPs)	Based on the construction date of the Site building (1965), LCPs may have been used during initial construction and subsequent renovation, although may have been painted over during renovations completed following the ban on LCPs.

Hazardous and Non-Hazardous Chemical Use and Storage	At the time of the inspection it was reported to AMEC that any chemicals that were used on Site were properly stored according to manufactures specifications and disposed of in accordance with provincial requirements. Additionally, it was reported to AMEC that in the past Work Place Heath and Safety has inspected the handling and disposal of the chemicals in the lab portion of the Site building and no issues were identified during the inspection. Chemicals utilized in the lab area are directed into an acid dilution system and which is then directed into the municipal sewer system. Chemicals that were observed at the time of the inspection were property stored.
Storage Tanks - Underground (USTs) - Aboveground (ASTs)	At the time of the inspection, AMEC observed two approximate 500 L day tanks, one located in the generator room in the basement of the Site buildings, and the second was observed in generator room 1, located on the 6th floor of the Public Safety Building. Both tanks were observed to be in good condition at the time of the inspection. Additionally, the fill cap for the main 2270 L underground diesel tank was observed within in the flower bed located along side the north side of the northeast ramp.
Hazardous and Non-Hazardous Solid Waste	There was no hazardous waste observed at the Site. It was reported by the City of Winnipeg that any hazardous waste that is produced on Site is handled and disposed according to regulations. Non-hazardous solid waste is stored in the garbage area located near the basement in the loading dock area until it is hauled off-Site.
Ozone Depleting Substances (ODSs)	Refrigeration equipment, including a commercial drink cooler and walk-in cooler as well as the building's air conditioning unit, may contain ODSs which would require servicing by a licensed technician.
Liquid Effluents	Liquid effluents (i.e. system process water and discharges to sewers or other disposal systems) were included domestic sewage, liquid effluent from acid dilution systems, and run-off collected within the basement of the Site buildings which is then directed to the municipal sewer system. It should be noted that collection drains were observed within the area of the basement that was reported to have formally operated as a service area for police vehicles.
Groundwater Wells	There are no known groundwater wells currently in use on the Site. However, a monitoring well was observed near the northwest corner of the Civic Center Parkade. Details regarding the construction and depth of the monitoring well were not available.
Radon	None known or reported at the time of the Site inspection.
Suspect Visible Mould Growth (SVG)	Significant water damage was observed in the basement of the Site building located beneath the Civic Center Parkade, were it was reported that water damage has been an ongoing issue. Additionally, a small section of ceiling tiles in several locations of the upper floors of the Public Safety Building.

Mercury	Potential sources of mercury observed at the Site were limited to thermostats, small commercial switches, industrial switches, the potential use of paint coatings, and fluorescent lamps.
Radioactive Materials	None observed or reported at the time of the Site inspection.
Urea Formaldehyde Foam Insulation (UFFI)	None observed or reported at the time of the Site inspection.

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1.0 INTRODUCTION

1.1 PROJECT BACKGROUND AND TERMS OF REFERENCE

Ms. Tracy L. Stople of the City of Winnipeg, Planning, Property and Development department ("Client") authorized AMEC Environment & Infrastructure (AMEC), a division of AMEC Americas Limited, to conduct a Phase I Environmental Site Assessment (ESA) of the Public Safety Building and the Civic Center Parkade property with the municipal address of 151 & 171 Princess Street in Winnipeg, Manitoba. The subject property is subsequently referred to as the 'Site' in this report.

1.2 SITE LOCATION AND ZONING

The Site is located in Winnipeg, Manitoba. According to the City of Winnipeg Citizen's Information Service, the Site and adjacent properties are zoned 'C' for Character Sector.

A map showing the location of the Site in relation to Winnipeg is shown in Figure A1, Appendix A. A plan showing the layout of the Site and the neighbouring properties is provided in Figure A2, Appendix A.

2.0 ENVIRONMENTAL SITE ASSESSMENT PROCESS

2.1 OBJECTIVES

The purpose of the Phase I ESA was to identify actual or potential environmental concerns at the Site. A Phase I ESA may assist in reducing the uncertainty about potential environmental liabilities and may be a basis for further investigation of the property. A Phase I ESA may be used to make informed decisions about property transactions, identify certain baseline environmental conditions, assist in meeting regulatory requirements, and as an initial step in Site remediation. Site observations were of a visual, walk-through type and did not include sampling or testing, a process consistent with the industry standard.

2.2 SCOPE OF WORK

As part of the Phase I ESA process, it is necessary to establish past and current activities at the Site and assess the possibility of these activities providing and actual or potential concern (impact) to the Site as indicated in the Canadian Standards Association (CSA) Phase I ESA guideline (Z768-01, Reaffirmed 2012).

- a review of selected historical and current information pertaining to the Site and surrounding properties;
- an inspection of the Site to identify practices or circumstances that may present potential environmental liabilities;
- interviews with personnel familiar with the Site; and
- a summary report.

Specific environmental issues that were addressed included:

- air emissions;
- asbestos containing materials (ACMs);
- polychlorinated biphenyls (PCBs);
- lead containing paint (LCP);
- hazardous and non-hazardous chemical use and storage activities;
- underground and aboveground storage tanks (USTs and ASTs);
- hazardous and non-hazardous wastes;
- ozone depleting substances (ODSs);
- liquid effluent;
- radon;
- suspect visible mould growth (SVG);
- radioactive materials;
- urea formaldehyde foam insulation (UFFI);
- dumps and landfills; and
- potential off-site sources of impact.

While this report provides an overview of potential environmental concerns, both past and present, the environmental site assessment process is limited by the availability of information at the time of the assessment. It is possible that unreported disposal of waste or illegal activities impairing the environmental status of the property may have occurred which could not be identified. A statement of limitations is provided in Appendix B.

2.3 METHODOLOGY

This assessment was conducted in general accordance with CSA Z768-01 (Reaffirmed 2012), which is currently referenced by the Canadian Mortgage and Housing Corporation (CMHC) and most banking institutions. Briefly, this guideline sets standards for review of information pertaining to the Site, development of detailed checklists or protocols, conducting the site inspection and preparation of the final report.

Ms. Angela Smith, of AMEC's Winnipeg Operations conducted the Site visit on 7 July 2013. Mr. Brent Piniuta of the City of Winnipeg's Planning, Property and Development department, and Mr. Chris Petrie Assistant Manager of Services for the Winnipeg Police Service assisted with the Site visit and provided information regarding the history and operations of the Site. Additional persons contacted or interviewed to evaluate the existing/historical Site operations included the following:

Name	Agency or Company	Position
Ms. Chris Hnat	Manitoba Conservation and Water Stewardship	Coordinator of File Searches
Mr. Warren Rospad	Manitoba Conservation and Water Stewardship	District Supervisor / Environment Officer
Mr. Alvin Dyck	Manitoba Conservation and Water Stewardship	Environment Officer

The qualifications of the assessors involved in the preparation of this report are provided in Appendix C.

2.3.1 Historical Review

A summary of the Site history was completed through a review of available sources of land use information, in order to assess the potential for site impacts from historic Site activities. The sources reviewed as part of the assessment included:

- Aerial photographs;
- Manitoba Conservation (MCWS) Files;
- Insurers' Advisory Organization (IAO) Fire Insurance Plans;
- Street Directories (Henderson Directories and MTS Fast Finder Directories);
- City of Winnipeg Property Assessment Department;
- Client supplied or publicly available reports or files; and
- Interviews with people knowledgeable of Site history.

Unless otherwise noted, AMEC's historical review of neighbouring properties was generally limited to a 100 m radius of the Site.

2.3.2 Review of Regulatory Information

A review of the following regulatory information was conducted:

- MCWS list of Impacted Sites (September 2011 and May 2012);
- MCWS list of Registered Petroleum Storage Tank Sites (February 2001, 2007, November 2011, and November 2012);
- MCWS list of Registered PCB Storage Sites (January 1999); and
- MCWS list of Registered Hazardous Waste Generators, Shippers and Receivers (June 2011 and September 2012).

It should be noted that review of the above regulatory documents is limited to that information which is publicly available. A review of the most current data is undertaken by MCWS and provided within approximately six weeks of AMEC's request. The above information is reviewed independently by AMEC to gain an understanding of whether any information may exist, within a more reasonable time frame, and is subject to later confirmation by the official MCWS file search.

3.0 SITE AND SURROUNDING LAND USE DESCRIPTION

3.1 SETTING OF SITE AND SURROUNDING LANDS

To facilitate directions throughout this report, Princess Street is assumed to be oriented in a north-south direction. The Site is located between James Avenue and William Avenue to the north and south, respectively, and between King Street and Princess Street to the east and

west, respectively, in the Civic Center Neighbourhood of the Downtown East Ward of Winnipeg, Manitoba. The Site was largely occupied by the Public Safety Building and the Civic Center Parkade at the time of the Site visit. The surrounding land consisted of residential, community, and commercial uses, described below.

North: James Avenue followed by residential and commercial properties including restaurants and offices spaces.

South: William Avenue followed by residential and commercial properties including restaurants, offices, and small shops.

East: King Street followed by City Hall with Main Street beyond.

West: Princess Street followed by Red River College.

3.2 SITE APPEARANCE AND DESCRIPTION OF FACILITIES

At the time of the Site inspection, the Public Safety Building (151 Princess Street) was observed to occupy the southeast portion of the Site and the Civic Center Parkade (171 Princess Street) was observed to occupy the west / northwest portion of the Site. Both structures were observed to share a common basement area. According to the City of Winnipeg Assessment and Taxation Department both structures were constructed in 1965. At the time of the inspection a wood frame structure with a roof was observed to surround the Public Safety Building due to safety issues associated with the exterior limestone facade. Additionally, the Civic Center Parkade observed to be fenced off and vacant at the time of the inspection, due to structural stability issues.

The Public Safety Building was observed to consist of a six story concrete frame structure with a basement. The walls throughout the building were observed to consist of a mixture of painted and exposed gypsum board, painted plaster, and painted and exposed concrete block. Ceilings throughout the building were observed to consist of a combination of suspended ceiling tiles, painted plaster, painted gypsum board, and exposed concrete. Flooring throughout the building was observed to consist of a mixture of carpeting, vinyl tile flooring, vinyl roll flooring, terrazzo, and exposed concrete. An epoxy coated floor was observed in the lab located on the 2nd floor. Lighting was provided by a mixture of fluorescent tube lighting, halogen lighting, and high-pressure sodium lamps. Heating was provided to the building by a combination suspended natural gas-fired radiant heating units and a natural gas-fired boiler systems. Cooling was reported to be provided to the building by roof-top cooling tower and condensers serve chiller. Roofing of the building was not accessed by AMEC and was reported to consist of tar and gravel. The exterior of the building was observed to consist of a limestone facade.

The 6th floor of the Public Safety Building was observed to be largely occupied by the mechanical equipment that services the building. Several small areas of surface staining were observed beneath or near pieces of mechanic equipment of this floor. Additionally, several approximately 20 L pails of chemicals and fluids related to the maintenance of the mechanical

equipment on this floor were observed in various areas of the mechanical rooms. It was reported to AMEC that only small amounts of the required chemicals / fluids related to maintenance are kept on Site. Two diesel powered generators were observed on this floor in separate rooms. Beneath the generator located in Generator Room 1, two small piles of what appeared to be an absorbent material utilized for oil spill was observed. Additionally, an approximately 500 L above ground storage tank located in a concrete dyke was observed within Generator Room 1, the tank was observed to be in good condition.

The 5th floor through the 1st floor generally consisted of offices spaces utilized by various departments of the Winnipeg Police. Generally all of the floors had been updated between approximately 1996 and 2007. The portion of the basement located beneath the public safety building consisted of a mixture of areas occupied by the Police Department, a gym area, changing rooms, storage, and an electrical / hydro room. For additional information regarding renovations that have been completed on Site please see section 4.0.

The Civic Center Parkade was observed to consist of a four story concrete frame structure with a shared basement. The walls and ceiling parking area of the building were observed to consist of exposed concrete. The flooring throughout the parking area was observed to consist of exposed concrete with an applied membrane, which was observed to be worn in various sections. The parking area was light by a mixture of fluorescent tube lighting and high-pressure sodium lamps. The stairwells / elevator areas were observed to consist of terrazzo flooring with painted brick, gypsum board, and concrete walls. The ceiling consisted of painted gypsum board were fluorescent light ballast were placed for lighting. Electric baseboard radiators and a boiler system provided heat the stairwell area. Mechanical equipment was observed on the roof of the building and on the second floor of the parkade. It was reported to AMEC that this equipment would be utilized to heat and cool areas of the shared basement. The exterior of the building was observed to consist of roughcast and exposed concrete.

The portion of the basement located beneath the Civic Center Parkade consisted of a large area utilized for parking police vehicles, several storage areas for various types of equipment, generator room, and a test firing area. It was reported to AMEC that the test firing area was the former location of the firing range. It was noted that prior to the firing range being renovated into the current test firing area a lead abatement program was completed in the room. The extent of the lead abatement program was not provided to AMEC and AMEC was unable to confirm if it included only the room or the associated equipment and ducting.

Two additional generators were observed in the generator room located in the basement level of the Civic Center Parkade, one generator was powered by diesel fuel, and the second generator was powered by propane. An approximate 500 L day tank was observed in the generator room, the tank was observed to be in good condition at the time of the inspection. The main diesel tank that supplies fuel to all of the generators was reported by the City of Winnipeg representative to be underground and located outside. The City of Winnipeg representative could not confirm the location of the tank. AMEC observed the fill cap for what appeared to be the main diesel tank located within the flower bed located along side the north side of the northeast ramp. Additionally, a monitoring well was observed approximately 2 m east of the

observed fill cap for the diesel tank. Information regarding the monitoring and installation of this well was not supplied to AMEC for review at the issuance of this report. The propane tank utilized to power the propane powered generator was observed to stored in a fenced off area near the northeast corner of the Site. It was reported to AMEC that any hazardous waste that is produced on Site would be handled and disposed of per current regulations.

It was reported to AMEC that police vehicles were formally serviced in the basement of the Civic Center Parkade between approximately 1965 and 1980. What appeared to be an old lift (hydraulic hoist) was observed within the concrete floor of the garage area. Floor drains were observed throughout this area.

A courtyard area was observed in both the northeast corner and southwest corner of the Site, extending from the Site buildings to the Site boundaries. The courtyards consisted of a mixture of green spaces and paved walkways areas with bench seating. The entrance to the basement level of the Site building is access by a ramp which leads off of James Street, located between the Public Safety building and the southwest courtyard. The exit of the basement level was observed to lead to King Street from a ramp located near the northeast corner of the Site.

Site photographs taken at the time of the site inspection are provided in Appendix D.

3.3 TOPOGRAPHY AND DRAINAGE

The topography of the Site appeared to be generally flat-lying. It is anticipated that overland storm water collected at the Site would flow toward adjacent roadways and associated catch basins, or remain standing and percolate into the surface.

3.4 SITE GEOLOGY AND GROUNDWATER

Based on available geological maps, the subsurface stratigraphy in this area of Winnipeg normally consists of topsoil and fill materials underlain by glacio-lacustrine silt and clay to a depth of approximately 12 to 15 m from grade. A deposit of silty till, typically a few metres or more in thickness, occurs between the clay and the underlying bedrock. The bedrock in this area consists of dolomite and limestone and is of the Lower Fort Garry member (Baracos et al., 1983). Bedrock is estimated to occur between about 15 to 18 m below grade.

Fractured zones in the bedrock comprise the major aquifer in the area. There are no aquifers above the bedrock. Given the substantial clay thickness, the potential for impacts to the aquifer, from on or off-site sources is considered to be low.

4.0 SITE AND SURROUNDING AREA HISTORY

According to Fire Insurance Plans in 1917 the Site was divided into three sections. The northern section located between James Avenue and a public lane way, which was occupied by several commercial buildings including an auto top manufacturer and storage facilities for hay and hide & fur. The middle section located between the public laneway and Market Avenue,

which formally transacted the Site, was occupied by several commercial buildings; a dwelling, and small shops located along the north side of Market Avenue including a drug store, a hotel, and a stable. The southern portion of the Site located between Market Avenue and William Avenue was occupied by a building labelled 'Central Market'.

The 1946 Fire Insure Plan show that all but one of the commercial buildings located in the northern portion of the Site with the exception of the auto top manufacture demolished, and a gas station was developed in the northeast corner of the Site with three associated storage tanks. According to Henderson Street Directories the gas station located in the northeast corner of the Site operated until 1965, however, the Fire Insurance Plans labelled this location as 'Auto Service" in 1964. According to the Henderson Street Directories, Rynolds Printing Co. occupied middle section of the Site (293 Market Avenue) between 1930 and 1935, additionally; a printing company was also illustrated in this building in the 1964 FIPs.

Prior to the commencement of construction of the Public Safety Building and Civic Center Parkade in 1965, all of the buildings on the property were demolished. Various departments associated with the Winnipeg Police have occupied the building since its construction. Additional, was reported to AMEC that police vehicles were formally serviced in the basement of the Civic Center Parkade between approximately 1965 and 1980. There has been little change to the exterior of the Site since it was constructed, with the exception of landscaping of the southwest courtyard area sometime between 1977 and 1988. It was reported to AMEC that various renovations have taken place within the Site building over the years. The following renovations were reported to have taken place within the Public Safety building;

- **Basement:** 1999 renovations took place in the Women's Locker Room, the Processing Area, and the Shooting Ranger was transformer in to a test firing area. Additionally, in approximately 2010, a lab was constructed in a portion of the old vehicle servicing area.
- **1st floor:** In 1999 large portion of the main floor were renovated including office areas;
- **2nd - 4th floor:** Completely gutted and renovated between 1996 and 1999;
- **5th floor:** In approximately 2003 carpet way laid over the old flooring in west side of the Site building;
- **6th floor:** In 2000 minimal renovations occurred in the Communication Center;

It was reported to AMEC the only major renovation that has taken place in the Civic Center Parkade is the installation of protective membrane was installed on the floors of the Civic Center Pakade in the mid 1990s. Further it was reported that the Parkade has been blocked off and left vacant for the past year due to structural issues. There have been no substantial changes to the Civic Center Parkade to date.

The history of the surrounding properties is summarized as follows:

James Avenue is located along the north side of the Site. James Avenue was followed by commercial properties, including a machine shop and auto body manufactures shop, with Rupert Avenue beyond has been located north of the Site prior to 1917 according to Fire Insurance Plans. Sometime between 1917 and 1946, the machine shop changed to

'Vulcanizing - Princes Tires Service' and the auto body manufacturing building change to 'Whole Stge.'. During this time period a gas station was developed at the southeast corner of the intersection of King Street and Rupert Avenue located approximately 70 m from the Site. Fire Insurance Plans Indicated that sometime between 1946 and 1964 this property was converted into to an automotive service location. Review of aerials photographs indicates that sometime between 1977 and 1988, former gas station building was demolished. This property was later redeveloped with a commercial building sometime between 1988 and 1997. There has been no substantial change to the area since 1997.

William Avenue is located along the south side of the Site. William Avenue was followed by a mixture of residential and commercial properties including a garage with associated storage tanks, located approximately 55 m south of the Site, was located south of the Site prior to 1917 according to Fire Insurance Plans. It is expected this property operated as a garage sometime between 1917 and 1965 as indicated by Fire Insurance Plans and Henderson Street Directories. Sometime between 1917 and 1947, an additional commercial building was developed along the south side of William Avenue. Review of aerials photographs of the area indicated that here has been no substantial change to the aerial since 1947.

King Street is located along the east side of the Site. King Street was followed by a mixture of properties including City Hall, apartments, and various commercial buildings followed by Main Street were located east of the Site according to Fire Insurance Plans prior to 1917. Sometime between 1956 and 1964, the buildings in this block were cleared in preparation for the development of the new City Hall building which was completed sometime between 1965 and 1968. There has been no substantial change to the area since 1968.

Princess Street was located along the west side of the Site. Princess Avenue was followed by various commercial properties with Adelaide Street beyond was located west of the Site according to Fire Insurance Plans prior to 1917. Between 1917 and 1946, according to Fire Insurance Plans several of the commercial properties along Princess Street were demolished. Additionally, a garage with associated storage tanks now appears to occupy one of the commercial buildings located approximately 70 m west of the Site. Given the garage is not listed in the Henderson Street Directories, it is unknown how long the garage operated out of this location. Review of aerial photographs of the Site indicated that here has been no substantial change to the area since 1946. However, Red River College Princess Street Campus now occupies this entire block utilizing the original site buildings. There has been no substantial change to the area to date.

A more specific summary of the historic land use, as determined through the various sources, is provided in the following sections.

4.1 FIRE INSURANCE PLAN REVIEW SUMMARY

A summary of the review of available Fire Insurance Plans is provided in Table 1.

TABLE 1: FIRE INSURANCE PLAN REVIEW SUMMARY		
Year	**Location**	**Description**
1917	Site	Market Avenue transects the approximate center of the Site. Several commercial buildings, a dwelling, and small shops appear in the northern portion of the Site including a drug store, a hid and fur store, a hotel, Stable, and an automotive top manufacture. A building labelled 'Central Market' appears in the southern portion of the Site.
	Off-Site	**North:** James Avenue followed by commercial properties including a machine shop and auto body manufactures shop both located approximately 20 m north of the Site. **South:** William Avenue followed by a mixture of residential and commercial properties including a garage located approximately 55 m south of the Site with two associated petroleum storage tank. Additionally, the dormitory located along Bannatyne Avenue located approximately 95 m southeast of the Site illustrates a storage tanks on the property. **East:** King Street followed by City Hall, apartments, offices, and commercial properties including clothing stores, hotels, and restaurants. **West:** Princess Street followed by commercial properties including grain and produce warehouses, clothing factories, and small shops. Additionally, a building labelled 'Cold Storage' located approximately 65 m west / southwest of the Site illustrates oils being stored in a metal container and well kept. Further, a second property located approximately 90 m southwest of the Site labelled 'Repairs and Paint Mixings' illustrates oil not being stored in metal containers and carelessly handled.
1917 with updates between 1931 and 1946	Site	The building located in the southern portion of the Site has been cross off and is now labelled 'Public Safety Building'. Several of the commercial properties along James Avenue have been demolished and a gas station with three associated storage tanks now appear in the north east corner of the Site. Additionally, the building located at the northeast corner of Princess Street and Market Avenue is now labelled 'Tenant Manufacturing and Printing'.
	Off-Site	**North:** The machine shop is now labelled 'Vulcanizing - Princes Tires Service' and the auto body manufacturing building is now labelled 'Whole Stge'. Additionally, the property located at the southeast corner of the intersection of King Street and Rupert Avenue, approximately 70 m northeast, is now labelled as a gas station with three associated storage tanks. Further, a building allocated along the south side of Rupert Avenue, located approximately 60 m north of the Site, is now labelled as a garage. **South:** The dormitories located along Banattyne Avenue with the associated storage tanks have been crossed out. **East:** No substantial change to the area since 1917. **West:** Several of the small shops along Princess Street have been crossed out. A building located approximately 70 m west of the Site is now labelled 'Garage', a storage tanks is illustrated on the northern portion of this property.
1956 partially revised in 1964	Site	The gas station in the northern portion of the Site is now labelled 'Auto Service' and only one of the petroleum tanks still appear on the property. The southern portion of the Site is labelled 'Civil Offices'. The building located at the northeast corner of Princess Street and Market Avenue is now a clothing manufacturing facility.

TABLE 1: FIRE INSURANCE PLAN REVIEW SUMMARY		
Year	**Location**	**Description**
	Off-Site	**North:** The gas station located at southeast corner of the intersection of King Street and Rupert Avenue is now labelled 'Automotive Service', only one of the storage tanks are still illustrated on the property. **South:** Storage tanks are no long illustrated within the building labelled garage located approximate 55 m south of the Site. **East:** The previous City Hall building has been demolished and the property is now labelled "Site for New City Hall'. **West:** No substantial change to the area since 1946.

4.2 STREET DIRECTORY REVIEW

A summary of the Henderson Street Directory review and current building occupants is provided in Table 2.

TABLE 2: STREET DIRECTORY REVIEW SUMMARY		
Street Address	**Occupant**	**Approx. Date**
Site 151 Princess Street	No listings	1915 and prior
	Residential	1920 - 1935
	No listings	1940 - 1965
Site 171 Princess Street	No listings	1915 and prior
	Residential	1920 - 1935
	No listings	1940 - 1965
Previous Site Addresses 169 – 179 Princess Street	commercial	1900-1960
	No listings	1965 - 2013
Previous Site Addresses 174 – 178 King Street	No listings	1950 and prior
	Commercial including	1900-1965
	• 176 - King & James Service Station	1953 - 1965
	No listings	1970 - 2013
Previous Site Addresses 275-293 Market Avenue	Residential and commercial	1900-1960
	• 293- Rynolds Printing Co.	1930-1935
	No listings	1965 - 2103
Previous Site Addresses 270-282 James Avenue	Commercial/res	1900 - 1946
	No listings	1950 - 2013
North of Site 201 - 215 James Avenue	Residential and commercial	1900 - 1985
	Vacant or no listings	1990 - 2013
North of Site 180 - 184 King Street	No listings or vacant	1945 and prior
	Commercial and residential	1950 - 2013
Northeast of Site 217 - 223 James Avenue	Residential	1900 - 1915
	Vacant	1920-1925

TABLE 2: STREET DIRECTORY REVIEW SUMMARY		
Street Address	**Occupant**	**Approx. Date**
Northeast of Site 217 - 223 James Avenue	Commercial	1930 - 2013
Northeast of Site 520 - 554 Main Street (even)	Residential and commercial	1900 - 2013
Northwest of Site 177 – 216 Princess Street	Residential and commercial	1900 - 2013
Northwest of Site 306 - 314 Ross Avenue	Residential and commercial	1900 - 2013
South of Site 104 – 138 Princess Street	Residential and commercial (various addresses including)	1900 – 2013
	• 127 – Auto Wrecking	1940 - 1945
South of Site 280 – 294 William Avenue	Residential, community, and commercial	1900 - 2013
South of Site 283 - 291 Bannatyne Avenue	Residential and commercial	1900 - 2013
South of Site 112 – 130 King Street	Commercial (various addresses) including	1900 - 2013
	• 112 – Blue Bird Garage	1926
	• City Dray (Garage)	1945 & 1960
Southeast of Site 211 – 275 Bannatyne Avenue	Residential and commercial	1900 - 2013
Southeast of Site 492 – 504 Main Street (even)	Residential and commercial	1900 - 2013
Southwest of Site 300 – 321 William Avenue	Residential and commercial	1900 - 1925
	No listings	1930 - 1940
	Residential and commercial (various addresses) including	1945 - 2013
	• 321 – William Tire Service	1960 - 1995
Southwest of Site 120 – 128 Adelaide Street	Residential and commercial	1900 - 2013
East of Site 510 – 519 Main Street (even)	Residential, community, and commercial	1900 - 2013
West of Site 129 – 138 Adelaide Street	No listings	1905 and prior
	Residential and commercial	1910
	No listings	1915 - 1920
	Residential and commercial	1925 - 2013
West of Site 319 – 325 Elgin Avenue	Residential and commercial (various addresses) including	1900 - 2013

TABLE 2: STREET DIRECTORY REVIEW SUMMARY		
Street Address	**Occupant**	**Approx. Date**
West of Site 319 – 325 Elgin Avenue	• 325 – Elgin Auto Service	1945
	• Metro Motors	1960 - 2013
West of Site 140 – 160 Princess Street	No listings	1920 and prior
	Commercial and community	1925 - 2013

Notes: Street Directories reviewed on approximate 5 year intervals.
Where community use is indicated occupants include schools and other such uses.
Where commercial use is indicated businesses such as department stores, restaurants, hotels, offices, and small shops and other such uses were listed.

4.3 AERIAL PHOTOGRAPHS

A summary of the aerial photograph review is provided in Table 3. Aerial photographs from 1950, 1968, and 1988 are provided in Appendix E. The Site Plan, Figure A2 (Appendix A) is comprised of the 2012 aerial photograph

TABLE 3: AERIAL PHOTOGRAPH REVIEW SUMMARY		
DATE ROLL NO. SCALE	**SITE**	**SURROUNDING PROPERTIES**
1950 A12650–277 1: 8000	A small building appears in northeast corner of the Site along with two additional small buildings along James Street followed by an inferred public laneway to the south. It is inferred that this building is the location a gas station or an automotive garage. A row of building appears in the approximate middle of the Site running in an east / west direction located along the north Side of Market Avenue with appears to transect the Site. South of Market Avenue a large commercial building and associated parking lot appear.	**North:** James Avenue followed by what appear to be commercial properties with Rupert Avenue beyond. Additional, an inferred gas station appears to be located at the southeast corner of the intersection of Rupert Avenue and King Street. **South:** William Avenue followed by followed by what appear to be commercial properties with Bannatyne Avenue beyond. **East:** King Street followed by a mixture of what appear to be commercial buildings and a green space transacted by Market Avenue in a east / west direction followed by Main Street beyond. **West:** Princess Street followed by what appear to be commercial properties and a parking lot followed by Adelaide Street.
1960 A16849-144 Unknown	The two small buildings along James Avenue have been demolished.	No substantial change to the area.
1968 A20412-56 1: 15 000	The Site has been completely redeveloped and the current Site buildings now appear.	**North, South, and West**: No substantial change to the area. **East:** The buildings east of King Street have been demolished and the a two new commercial buildings have been developed (City Hall)

TABLE 3: AERIAL PHOTOGRAPH REVIEW SUMMARY		
DATE ROLL NO. SCALE	**SITE**	**SURROUNDING PROPERTIES**
1977 A24650-92 1: 25 000	As in 1968.	No substantial change to the area.
1988 A27254-98 1: 20 000	Landscaping appears to have taken places in the southwest corner of the Site	**North:** The gas station located at the southeast corner of the intersection of Rupert Avenue and King Street no longer appears. **South, East, and West:** No substantial change to the area.
1997 MB97004-105 1: 20 000	As in 1988.	As in 1988.
2012 Google satellite image 1: 10 000	As in 1997.	**North:** A new commercial building was constructed at the location of the former gas station. **South, East, and West:** No substantial change to the area.

4.4 PREVIOUS ENVIRONMENTAL REPORT REVIEW

The following draft report was supplied by the City of Winnipeg to AMEC for review:

Excavation of Impacted Soils at 151 Princess Street - Underground Storage Tank for Generator, 2 March 2004, Wardrop Engineering Inc. (Draft Report). The City of Winnipeg could not provide a final report so the information could not be verified and was considered for informational purposes only by AMEC. The report documented the removal of an underground diesel storage tank in December 2003 and subsequent remedial excavation activities if impacted soils. The report stipulated the tank was located adjacent to the parkade at the rear of the building along St. James Street. The report inferred that the documents impacts extended beyond the Site property lines to the north and possibly on-site to the east of the tank. As such a liner was installed along both those excavation extents. The report indicated that one of the seven soil samples collected from the extent of the excavation had a concentration of petroleum hydrocarbons exceeding the commercial criteria stipulated in the report.

5.0 REGULATORY INFORMATION

5.1 LANDFILLS

According to the City of Winnipeg Landfill Plans, there are no landfills or dump sites located within 2 km of the Site.

5.2 LOCAL REGULATORY AGENCY

According to AMEC's preliminary search, the Site is listed on MCWS's Hazardous Waste Generators List, Petroleum Storage Tank Registry, and Impacted Sites List. Additionally, the following neighbouring properties are registered with MCWS as hazardous waste generators:

- 160 Princess Street, Red River College, located approximately 20 m west of the Site;
- 4-180 King Street, City of Winnipeg, located approximately 50 m north of the Site;
- 600-180 King Street, Glenway Pharmacy, located approximately 50 m north of the Site;
- 315 William Avenue, City of Winnipeg, located approximately 50 m west of the Site;
- 504 Main Street, Red River College, located approximately 55 m southeast of the Site;
- 325 Elgin Avenue, Metro Motors, located approximately 55 m west of the Site;
- 554 Main Street, McLaren Hotel, located approximately 90 m northeast of the Site; and
- 110 Princess Street, Fairchild Loft Company, located approximately 95 m southwest of the Site.

AMEC requested a file search for the Site and received a response on 9 August 2013. According to MCWS the Site registered to produce the following quantities of hazardous wastes per month;

- 15 L of waste type 2;
- 3 L of waste type 3;
- 4 L of waste type 5;
- 1 L of corrosive liquids;
- 200 L of photo processing waste;
- (quantity not listed) EHS liquid (lead) used oil;
- 300 L of toxic liquid, organic;
- 135 kg of batteries;
- < 5 L of formaldehyde solution;
- < 1L of hydrochloric acid;
- < 1 L of sulphuric acid; polychlorinated biphenyls-PCB (one time only); and
- 20 L of printing ink or printing related material (one time only).

Additionally, the Site is registered as a petroleum storage tank location. MCWS provided the following storage tank history of the Site;

- November 1965 – one 2270 L underground storage tank was installed;
- December 2003 – one 2270 L underground storage tank was removed;
- February 2004 – on 2270 L underground storage tank was installed with a overfill containment; overfill prevention, and enviro-flex piping.

Further, the Site is listed with MCWS as an impacted site. AMEC contact MCWS for additional information with regards to this listing. Mr. Alvin Dyck, Environmental Officer for MCWS, indicated that the only information in their files was a proposed remediation plan for the Site.

According to MCWS there are no records of any outstanding work orders or environmental accidents found pertaining to the above-mentioned property. This site is not considered a contaminated site. A copy of the MCWS file search letter is provided in Appendix F

6.0 POTENTIAL OFF-SITE SOURCES OF IMPACT

The following is a summary of the potential off-site sources of impact present within a 50 m radius of the Site as determined by AMEC's review of current and historical operations. Operations located more than 60 m from the Site are not expected to pose a potential for environmental concern at the Site based on the expected low permeability of the subsurface in this area of Winnipeg.

According to MCWS the following neighbouring properties are listed as hazardous waste generators;

- 160 Princess Street, Red River College, located approximately 20 m west of the Site;
- 4-180 King Street, City of Winnipeg, located approximately 50 m north of the Site;
- 600-180 King Street, Glenway Pharmacy, located approximately 50 m north of the Site;
- 315 William Avenue, City of Winnipeg, located approximately 50 m west of the Site;
- 504 Main Street, Red River College, located approximately 55 m southeast of the Site; and
- 325 Elgin Avenue, Metro Motors, located approximately 55 m west of the Site.

Given the distance of these properties from the Site and the fact that a multi-lane main corridor with underground utilities separates these properties from the Site, coupled with the expected low permeability of the subsurface soil in this area of the City of Winnipeg, it is unlikely that the hazardous waste produced at these properties would pose a potential for subsurface impacts to the Site.

Review of the Fire Insurance Plans for the Site and surrounding area indicated that in 1917 and 1946 a garage with two associated petroleum storage tanks was located at 112 King Street located approximately 55 m south of the Site. Review of the 1964 Fire Insurance Plans of this property no long illustrated petroleum tanks on the property. Additionally, the 1946 and 1964 Fire Insurance Plans also illustrate a garage located along the south side of Rupert Avenue, located approximately 60 m north of the Site. There were not tanks illustrated on this property. Review of Henderson Street Directories list this property in 1926 (occupied by Blue Bird Garage) and in1946 and 1960 (occupied by City Dray). Given the distance of this former garages to the Site, coupled with the expected low permeability of the subsurface soil in this area of the City of Winnipeg, it is unlikely that these former garages would pose a potential for subsurface impacts to the Site.

Review of the Henderson Street Directories indicates that an auto wrecking company occupied the southwest corner of the intersection of William Avenue and Princess Street, located approximately 35 m southwest of the Site, between 1940 and 1945. Based on the proximity of the former wrecking yard to the Site, impacts to the Site as a result of this property cannot be discounted at this time.

Review of Fire Insurance Plans indicated that a machine shop and auto body manufactures shop were located along the north Site of James Street located approximately 20 m north of the Site in 1917. The 1946 and 1964 Fire Insurance Plans of the area re-labelled the machine shop to 'Vulcanizing - Princes Tires Service', and the automotive manufacturing building was re-labelled 'Whole Stge'. Given that these properties were not listed in the Henderson Street Directories it is unknown to AMEC how long these properties operated for. Based on the proximity of these properties to the Site, impacts to the Site as a result of these properties cannot be discounted at this time.

7.0 SITE ENVIRONMENTAL ISSUES

The following potential environmental issues were assessed as part of the Site inspection conducted 7 July 2013.

AMEC did not obtain access to the entire Site. However, the portion of the Site that AMEC did inspect was reported to be representative of the Site buildings.

7.1 AIR EMISSIONS

There were no sources of air emissions observed on Site at the time of the inspection, apart from standard heating and cooling equipment.

7.2 ASBESTOS CONTAINING MATERIAL (ACMS)

Manitoba Workplace Safety & Health Regulations (217/2006) defines an ACM as any non-friable material containing 1.0% or greater asbestos fibres and any friable material containing 0.1% or greater asbestos fibres. Part 37 of the Regulation also requires that any potential ACM must be treated as an ACM unless laboratory analysis indicates otherwise. As part of this regulation, employees present in buildings with known or suspect ACMs must be informed and all ACMs must be identified. It must be recognised that there was no complete ban of asbestos in building and other material. Generally, buildings constructed prior to the mid 1980s or with building materials manufactured prior to the early 1980s (with exception of potential vermiculite insulation used in the early 1990s) have a greater likelihood that friable ACMs present. Friable ACMs may pose a higher risk to building occupants.

Asbestos inventory documents were provided to AMEC for viewing for both 151 and 171 Princess Street. As indicated in the asbestos inventory sheets ACMs are currently present located within both of the Site buildings. AMEC also observed labelling of ACMs throughout the Site building at the time of the inspection. Some potential ACMs that were observed within the Site buildings but were not included in the asbestos inventory documents include;

- Mortar associated with brick / masonry;
- Grout and mortar associated with ceramic tile;
- Roofing materials and mastics;
- Mastics, sealants and adhesives; and

- Gypsum board joint compound.

ACMs which may be present within the building, but which were not observed or reported during the Site inspection, may include roofing materials and mastics, joint compounds associated with various types of concrete block, vermiculite insulation within wall cavities, and thermal insulating materials such as fire door insulation, and gaskets associated with mechanical equipment. It should be noted that Provincial Regulations regarding suspected asbestos containing material, until confirmed to be non-asbestos material, requires an inventory of such materials and the preparation of an asbestos control plan for the protection of the workplace.

7.3 POLYCHLORINATED BIPHENYLS (PCBS)

PCB-containing products were manufactured for use in applications where stable, fire-resistant, and heat-transfer properties were demanded up to 1977. Most PCBs were sold for use as dielectric fluids (insulating liquids) in electric transformers and capacitors. Other uses included heat transfer fluid, hydraulic fluid, dye carriers in carbonless copy paper, plasticizers in paints, adhesives, and caulking compounds. In Canada, PCBs were prohibited from being used in products, equipment, machinery, electrical transformers and capacitors that were manufactured or imported into the country after July 1980.

Where possible, labelling or other forms of identification on electrical and other equipment are compared to summary documents prepared by Manitoba Hydro. Manitoba Hydro may be contacted to determine the PCB content of electrical transformers based on their serial numbers.

Fluorescent tube light fixtures were observed throughout the Site building. As the building was constructed prior to the ban on PCBs, there is a potential that the dielectric fluid in the fluorescent light ballasts that were not upgraded during the 1999 to 2007 renovations to contain PCBs. PCB containing light ballasts must be handled as hazardous waste and can not be disposed of in a commercial dumpster.

It was reported to AMEC that two transformer vaults are located on the Site. However, AMEC was unable to access the vaults at the time of the inspection. There is a potential for the transformers within these values to contain PCBs. Additional PCBs which may be present within the building, but which were not observed or reported during the Site inspection, may include mechanical oils, lubricants, hydraulic equipment, paints and caulking material.

7.4 LEAD CONTAINING PAINTS (LCPS)

Lead was used extensively for pigmentation, sealing, and as a drying agent in oil based paints up until the early 1950s. Exterior paints typically contained up to 60% lead by weight. Beginning in the 1960s, a decrease in the content of lead employed in paints was initiated. In 1976, the Canadian Federal Government introduced the Liquid Coating Materials Regulations under the Federal Hazardous Products Act, restricting the maximum total lead content of paints and other liquid coating materials used in or around premises attended by children or pregnant

women to 0.5% by weight (5000 mg/kg). In April 2005 the Canadian Federal Government enacted the Surface Coating Materials Regulations which reduce the maximum total lead content of any new surface coatings used in or around premises attended by children or pregnant women from 0.5% to 0.06% and more recently to 0.009%. This reduction does not generally apply to surface coating applied to buildings or other structures used for agricultural or industrial purposes as an anti-weathering or anti-corrosive coating.

Based on the construction date of the Site building (1965), LCPs may have been used during initial construction and subsequent renovation, although may have been painted over during renovations completed following the ban on LCPs. Painted surfaces were observed to be in good condition at the time of the assessment.

7.5 HAZARDOUS AND NON-HAZARDOUS CHEMICAL USE AND STORAGE

At the time of the inspection it was reported to AMEC that any chemicals that were used on Site were properly stored according to manufactures specifications and disposed of in accordance with provincial requirements. Additionally, it was reported to AMEC that in the past Work Place Heath and Safety has inspected the handling and disposal of the chemicals in the lab portion of the Site building and no issues were identified during the inspection. Chemicals utilized in the lab area are directed into an acid dilution system and which is then directed into the municipal sewer system. Chemicals that were observed at the time of the inspection were property stored.

7.6 UNDERGROUND AND ABOVEGROUND STORAGE TANKS (USTS AND ASTS)

According to Henderson directories a service station was present on Site from 1953 to 1965. However, it should be noted that the 1964 Fire insurance Plans labelled this location as an auto service location. Both the 1949 and the 1965 FIPs illustrate tanks on the property. MCWS does not have a record of a service station at this location as MCWS's tank registration program did not begin until 1976.

MCWS provided AMEC with the following petroleum tank information pertaining to the Site;

- November 1965 – one 2270 L underground storage tank was installed;
- December 2003 – one 2270 L underground storage tank was removed;
- February 2004 – on 2270 L underground storage tank was installed with a overfill containment; overfill prevention, and envoi-flex piping.

At the time of the inspection, AMEC observed two approximate 500 L day tanks, one located in the generator room in the basement of the Site buildings, and the second was observed in generator room 1 located on the 6th floor of the Public Safety Building. Both tanks were observed to be in good condition at the time of the inspection. Given that the storage tanks located within the Site building are stored above a concrete slab, impacts to the Site as a result of these tanks is considered to be low.

The fill cap for the main 2270 L underground diesel tank was observed within in the flower bed located along side the north side of the northeast ramp. While the City of Winnipeg could not confirm this was the tank location, this is the assumed location based on AMEC's observations. Impacts to the Site as a result of this tank and associated fill lines cannot be fully discount at this time, given that the condition of the tank cannot be observed. Based on a draft report provided by the City of Winnipeg, known impacts associated with the former underground storage tank are likely present. The tank is assumed to be located in close proximity to the existing underground tank.

7.7 HAZARDOUS AND NON-HAZARDOUS WASTE

MCWS defines hazardous wastes, with certain exceptions, in general as 'waste dangerous goods' from the use of familiar products that households and businesses use every day. Hazardous waste can include waste paint, paint thinners, oil, oil filters, batteries, and cleaning chemicals, among many others. If the product has a dangerous goods safety mark (label) on the packaging, the waste product is more than likely a hazardous waste.

There was no hazardous waste observed at the Site. It was reported to AMEC that any hazardous waste that is produced on Site is handled and disposed according to regulations. Non-hazardous solid waste is stored in the garbage area located near the basement in the loading dock area until it is hauled off-Site.

7.8 OZONE DEPLETING SUBSTANCES (ODS)

ODS, such as chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and halons, may be used as refrigerants, propellants, and in the manufacture of items such as packaging, insulation, solvents, and halon based fire extinguishing agents. Under the Manitoba Ozone Depleting Substances and Other Halocarbons Regulation (Manitoba Regulation 178/05) all ODSs and specified greenhouse gases (GHGs) are subject to regulatory control including spill reporting, worker training, phase-out of materials, and proper recovery and disposal of substances. In Canada, the production or import of CFCs was completely banned in January 1996 and all equipment containing CFCs will be required to be recharged with an alternate refrigerant after December 2014. While less damaging to the ozone layer, HCFCs are being phased out in Canada over a series of cap reduction dates (1996, 2004, 2010, 2015, 2020 and 2030).

Refrigeration equipment, including a commercial drink cooler and walk-in cooler as well as the building's air conditioning unit, may contain ODSs which would require servicing by a licensed technician.

7.9 LIQUID EFFLUENTS

Liquid effluents (i.e. system process water and discharges to sewers or other disposal systems) were included domestic sewage, liquid effluent from acid dilution systems, and run-off collected within the basement of the Site buildings which is then directed to the municipal sewer system.

It should be noted that collection drains were observed within the area of the basement that was reported to have formally operated as a service area for police vehicles.

7.10 GROUNDWATER WELLS

There are no known groundwater wells currently in use on the Site. However, a monitoring well was observed near the northwest corner of the Civic Center Parkade. Details regarding the construction and depth of the monitoring well were not available.

7.11 RADON

Radon is a colourless, odourless gas that occurs naturally from the breakdown of Uranium. Radon can be found in high concentrations where there are soils and rocks containing high levels of uranium, granite, shale or phosphorus. In open air or in areas with high air circulation, radon is not considered a health problem. However, in confined areas (such as basements), radon can migrate through foundation cracks or sumps and become a health hazard. According to the Interdepartmental Working Group on Radon established by the government of Manitoba, bedrock in the Winnipeg area is known for having moderate to high radon gas-generating potential. Levels of radon are not regulated, however, Health Canada have established recommended radon concentrations for residential structures.

AMEC is unaware if there has been a radon gas survey completed at the Site. Generally speaking, maintaining good air circulation limits the potential for radon gas accumulation.

7.12 SUSPECT VISIBLE MOULD GROWTH

Suspected visible mould growth (SVG) on building materials is identified by visual growth or evidence of water intrusion / damage. Evidence of SVG was not observed within the Site building. Water damage was observed to a small section of ceiling tiles in several locations of the upper floors of the Public Safety Building. A significant area of water staining was also observed in the basement of the Site building located beneath the Civic Center Parkade, were it was reported that water damage has been an ongoing issue. SVG may occur within enclosed spaces and may not be evident from a walk through building assessment.

7.13 MERCURY

Mercury has historically been employed in the construction of thermostats, switches and lamps. Small commercial switches and thermostats reportedly may contain 2 to 18 mg of mercury with industrial switches and equipment containing 5 kg or more. Older mercury containing lamps can contain up to 80 mg of mercury per lamp. Newer style fluorescent lamps manufactured since 2000 have in the order of 4 to 12 mg of mercury per lamp. Other types of lamps, such as metal halide and high pressure sodium, can also contain mercury in the order of 20 to 250 mg/lamp.

Mercury was also commonly added to paint coatings as a fungal retardant, and other paint coatings, however it is not commonly tested for as the proper handling and disposal of lead

containing paints would typically minimize any safety or disposal issues for mercury. The Surface Coating Materials Regulations restricted the maximum total mercury content of paints and other liquid coating materials to 10 mg/kg in or around premises attended by children or pregnant women.

Potential sources of mercury observed at the Site were limited to thermostats, small commercial switches, industrial switches, the potential use of paint coatings, and fluorescent lamps.

7.14 RADIOACTIVE MATERIALS

No evidence of radioactive materials was identified during the Site visit.

7.15 UREA FORMALDEHYDE FOAM INSULATION (UFFI)

UFFI is a thermal insulation material that is pumped into interstitial spaces between the walls of buildings where it hardens to form a solid layer of insulation. The sale and installation of UFFI was banned for health-related reasons because of the formation of formaldehyde gas, which is released from the UFFI to the building interior. Most installations occurred between 1977 and its ban in Canada in 1980.

Because the buildings were constructed in 1965, UFFI is not expected to be present.

7.16 SUMMARY OF SITE INSPECTION FINDINGS

The following issues have been identified as representing a potential environmental concern to the Site:

- Potential asbestos containing materials (ACMs) including mortar associated with brick / masonry, grout and mortar associated with ceramic tile, roofing materials and mastics, sealants, adhesives and mastics, and gypsum board joint compound were not included in the Site's Asbestos Inventories provided to AMEC for review. ACMs are known to be present at the Site;
- Potential polychlorinated biphenyls (PCBs) in light ballasts and other equipment;
- Potential lead containing paints (LCPs) throughout the building;
- Potential mercury in fluorescent lamps and other building equipment;
- Potential ozone depleting substances in refrigeration and cooling equipment; and
- Water damage was observed in several areas of the Site building, with significant water damage observed in the basement of the Site building located beneath the Civic Center Parkade. While no suspect visible mould (SVG) was observed, SVG may be present in areas not observed or may occur at a later date if the water issues are not addressed.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the environmental assessment conducted, the following areas of actual or potential environmental concerns (APECs) were identified at the Site:

APEC 1: AMECs historical review of the Site indicates that an automotive fuel station / auto service center, with associated underground storage tanks, was formally located at the northeast corner of the Site from prior to 1946 until 1965, prior to the development of the current Site buildings. Potential contaminants of concern associated with automotive service shops and fuel stations generally include petroleum products such as gasoline and diesel fuel, solvents,, waste oils and other lubricates and other automotive fluids such as anti-freeze and battery fluids.

APEC 2: AMEC's historical review of the Site indicates that, Rynolds Printing Co. occupied middle section of the Site (293 Market Avenue) between 1930 and 1935. A printing company was also illustrated in this building in the 1964 FIPs. Given that this property was formally located on the portion of the Site that was excavated for the development of the basement of the Civic Center Parkade, impacts to the Site as a result of the printing companies at this location are consider to be low. It is expected that if soil contamination was present, that the contaminated soils would have been taken off site during the construction of the Civic Center basement.

APEC 3: The City of Winnipeg reported to AMEC at the time of the Site inspection that a portion of the basement level of the Site buildings was formally utilized to service garage for police vehicles. AMEC observed the remnants of an inferred hoist which was encased in concrete in this general area. Further, given that there are floor drains throughout the former service area, there is a potential for chemicals and other automotive related maintenance fluids to have entered the drain system.

APEC 4: According to Manitoba Conservation and Water Stewardship (MCWS) a 2270 L underground storage tank is current located on Site. At the time of the inspection, AMEC observed the fill cap for an underground tank within the flower bed located along side the north side of the northeast ramp. While the City of Winnipeg was unable to confirm this was the location of the tank, they reported that it should be in that general area of the Site. Historically, based on a draft report provided to AMEC, an underground diesel storage tank was formerly located in this area of the Site. Petroleum hydrocarbon impacted soils associated with the former were identified and remediated in this area, however residual impacts reported remain.

In addition to the onsite APECs, AMEC identified the following APECs located adjacent to or neighbouring the Site which are an APEC to the Site:

APEC 5: Review of the Henderson Street Directories indicates that an auto wrecking company occupied the southwest corner of the intersection of William Avenue and Princess Street, located approximately 35 m southwest of the Site, between 1940 and 1945.

APEC 6: Review of Fire Insurance Plans indicated that a machine shop and auto body manufactures shop were located along the north Site of James Street located approximately 20 m north of the Site in 1917. The 1946 and 1964 Fire Insurance Plans of the area re-labelled the machine shop to 'Vulcanizing - Princes Tires Service', and the automotive manufacturing building was no longer occupied by the auto body manufactures shop. Given that these properties were not listed in the Henderson Street Directories it is unknown to AMEC how long these properties operated for.

Based on the APECs listed above, AMEC recommends a Phase II ESA to assess for potential for subsurface impacts.

The following items may require additional attention:

- Potential ACMs including mortar associated with brick / masonry, grout and mortar associated with ceramic tile, roofing materials and mastics, sealants, adhesives and mastics, and gypsum board joint compound were not included in the Site's Asbestos Inventories provided to AMEC for review. ACMs are known to be present at the Site;
- Potential polychlorinated biphenyls (PCBs) in light ballasts and other equipment;
- Potential LCPs throughout the building;
- Potential mercury in fluorescent lamps and other building equipment;
- Potential ozone depleting substances in refrigeration and cooling equipment; and
- Water damage was observed in several areas of the Site building, with significant water damage observed in the basement of the Site building located beneath the Civic Center Parkade. While no SVG was observed, SVG may be present in areas not observed or may occur at a later date if the water issues are not addressed.

Based on the findings of the assessment, and given that a completed asbestos survey has not been completed on Site, AMEC recommends that a DSS be conducted given the potential for disturbance of these materials in the future. It should be noted that Provincial Regulations regarding suspected asbestos containing material, until confirmed to be non-asbestos material, requires an inventory of such materials and the preparation of an asbestos control plan for the protection of the workplace.

9.0 CLOSURE

The Canadian Standards Association notes that no environmental site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a property. Performance of a standardized environmental site assessment protocol is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions in connection with the property, given reasonable limits of time and cost.

This report was prepared for the exclusive use of the City of Winnipeg and is intended to provide a Phase I ESA for the Site located at 151 & 171 Princess Street at the time of the Site visit. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third party. Should additional parties require reliance on this report, written authorization from AMEC will be required. With respect to third parties, AMEC has no liability or responsibility for losses of any kind whatsoever, including direct or consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The report is based on data and information collected during the Phase I ESA of the property conducted by AMEC. It is based solely on the conditions of the Site encountered at the time of the Site visit on 7 July 2013, supplemented by a review of historical information and data obtained by AMEC as described in this report, and discussion with a representative of the owner/occupant, as reported herein. Except as otherwise maybe specified, AMEC disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to AMEC after the time during which AMEC conducted the Phase I ESA.

In evaluating the property, AMEC has relied in good faith on information provided by other individuals noted in this report. AMEC has assumed that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the current owner/occupant. AMEC accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

AMEC makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

This Report is also subject to the further Limitations contained in Appendix B.

We trust that the information presented in this report meets your current requirements. Should you have any questions, or concerns, please do not hesitate to contact the undersigned.

Respectfully submitted,
AMEC Environment & Infrastructure

Angela Smith, Dilp.
Environmental Technician

Kerri-Lyn Szwaluk, M.Sc., P.Ag
Senior Environmental Planner
Project Manager

Reviewed by:

Patrick Campbell, B.Sc., EP, CRSP
Associate Environmental Scientist
Manager – Health, Safety & Environment Services

Dist. (1) Electronic Copy – Addressee

10.0 REFERENCES

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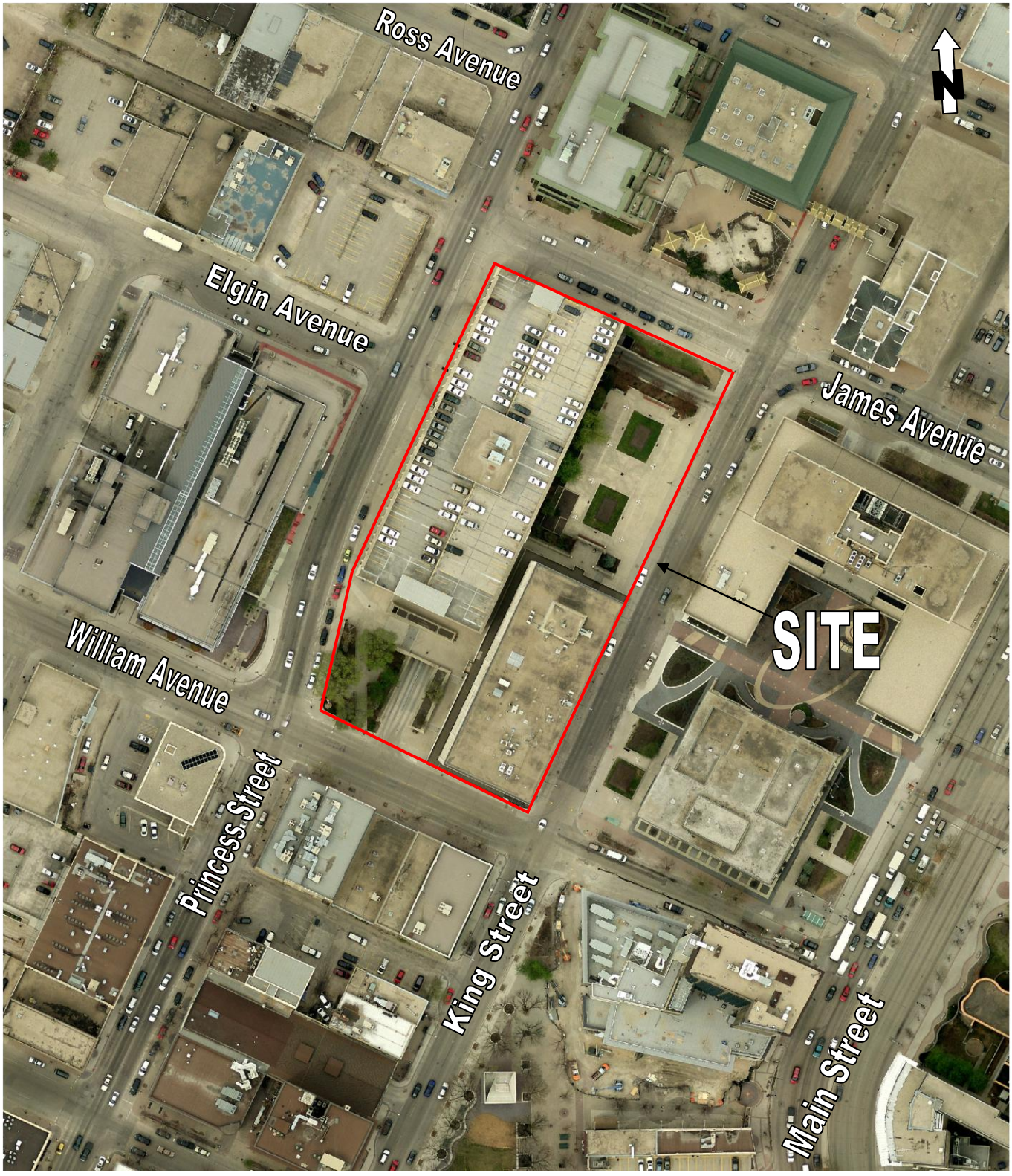
APPENDIX A

FIGURES

CITY OF WINNIPEG

amec **Environment & Infrastructure** **CITY OF WINNIPEG**		**SITE LOCATION PLAN** **PHASE I ENVIRONMENTAL SITE ASSESSMENT** **151 & 171 PRINCESS STREET** **WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: ~1:150 000	Date: AUG/2013	Project No.: WX17205	Figure: A1



amec

Environment & Infrastructure

CITY OF WINNIPEG

SITE PLAN
PHASE I ENVIRONMENTAL SITE ASSESSMENT
151 & 171 PRINCESS STREET
WINNIPEG, MANITOBA

Drawn: N/A	Original Scale: Unknown	Date: AUG/2013	Project No.: WX17205	Figure: A2

APPENDIX B

STATEMENT OF LIMITATIONS

LIMITATIONS

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:
   (a) The Standard Terms and Conditions which form a part of our Professional Services Contract;
   (b) The Scope of Services;
   (c) Time and Budgetary limitations as described in our Contract; and
   (d) The Limitations stated herein.
2. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.
3. The conclusions presented in this report were based, in part, on visual observations of the Site and attendant structures. Our conclusions cannot and are not extended to include those portions of the Site or structures, which are not reasonably available, in AMEC's opinion, for direct observation.
4. The environmental conditions at the Site were assessed, within the limitations set out above, having due regard for applicable environmental regulations as of the date of the inspection. A review of compliance by past owners or occupants of the Site with any applicable local, provincial or federal by-laws, orders-in-council, legislative enactments and regulations was not performed.
5. The Site history research included obtaining information from third parties and employees or agents of the owner. No attempt has been made to verify the accuracy of any information provided, unless specifically noted in our report.
6. Where testing was performed, it was carried out in accordance with the terms of our contract providing for testing. Other substances, or different quantities of substances testing for, may be present on Site and may be revealed by different or other testing not provided for in our contract.
7. Because of the limitations referred to above, different environmental conditions from those stated in our report may exist. Should such different conditions be encountered, AMEC must be notified in order that it may determine if modifications to the conclusions in the report are necessary.
8. The utilization of AMEC's services during the implementation of any remedial measures will allow AMEC to observe compliance with the conclusions and recommendations contained in the report. AMEC's involvement will also allow for changes to be made as necessary to suit field conditions as they are encountered.
9. This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or the part, or any reliance thereon or decisions made based on any information or conclusions in the report is the sole responsibility of such third party. AMEC accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.
10. This report is not to be given over to any third party for any purpose whatsoever without the written permission of AMEC.
11. Provided that the report is still reliable, and less than 12 months old, AMEC will issue a third-party reliance letter to parties that the client identifies in writing, upon payment of the then current fee for such letters. All third parties relying on AMEC's report, by such reliance agree to be bound by our proposal and AMEC's standard reliance letter. AMEC's standard reliance letter indicates that in no event shall AMEC be liable for any damages, howsoever arising, relating to third-party reliance on AMEC's report. No reliance by any party is permitted without such agreement.

APPENDIX C

AMEC ASSESSOR QUALIFICATIONS

AMEC Environment & Infrastructure

AMEC is a highly respected environmental, geotechnical, materials and water resource engineering firm supplying services to clients throughout North America and internationally. The Winnipeg office of AMEC provides specialist expertise in environmental and geotechnical projects, as well as materials testing, combining the best of local understanding, experience and depth, along with AMEC's global reach, experience and support. The Winnipeg AMEC office services the entire province of Manitoba and, if required, beyond the border into Saskatchewan and Northwest Ontario. The Environment & Infrastructure division in Winnipeg conducts over 100 Phase I ESAs each year. In addition the Winnipeg office has conducted over 1000 Phase II and III ESAs in Manitoba, all in accordance with the various and current Manitoba Conservation and CCME guidance documentation publicized over the years. The Winnipeg office of AMEC has a total of 30 full time and seasonal staff, of which nine are directly involved in the environmental field, and has experienced steady growth since opening in 1987. AMEC's Winnipeg office focuses on quality and timely project deliverables to our clients in the manufacturing, mining, commercial and public sectors.

Patrick Campbell, B. Sc., EP, CRSP
Associate Environmental Scientist,
Manager - Health, Safety & Environment Services

Mr. Campbell is has 15 years of experience in assessing and managing projects throughout Manitoba and across Canada and has conducted or reviewed hundreds of Phase I environmental site assessments of residential, commercial and industrial properties. Mr. Campbell has served as a technical specialist, project and client manager, technical reviewer and lead assessor in the completion of regulatory reviewers, Phase I, II and III ESAs, site remediation and management and, risk reviews for environmental, human health and financial management. Mr. Campbell's is a specialist in hazardous materials management, building decommissioning and construction safety. Hazardous materials management experience includes assessment, management plans, abatement, development of work plans and specifications, facility decommissioning and risk reviews for such materials as asbestos, mould, lead, PCBs, radon and formaldehyde.

Mr. Campbell is a Canadian Certified Environmental Practitioner (EP) in the field of health & safety, air, water and soil and a Canadian Registered Safety Professional (CRSP). An active member of the professional community, Mr. Campbell is a member of numerous professional organizations including as a past chapter president of the American Industrial Hygiene Association and a current member of AMEC's professional practice boards.

Kerri-Lyn Szwaluk, M.Sc., P.Ag.
Senior Environmental Planner

Kerri-Lyn Szwaluk currently has 15 years of experience in land use planning, environmental assessments, environmental impact statements, and environmental protection plans. Throughout her work experience she has developed an extensive

knowledge of hydro developments in Manitoba, and the oil and gas industry in Alberta. Kerri-Lyn has previously been responsible for project management and coordination of numerous pipelines and well sites. Over the last eleven years Kerri-Lyn has been involved with transmission line projects for Manitoba Hydro, with responsibilities such as route selection, preparing and submitting environmental impact statements for regulatory approval and assisting in the preparation of protection plans. In addition to Manitoba Hydro projects, Kerri-Lyn has also managed and assisted in the preparation of Environmental Assessments for transportation projects, the conversion of a tramway to and all weather road, floodway recreational opportunity concepts and a private golf course.

Angela Smith

Environmental Technician

Angela Smith has a Diploma in Environmental Protection Technology. She is an Environmental Technician with one year of experience conducting over 100 Phase I ESAs for a variety of properties including residential, agricultural, commercial and industrial land uses. She is familiar with applicable federal, provincial, and local legislation and published guidelines used to evaluate the actual or potential presence of contamination of the property.

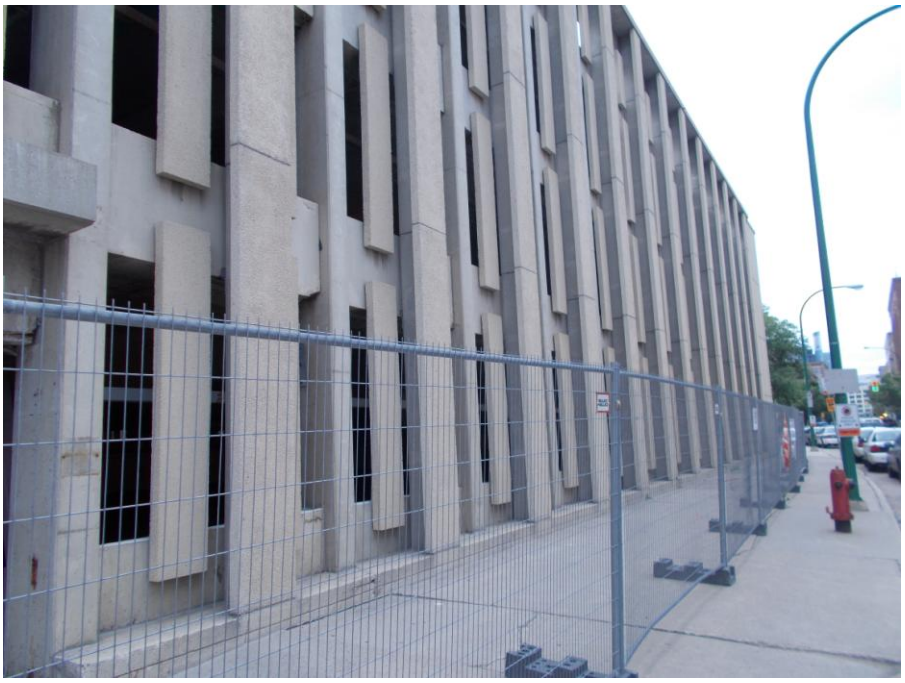
APPENDIX D

SITE PHOTOGRAPHS

PHOTOGRAPH 1: Looking southwest across the Site from the northeast corner of the Site.

PHOTOGRAPH 2: Looking northwest across King Street showing the exterior of the Public Safety Building.

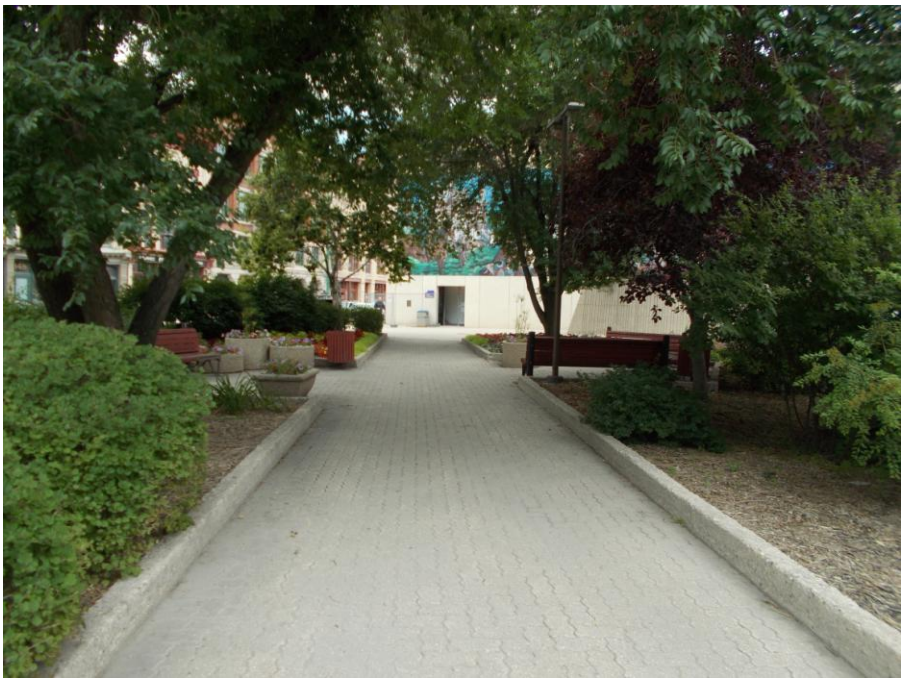
amec **Environment & Infrastructure** **CITY OF WINNIPEG**		**SITE PHOTOGRAPHS** **PHASE I ENVIRONMENTAL SITE ASSESSMENT** **151 & 171 PRINCESS STREET** **WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	Date: AUG/13	Project No.: WX17205	Figure: D1



PHOTOGRAPH 3: Looking south /southeast showing the exterior of the Civil Centre Parkade.

PHOTOGRAPH 4: Looking northeast across the Site from the entrance to the basement level of the Site buildings.

amec **Environment & Infrastructure**		**SITE PHOTOGRAPHS** **PHASE I ENVIRONMENTAL SITE ASSESSMENT** **151 & 171 PRINCESS STREET** **WINNIPEG, MANITOBA**		
CITY OF WINNIPEG				
Drawn: N/A	Scale: N/A	Date: AUG/13	Project No.: WX17205	Figure: D2



PHOTOGRAPH 5: Looking north .from the western portion of the southern Site boundary showing the southwest courtyard area.

PHOTOGRAPH 6: Showing the typical interior building materials of the Public Safety Building.

amec **Environment & Infrastructure**		**SITE PHOTOGRAPHS** **PHASE I ENVIRONMENTAL SITE ASSESSMENT** **151 & 171 PRINCESS STREET** **WINNIPEG, MANITOBA**		
CITY OF WINNIPEG				
Drawn: N/A	Scale: N/A	Date: AUG/13	Project No.: WX17205	Figure: D3

PHOTOGRAPH 7: Showing the typical interior building materials of the Public Safety Building.

PHOTOGRAPH 8: Showing the typical interior building materials of the Public Safety Building.

amec **Environment & Infrastructure**		**SITE PHOTOGRAPHS** **PHASE I ENVIRONMENTAL SITE ASSESSMENT** **151 & 171 PRINCESS STREET** **WINNIPEG, MANITOBA**		
CITY OF WINNIPEG				
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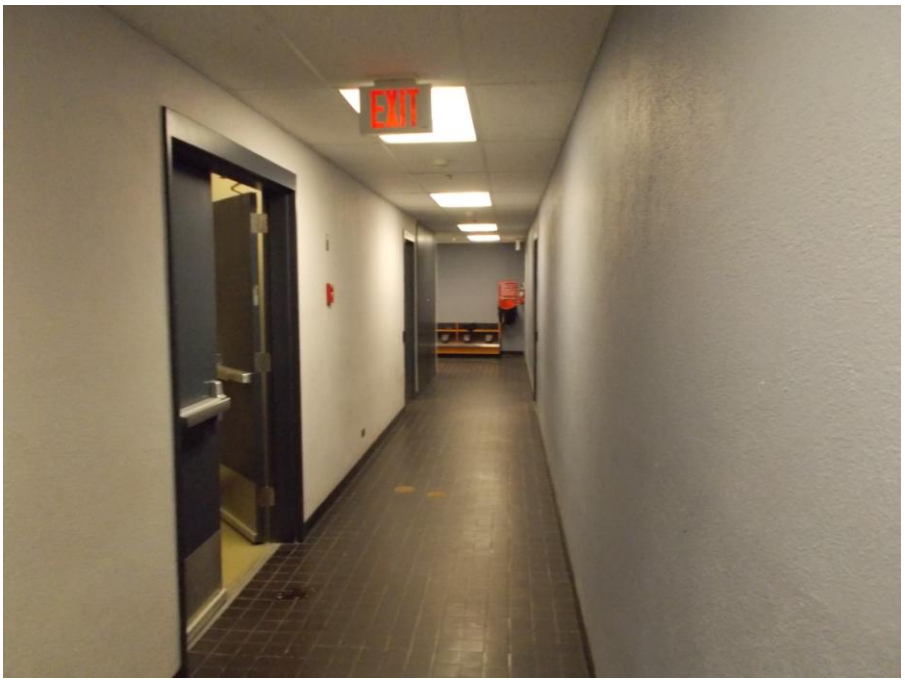


PHOTOGRAPH 9: Showing the typical interior building materials in the basement of the Public Safety Building.

PHOTOGRAPH 10: Showing typical building materials observed on within the 6th floor mechanical rooms.

amec Environment & Infrastructure **CITY OF WINNIPEG**		**SITE PHOTOGRAPHS** **PHASE I ENVIRONMENTAL SITE ASSESSMENT** **151 & 171 PRINCESS STREET** **WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	Date: AUG/13	Project No.: WX17205	Figure: D5

PHOTOGRAPH 11: Showing an example of asbestos labelling within the Site buildings.

PHOTOGRAPH 12: Showing one of the backup diesel generators located on the 6th floor.

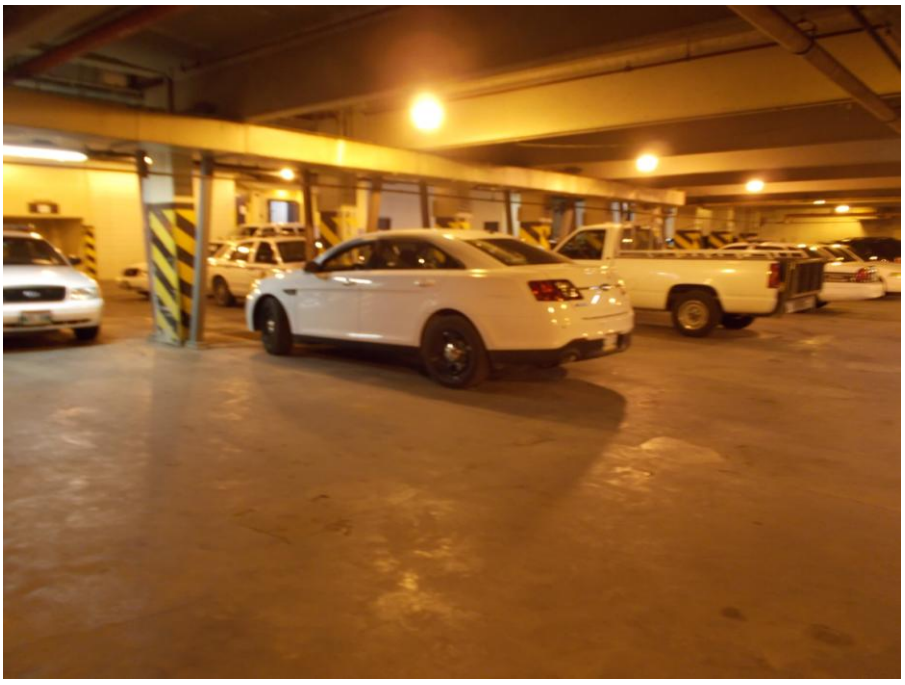
amec **Environment & Infrastructure**		**SITE PHOTOGRAPHS** **PHASE I ENVIRONMENTAL SITE ASSESSMENT** **151 & 171 PRINCESS STREET** **WINNIPEG, MANITOBA**		
CITY OF WINNIPEG				
Drawn: N/A	Scale: N/A	Date: AUG/13	Project No.: WX17205	Figure: D6

PHOTOGRAPH 13: Showing the diesel day tank located on the 6th floor in generator room 1.

PHOTOGRAPH 14: Showing an example of the surface staining that was observed on the 6th floor.

amec **Environment & Infrastructure**		**SITE PHOTOGRAPHS** **PHASE I ENVIRONMENTAL SITE ASSESSMENT** **151 & 171 PRINCESS STREET** **WINNIPEG, MANITOBA**		
CITY OF WINNIPEG				
Drawn: N/A	Scale: N/A	Date: AUG/13	Project No.: WX17205	Figure: D7

PHOTOGRAPH 15: Showing water damage observed in the basement located below the Civic Centre Parkade.



PHOTOGRAPH 16: Showing the parking area located in the connected basement of the Site buildings.

amec Environment & Infrastructure **CITY OF WINNIPEG**		**SITE PHOTOGRAPHS** **PHASE I ENVIRONMENTAL SITE ASSESSMENT** **151 & 171 PRINCESS STREET** **WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	Date: AUG/13	Project No.: WX17205	Figure: D8

PHOTOGRAPH 17: Showing the inferred former mechanical lift located in the portion of the basement that formally operated as a service area for vehicles.

PHOTOGRAPH 18: Showing the backup generator located in the shared basement of the Site buildings.

amec **Environment & Infrastructure** **CITY OF WINNIPEG**		**SITE PHOTOGRAPHS** **PHASE I ENVIRONMENTAL SITE ASSESSMENT** **151 & 171 PRINCESS STREET** **WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	Date: AUG/13	Project No.: WX17205	Figure: D9

PHOTOGRAPH 19: Showing the day tank located in the basement generator room.

PHOTOGRAPH 20: Showing the fill cap for the 2270 L underground storage tank.

amec **Environment & Infrastructure**		**SITE PHOTOGRAPHS** **PHASE I ENVIRONMENTAL SITE ASSESSMENT** **151 & 171 PRINCESS STREET** **WINNIPEG, MANITOBA**		
CITY OF WINNIPEG				
Drawn: N/A	Scale: N/A	Date: AUG/13	Project No.: WX17205	Figure: D10

PHOTOGRAPH 21: Showing interior building materials of the Civic Centre Parkade.

PHOTOGRAPH 22: Showing mechanical equipment located in the Civic Centre Parkade.

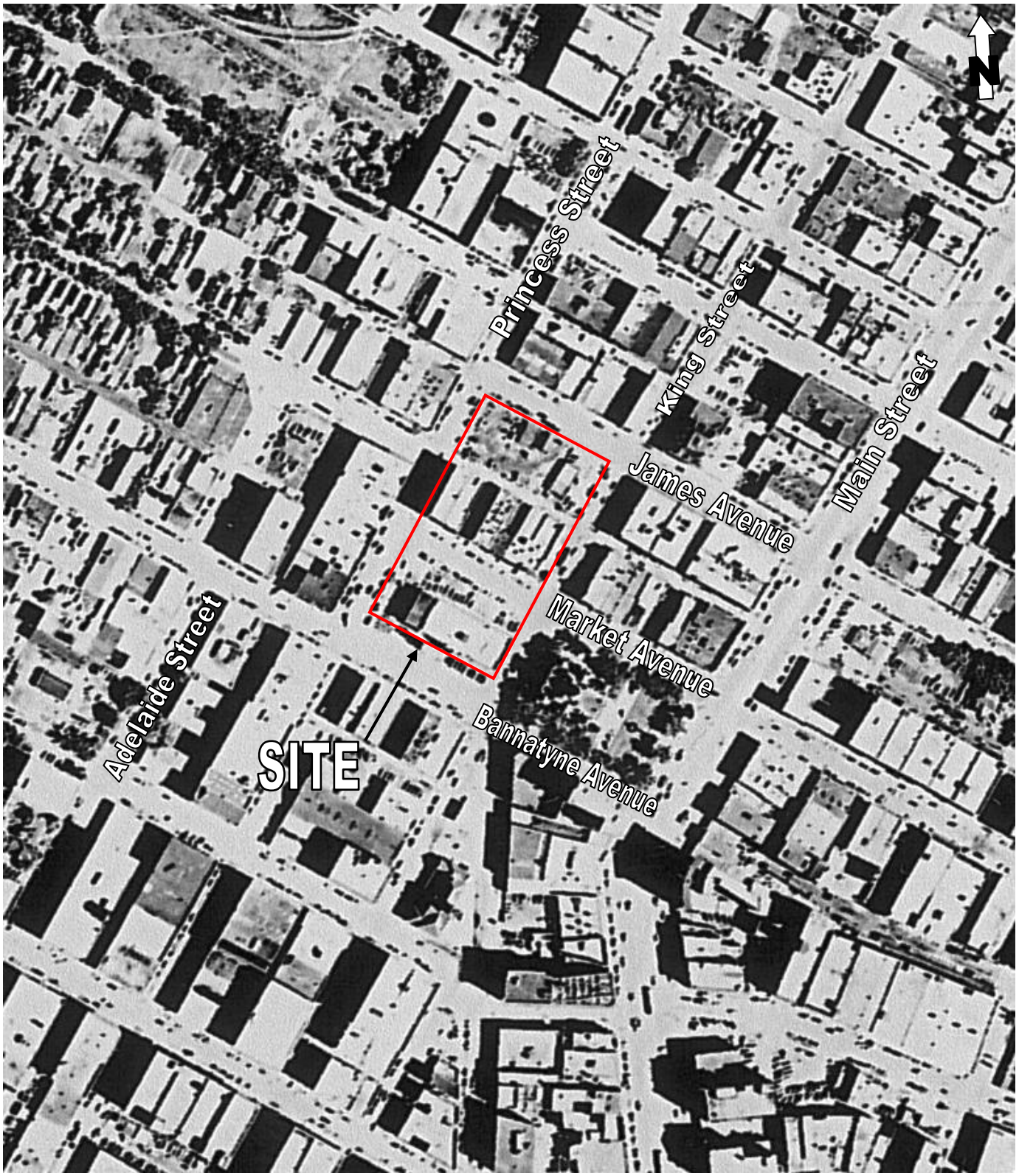
amec **Environment & Infrastructure**		**SITE PHOTOGRAPHS** **PHASE I ENVIRONMENTAL SITE ASSESSMENT** **151 & 171 PRINCESS STREET** **WINNIPEG, MANITOBA**		
CITY OF WINNIPEG				
Drawn: N/A	Scale: N/A	Date: AUG/13	Project No.: WX17205	Figure: D11

PHOTOGRAPH 23: Showing the interior building materials of the stairwells / elevator access areas of the Civic Centre Parkade.

Environment & Infrastructure **CITY OF WINNIPEG**		**SITE PHOTOGRAPHS PHASE I ENVIRONMENTAL SITE ASSESSMENT 151 & 171 PRINCESS STREET WINNIPEG, MANITOBA**		
Drawn: N/A	Scale: N/A	Date: AUG/13	Project No.: WX17205	Figure: D12

APPENDIX E

AERIAL PHOTOGRAPHS



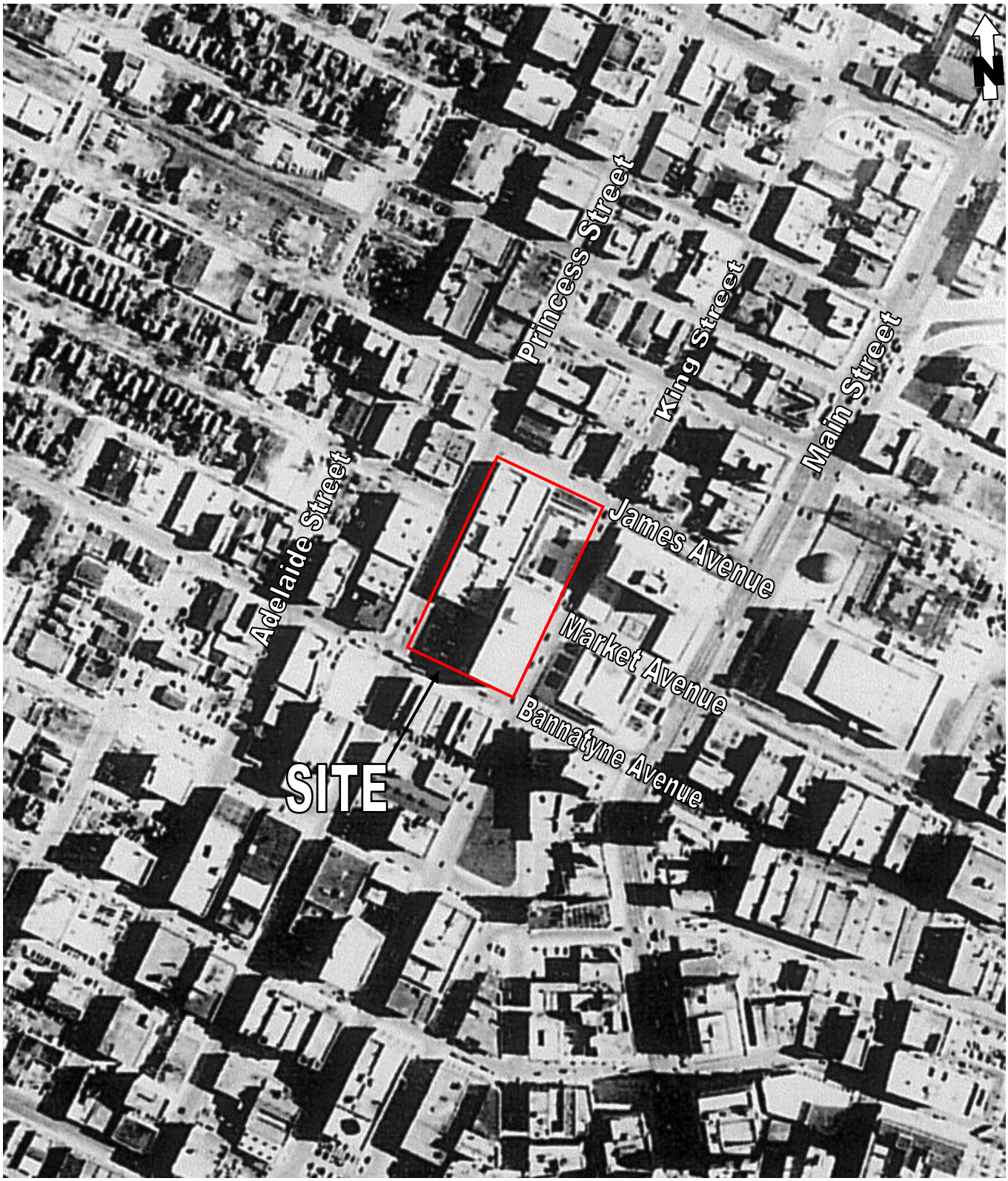
amec

Environment & Infrastructure

CITY OF WINNIPEG

1950 AERIAL PHOTOGRAPH
PHASE I ENVIRONMENTAL SITE ASSESSMENT
151 & 171 PRINCESS STREET
WINNIPEG, MANITOBA

Drawn: N/A	Original Scale: 1: 8,000	Date: AUG/2013	Project No.: WX17205	Figure: E1



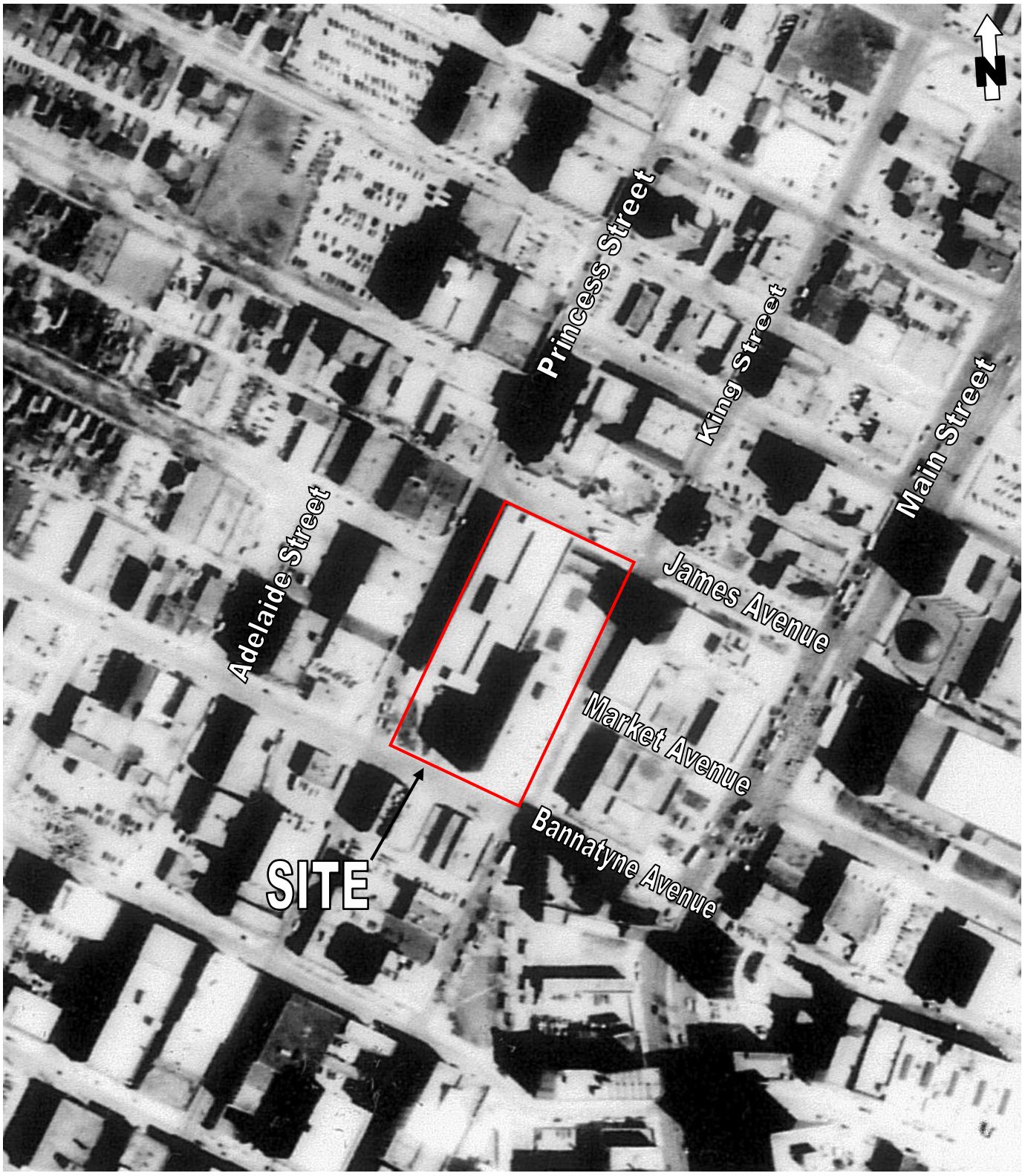
amec

Environment & Infrastructure

CITY OF WINNIPEG

1968 AERIAL PHOTOGRAPH
PHASE I ENVIRONMENTAL SITE ASSESSMENT
151 & 171 PRINCESS STREET
WINNIPEG, MANITOBA

Drawn: N/A	Original Scale: 1: 15,000	Date: AUG/2013	Project No.: WX17205	Figure: E2



amec

Environment & Infrastructure

CITY OF WINNIPEG

1988 AERIAL PHOTOGRAPH
PHASE I ENVIRONMENTAL SITE ASSESSMENT
151 & 171 PRINCESS STREET
WINNIPEG, MANITOBA

Drawn: N/A	Original Scale: 1: 20,000	Date: AUG/2013	Project No.: WX17205	Figure: E3

APPENDIX F

MCWS FILE SEARCH LETTER

Manitoba
Conservation and Water Stewardship
Administration and Finance
200 Saulteaux Crescent, Box 85
Winnipeg, MB R3J 3W3
T 204-945-7098 F 204-945-2385
www.manitoba.ca

August 9, 2013
File # 14033

Ms. Angela Smith
AMEC Environment and Infrastructure
440 Dovercourt Drive,
Winnipeg, MB R3Y 1N4

Dear Ms. Smith:

Re: 151 and 171 Princess Street, Winnipeg, MB

This letter summarizes the information found in the current records maintained by the Department of Conservation and Water Stewardship.

- *Hazardous waste generators:*
  - City of Winnipeg
    Status: active; generator number: MBG01296
    Products: Waste type 2 (NA9302); Waste type 3 (NA9303); Corrosive liquid (UN1760C); Photoprocessing waste (PHOWST2); Waste type 5 (NA9305); EHS liquid (lead) used oil (UN3082KC); Toxic liquid, organic (UN2810); Batteries, wet, filled with acid (UN2794); Formaldehyde solution, flammable (UN1198); Hydrochloric acid (UN1789); Sulphuric acid (UN1830); Polychlorinated biphenyls/PCB (UN2315) – one time only
  - City of Winnipeg Storage Shed
    Status: inactive; generator number: MBG11157
    Product: Printing ink or printing related material (UN1210), one time only storage of printing ink from Print Centre
- *Petroleum storage site:*
  - PSF permit was issued to the City of Winnipeg Police at 151 Princess Street
  - Petroleum storage site code: 14150
  - 1 x 2,270 litres of underground storage tank installed on November 9, 1965
  - 1 x 2,270 litres of underground storage tank was removed on December 20, 2003
  - Application for permit was received on February 20, 2004 with file number 3423
  - 1 x 2,270 litres of underground storage tank was installed on February 20, 2004
  - Installed overfill containment, overfill prevention, and enviroflex piping on February 20, 2004
- *Contaminated/Impacted sites file:*
  - City of Winnipeg – Public Safety Building with impacted sites file number 28093

There are no records of any outstanding work orders or environmental incidents found pertaining to the above-mentioned property. This site is not considered a contaminated site in our files.

Should you need further information, please contact Alvin Dyck, Environment Officer at 204-470-7548.

Yours truly,

Lorie Saflor
Administrative Services Clerk

Disclaimer attached
(GST registration # R107863847)

DISCLAIMER

Enclosed is the information requested with respect to your recent File Search Request. This response summarizes the information found in current records maintained by Manitoba Conservation and is for informational purposes only. No representation or responsibility is assumed whatsoever as to the completeness of this information as it related to the environmental condition or prior incidents associated with the property in question. In order to obtain more complete information on the property, persons may wish to retain the services of a qualified consultant for the purpose of conducting an environmental audit.

PHASE II ENVIRONMENTAL SITE ASSESSMENT
PUBLIC SAFETY BUILDING &
CIVIC CENTRE PARKADE

151 & 171 PRINCESS STREET
WINNIPEG, MANITOBA

Submitted to:

Ms. Tracy Stople

City of Winnipeg
Planning Property & Development
Municipal Accommodations Division
4th Floor, 185 King Street
Winnipeg, Manitoba

Submitted by:
AMEC Environment and Infrastructure
440 Dovercourt Drive
Winnipeg, Manitoba
R3Y 1N4
Ph: 204-488-2997

DRAFT: 6 February 2014
FINAL: 3 June 2014

AMEC Project No: WX17293

EXECUTIVE SUMMARY

AMEC Environment & Infrastructure, a division of AMEC Americas Limited ("AMEC"), was retained by Ms. Tracy Stople of the Planning Property & Development division of the City of Winnipeg ("Client") to conduct a Phase II Environmental Site Assessment (ESA) of a the Public Safety Building and Civic Center Parkade property located at 151 & 171 Princess Street, in Winnipeg, Manitoba (the "Site").

The objective of the Phase II ESA was to assess the soil conditions at the Site based on the areas of potential environmental concern (APECs) that were identified in the AMEC's Phase I ESA completed in August 2013. The following six APECS were the focus of the Phase II ESA:

- APEC 1: Historic automotive fuel/auto service station
- APEC 2: Historic Printing company
- APEC 3: Former City of Winnipeg police service station
- APEC 4: Current and Historic underground storage tank (UST)
- APEC 5: Off-Site historic auto wrecking company
- APEC 6: Off-Site historic machine shop and auto body manufactures shop

The AMEC drilling program was conducted on 2 & 3 December 2013. The drilling program consisted of advancing 15 test holes (TH13-01 through TH13-15) to maximum depths of 6.1 meters below grade level (m bgl), with the exception of TH13-05 which was advanced to 3.0 m bgl and TH13-08 which could not be advanced further than 0.6 m bgl due to concrete encountered at the test hole location. TH13-01 through TH13-05 (completed within the parkade basement) were advanced with the use of a B20 Cricket Rig and TH13-06 through TH13-15 (advanced outside the parkade) were advanced with the use of a B40 Truck-mounted Rig. Both drill rigs are capable of advancing continuous flight solid stem auger (125 mm diameter), and were supplied and operated by Maple Leaf Drilling of Winnipeg, Manitoba.

The soil profile varied in the test holes advanced within the basement of the parkade (TH13-01 through TH13-05), the test holes advanced outside of the parkade but remaining on the property (TH13-06 through TH13-10 and 13-15), and the test holes drilled on James Avenue (TH13-11 through TH13-14). A high plastic clay with some silt was encountered at the termination depth of each test holes. The test holes advanced within the parkade as well as on James Avenue were concrete/asphalt cored prior to the advancement of the test holes by AMEC and patched after the test hole drilling program.

The maximum soil vapour concentration encountered during the test hole drilling program was 90 parts per million total combustible vapours (ppm_v) in the soil sample collected from test hole TH13-03 at a depth of 0.8 m bgl within the parkade basement. Visual impacts were not noted in any of the soil samples collected.

For the purpose of this assessment, the guidelines selected to be applicable to the Site were the commercial land use, Canadian Council of Ministers of the Environment commercial (CCME) guidelines. However, at the request of the City of Winnipeg the residential CCME guidelines were also included for comparison purposes, so as not to limit future development of the property.

A total of 21 soil samples were submitted for laboratory analysis. Eighteen of the soil samples were analyzed for petroleum hydrocarbon (PHC) constituents, ten for metal parameters, twelve for volatile organic compounds (VOCs), and one for the analysis of total polychlorinated biphenyls (PCBs).

The soil samples submitted for analysis of PHC parameters contained concentrations less than the applicable commercial and residential guidelines. Although less than the guidelines (by a factor of three or more), seven of the samples contained detectable concentration of PHC components. The remaining samples contained PHC concentrations below the laboratory detection method.

One metal parameter, barium, in TH13-01 at a depth of 2.3 m bgl contained a concentration of 2020 µg/g which exceeds the commercial (2000 µg/g) and residential (500 µg/g) CCME guideline. The test hole that contained the barium exceedance is situated within APEC 3: the historic service garage for police vehicles. The other soil samples submitted for laboratory analysis remained below the applicable commercial and residential CCME guidelines for metal parameters.

The soil samples submitted for VOC parameters remained below the laboratory method detection limit and therefore below the applicable commercial and residential CCME guidelines.

The soil sample submitted for laboratory analysis of total PCBs remained below laboratory method detection limit and therefore remained below the applicable commercial and residential CCME guidelines.

This report has assessed the soil conditions at the Site in the areas of potential environmental concern (APECs) that were identified in AMEC's Phase I ESA completed in August 2013. Based on the results of this Phase II ESA, with the exception of barium in a soil sample from TH13-01, located in the basement parkade (location of APEC 3; historic service garage), the Site meets commercial and residential guidelines. The soil sampled at the Site had concentrations less than both residential and commercial CCME guidelines for the parameters analyzed with exception of the barium exceedance noted. Further environmental assessment of the soil conditions at the Site are not recommended at this time.

AMEC recommends that if the property is to be sold or redeveloped that the existing UST be removed. Additionally Manitoba Conservation, as per the *Storage and Handling of Petroleum Products and Allied Regulation* (188/2001) requires out of service tanks to be dismantled and removed within 365 out of service days. AMEC recommends that when the tank is no longer in service, the tank be removed and soil sampling completed for regulatory compliance. Based on reports by others, it is expected that limited residual PHC impacts are present in the area of the UST. Given the anticipated limited extent of the PHC impacts, AMEC recommends these be removed by excavation or removal of the tank or decommissioning of the facility when the areas can be accessed.

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LIST OF APPENDICES

1.0 INTRODUCTION

AMEC Environment & Infrastructure, a division of AMEC Americas Limited ("AMEC"), was retained by the Planning, Property & Development division of the City of Winnipeg ("Client") to conduct a Phase II Environmental Site Assessment (ESA) of a the Public Safety Building and Civic Center Parkade property located at the municipal addresses of 151 & 171 Princess Street, in Winnipeg, Manitoba (the "Site").

The objective of the Phase II ESA was to assess the soil conditions at the Site based on the areas of potential environmental concern (APECs) that were identified in AMEC's Phase I ESA completed in August 2013.

A Site and Surrounding Land Use Plan is presented in Figure 1(Appendix A) and summarized in Table 1 (Appendix B).

2.0 BACKGROUND

The following APECs were identified in the Phase I ESA completed by AMEC in August 2013, based on the historical review and the current uses of the Site and surrounding properties:

APEC 1: AMECs historical review of the Site indicates that an automotive fuel station / auto service center, with associated underground storage tanks, was formally located at the northeast corner of the Site from prior to 1946 until 1965, prior to the development of the current Site buildings. Potential contaminants of concern associated with automotive service shops and fuel stations generally include petroleum products such as gasoline and diesel fuel, solvents, waste oils and other lubricants and other automotive fluids such as anti-freeze and battery fluids.

APEC 2: AMEC's historical review of the Site indicates that, Rynolds Printing Co. occupied the middle section of the Site (293 Market Avenue) between 1930 and 1935. A printing company was also illustrated in this building in the 1964 FIPs. Given that this property was formally located on the portion of the Site that was excavated for the development of the basement of the Civic Center Parkade, impacts to the Site as a result of the printing companies at this location are consider to be low. It is expected that if soil contamination was present, that the contaminated soils would have been taken off site during the construction of the Civic Center basement.

APEC 3: The City of Winnipeg reported to AMEC at the time of the Site inspection that a portion of the basement level of the Site buildings was formally utilized to service garage for police vehicles. AMEC observed the remnants of an inferred hoist which was encased in concrete in this general area. Further, given that there are floor drains throughout the former service area, there is a potential for chemicals and other automotive related maintenance fluids to have entered the drain system.

APEC 4: According to Manitoba Conservation and Water Stewardship (MCWS) a 2270 L underground storage tank is current located on Site. At the time of the inspection, AMEC observed the fill cap for an underground tank within the flower bed located along side the north side of the northeast ramp. While the City of Winnipeg was unable to confirm this was the location of the tank, they reported that it should be in that

general area of the Site. Historically, based on a draft report provided to AMEC, an underground diesel storage tank was formerly located in this area of the Site. Petroleum hydrocarbon impacted soils associated with the former tank were identified and remediated in this area, however residual impacts reportedly remain.

In addition to the onsite APECs, AMEC identified the following APECs located adjacent to or neighbouring the Site which are an APEC to the Site:

APEC 5: Review of the Henderson Street Directories indicates that an auto wrecking company occupied the southwest corner of the intersection of William Avenue and Princess Street, located approximately 35 m southwest of the Site, between 1940 and 1945.

APEC 6: Review of Fire Insurance Plans indicated that a machine shop and auto body manufactures shop were located along the north Site of James Street located approximately 20 m north of the Site in 1917. The 1946 and 1964 Fire Insurance Plans of the area re-labelled the machine shop to 'Vulcanizing - Princess Tires Service', and the automotive manufacturing building was no longer occupied by the auto body manufactures shop. Given that these properties were not listed in the Henderson Street Directories it is unknown to AMEC how long these properties operated for.

The approximate assumed locations of the APECs are shown in Figure 2 (Appendix A).

3.0 SCOPE OF WORK

The ESA scope of work was proposed as part of AMEC's proposal WPG2013.389rev dated 8 November 2013 and included:

- A review of utility line locations from drawings supplied by the City of Winnipeg to minimize underground utility clearance times.
- The arranging of underground utility clearances of public utilities in advance of test hole drilling by public utility locators. In addition arranging for a private utility locator for the outdoor utilities as well as conducting ground penetrating radar (GPR) concrete scanning for the test holes locations that were to be cored and drilled within the parkade and concrete areas.
- Advancing up to 16 test holes to a maximum depth of 6.1 m.
- Field screening soil samples with an Eagle RKI combustible vapour analyzers set to the methane elimination mode to detect petroleum hydrocarbons.
- Submitting up to ten soil samples for laboratory analysis of metals, 19 soil samples for benzene, toluene, ethylbenzene, and xylenes (BTEX) and petroleum hydrocarbon (PHC) fractions F1-F4, 12 soil samples for volatile organic compounds (VOCs), one soil sample for polychlorinated biphenyls (PCBs), and two soil samples for grain size analysis.
- Preparing a report summarizing the methodology of the Phase II ESA, and the field and laboratory findings. The findings were to be compared to Canadian Council of Ministers of the Environment (CCME) guidelines.

- Providing general recommendations, if requested, under a separate cover.

The Phase II was conducted according to AMEC's proposal with the following exceptions:

- Only 15 test holes were advanced instead of the proposed 16. The test holes were reduced given the accessibility of drilling locations.
- Due to site conditions laboratory analysis was reduced. 18 BTEX and PCHs fractions F1-F4 instead of the proposed 19 and three grain size analysis instead of the proposed two were submitted for laboratory analysis.

The Site investigation was conducted in accordance with Manitoba Conservation's 1998 (revised 2002) "Guideline 98-01 – Environmental Site Investigations in Manitoba."

4.0 INVESTIGATIVE METHODOLOGY

4.1 HAZARD ASSESSMENT AND SERVICE LOCATIONS

Prior to the start of the intrusive investigation, AMEC completed a site specific health and safety checklist to identify project health and safety requirements, work site classification and personal protective equipment requirements.

As part of the checklist, AMEC contacted the one call service Click Before You Dig MB, which contacted the local service providers: Manitoba Telecommunications System (MTS), City of Winnipeg Sewer and Water, City of Winnipeg Traffic Signals, and Telus to mark their respective underground utility locations. In addition, the following local service providers were contacted directly by AMEC: Manitoba Hydro, TeraSpan Fiberoptic, and Shaw Cable. In addition a private locator was employed to identify private utilities as well as conduct a GPR concrete scan for the test holes to be advanced within the basement of the civic centre parkade. The City of Winnipeg provided a topographic survey which contains all of their known utility services and was reviewed prior to the drilling program; the drawing is provided in Figure 3 (Appendix A).

4.2 SURROUNDING LAND USE

A survey of surrounding land uses was conducted as part of AMEC's Site visit. The purpose of the survey was to identify specific land uses (i.e. agricultural, residential, commercial or industrial) adjacent to the Site to establish the applicable soil and groundwater use criteria. The surrounding land uses are outlined in Table 1 (Appendix B).

4.3 DRILLING AND SAMPLING PROGRAM

The AMEC drilling program was completed by Ms. Vanessa Krahn of AMEC on 2 & 3 December 2013. The drilling program consisted of advancing 15 test holes (TH13-01 through TH13-15) to maximum depths of 6.1 meters below grade level (m bgl), with the exception of TH13-05 which was advanced to 3.0 m bgl and TH13-08 which could not be advanced further than 0.6 m bgl due to concrete encountered at the test hole location. TH13-01 through TH13-05 (completed within the parkade basement) were advanced with the use of a B20 Cricket Rig and TH13-06 through TH13-15 (advanced outside the parkade) were advanced with the use of a B40 Truck-

mounted Rig. Both drill rigs are capable of advancing continuous flight solid stem auger (125 mm diameter) and were supplied and operated by Maple Leaf Drilling of Winnipeg, Manitoba.

The test hole locations were selected to capture potential impacts as a result of current and historical Site activities and were based on AMEC's Phase I ESA completed in August 2013. Test holes advanced within the parkade area as well as on James Avenue were cored by AMEC prior to drilling. After the test holes had been completed the remaining core-holes were patched with either concrete (in the parkade) or asphalt (for the test holes located James Avenue). The test hole locations are shown on Figure 3 (Appendix A). Site photographs are shown in Appendix C.

Soil samples recovered from the auger flights were collected at approximately 0.8 m depth intervals to the maximum depth of the test holes. Disturbed soils were removed from the outside of the samples to minimize potential cross contamination. Soil samples were also obtained in zones of visual impacts and/or at each stratigraphy change. Detailed soil logs are presented in Appendix D.

Soil samples were classified according to the Modified Unified Soil Classification System and observed for visual evidence of impacts. Soil samples collected for potential volatile analysis were collected and split into two portions. One portion was placed in a laboratory prepared glass jar (for possible laboratory analyses) and the other portion was placed in a plastic bag (for field screening of combustible vapours). Soil samples were field screened for volatile PHC vapours using ambient temperature headspace (ATH) techniques with an RKI Eagle combustible vapour analyzer set in the no methane response mode. The ATH method involves partially filling and sealing a plastic bag with soil and allowing the vapours to accumulate at ambient temperatures prior to analyzing the headspace. Accumulated vapours were measured in parts per million total combustible vapours (ppm_v).

Soil samples were stored in an insulated cooler while on Site and during transport to the laboratory. The field protocols and QA/QC procedures utilized by AMEC were in accordance with standard industry protocols.

4.4 LABORATORY ANALYSIS

In total, 21 soil samples were submitted for laboratory analysis to AMEC's laboratory in Edmonton, Alberta. PHC's, metals, VOCs, and PCBs were the contaminants of concern associated with the APECs. The following is a summary of the contaminants of concern as well as analysis:

- PHCs are commonly found in products such as gasoline, diesel fuel, oil, and hydraulic fluids (CCME 1999). In total, 18 soil samples were submitted for analysis of BTEX, F1-F4.
- VOCs are most commonly used in the dry cleaning industry but are also encountered in metal degreasing and cleaning. VOCs are also found in some adhesives, aerosols, paints, solvents, and caulking (CCME 1999). In total, 12 soil samples were submitted for analysis of VOCs.

- PCBs were primarily used in the process of insulating and cooling in electrical systems such as capacitors and transformers. Although discontinued in North America in 1979, PCBs were also present in some adhesives, lubricants, hydraulic fluids, among other items (CCME 1999). In total, one soil sample was submitted for analysis of PCBs.
- In total, ten soil samples were submitted for the analysis of metal parameters.
- Three soil samples were submitted for grain size analysis for the determination of the proper site guidelines.

The soil samples submitted to the laboratory for analysis were based on an evaluation of the soil and headspace vapour concentrations, location, depth and soil type.

The Canadian Association Laboratory Accreditation Inc. (CALA) has accredited AMEC's Edmonton laboratory for testing including PHC parameters in accordance with the International Standard ISO/IEC 17025. The laboratory QA/QC is provided in Appendix E.

5.0 ASSESSMENT CRITERIA

5.1 GENERAL

Environmental assessments in Manitoba are based on the assessment criteria as produced by CCME. The following documents produced by CCME were selected as being applicable to the Site based on the contaminants of concern.

- CCME 1999 (updated 2011). Canadian Environmental Quality Guidelines (EQGs).
- CCME 2001 (revised 2008). Canada-Wide Standards (CWS) for Petroleum Hydrocarbons in Soil

Based on the above current CCME documents (and their precursors), AMEC conducted an evaluation of the applicable exposure pathways, land uses, key receptors, soil grain size analysis, and a visual evaluation of the predominant soil texture at the Site. The sensitivity assessment was conducted in accordance with current CCME guidelines and did not include the modification or recalculation of the formulas used to derive the criteria values.

Given that the future use of the Site is unknown, and based on communication with the City of Winnipeg, AMEC has typically defaulted to the most stringent risk based scientific guidelines (or interim guideline when a scientific guideline is not available) for the various pathways which may be applicable at the Site based on current and future land use.

5.2 LAND USE

The CCME CWS 2008 has been developed for four generic land uses that have been adopted within these guidelines. A generic land use scenario is envisioned for each category based on the normal activities on these lands. The four land uses as defined by CCME are:

***Agricultural lands*:** where the primary land use is growing crops or tending livestock. This also includes agricultural lands that provide habitat for resident and transitory wildlife and native flora. The portion of a farm that houses people is considered a residential land use.

***Residential/Parkland*:** where the primary activity is residential or recreational activity. The ecologically-based approach assumes parkland is used as a buffer between areas of residency, but this does not include wild lands such as national or provincial parks.

Commercial: where the primary activity is commercial (*e.g.*, shopping mall) and there is free access to all members of the public, including children. The use may include, for example, commercial day-care centres. It does not include operations where food is grown.

Industrial: where the primary activity involves the production, manufacture or construction of goods. Public access is restricted and children are not permitted continuous access or occupancy.

The property was occupied by a public safety building, the unoccupied civic centre parkade, and some green space. Although future development of the property is unknown it is assumed that a commercial property will occupy the Site for the foreseeable future. As a result, the commercial land use guidelines have been applied. At the request of the City of Winnipeg, residential guidelines are also included for comparison purposes in the event that future residential development may be considered.

5.3 GRAIN SIZE DESIGNATION

The CCME guidelines have been developed for coarse-grained and fine-grained soils for PHC assessments where as VOCs (with the exception of trichloroethylene), metal parameters, and PCB assessments are independent of grain size. Fine-grained soils are defined as having a median grain size of less than or equal to 75 µm; coarse-grained soils have a median grain size of greater than 75 µm. Where both fine and coarse grained strata are present, the dominant soil particle size is determined by the stratum governing horizontal and vertical migration to a receptor.

Grain size analysis was conducted as part of the Phase II ESA on three soil samples; two soil samples consisted of the silt material found in several test hole locations and the third sample was of the high plastic clay that was encountered to the termination of all of the test holes (TH13-13 at 2.3 m, TH13-09 at 2.3 m, and TH13-09 at 3.8 m respectively). The two silt samples contained a grain size analysis of 95.8% and 95.7% passing a 75 µm sieve for TH13-13 at 2.3 and TH13-09 at 2.3 m respectively. The one clay sample contained a grain size analysis of 99.3% passing a 75 µm sieve in TH13-09 at 3.8m. As all grain size analysis conducted contained a value greater than 50% as well as visual observations during drilling activities, a fine grain soil designation was given to the Site for the purpose of this assessment.

Copies of the grain size analyses are included in the laboratory certificate in Appendix E.

5.4 APPLICABLE EXPOSURE PATHWAYS

CCME recognizes two soil horizons; surface soil (≤ 1.5 m depth) and subsoil (>1.5 m depth) for PHC assessment. Exposure pathways for PHCs are assessed individually for both horizons. VOC, PCB and metal guidelines are independent of soil depth.

5.4.1 Human Exposure Pathways

Potential human exposure pathways include the soil ingestion, soil dermal contact, vapour inhalation, and protection of potable groundwater pathways. The applicability of each of these potential exposure pathways are discussed in the following sections.

5.4.1.1 *Direct Contact (Soil Ingestion, Dermal Contact and/or Particulate Inhalation) Pathway*

The majority of the ground surface at the Site is covered with concrete however a section of the Site contains a topsoil and grass cover. The potential for contact with the underlying soils currently exists and may exist in the future. As such, the soil ingestion and dermal contact exposure pathway is applicable to the surface soil horizon at this Site.

Exposure via ingestion or dermal contact at the subsoil horizon is not considered realistic. As such, the ingestion and dermal contact pathways would not be considered applicable to the subsoil horizon.

5.4.1.2 *Vapour Inhalation Pathway*

The vapour inhalation (indoor) pathway is applicable to both the surface and subsoil horizons since the Site contains a commercial slab on grade building as well as a parkade basement. Future development is unknown, but will likely include buildings. For the purpose of this report, the existing building or a slab on grade building has been assumed for the foreseeable future.

5.4.1.3 *Protection of Potable Groundwater*

5.4.1.3.1 Manitoba Well Search

Considering the present and potential future land use of the Site and surrounding properties, and that potable water is supplied by the City of Winnipeg, it is unlikely that there would be usage of groundwater for potable purposes and therefore a well records search was not conducted.

5.4.1.3.2 Potable Groundwater Pathway

CCME considers all water bearing units as a potential potable groundwater resource; however CCME defines a water bearing unit as having a hydraulic conductivity of greater than 10^{-4} cm/s. Fractured zones in the bedrock comprise the major aquifer in the area, although the aquifer is infrequently used. There are no known aquifers above the bedrock.

MCWS recognizes that impacted soil and groundwater can be isolated from an underlying aquifer if they are not hydraulically connected. A five meter thick mass of unfractured saturated fine-grained material, with a bulk hydraulic conductivity less than 10^{-5} cm/s occurring below the impacted material is considered sufficient to ensure isolation of an underlying aquifer.

Based on available geological maps, the surficial stratigraphy in this area of Winnipeg normally consists of offshore glaciolacustrine sediments comprising of clay, silt and minor sand approximately 1 to 20 m thick (Matile 2004). Depth to till is estimated to about 12.5 to 15.2 metres from grade. Bedrock is estimated to occur at about 18.6 to 21.3 metres below grade. Fractured zones in the bedrock comprise the major aquifer in the area. There are no aquifers above the bedrock (Baracos et al 1981). These results indicate a 3.4 m to 8.8 m thick clay till layer; as this thickness overlying the aquifer could possibly be less than the required 5 m

thickness it is not considered sufficient to provide a confining layer for protection of the underlying groundwater aquifer. However, test holes TH13-01 through TH13-04 were completed within the basement of the parkade and a 5 m thickness of massive unfractured saturated fine-grain material was encountered in all of the 4 test holes. As such the protection of potable groundwater is not considered to be applicable for the Site.

5.4.2 Ecological Exposure Pathways

Potential ecological exposure pathways include the ecological soil contact, soil and food ingestions, and freshwater aquatic life pathways. The applicability of each of these potential exposure pathways are discussed in the following sections.

5.4.2.1 *Ecological Soil Contact Pathway*

The ecological soil contact pathway is applicable as ecological receptor exposure, from terrestrial and subterranean organisms and plant root systems, to soils in the surface soil horizon is feasible at the Site. Ecological receptor exposure to soils in the subsoil horizon is not considered realistic and the ecological soil contact pathway is not applicable to the subsoil horizon.

5.4.2.2 *Soil and Food Ingestion*

The soil and food ingestion pathway would be considered applicable as an ecological receptor as it is a possibility that humans, wildlife or domestic animals could ingest soil or food located on the property.

5.4.2.3 *Freshwater Aquatic Life Pathway*

CCME states that the freshwater aquatic life pathway may be excluded in cases where there is no surface water body within 10 m of a site classified as fine grained or within 500 m of a site classified as coarse grained for PHC components. The freshwater aquatic life pathway is excluded in cases where there is no surface water body within 500 m for all other parameters. The nearest surface water body is the Red River located approximately 650 m southeast of the Site. As a result, the freshwater aquatic life pathway is not applicable to the Site for PHCs or the remaining parameters.

5.4.3 Miscellaneous Criteria

As commercial land use criteria are applicable to the Site, non-toxic soil management limits as produced by CCME are required to be assessed. As well, CCME produced interim criteria in 1991 for many metal constituents in which no final guidelines have been developed.

5.4.3.1 *Management Limit*

The management limits for PHCs applies for all soils in the surface soil and subsoil horizon.

5.4.3.2 *Off-Site Migration Check*

For the commercial guidelines as there are properties adjacent to the Site with more sensitive land use (residential), the off-site migration check is applicable to the Site. For residential

guidelines as the land use guidelines already account for the more sensitive land use and as such the off-site migration check is not applicable.

5.4.3.3 *CCME 1991 Interim Criteria*

CCME initially developed interim criteria for many potential contaminants in 1991. With the publishing of the Canadian Environmental Quality Guidelines in 1999 (and subsequent updates), CCME adopted a risk based scientific approach to determining soil quality guidelines. While many of the interim criteria have been superseded by scientifically derived guidelines, there are still contaminants, including several metals and VOCs in which new guidelines have not yet been developed for all exposure pathways and, in some cases, the interim criteria still remain as the only guideline for assessment comparison. Note that even though some interim criteria are more stringent, the scientifically derived guidelines are considered more defensible and therefore will take precedent over the interim criteria.

5.5 SUMMARY

Given the commercial land use designation of the Site, surrounding residential land use, the fine grained nature of the soil and the applicable exposure pathways as outlined in the previous sections, AMEC determined assessment guidelines for each contaminant of concern. The most stringent of the applicable exposure pathway guideline values as produced by CCME was used for each contaminant for both the surface soil and subsoil horizons. The selected residential land use guidelines are also included for comparison purposes.

AMEC has chosen the following applicable risk guideline criteria for the Site:

<u>Petroleum Hydrocarbon Soil guidelines:</u>

Above 1.5 m below grade:

- Commercial and Residential values for fine grained surface soil in a non-potable situation as limited by the:
    - Inhalation of indoor air (slab on grade) exposure for benzene; and
    - Ecological soil contact exposure for toluene, ethylbenzene, xylenes and PHC fractions F1-F4.

Below 1.5 m below grade:

- Commercial values for fine grained subsurface soil in a non-potable situation as limited by the:
    - Inhalation of indoor air check (slab on grade) exposure pathway for BTEX ; and
    - Management Limits for PHC fractions F1 – F4.
- Residential values for fine grained subsurface soil in a non-potable situation as limited by the:
    - Inhalation of indoor air check (slab on grade) exposure pathway for BTEX and PHC fractions F1.
    - Management Limits for PHC fractions F2-F4

<u>Metal Guidelines:</u>

- Commercial and Residential values in a non-potable situation as limited by the:

- Direct Contact (Soil Ingestion, Dermal Contact and/or Particulate Inhalation Pathway) exposure for arsenic, lead, mercury, and uranium;
- Ecological Soil Contact guideline for cadmium, chromium, copper, nickel, selenium, thallium, vanadium, and zinc;
- Provisional guideline for thallium; and
- Interim Criteria for antimony, barium, beryllium, cobalt, molybdenum, silver, and tin.

VOC Guidelines:

- Commercial and Residential values in a non-potable situation as limited by the:
  - Inhalation of Indoor Air Check for tetrachloroethene (PCE) and trichloroethene (TCE); and
  - Interim Criteria for 1,1,1 trichoroethane, 1,1,2,2 tetrachlorethane, 1,1,2 trichloroethane, 1,1 dichloroethane, chlorobenzene, chloroform (trichloromethane), 1,1 dichloroethene, 1,2 dichlorobenzene, 1,2 dichloroethane, 1,2 dichloropropane, dichloromethane, tr 1,2-dichloroethene, 1,3 dichlorobenzene, 1,4 dichlorobenzene, cis-1,2 dichloroethene, styrene, and carbon tetrachloride (tetrachloromethane).

PCB Guidelines:

- Commercial Soil Contact Guideline for total PCBs; and
- Residential Soil and Food Ingestion Guideline for total PCBs.

The applicable assessment guidelines are summarized in Table 2 (Appendix B) for commercial guidelines and Table 3 (Appendix B) for residential guidelines.

Please note: the CCME Soil Quality Guideline for benzene provides for both a 10^{-6} (1 in 1,000,000) and 10^{-5} (1 in 100,000) incremental risk comparison criteria. A 10^{-6} (1 in 1,000,000) risk comparison criteria was used in the risk assessment for this Site.

6.0 ASSESSMENT RESULTS

6.1 SITE AND AREA DESCRIPTION

To facilitate directions throughout this report, Princess Street is assumed to be oriented in a north-south direction. The Site is located between James Avenue and William Avenue to the north and south, respectively, and between King Street and Princess Street to the east and west, respectively, in the Civic Center Neighbourhood of the Downtown East Ward of Winnipeg, Manitoba. The Site was largely occupied by the Public Safety Building and the Civic Center Parkade at the time of the Site visit.

At the time of the Site inspection, the Public Safety Building (151 Princess Street) was observed to occupy the southeast portion of the Site and the Civic Center Parkade (171 Princess Street) was observed to occupy the west / northwest portion of the Site. Both structures were observed to share a common basement area. According to the City of Winnipeg Assessment and Taxation Department both structures were constructed in 1965. At the time of the inspection a wood frame structure with a roof was observed to surround the Public Safety Building due to

safety issues associated with the exterior limestone facade. Additionally, the Civic Center Parkade was observed to be fenced off and vacant at the time of the inspection, reportedly due to structural stability issues.

Residential and commercial properties were present to the north and south, Red River College to the west and City Hall to the East.

6.2 SERVICE LOCATIONS

Manitoba Hydro, MTS, City of Winnipeg – Sewer and Water, City of Winnipeg – Traffic Signals, Telus, TeraSpan Fiberoptic, Shaw, and a Private locator were used to determine the location of utilities. Additionally the City of Winnipeg supplied a topographic survey including all their known utilities which was reviewed prior to the drilling program. Numerous utility lines were located in the drilling area. The approximate locations of the utilities are located on the Figure 3 (Appendix A) based on the drawing supplied to AMEC by the City of Winnipeg.

6.3 SOIL CONDITIONS

6.3.1 Regional and Local Geology

Based on available geological maps (Aquifer Maps of Southern Manitoba 1987), the bedrock aquifers consist of the Paleozoic Carbonate rock formations. These carbonate rocks of limestone and dolomite encompasses the aquifer which is continuous over the area formed by thick and extensive carbonate rock beds with minor shale beds. Sand and gravel aquifers consist of lenses of sand and gravel. The sand and gravel aquifers occur in till and other surficial deposits, the depth to the sand and gravel aquifers ranges from a few meters to more than 100 m.

6.3.2 Stratigraphy

The soil profile encountered at the test hole locations within the basement of the parkade (TH13-01 through TH13-05) generally consisted of:

- Concrete – averaging a thickness of 0.17 m.
- Granular Fill – underlying the concrete with an average thickness of 0.14m with the exception of TH13-05 which did not contain granular fill underneath the concrete surface.
- Clay – some silt, high plastic, brown and usually contained occasional silt intrusions was encountered underneath the granular fill to the termination of the test hole with the exception of:
    - TH13-01 contained an additional concrete surface underlying the granular fill from 0.30 m bgl to 0.41 m bgl; the clay followed the concrete surface to the termination of the test hole.

- TH13-05 which contained a low plastic silty clay layer underneath the concrete surface from 0.20 m bgl to 0.91 m bgl; the above mentioned high plastic clay followed this layer to the termination of the test hole (3.0 m bgl).

The soil profile encountered at the test hole locations on the property and outside the basement of the parkade (TH13-06 through TH13-10 and 13-15) generally consisted of:

- An organic clay at the surface averaging approximately 0.65 m, with the exception of TH13-10 which was drilled within the former UST excavation which contained a fine grained sand from surface to 4.11 m bgl.
- A medium plastic silty clay or a low plastic clayey silt, both grey, continued the test holes to an average of 2.1 m bgl with the exception of TH13-10 as mentioned above which contained sand and TH13-07 which contained a small sand and clay layer from 0.6 m bgl to 1.2 m bgl.
- Clay – some silt, high plastic, was brown and usually contained occasional silt and sulphate intrusions (similar to test holes drilled within the parkade) was encountered to the termination of the test holes.

The soil profile encountered at the test hole locations drilled on James Avenue (TH13-11 through TH13-14) generally consisted of:

- Asphalt surface averaging a thickness of 0.13 m.
- A frozen granular fill and/or clay fill was then encountered to an average depth of 1.60 m bgl. A low plastic clayey silt was then encountered to an average depth of 3.9 m bgl.
- Clay – some silt, high plastic, was brown and usually contained occasional silt and sulphate intrusions (similar to all of the other test holes drilled) was encountered to the termination of the test holes.

The detailed individual soil profiles for each test hole location is shown on the test hole logs included in Appendix D.

6.3.3 Field Observations

Soil vapour concentrations and field observations made during the field investigations 2 and 3 December 2013 are summarized in Table 4 (Appendix B) and detailed on the test hole logs (Appendix D).

The maximum soil vapour concentration encountered during the test hole drilling program was 90 ppm_v measured in the soil sample collected from test hole TH13-03 at a depth of 0.8 m bgl within the parkade basement. Visual impacts were not noted in any of the soil samples collected.

Originally an additional test hole was to be completed within the parkade basement and an area had been cleared by the GPR concrete scan by the private locator. However, during the concrete coring process it was noticed that the edge of a line containing electrical wires had been contacted. After confirming with a Site electrician, it was noted that there was no power supplied to the wires and the line was abandoned. As the wires were not powered they could

not be located by a private locator. As a safety precaution that test hole location was abandoned. Additionally, TH13-08 could not be advanced past 0.6 m bgl due to concrete encountered at the base of the test hole.

6.3.4 Soil Laboratory Results

A total of 21 soil samples were submitted for laboratory analysis. 18 of the soil samples were analyzed for PHCs constituents, ten for metal parameters, 12 for VOC parameters, and one for the analysis of total PCBs. Copies of the detailed analytical reports are provided in Appendix E.

The soil samples, select analytes and rationale are outlined on Table 5 (Appendix B).

Petroleum Hydrocarbon -PHCs

The following 18 soil samples were submitted for laboratory analysis of PHC parameters.

- TH13-01 at a depth of 2.3 m bgl;
- TH13-02 at a depth of 3.8 m bgl;
- TH13-03 at a depth of 0.8 m bgl;
- TH13-03 at a depth of 4.5 m bgl;
- TH13-04 at a depth of 6.1 m bgl;
- TH13-06 at a depth of 2.3 m bgl;
- TH13-06 at a depth of 6.1 m bgl;
- TH13-07 at a depth of 1.5 m bgl;
- TH13-07 at a depth of 2.3 m bgl;
- TH13-09 at a depth of 2.3 m bgl;
- TH13-09 at a depth of 3.8 m bgl;
- TH13-09 at a depth of 6.1 m bgl;
- TH13-10 at a depth of 4.5 m bgl;
- TH13-11 at a depth of 6.1 m bgl;
- TH13-12 at a depth of 3.8 m bgl;
- TH13-13 at a depth of 2.3 m bgl;
- TH13-14 at a depth of 4.5 m bgl; and
- TH13-15 a depth of at 1.5 m bgl.

As summarized in Table 6 (Appendix B) the soil samples mentioned above contained concentrations of PHC parameters below the applicable commercial and residential guidelines. Although remaining below the guidelines (by a factor of three or more) seven of the soil samples

submitted contained detectable concentration of PHC components. The remaining samples contained concentrations below the laboratory detection method.

The soil laboratory results for PHCs are shown on Figure 4 (Appendix A) for all soil samples collected and summarized in Table 6 (Appendix B).

Metals

The following ten soil samples were submitted for laboratory analysis of metal parameters:

- TH13-01 at a depth of 2.3 m bgl;
- TH13-02 at a depth of 3.8 m bgl;
- TH13-03 at a depth of 0.8 m bgl;
- TH13-05 at a depth of 2.3 m bgl;
- TH13-06 at a depth of 2.3 m bgl;
- TH13-06 at a depth of 6.1 m bgl;
- TH13-07 at a depth of 1.5 m bgl;
- TH13-07 at a depth of 2.3 m bgl;
- TH13-14 at a depth of 0.8 m bgl; and
- TH13-15 at a depth of 1.5 m bgl.

As summarized in Table 7 (Appendix B), one metal parameter, barium in TH13-01 at a depth of 2.3 m bgl contained a concentration of 2020 µg/g which exceeds the interim commercial CCME guideline of 2000 µg/g as well as the residential CCME guideline of 500 µg/g. This test hole location is situated within APEC 3, the historic service garage for police vehicles. All other soil samples submitted for laboratory analysis remained below the applicable commercial and residential CCME guidelines. The results of the soil laboratory analysis for metals, indicating samples which exceeded or did not exceed the assessment guidelines, are shown on Figure 5 (Appendix A).

Volatile Organic Compounds - VOCs

The following 12 soil samples were submitted for laboratory analysis of VOC parameters:

- TH13-01 at a depth of 2.3 m bgl;
- TH13-02 at a depth of 3.8 m bgl;
- TH13-03 at a depth of 0.8 m bgl;
- TH13-03 at a depth of 4.5 m bgl;
- TH13-04 at a depth of 6.1 m bgl;
- TH13-05 at a depth of 2.3 m bgl;

- TH13-06 at a depth of 2.3 m bgl;
- TH13-06 at a depth of 6.1 m bgl;
- TH13-07 at a depth of 1.5 m bgl;
- TH13-07 at a depth of 2.3 m bgl;
- TH13-14 at a depth of 4.5 m bgl; and
- TH13-15 at a depth of 6.1 m bgl.

As summarized in Table 8 (Appendix B), the VOC parameters from the soil samples submitted for laboratory analysis remained below the laboratory method detection limit and therefore below the applicable commercial and residential CCME guidelines. The results of the soil laboratory analysis for VOCs, indicating sample selection and which exceeded or did not exceed the assessment guidelines, are shown on Figure 6 (Appendix A).

Polychlorinated Biphenyls - PCBs

The following soil sample was submitted for laboratory analysis of total PCBs:

- TH13-03 at a depth of 0.8 m bgl.

As summarized in Table 9 (Appendix B), the soil sample submitted for laboratory analysis remained below laboratory method detection limit and therefore remained below the applicable commercial and residential CCME guidelines.

The soil PCB results are shown in Figure 7 (Appendix A).

6.4 QUALITY ASSURANCE

6.4.1 Accreditation

The analytical laboratory employed to perform the laboratory analyses (AMEC's laboratory located in Edmonton, Alberta) is certified with the Canadian Association for Laboratory Accreditation Inc. (CALA).

6.4.2 Data Validation

Laboratory QA/QC

The laboratory incorporates various QA/QC procedures to ensure the accuracy of the laboratory results and assess the possibility of false positives attributed to analytical equipment contributions and laboratory control samples. The laboratory QA/QC includes the completion of laboratory blanks, blank spikes and blank spike recovery. A summary of laboratory QA/QC findings is present below:

- All samples/sample extracts were analyzed within their applicable hold times using approved analytical methods;
- The reported detection limits were met for all tested parameters;

- Agreement between the corresponding datasets for the reference material samples, where applicable, and recoveries reported for spiked samples/blanks, where applicable, were within acceptable range;
- Surrogate recoveries were within acceptable ranges in all cases for all samples;
- Agreement between the corresponding datasets for the laboratory replicate samples is considered acceptable.

The results of the laboratory's QA/QC analyses are detailed on the laboratory Certificates of Analyses presented in Appendix E.

7.0 DISCUSSION

APEC 1 – Historical Auto Fuel Station

Two test holes (TH13-06 and TH13-07) were conducted to determine the potential for impact from the historical auto fuel/service station. Soil samples were analyzed for VOCs, metals, BTEX, and PHC F1-F4. The soil samples analyzed were less than the applicable CCME commercial and residential guidelines.

Soil sample TH13-06 at a depth of 6.1 m bgl contained a detectable concentration of PHC fraction F3 of 54 µg/g. This concentration was less than the guideline of 3500 µg/g or 5000 µg/g for residential and commercial land uses, respectively.

APEC 2 – Historical Printing Company

One test hole (TH13-05) was drilled within the parkade basement to determine if impacts from the historical printing company existing. Soil samples were analyzed for VOCs and metals. The soil samples analyzed had concentrations less than the commercial and residential guidelines.

APEC 3 – Historic Service Garage for Police Vehicles

Four test holes (TH13-01 through TH13-04) were drilled within the parkade basement near hydraulic joists and a floor drain to determine if historical practices in the area impacted the surrounding soil. Soil samples were analyzed for VOCs, BTEX, and PHCs F1-F4, additionally one soil sample was analyzed for PCB analysis. The soil samples analyzed were less than the applicable commercial and residential guidelines with the exception of the metal parameter, barium, in the soil sample TH13-01 at a depth of 2.3 m bgl. This soil sample contained a barium concentration of 2020 µg/g which is greater than the applicable commercial criteria of 2000 µg/g and the residential criteria of 500 µg/g. AMEC notes that the applicable CCME criteria selected for barium is an interim criteria, as no scientific defendable guideline has been developed for this metal parameter.

Detectable concentrations of benzene, toluene, ethylbenzene, xylenes, and PHC fraction F3 were encountered in soil sample TH13-01 at a depth of 2.3 m bgl. However, the parameters remained at least three times less than the residential guidelines. TH13-01 at a depth of 2.3 m

bgl, TH13-03 at a depth of 4.5 m bgl, and TH13-04 at a depth of 6.1 m bgl contained detectable concentrations of PHC fraction F3 although were less than the guideline.

APEC 4 – Historic and Current UST

Six test holes (TH13-08 through TH13-13) were advanced to determine the impact from the former and current UST located on the Site. Soil samples were analyzed for BTEX and PHC fractions F1-F4. Two test holes were completed east of the current UST to determine the soil conditions to the east of the former excavation as well as to determine the condition of the base of the former excavation (TH13-09 and TH13-10). TH13-11 through TH13-13 were advanced within James Avenue to determine if impacts remaining from the former UST excavation had migrated into the roadway. The soil samples analyzed had concentrations less than the applicable commercial and residential guidelines.

The results of the laboratory analysis indicate that the test hole completed east of the former excavation (TH13-09) contained detectable concentrations of PHC fraction F3 and that the base of the former excavation (TH13-10) does not contain detectable PHC parameters. In addition PHC parameters were not detected in the soil samples analyzed from the test holes in James Avenue. This indicates that the impacts from the former UST do not appear to have migrated into the adjacent street.

Drilling at APEC 4 was restricted due to the presence of the access ramp for the parkade, the building and the presence of utilities along the north side of James Avenue. Based on previous environmental assessment reports, it is expected that residual PHC impacts are present in close proximity to the USTs. Based on the drilling conducted, these impacts are expected to be limited in nature.

APEC 5 – Off Site Historic Auto Wrecking facility

One test hole, TH13-15, was advanced in the southwest corner of the Site to determine the gross impact of the historical off site auto wrecking facility. Soil samples were analyzed for BTEX, F1-F4, metals, and VOC parameters. Detectable limits of PHC parameters benzene and fraction F3 and F4 were encountered in soil sample TH13-15 at a depth of 1.5 m bgl, however the soil samples analyzed had concentrations less than the commercial and residential guidelines.

APEC 6 – Off Site Historic Automotive Manufacturing

One test hole, TH13-14, was advanced in James Avenue to the north of the west section of the Site to determine if gross impact from the historical automotive manufacturing facility was encountered. Detectable concentrations of PHC parameter fraction F3 was encountered in soil sample TH13-14 at a depth of 4.5 m bgl, however the soil samples analyzed had concentrations less than applicable commercial and residential guidelines.

8.0 SUMMARY

AMEC, was retained by Ms. Tracy Stople of the Planning Property & Development division of the City of Winnipeg to conduct a Phase II ESA of a the Public Safety Building and Civic Center Parkade property located at 151 & 171 Princess Street, in Winnipeg, Manitoba. The objective of the Phase II ESA was to assess the soil conditions at the Site based on the APECs that were identified in the AMEC's Phase I ESA completed in August 2013.

The AMEC drilling program was conducted on 2 & 3 December 2013. The drilling program consisted of advancing 15 test holes (TH13-01 through TH13-15) to maximum depths of 6.1 m bgl meters below grade level (m bgl), with the exception of TH13-05 which was advanced to 3.0 m bgl and TH13-08 which could not be advanced further than 0.6 m bgl due to concrete encountered at the test hole location. TH13-01 through TH13-05 (completed within the parkade basement) were advanced with the use of a B20 Cricket Rig and TH13-06 through TH13-15 (advanced outside the parkade) were advanced with the use of a B40 Truck-mounted Rig. Both drill rigs are capable of advancing continuous flight solid stem auger (125 mm diameter), and were supplied and operated by Maple Leaf Drilling of Winnipeg, Manitoba.

The soil profile varied in the test holes advanced within the basement of the parkade (TH13-01 through TH13-05), the test holes advanced outside of the parkade but remaining on the property (TH13-06 through TH13-10 and 13-15), and the test holes drilled on James Avenue (TH13-11 through TH13-14). A high plastic clay with some silt was encountered at the termination depth of each test holes. The test holes advanced within the parkade as well as on James Avenue were concrete/asphalt cored prior to the advancement of the test holes by AMEC and patched after the test hole drilling program.

The maximum soil vapour concentration encountered during the test hole drilling program was 90 parts ppm_v in the soil sample collected from test hole TH13-03 at a depth of 0.8 m bgl within the parkade basement. Visual impacts were not noted in any of the soil samples collected.

A total of 21 soil samples were submitted for laboratory analysis. Eighteen of the soil samples were analyzed for PHC constituents, 10 for metal parameters, 12 for VOCs, and one for the analysis of total PCBs.

The soil samples submitted for analysis of PHC parameters contained concentrations less than the applicable commercial and residential guidelines. Although less than the guidelines (by a factor of three or more), seven of the samples contained detectable concentration of PHC components. The remaining samples contained PHC concentrations below the laboratory detection method.

One metal parameter, barium, in TH13-01 at a depth of 2.3 m bgl contained a concentration of 2020 µg/g which exceeds the commercial (2000 µg/g) and residential (500 µg/g) CCME guideline. The test hole that contained the barium exceedance is situated within APEC 3: the historic service garage for police vehicles. The other soil samples submitted for laboratory analysis remained below the applicable commercial and residential CCME guidelines for metal parameters.

The soil samples submitted for VOC parameters remained below the laboratory method detection limit and therefore below the applicable commercial and residential CCME guidelines.

The soil sample submitted for laboratory analysis of total PCBs remained below laboratory method detection limit and therefore remained below the applicable commercial and residential CCME guidelines.

9.0 CONCLUSION & RECOMMENDATIONS

This report has assessed the soil conditions at the Site in the areas of potential environmental concern (APECs) that were identified in AMEC's Phase I ESA completed in August 2013. Based on the results of this Phase II ESA, with the exception of barium in a soil sample from TH13-01, located in the basement parkade (location of APEC 3; historic service garage), the Site meets commercial and residential guidelines. The soil sampled at the Site had concentrations less than both residential and commercial CCME guidelines for the parameters analyzed with exception of the barium exceedance noted. Further environmental assessment of the soil conditions at the Site are not recommended at this time.

AMEC recommends that if the property is to be sold or redeveloped that the existing UST be removed. Additionally Manitoba Conservation, as per the *Storage and Handling of Petroleum Products and Allied Regulation* (188/2001) requires out of service tanks to be dismantled and removed within 365 out of service days. AMEC recommends that when the tank is no longer in service, the tank be removed and soil sampling completed for regulatory compliance. Based on reports by others, it is expected that limited residual PHC impacts are present in the area of the UST. Given the anticipated limited extent of the PHC impacts, AMEC recommends these be removed by excavation or removal of the tank or decommissioning of the facility when the areas can be accessed.

10.0 CLOSURE

The American Society for Testing and Materials Standard of Practice notes that no environmental Site assessment can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in the connection with a property. Performance of a standardized environmental Site assessment protocol is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions in connection with the property, given reasonable limits of time and costs. The findings of this investigation are based on the interpretation of data from a limited number of boreholes and analytical results pertaining to specific samples. The evaluation and interpretations do not preclude the existence of chemical substances other than those identified herein, or the possibility that contamination levels can vary between the areas of the investigation.

This report was prepared for the exclusive use of the Planning, Property & Development Division of the City of Winnipeg and is intended to provide an ESA for the Site located at the property with the municipal address of 151 & 171 Princess Street in Winnipeg, Manitoba at the time of the Site visit. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third party. Where additional parties require reliance on this report written authorization from AMEC will need to be attained. With respect to third parties, AMEC has no liability or responsibility for losses of any kind whatsoever, including direct or consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The report is based on data and information collected during the ESA of the property conducted by AMEC. It is based solely on the conditions of the Site encountered at the time of the Site visit supplemented by a review of historical information and data obtained by AMEC as described in this report, and discussion with a representative of the owner/occupant, as reported herein. Except as otherwise maybe specified, AMEC disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to AMEC after the time during which AMEC conducted the ESA.

In evaluating the property, AMEC has relied in good faith on information provided by other individuals noted in this report. AMEC has assumed that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the current owner/occupant. AMEC accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted. AMEC makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

This Report is also subject to the further General Conditions contained in Appendix F.

Respectively submitted,

AMEC Environment & Infrastructure,

a division of AMEC Americas Limited

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Environmental Engineer in Training

Patrick Campbell
Associate – Environmental Scientist
Project Manager

Reviewed by:
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Associate Environmental Engineer
Manager, Winnipeg Operations

11.0 REFERENCES

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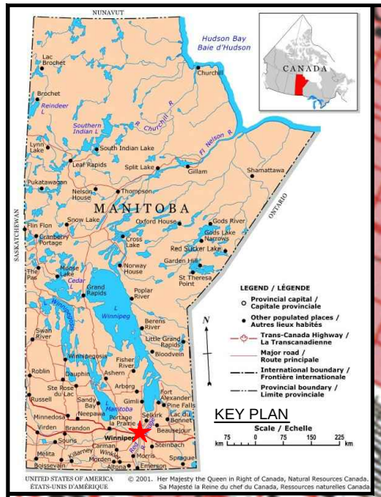
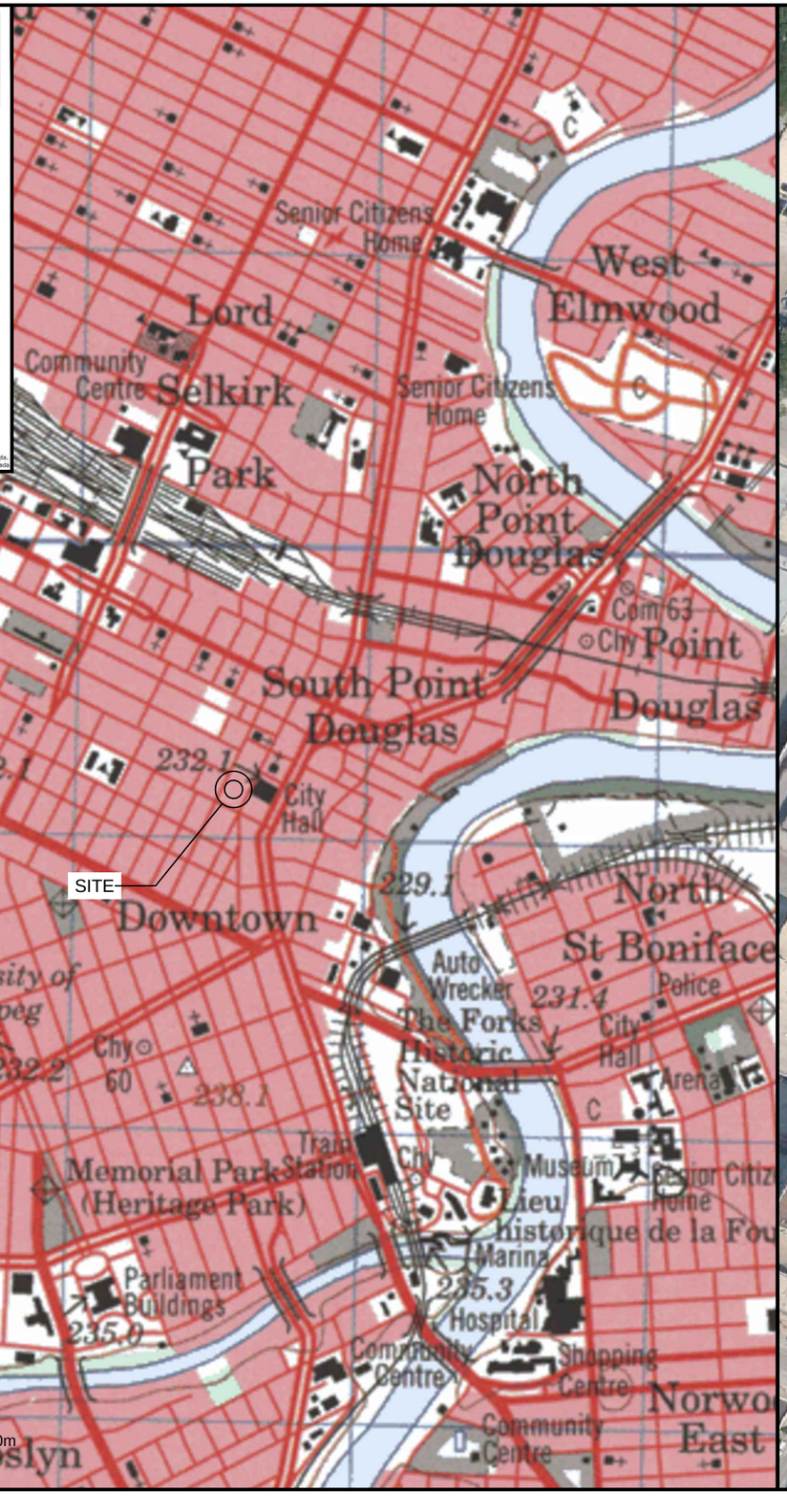
Phase I Environmental Site Assessment, Public Safety Building & Civic Centre Parkade, 151 & 171 Princess Street, Winnipeg, MB; August 2013, AMEC.

APPENDIX A
FIGURES





amec
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MANITOBA R3Y 1N4 PHONE:
204.488.2997 FAX:204.489.8261

CLIENT:

Winnipeg
CITY OF WINNIPEG

LEGEND:

PROPERTY LINE

NOTE:
- SITE FEATURE LOCATIONS ARE APPROXIMATE.
- IMAGES FROM GOOGLE EARTH PRO AND TOPO MAP.

NO.	REVISION	DATE	BY

PHASE II ENVIRONMENTAL SITE ASSESSMENT

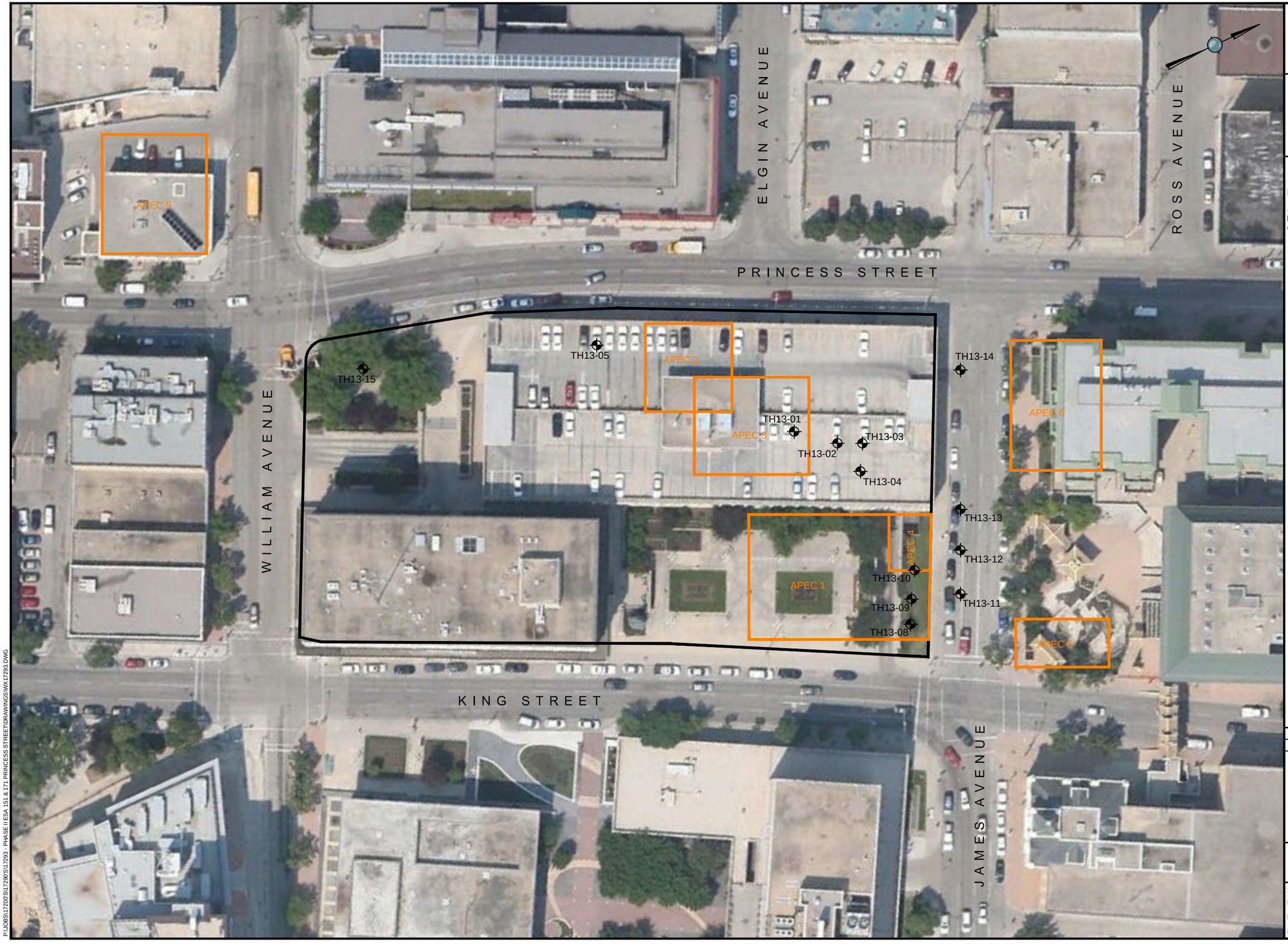
151 AND 171 PRINCESS STREET
WINNIPEG, MANITOBA

SITE AND SURROUNDING LAND USE PLAN

SCALE:	AS SHOWN
DATE:	JUNE 2014
DRAWN BY:	MD
PROJECT NO.:	WX17293

FIGURE 1

P:\JOBS\17200'S\17290'S\17293 - PHASE II ESA 151 & 171 PRINCESS STREET\DRAWINGS\WX17293.DWG



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CLIENT:

Winnipeg

LEGEND:

PROPERTY LINE

ACTUAL OR POTENTIAL AREA OF CONCERN

TEST HOLE

NOTE:
- SITE FEATURE LOCATIONS ARE APPROXIMATE.

NO.	REVISION	DATE	BY

PHASE II ENVIRONMENTAL SITE ASSESSMENT

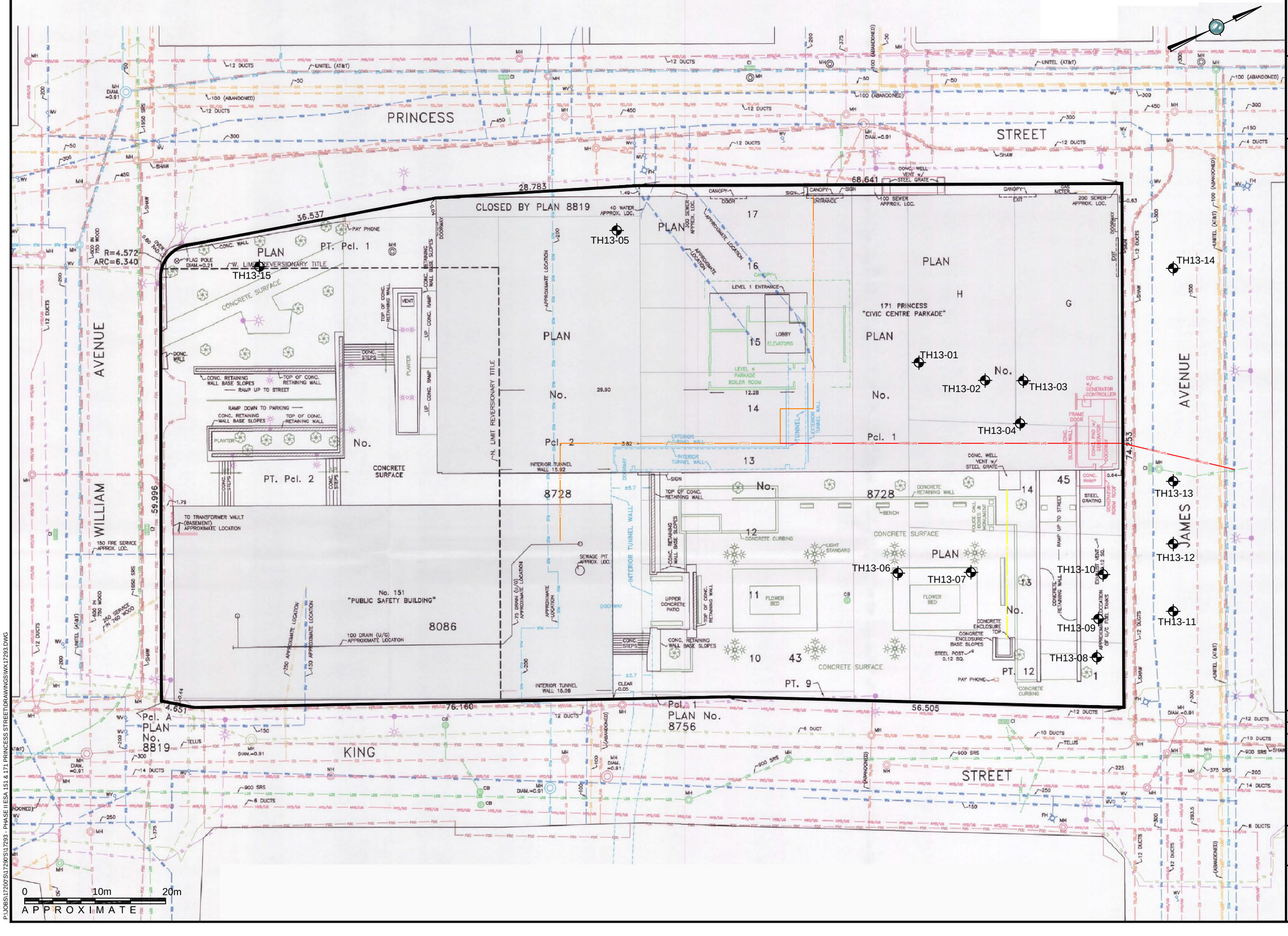
151 AND 171 PRINCESS STREET
WINNIPEG, MANITOBA

APPROXIMATE APEC LOCATIONS

SCALE:	AS SHOWN
DATE:	JUNE 2014
DRAWN BY:	MD
PROJECT NO.:	WX17293

FIGURE 2

P:\JOBS\17200\S\17290\S\17293 - PHASE II ESA 151 & 171 PRINCESS STREET\DRAWINGS\WX17293.DWG



P:\JOBS\17200\S17293\17293 - PHASE II ESA-151 & 171 PRINCESS STREET\DRAWINGS\WX17293.DWG

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CLIENT:

Winnipeg
CITY OF WINNIPEG

LEGEND:

- Property Lines and Dim 100.
- Manholes (Colour varies
- Catch Basins
- Curb Inlets
- Fire Hydrants
- Water Valves
- Street/Property Lights or
- Traffic Lights
- Combined Sewer CS
- Land Drainage Sewer LDS
- Waste Water Sewer WWS
- Watermain WM
- Natural Gas Line GAS
- Telephone Cables (underground) TEL/UG
- Hydro Cables (underground) HYD/UG
- Street Light Cables SL
- Traffic Signal Cables TS
- Communication Cables COMM
- Fibre Optic Cables FOC
- Steam Heat STM
- TEST HOLE

NOTE:
- SITE FEATURE LOCATIONS ARE APPROXIMATE.
- DRAWING BASED ON THE TOPOGRAPHIC DRAWING PROVIDED TO AMEC BY THE CITY OF WINNIPEG.

NO.	REVISION	DATE	BY

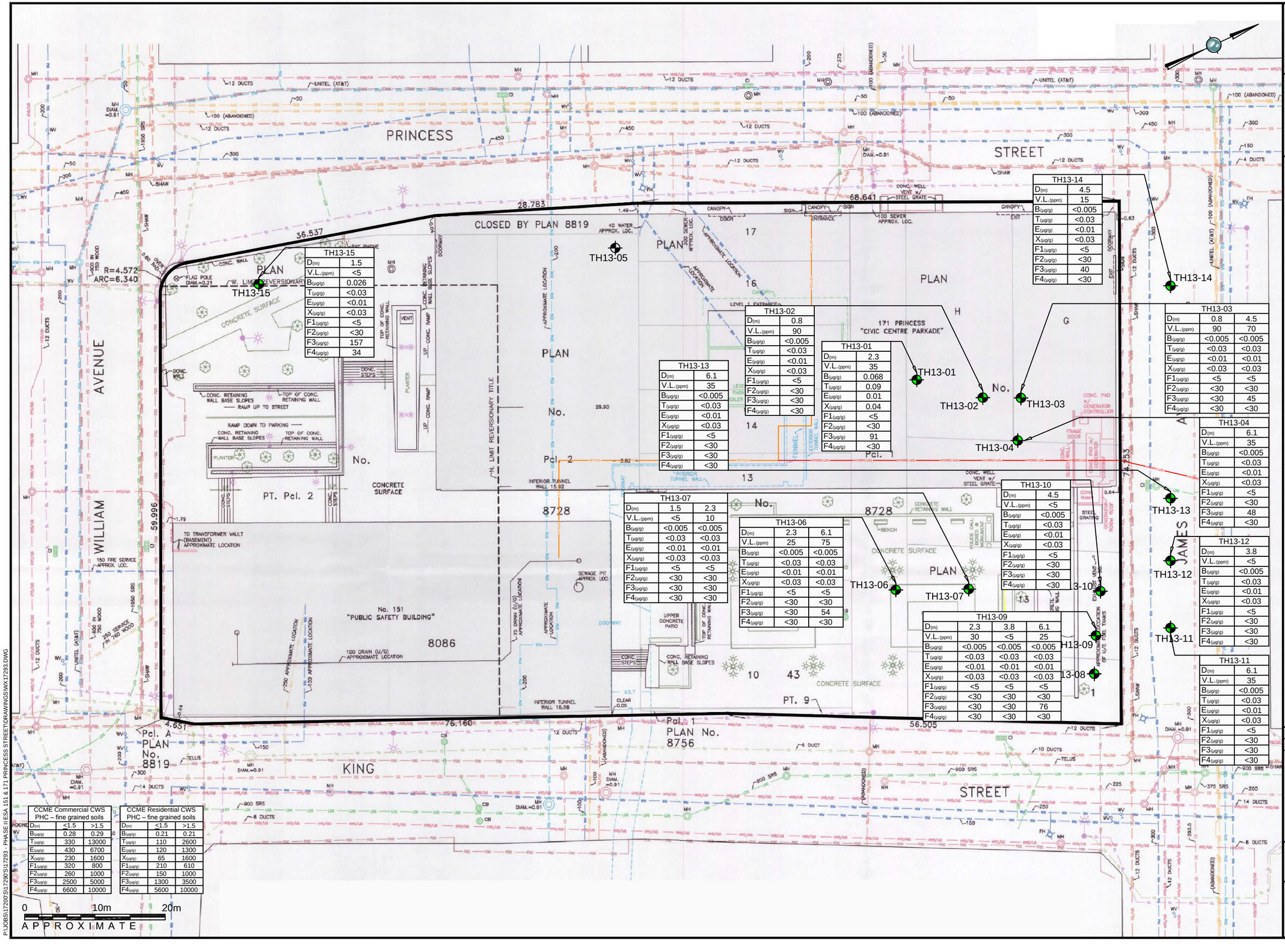
PHASE II ENVIRONMENTAL SITE ASSESSMENT

151 AND 171 PRINCESS STREET
WINNIPEG, MANITOBA

TEST HOLE LOCATION PLAN

SCALE:	AS SHOWN
DATE:	JUNE 2014
DRAWN BY:	MD
PROJECT NO.:	WX17293

FIGURE 3



TH13-15	
D(m)	1.5
V.L.(ppm)	<5
B(µg/g)	0.026
T(µg/g)	<0.03
E(µg/g)	<0.01
X(µg/g)	<0.03
F1(µg/g)	<5
F2(µg/g)	<30
F3(µg/g)	157
F4(µg/g)	34

TH13-14	
D(m)	4.5
V.L.(ppm)	15
B(µg/g)	<0.005
T(µg/g)	<0.03
E(µg/g)	<0.01
X(µg/g)	<0.03
F1(µg/g)	<5
F2(µg/g)	<30
F3(µg/g)	40
F4(µg/g)	<30

TH13-02	
D(m)	0.8
V.L.(ppm)	90
B(µg/g)	<0.005
T(µg/g)	<0.03
E(µg/g)	<0.01
X(µg/g)	<0.03
F1(µg/g)	<5
F2(µg/g)	<30
F3(µg/g)	<30
F4(µg/g)	<30

TH13-01	
D(m)	2.3
V.L.(ppm)	35
B(µg/g)	0.068
T(µg/g)	0.09
E(µg/g)	0.01
X(µg/g)	0.04
F1(µg/g)	<5
F2(µg/g)	<30
F3(µg/g)	91
F4(µg/g)	<30

TH13-03		
D(m)	0.8	4.5
V.L.(ppm)	90	70
B(µg/g)	<0.005	<0.005
T(µg/g)	<0.03	<0.03
E(µg/g)	<0.01	<0.01
X(µg/g)	<0.03	<0.03
F1(µg/g)	<5	<5
F2(µg/g)	<30	<30
F3(µg/g)	<30	45
F4(µg/g)	<30	<30

TH13-04	
D(m)	6.1
V.L.(ppm)	35
B(µg/g)	<0.005
T(µg/g)	<0.03
E(µg/g)	<0.01
X(µg/g)	<0.03
F1(µg/g)	<5
F2(µg/g)	<30
F3(µg/g)	48
F4(µg/g)	<30

TH13-13	
D(m)	6.1
V.L.(ppm)	35
B(µg/g)	<0.005
T(µg/g)	<0.03
E(µg/g)	<0.01
X(µg/g)	<0.03
F1(µg/g)	<5
F2(µg/g)	<30
F3(µg/g)	<30
F4(µg/g)	<30

TH13-07		
D(m)	1.5	2.3
V.L.(ppm)	<5	10
B(µg/g)	<0.005	<0.005
T(µg/g)	<0.03	<0.03
E(µg/g)	<0.01	<0.01
X(µg/g)	<0.03	<0.03
F1(µg/g)	<5	<5
F2(µg/g)	<30	<30
F3(µg/g)	<30	<30
F4(µg/g)	<30	<30

TH13-06		
D(m)	2.3	6.1
V.L.(ppm)	25	75
B(µg/g)	<0.005	<0.005
T(µg/g)	<0.03	<0.03
E(µg/g)	<0.01	<0.01
X(µg/g)	<0.03	<0.03
F1(µg/g)	<5	<5
F2(µg/g)	<30	<30
F3(µg/g)	<30	54
F4(µg/g)	<30	<30

TH13-10	
D(m)	4.5
V.L.(ppm)	<5
B(µg/g)	<0.005
T(µg/g)	<0.03
E(µg/g)	<0.01
X(µg/g)	<0.03
F1(µg/g)	<5
F2(µg/g)	<30
F3(µg/g)	<30
F4(µg/g)	<30

TH13-09			
D(m)	2.3	3.8	6.1
V.L.(ppm)	30	<5	25
B(µg/g)	<0.005	<0.005	<0.005
T(µg/g)	<0.03	<0.03	<0.03
E(µg/g)	<0.01	<0.01	<0.01
X(µg/g)	<0.03	<0.03	<0.03
F1(µg/g)	<5	<5	<5
F2(µg/g)	<30	<30	<30
F3(µg/g)	<30	<30	76
F4(µg/g)	<30	<30	<30

TH13-12	
D(m)	3.8
V.L.(ppm)	<5
B(µg/g)	<0.005
T(µg/g)	<0.03
E(µg/g)	<0.01
X(µg/g)	<0.03
F1(µg/g)	<5
F2(µg/g)	<30
F3(µg/g)	<30
F4(µg/g)	<30

TH13-11	
D(m)	6.1
V.L.(ppm)	35
B(µg/g)	<0.005
T(µg/g)	<0.03
E(µg/g)	<0.01
X(µg/g)	<0.03
F1(µg/g)	<5
F2(µg/g)	<30
F3(µg/g)	<30
F4(µg/g)	<30

CCME Commercial CWS PHC – fine grained soils		
D(m)	≤1.5	>1.5
B(µg/g)	0.28	0.29
T(µg/g)	330	13000
E(µg/g)	430	6700
X(µg/g)	230	1600
F1(µg/g)	320	800
F2(µg/g)	260	1000
F3(µg/g)	2500	5000
F4(µg/g)	6600	10000

CCME Residential CWS PHC – fine grained soils		
D(m)	≤1.5	>1.5
B(µg/g)	0.21	0.21
T(µg/g)	110	2600
E(µg/g)	120	1300
X(µg/g)	65	1600
F1(µg/g)	210	610
F2(µg/g)	150	1000
F3(µg/g)	1300	3500
F4(µg/g)	5600	10000

P:\JOBS\17200\S\17293\17293 - PHASE II ESA 151 & 171 PRINCESS STREET\DRAWINGS\WX17293.DWG

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CLIENT:

Winnipeg
CITY OF WINNIPEG

LEGEND:

- Property Lines and Dim 100.
- Manholes (Colour varies
- Catch Basins
- Curb Inlets
- Fire Hydrants
- Water Valves
- Street/Property Lights or
- Traffic Lights
- Combined Sewer CS
- Land Drainage Sewer LDS
- Waste Water Sewer WWS
- Watermain WM
- Natural Gas Line GAS
- Telephone Cables (underground) TEL/UG
- Hydro Cables (underground) HYD/UG
- Street Light Cables SL
- Traffic Signal Cables TS
- Communication Cables COMM
- Fibre Optic Cables FOC
- Steam Heat STM
- TEST HOLE
- BELOW CRITERIA
- ABOVE CRITERIA

NOTE:
- SITE FEATURE LOCATIONS ARE APPROXIMATE.
- DRAWING BASED ON THE TOPOGRAPHIC DRAWING PROVIDED TO AMEC BY THE CITY OF WINNIPEG.

NO.	REVISION	DATE	BY

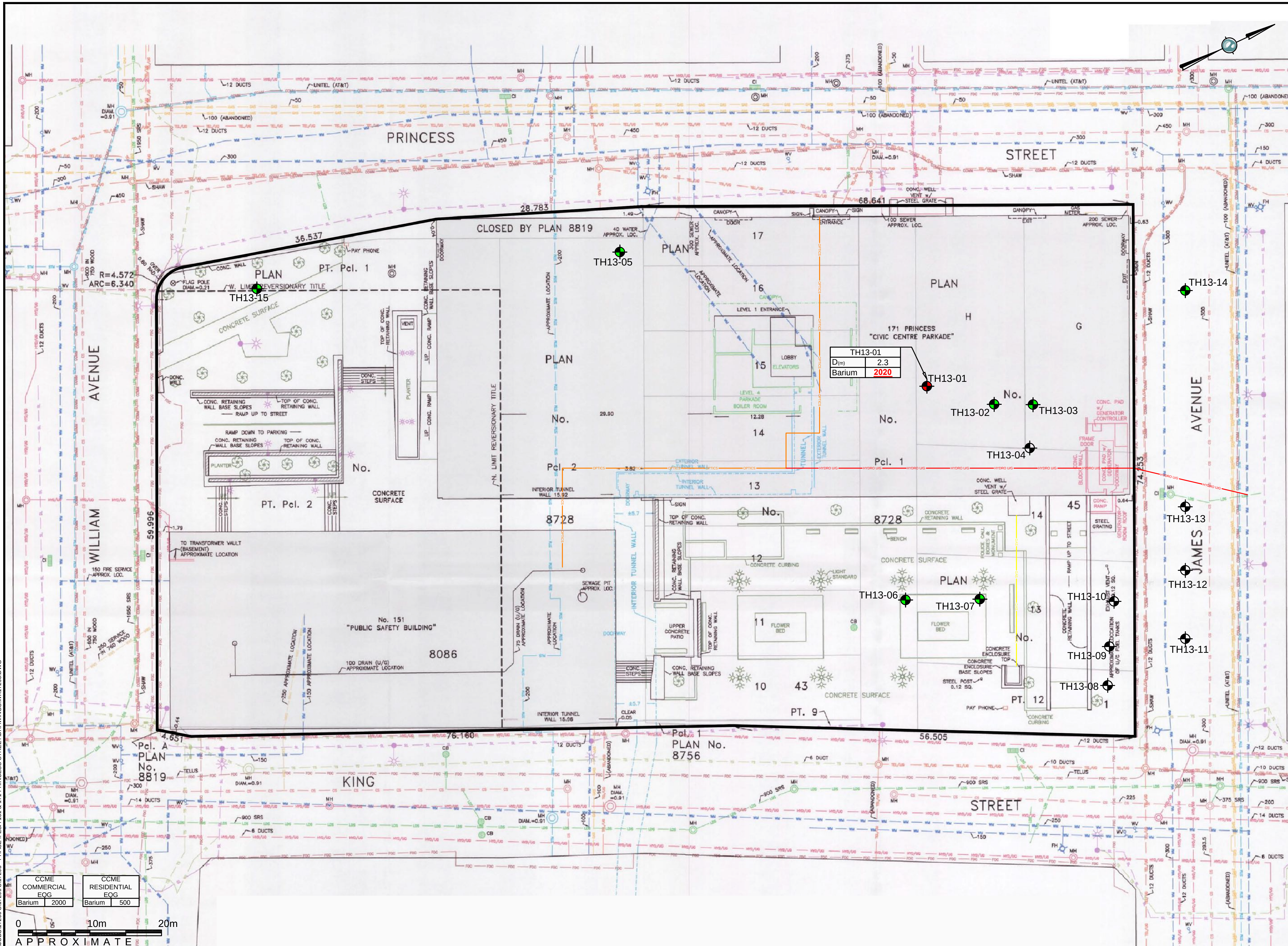
PHASE II ENVIRONMENTAL SITE ASSESSMENT

151 AND 171 PRINCESS STREET
WINNIPEG, MANITOBA

SOIL ANALYTICAL RESULTS (PHCs)

SCALE:	AS SHOWN
DATE:	JUNE 2014
DRAWN BY:	MD
PROJECT NO.:	WX17293

FIGURE 4



amec
AMEC Environment & Infrastructure
440 DOVERCOURT DRIVE WINNIPEG, MANITOBA R3Y 1N4 PHONE: 204.488.2997 FAX:204.489.8261

CLIENT: Winnipeg

LEGEND:

- Property Lines and Dim
- Manholes (Colour varies)
- Catch Basins
- Curb Inlets
- Fire Hydrants
- Water Valves
- Street/Property Lights
- Traffic Lights
- Combined Sewer
- Land Drainage Sewer
- Waste Water Sewer
- Watermain
- Natural Gas Line
- Telephone Cables (underground)
- Hydro Cables (underground)
- Street Light Cables
- Traffic Signal Cables
- Communication Cables
- Fibre Optic Cables
- Steam Heat
- TEST HOLE
- BELOW CRITERIA
- ABOVE CRITERIA

NOTE:
- SITE FEATURE LOCATIONS ARE APPROXIMATE.
- SEE APPENDIX B TABLE 7 FOR SOIL ANALYTICAL RESULT (METALS) FOR DETAILS.
- ONLY METAL PARAMETERS CONTAINING EXCEEDENCES SHOWN IN DRAWING.
- DRAWING BASED ON THE TOPOGRAPHIC DRAWING PROVIDED TO AMEC BY THE CITY OF WINNIPEG.

NO.	REVISION	DATE	BY

PHASE II ENVIRONMENTAL SITE ASSESSMENT

151 AND 171 PRINCESS STREET
WINNIPEG, MANITOBA

SOIL ANALYTICAL RESULTS (METALS)

SCALE:	AS SHOWN	FIGURE 5
DATE:	JUNE 2014	
DRAWN BY:	MD	
PROJECT NO.:	WX17293	

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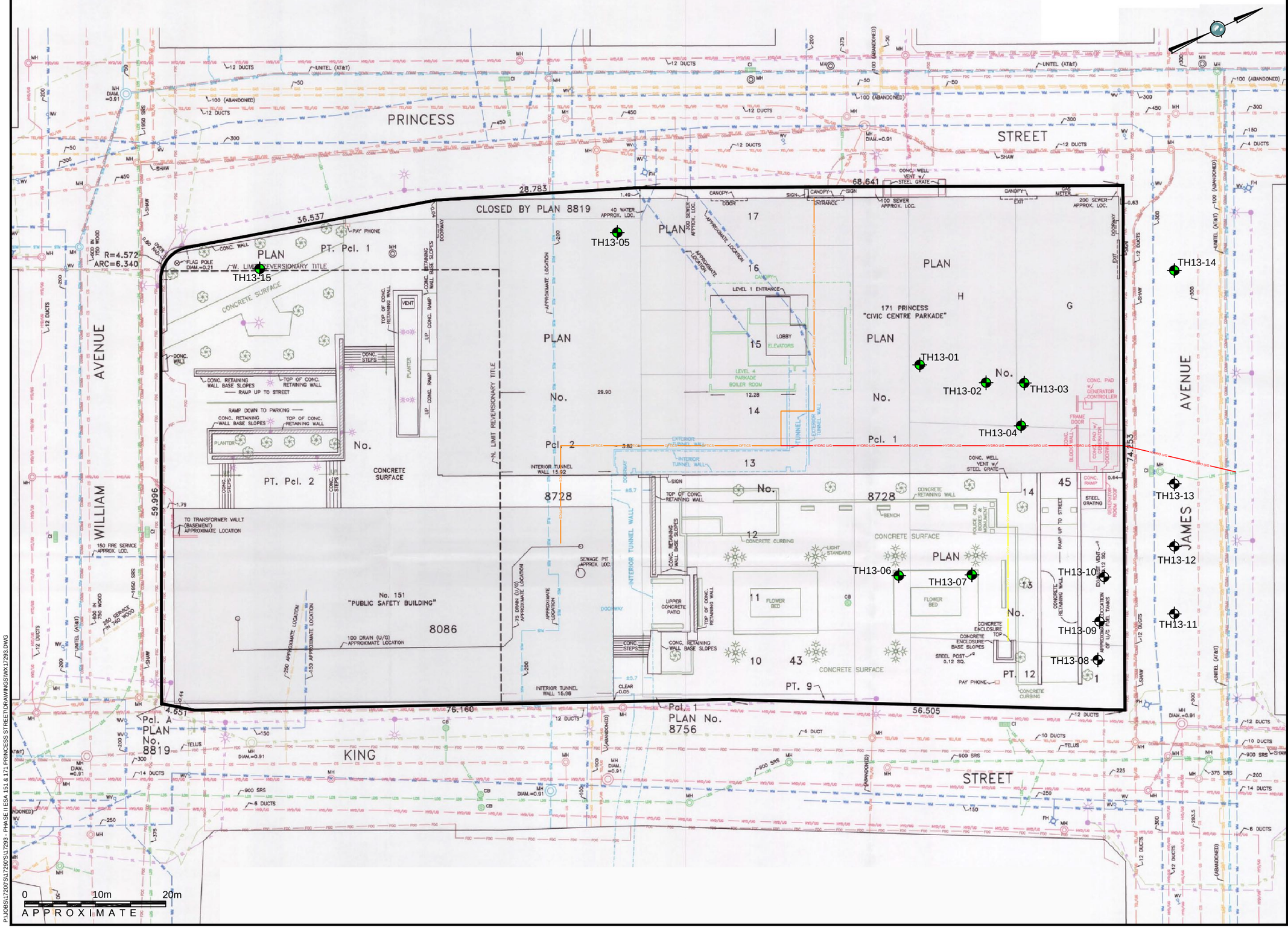

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CLIENT: Winnipeg

LEGEND:

- Property Lines and Dim
- Manholes (Colour varies
- Catch Basins
- Curb Inlets
- Fire Hydrants
- Water Valves
- Street/Property Lights or
- Traffic Lights
- Combined Sewer
- Land Drainage Sewer
- Waste Water Sewer
- Watermain
- Natural Gas Line
- Telephone Cables (underground)
- Hydro Cables (underground)
- Street Light Cables
- Traffic Signal Cables
- Communication Cables
- Fibre Optic Cables
- Steam Heat
- TEST HOLE
- BELOW CRITERIA
- ABOVE CRITERIA

NOTE:
- SITE FEATURE LOCATIONS ARE APPROXIMATE.
- SEE APPENDIX B TABLE 8 FOR SOIL ANALYTICAL RESULT (VOC) FOR DETAILS.
- DRAWING BASED ON THE TOPOGRAPHIC DRAWING PROVIDED TO AMEC BY THE CITY OF WINNIPEG.

NO.	REVISION	DATE	BY

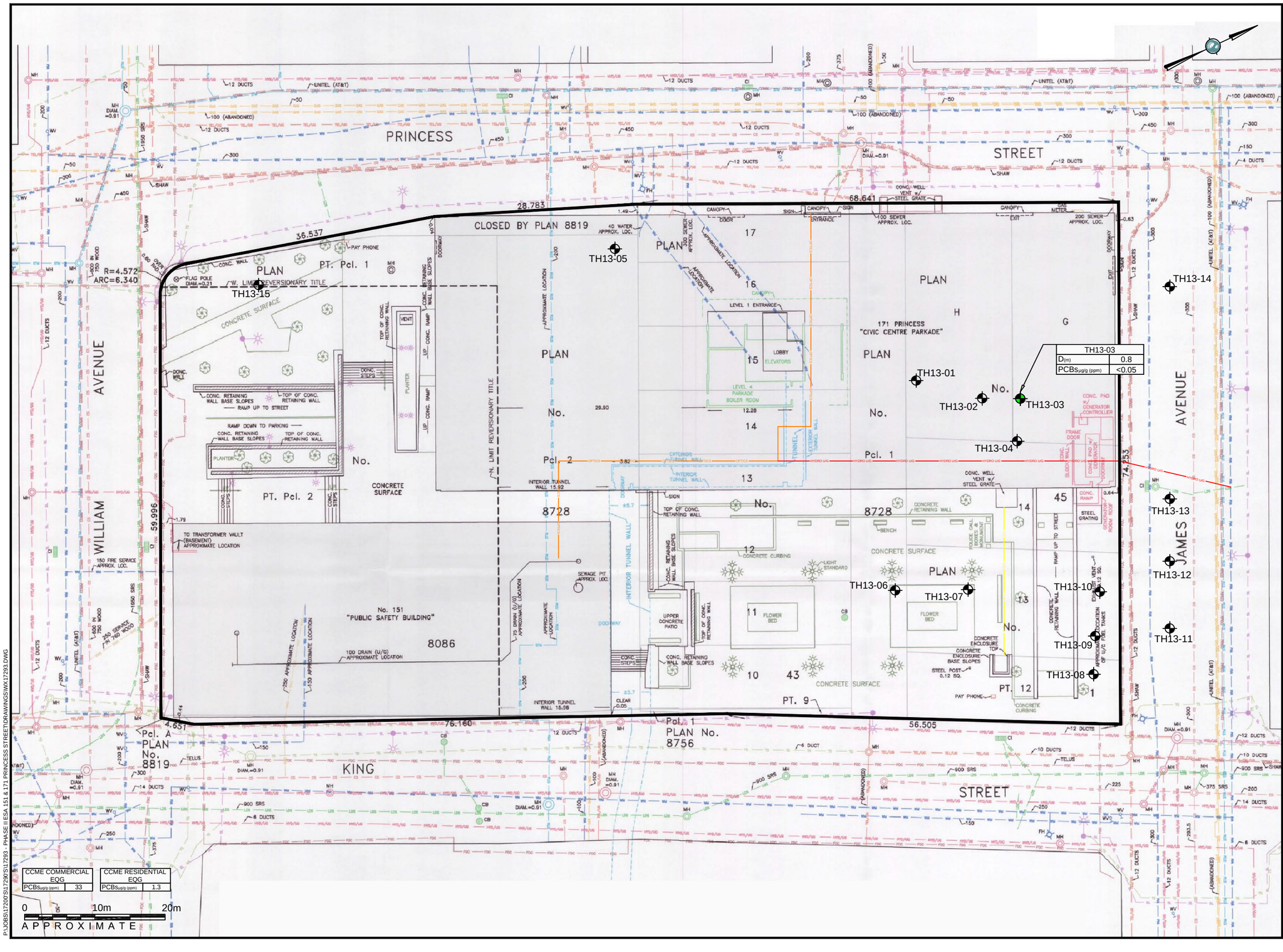
PHASE II ENVIRONMENTAL SITE ASSESSMENT

151 AND 171 PRINCESS STREET
WINNIPEG, MANITOBA

SOIL ANALYTICAL RESULTS (VOC)

SCALE:	AS SHOWN
DATE:	JUNE 2014
DRAWN BY:	MD
PROJECT NO.:	WX17293

FIGURE 6



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AMEC Environment & Infrastructure
440 DOVERCOURT DRIVE WINNIPEG, MANITOBA R3Y 1N4 PHONE: 204.488.2997 FAX:204.489.8261

CLIENT: Winnipeg

LEGEND:

- Property Lines and Dim 100.
- Manholes (Colour varies
- Catch Basins
- Curb Inlets
- Fire Hydrants
- Water Valves
- Street/Property Lights or
- Traffic Lights
- Combined Sewer
- Land Drainage Sewer
- Waste Water Sewer
- Watermain
- Natural Gas Line
- Telephone Cables (underground)
- Hydro Cables (underground)
- Street Light Cables
- Traffic Signal Cables
- Communication Cables
- Fibre Optic Cables
- Steam Heat
- TEST HOLE
- BELOW CRITERIA
- ABOVE CRITERIA

NOTE:
- SITE FEATURE LOCATIONS ARE APPROXIMATE.
- SEE APPENDIX B TABLE 9 FOR SOIL ANALYTICAL RESULT (PCBs) FOR DETAILS.
- ONLY DETECTABLE CONCENTRATIONS OF PCBs SHOWN IN DRAWING.
- DRAWING BASED ON THE TOPOGRAPHIC DRAWING PROVIDED TO AMEC BY THE CITY OF WINNIPEG.

NO.	REVISION	DATE	BY

PHASE II ENVIRONMENTAL SITE ASSESSMENT

151 AND 171 PRINCESS STREET
WINNIPEG, MANITOBA

SOIL ANALYTICAL RESULTS (PCBs)

SCALE:	AS SHOWN
DATE:	JUNE 2014
DRAWN BY:	MD
PROJECT NO.:	WX17293

FIGURE 7

APPENDIX B
TABLES

TABLE 1: SITE AND SURROUNDING LAND USE		
Direction	Land Use	Approx. Distance (m)
Site	Public Safety Building and Parkade	Site
North	James Avenue followed by residential and commercial properties including restaurants and offices spaces.	adjacent
East	King Street followed by City Hall with Main Street beyond.	adjacent
South	William Avenue followed by residential and commercial properties including restaurants, offices, and small shops.	adjacent
West	Princess Street followed by Red River College	adjacent

TABLE 2: COMMERCIAL ASSESSMENT GUIDELINES (SELECT PARAMETERS)

Land Use	Exposure Pathway	Fine Grained Soil Guidelines (ug/g) (PHCs)							
		Benzene	Toluene	Ethylbenzene	Xylenes	PHC (F1)	PHC (F2)	PHC (F3)	PHC (F4)
Commercial (≤ 1.5 m depth)	Soil Ingestion	11	82000	36000	560000	19000**	10000**	23000**	RES**
	Dermal Contact	25	790000	210000	NA				
	Indoor Vapour Inhalation	**0.28**	13000	6500	1600	4600	23000	NA	NA
	Ecological Soil Contact	310	**330**	**430**	**230**	**320**	**260**	**2500**	**6600**
	Offsite Migration	NG	NG	NG	NG	NG	NG	19000	RES
	Management Limits	NG	NG	NG	NG	800	1000	5000	10000
Commercial (> 1.5 m depth)	Indoor Vapour Inhalation	**0.29**	**13000**	**6700**	**1600**	4600	23000	NA	NA
	Offsite Migration	NG	NG	NG	NG	NG	NG	19000	RES
	Management Limits	NG	NG	NG	NG	**800**	**1000**	**5000**	**10000**

Land Use	Exposure Pathway	Soil Guidelines (ug/g) (Metals)***								
		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead
Commercial	Direct Contact*	NC	**12**	10000	NC	49	630	NC	4000	**260**
	Indoor Vapour Inhalation	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Ecological Soil Contact	NC	26	NC	NC	**22**	**87**	NC	**91**	600
	Interim Criteria****	**40**	50	**2000**	**8**	20	800	**300**	500	1000

Land Use	Exposure Pathway	Soil Guidelines (ug/g) (Metals)***									
		Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Tin	Uranium	Vanadium	Zinc
Commercial	Direct Contact*	**24**	NC	NC	300	NC	**1 (provisional)**	NC	**33**[a]	NC	NG
	Indoor Vapour Inhalation	NC	NC	NC	NC	NC	NC	NC	NC	NC	NG
	Ecological Soil Contact	50	NC	**50**	**2.9**	NC	*3.6*	NC	2000	**130**	**360**[b]
	Interim Criteria****	10	**40**	500	10	**40**	NG	**300**	NG	NG	1500

Land Use	Exposure Pathway	Fine Grained Soil Guidelines (ug/g) (VOCs)***					
		1,1,1 Trichoroethane	1,1,2,2 Tetrachlorethane	1,1,2 Trichloroethane	1,1 Dichloroethane	Chlorobenzene	Chloroform (Trichloromethane)
Commercial	Interim Soil Quality Criterion****	**50**	**50**	**50**	**50**	**10**	**50**

Land Use	Exposure Pathway	Fine Grained Soil Guidelines (ug/g) (VOCs)***					
		1,1 Dichloroethene	1,2 Dichlorobenzene	1,2 Dichloroethane	1,2 Dichloropropane	Dichloromethane	Tr 1,2-Dichloroethene
Commercial	Interim Soil Quality Criterion****	**50**	**10**	**50**	**50**	**50**	**50**

Land Use	Exposure Pathway	Fine Grained Soil Guidelines (ug/g) (VOCs)***				
		1,3 Dichlorobenzene	1,4 Dichlorobenzene	Cis-1,2 Dichloroethene	Styrene	Carbon Tetrachloride (Tetrachloromethane)
Commercial	Interim Soil Quality Criterion****	**10**	**10**	**50**	**50**	**50**

Land Use	Exposure Pathway	Fine Grained Soil Guidelines (ug/g) (VOCs)***	
		Tetrachloroethene (PCE)	Trichloroethene (TCE)[c]
Commerical	Direct contact*	NG	100
	Inhalation of Indoor Air Check	**0.5**	**0.92**
	Interim Soil Quality Criterion****	50	50
	Ecological Soil Contact (Provisional SQG)	34	50

Land Use	Exposure Pathway	PCBs***
Commercial	Soil Contact Guideline	**33**
	Soil and Food Ingestion	NG
	Interim Soil Quality Criterion****	50

Notes:

* Direct contact may be a combination and/or lowest of soil injestion, soil dermal contact, and particulate inhalation

** Combined values for soil injestion and dermal contact for exposure pathway

*** Metals, VOCs (with the exception of TCE), and PCB guidelines are independent of soil grain size or sample depth. Note - parameters with guidelines included in CCME documentation are included in guideline table

**** Interim Criteria based on non-scientific rational. In the case where a scientific defensible value established for an exposure pathway is greater than the interim criteria value, the scientific defensible value will be considered applicable.

[a] Uranium soil ingestion pathway includes cumulative effects of soil ingestion, inhalation, and dermal contact

[b] Zinc ecological soil pathway derived as geometric mean of ecological contact and nutrient cycling check and will supersede Nutrient Cycle Check if Ecological Soil Contact pathway is present.

c Trichloroethylene values are based on fine grained soil guidelines.

- PHC (F1) - volatile petroleum hydrocarbons ($C_6 - C_{10}$)
- PHC (F2) - extractable petroleum hydrocarbons ($C_{10} - C_{16}$)
- PHC (F3) - extractable petroleum hydrocarbons ($C_{16} - C_{34}$)
- PHC (F4) - extractable petroleum hydrocarbons ($C_{34} - C_{50}$)
- ug/g - concentration in micrograms per gram

BOLD – selected guideline

- NA - not applicable, calculated value exceeds 1,000,000 mg/kg
- NG - no guideline available
- CCME EQG Criteria – commercial land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) "Canadian Environmental Quality Guidelines", 1999 (updates to 2013). The benzene concentration is based on one million (10-6) incremental risk of cancer
- CCME CWS PHC Criteria - commercial land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) "Canada-Wide Standards for Hydrocarbons in Soil", 2001, revised 2008.

TABLE 3: RESIDENTIAL ASSESSMENT GUIDELINES (SELECT PARAMETERS)

Land Use	Exposure Pathway	Fine Grained Soil Guidelines (ug/g) (PHCs)							
		Benzene	Toluene	Ethylbenzene	Xylenes	PHC (F1)	PHC (F2)	PHC (F3)	PHC (F4)
Residential (≤ 1.5 m depth)	Soil Ingestion	11	22000	10000	150000	12000**	6800**	15000**	21000**
	Dermal Contact	25	220000	58000	NA				
	Indoor Vapour Inhalation	**0.21**	2600	1300	320	610	3100	NA	NA
	Ecological Soil Contact	60	**110**	**120**	**65**	**210**	**150**	**1300**	**5600**
	Management Limits	NG	NG	NG	NG	800	1000	3500	10000
Residential (> 1.5 m depth)	Indoor Vapour Inhalation	**0.21**	**2600**	**1300**	**1600**	**610**	3100	NA	NA
	Management Limits	NG	NG	NG	NG	800	**1000**	**3500**	**10000**

Land Use	Exposure Pathway	Soil Guidelines (ug/g) (Metals)***								
		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead
Residential	Direct Contact*	NC	**12**	6800	NC	14	220	NC	1100	**140**
	Indoor Vapour Inhalation	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Ecological Soil Contact	NC	17	NC	NC	**10**	**64**	NC	**63**	300
	Interim Criteria****	**20**	30	**500**	**4**	5	250	**50**	100	500

Land Use	Exposure Pathway	Soil Guidelines (ug/g) (Metals)***									
		Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Tin	Uranium	Vanadium	Zinc
Residential	Direct Contact*	**6.6**	NC	NC	80	NC	**1 (provisional)**	NC	**23**[a]	NC	NG
	Indoor Vapour Inhalation	NC	NC	NC	NC	NC	NC	NC	NC	NC	NG
	Ecological Soil Contact	12	NC	**50**	**1**	NC	1.4	NC	500	**130**	**200**[b]
	Interim Criteria****	2	**10**	100	3	**20**	NG	**50**	NG	200	500

Land Use	Exposure Pathway	Fine Grained Soil Guidelines (ug/g) (VOCs)***					
		1,1,1 Trichoroethane	1,1,2,2 Tetrachlorethane	1,1,2 Trichloroethane	1,1 Dichloroethane	Chlorobenzene	Chloroform (Trichloromethane)
Residential	Interim Soil Quality Criterion****	**5**	**5**	**5**	**5**	**1**	**5**

Land Use	Exposure Pathway	Fine Grained Soil Guidelines (ug/g) (VOCs)***					
		1,1 Dichloroethene	1,2 Dichlorobenzene	1,2 Dichloroethane	1,2 Dichloropropane	Dichloromethane	Tr 1,2-Dichloroethene
Residential	Interim Soil Quality Criterion****	**5**	**1**	**5**	**5**	**5**	**5**

Land Use	Exposure Pathway	Fine Grained Soil Guidelines (ug/g) (VOCs)***				
		1,3 Dichlorobenzene	1,4 Dichlorobenzene	Cis-1,2 Dichloroethene	Styrene	Carbon Tetrachloride (Tetrachloromethane)
Residential	Interim Soil Quality Criterion****	**1**	**1**	**5**	**5**	**5**

Land Use	Exposure Pathway	Fine Grained Soil Guidelines (ug/g) (VOCs)***	
		Tetrachloroethene (PCE)	Trichloroethene (TCE)[c]
Residential	Direct contact*	NG	28
	Inhalation of Indoor Air Check	**0.2**	**0.37**
	Ecological Soil Contact	NC	3
	Interim Soil Quality Criterion ****	5	5
	Ecological Soil Contact (Provisional SQG)	3.8	NG

Land Use	Exposure Pathway	PCBs***
Residential	Soil Contact Guideline	33
	Soil and Food Ingestion	**1.3**
	Interim Soil Quality Criterion****	5

Notes:

* Direct Contact may be a combination and/or the lowest of soil injestion, dermal contact, and particle inhalation.

** Combined values for soil injection and dermal contact for exposure pathway

*** Metals, VOCs (with the exception of TCE), and PCB guidelines are independent of soil grain size or sample depth. Note - parameters with guidelines included in CCME documentation are included in guideline table

**** Interim Criteria based on non-scientific rational. In the case where a scientific defensible value established for an exposure pathway is greater than the interim criteria value, the scientific defensible value will be considered applicable.

[a] Uranium soil ingestion pathway includes cumulative effects of soil ingestion, inhalation, and dermal contact

[b] Zinc ecological soil pathway derived as geometric mean of ecological contact and nutrient cycling check and will supersede Nutrient Cycle Check if Ecological Soil Contact pathway is present.

c Trichloroethylene values are based on fine grained soil guidelines.

- PHC (F1) - volatile petroleum hydrocarbons ($C_6 - C_{10}$)
- PHC (F2) - extractable petroleum hydrocarbons ($C_{10} - C_{16}$)
- PHC (F3) - extractable petroleum hydrocarbons ($C_{16} - C_{34}$)
- PHC (F4) - extractable petroleum hydrocarbons ($C_{34} - C_{50}$)
- ug/g - concentration in micrograms per gram

BOLD – selected guideline

- NA - not applicable, calculated value exceeds 1,000,000 mg/kg
- NC - not calculated
- NG - no guideline available
- CCME EQG Criteria – residential land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines, 1999 (updates to 2013). The benzene concentration is based on one million (10-6) incremental risk of cancer
- CCME CWS PHC Criteria - residential land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) Canada-Wide Standards for Hydrocarbons in Soil, 2001, revised 2008.

TABLE 4: FIELD OBSERVATIONS AND SOIL HEADSPACE TESTING

Test Hole	Total Depth (m)	Max. Soil Vapour Concentration	
		Level (ppm_v)	Depth (m)
TH13-01	6.1	35	2.3
TH13-02	6.1	20	3.8
TH13-03	6.1	90	0.8
TH13-04	6.1	60	0.8
TH13-05	3.0	20	2.3
TH13-06	6.1	75	6.1
TH13-07	6.1	10	2.3
TH13-08	Encountered concrete at 0.6 m		
TH13-09	6.1	30	2.3
TH13-10	6.1	5	2.3 & 6.1
TH13-11	6.1	35	6.1
TH13-12	6.1	5	3
TH13-13	6.1	5	1.5 & 2.3
TH13-14	6.1	20	0.8
TH13-15	6.1	<5	all

Notes:

N/A - not applicable

ppm_v – parts per million combustible vapour

m - metres

TABLE 5: SAMPLE SUBMISSION RATIONALE

Sample ID	Chemical Analysis	APEC	Rationale
TH13-01 @ 2.3m	BTEX, F1-F4 VOCs Metals	APEC 3 Service Garage for police vehicles	Near hydraulic hoist Area of suspected migration (highest vapour reading)
TH13-02 @ 3.8m	BTEX, F1-F4 VOCs Metals	APEC 3 Service Garage for police vehicles	Near hydraulic hoist (highest vapour reading)
TH13-03 @ 0.8m	BTEX, F1-F4 VOCs Metals PCBs	APEC 3 Service Garage for police vehicles	Near hydraulic hoist – shallow soil sample (highest vapour reading)
TH13-03 @ 4.5m	BTEX, F1-F4 VOCs	APEC 3 Service Garage for police vehicles	Near hydraulic hoist – vertical migration if surface issues found
TH13-04 @ 6.1m	BTEX, F1-F4 VOCs	APEC 3 Service Garage for police vehicles	Near floor drain located east of hydraulic hoists. VOCs typically migrate at deeper depths
TH13-05 @ 2.3m	VOCs Metals	APEC 2 Historical printing company	Shallow soil sample (highest vapour reading)
TH13-06 @ 2.3m	BTEX, F1-F4 VOCs Metals	APEC 1 Historical auto service station	In Silt layer – area of suspected migration
TH13-06 @ 6.1m	BTEX, F1-F4 VOCs Metals	APEC 1 Historical auto service station	Vertical migration if surface issues found and VOCs typically migrate at deeper depths (highest vapour reading)
TH13-07 @ 1.5m	BTEX, F1-F4 VOCs Metals	APEC 1 Historical auto service station	Mild hydrocarbon odours encountered in soil sample
TH13-07 @ 2.3m	BTEX, F1-F4 VOCs Metals	APEC 1 Historical auto service station	Silt layer underneath clay layer containing mild hydrocarbon odours (highest vapour reading)
TH13-09 @ 2.3m	BTEX, F1-F4 Grain Size Analysis	APEC 4 Historic and current UST	Mild hydrocarbon odour and grain size analysis for silt layer (highest vapour reading)
TH13-09 @ 3.8m	BTEX, F1-F4 Grain Size Analysis	APEC 4 Historic and current UST	Mild hydrocarbon odour and grain size analysis for typical clay located on Site.
TH13-09 @ 6.1m	BTEX, F1-F4	APEC 4 Historic and current UST	Soil sample for historic PHCs migration
TH13-10 @ 4.5m	BTEX, F1-F4	APEC 4 Historic and current UST	Mild hydrocarbon odour, base of previous excavation for tank removal
TH13-11 @ 6.1m	BTEX, F1-F4	APEC 4 Historic and current UST	Historic migration for historical UST (highest vapour reading)
TH13-12 @ 3.8m	BTEX, F1-F4	APEC 4 Historic and current UST	Determine if migration of PHCs into street
TH13-13 @ 2.3m	BTEX, F1-F4 Grain Size Analysis	APEC 4 Historic and current UST	Silt layer – area of suspected migration (highest vapour reading)
TH13-14 @ 0.8m	Metals	APEC 6 Historic automotive manufacturing	Surface soil sample for metals
TH13-14 @ 4.5m	BTEX, F1-F4 VOCs	APEC 6 Historic automotive manufacturing	Clay layer, VOCs typically migrate at deeper depths
TH13-15 @ 1.5m	BTEX, F1-F4 Metals	APEC 5 Historic Auto Wrecking company	Clay layer underlaying granular fill
TH13-15 @ 6.1 m	VOCs	APEC 5 Historic Auto Wrecking company	VOCs typically migrate at deeper depths.

Notes:

N/A - not applicable

ppm_v – parts per million combustible vapour

m - metres

TABLE 6: SOIL ANALYTICAL RESULTS - PHCs

Sample ID	Depth (m)	Soil Vapour Concentration (ppm_v)	Benzene (µg/g)	Toluene (µg/g)	Ethylbenzene (µg/g)	Xylenes (µg/g)	PHC F1 (µg/g)	PHC F2 (µg/g)	PHC F3 (µg/g)	PHC F4 (µg/g)
TH13-03 @ 0.8m	0.8	90	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH13-07 @ 1.5m	1.5	<5	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH13-15 @ 1.5m	1.5	<5	0.026	< 0.03	< 0.01	< 0.03	< 5.0	< 30	157	34
CCME Commercial EQG (<1.5m depth)			**0.28**	**330**	**430**	**230**	**NG**	**NG**	**NG**	**NG**
CCME Commercial CWS PHC – fine grained soils (<1.5m depth below grade)							**320**	**260**	**2500**	**6600**
CCME Residential EQG (<1.5m depth)			**0.21**	**110**	**120**	**65**	**NG**	**NG**	**NG**	**NG**
CCME Residential CWS PHC – fine grained soils (<1.5m depth below grade)							**210**	**150**	**1300**	**5600**
TH13-01 @ 2.3m	2.3	35	0.068	0.09	0.01	0.04	< 5.0	< 30	91	< 30
TH13-02 @ 3.8m	3.8	20	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH13-03 @ 4.5m	4.5	70	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	45	< 30
TH13-04 @ 6.1m	6.1	35	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	48	< 30
TH13-06 @ 2.3m	2.3	25	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH13-06 @ 6.1m	6.1	75	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	54	< 30
TH13-07 @ 2.3m	2.3	10	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH13-09 @ 2.3m	2.3	30	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH13-09 @ 3.8m	3.8	<5	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH13-09 @ 6.1m	6.1	25	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	76	< 30
TH13-10 @ 4.5m	4.5	<5	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH13-11 @ 6.1m	6.1	35	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH13-12 @ 3.8m	3.8	<5	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH13-13 @ 2.3m	2.3	5	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	< 30	< 30
TH13-14 @ 4.5m	4.5	15	< 0.005	< 0.03	< 0.01	< 0.03	< 5.0	< 30	40	< 30
CCME Commercial EQG (>1.5m depth)			**0.29**	**13000**	**6700**	**1600**	**NG**	**NG**	**NG**	**NG**
CCME Commercial CWS PHC – fine grained soils (>1.5m depth below grade)							**800**	**1000**	**5000**	**10000**
CCME Residential EQG (>1.5m depth)			**0.21**	**2600**	**1300**	**1600**	**NG**	**NG**	**NG**	**NG**
CCME Residential CWS PHC – fine grained soils (>1.5m depth below grade)							**610**	**1000**	**3500**	**10000**

Notes:

- ppm_v – parts per million organic vapour
- (µg/g) – micrograms per gram
- **BOLD** – exceeds the commercial and residential referenced guideline
- **BOLD** – exceeds the residential referenced guideline
- NG - No Guideline
- PHC FI – volatile petroleum hydrocarbons (C_6-C_{10})
- PHC F2 – extractable petroleum hydrocarbons (C_{10}-C_{16})
- PHC F3 – extractable petroleum hydrocarbon (C_{16}-C_{34})
- PHC F4 – extractable petroleum hydrocarbons (C_{34}-C_{50})
- < - less than the method detection limit
- CCME EQG Criteria – commercial and residential land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines, 1999 (updated to 2013).

The benzene concentration is based on one million (10^6) incremental risk of cancer.

- CCME CWS PHC Criteria - commercial and residential land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) Canada-Wide Standards for Hydrocarbons in Soil, 2001, revised 2008.
- See laboratory report for detection limits, testing protocols and QA/QC procedures. Laboratory analysis was performed by AMEC Laboratory.

TABLE 7: SOIL ANALYTICAL RESULTS - Metals

Parameter	Units	TH13-01 @ 2.3m	TH13-02 @ 3.8m	TH13-03 @ 0.8m	TH13-05 @ 2.3m	TH13-06 @ 2.3m	TH13-06 @ 6.1m	TH13-07 @ 1.5m	TH13-07 @ 2.3m	TH13-14 @ 0.8m	TH13-15 @ 1.5m	CCME COMMERICAL EQG	CCME RESIDENTIALEQG
Antimony	µg/g (ppm)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	**40**	**20**
Aluminum	µg/g (ppm)	12700	10300	12200	11500	3560	12900	17300	3300	19000	11700	**NG**	**NG**
Arsenic	µg/g (ppm)	4.3	10.4	5.3	6.1	1.3	5.5	6.1	1.4	4.2	4.7	**12**	**12**
Barium	µg/g (ppm)	**2020**	102	291	464	30	150	141	32	112	113	**2000**	**500**
Beryllium	µg/g (ppm)	0.7	0.6	0.7	0.7	0.1	0.7	0.6	0.1	0.7	0.5	**8**	**4**
Cadmium	µg/g (ppm)	0.3	0.4	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**22**	**10**
Calcium	µg/g (ppm)	28800	28900	30500	25100	112000	28900	46400	98800	10200	60900	**NG**	**NG**
Chromium	µg/g (ppm)	22.3	17.2	22.3	20.6	7	22.8	23.2	6.6	26.4	19.5	**87**	**64**
Cobalt	µg/g (ppm)	12.1	10.8	10.4	10.6	2.5	12	10	2.5	11.8	8.5	**300**	**50**
Copper	µg/g (ppm)	29.5	29.6	25.6	26.1	6.3	23.8	23.1	5.8	21.5	19.3	**91**	**63**
Iron	µg/g (ppm)	24200	23900	25200	24000	5310	23700	22500	5170	24600	18400	**NG**	**NG**
Lead	µg/g (ppm)	10.5	9.8	43	9.1	2.7	10.5	9.3	2.8	10.4	15.9	**260**	**140**
Magnesium	µg/g (ppm)	10800	10200	12400	10500	58800	12100	16700	51100	9610	23800	**NG**	**NG**
Manganese	µg/g (ppm)	487	265	310	288	151	294	278	127	406	318	**NG**	**NG**
Mercury	µg/g (ppm)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**24**	**6.6**
Molybdenum	µg/g (ppm)	0.9	0.8	0.7	0.9	< 0.5	0.8	0.6	< 0.5	0.5	< 0.5	**40**	**10**
Nickel	µg/g (ppm)	32.6	25.5	28.4	28.9	6	31.6	25.4	5.9	31.4	21.5	**50**	**50**
Phosphorus	µg/g (ppm)	434	425	390	406	252	419	385	219	297	469	**NG**	**NG**
Potassium	µg/g (ppm)	3670	2700	3470	3140	1240	3400	4910	1160	4930	3760	**NG**	**NG**
Selenium	µg/g (ppm)	< 0.5	< 0.5	0.6	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	**2.9**	**1**
Sodium	µg/g (ppm)	977	836	861	820	2640	1060	4030	2380	2070	1240	**NG**	**NG**
Silver	µg/g (ppm)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**40**	**20**
Thallium	µg/g (ppm)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	**1**	**1**
Tin	µg/g (ppm)	< 0.5	< 0.5	0.6	< 0.5	< 0.5	< 0.5	0.5	< 0.5	0.6	1.2	**300**	**50**
Vanadium	µg/g (ppm)	30.6	24.6	29.6	28.4	9.6	30.3	34.5	8.9	31.3	29.5	**130**	**130**
Uranium	µg/g (ppm)	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	**33**	**23**
Zinc	µg/g (ppm)	71.8	65.6	86	67.5	12.9	68.8	55.5	13.5	66.2	52.1	**360**	**200**

Notes:

- < - less than the method detection limit
- * Analysis not performed by AMEC
- NG – not applicable/no guideline criteria established.
- **BOLD** – exceeds the commerical and residential referenced guideline
- **BOLD** – exceeds the residential referenced guideline
- CCME EQG Criteria – commercial land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) "Canadian Environmental Quality Guidelines", 1999 (updates to 2013)
- See laboratory report for detection limits, testing protocols and QA/QC procedures.
- Analysis was performed by AMEC Chemistry lab in Edmonton.

TABLE 8: SOIL ANALYTICAL RESULTS - VOCs

Parameter	Units	TH13-01 @ 2.3m	TH13-02 @ 3.8m	TH13-03 @ 0.8m	TH13-03 @ 4.5m	TH13-04 @ 6.1m	TH13-05 @ 2.3m	TH13-06 @ 2.3m	TH13-06 @ 6.1m	TH13-07 @ 1.5m	TH13-07 @ 2.3m	TH13-14 @ 4.5m	TH13-15 @ 6.1m	CCME COMMERCIAL EQG	CCME RESIDENTIAL EQG
Chloromethane	µg/g (ppm)	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	NG	NG
Vinyl Chloride	µg/g (ppm)	< 0.00034	< 0.00034	< 0.00034	< 0.00034	< 0.00034	< 0.00034	< 0.00034	< 0.00034	< 0.00034	< 0.00034	< 0.00034	< 0.00034	NG	NG
Bromomethane	µg/g (ppm)	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	NG	NG
Chloroethane	µg/g (ppm)	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	NG	NG
Trichlorofluoromethane	µg/g (ppm)	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	< 0.08	NG	NG
1,1-Dichloroethene	µg/g (ppm)	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	50	5
Dichloromethane	µg/g (ppm)	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	50	5
Tr-1,2-dichloroethene	µg/g (ppm)	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	50	5
1,1-Dichloroethane	µg/g (ppm)	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	50	5
Cis-1,2-dichloroethene	µg/g (ppm)	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	50	5
Chloroform	µg/g (ppm)	< 0.00060	< 0.00060	< 0.00060	< 0.00060	< 0.00060	< 0.00060	< 0.00060	< 0.00060	< 0.00060	< 0.00060	< 0.00060	< 0.00060	50	5
1,1,1-Trichloroethane	µg/g (ppm)	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	50	5
Carbon Tetrachloride	µg/g (ppm)	< 0.00030	< 0.00030	< 0.00030	< 0.00030	< 0.00030	< 0.00030	< 0.00030	< 0.00030	< 0.00030	< 0.00030	< 0.00030	< 0.00030	50	5
Benzene	µg/g (ppm)	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	0.28/0.29	0.21
1,2-Dichloroethane	µg/g (ppm)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	50	5
Trichloroethene (TCE)	µg/g (ppm)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.92	0.37
1,2-Dichloropropane	µg/g (ppm)	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	50	5
Bromodichloromethane	µg/g (ppm)	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	NG	NG
Cis-1,3-dichloropropene	µg/g (ppm)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	NG	NG
Toluene	µg/g (ppm)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	230/13000	110/2600
Tr-1,3-dichloropropene	µg/g (ppm)	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	NG	NG
1,1,2-Trichloroethane	µg/g (ppm)	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	< 0.065	50	5
Tetrachloroethene (PCE)	µg/g (ppm)	< 0.035	< 0.035	< 0.035	< 0.035	< 0.035	< 0.035	< 0.035	< 0.035	< 0.035	< 0.035	< 0.035	< 0.035	0.5	0.2
Dibromochloromethane	µg/g (ppm)	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07	NG	NG
Chlorobenzene	µg/g (ppm)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	10	1
Ethylbenzene	µg/g (ppm)	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	430/6700	120/2600
m+p-Xylene	µg/g (ppm)	< 0.085	< 0.085	< 0.085	< 0.085	< 0.085	< 0.085	< 0.085	< 0.085	< 0.085	< 0.085	< 0.085	< 0.085	Total 230/1600	Total 65/1600
o-Xylene	µg/g (ppm)	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045		
Styrene	µg/g (ppm)	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	< 0.045	50	5
Bromoform	µg/g (ppm)	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	NG	NG
1,1,2,2 Tetrachloroethane	µg/g (ppm)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	50	5
1,3-Dichlorobenzene	µg/g (ppm)	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	10	1
1,4-Dichlorobenzene	µg/g (ppm)	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	10	1
1,2-Dichlorobenzene	µg/g (ppm)	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	10	1

Notes:

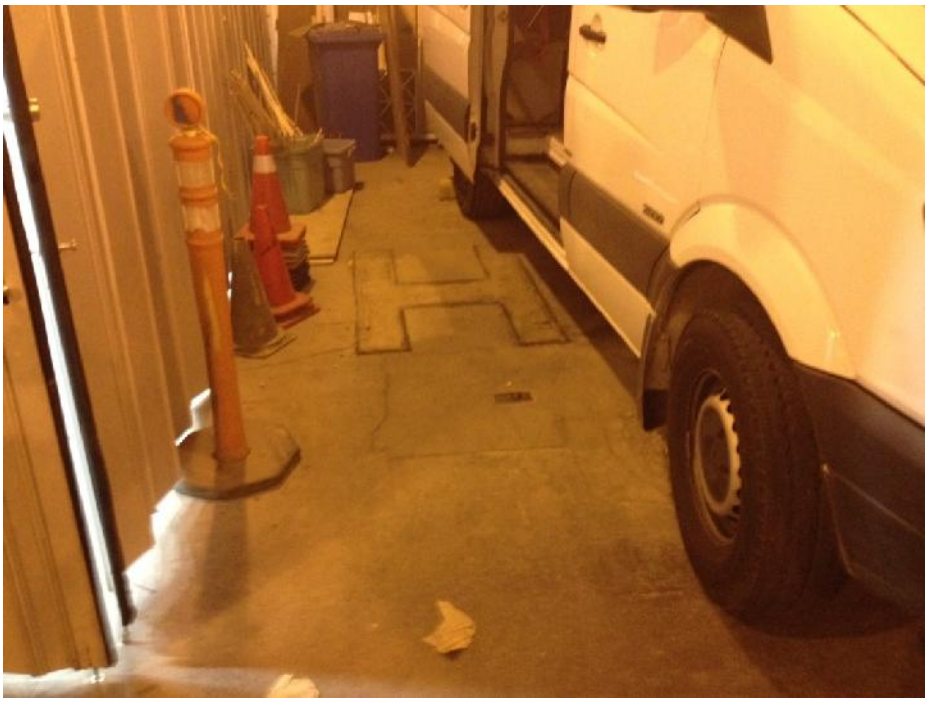
- **BOLD** – exceeds the referenced guideline
- NG - No Guideline
- < - less than the method detection limit
- CCME EQG Criteria – commercial and residential land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) "Canadian Environmental Quality Guidelines", 1999 (updates 2013)
- See laboratory report for detection limits, testing protocols and QA/QC procedures. Laboratory analysis was performed by AMEC Laboratory.

TABLE 9: SOIL ANALYTICAL RESULTS - PCBs				
Parameter	**Units**	TH13-03 @ 0.8m	**CCME COMMERCIAL EQG**	**CCME RESIDENTIAL EQG**
PCBs	µg/g (ppm)	< 0.05	**33**	**1.3**

Notes:

- **BOLD** – exceeds the commercial and residential referenced guideline
- **BOLD** – exceeds the residential referenced guideline
- NG - No Guideline
- < - less than the method detection limit
- CCME EQG Criteria – commercial and residential land use criteria as outlined in the Canadian Council of the Ministers of the Environment (CCME) “Canadian Environmental Quality Guidelines”, 1999 (updates to 2013)
- See laboratory report for detection limits, testing protocols and QA/QC procedures. Laboratory analysis was performed by AMEC - Edmonton

APPENDIX C
SITE PHOTOGRAPHS



PHOTOGRAPH 1: The inferred former hydraulic joist. TH13-01 was advanced near this location.

PHOTOGRAPH 2: The floor drain located within the basement of the parkade. TH13-04 was advanced near this location.

PHOTOGRAPH 3: Historic monitoring well located by the current UST.

PHOTOGRAPH 4: The drilling of TH13-10.

PHOTOGRAPH 5: The drilling of TH13-14 located on James Avenue.

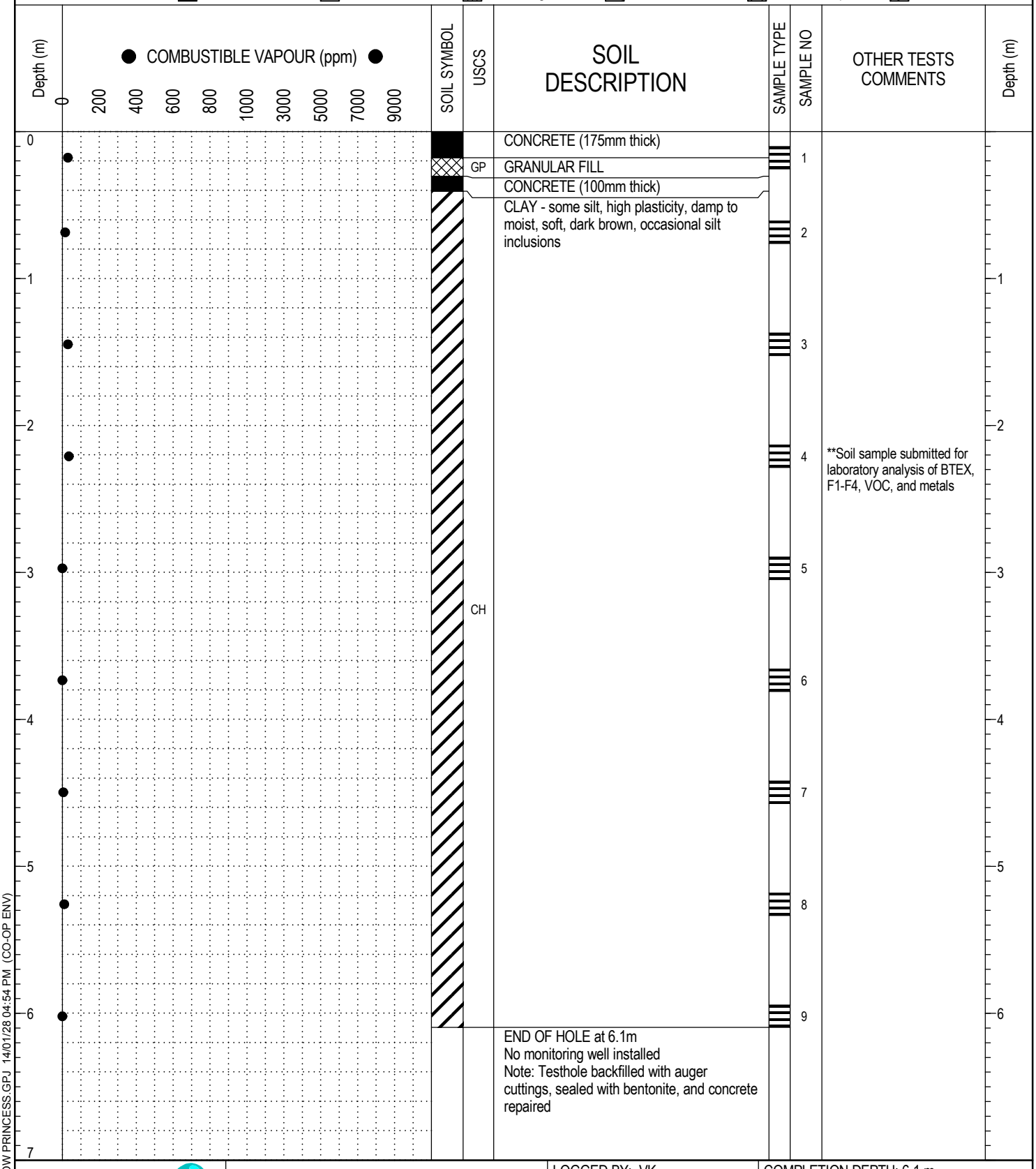
PHOTOGRAPH 6: The drilling of TH13-15 within the flower bed in the south west of the Site.

APPENDIX D
TEST HOLE LOGS

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-01**
CLIENT: City of Winnipeg	DRILL RIG: B20 Cricket Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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



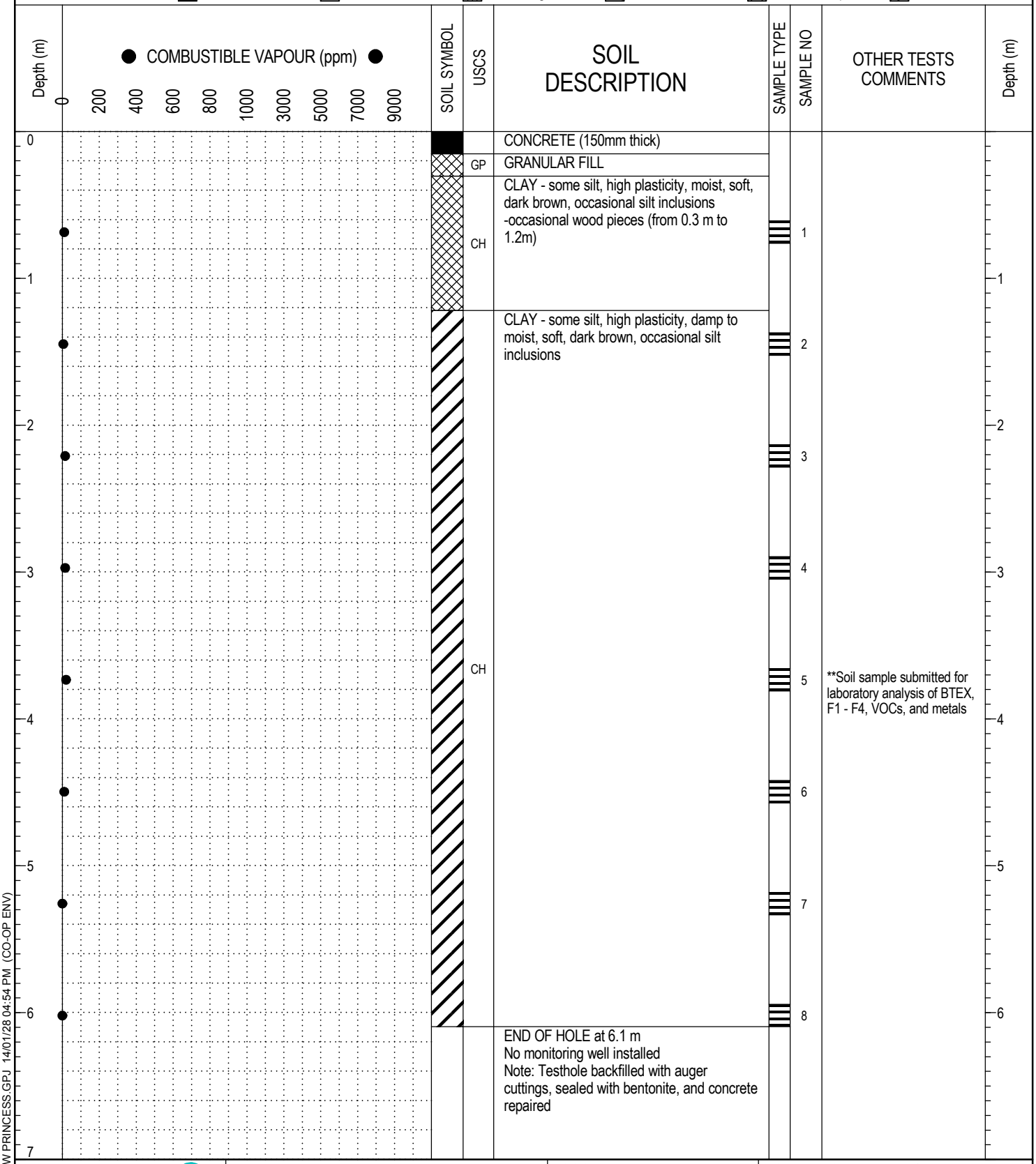
amec	**AMEC Environment & Infrastructure Winnipeg, Manitoba**	LOGGED BY: VK	COMPLETION DEPTH: 6.1 m
		REVIEWED BY: PC	COMPLETION DATE: December 2, 2013
			Page 1 of 1

17293 - COW PRINCESS.GPJ 14/01/28 04:54 PM (CO-OP ENV)

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-02**
CLIENT: City of Winnipeg	DRILL RIG: B20 Cricket Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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



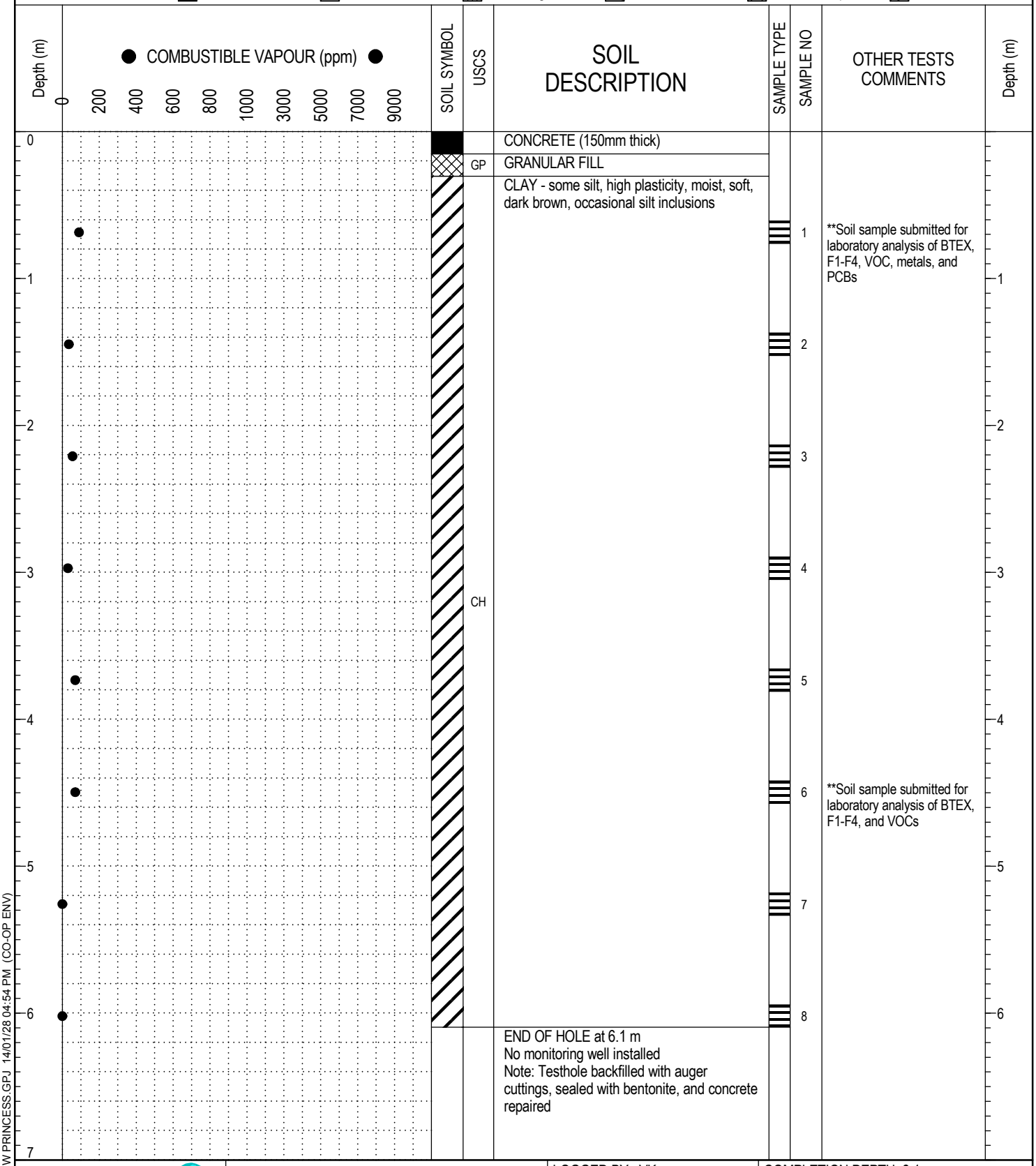
amec	**AMEC Environment & Infrastructure Winnipeg, Manitoba**	LOGGED BY: VK	COMPLETION DEPTH: 6.1 m
		REVIEWED BY: PC	COMPLETION DATE: December 2, 2013
			Page 1 of 1

17293 - COW PRINCESS.GPJ 14/01/28 04:54 PM (CO-OP ENV)

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-03**
CLIENT: City of Winnipeg	DRILL RIG: B20 Cricket Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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



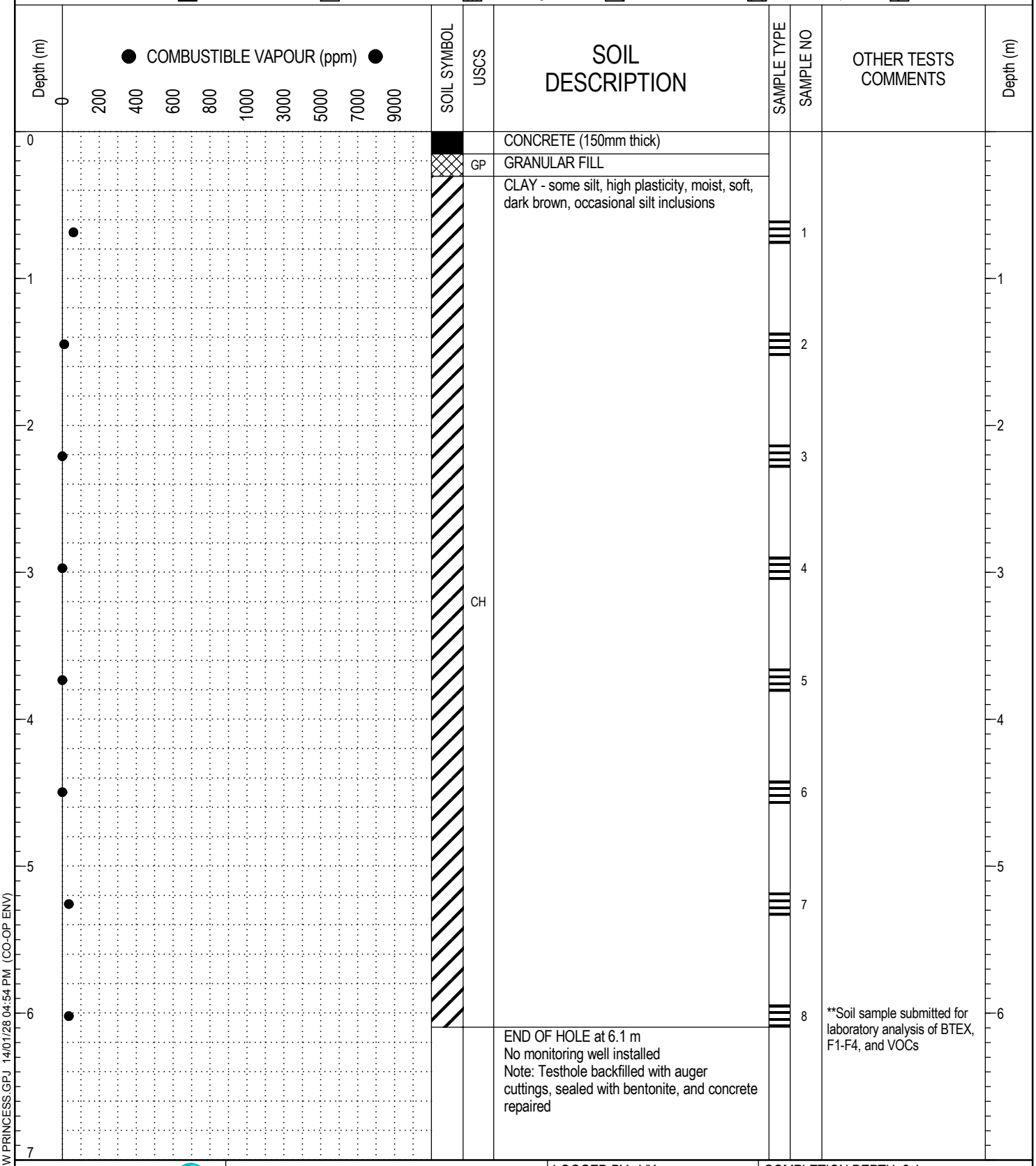
amec	**AMEC Environment & Infrastructure Winnipeg, Manitoba**	LOGGED BY: VK	COMPLETION DEPTH: 6.1 m
		REVIEWED BY: PC	COMPLETION DATE: December 2, 2013
			Page 1 of 1

17293 - COW PRINCESS.GPJ 14/01/28 04:54 PM (CO-OP ENV)

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-04**
CLIENT: City of Winnipeg	DRILL RIG: B20 Cricket Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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



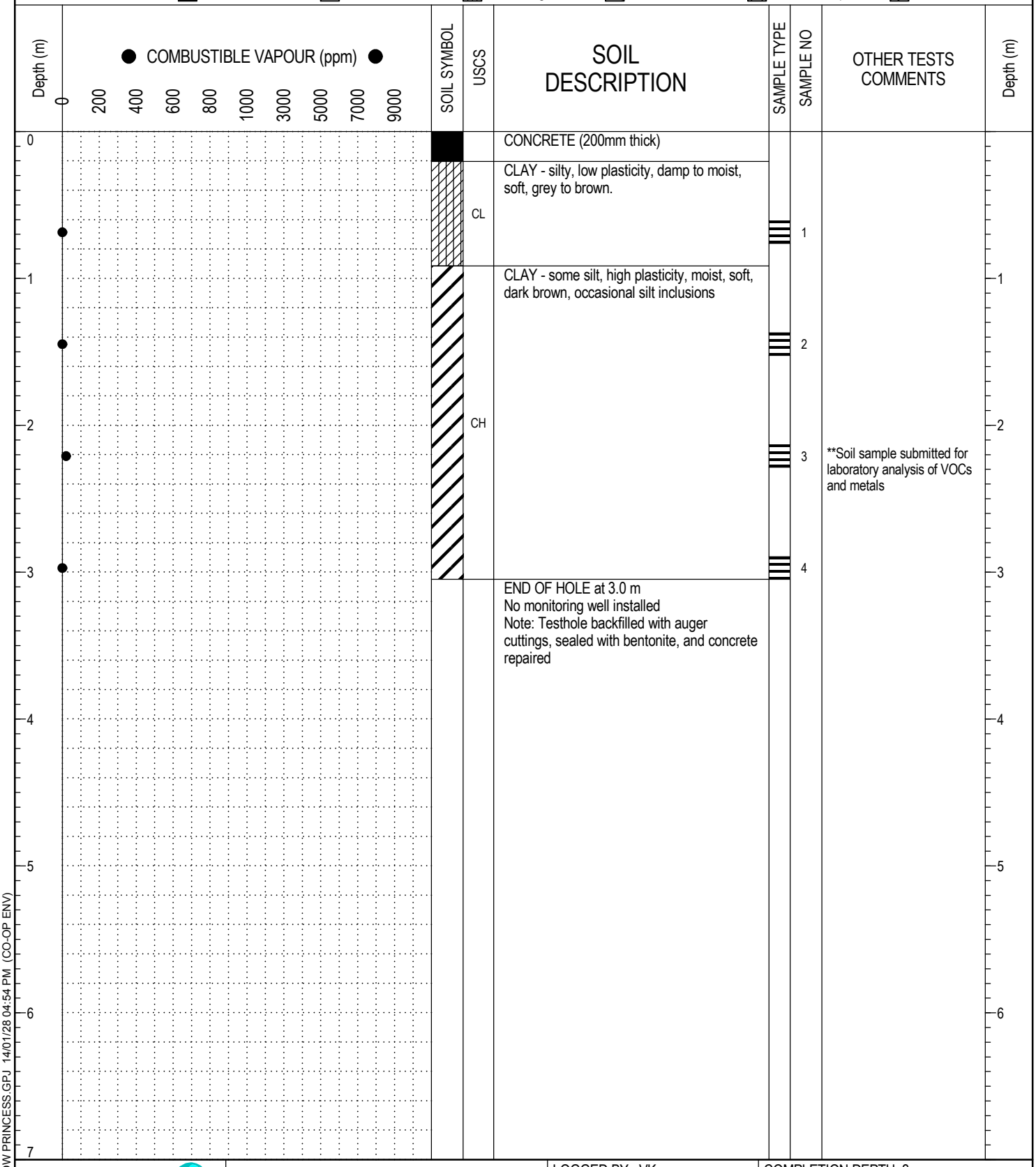
AMEC Environment & Infrastructure **Winnipeg, Manitoba**	LOGGED BY: VK	COMPLETION DEPTH: 6.1 m
	REVIEWED BY: PC	COMPLETION DATE: December 2, 2013
		Page 1 of 1

17293 - COW PRINCESS.GPJ 14/01/28 04:54 PM (CO-OP ENV)

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-05**
CLIENT: City of Winnipeg	DRILL RIG: B20 Cricket Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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



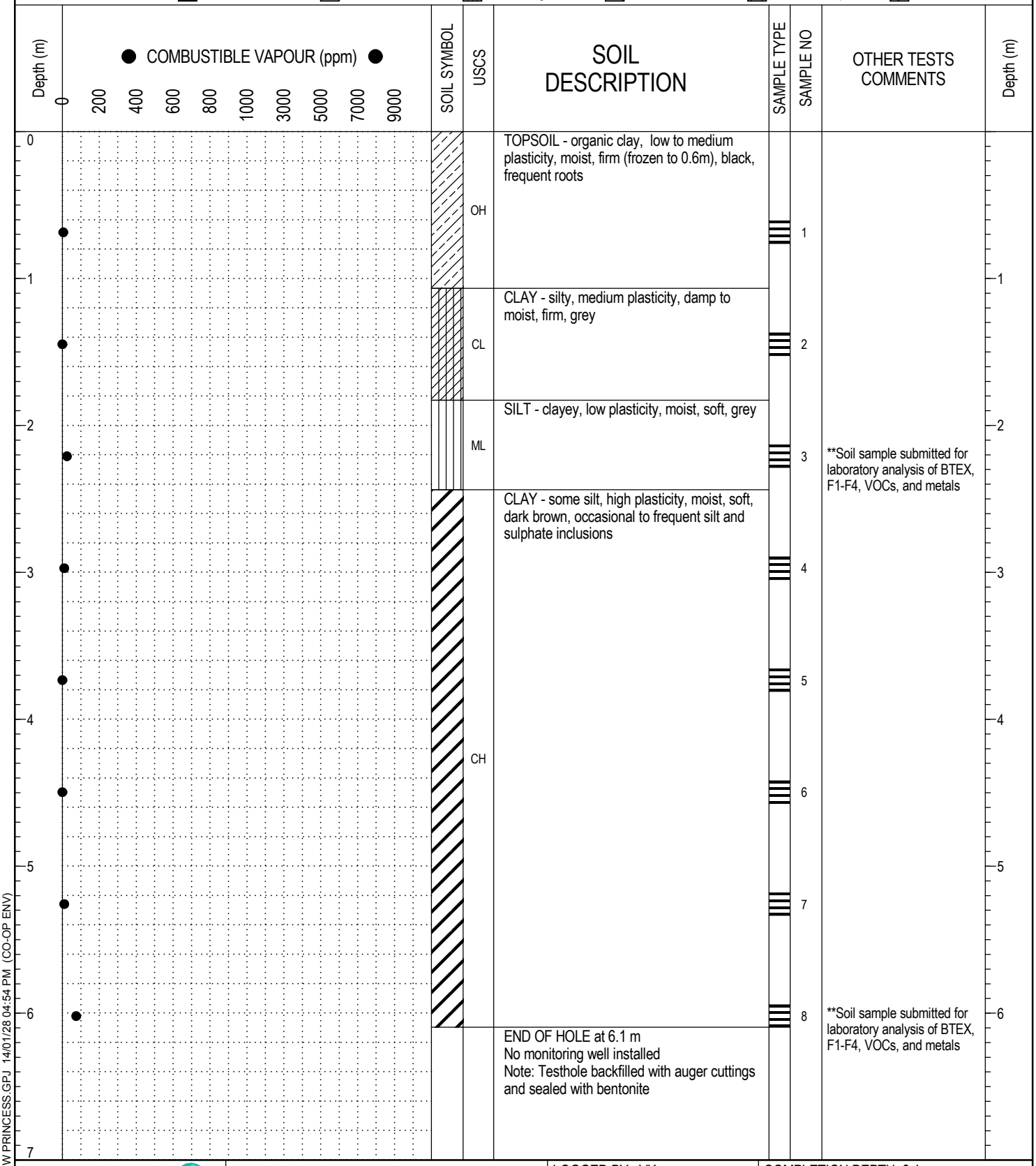
AMEC Environment & Infrastructure Winnipeg, Manitoba	LOGGED BY: VK	COMPLETION DEPTH: 3 m
	REVIEWED BY: PC	COMPLETION DATE: December 2, 2013
		Page 1 of 1

17293 - COW PRINCESS.GPJ 14/01/28 04:54 PM (CO-OP ENV)

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-06**
CLIENT: City of Winnipeg	DRILL RIG: B40 Truck Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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



amec	**AMEC Environment & Infrastructure Winnipeg, Manitoba**	LOGGED BY: VK
		REVIEWED BY: PC
		COMPLETION DEPTH: 6.1 m
		COMPLETION DATE: December 3, 2013

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-07**
CLIENT: City of Winnipeg	DRILL RIG: B40 Truck Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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

COMBUSTIBLE VAPOUR (ppm): 0, 200, 400, 600, 800, 1000, 3000, 5000, 7000, 9000

Depth (m)	USCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	OTHER TESTS COMMENTS
0	OH	TOPSOIL - organic clay, low to medium plasticity, moist, firm (frozen to 0.6m), black, frequent roots			
1	SC	SAND & CLAY - low plasticity, moist, soft, brown		1	
	CL	CLAY - silty, medium plasticity, damp to moist, firm, grey -mild hydrocarbon odour at 1.5 m.		2	**Soil sample submitted for laboratory analysis of BTEX, F1-F4, VOCs, and metals
2	ML	SILT - clayey, low plasticity, moist, soft, grey		3	**Soil sample submitted for laboratory analysis of BTEX, F1-F4, VOCs, and metals
3	CH	CLAY - some silt, high plasticity, moist, soft, dark brown, occasional to frequent sulphate inclusions, occasional silt inclusions.		4	
4				5	
				6	
5				7	
6		END OF HOLE at 6.1 m No monitoring well installed Note: Testhole backfilled with auger cuttings and sealed with bentonite		8	
7					

17293 - COW PRINCESS.GPJ 14/01/28 04:54 PM (CO-OP ENV)

amec

AMEC Environment & Infrastructure
Winnipeg, Manitoba

LOGGED BY: VK	COMPLETION DEPTH: 6.1 m
REVIEWED BY: PC	COMPLETION DATE: December 3, 2013

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-08**
CLIENT: City of Winnipeg	DRILL RIG: B40 Truck Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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

Depth (m)	COMBUSTIBLE VAPOUR (ppm) 0 200 400 600 800 1000 3000 5000 7000 9000	SOIL SYMBOL	USCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	OTHER TESTS COMMENTS	Depth (m)
0			OL	TOPSOIL - organic clay, low to medium plasticity, moist, firm (frozen to 0.6m), black, frequent roots				0
				CONCRETE				
1				END OF HOLE at 0.6 m on suspect structure No monitoring well installed Note: Testhole backfilled with auger cuttings Redrilled as TH13-09				1
2								2
3								3
4								4
5								5
6								6
7								

17293 - COW PRINCESS.GPJ 14/01/28 04:54 PM (CO-OP ENV)

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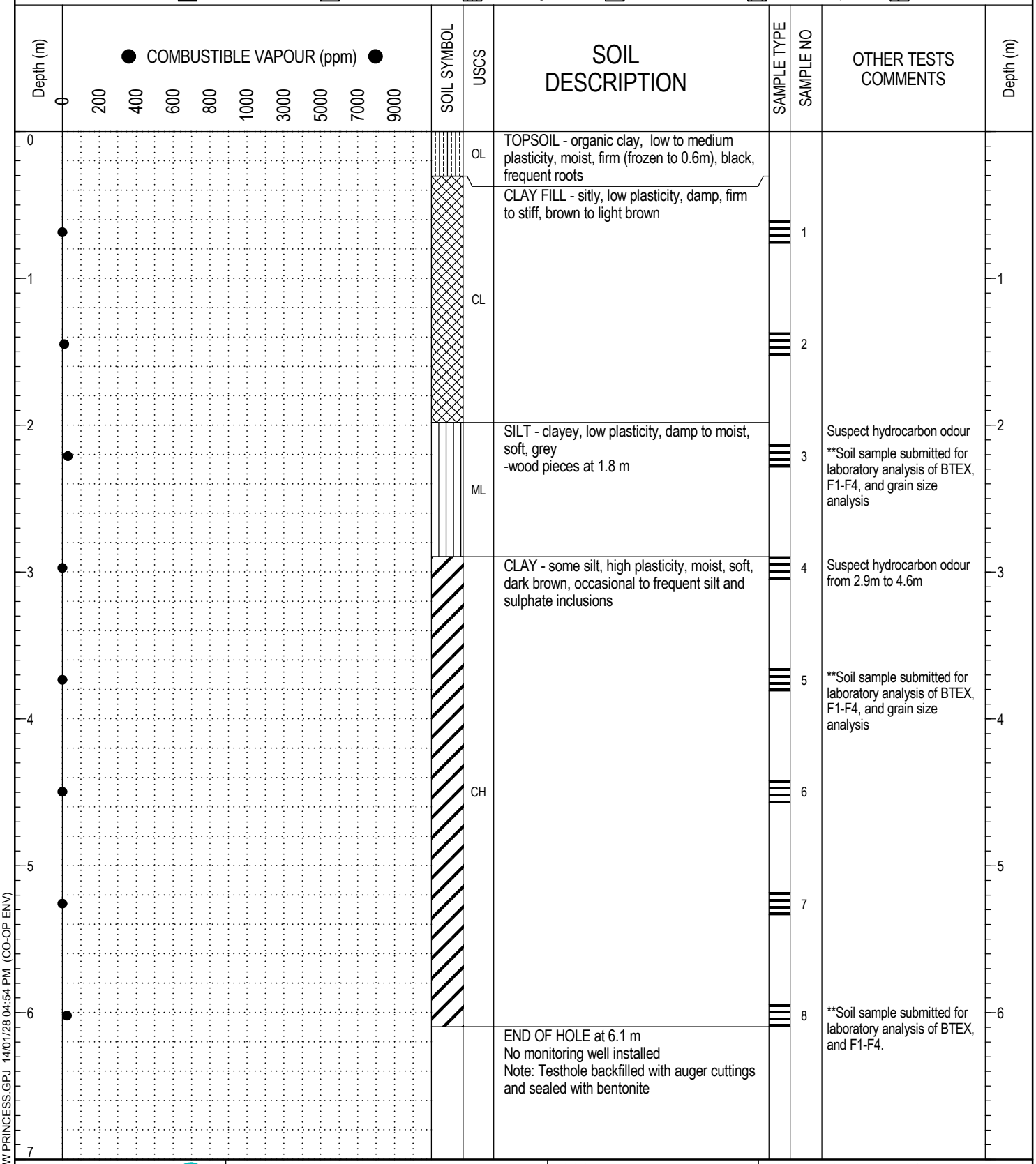
Winnipeg, Manitoba

LOGGED BY: VK	COMPLETION DEPTH: 0.6 m
REVIEWED BY: PC	COMPLETION DATE: December 3, 2013

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-09**
CLIENT: City of Winnipeg	DRILL RIG: B40 Truck Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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



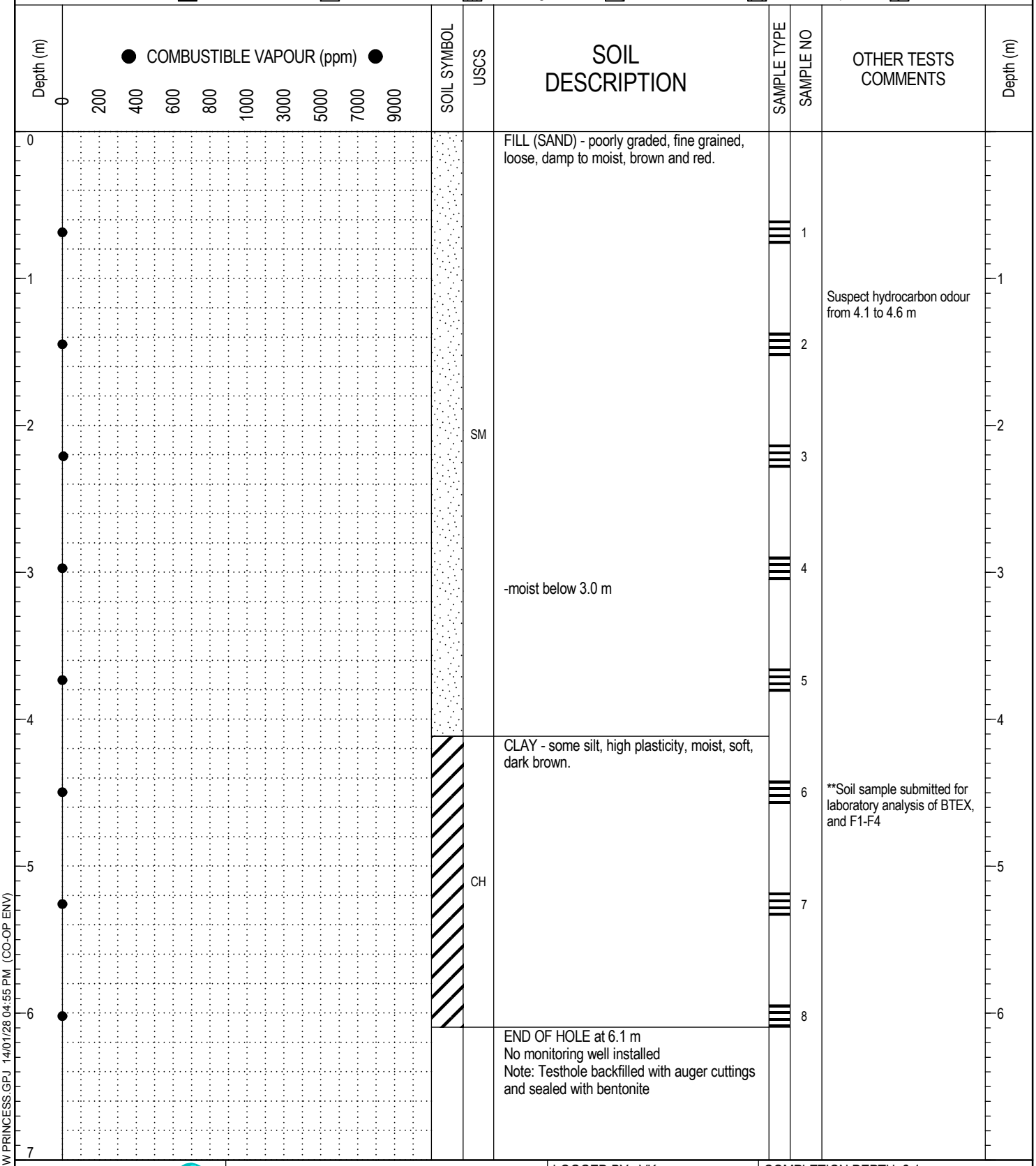
amec	**AMEC Environment & Infrastructure Winnipeg, Manitoba**	LOGGED BY: VK	COMPLETION DEPTH: 6.1 m
		REVIEWED BY: PC	COMPLETION DATE: December 3, 2013
			Page 1 of 1

17293 - COW PRINCESS.GPJ 14/01/28 04:54 PM (CO-OP ENV)

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-10**
CLIENT: City of Winnipeg	DRILL RIG: B40 Truck Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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



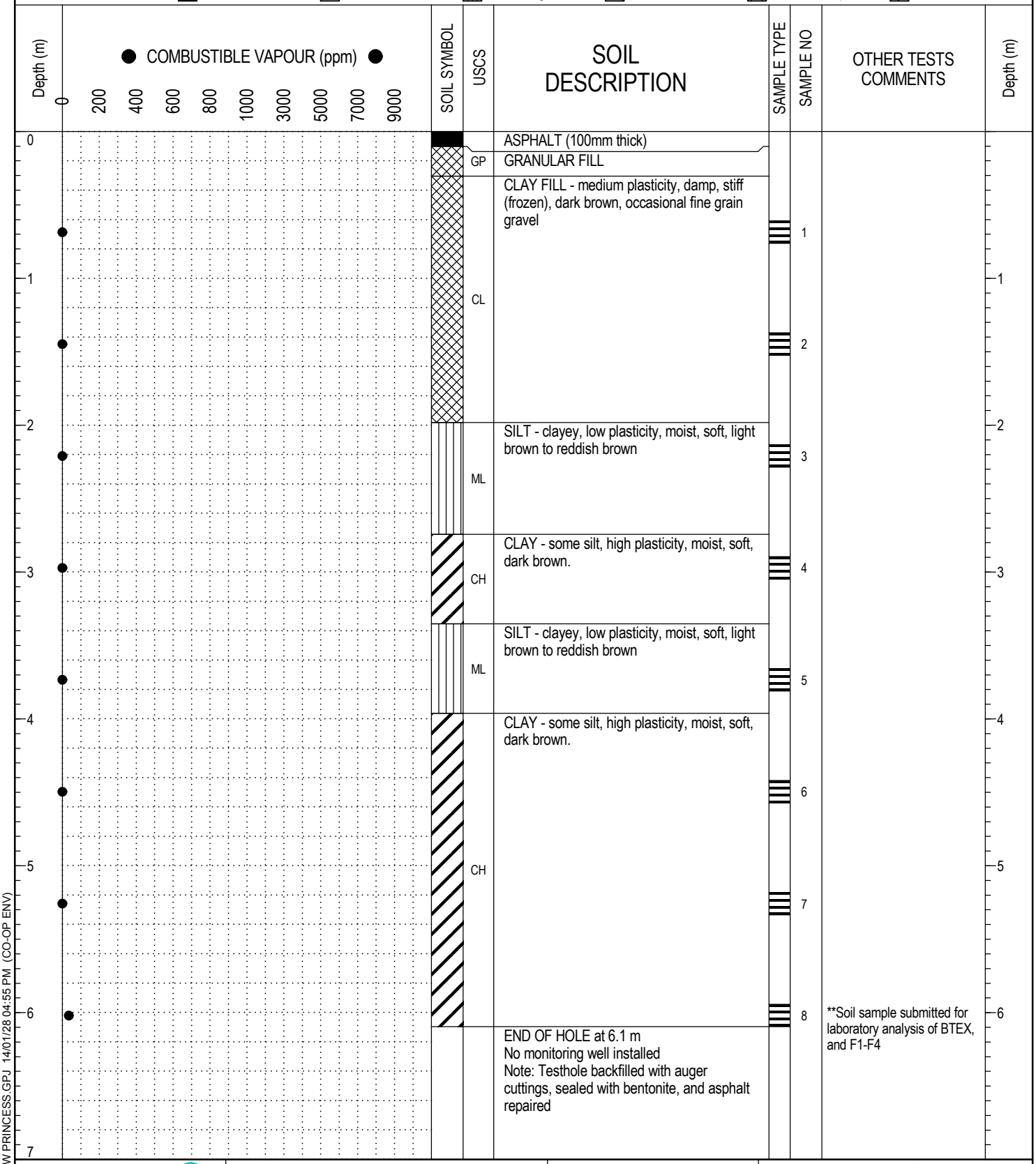
amec	**AMEC Environment & Infrastructure Winnipeg, Manitoba**	LOGGED BY: VK	COMPLETION DEPTH: 6.1 m
		REVIEWED BY: PC	COMPLETION DATE: December 3, 2013
			Page 1 of 1

17293 - COW PRINCESS.GPJ 14/01/28 04:55 PM (CO-OP ENV)

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-11**
CLIENT: City of Winnipeg	DRILL RIG: B40 Truck Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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



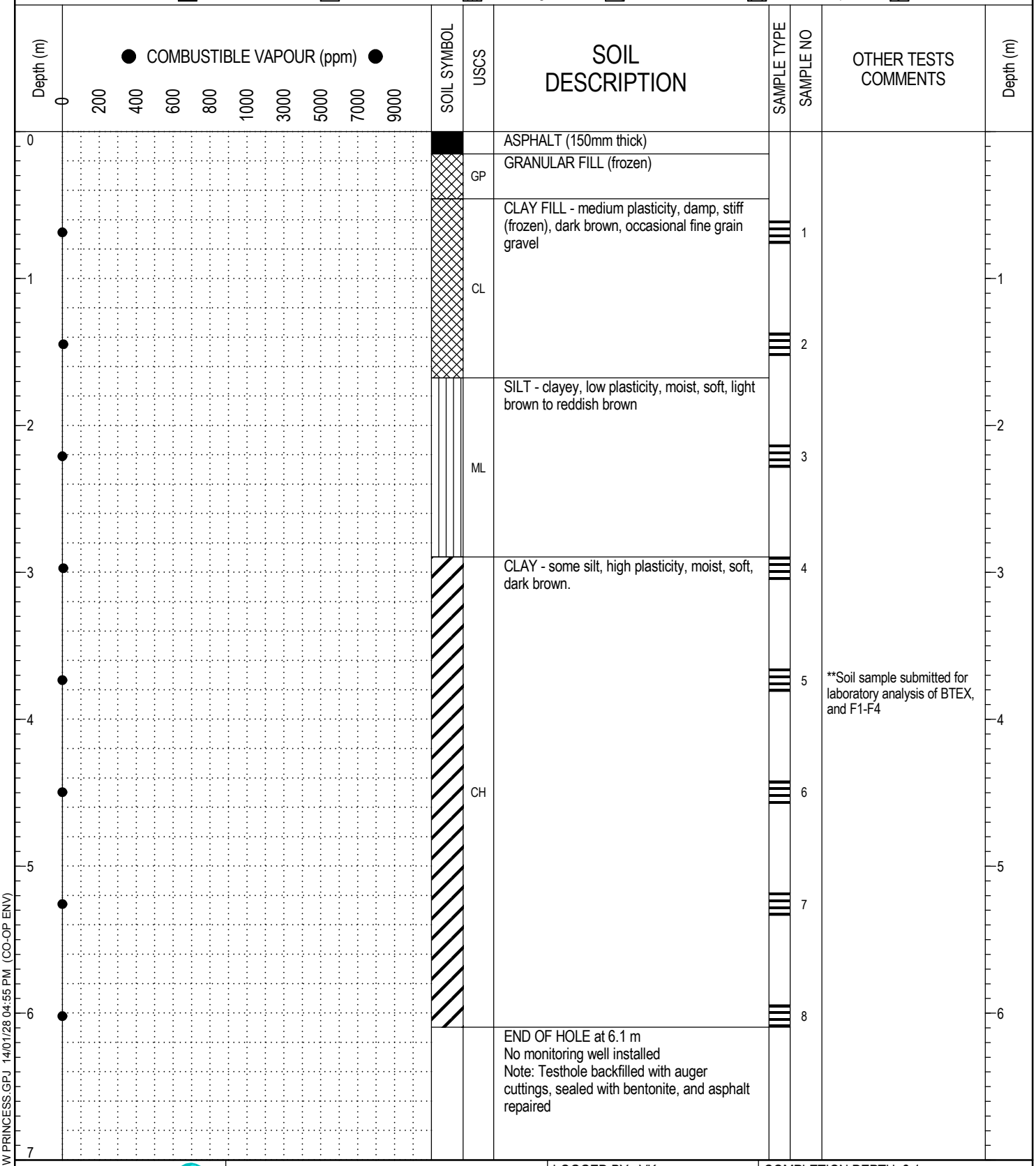
amec	**AMEC Environment & Infrastructure Winnipeg, Manitoba**	LOGGED BY: VK	COMPLETION DEPTH: 6.1 m
		REVIEWED BY: PC	COMPLETION DATE: December 3, 2013
			Page 1 of 1

17293 - COW PRINCESS.GPJ 14/01/28 04:55 PM (CO-OP ENV)

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-12**
CLIENT: City of Winnipeg	DRILL RIG: B40 Truck Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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



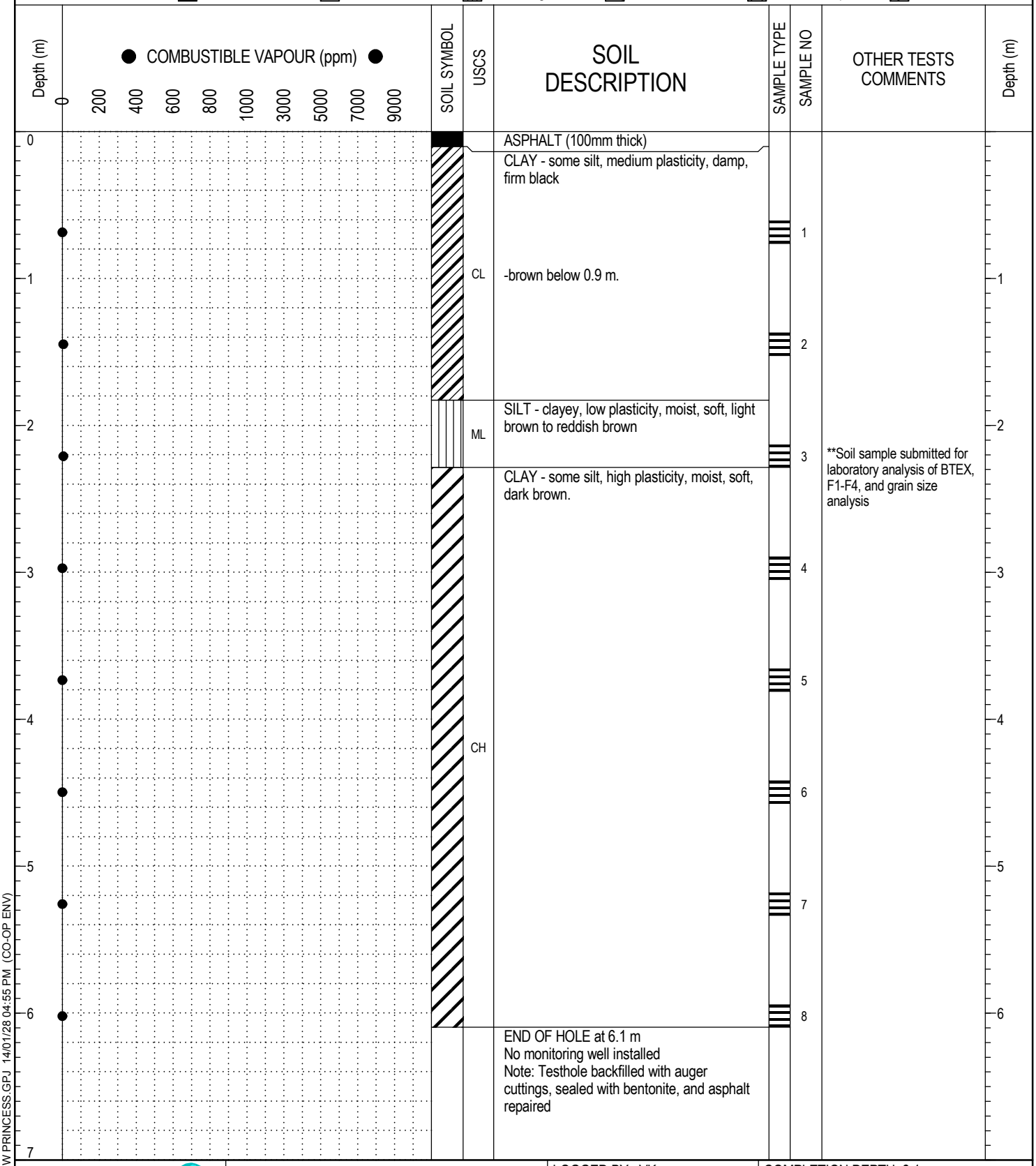
amec	**AMEC Environment & Infrastructure Winnipeg, Manitoba**	LOGGED BY: VK	COMPLETION DEPTH: 6.1 m
		REVIEWED BY: PC	COMPLETION DATE: December 3, 2013
			Page 1 of 1

17293 - COW PRINCESS.GPJ 14/01/28 04:55 PM (CO-OP ENV)

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-13**
CLIENT: City of Winnipeg	DRILL RIG: B40 Truck Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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



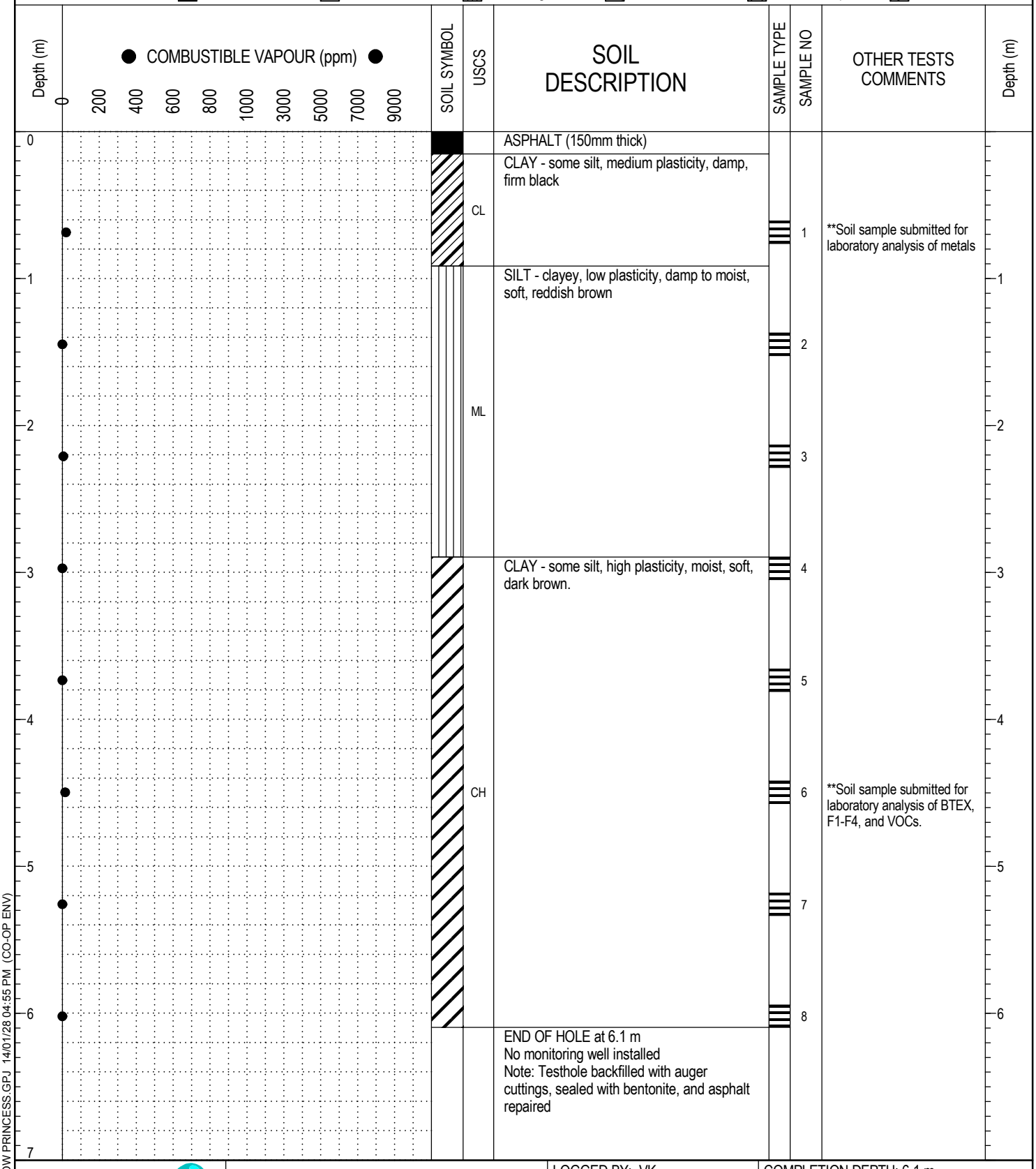
amec	**AMEC Environment & Infrastructure Winnipeg, Manitoba**	LOGGED BY: VK	COMPLETION DEPTH: 6.1 m
		REVIEWED BY: PC	COMPLETION DATE: December 3, 2013
			Page 1 of 1

17293 - COW PRINCESS.GPJ 14/01/28 04:55 PM (CO-OP ENV)

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-14**
CLIENT: City of Winnipeg	DRILL RIG: B40 Truck Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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



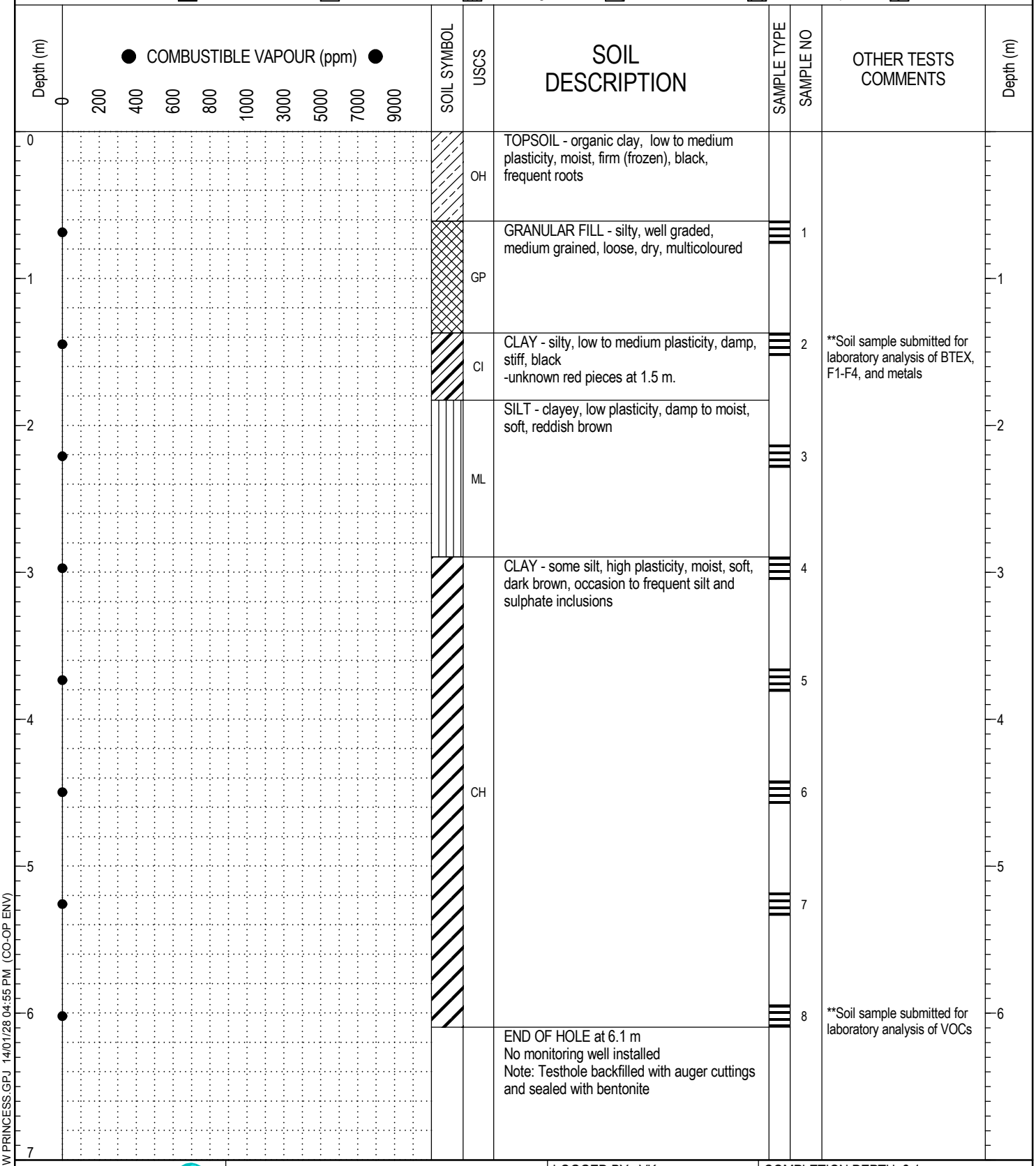
amec	**AMEC Environment & Infrastructure Winnipeg, Manitoba**	LOGGED BY: VK	COMPLETION DEPTH: 6.1 m
		REVIEWED BY: PC	COMPLETION DATE: December 3, 2013
			Page 1 of 1

17293 - COW PRINCESS.GPJ 14/01/28 04:55 PM (CO-OP ENV)

PROJECT: Phase II ESA	DRILLED BY: Maple Leaf Drilling	TEST HOLE NO: **TH13-15**
CLIENT: City of Winnipeg	DRILL RIG: B40 Truck Rig	PROJECT NO: WX17293
LOCATION: 151 & 171 Princess Street	DRILL TYPE: 125mm SSA	ELEVATION:

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

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



amec	**AMEC Environment & Infrastructure Winnipeg, Manitoba**	LOGGED BY: VK	COMPLETION DEPTH: 6.1 m
		REVIEWED BY: PC	COMPLETION DATE: December 3, 2013
			Page 1 of 1

17293 - COW PRINCESS.GPJ 14/01/28 04:55 PM (CO-OP ENV)

APPENDIX E
LABORATORY RESULTS

Final Analytical Report

Attention: Pat Campbell

AMEC Environment & Infrastructure
440 Dovercourt Drive
Winnipeg, MB R3Y 1N4

Results for File: EC-66669

Project Number: WX17293
Project Name: 151 & 171 Princess Street

Date Received: 2013/12/05
Date of Report: 2013/12/12

Report reviewed by:

Jesse Dang, B.Sc.
Manager
Laboratory Services

Kristine Connor
Client Services Representative
Laboratory Services

** All samples will be disposed of after 30 days following analysis. Please contact the lab if you require additional sample storage time. (Samples deemed hazardous will be returned to the client at their own expense or disposal will be arranged.) **

Soil Analysis - Hydrocarbons

Project No. WX17293

Final
File No. EC-66669

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: / Client ID: / Sample Date: / MDL	13-17477 TH13-01 @ 2.3m 2013/12/02 0:00	13-17477-D TH13-01 @ 2.3m Lab Duplicate	13-17478 TH13-02 @ 3.8m 2013/12/02 0:00	13-17479 TH13-03 @ 0.8m 2013/12/02 0:00
AD	2013/12/05	Benzene	µg/g (ppm)	EPA 8260B	0.005	0.068	0.068	< 0.005	< 0.005
AD	2013/12/05	Toluene	µg/g (ppm)	EPA 8260B	0.03	0.09	0.09	< 0.03	< 0.03
AD	2013/12/05	Ethylbenzene	µg/g (ppm)	EPA 8260B	0.01	0.01	0.01	< 0.01	< 0.01
AD	2013/12/05	Total Xylenes	µg/g (ppm)	EPA 8260B	0.03	0.04	0.04	< 0.03	< 0.03
AD	2013/12/05	Surrogate Recovery	%	--	0.1	101	110	109	101
AD	2013/12/05	F1 (C6-C10)	µg/g (ppm)	CCME	5.0	< 5.0	< 5.0	< 5.0	< 5.0
PC	2013/12/05	F2 (EPH C10-C16)	µg/g (ppm)	CCME	30	< 30	< 30	< 30	< 30
PC	2013/12/05	F3 (EPH C16-C34)	µg/g (ppm)	CCME	30	91	72	< 30	< 30
PC	2013/12/05	F4 (EPH C34-C50)	µg/g (ppm)	CCME	30	< 30	< 30	< 30	< 30
PC	2013/12/05	Moisture	%	---	0.5	34.9	34.9	32.8	35.4
AP	2013/12/10	F1 - BTEX	µg/g (ppm)	CCME	5.00	< 5.00	< 5.00	< 5.00	< 5.00

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: / Client ID: / Sample Date: / MDL	13-17480 TH13-03 @ 4.5m 2013/12/02 0:00	13-17481 TH13-04 @ 6.1m 2013/12/02 0:00	13-17483 TH13-06 @ 2.3m 2013/12/02 0:00	13-17484 TH13-06 @ 6.1m 2013/12/02 0:00
AD	2013/12/05	Benzene	µg/g (ppm)	EPA 8260B	0.005	< 0.005	< 0.005	< 0.005	< 0.005
AD	2013/12/05	Toluene	µg/g (ppm)	EPA 8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Ethylbenzene	µg/g (ppm)	EPA 8260B	0.01	< 0.01	< 0.01	< 0.01	< 0.01
AD	2013/12/05	Total Xylenes	µg/g (ppm)	EPA 8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Surrogate Recovery	%	--	0.1	101	111	103	105
AD	2013/12/05	F1 (C6-C10)	µg/g (ppm)	CCME	5.0	< 5.0	< 5.0	< 5.0	< 5.0
PC	2013/12/05	F2 (EPH C10-C16)	µg/g (ppm)	CCME	30	< 30	< 30	< 30	< 30
PC	2013/12/05	F3 (EPH C16-C34)	µg/g (ppm)	CCME	30	45	48	< 30	54
PC	2013/12/05	F4 (EPH C34-C50)	µg/g (ppm)	CCME	30	< 30	< 30	< 30	< 30
PC	2013/12/05	Moisture	%	---	0.5	30.7	32.3	19.1	34.9
AP	2013/12/10	F1 - BTEX	µg/g (ppm)	CCME	5.00	< 5.00	< 5.00	< 5.00	< 5.00

Soil Analysis - Hydrocarbons

Project No. WX17293

Final
File No. EC-66669

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: / Client ID: / Sample Date: / MDL	13-17485 TH13-07 @ 1.5m 2013/12/03 0:00	13-17486 TH13-07 @ 2.3m 2013/12/03 0:00	13-17487 TH13-09 @ 2.3m 2013/12/03 0:00	13-17487-D TH13-09 @ 2.3m Lab Duplicate
AP	2013/12/10	Grain Size	%Fine<75µm	Carter 55.2.3	0.1	---	---	95.7	95.6
AD	2013/12/05	Benzene	µg/g (ppm)	EPA 8260B	0.005	< 0.005	< 0.005	< 0.005	---
AD	2013/12/05	Toluene	µg/g (ppm)	EPA 8260B	0.03	< 0.03	< 0.03	< 0.03	---
AD	2013/12/05	Ethylbenzene	µg/g (ppm)	EPA 8260B	0.01	< 0.01	< 0.01	< 0.01	---
AD	2013/12/05	Total Xylenes	µg/g (ppm)	EPA 8260B	0.03	< 0.03	< 0.03	< 0.03	---
AD	2013/12/05	Surrogate Recovery	%	--	0.1	116	110	111	---
AD	2013/12/05	F1 (C6-C10)	µg/g (ppm)	CCME	5.0	< 5.0	< 5.0	< 5.0	---
PC	2013/12/05	F2 (EPH C10-C16)	µg/g (ppm)	CCME	30	< 30	< 30	< 30	---
PC	2013/12/05	F3 (EPH C16-C34)	µg/g (ppm)	CCME	30	< 30	< 30	< 30	---
PC	2013/12/05	F4 (EPH C34-C50)	µg/g (ppm)	CCME	30	< 30	< 30	< 30	---
PC	2013/12/05	Moisture	%	---	0.5	28.1	17.3	18.3	---
AP	2013/12/10	F1 - BTEX	µg/g (ppm)	CCME	5.00	< 5.00	< 5.00	< 5.00	---

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: / Client ID: / Sample Date: / MDL	13-17488 TH13-09 @ 3.8m 2013/12/03 0:00	13-17489 TH13-09 @ 6.1m 2013/12/03 0:00	13-17490 TH13-10 @ 4.5m 2013/12/03 0:00	13-17491 TH13-11 @ 6.1m 2013/12/03 0:00
AP	2013/12/10	Grain Size	%Fine<75µm	Carter 55.2.3	0.1	99.3	---	---	---
AD	2013/12/05	Benzene	µg/g (ppm)	EPA 8260B	0.005	< 0.005	< 0.005	< 0.005	< 0.005
AD	2013/12/05	Toluene	µg/g (ppm)	EPA 8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Ethylbenzene	µg/g (ppm)	EPA 8260B	0.01	< 0.01	< 0.01	< 0.01	< 0.01
AD	2013/12/05	Total Xylenes	µg/g (ppm)	EPA 8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Surrogate Recovery	%	--	0.1	113	111	109	110
AD	2013/12/05	F1 (C6-C10)	µg/g (ppm)	CCME	5.0	< 5.0	< 5.0	< 5.0	< 5.0
PC	2013/12/05	F2 (EPH C10-C16)	µg/g (ppm)	CCME	30	< 30	< 30	< 30	< 30
PC	2013/12/05	F3 (EPH C16-C34)	µg/g (ppm)	CCME	30	< 30	76	< 30	< 30
PC	2013/12/05	F4 (EPH C34-C50)	µg/g (ppm)	CCME	30	< 30	< 30	< 30	< 30
PC	2013/12/05	Moisture	%	---	0.5	34.6	35.1	24.6	35.0
AP	2013/12/10	F1 - BTEX	µg/g (ppm)	CCME	5.00	< 5.00	< 5.00	< 5.00	< 5.00

Soil Analysis - Hydrocarbons

Project No. WX17293

Final
File No. EC-66669

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: Client ID: Sample Date: MDL	13-17492 TH13-12 @ 3.8m 2013/12/03 0:00	13-17493 TH13-13 @ 2.3m 2013/12/03 0:00	13-17495 TH13-14 @ 4.5m 2013/12/03 0:00	13-17496 TH13-15 @ 1.5m 2013/12/03 0:00
AP	2013/12/10	Grain Size	%Fine<75µm	Carter 55.2.3	0.1	---	95.8	---	---
AD	2013/12/05	Benzene	µg/g (ppm)	EPA 8260B	0.005	< 0.005	< 0.005	< 0.005	0.026
AD	2013/12/05	Toluene	µg/g (ppm)	EPA 8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Ethylbenzene	µg/g (ppm)	EPA 8260B	0.01	< 0.01	< 0.01	< 0.01	< 0.01
AD	2013/12/05	Total Xylenes	µg/g (ppm)	EPA 8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Surrogate Recovery	%	--	0.1	110	115	110	103
AD	2013/12/05	F1 (C6-C10)	µg/g (ppm)	CCME	5.0	< 5.0	< 5.0	< 5.0	< 5.0
PC	2013/12/05	F2 (EPH C10-C16)	µg/g (ppm)	CCME	30	< 30	< 30	< 30	< 30
PC	2013/12/05	F3 (EPH C16-C34)	µg/g (ppm)	CCME	30	< 30	< 30	40	157
PC	2013/12/05	F4 (EPH C34-C50)	µg/g (ppm)	CCME	30	< 30	< 30	< 30	34
PC	2013/12/05	Moisture	%	---	0.5	32.4	17.2	34.8	20.7
AP	2013/12/10	F1 - BTEX	µg/g (ppm)	CCME	5.00	< 5.00	< 5.00	< 5.00	< 5.00

Soil Analysis - Metals

Project No. WX17293

Final
File No. EC-66669

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: Client ID: Sample Date: MDL	13-17477 TH13-01 @ 2.3m 2013/12/02 0:00	13-17478 TH13-02 @ 3.8m 2013/12/02 0:00	13-17479 TH13-03 @ 0.8m 2013/12/02 0:00	13-17482 TH13-05 @ 2.3m 2013/12/02 0:00
AD	2013/12/10	Antimony	µg/g (ppm)	EPA 3050/6010	0.5	< 0.5	< 0.5	< 0.5	< 0.5
AD	2013/12/10	Aluminum	µg/g (ppm)	EPA 3050/6010	5	12700	10300	12200	11500
AD	2013/12/10	Arsenic	µg/g (ppm)	EPA 3050/6010	0.5	4.3	10.4	5.3	6.1
AD	2013/12/10	Barium	µg/g (ppm)	EPA 3050/6010	1	2020	102	291	464
AD	2013/12/10	Beryllium	µg/g (ppm)	EPA 3050/6010	0.1	0.7	0.6	0.7	0.7
AD	2013/12/10	Cadmium	µg/g (ppm)	EPA 3050/6010	0.2	0.3	0.4	< 0.2	< 0.2
AD	2013/12/10	Calcium	µg/g (ppm)	EPA 3050/6010	5	28800	28900	30500	25100
AD	2013/12/10	Chromium	µg/g (ppm)	EPA 3050/6010	0.5	22.3	17.2	22.3	20.6
AD	2013/12/10	Cobalt	µg/g (ppm)	EPA 3050/6010	0.5	12.1	10.8	10.4	10.6
AD	2013/12/10	Copper	µg/g (ppm)	EPA 3050/6010	0.1	29.5	29.6	25.6	26.1
AD	2013/12/10	Iron	µg/g (ppm)	EPA 3050/6010	5	24200	23900	25200	24000
AD	2013/12/10	Lead	µg/g (ppm)	EPA 3050/6010	0.5	10.5	9.8	43.0	9.1
AD	2013/12/10	Magnesium	µg/g (ppm)	EPA 3050/6010	1	10800	10200	12400	10500
AD	2013/12/10	Manganese	µg/g (ppm)	EPA 3050/6010	0.5	487	265	310	288
AD	2013/12/10	Mercury	µg/g (ppm)	EPA 3050/6010	0.2	< 0.2	< 0.2	< 0.2	< 0.2
AD	2013/12/10	Molybdenum	µg/g (ppm)	EPA 3050/6010	0.5	0.9	0.8	0.7	0.9
AD	2013/12/10	Nickel	µg/g (ppm)	EPA 3050/6010	0.5	32.6	25.5	28.4	28.9
AD	2013/12/10	Phosphorus	µg/g (ppm)	EPA 3050/6010	5	434	425	390	406
AD	2013/12/10	Potassium	µg/g (ppm)	EPA 3050/6010	5	3670	2700	3470	3140
AD	2013/12/10	Selenium	µg/g (ppm)	EPA 3050/6010	0.5	< 0.5	< 0.5	0.6	0.6
AD	2013/12/10	Sodium	µg/g (ppm)	EPA 3050/6010	1	977	836	861	820
AD	2013/12/10	Silver	µg/g (ppm)	EPA 3050/6010	0.1	< 0.1	< 0.1	< 0.1	< 0.1
AD	2013/12/10	Thallium	µg/g (ppm)	EPA 3050/6010	0.5	< 0.5	< 0.5	< 0.5	< 0.5
AD	2013/12/10	Tin	µg/g (ppm)	EPA 3050/6010	0.5	< 0.5	< 0.5	0.6	< 0.5
AD	2013/12/10	Vanadium	µg/g (ppm)	EPA 3050/6010	0.2	30.6	24.6	29.6	28.4
AD	2013/12/10	Uranium	µg/g (ppm)	EPA 3050/6010	15	< 15	< 15	< 15	< 15
AD	2013/12/10	Zinc	µg/g (ppm)	EPA 3050/6010	0.5	71.8	65.6	86.0	67.5

Soil Analysis - Metals

Project No. WX17293

Final
File No. EC-66669

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: / Client ID: / Sample Date: / MDL	13-17483 TH13-06 @ 2.3m 2013/12/02 0:00	13-17484 TH13-06 @ 6.1m 2013/12/02 0:00	13-17485 TH13-07 @ 1.5m 2013/12/03 0:00	13-17486 TH13-07 @ 2.3m 2013/12/03 0:00
AD	2013/12/10	Antimony	µg/g (ppm)	EPA 3050/6010	0.5	< 0.5	< 0.5	< 0.5	< 0.5
AD	2013/12/10	Aluminum	µg/g (ppm)	EPA 3050/6010	5	3560	12900	17300	3300
AD	2013/12/10	Arsenic	µg/g (ppm)	EPA 3050/6010	0.5	1.3	5.5	6.1	1.4
AD	2013/12/10	Barium	µg/g (ppm)	EPA 3050/6010	1	30	150	141	32
AD	2013/12/10	Beryllium	µg/g (ppm)	EPA 3050/6010	0.1	0.1	0.7	0.6	0.1
AD	2013/12/10	Cadmium	µg/g (ppm)	EPA 3050/6010	0.2	< 0.2	< 0.2	< 0.2	< 0.2
AD	2013/12/10	Calcium	µg/g (ppm)	EPA 3050/6010	5	112000	28900	46400	98800
AD	2013/12/10	Chromium	µg/g (ppm)	EPA 3050/6010	0.5	7.0	22.8	23.2	6.6
AD	2013/12/10	Cobalt	µg/g (ppm)	EPA 3050/6010	0.5	2.5	12.0	10.0	2.5
AD	2013/12/10	Copper	µg/g (ppm)	EPA 3050/6010	0.1	6.3	23.8	23.1	5.8
AD	2013/12/10	Iron	µg/g (ppm)	EPA 3050/6010	5	5310	23700	22500	5170
AD	2013/12/10	Lead	µg/g (ppm)	EPA 3050/6010	0.5	2.7	10.5	9.3	2.8
AD	2013/12/10	Magnesium	µg/g (ppm)	EPA 3050/6010	1	58800	12100	16700	51100
AD	2013/12/10	Manganese	µg/g (ppm)	EPA 3050/6010	0.5	151	294	278	127
AD	2013/12/10	Mercury	µg/g (ppm)	EPA 3050/6010	0.2	< 0.2	< 0.2	< 0.2	< 0.2
AD	2013/12/10	Molybdenum	µg/g (ppm)	EPA 3050/6010	0.5	< 0.5	0.8	0.6	< 0.5
AD	2013/12/10	Nickel	µg/g (ppm)	EPA 3050/6010	0.5	6.0	31.6	25.4	5.9
AD	2013/12/10	Phosphorus	µg/g (ppm)	EPA 3050/6010	5	252	419	385	219
AD	2013/12/10	Potassium	µg/g (ppm)	EPA 3050/6010	5	1240	3400	4910	1160
AD	2013/12/10	Selenium	µg/g (ppm)	EPA 3050/6010	0.5	< 0.5	< 0.5	< 0.5	< 0.5
AD	2013/12/10	Sodium	µg/g (ppm)	EPA 3050/6010	1	2640	1060	4030	2380
AD	2013/12/10	Silver	µg/g (ppm)	EPA 3050/6010	0.1	< 0.1	< 0.1	< 0.1	< 0.1
AD	2013/12/10	Thallium	µg/g (ppm)	EPA 3050/6010	0.5	< 0.5	< 0.5	< 0.5	< 0.5
AD	2013/12/10	Tin	µg/g (ppm)	EPA 3050/6010	0.5	< 0.5	< 0.5	0.5	< 0.5
AD	2013/12/10	Vanadium	µg/g (ppm)	EPA 3050/6010	0.2	9.6	30.3	34.5	8.9
AD	2013/12/10	Uranium	µg/g (ppm)	EPA 3050/6010	15	< 15	< 15	< 15	< 15
AD	2013/12/10	Zinc	µg/g (ppm)	EPA 3050/6010	0.5	12.9	68.8	55.5	13.5

Soil Analysis - Metals

Project No. WX17293

Final
File No. EC-66669

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: Client ID: Sample Date: MDL	13-17494 TH13-14 @ 0.8m 2013/12/03 0:00	13-17496 TH13-15 @ 1.5m 2013/12/03 0:00
AD	2013/12/10	Antimony	µg/g (ppm)	EPA 3050/6010	0.5	< 0.5	< 0.5
AD	2013/12/10	Aluminum	µg/g (ppm)	EPA 3050/6010	5	19000	11700
AD	2013/12/10	Arsenic	µg/g (ppm)	EPA 3050/6010	0.5	4.2	4.7
AD	2013/12/10	Barium	µg/g (ppm)	EPA 3050/6010	1	112	113
AD	2013/12/10	Beryllium	µg/g (ppm)	EPA 3050/6010	0.1	0.7	0.5
AD	2013/12/10	Cadmium	µg/g (ppm)	EPA 3050/6010	0.2	< 0.2	< 0.2
AD	2013/12/10	Calcium	µg/g (ppm)	EPA 3050/6010	5	10200	60900
AD	2013/12/10	Chromium	µg/g (ppm)	EPA 3050/6010	0.5	26.4	19.5
AD	2013/12/10	Cobalt	µg/g (ppm)	EPA 3050/6010	0.5	11.8	8.5
AD	2013/12/10	Copper	µg/g (ppm)	EPA 3050/6010	0.1	21.5	19.3
AD	2013/12/10	Iron	µg/g (ppm)	EPA 3050/6010	5	24600	18400
AD	2013/12/10	Lead	µg/g (ppm)	EPA 3050/6010	0.5	10.4	15.9
AD	2013/12/10	Magnesium	µg/g (ppm)	EPA 3050/6010	1	9610	23800
AD	2013/12/10	Manganese	µg/g (ppm)	EPA 3050/6010	0.5	406	318
AD	2013/12/10	Mercury	µg/g (ppm)	EPA 3050/6010	0.2	< 0.2	< 0.2
AD	2013/12/10	Molybdenum	µg/g (ppm)	EPA 3050/6010	0.5	0.5	< 0.5
AD	2013/12/10	Nickel	µg/g (ppm)	EPA 3050/6010	0.5	31.4	21.5
AD	2013/12/10	Phosphorus	µg/g (ppm)	EPA 3050/6010	5	297	469
AD	2013/12/10	Potassium	µg/g (ppm)	EPA 3050/6010	5	4930	3760
AD	2013/12/10	Selenium	µg/g (ppm)	EPA 3050/6010	0.5	< 0.5	< 0.5
AD	2013/12/10	Sodium	µg/g (ppm)	EPA 3050/6010	1	2070	1240
AD	2013/12/10	Silver	µg/g (ppm)	EPA 3050/6010	0.1	< 0.1	< 0.1
AD	2013/12/10	Thallium	µg/g (ppm)	EPA 3050/6010	0.5	< 0.5	< 0.5
AD	2013/12/10	Tin	µg/g (ppm)	EPA 3050/6010	0.5	0.6	1.2
AD	2013/12/10	Vanadium	µg/g (ppm)	EPA 3050/6010	0.2	31.3	29.5
AD	2013/12/10	Uranium	µg/g (ppm)	EPA 3050/6010	15	< 15	< 15
AD	2013/12/10	Zinc	µg/g (ppm)	EPA 3050/6010	0.5	66.2	52.1

Soil Analysis - Polychlorinated Biphenyls

Project No. WX17293

Final
File No. EC-66669

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: / Client ID: / Sample Date: / MDL	13-17479 / TH13-03 @ 0.8m / 2013/12/02 0:00 /
PC	2013/12/05	PCB - Total	µg/g (ppm)	EPA 3550/8082	0.05	< 0.05
PC	2013/12/05	Surrogate Recovery	%	EPA 3550/8082	0.1	90.5
PC	2013/12/05	Moisture	%	--	0.5	35.4
PC	2013/12/05	Surrogate Recovery	%	EPA3550/8082	0.1	110

Soil Analysis - Volatile Organic Compounds

Project No. WX17293

Final
File No. EC-66669

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: Client ID: Sample Date: MDL	13-17477 TH13-01 @ 2.3m 2013/12/02 0:00	13-17477-D TH13-01 @ 2.3m Lab Duplicate	13-17478 TH13-02 @ 3.8m 2013/12/02 0:00	13-17479 TH13-03 @ 0.8m 2013/12/02 0:00
AD	2013/12/05	Chloromethane	µg/g (ppm)	EPA 5035/8260B	0.07	< 0.07	< 0.07	< 0.07	< 0.07
AD	2013/12/05	Vinyl Chloride	µg/g (ppm)	EPA 5035/8260B	0.00034	< 0.00034	< 0.00034	< 0.00034	< 0.00034
AD	2013/12/05	Bromomethane	µg/g (ppm)	EPA 5035/8260B	0.025	< 0.025	< 0.025	< 0.025	< 0.025
AD	2013/12/05	Chloroethane	µg/g (ppm)	EPA 5035/8260B	0.04	< 0.04	< 0.04	< 0.04	< 0.04
AD	2013/12/05	Trichlorofluoromethane	µg/g (ppm)	EPA 5035/8260B	0.08	< 0.08	< 0.08	< 0.08	< 0.08
AD	2013/12/05	1,1-Dichloroethene	µg/g (ppm)	EPA 5035/8260B	0.002	< 0.002	< 0.002	< 0.002	< 0.002
AD	2013/12/05	Dichloromethane	µg/g (ppm)	EPA 5035/8260B	0.02	< 0.02	< 0.02	< 0.02	< 0.02
AD	2013/12/05	Tr-1,2-dichloroethene	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	1,1-Dichloroethane	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Cis-1,2-dichloroethene	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Chloroform	µg/g (ppm)	EPA 5035/8230B	0.00060	< 0.00060	< 0.00060	< 0.00060	< 0.00060
AD	2013/12/05	1,1,1-Trichloroethane	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Carbon tetrachloride	µg/g (ppm)	EPA 5035/8260B	0.00030	< 0.00030	< 0.00030	< 0.00030	< 0.00030
AD	2013/12/05	Benzene	µg/g (ppm)	EPA 5035/8260B	0.025	< 0.025	< 0.025	< 0.025	< 0.025
AD	2013/12/05	1,2-Dichloroethane	µg/g (ppm)	EPA 5035/8260B	0.001	< 0.001	< 0.001	< 0.001	< 0.001
AD	2013/12/05	Trichloroethene	µg/g (ppm)	EPA 5035/8260B	0.01	< 0.01	< 0.01	< 0.01	< 0.01
AD	2013/12/05	1,2-Dichloropropane	µg/g (ppm)	EPA 5035/8260B	0.010	< 0.010	< 0.010	< 0.010	< 0.010
AD	2013/12/05	Bromodichloromethane	µg/g (ppm)	EPA 5035/8260B	0.045	< 0.045	< 0.045	< 0.045	< 0.045
AD	2013/12/05	Cis-1,3-dichloropropene	µg/g (ppm)	EPA 5035/8260B	0.005	< 0.005	< 0.005	< 0.005	< 0.005
AD	2013/12/05	Toluene	µg/g (ppm)	EPA 8260B	0.01	< 0.01	< 0.01	< 0.01	< 0.01
AD	2013/12/05	Tr-1,3-dichloropropene	µg/g (ppm)	EPA 5035/8260B	0.005	< 0.005	< 0.005	< 0.005	< 0.005
AD	2013/12/05	1,1,2-Trichloroethane	µg/g (ppm)	EPA 5035/8260B	0.065	< 0.065	< 0.065	< 0.065	< 0.065
AD	2013/12/05	Tetrachloroethene (Perc)	µg/g (ppm)	EPA 5035/8260B	0.035	< 0.035	< 0.035	< 0.035	< 0.035
AD	2013/12/05	Dibromochloromethane	µg/g (ppm)	EPA 5035/8260B	0.07	< 0.07	< 0.07	< 0.07	< 0.07
AD	2013/12/05	Chlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.001	< 0.001	< 0.001	< 0.001	< 0.001
AD	2013/12/05	Ethylbenzene	µg/g (ppm)	EPA 8260B	0.04	< 0.04	< 0.04	< 0.04	< 0.04
AD	2013/12/05	m+p-Xylene	µg/g (ppm)	EPA 5035/8260B	0.085	< 0.085	< 0.085	< 0.085	< 0.085
AD	2013/12/05	o-Xylene	µg/g (ppm)	EPA 8260B	0.045	< 0.045	< 0.045	< 0.045	< 0.045
AD	2013/12/05	Styrene	µg/g (ppm)	EPA 8260B	0.045	< 0.045	< 0.045	< 0.045	< 0.045
AD	2013/12/05	Bromoform	µg/g (ppm)	EPA 5035/8260B	0.15	< 0.15	< 0.15	< 0.15	< 0.15
AD	2013/12/05	1,1,2,2 Tetrachloroethane	µg/g (ppm)	EPA 5035/8260B	0.001	< 0.001	< 0.001	< 0.001	< 0.001
AD	2013/12/05	1,3-Dichlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.06	< 0.06	< 0.06	< 0.06	< 0.06
AD	2013/12/05	1,4-Dichlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	1,2-Dichlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.06	< 0.06	< 0.06	< 0.06	< 0.06
AD	2013/12/05	Surrogate Recovery	%	EPA 5035/8260B	0.1	96.0	98.6	96.8	94.1

Soil Analysis - Volatile Organic Compounds

Project No. WX17293

Final
File No. EC-66669

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: / Client ID: / Sample Date: / MDL	13-17480 TH13-03 @ 4.5m 2013/12/02 0:00	13-17481 TH13-04 @ 6.1m 2013/12/02 0:00	13-17482 TH13-05 @ 2.3m 2013/12/02 0:00	13-17483 TH13-06 @ 2.3m 2013/12/02 0:00
AD	2013/12/05	Chloromethane	µg/g (ppm)	EPA 5035/8260B	0.07	< 0.07	< 0.07	< 0.07	< 0.07
AD	2013/12/05	Vinyl Chloride	µg/g (ppm)	EPA 5035/8260B	0.00034	< 0.00034	< 0.00034	< 0.00034	< 0.00034
AD	2013/12/05	Bromomethane	µg/g (ppm)	EPA 5035/8260B	0.025	< 0.025	< 0.025	< 0.025	< 0.025
AD	2013/12/05	Chloroethane	µg/g (ppm)	EPA 5035/8260B	0.04	< 0.04	< 0.04	< 0.04	< 0.04
AD	2013/12/05	Trichlorofluoromethane	µg/g (ppm)	EPA 5035/8260B	0.08	< 0.08	< 0.08	< 0.08	< 0.08
AD	2013/12/05	1,1-Dichloroethene	µg/g (ppm)	EPA 5035/8260B	0.002	< 0.002	< 0.002	< 0.002	< 0.002
AD	2013/12/05	Dichloromethane	µg/g (ppm)	EPA 5035/8260B	0.02	< 0.02	< 0.02	< 0.02	< 0.02
AD	2013/12/05	Tr-1,2-dichloroethene	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	1,1-Dichloroethane	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Cis-1,2-dichloroethene	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Chloroform	µg/g (ppm)	EPA 5035/8230B	0.00060	< 0.00060	< 0.00060	< 0.00060	< 0.00060
AD	2013/12/05	1,1,1-Trichloroethane	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Carbon tetrachloride	µg/g (ppm)	EPA 5035/8260B	0.00030	< 0.00030	< 0.00030	< 0.00030	< 0.00030
AD	2013/12/05	Benzene	µg/g (ppm)	EPA 5035/8260B	0.025	< 0.025	< 0.025	< 0.025	< 0.025
AD	2013/12/05	1,2-Dichloroethane	µg/g (ppm)	EPA 5035/8260B	0.001	< 0.001	< 0.001	< 0.001	< 0.001
AD	2013/12/05	Trichloroethene	µg/g (ppm)	EPA 5035/8260B	0.01	< 0.01	< 0.01	< 0.01	< 0.01
AD	2013/12/05	1,2-Dichloropropane	µg/g (ppm)	EPA 5035/8260B	0.010	< 0.010	< 0.010	< 0.010	< 0.010
AD	2013/12/05	Bromodichloromethane	µg/g (ppm)	EPA 5035/8260B	0.045	< 0.045	< 0.045	< 0.045	< 0.045
AD	2013/12/05	Cis-1,3-dichloropropene	µg/g (ppm)	EPA 5035/8260B	0.005	< 0.005	< 0.005	< 0.005	< 0.005
AD	2013/12/05	Toluene	µg/g (ppm)	EPA 8260B	0.01	< 0.01	< 0.01	< 0.01	< 0.01
AD	2013/12/05	Tr-1,3-dichloropropene	µg/g (ppm)	EPA 5035/8260B	0.005	< 0.005	< 0.005	< 0.005	< 0.005
AD	2013/12/05	1,1,2-Trichloroethane	µg/g (ppm)	EPA 5035/8260B	0.065	< 0.065	< 0.065	< 0.065	< 0.065
AD	2013/12/05	Tetrachloroethene (Perc)	µg/g (ppm)	EPA 5035/8260B	0.035	< 0.035	< 0.035	< 0.035	< 0.035
AD	2013/12/05	Dibromochloromethane	µg/g (ppm)	EPA 5035/8260B	0.07	< 0.07	< 0.07	< 0.07	< 0.07
AD	2013/12/05	Chlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.001	< 0.001	< 0.001	< 0.001	< 0.001
AD	2013/12/05	Ethylbenzene	µg/g (ppm)	EPA 8260B	0.04	< 0.04	< 0.04	< 0.04	< 0.04
AD	2013/12/05	m+p-Xylene	µg/g (ppm)	EPA 5035/8260B	0.085	< 0.085	< 0.085	< 0.085	< 0.085
AD	2013/12/05	o-Xylene	µg/g (ppm)	EPA 8260B	0.045	< 0.045	< 0.045	< 0.045	< 0.045
AD	2013/12/05	Styrene	µg/g (ppm)	EPA 8260B	0.045	< 0.045	< 0.045	< 0.045	< 0.045
AD	2013/12/05	Bromoform	µg/g (ppm)	EPA 5035/8260B	0.15	< 0.15	< 0.15	< 0.15	< 0.15
AD	2013/12/05	1,1,2,2 Tetrachloroethane	µg/g (ppm)	EPA 5035/8260B	0.001	< 0.001	< 0.001	< 0.001	< 0.001
AD	2013/12/05	1,3-Dichlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.06	< 0.06	< 0.06	< 0.06	< 0.06
AD	2013/12/05	1,4-Dichlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	1,2-Dichlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.06	< 0.06	< 0.06	< 0.06	< 0.06
AD	2013/12/05	Surrogate Recovery	%	EPA 5035/8260B	0.1	95.7	97.2	93.9	94.4

Soil Analysis - Volatile Organic Compounds

Project No. WX17293

Final
File No. EC-66669

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: / Client ID: / Sample Date: / MDL	13-17484 TH13-06 @ 6.1m 2013/12/02 0:00	13-17485 TH13-07 @ 1.5m 2013/12/03 0:00	13-17486 TH13-07 @ 2.3m 2013/12/03 0:00	13-17495 TH13-14 @ 4.5m 2013/12/03 0:00
AD	2013/12/05	Chloromethane	µg/g (ppm)	EPA 5035/8260B	0.07	< 0.07	< 0.07	< 0.07	< 0.07
AD	2013/12/05	Vinyl Chloride	µg/g (ppm)	EPA 5035/8260B	0.00034	< 0.00034	< 0.00034	< 0.00034	< 0.00034
AD	2013/12/05	Bromomethane	µg/g (ppm)	EPA 5035/8260B	0.025	< 0.025	< 0.025	< 0.025	< 0.025
AD	2013/12/05	Chloroethane	µg/g (ppm)	EPA 5035/8260B	0.04	< 0.04	< 0.04	< 0.04	< 0.04
AD	2013/12/05	Trichlorofluoromethane	µg/g (ppm)	EPA 5035/8260B	0.08	< 0.08	< 0.08	< 0.08	< 0.08
AD	2013/12/05	1,1-Dichloroethene	µg/g (ppm)	EPA 5035/8260B	0.002	< 0.002	< 0.002	< 0.002	< 0.002
AD	2013/12/05	Dichloromethane	µg/g (ppm)	EPA 5035/8260B	0.02	< 0.02	< 0.02	< 0.02	< 0.02
AD	2013/12/05	Tr-1,2-dichloroethene	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	1,1-Dichloroethane	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Cis-1,2-dichloroethene	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Chloroform	µg/g (ppm)	EPA 5035/8230B	0.00060	< 0.00060	< 0.00060	< 0.00060	< 0.00060
AD	2013/12/05	1,1,1-Trichloroethane	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	Carbon tetrachloride	µg/g (ppm)	EPA 5035/8260B	0.00030	< 0.00030	< 0.00030	< 0.00030	< 0.00030
AD	2013/12/05	Benzene	µg/g (ppm)	EPA 5035/8260B	0.025	< 0.025	< 0.025	< 0.025	< 0.025
AD	2013/12/05	1,2-Dichloroethane	µg/g (ppm)	EPA 5035/8260B	0.001	< 0.001	< 0.001	< 0.001	< 0.001
AD	2013/12/05	Trichloroethene	µg/g (ppm)	EPA 5035/8260B	0.01	< 0.01	< 0.01	< 0.01	< 0.01
AD	2013/12/05	1,2-Dichloropropane	µg/g (ppm)	EPA 5035/8260B	0.010	< 0.010	< 0.010	< 0.010	< 0.010
AD	2013/12/05	Bromodichloromethane	µg/g (ppm)	EPA 5035/8260B	0.045	< 0.045	< 0.045	< 0.045	< 0.045
AD	2013/12/05	Cis-1,3-dichloropropene	µg/g (ppm)	EPA 5035/8260B	0.005	< 0.005	< 0.005	< 0.005	< 0.005
AD	2013/12/05	Toluene	µg/g (ppm)	EPA 8260B	0.01	< 0.01	< 0.01	< 0.01	< 0.01
AD	2013/12/05	Tr-1,3-dichloropropene	µg/g (ppm)	EPA 5035/8260B	0.005	< 0.005	< 0.005	< 0.005	< 0.005
AD	2013/12/05	1,1,2-Trichloroethane	µg/g (ppm)	EPA 5035/8260B	0.065	< 0.065	< 0.065	< 0.065	< 0.065
AD	2013/12/05	Tetrachloroethene (Perc)	µg/g (ppm)	EPA 5035/8260B	0.035	< 0.035	< 0.035	< 0.035	< 0.035
AD	2013/12/05	Dibromochloromethane	µg/g (ppm)	EPA 5035/8260B	0.07	< 0.07	< 0.07	< 0.07	< 0.07
AD	2013/12/05	Chlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.001	< 0.001	< 0.001	< 0.001	< 0.001
AD	2013/12/05	Ethylbenzene	µg/g (ppm)	EPA 8260B	0.04	< 0.04	< 0.04	< 0.04	< 0.04
AD	2013/12/05	m+p-Xylene	µg/g (ppm)	EPA 5035/8260B	0.085	< 0.085	< 0.085	< 0.085	< 0.085
AD	2013/12/05	o-Xylene	µg/g (ppm)	EPA 8260B	0.045	< 0.045	< 0.045	< 0.045	< 0.045
AD	2013/12/05	Styrene	µg/g (ppm)	EPA 8260B	0.045	< 0.045	< 0.045	< 0.045	< 0.045
AD	2013/12/05	Bromoform	µg/g (ppm)	EPA 5035/8260B	0.15	< 0.15	< 0.15	< 0.15	< 0.15
AD	2013/12/05	1,1,2,2 Tetrachloroethane	µg/g (ppm)	EPA 5035/8260B	0.001	< 0.001	< 0.001	< 0.001	< 0.001
AD	2013/12/05	1,3-Dichlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.06	< 0.06	< 0.06	< 0.06	< 0.06
AD	2013/12/05	1,4-Dichlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03	< 0.03	< 0.03	< 0.03
AD	2013/12/05	1,2-Dichlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.06	< 0.06	< 0.06	< 0.06	< 0.06
AD	2013/12/05	Surrogate Recovery	%	EPA 5035/8260B	0.1	95.5	92.4	94.5	94.8

Soil Analysis - Volatile Organic Compounds

Project No. WX17293

Final
File No. EC-66669

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	Lab #: Client ID: Sample Date: MDL	13-17497 TH13-15 @ 6.1m 2013/12/03 0:00
AD	2013/12/05	Chloromethane	µg/g (ppm)	EPA 5035/8260B	0.07	< 0.07
AD	2013/12/05	Vinyl Chloride	µg/g (ppm)	EPA 5035/8260B	0.00034	< 0.00034
AD	2013/12/05	Bromomethane	µg/g (ppm)	EPA 5035/8260B	0.025	< 0.025
AD	2013/12/05	Chloroethane	µg/g (ppm)	EPA 5035/8260B	0.04	< 0.04
AD	2013/12/05	Trichlorofluoromethane	µg/g (ppm)	EPA 5035/8260B	0.08	< 0.08
AD	2013/12/05	1,1-Dichloroethene	µg/g (ppm)	EPA 5035/8260B	0.002	< 0.002
AD	2013/12/05	Dichloromethane	µg/g (ppm)	EPA 5035/8260B	0.02	< 0.02
AD	2013/12/05	Tr-1,2-dichloroethene	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03
AD	2013/12/05	1,1-Dichloroethane	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03
AD	2013/12/05	Cis-1,2-dichloroethene	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03
AD	2013/12/05	Chloroform	µg/g (ppm)	EPA 5035/8230B	0.00060	< 0.00060
AD	2013/12/05	1,1,1-Trichloroethane	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03
AD	2013/12/05	Carbon tetrachloride	µg/g (ppm)	EPA 5035/8260B	0.00030	< 0.00030
AD	2013/12/05	Benzene	µg/g (ppm)	EPA 5035/8260B	0.025	< 0.025
AD	2013/12/05	1,2-Dichloroethane	µg/g (ppm)	EPA 5035/8260B	0.001	< 0.001
AD	2013/12/05	Trichloroethene	µg/g (ppm)	EPA 5035/8260B	0.01	< 0.01
AD	2013/12/05	1,2-Dichloropropane	µg/g (ppm)	EPA 5035/8260B	0.010	< 0.010
AD	2013/12/05	Bromodichloromethane	µg/g (ppm)	EPA 5035/8260B	0.045	< 0.045
AD	2013/12/05	Cis-1,3-dichloropropene	µg/g (ppm)	EPA 5035/8260B	0.005	< 0.005
AD	2013/12/05	Toluene	µg/g (ppm)	EPA 8260B	0.01	< 0.01
AD	2013/12/05	Tr-1,3-dichloropropene	µg/g (ppm)	EPA 5035/8260B	0.005	< 0.005
AD	2013/12/05	1,1,2-Trichloroethane	µg/g (ppm)	EPA 5035/8260B	0.065	< 0.065
AD	2013/12/05	Tetrachloroethene (Perc)	µg/g (ppm)	EPA 5035/8260B	0.035	< 0.035
AD	2013/12/05	Dibromochloromethane	µg/g (ppm)	EPA 5035/8260B	0.07	< 0.07
AD	2013/12/05	Chlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.001	< 0.001
AD	2013/12/05	Ethylbenzene	µg/g (ppm)	EPA 8260B	0.04	< 0.04
AD	2013/12/05	m+p-Xylene	µg/g (ppm)	EPA 5035/8260B	0.085	< 0.085
AD	2013/12/05	o-Xylene	µg/g (ppm)	EPA 8260B	0.045	< 0.045
AD	2013/12/05	Styrene	µg/g (ppm)	EPA 8260B	0.045	< 0.045
AD	2013/12/05	Bromoform	µg/g (ppm)	EPA 5035/8260B	0.15	< 0.15
AD	2013/12/05	1,1,2,2 Tetrachloroethane	µg/g (ppm)	EPA 5035/8260B	0.001	< 0.001
AD	2013/12/05	1,3-Dichlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.06	< 0.06
AD	2013/12/05	1,4-Dichlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.03	< 0.03
AD	2013/12/05	1,2-Dichlorobenzene	µg/g (ppm)	EPA 5035/8260B	0.06	< 0.06
AD	2013/12/05	Surrogate Recovery	%	EPA 5035/8260B	0.1	95.2

Quality Control Standard

Project No. WX17293 File No. EC-66669

Soil Analysis - Hydrocarbons

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	MDL	Analyzed Value	Advisory Range	Target Value	Reference No.
AP	2013/12/10	Grain Size	% fine (<75um)	Carter 47.2.3 mod.	1.0	62.9	57.57-68.13	62.9	SS#18
AD	2013/12/05	Benzene	%	EPA 8260B	0.005	87.1	80-120	100.000	Spike Recovery
AD	2013/12/05	Toluene	%	EPA 8260B	0.03	89.0	80-120	100.00	Spike Recovery
AD	2013/12/05	Ethylbenzene	%	EPA 8260B	0.01	89.8	80-120	100.00	Spike Recovery
AD	2013/12/05	Total Xylenes	%	EPA 8260B	0.03	90.5	80-120	100.00	Spike Recovery
AD	2013/12/05	F1 (C6-C10)	%	CCME	5.0	88.6	80-120	100.0	Spike Recovery
PC	2013/12/10	F2 (EPH C10-C16)	µg/g (ppm)	CCME	30	584	322 - 868	595	Spike Recovery
PC	2013/12/10	F3 (EPH C16-C34)	µg/g (ppm)	CCME	30	3390	2701 - 3706	3204	Spike Recovery
PC	2013/12/10	F4 (EPH C34-C50)	µg/g (ppm)	CCME	30	2150	1682 - 2453	2067	Spike Recovery

Soil Analysis - Metals

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	MDL	Analyzed Value	Advisory Range	Target Value	Reference No.
AD	2013/12/10	Antimony	µg/g (ppm)	EPA 3050/6010	0.1	42.5	22.91-68.68	45.8	ERA D079-540
AD	2013/12/10	Aluminum	µg/g (ppm)	EPA 3050/6010	5	5820	3715-9435	6575	ERA D079-540
AD	2013/12/10	Arsenic	µg/g (ppm)	EPA 3050/6010	0.5	92.9	83.38-111.1	97.2	ERA D079-540
AD	2013/12/10	Barium	µg/g (ppm)	EPA 3050/6010	1	85	81.34-101.09	91	ERA D079-540
AD	2013/12/10	Beryllium	µg/g (ppm)	EPA 3050/6010	0.1	49.2	45.31-57.38	51.3	ERA D079-540
AD	2013/12/10	Cadmium	µg/g (ppm)	EPA 3050/6010	0.1	30.8	28.00-34.98	31.5	ERA D079-540
AD	2013/12/10	Calcium	µg/g (ppm)	EPA 3050/6010	5	3980	3213-4691	3952	ERA D079-540
AD	2013/12/10	Chromium	µg/g (ppm)	EPA 3050/6010	0.5	67.8	64.07-81.98	73.0	ERA D079-540
AD	2013/12/10	Cobalt	µg/g (ppm)	EPA 3050/6010	0.5	96.1	72.23-104.30	88.3	ERA D079-540
AD	2013/12/10	Copper	µg/g (ppm)	EPA 3050/6010	0.1	48.7	43.92-55.30	49.6	ERA D079-540
AD	2013/12/10	Iron	µg/g (ppm)	EPA 3050/6010	5	7990	7178-10027	8602	ERA D079-540
AD	2013/12/10	Lead	µg/g (ppm)	EPA 3050/6010	0.5	72.2	63.34-85.41	74.4	ERA D079-540
AD	2013/12/10	Magnesium	µg/g (ppm)	EPA 3050/6010	1	1280	1200-1621	1410	ERA D079-540
AD	2013/12/10	Manganese	µg/g (ppm)	EPA 3050/6010	0.5	146	132.2-166.4	149.3	ERA D079-540
AD	2013/12/10	Mercury	µg/g (ppm)	EPA 3050/6010	0.5	6.1	2.79-6.31	5.0	ERA D079-540
AD	2013/12/10	Molybdenum	µg/g (ppm)	EPA 3050/6010	0.5	22.2	20.59-26.06	23.3	ERA D079-540
AD	2013/12/10	Nickel	µg/g (ppm)	EPA 3050/6010	0.5	77.3	60.46-83.34	71.9	ERA D079-540
AD	2013/12/10	Phosphorus	µg/g (ppm)	EPA 3050/6010	5	293	279.72-362.15	321	ERA D079-540
AD	2013/12/10	Potassium	µg/g (ppm)	EPA 3050/6010	5	1670	1552-2064	1809	ERA D079-540
AD	2013/12/10	Selenium	µg/g (ppm)	EPA 3050/6010	0.5	43.6	40.30-49.45	44.9	ERA D079-540
AD	2013/12/10	Sodium	µg/g (ppm)	EPA 3050/6010	1	243	218-352	285	ERA D079-540
AD	2013/12/10	Silver	µg/g (ppm)	EPA 3050/6010	0.1	30.2	28.32-35.72	32.0	ERA D079-540
AD	2013/12/10	Thallium	µg/g (ppm)	EPA 3050/6010	0.5	72.9	2.71-122.49	63.0	ERA D079-540
AD	2013/12/10	Tin	µg/g (ppm)	EPA 3050/6010	0.5	75.9	67.71-90.57	79.1	ERA D079-540
AD	2013/12/10	Vanadium	µg/g (ppm)	EPA 3050/6010	0.2	61.8	59.65-76.00	67.8	ERA D079-540
AD	2013/12/10	Uranium	µg/g (ppm)	EPA 3050/6010	15	59	57.19-81.79	69	ERA D079-540
AD	2013/12/10	Zinc	µg/g (ppm)	EPA 3050/6010	0.5	118	84.42-135.62	110.0	ERA D079-540

Quality Control Standard

Project No. WX17293 File No. EC-66669

Soil Analysis - Polychlorinated Biphenyls

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	MDL	Analyzed Value	Advisory Range	Target Value	Reference No.
PC	2013/12/05	PCB - Total	µg/g (ppm)	EPA 3550/8082	0.20	10.8	6.30-18.0	14.80	ERA D040726

Soil Analysis - Volatile Organic Compounds

Analyst	Date of Analysis (yyyy/m/d)	Analytical Parameter	Units	Reference Method	MDL	Analyzed Value	Advisory Range	Target Value	Reference No.
AD	2013/12/05	Chloromethane	%	EPA 8260B	0.07	91	80-120	100.00	Spike Recovery
AD	2013/12/05	Vinyl Chloride	%	EPA 8260B	0.00034	96	80-120	100.00000	Spike Recovery
AD	2013/12/05	Bromomethane	%	EPA 8260B	0.025	92	80-120	100.000	Spike Recovery
AD	2013/12/05	Chloroethane	%	EPA 8260B	0.04	93	80-120	100.00	Spike Recovery
AD	2013/12/05	Trichlorofluoromethane	%	EPA 8260B	0.08	99	80-120	100.00	Spike Recovery
AD	2013/12/05	1,1-Dichloroethene	%	EPA 5035/8260B	0.002	94.9	80-120	100.000	Spike Recovery
AD	2013/12/05	Dichloromethane	%	EPA 8260B	0.02	93	80-120	100.00	Spike Recovery
AD	2013/12/05	Tr-1,2-dichloroethene	%	EPA 8260B	0.03	93	80-120	100.00	Spike Recovery
AD	2013/12/05	1,1-Dichloroethane	%	EPA 5035/8260B	0.03	92	80-120	100.00	Spike Recovery
AD	2013/12/05	Cis-1,2-dichloroethene	%	EPA 8260B	0.03	93	80-120	100.00	Spike Recovery
AD	2013/12/05	Chloroform	%	EPA 8260B	0.00030	92	80-120	100.00000	Spike Recovery
AD	2013/12/05	1,1,1-Trichloroethane	%	EPA 5035/8260B	0.03	94	80-120	100.00	Spike Recovery
AD	2013/12/05	Carbon tetrachloride	%	EPA 8260B	0.00030	97	80-120	100.00000	Spike Recovery
AD	2013/12/05	Benzene	%	EPA 8260B	0.025	93	80-120	100.000	Spike Recovery
AD	2013/12/05	1,2-Dichloroethane	%	EPA 8260B	0.001	94	80-120	100.000	Spike Recovery
AD	2013/12/05	Trichloroethene	%	EPA 8260B	0.01	94	80-120	100.00	Spike Recovery
AD	2013/12/05	1,2-Dichloropropane	%	EPA 8260B	0.010	93	80-120	100.000	Spike Recovery
AD	2013/12/05	Bromodichloromethane	%	EPA 8260B	0.045	94	80-120	100.000	Spike Recovery
AD	2013/12/05	Cis-1,3-dichloropropene	%	EPA 8260B	0.005	93	80-120	100.000	Spike Recovery
AD	2013/12/05	Toluene	%	EPA 8260B	0.01	91.4	80-120	100.00	Spike Recovery
AD	2013/12/05	Tr-1,3-dichloropropene	%	EPA 8260B	0.005	93	80-120	100.000	Spike Recovery
AD	2013/12/05	1,1,2-Trichloroethane	%	EPA 8260B	0.065	93	80-120	100.000	Spike Recovery
AD	2013/12/05	Tetrachloroethene (Perc)	%	EPA 8260B	0.035	93	80-120	100.000	Spike Recovery
AD	2013/12/05	Dibromochloromethane	%	EPA 8260B	0.07	94	80-120	100.00	Spike Recovery
AD	2013/12/05	Chlorobenzene	%	EPA 8260B	0.001	92	80-120	100.000	Spike Recovery
AD	2013/12/05	Ethylbenzene	%	EPA 8260B	0.04	91	80-120	100.00	Spike Recovery
AD	2013/12/05	m+p-Xylene	%	EPA 8260B	0.085	91	80-120	100.000	Spike Recovery
AD	2013/12/05	o-Xylene	%	EPA 8260B	0.045	93	80-120	100.000	Spike Recovery
AD	2013/12/05	Styrene	%	EPA 8260B	0.045	92	80-120	100.000	Spike Recovery
AD	2013/12/05	Bromoform	%	EPA 8260B	0.15	96	80-120	100.00	Spike Recovery
AD	2013/12/05	1,1,2,2 Tetrachloroethane	%	EPA 8260B	0.001	94	80-120	100.000	Spike Recovery
AD	2013/12/05	1,3-Dichlorobenzene	%	EPA 8260B	0.06	91	80-120	100.00	Spike Recovery
AD	2013/12/05	1,4-Dichlorobenzene	%	EPA 8260B	0.03	92	80-120	100.00	Spike Recovery
AD	2013/12/05	1,2-Dichlorobenzene	%	EPA 8260B	0.06	93	80-120	100.00	Spike Recovery

Analytical Comments

Project No. WX17293 File No. EC-66669

All Analytical results pertain to samples analyzed as received.

Carter: Carter, Martin R., 1993. Soil Sampling and Methods of Analysis, Canadian Society of Soil Science. Ottawa

CCME (EPH) - Canadian Council of Ministers of the Environment - Method for Canada Wide Standards for Petroleum Hydrocarbon in Soil, Tier 1 Method, Revision 5.0. The method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

Chromatography returned to baseline by C50.

EPA: U.S. Environmental Protection Agency. 1997. Test Methods of Evaluation of Solid Waste 3rd Ed through Update III. Office Solid Waste Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

EPH: Extractable Petroleum Hydrocarbon - not corrected for PAH content.

Extraction and analysis limits for holding time for Hydrocarbons were met.

MDL - Method Detection Limit

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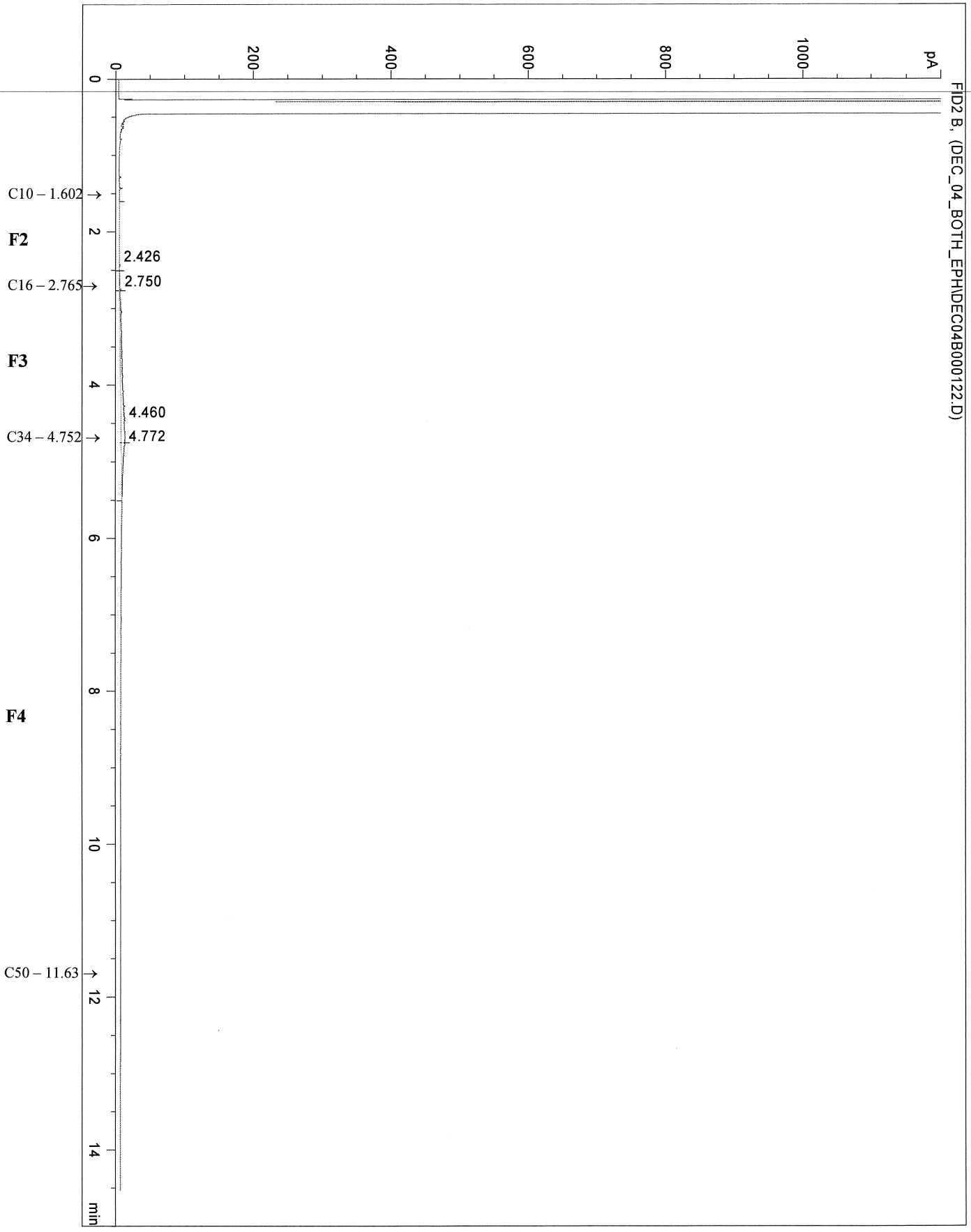

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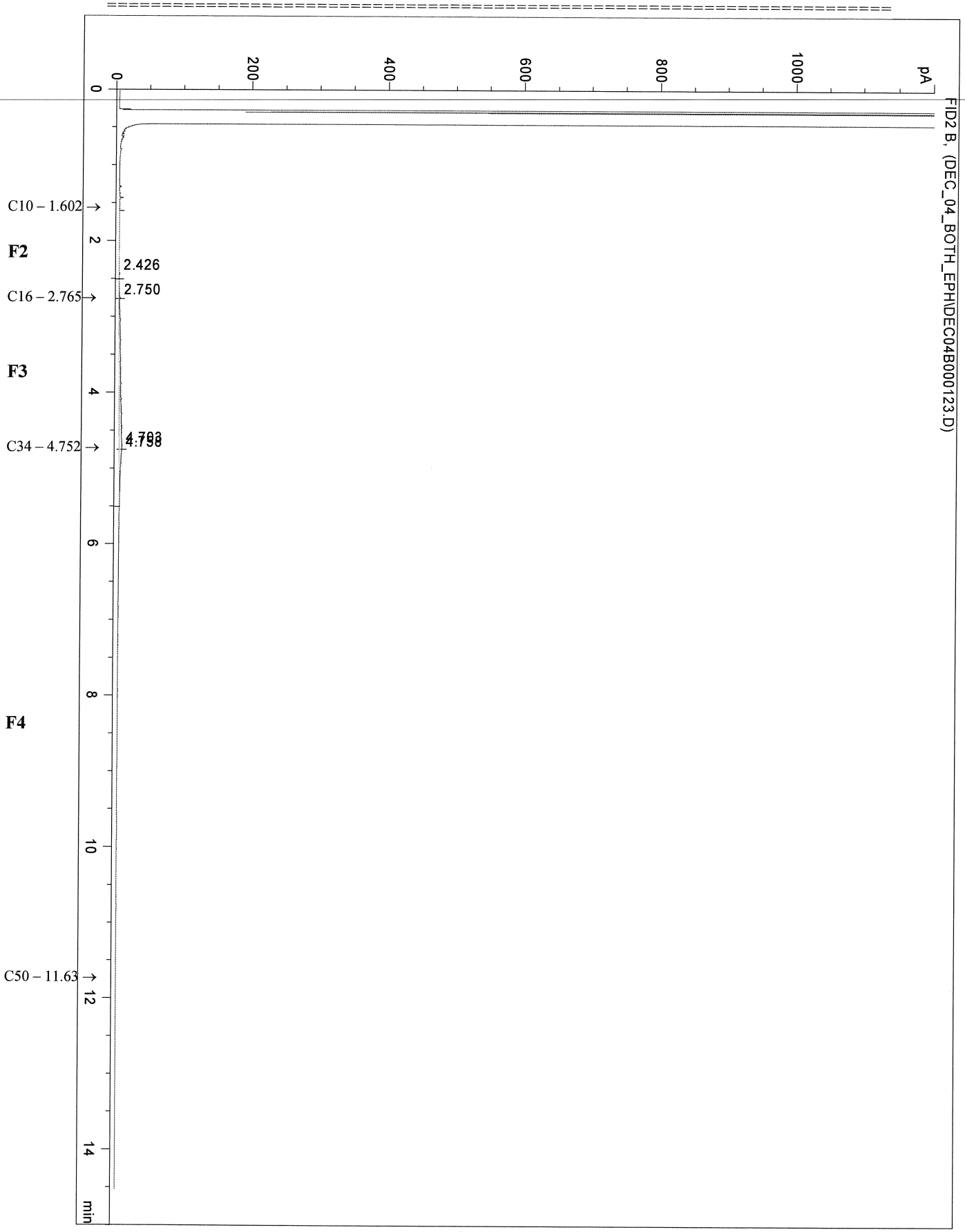

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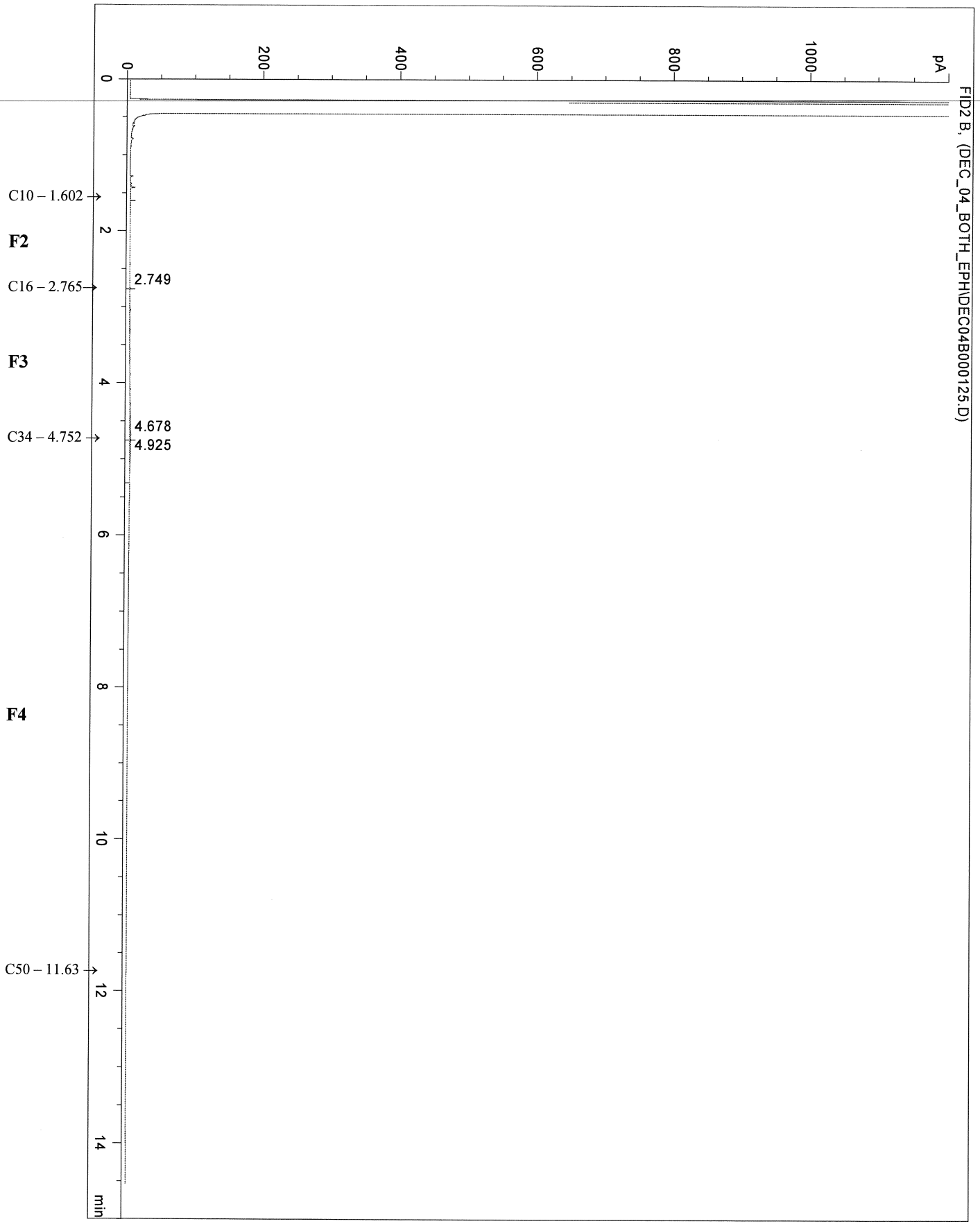

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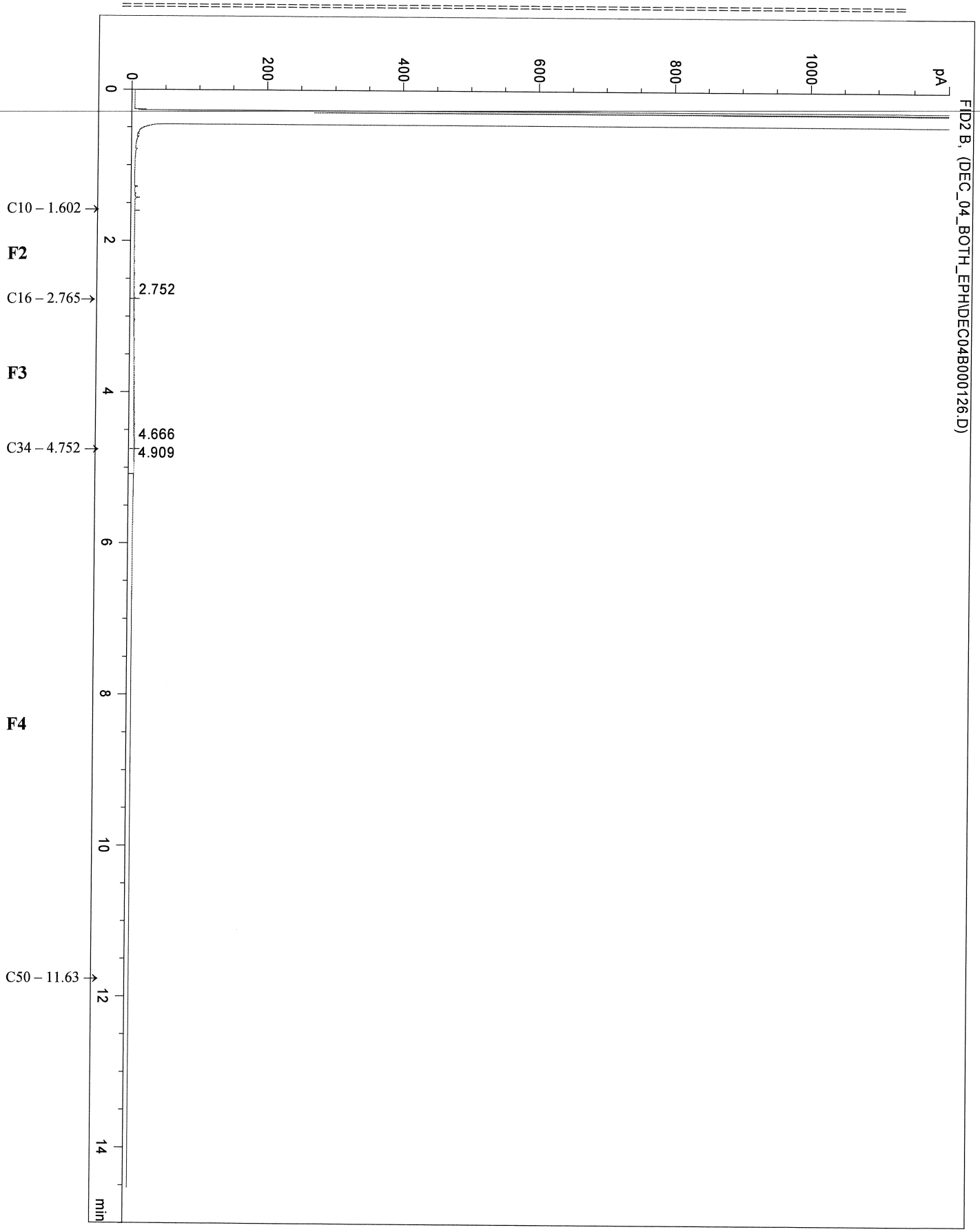

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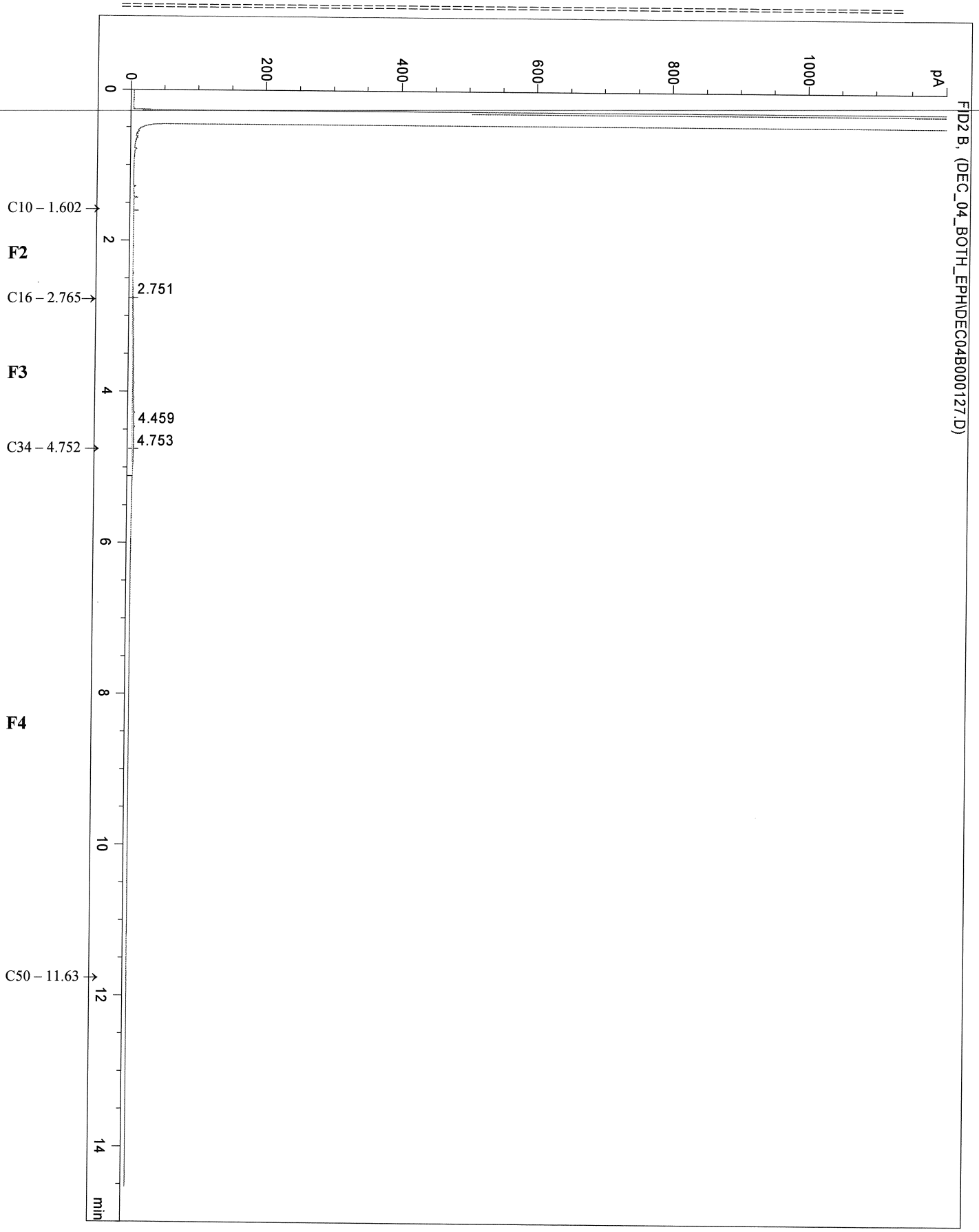

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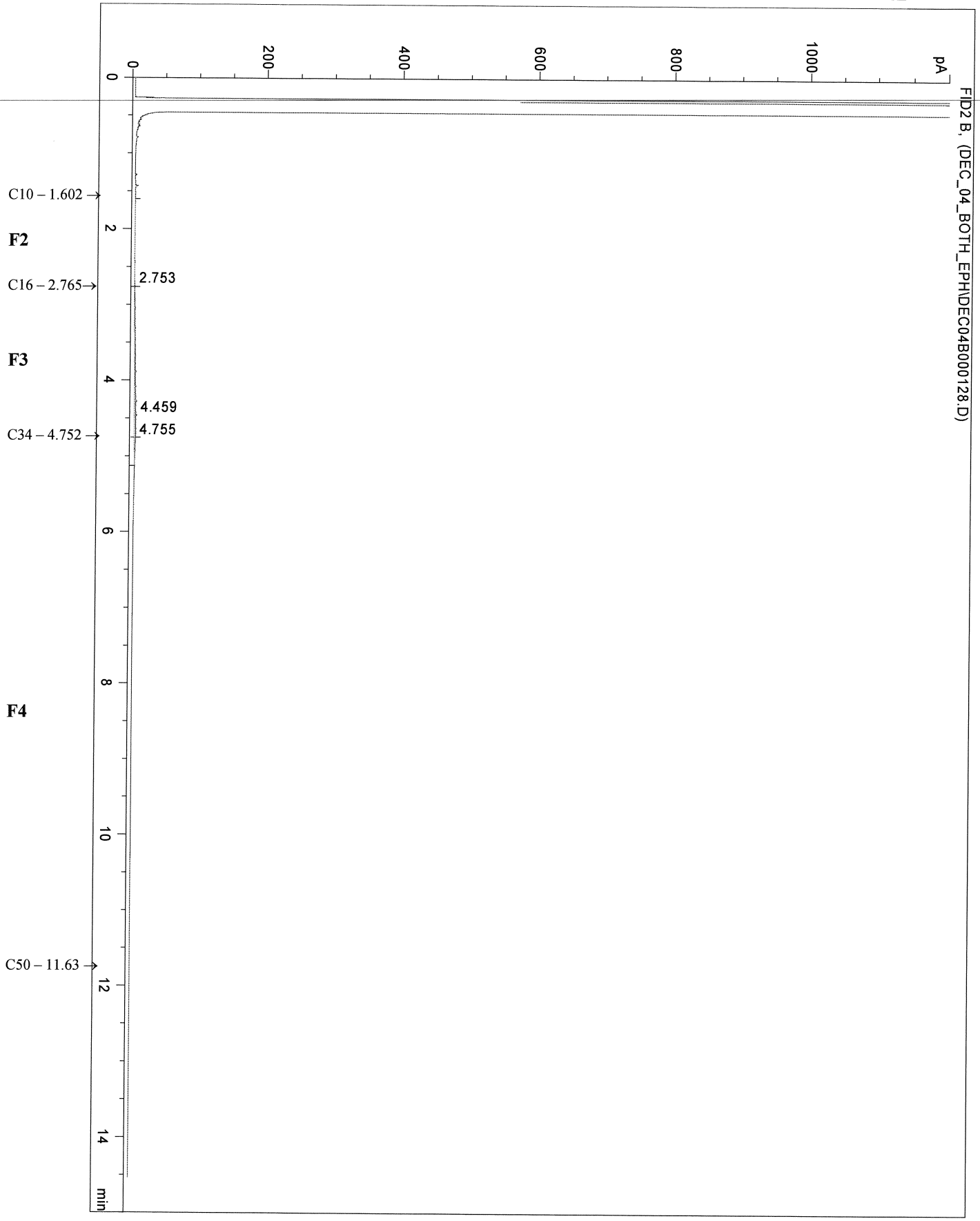

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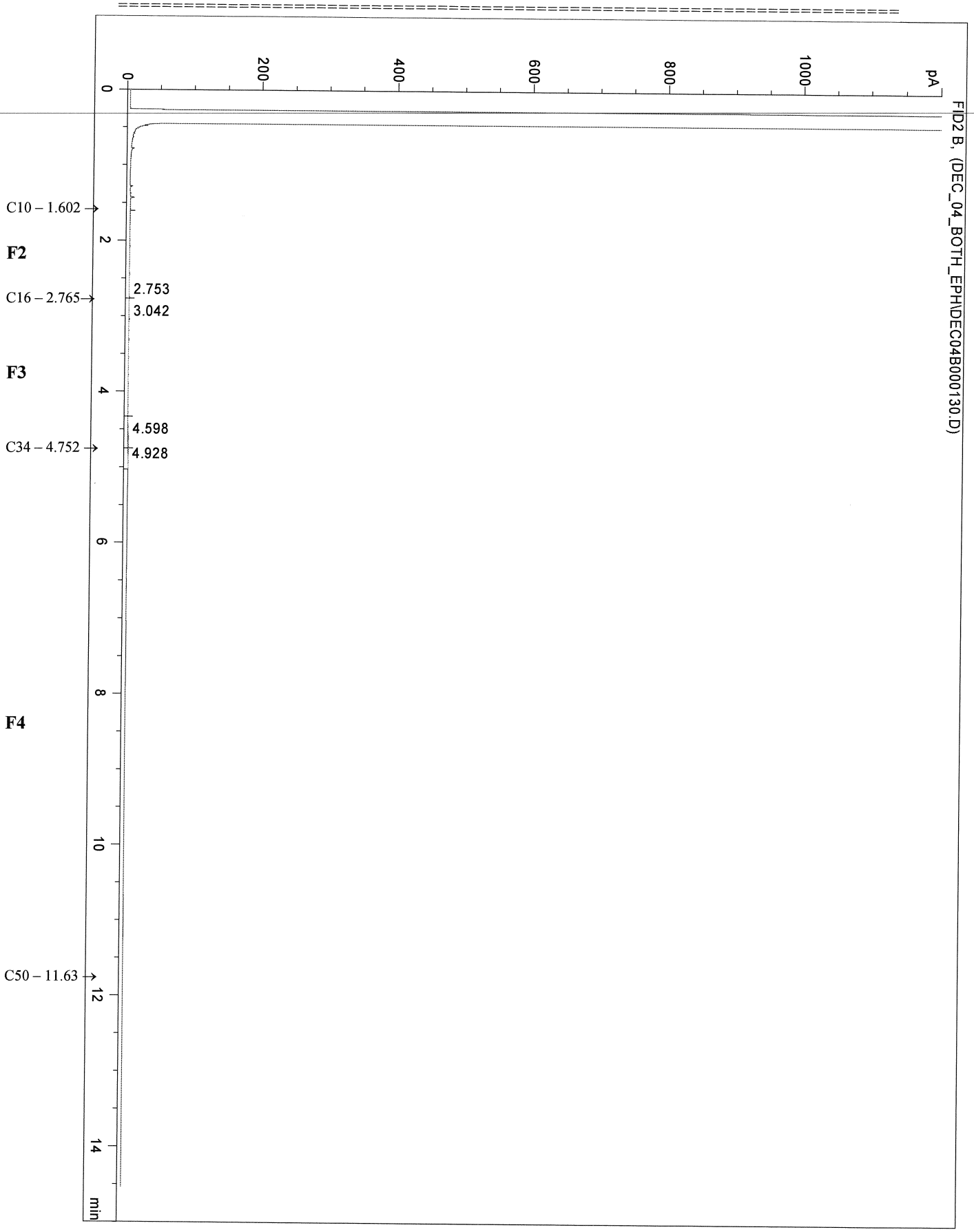

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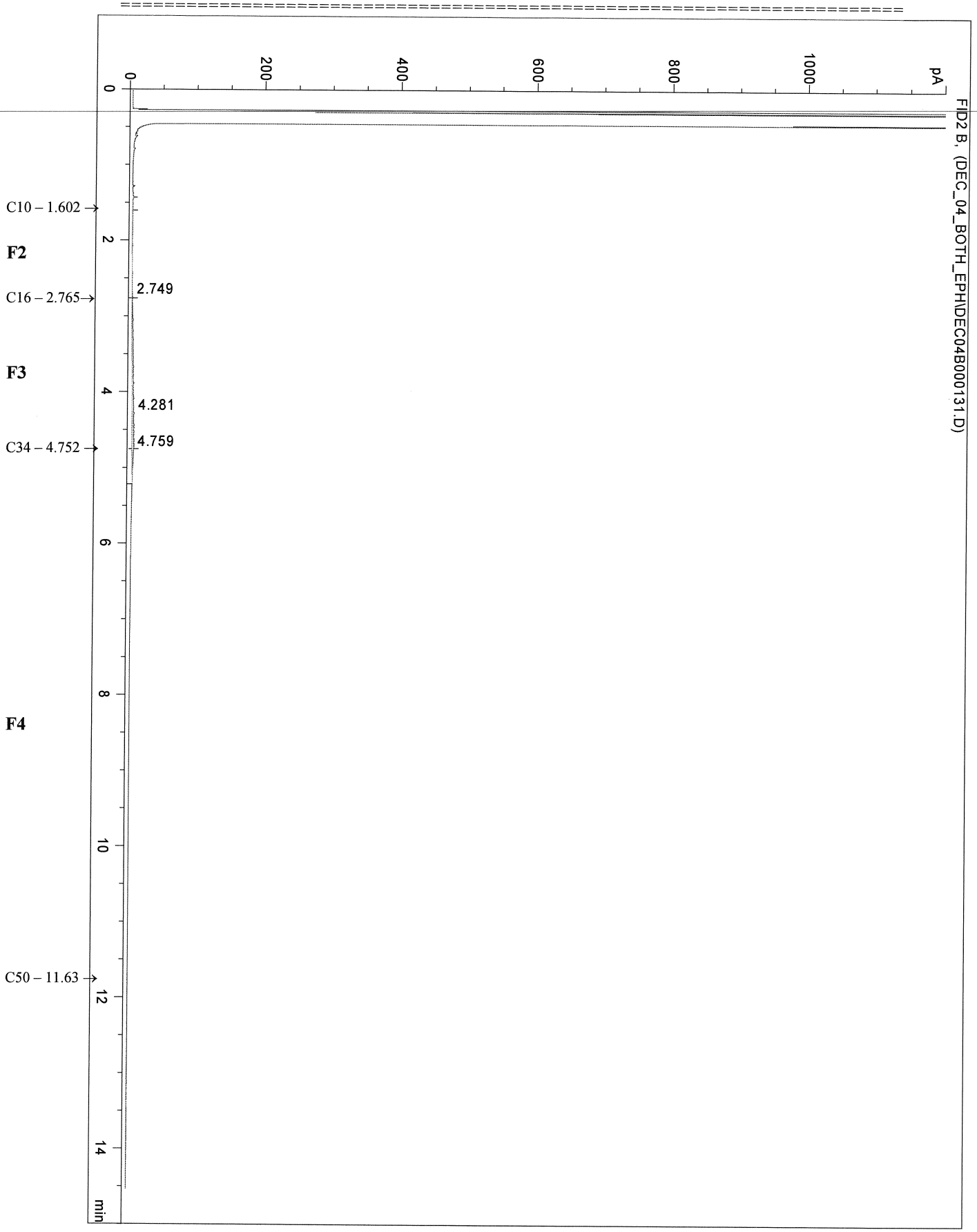

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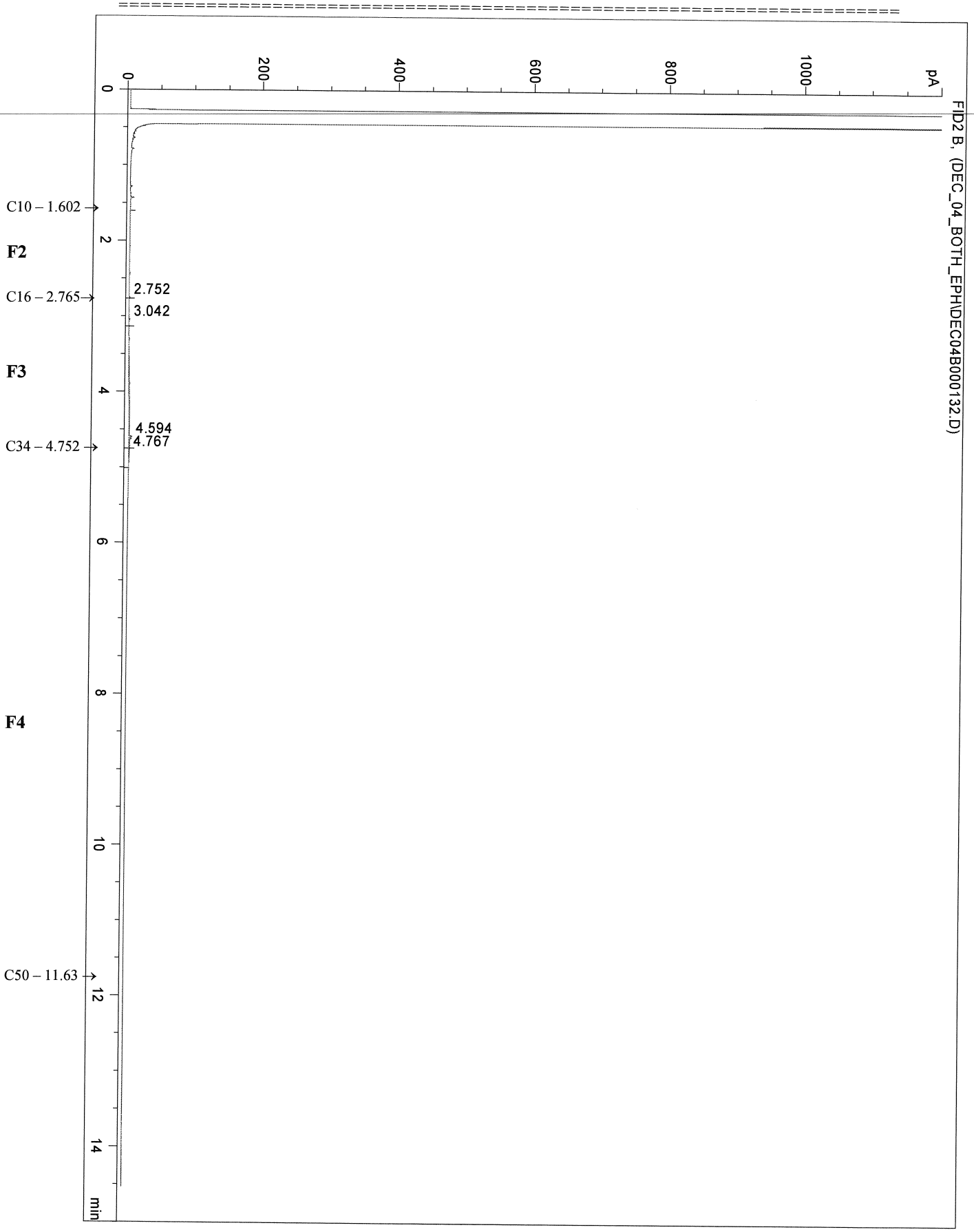
Sample Name: 17485 ephs



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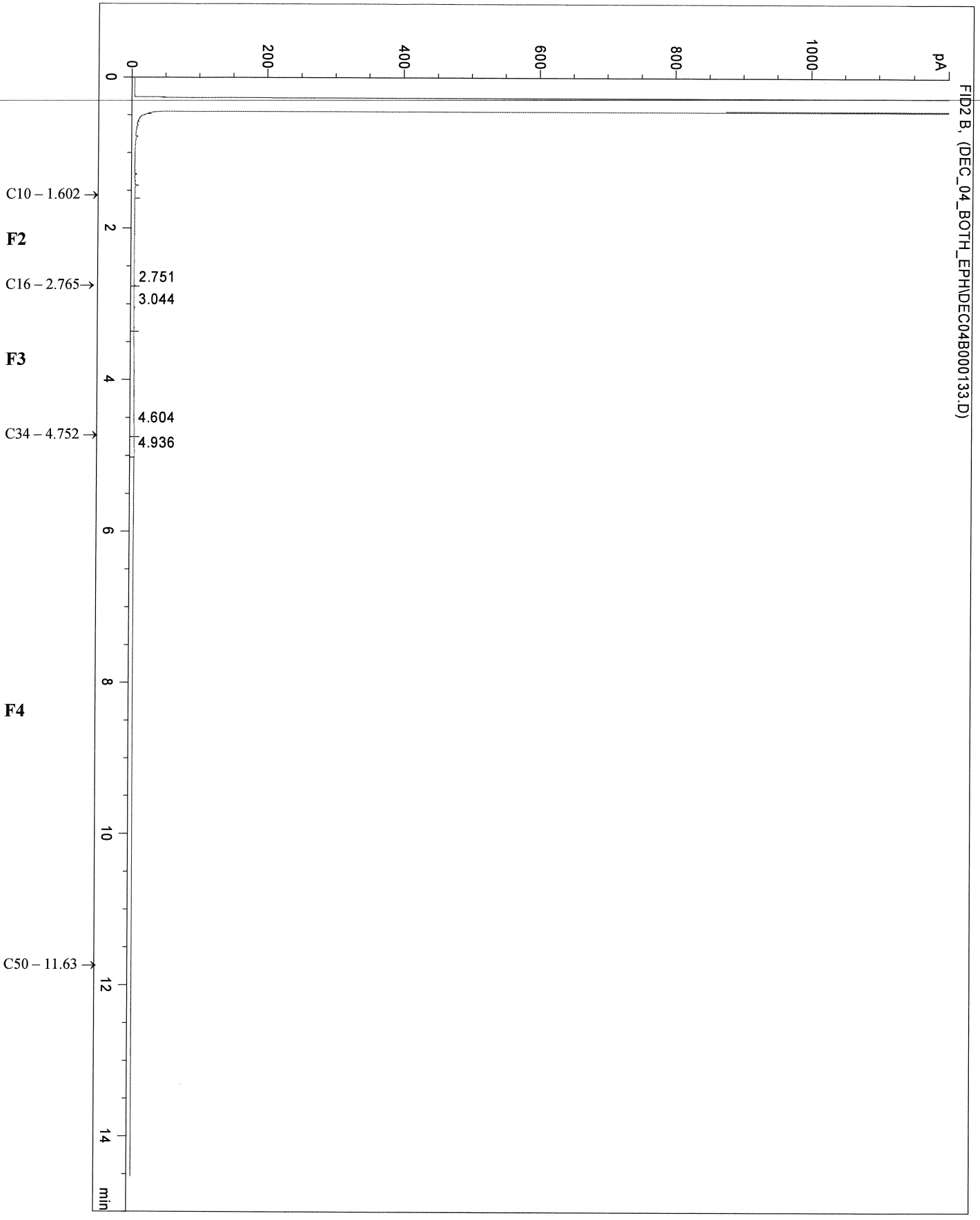
Sample Name: 17486 ephs



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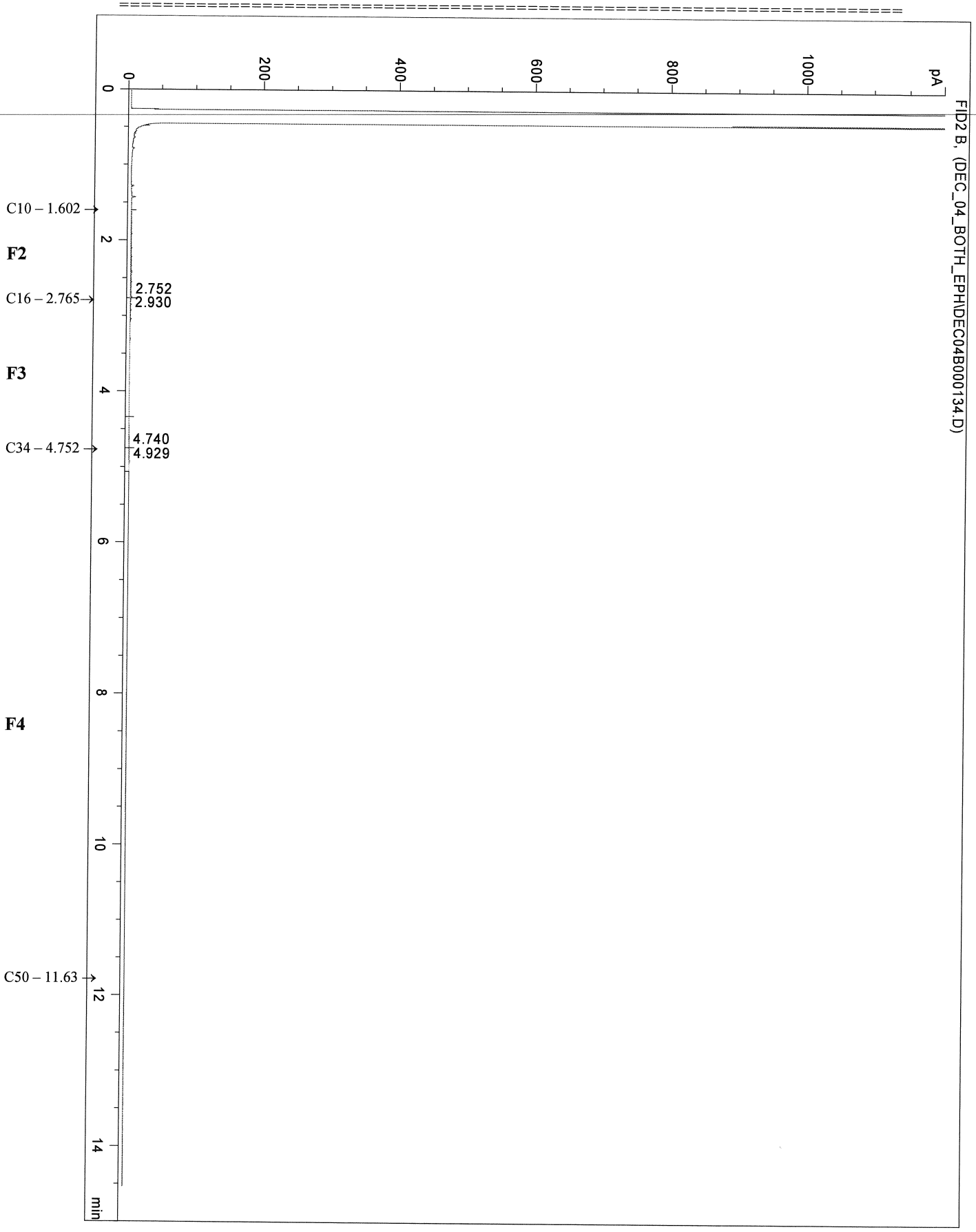

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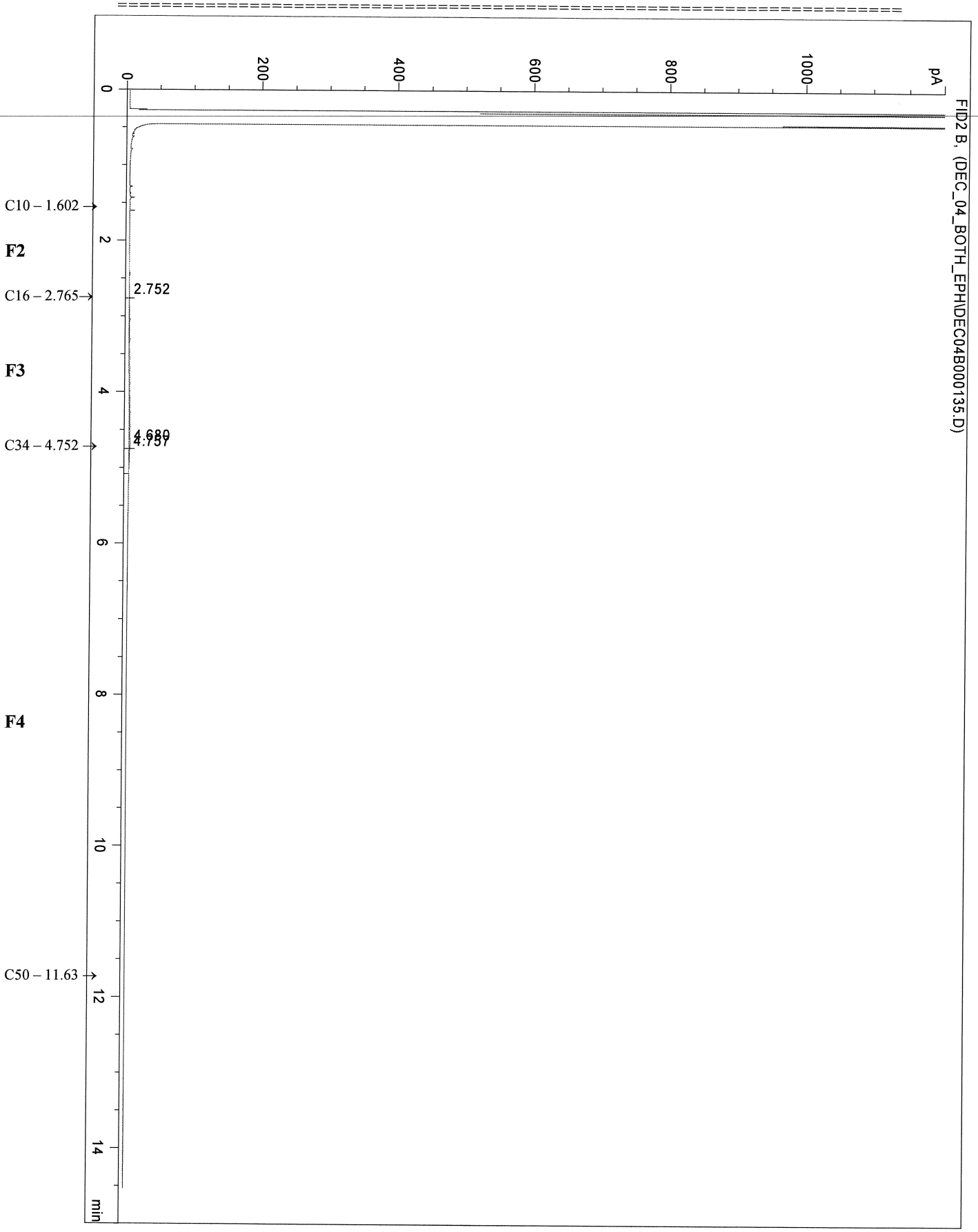
Sample Name: 17488 ephs



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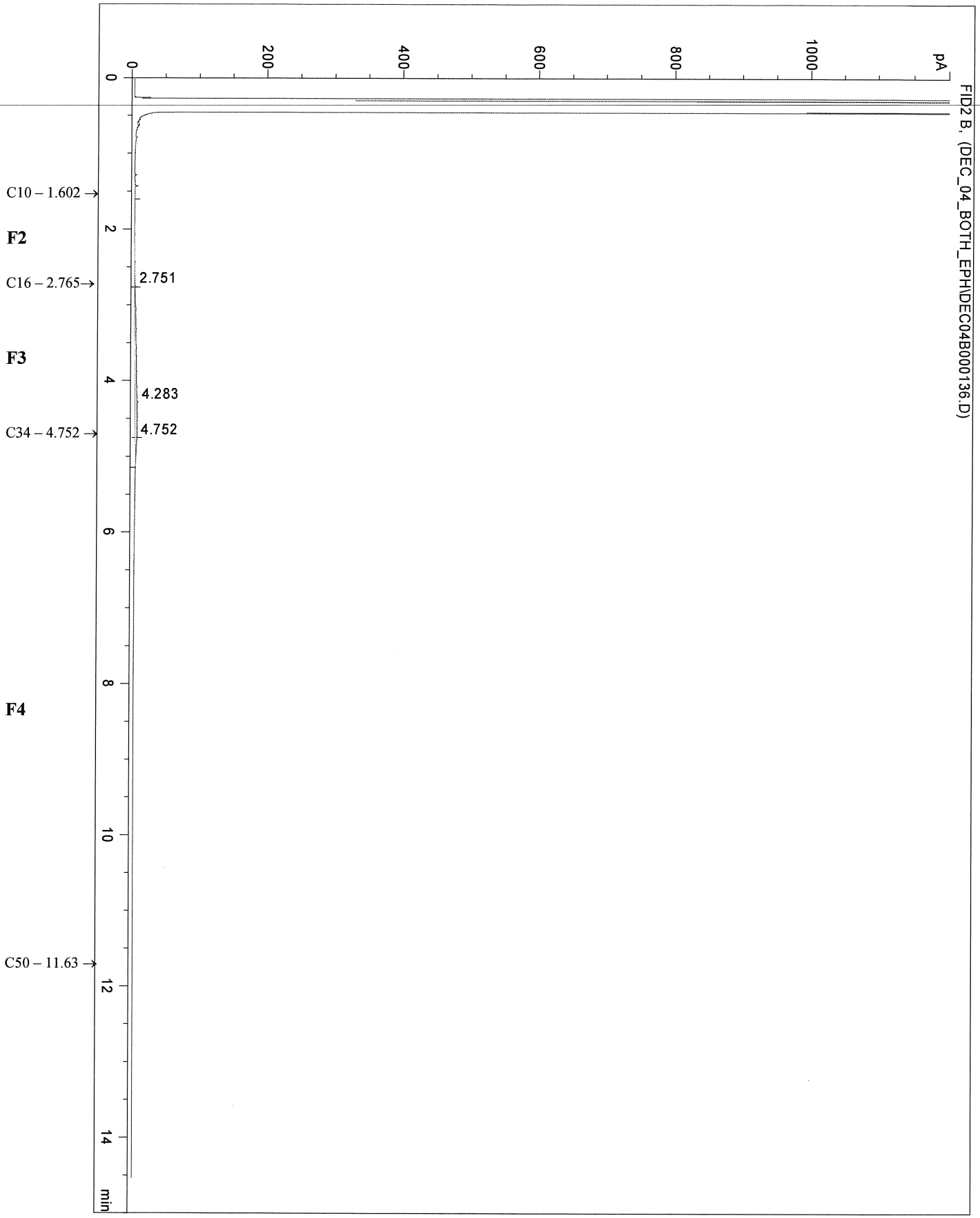
Sample Name: 17489 ephs



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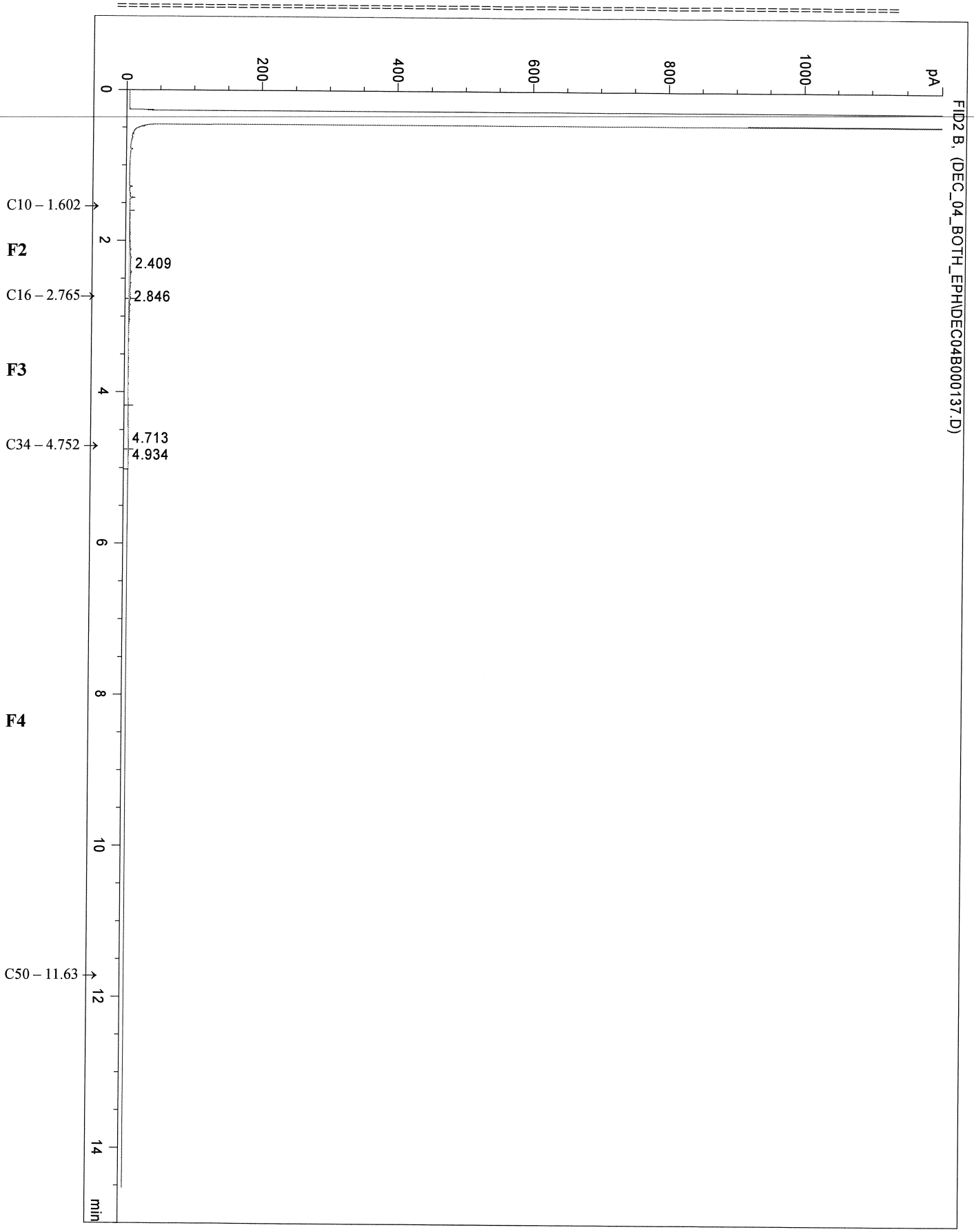

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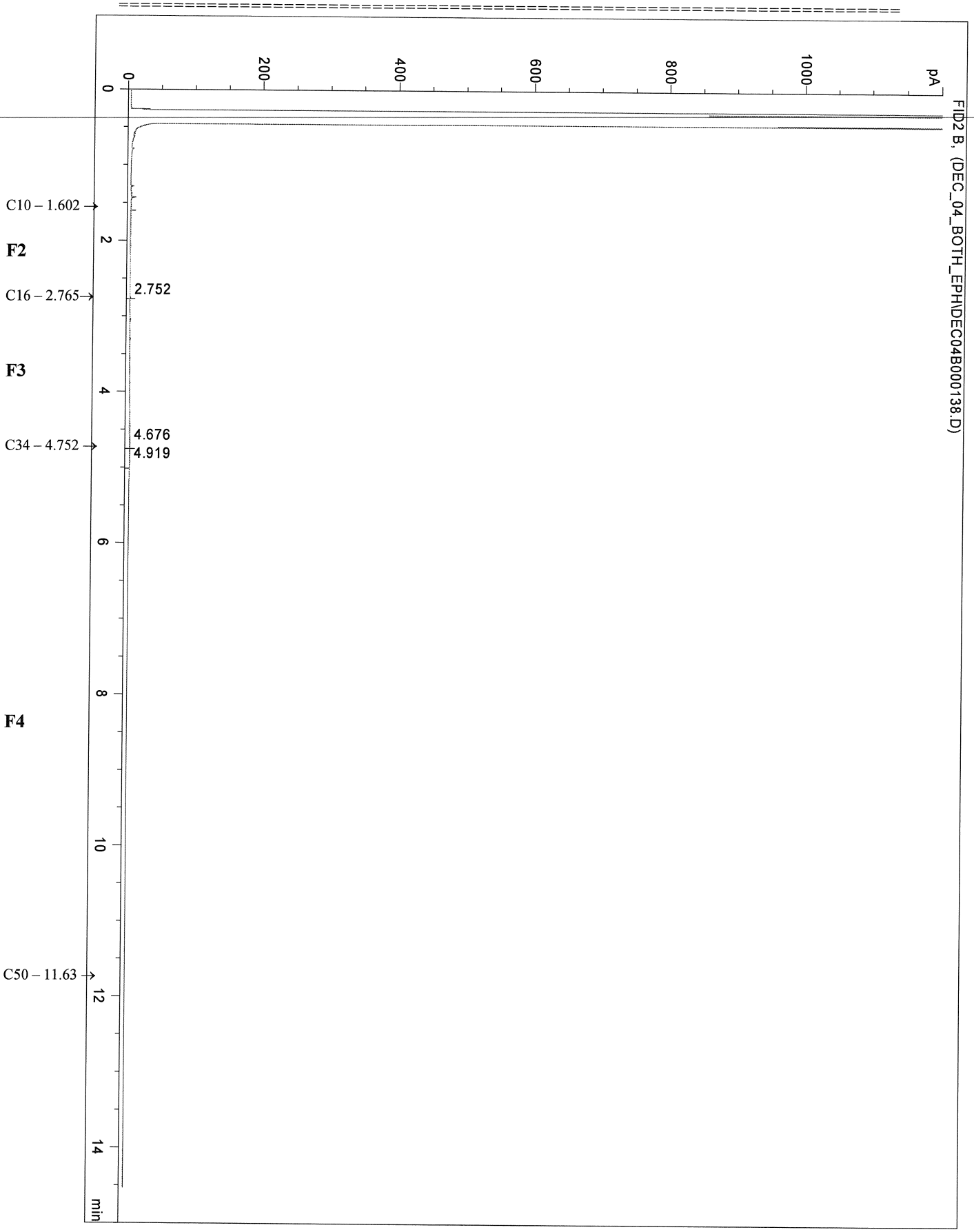
Sample Name: 17491 ephs



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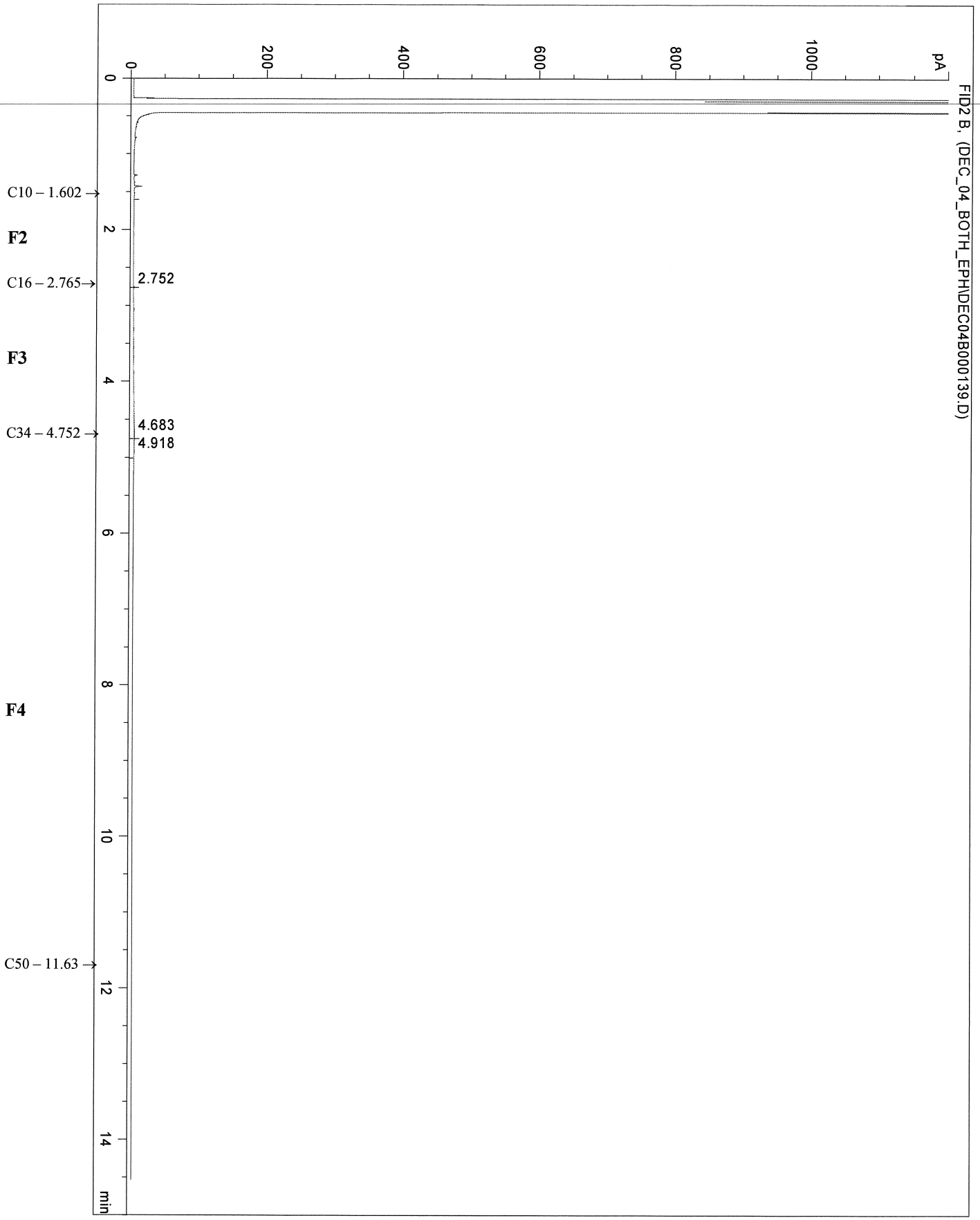

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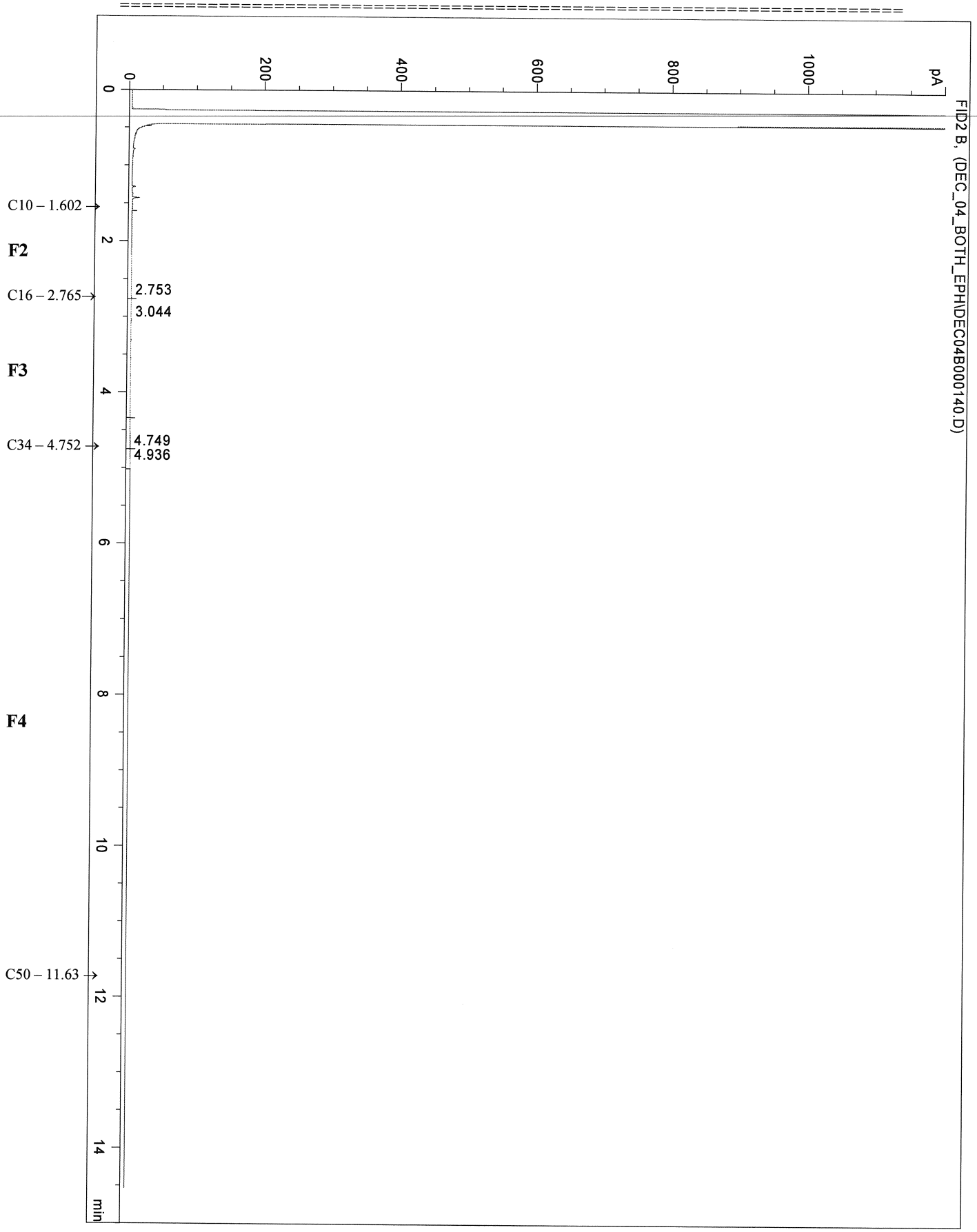
Sample Name: 17493 ephs



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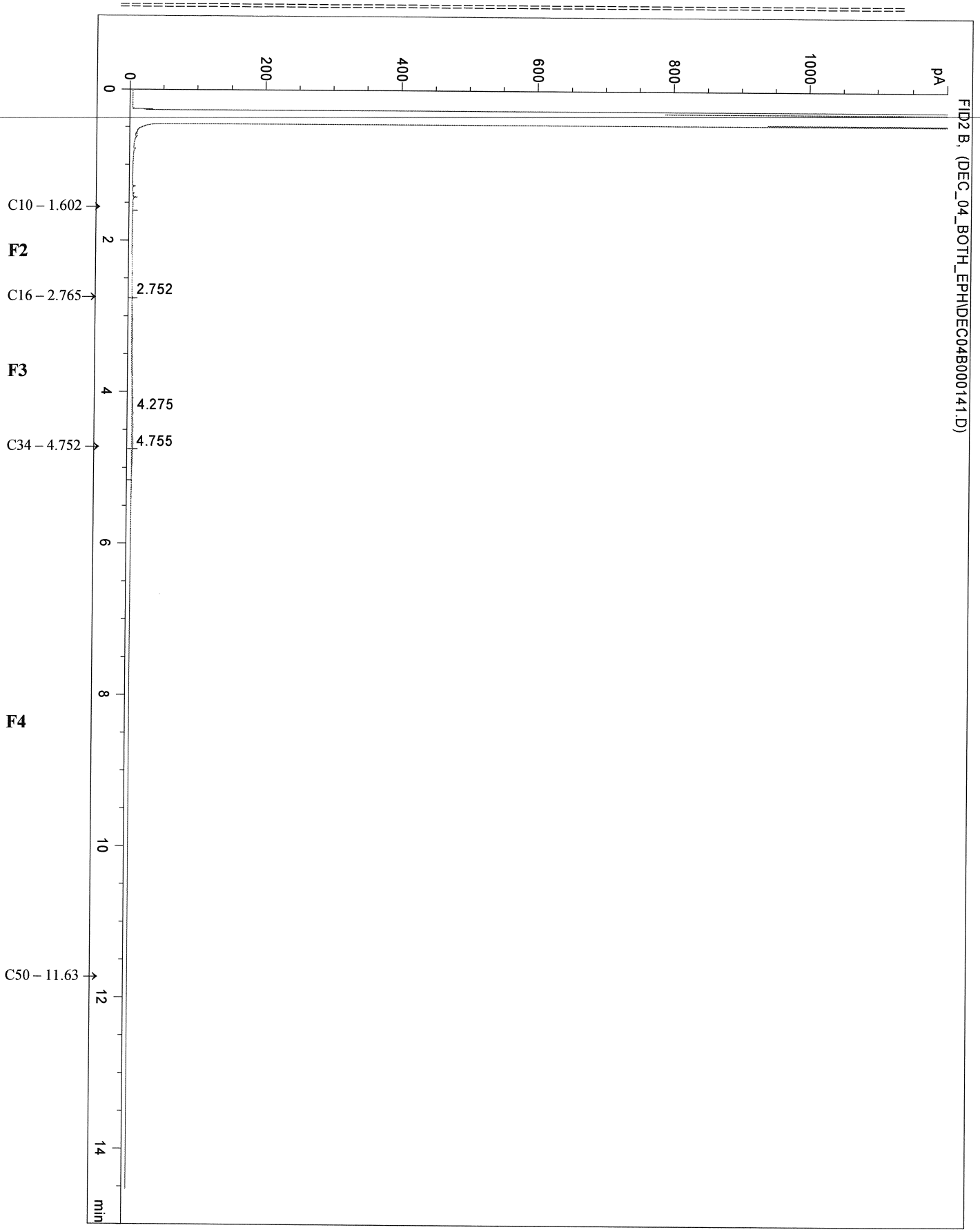
Sample Name: 17495 ephs



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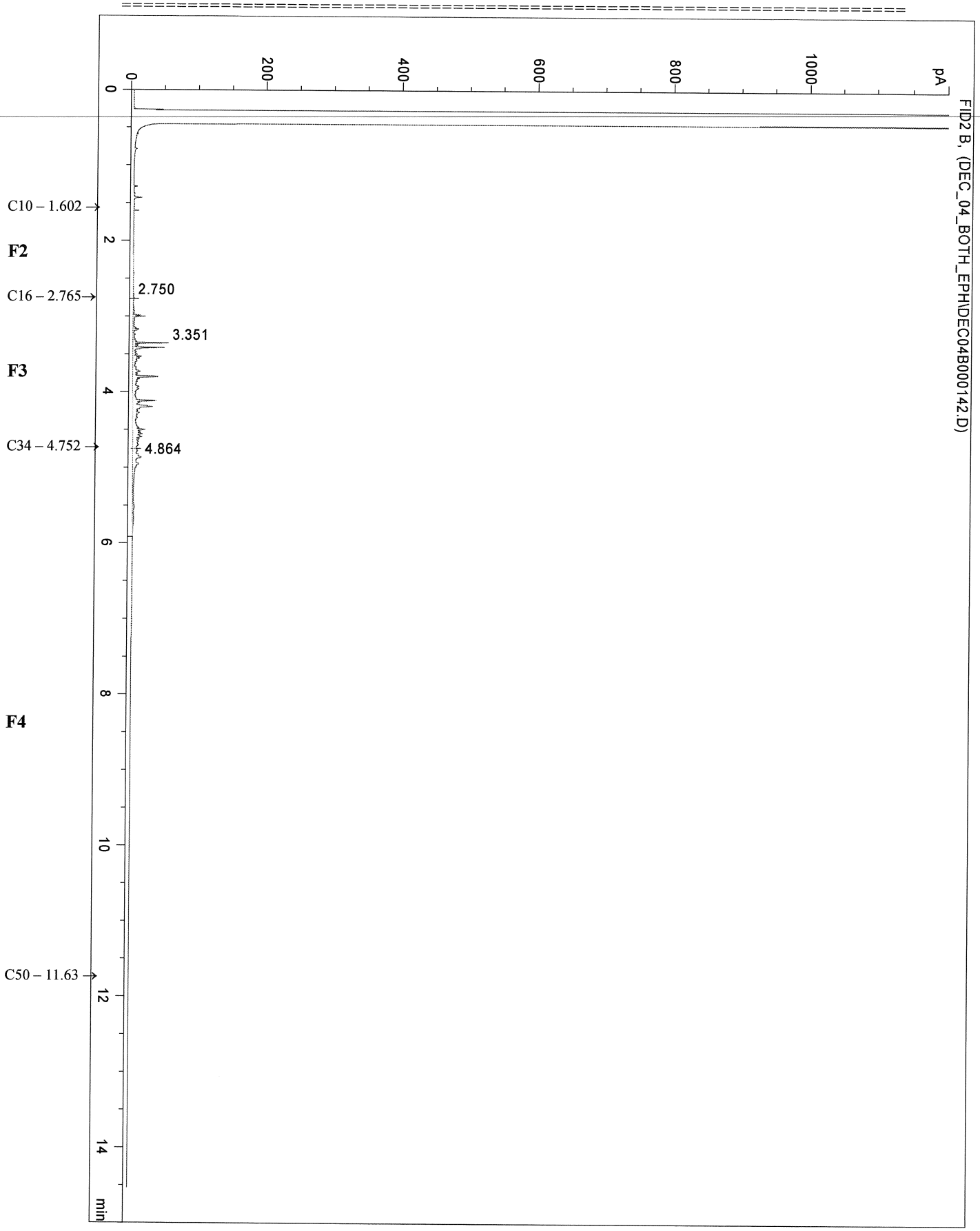
Sample Name: 17496 ephs



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EARTH & ENVIRONMENTAL

EC-C6669

Chain of Custody Record/Analysis Request

Tracking #: 9

ISSUING OFFICE:	AMEC E&I Winnipeg
Project Name:	151 & 171 Princess Street
Job No.:	wx17293
Project Manager:	Patrick Campbell
Phone No.:	204-488-2997
Sampler:	Nathan Bartel

ANALYSIS REQUIRED (Note preferred method)

QUOTED PRICE: ○ YES (Please attach a copy of the quote) ◉ NO

Quote #:

Client Sample ID	AMEC E & E Lab Sample ID (FOR LAB USE ONLY)	Date Collected (yyyy/mm/dd)	Matrix	1L Bottle	250 mL Jar	40 mL Vial	1L Polyethylene	BTEX, F1-F4	VOCs	Metals	Grain Size	PCB	50% RUSH (Please Notify Lab!)	100% RUSH (Please Notify Lab!)
TH13-01 @ 2.3m	13-17477	2013/12/02	soil/sed		X			X	X	X				
TH13-02 @ 3.8 m	8	2013/12/02	soil/sed		X			X	X	X				
TH13-03 @ 0.8m	9	2013/12/02	soil/sed		X			X	X	X		X		
TH13-03 @ 4.5m	80	2013/12/02	soil/sed		X			X	X					
TH13-04 @ 6.1m	1	2013/12/02	soil/sed		X			X	X					
TH13-05 @ 2.3m	2	2013/12/02	soil/sed		X				X	X				
TH13-06 @ 2.3m	3	2013/12/02	soil/sed		X			X	X	X				
TH13-06 @ 6.1m	4	2013/12/02	soil/sed		X			X	X	X				
TH13-07 @ 1.5m	5	2013/12/03	soil/sed		X			X	X	X				
TH13-07 @ 2.3m	6	2013/12/03	soil/sed		X			X	X	X				
TH13-09 @ 2.3m	7	2013/12/03	soil/sed		X			X			X			
TH13-09 @ 3.8m	8	2013/12/03	soil/sed		X			X			X			
TH13-09 @ 6.1m	9	2013/12/03	soil/sed		X			X						
TH13-10 @ 4.5m	90	2013/12/03	soil/sed		X			X						
TH13-11 @ 6.1m	1	2013/12/03	soil/sed		X			X						
TH13-12 @ 3.8m	2	2013/12/03	soil/sed		X			X						
TH13-13 @ 2.3m	3	2013/12/03	soil/sed		X			X			X			
TH13-14 @ 0.8m	4	2013/12/03	soil/sed		X					X				
TH13-14 @ 4.5m	5	2013/12/03	soil/sed		X			X	X					
TH13-15 @ 1.5m	6	2013/12/03	soil/sed		X			X		X				

Receiver's Comments: 7.9°C

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:	Comments:
Signature:	Signature: Troy Woodbeck	Signature:	Signature:	
Printed Name: Nathan Bartel	Printed Name: Troy Woodbeck	Printed Name:	Printed Name:	
Firm: AMEC E&I Winnipeg	Firm: Amec	Firm:	Firm:	
Date/Time: 4-Dec-13 @ 4:00	Date/Time: Dec 5, 2013 9:40 AM	Date/Time:	Date/Time:	

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EARTH & ENVIRONMENTAL

Chain of Custody Record/Analysis Request

Tracking #:

ISSUING OFFICE:	AMEC E&I Winnipeg
Project Name:	151 & 171 Princess Street
Job No.:	wx17293
Project Manager:	Patrick Campbell
Phone No.:	204-488-2997
Sampler:	Nathan Bartel

ANALYSIS REQUIRED (Note preferred method)

QUOTED PRICE

○ YES
Please attach a copy of the quote
◉ NO

Quote #:

Client Sample ID	AMEC E & E Lab Sample ID (FOR LAB USE ONLY)	Date Collected (yyyy/mm/dd)	Matrix	1L Bottle	250 mL Jar	40 mL Vial	1L Polyethylene				BTEX, F1-F4	VOCs	Metals	Grain Size	PCB								50% RUSH (Please Notify Lab!)	100% RUSH (Please Notify Lab!)
TH13-05 @ 6.1m	7	2013/12/03	soil/sed		X							X												

Receiver's Comments

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature:	Signature:	Signature:	Signature:
Printed Name: Nathan Bartel	Printed Name:	Printed Name:	Printed Name:
Firm: AMEC E&I Winnipeg	Firm:	Firm:	Firm:
Date/Time: 4-Dec-13 @ 4:00	Date/Time:	Date/Time:	Date/Time:

Comments:

Castor, Colin

From: Campbell, Patrick D (Winnipeg)
Sent: December-05-13 11:21 AM
To: Castor, Colin
Cc: Connor, Kristine; Bartel, Nathan
Subject: RE: 151 & 171 Princess Street

It should be TH13-15 @ 6.1. This is for VOC analysis.
Thanks

Patrick Campbell, BSc., EP, CRSP
Associate - Environmental Scientist
Manager - Health, Safety & Environmental Services
AMEC ENVIRONMENT & INFRASTRUCTURE | Tel +1.204.488.2997 | Fax +1.204.489.8261

From: Castor, Colin
Sent: Thursday, December 05, 2013 11:26 AM
To: Campbell, Patrick D (Winnipeg)
Cc: Connor, Kristine; Bartel, Nathan
Subject: 151 & 171 Princess Street

Hey Pat,

For the above quoted project the last sample on the CoC is listed as **TH13-05 @ 6.1m** but the jar we have is **TH13-15 @ 6.1m**. Did you want to use that on the report?

Cheers,

Colin Castor
Sample Coordinator
AMEC
Environment & Infrastructure
5667 70 Street, Edmonton, AB, T6B 3P6, Canada
Tel 780-436-2152 x 4568
colin.castor@amec.com
amec.com

Holiday Hours - the AMEC Chemistry Lab will be **closed** at **noon Dec 24** and will re-open **Jan 2, 2014**.
Lockboxes are available for after hour sample drop-off.

For more information on the AMEC Edmonton Chemistry Laboratory (MSDS information, online CoC and bottle order forms etc..) go to.
http://am.amecnet.com/ee/28278.aspx

APPENDIX F
GENERAL CONDITIONS

AMEC ENVIRONMENT & INFRASTRUCTURE, A DIVISION OF AMEC AMERICAS LIMITED
STANDARD TERMS AND CONDITIONS

1) **ENTIRE AGREEMENT.** Upon authorization by the CLIENT and commencement of performance hereunder, these terms constitute the entire agreement between the parties concerning its subject matter. Any changes or additional conditions proposed by CLIENT are hereby rejected, unless expressly stated in the Agreement or incorporated by a change order. CLIENT acknowledges and agrees that its use of any purchase order or other form to procure services is solely for administrative purposes and in no event shall AMEC be bound to any terms and conditions on such form regardless of reference to or signature. CLIENT shall endeavor to reference this Agreement on any purchase order (or any other form), but CLIENT's failure to do so shall not operate to modify this Agreement.
2) **CHANGES.** CLIENT acknowledges that AMEC's services do not include the review of public disclosure documents or preparing consents for regulatory filing purposes. If CLIENT requests such consents from AMEC, CLIENT acknowledges that it will be at CLIENT's cost, and CLIENT shall allow sufficient time for AMEC to perform the necessary review required for completing the consents. Upon receipt of notice from CLIENT of a change in the scope of the work hereunder, AMEC will promptly notify the CLIENT if there is an impact on the schedule, price or terms of the Agreement. Thereafter, an estimate of any impact on the Agreement will be prepared and submitted to the CLIENT. The parties agree to promptly negotiate and implement changes to the Agreement.
3) **SITE INFORMATION AND ACCESS.** The CLIENT shall make available to AMEC all relevant information and documents under his control regarding past, present and proposed conditions of the site. The information shall include, but not be limited to, plot plans, topographic surveys, hydrologic data and previous soil and geologic data including borings, field or laboratory tests and written reports. The CLIENT shall immediately transmit to AMEC any new information that becomes available or any change in plans. The CLIENT shall also ensure uninterrupted site access for AMEC throughout performance of this Agreement.
4) **PERMITS AND UTILITIES.** Unless otherwise stated elsewhere, the CLIENT shall apply for and obtain all required permits and licenses and shall make all necessary arrangements for right of entry to provide AMEC access to the site for all equipment and personnel at no charge to AMEC. The CLIENT shall also provide AMEC with the location of all underground utilities and structures in the exploration area. AMEC is not responsible for location or identification of utilities.
5) **PAYMENT AND SUSPENSION.** Unless otherwise stated in the Proposal, invoices will be submitted by AMEC either at the completion of the work or on a monthly basis and will be due and payable on the invoice date. Invoices not paid within thirty (30) days of the invoice date shall be subject to a late fee of one and one-half percent (1.5%) per month computed at 31 days from the date of invoice. In addition, any collection fees, legal fees, court costs, and other related expenses incurred by AMEC in the collection of delinquent invoice amounts shall be paid by CLIENT. **IN THE EVENT CLIENT DISPUTES ALL OR PART OF AN INVOICE, CLIENT MUST ADVISE AMEC IN WRITING WITHIN FIFTEEN (15) DAYS FROM INVOICE DATE**. **UNDISPUTED PORTIONS ARE SUBJECT TO PAYMENT WITHIN THIRTY (30) DAYS.** AMEC may suspend performance of services under this Agreement if: 1) CLIENT fails to make payment in accordance with the terms hereof, 2) CLIENT becomes insolvent, enters bankruptcy, receivership, or other like proceeding (voluntary or involuntary) or makes an assignment for the benefit of creditors, or 3) AMEC reasonably believes that CLIENT will be unable to pay AMEC in accordance with the terms hereof and notifies CLIENT in writing prior to such suspension of services. If any such suspension causes an increase in the time required for AMEC's performance, the performance schedule and/or period for performance shall be extended for a period of time equal to the suspension period.
6) **OWNERSHIP RIGHTS.** Any documents produced by AMEC shall be the sole property of AMEC. At the request and expense of the CLIENT, AMEC shall provide the CLIENT with copies of any or all drawings, specifications and other documents prepared by AMEC.
7) **STANDARD OF CARE.** In the performance of professional services, AMEC will use that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession practicing in the same or similar localities. No warranty, either express or implied, is made or intended by this Agreement or by furnishing oral or written reports of the findings. AMEC is to be liable only for damage proximately caused by the negligence of AMEC. The CLIENT recognizes that subsurface conditions may vary from those encountered at the location where borings, surveys or explorations are made by AMEC and that the data, interpretations and recommendation of AMEC are based solely on the information available to him. AMEC will not be responsible for the interpretation by others of the information developed.
8) **INSURANCE.** AMEC will maintain insurance for this Agreement in the following types: 1) worker's compensation insurance at statutorily required levels, 2) comprehensive general liability (CGL) insurance and 3) automobile liability insurance for bodily injury and property damage.
9) **ENVIRONMENTAL LIABILITY.** Because CLIENT owns and/or operates the site where work is being performed, CLIENT has and shall retain all responsibility and liability associated with the environmental conditions at the site. Unless specifically identified elsewhere, CLIENT'S responsibility and liability includes the handling and disposal of any samples or hazardous materials generated on the site as a result of AMEC's performance hereunder.
10) **CONSEQUENTIAL DAMAGES.** AMEC shall NOT be responsible for any consequential, incidental or indirect damages.
11) **LIMITATION OF LIABILITY.** ***Notwithstanding any other provision of this Agreement, the total liability of AMEC, its officers, directors and employees for liabilities, claims, judgments, demands and causes of action arising under or related to this Agreement, whether based in contract or tort, shall be limited to the total compensation actually paid to AMEC for the services hereunder or $50,000, whichever is less. All claims by CLIENT shall be deemed relinquished unless filed within one (1) year after substantial completion of the services hereunder.***
12) **DISPUTES.** Any dispute arising hereunder shall first be resolved by taking the following steps, where a successive step is taken if the issue is not resolved at the preceding step: 1) by the technical and contractual personnel for each party performing this Agreement, 2) by executive management of each party, 3) by mediation or 4) through the court system of the jurisdiction of the AMEC office that entered into this Agreement. CLIENT hereby waives the right to trial by jury for any disputes arising out of this Agreement. Except as otherwise provided herein, each party shall be responsible for its own legal fees and costs.
13) **AUTHORIZATION TO SIGN.** The person signing this Agreement warrants that he has authority to sign as, or on behalf of, the CLIENT for whom or for whose benefit AMEC's services are rendered. If such a person does not have such authority, he agrees that he is personally liable for all breaches of this Agreement, and that in any such action against him for breach of such warranty, reasonable legal fees and costs shall be included in a judgment rendered.
14) **ASSIGNMENT.** Neither party shall assign its interest in this Agreement without the written consent of the other except that AMEC may assign its interest in the Agreement to related or affiliated companies of AMEC without the consent of CLIENT.
15) **CHOICE OF LAWS.** This Agreement shall be governed by the laws of the province of the AMEC office performing the work.
16) **FORCE MAJEURE.** Should performance of services by AMEC be affected by causes beyond its reasonable control, including but not limited to: acts of God; acts of a legislative, administrative or judicial entity; acts of contractors other than contractors engaged by AMEC; fires; floods; labor disturbances; unusually severe weather and/or an epidemic; then CLIENT will grant AMEC a time extension and the parties will negotiate an equitable adjustment to the price of any affected services, where appropriate.
17) **FIELD REPRESENTATION.** Unless otherwise expressly agreed in writing, AMEC shall not be responsible for the safety or direction of the means and methods at the CLIENT's site of contractors or their employees or agents that are not hired by AMEC, and the presence of AMEC at the CLIENT's site will not relieve the contractor of its responsibilities for performing the work in accordance with applicable regulations, or in accordance with project plans and specifications. If necessary, CLIENT will advise any contractors that AMEC's services are so limited. AMEC will not assume the role of "prime contractor", "principal contractor", "constructor", "controlling employer", or their equivalents unless the scope of such services are expressly agreed in writing.
18) **TERMINATION.** This Agreement may be terminated by either party upon ten (10) days written notice to the other. In the event of a termination, Client shall pay for all reasonable charges for work performed and demobilization by AMEC to date of notice of termination. The limitation of liability and indemnity obligations of this Agreement shall be binding notwithstanding any termination of this Agreement.
19) **ANTI-BRIBERY.** The Parties undertake to protect the standards of business practice of the other Party at all times and to act in such a way as to uphold the good name and reputation of the other Party and not to do or attempt to do any act or thing which is intended to and/or which in fact causes any damage to or brings discredit upon the other Party and, in particular, the Parties will not:
    (a) Offer or give or agree to give to any director, officer, employee or agent of the other Party or any other entity any gift or consideration of any kind as an inducement or reward for doing or for forbearing to do or for having done or forborne to do any action in relation to the obtaining or execution of any contract or for showing or forbearing to show any favor or disfavor to any person in relation to any contract.
    (b) Induce or attempt to induce any officer, servant or agent of any private or public body to depart from his duties to his employer nor be involved with any such arrangement.