

# **Proposal for Annexation**

**Submitted by: The Council of the City of Brandon**

**Submitted to: The Manitoba Municipal Board**



April 18, 2017

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E	Geotechnical Report
F	Water and Sanitary Assessment
G	Drainage Study
H	Transportation Summary
I	Brandon land Inventory
J	Brandon Growth Projections
K	Brandon Economic Growth Strategy 2014-2019 <a href="http://www.economicdevelopmentbrandon.com/images/pdf/EDB_Strategy_Booklet%202014-2019.pdf">http://www.economicdevelopmentbrandon.com/images/pdf/EDB_Strategy_Booklet%202014-2019.pdf</a>
L	Brandon and Area Planning District Development Plan <a href="http://www.brandon.ca/images/pdf/developmentServices/planning/By-laws/2015developmentPlan.pdf">http://www.brandon.ca/images/pdf/developmentServices/planning/By-laws/2015developmentPlan.pdf</a>
M	Brandon & Area Planning District Fringe Area Growth Strategy <a href="http://www.brandon.ca/images/pdf/planning/GrowthStrategy/adoptedGrowthStrategy.pdf">http://www.brandon.ca/images/pdf/planning/GrowthStrategy/adoptedGrowthStrategy.pdf</a>

# 1 Introduction

## 1.1 Council Resolution

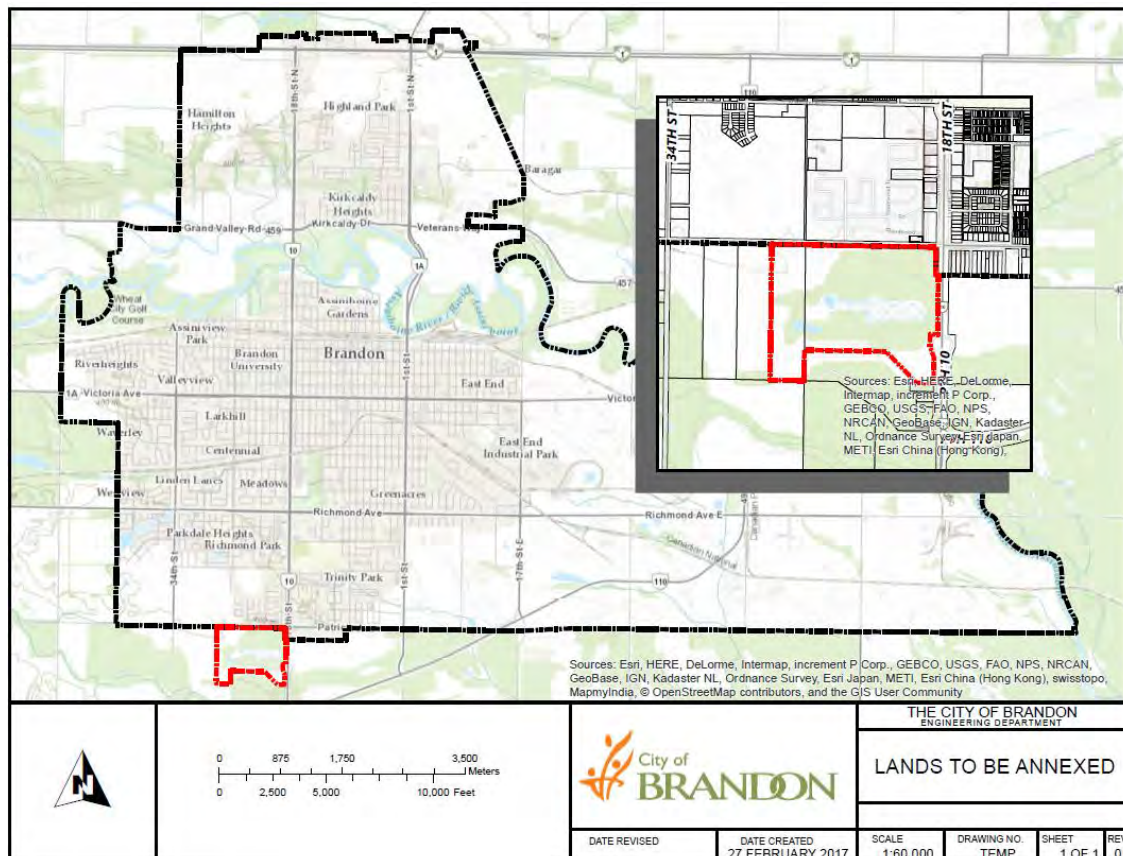
On April 18, the Council of the City of Brandon passed the following resolution to submit an annexation application to The Municipal Board:

*“That the proposal to annex lands from the Rural Municipality of Cornwallis attached to the report of the Chief Planner as “Attachment A”, be submitted to The Municipal Board and that Administration initiate consultations in accordance with Section 71(1) of The Municipal Act.”*

## 1.2 Location

The City of Brandon (“the City”) is proposing to annex a 69-hectare (170-acre) site from the Rural Municipality of Cornwallis (“the RM”) located to the southwest of the PTH 10 and Patricia Avenue intersection as shown on Map 1 below. The contour plan with site dimensions is attached as Schedule A.

Map 1: Location of land



### **1.3 Land Description**

FIRSTLY: THE NE ¼ OF SECTION 3-10-19 WPM  
EXC: GRAVEL PIT PLAN 1368 BLTO  
AND EXC: ROAD PLANS 538 AND 36987 BLTO

SECONDLY: THE E1/2 OF LEGAL SUBDIVISIONS 11 AND 14 OF  
SECTION 3-10-19 WPM

### **1.4 Names and Contacts of Municipalities Affected**

City of Brandon  
638 Princess Avenue  
Brandon, MB R7A 0P3  
Attention: Chief Planner – Ryan Nickel  
E-mail: [r.nickel@brandon.ca](mailto:r.nickel@brandon.ca)  
Phone: 204-729-2124

Rural Municipality of Cornwallis  
Site 500, Box 10, R.R. #5  
Brandon, MB R7A 5Y5  
Attention: CAO – Donna Anderson  
E-mail: [donna@gov.cornwallis.mb.ca](mailto:donna@gov.cornwallis.mb.ca)  
Phone: 204-725-8681

### **1.5 Ownership**

VBJ Developments Ltd. is the sole owner of the site. The status of title is attached as Schedule B, and a letter of support from VBJ Developments is attached as Schedule C.

## 1.6 Context and Existing Conditions

### ***Current Land Use***

The site is designated Agricultural in the Brandon & Area Planning District Development Plan 2013 (“the Development Plan”) and zoned Agricultural “AG80” in the RM of Cornwallis Zoning By-law 1558/09/99. Portions of the site are currently in use for haying purposes.

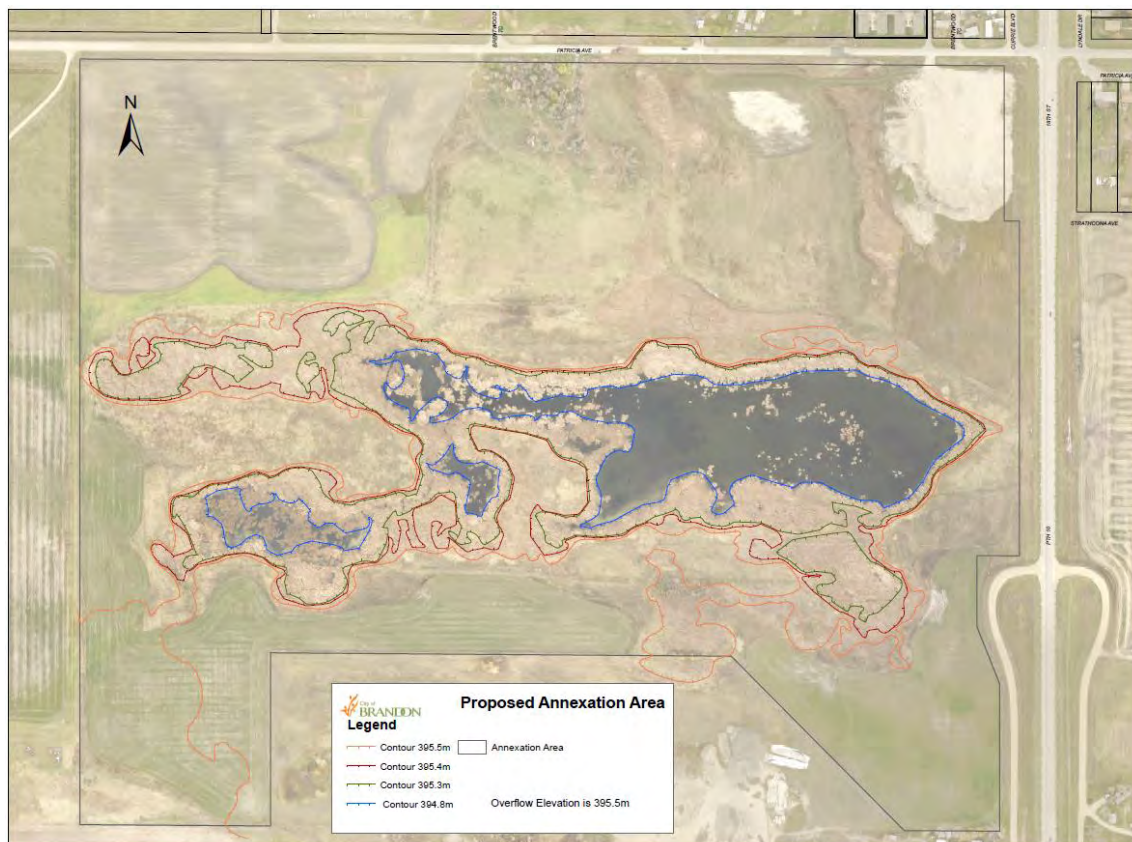
### ***Adjacent Land Uses***

The site is located south of Patricia Avenue and existing urban residential and commercial developments in the City. PTH 10 borders the land to the east and a 16.2ha (40 acre) rural residential lot is located to the west. A Manitoba Infrastructure utility yard and five rural residential lots are located to the south.

### ***Wetland Area***

A Class IV wetland (semi-permanent pond and lake) is located on the site. The wetland provides stormwater retention for a drainage catchment area, which includes properties located in the City. The natural storage volume of the existing basin is approximately 85,000m<sup>3</sup> and encompasses an area shown on Map 3 below.

*Map 3: Boundary of natural storage on property*



***Environmental***

A phase 1 environmental site assessment was completed for the site (Schedule D). The potential for subsurface contamination at the site as a result of on- or off-site sources is considered low.

***Geotechnical***

A geotechnical report was completed for the site (Schedule E). The report identifies the area as having a high water table and soft surface material, and provides recommendations for constructing building foundations in the area.

***Other Conditions***

No other physical constraints (e.g. aggregate deposits or environmental considerations) are identified on the site.

## **2 Background**

### **2.1 Previous Annexation**

The City recently completed an annexation in 2011:

- The City proposed to annex lands to the southwest of the City boundary on March 6, 2008
- The proposal included three quarter-sections of land for residential development
- The Manitoba Municipal Board heard the application on August 13, 2010 and recommended that two of the three quarter-sections be annexed subject to conditions (Order No. E-10-15)
- The conditions included servicing of existing lots, terms of compensation, phasing of taxes and limits on future residential annexations (demonstrated land supply of less than 20 years)
- The annexation agreement was executed between the City and the RM on November 3, 2011

### **2.2 Brandon & Area Planning District Fringe Area Growth Strategy**

Following the 2011 annexation, the Brandon & Area Planning District (“the Planning District”) undertook The Brandon & Area Planning District Fringe Area Growth Strategy (“the Growth Strategy”) to provide a framework for future urban growth. One of the reasons for the Growth Strategy (Schedule F) is to improve communication and cooperation between the member municipalities on fringe area development requests.

### **2.3 Urban Expansion Application**

The Brandon & Area Planning District Board (“the Board”) adopted a process whereby the impacted municipalities must collaboratively review all development applications for urban expansion prior to an application for annexation. The Board established an intermunicipal committee comprised of elected officials from the RM of Elton, the RM of Cornwallis and the City of Brandon to review all urban expansion requests. The intermunicipal committee received an urban expansion request from VBJ Developments Ltd. on May 15, 2015 for the subject site.

The intermunicipal committee executed a Memorandum of Understanding (MOU) with VBJ Developments Ltd. to initiate the completion of all relevant background studies to evaluate the request. This proposal includes a summary of all the studies and demonstrates compliance with the terms of the MOU.



## 3 Development Concept

### 3.1 Proposed Land Uses

The driver of the annexation request is 20 hectares (50 acres) of land on the subject site identified for regional retail development located directly southwest of the PTH 10 and Patricia Avenue intersection as shown on Map 3 below. The regional retail development area projects to accommodate 37,161 square metres (400,000 square feet) of commercial floor area at full built-out. The residual portion of the site is proposed for a mixture of residential uses and types (approximately 1,000 dwelling units).

*Map 3 – Development Concept*



### 3.2 Timing of Development

The buildout of regional retail will include multiple phases with full build-out completed within five and ten years based on market demand. The initial phase is anticipated to include one major anchor tent along with pad sites for restaurants, a gas station and smaller retail spaces. The residential portion is identified for longer-term growth (20+ years).

## 4 Reasons for Annexation

The annexation is necessary for two reasons described in this section: a shortage of commercial land and land required for storm management.

### 4.1 Reason #1—Shortage of Land for Regional Retail Development

The Brandon Growth Forecast Final Report prepared by SJ Research Services (Schedule I) projects the City having a shortage of developable regional retail land, especially in the south growth area. The City will require additional commercial land in the south growth area.

- The City is the education, health, entertainment, commercial and retail centre for a growing trading area of over 180,000 people
- The City has a population of 48,859 (2016 Census) and has grown by 7,348 residents or 15% over the past 10 years
- The role of the City as a regional service centre and the growth of the city has increased the demand for all services, including regional retail
- The Brandon Growth Forecast Final Report projects the City to have sufficient commercial designated land supply to accommodate 15-20 years of growth
- The target in the Brandon and Area Planning District Growth Strategy for designated lands is 20-30 years
- The majority of the City's commercial designated land (80%) is located in the north growth area
- The majority of the City's residential growth (65%-75%) is occurring in the south growth area
- No commercial designated land exists in the south growth area which can be developed for regional retail
- The location of the proposed annexation is in the south growth area, directly south of the City and west of PTH 10 (the main commercial corridor in the City)

### 4.2 Reason #2—City Storm Water Network

The site proposed for annexation contains a wetland that is an essential part of the City's storm water management network.

- A class IV wetland (semi-permanent pond and lake) is located on the site
- The natural storage of storm water in the wetland is approximately 85,000m<sup>3</sup>
- The natural storage serves a catchment area, which includes 105 hectares (237 acres) currently located within the City
- At this time there is very little oversight to works being undertaken on the site
- Annexing the lands will allow the City to have the wetland/retention pond area dedicated as public reserve during development of the site
- The wetland/retention pond area, dedicated as a public reserve, will allow the City to operate and maintain the area as part of the overall drainage network

## 5 Principles for Annexation

The proposal complies with the six principles for annexation as determined by The Manitoba Municipal Board.

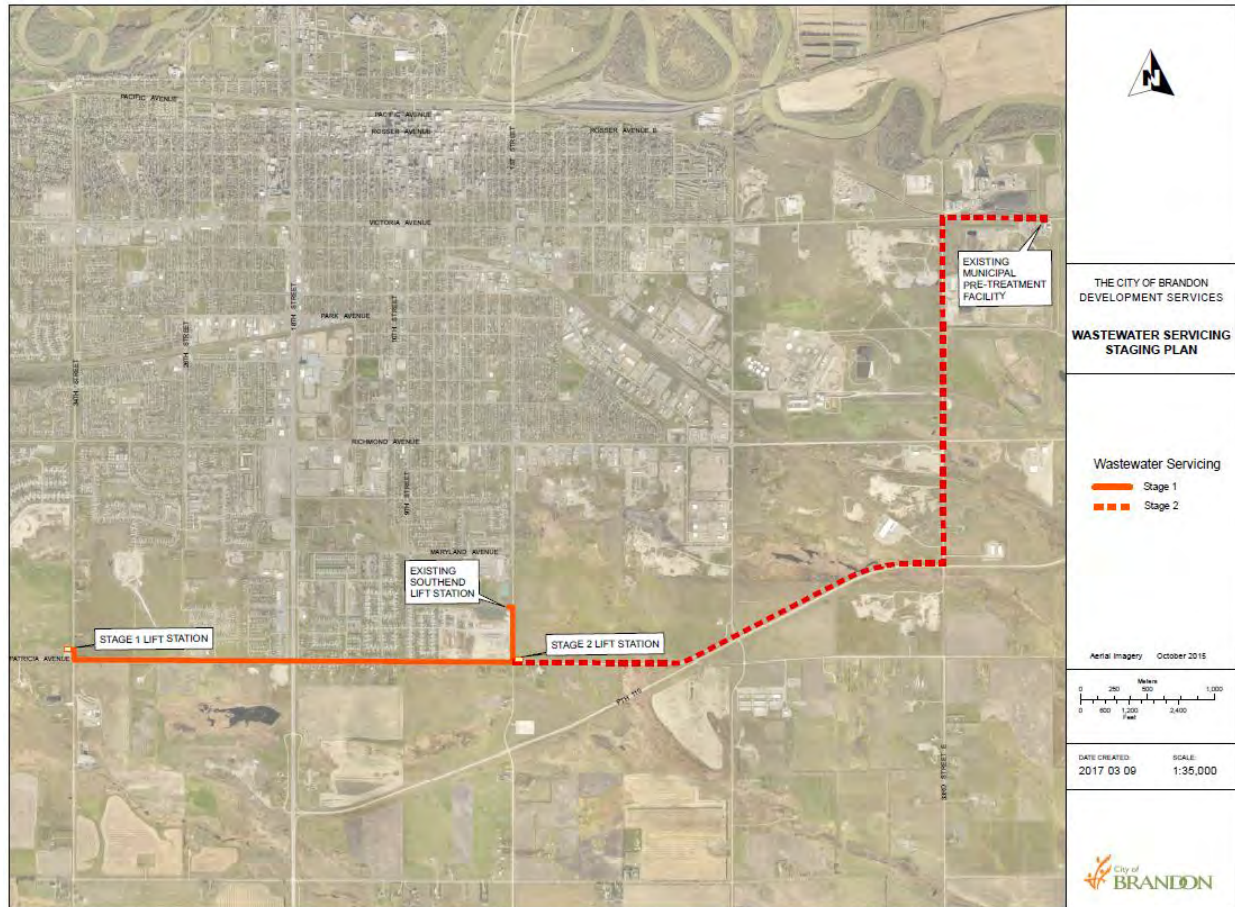
### 5.1 Principle #1—Servicing

#### *Water and Wastewater*

The City prepared a water and wastewater servicing assessment (Schedule F). The following are the key findings:

- The water service connection to the subject site will be to the existing 300mm watermain within the Patricia Avenue right-of-way
- The capacity in the water network is sufficient to accommodate the development to full build-out
- The wastewater network requires two stages of capital infrastructure investment to accommodate the full build-out of the development, along with other developments in the south growth area, as shown in Map 4 on the following page
  - Stage 1 includes a new lift station at 34<sup>th</sup> Street and Patricia Avenue and a new forcemain running east to the lift station at 1<sup>st</sup> Street and Patricia Avenue
  - Stage 2 includes a new a new lift station at 1<sup>st</sup> Street and Patricia Avenue and a new forcemain running east from 1<sup>st</sup> Street along PTH 110 to the Municipal Pre-Treatment Facility
- Proceeding with Stage 1 requires sufficient flow to proceed with the proposed Patricia Avenue and 34<sup>th</sup> Street lift station
  - In the interim, a portion of the development (maximum of 2.1 litres/second peak design flow) can connect temporarily to a 200mm domestic sewer located directly to the north of the site. This temporary connection shall be terminated at the time the stage 1 improvement is constructed.
  - The interim solution requires the wastewater main along Maryland Avenue between Tracey Street and 9<sup>th</sup> Street to be upgraded

Map 4: Conceptual Wastewater Staging Plan



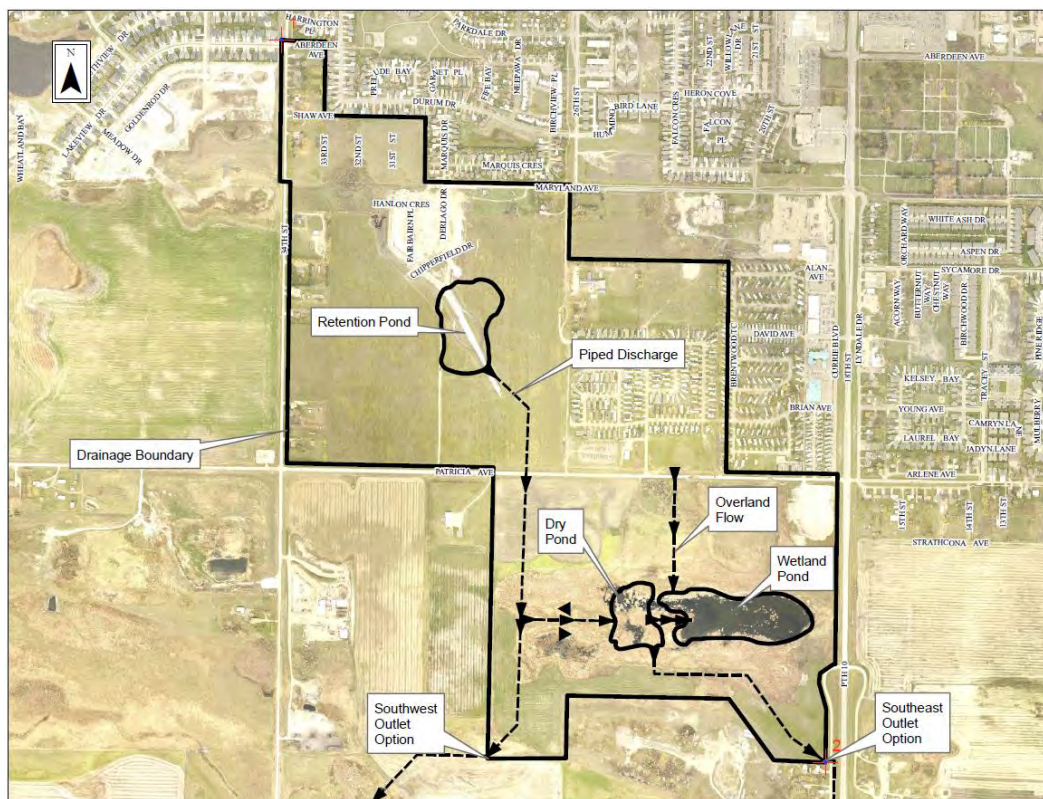


## Drainage

WSP prepared a conceptual drainage plan on behalf of VBJ Development Ltd. (Schedule G). The following are the key findings:

- A Class IV wetland (semi-permanent pond and lake) is located on the site
- The wetland area is 36.4 hectares (89.9 acres), consisting of 5.5 hectares (13.6 acres) of deep marsh zone, 11.4 hectares (28.2 acres) of shallow marsh zone, 9.5 hectares (23.5 acres) of wet meadow zone and 11.0 hectares (27.2 acres) of low prairie zone
- The deepest part of the wetland is located in the deep marsh zone and has a depth of 1.2m
- The natural storage volume of the site is approximately 85,000m<sup>3</sup>
- The overall drainage boundary (catchment) area is 177.4 hectares (438 acres), which includes 105 hectares (237 acres) located in the City
- The establishment of a wetland pond will be included in the general shape and function of the deep marsh and shallow marsh zones of the wetland feature
- A dry pond will be interconnected to the wetland pond and sized to contain a 100-year storm event
- The wetland pond is recommended to include a slope of 6:1 to maintain a more naturalized border, including a 10-metre buffer zone of the shallow marsh zone
- Two outlet options are identified, including the Gun Club Coulee to the west and the PTH 10 ditch to the east (Map 5)

Map 5: Conceptual Drainage Plan

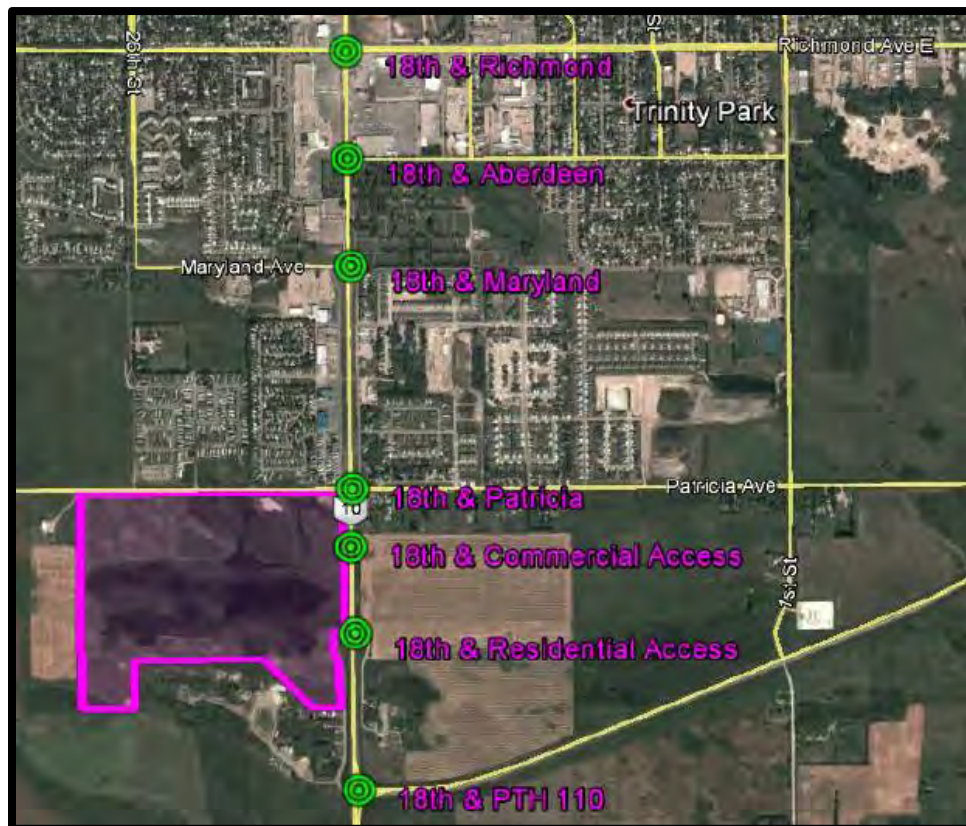


### ***Transportation***

WSP prepared a preliminary traffic study on behalf of VBJ Developments Ltd. (Schedule H). The following are the key findings:

- The study estimates high level impacts of the development on the adjacent roadway network
- The area for the study includes the evaluation of signalized intersections along 18<sup>th</sup> Street from Richmond Avenue to PTH 110 (Map 6)
- The Richmond Avenue and 18<sup>th</sup> Street intersection and the Patricia Avenue and 18<sup>th</sup> Street intersection may require upgrades to accommodate traffic from the development at full build-out
- Further analysis of the two intersections will be completed once detailed plans are completed

*Map 6: Signalized Intersections Evaluated*



### ***Community Services***

As new development occurs the demand for community services (e.g. police, fire/EMS, parks, libraries, recreation facilities, transit, administration) increases. As the land develops, City Council will evaluate the need to increase operating and maintenance allocations to provide services to the new businesses and residents.

### ***Education Services***

The subject site is located within the Brandon School Division (BSD). BSD has identified plans for the students from the annexed site to attend a new school to be constructed in the southwest area of the City (Brookwood South Neighbourhood).

### ***Health Services***

The Prairie Mountain Health Region currently provides health services to City residents and will provide health services to the subject site.

## **5.2 Principle #2—Social and Economic Ties**

VBJ Developments Ltd. is the sole owner of the site. VBJ Developments Ltd. is proposing to develop the site for urban commercial and urban residential purposes. As an urban commercial/residential developer, the sole landowner has social and economic ties to the City.

## **5.3 Principle #3—Land Uses in Area**

The proposed land uses include urban commercial and urban residential development. The Development Plan identifies that urban commercial and urban residential designations are to locate in the City. The location of the proposed annexation is to the west of PTH 10, which is the main commercial corridor in the City and an appropriate location for regional-scale commercial development.

## **5.4 Principle #4—Viability and Future Growth – Land Supply and Demand**

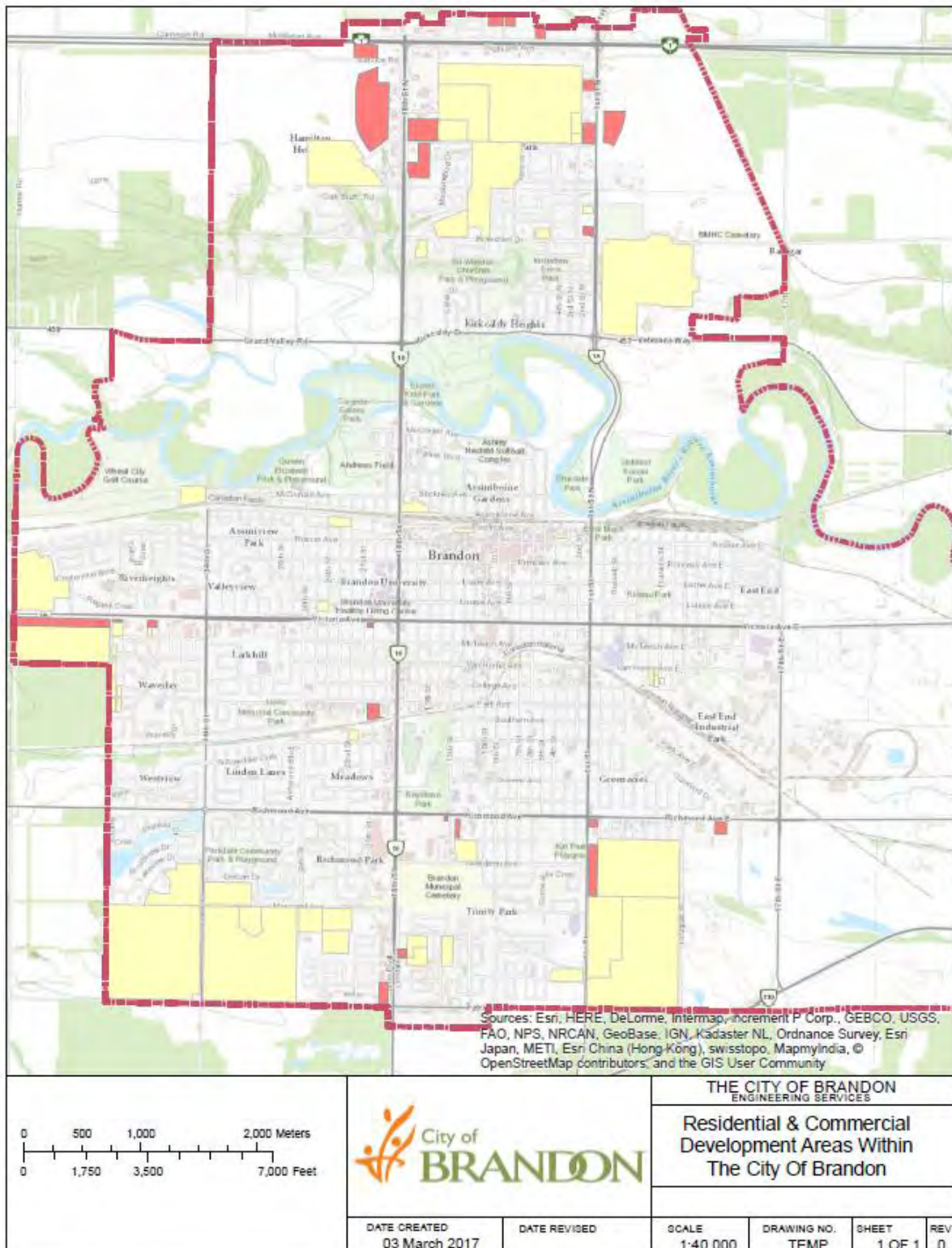
### ***Land Supply***

The City completed an inventory (Schedule I) of all undeveloped and underdeveloped properties available for residential and non-residential development in the City of Brandon (Map 7) as designated in the Development Plan.

- Residential designated areas (yellow) can accommodate 9,000-10,000 dwelling units
- Commercial designated areas (red) include 54 hectares (133 acres) which can accommodate 300,000m<sup>2</sup> (3,200,000ft<sup>2</sup>) of commercial floor area
- The south growth area includes nine hectares (22.2 acres) of commercial designated land



Map 7: Residential and Commercial Supply





### **Land Demand**

SJ Research Services provided a land development forecast for the City (Schedule I). Table 1 below identifies residential unit and commercial land area projections for a 30-year growth period.

*Table 1: Residential and Commercial Demand*

Year	Housing Starts (units)	Commercial (ha)
2020	1,362	14
2025	2,768	28
2030	4,214	43
2035	5,695	58
2040	7,209	72
2045	8,748	87

### **Summary**

- Residential designated areas are projected to accommodate 30-35 years of residential growth
- Commercial designated areas are projected to accommodate 15-20 years of commercial growth
- During the past 5-10 years, the majority of new residential dwelling units (65% to 75%) have been constructed in the south growth area
- No commercial designated areas exist in the south growth area which can accommodate regional retail development

## **5.4 Principle #4—Viability and Future Growth – Policy Analysis**

### ***Prosperity by Design (Economic Development Strategy) 2014-2019***

The City's Economic Development Strategy focuses resources on strategic directions and targeted sectors for continued growth. Highlights of the strategy are as follows:

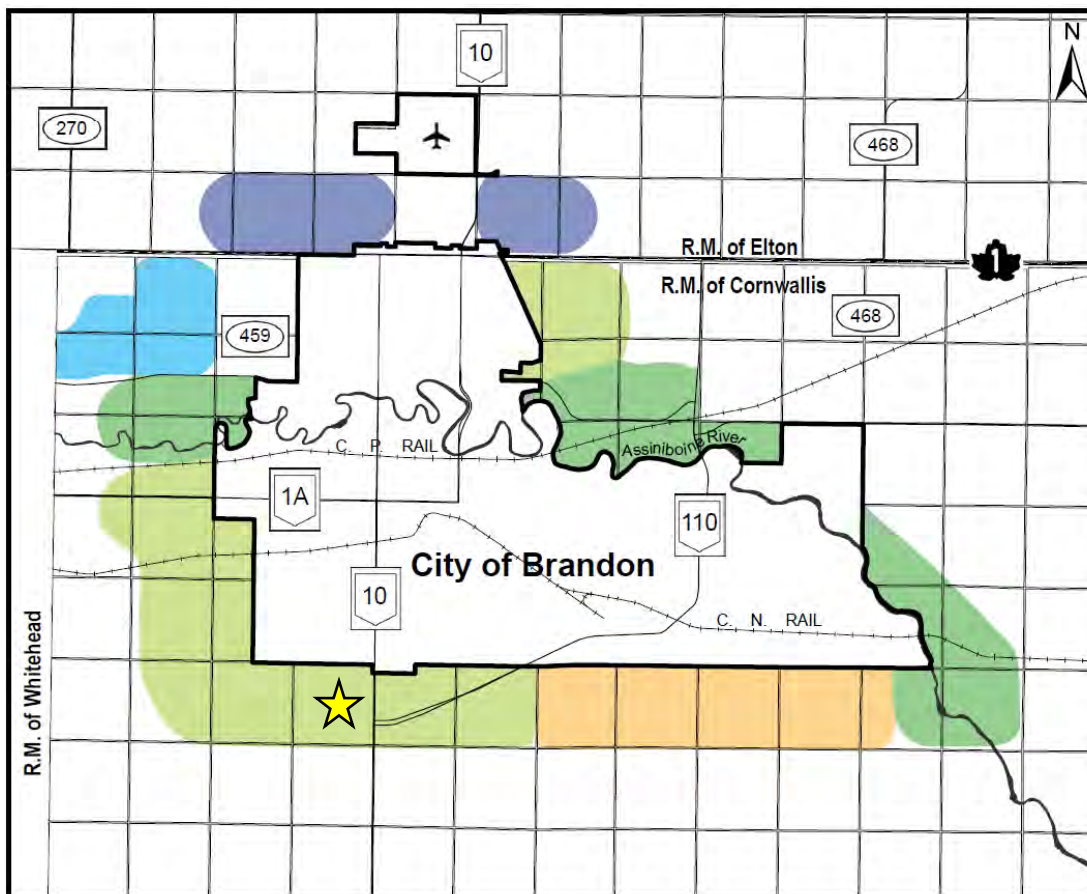
- One of the five target sectors identified in the strategy is regional retail to enhance the City's role as a regional retail service centre
- Proven demand exists for an expansion of regional retail
- The City is a regional service centre with a growing population and increasing household income
- Retail "leakage" is occurring due to the shortage of developable land and lack of infrastructure to the most desirable sites
- Target of an additional 400,000 square feet of retail space over the length of the strategic plan (by end of 2019)
- The City will proactively attract new regional retail development

### ***Brandon & Area Planning District Development Plan, 2013***

The Development Plan provides direction on future urban growth in the Planning District.

- The annexation is for lands directly to the south of the City and located in an area identified for future urban residential, recreational, institutional and commercial land uses (light green on Map 8).
- The proposal complies with the criteria for new development (Policy 11.2.2)
  - The subject site is not identified as an aggregate resource
  - Infrastructure services appropriate for the development have been provided
  - The site is located on the north side of the PTH 110 corridor where the majority of development already exists
  - The proposal demonstrates a need for an additional supply of urban commercial designated land

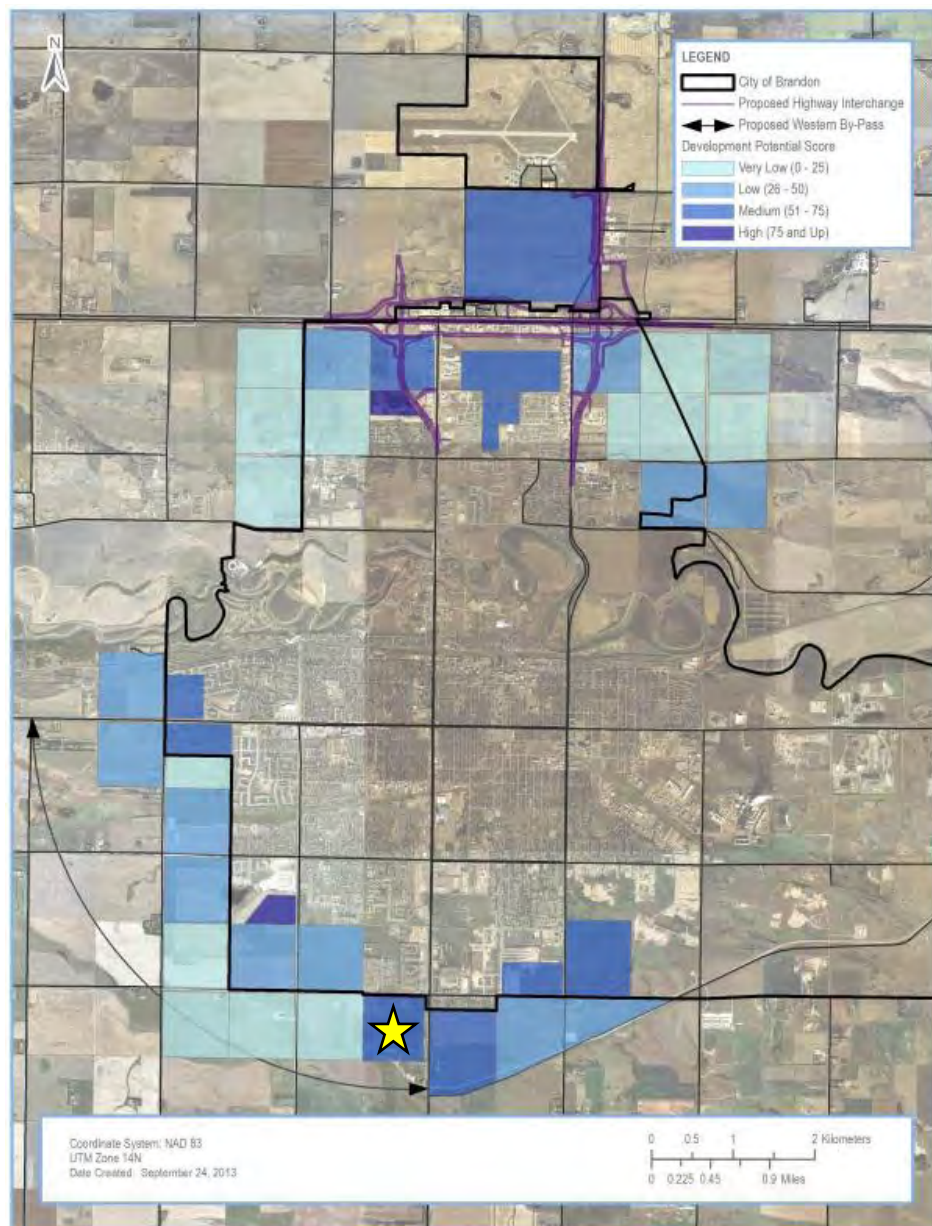
*Map 8: Future Growth (Reference Map 10 of Development Plan)*



### ***Brandon & Area Planning District Fringe Area Growth Strategy***

The Growth Strategy refines the growth areas in the Development Plan. The Growth Strategy coordinates infrastructure and land use planning by identifying areas where urban growth is likely to occur in the immediate, intermediate and long term horizons. The evaluation of the lands in the Growth Strategy identified the subject site as having “medium” development potential (Map 8). The site’s “medium” development potential score was primarily a result of the high probability of commercial/regional retail development.

*Map 9: Development Potential of Fringe Area*



The proposal complies with the following Growth Strategy policies:

- The site is located in the southeast Brandon growth node (Policy 6.2.1)
- The annexation is necessary to provide an adequate urban commercial designated land supply within the City (Policy 6.1.4)
- The site is located north of the conceptual plan for the future PTH 110 westerly extension (Policy 6.2.2)
- The site is a priority three area (long-term growth) in the growth strategy (Policy 6.3.1) and complies with the three criteria for urban development:
  - Complies with policies in the Growth Strategy and the Development Plan
  - Located in a Growth Node
  - Complies with the targeted land supply of 20-30 years
- The proposal demonstrates the serviceability of the site as part of the larger infrastructure network and identifies a plan to increase capacity to accommodate the development (Policies 6.5.1 & 6.5.2)
- The proposal includes terms to compensate the RM for the loss of potential property tax revenues

## 5.5 Principle #5—Will of the People

VBJ Developments Ltd. is the sole owner of the site. A letter of support from VBJ Development Ltd. is attached to this proposal as Schedule D.

## 5.6 Principle #6—Geographical Boundaries

The subject site is directly south of the City boundary and north of the conceptual PTH 110 westerly extension. The boundary is not a straight line as shown in Map 10 below, as the City does not want to annex the Manitoba Infrastructure utility yard or the rural residential properties south of the site.

*Map 10: RM land ownership*



## **6 Terms of Annexation**

### **6.1 Municipal Responsibilities**

The City will be responsible for operating and maintaining new public infrastructure (e.g. transportation, water, wastewater, drainage) and providing community services (e.g. police, fire/EMS, operations, community development) for the subject site. As the subject site develops, the City will evaluate the need to increase operating and maintenance allocations to accommodate the new growth.

The annexation will not affect servicing responsibilities for the RM as the site is currently undeveloped and the City and Manitoba Infrastructure operate and maintain the roads bordering the site (Patricia Avenue and PTH 10).

### **6.2 Property Tax Implications**

The subject site is valued at \$236,400 and classified as “farm property” by Manitoba Provincial Assessment (2016 Tax Year). The 2016 municipal property tax for the site was \$391.19. If the site were located in the City, the site’s municipal property taxes would have been \$974.33.

One property owner (who initiated the annexation request) owns the subject site. The City proposes that the City’s property tax rates will apply from the date of annexation. Once the site is developed (for commercial and residential purposes), the taxes will increase proportionally.

The RM tax revenue will be reduced by \$391.19 a year. The City is prepared to negotiate mutually acceptable terms during the consultation process.

### **6.3 Drainage Impacts**

During the urban expansion process, the RM reinforced the importance of the existing wetland as a natural asset. In particular, the wetland is important in managing surface storm water runoff into the RM and filtering the storm water that infiltrates into the aquifer that provides water to RM residents. The City agrees that the wetland is important as a natural asset and proposes the following draft terms be included in the annexation agreement:

- Development of the subject site will result in no net loss to the natural storage of storm water on the site
- Any development of the wetland shall incorporate principles of naturalization, including but not limited to intercepting and filtering overland runoff, filtering out coarse sediment, and impeding colonization by undesirable invasive species
- The City will invite the RM to undertake a peer review of any conceptual or detailed drainage plans submitted to the City and Manitoba Sustainable Development as part of any rezoning and subdivision application to develop the site

## 7 Development Process

Following submission of the annexation proposal, the developer will submit an application to amend the Development Plan to the Board. The development plan amendment application will run concurrently with the annexation request and allow consultations to proceed on both applications at the same time. The by-law to re-designate the subject site will be contingent on the annexation being completed and shall not be adopted until the annexation is approved.

The City will receive all other development applications, including secondary plan, rezoning and subdivision, as well as development building permit applications, following approval of the annexation.

## 8 Consultations

Pursuant to Section 37(1) of The Municipal Act (Manitoba), following submission of the annexation proposal, the City will initiate consultations. The intent is to have all consultations completed between May and August of 2017.

### 8.1 RM of Cornwallis

The consultation with the RM will be a continuation of the consultation held during the urban expansion process:

- The City (Council and administration) will present the annexation proposal at an RM Council meeting to clarify the request and answer any questions
- If the RM is amendable, the City and the RM will begin discussions regarding terms to be included in an annexation agreement
- An inter-municipal committee comprised of elected officials and administration from both municipalities will negotiate the terms of the annexation agreement
- At the conclusion of the consultation, the intent is to have the RM Council pass a resolution to support the annexation and the terms for annexation in a draft agreement

### 8.2 Local Authorities

The local authorities for the annexation proposal are

- The Brandon & Area Planning District
- The Brandon School Division
- The Assiniboine Hills Conservation District
- The Prairie Mountain Health Regional Health Authority

The City will be in contact with representatives of each local authority (in person meeting, open house or phone call). Each local authority will be invited to provide formal comments in writing by the end of the consultation period.



### 8.3 Public

The City will consult the following public stakeholders:

- *Neighbouring property owners and general public* — The City will host two open houses:  
*Open House #1* – To introduce the annexation proposal and facilitate feedback (End of May).  
*Open House #2* – To provide a summary of the feedback received and any changes to the annexation proposal (End of July).
- Notices for the open houses will be sent to all property owners within 200m of the subject site. The City will provide the option of individual meetings with neighbouring property owners who desire to discuss the proposal in further detail.
- *Owner of the subject site*—The City will hold reoccurring meetings with the owner of the subject site throughout the consultation process.

### 8.4 Consultation Report

Pursuant to Section 37(2) of The Municipal Act, upon conclusion of the negotiations and consultations, the City will submit a report to The Manitoba Municipal Board that describes the results of the negotiations and consultations, including

- a description of the negotiations undertaken and a summary of the views expressed
- a description of matters agreed on and not agreed on by the proponent and affected municipalities
- a description of the consultations undertaken and a summary of the views expressed
- a statement of the content of the original proposal and particulars of any amendments to the proposal made in the report and the reasons for them
- a list of studies prepared by or for the proponent respecting the proposal and a summary of their findings
- a statement as to whether the proponent intends to proceed with the proposal at all, as initiated or in an amended form



**STATUS OF TITLE**

Title Number      **2513700/2**  
Title Status        **Accepted**  
Client File         02272017

**The Property Registry**

A Service Provider for the Province of Manitoba

**1. REGISTERED OWNERS, TENANCY AND LAND DESCRIPTION**

VBJ DEVELOPMENTS LTD.

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

FIRSTLY: THE NE 1/4 OF SECTION 3-10-19 WPM  
EXC: GRAVEL PIT PLAN 1368 BLTO  
AND EXC: ROAD PLANS 538 AND 36987 BLTO

SECONDLY: THE E 1/2 OF LEGAL SUBDIVISIONS 11 AND 14 OF  
SECTION 3-10-19 WPM

The land in this title is, unless the contrary is expressly declared, deemed to be subject to the reservations and restrictions set out in section 58 of *The Real Property Act*.

**2. ACTIVE INSTRUMENTS**

Instrument Type:        **Caveat**  
Registration Number:   **R119560/2**  
Instrument Status:      **Accepted**

Registration Date:       1977-04-18  
From/By:                 MANITOBA TELEPHONE SYSTEM  
To:

Amount:  
Notes:                    PARTS  
Description:              No description

Instrument Type: **Caveat**  
Registration Number: **R141242/2**  
Instrument Status: **Accepted**

Registration Date: 1979-11-14  
From/By: THE MANITOBA HYDRO-ELECTRIC BOARD  
To:

Amount:  
Notes: PTS FOR R/W PL 1947  
Description: No description

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Instrument Type: **Caveat**  
Registration Number: **91-6855/2**  
Instrument Status: **Accepted**

Registration Date: 1991-07-26  
From/By: MANITOBA TELEPHONE SYSTEM  
To:

Amount:  
Notes: PT NW 1/4 ON PL 27161  
Description: No description

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Instrument Type: **Caveat**  
Registration Number: **1107630/2**  
Instrument Status: **Accepted**

Registration Date: 2002-01-30  
From/By: MTS COMMUNICATIONS INC  
To: WILLIAM F JOHNSTONE AS AGENT

Amount:  
Notes: PT NE 1/4 3 RE: PL 40213  
Description: RIGHT OF WAY AGRT DATED 8 JUNE 1999

Instrument Type:	<b>Mortgage</b>
Registration Number:	<b>1283109/2</b>
Instrument Status:	<b>Accepted</b>
Registration Date:	2011-03-01
From/By:	VBJ DEVELOPMENTS LTD.
To:	WESTOBA CREDIT UNION LIMITED
Amount:	\$6,000,000.00
Notes:	No notes
Description:	No description

<b>3. ADDRESSES FOR SERVICE</b>  VBJ DEVELOPMENTS LTD. 2404 PARK AVENUE BRANDON MB R7B 0S3												
<b>4. TITLE NOTES</b>  No title notes												
<b>5. LAND TITLES DISTRICT</b>  Brandon												
<b>6. DUPLICATE TITLE INFORMATION</b>  Duplicate not produced												
<b>7. FROM TITLE NUMBERS</b>  1683407/2          All												
<b>8. REAL PROPERTY APPLICATION / CROWN GRANT NUMBERS</b>  No real property application or grant information												
<b>9. ORIGINATING INSTRUMENTS</b>  <table> <tr> <td>Instrument Type:</td> <td><b>Transfer Of Land</b></td> </tr> <tr> <td>Registration Number:</td> <td><b>1283108/2</b></td> </tr> <tr> <td>Registration Date:</td> <td>2011-03-01</td> </tr> <tr> <td>From/By:</td> <td>LENA MONCAUSKAS &amp; HORACE VINCENT MONCAUSKAS</td> </tr> <tr> <td>To:</td> <td>VBJ DEVELOPMENTS LTD.</td> </tr> <tr> <td>Consideration:</td> <td>\$900,000.00</td> </tr> </table>	Instrument Type:	<b>Transfer Of Land</b>	Registration Number:	<b>1283108/2</b>	Registration Date:	2011-03-01	From/By:	LENA MONCAUSKAS & HORACE VINCENT MONCAUSKAS	To:	VBJ DEVELOPMENTS LTD.	Consideration:	\$900,000.00
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Registration Number:	<b>1283108/2</b>											
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From/By:	LENA MONCAUSKAS & HORACE VINCENT MONCAUSKAS											
To:	VBJ DEVELOPMENTS LTD.											
Consideration:	\$900,000.00											

**10. LAND INDEX**

NE 3-10-19W  
EX GRAVEL PIT PL 1368 & EX RD PL 36987

NW 3-10-19W  
E 1/2 OF LSDS 11 & 14

CERTIFIED TRUE EXTRACT PRODUCED FROM THE LAND TITLES DATA STORAGE  
SYSTEM OF TITLE NUMBER 2513700/2

Schedule C

April 4, 2017

Ryan Nickel  
Principal Planner  
City of Brandon Planning & Building Safety  
638 Princess Avenue  
Brandon MB, R7A 0P3

RE: Support for Annexation of lands SW of Patricia Avenue and 18<sup>th</sup> Street

VBJ Developments is in support of the annexation application of our lands SW of Patricia Avenue and 18<sup>th</sup> Street. This annexation follows our Urban Expansion request from May 15, 2015 and our earlier requests to develop these lands, dating back to 2011.

During the Urban Expansion application process, it was identified that there are some infrastructure constraints in the south end of Brandon. VBJ Developments is committed to working with the City of Brandon and the RM of Cornwallis councils, and administrations, to work towards a funding solution that will provide servicing for future development.

If there are any questions with the above information, please let me know.

Sincerely,



.. begins with a plan.

Steve McMillan  
VP of Planning Services  
VBJ Developments Ltd.



**PHASE I ENVIRONMENTAL SITE ASSESSMENT**

**PROPOSED RESIDENTIAL SUBDIVISION  
NE 3 -10 – 19W  
R.M. OF CORNWALLIS, MANITOBA**

Submitted to:

Mr. Kyle Cumming

**VBJ Developments Limited**

2404 Park Avenue  
Brandon, Manitoba  
R7B 0S3

Submitted by:

**AMEC Earth & Environmental**

A Division of AMEC Americas Limited  
440 Dovercourt Drive  
Winnipeg, Manitoba  
R3Y 1N4

5 January 2011

AMEC Project No: WX16451





## EXECUTIVE SUMMARY

AMEC Earth & Environmental, a division of AMEC Americas Limited (AMEC), was retained by Mr. Kyle Cumming of VBJ Developments Limited ("Client") to conduct a Phase I Environmental Site Assessment (ESA) of a cultivated agricultural property located at the section, township, and range of NE 3-10-19W in the R. M. of Cornwallis, Manitoba (referred to in this Report as 'The Site'). The Site is proposed for a residential subdivision.

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 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.

The Site is located at the southwest corner of the intersection of Patricia Avenue and Provincial Highway #10 in the R.M. of Cornwallis, Manitoba. According to the Brandon and Area Planning District, the Site is zoned for agricultural land use (AG-AD designation).

Ms. Amanda Crawley of AMEC conducted a Site reconnaissance on 1 December 2010 to evaluate possible on-Site issues, and assess whether any surrounding land uses may have and/or are currently impacting the environmental condition of the Site. Ms. Amanda Crawley had previously conducted a Site reconnaissance on 14 October 2010 for an adjacent property located at NW 3-10-19W. Information obtained from the 14 October 2010 Site visit is referenced for this report.

A pole mounted transformer was observed on the central north portion of the Site. Markings on the transformer indicated that it did not contain PCB oil. Leaking or staining was not observed around the transformer at the time of the Site visit. Several dilapidated building structures, inferred to be former storage sheds and outbuildings, were visible throughout the treed area surrounding an abandoned residence. Various items such as scrap metal, rubber tires, mechanical equipment, and paper and plastic refuse were observed near the surrounding tree line of the abandoned residence. There were no other items of concern identified on the site.

Based on the assessment undertaken, the use of storage tanks, chemicals and fertilizer is probable due to the agricultural nature of the Site, with heating oil potentially used at some point to provide heat for the residence. There is a potential for localized impacts however, it is not likely to be of an overall concern and would be very hard to locate and identify. The potential for significant subsurface contamination at the Site as the result of on or off-site sources is considered to be low and the Site is considered suitable for residential development.



A Phase II investigation is not recommended at this time. The abandoned buildings may have associated issues with hazardous building materials. As such, a Designated Substance Survey (DSS) should be completed prior to demolition to further assess the presence of asbestos, lead, mercury, and other designated substances. AMEC would be pleased to provide this service upon request. However, as the building was deemed unfit to enter, it may be preferred to assume that such materials are present and handle the materials accordingly when demolishing.

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**GEOTECHNICAL REPORT  
PROPOSED BRANDON COMMERCIAL MIXED USE  
BRANDON, MANITOBA**

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**Prepared for:**

**VBJ Development Ltd.  
2404 Park Avenue  
Brnadon, Manitoba  
R7B 0S3**

**Project No: SU 13 091 00 SU  
September, 2013**

**SILVESTRE URBANO, P.ENG.  
22 SAPHIRE PLACE  
WINNIPEG, MB R2V 4N4**

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**Appendix A** - Site Plan

**Appendix B** - Testhole Logs

**Appendix C** – Laboratory Test Results

**Appendix D** – Granular Specification/ Helical Screw Piles Selection Table

## **1.0 SUMMARY**

A geotechnical investigation was conducted for the proposed Brandon Commercial Mixed Use at the southwest corner of PTH #10 and Patricia Road in Brandon, Manitoba to assess the general subsurface conditions. It was requested that foundation recommendations for the proposed multiple buildings and access road with parking lot be provided. A total of 12 testholes (10 deep testholes drilled to between 12.2m and two to 18.3m depths) revealed a general soil profile consisting of a layer of topsoil underlain by an upper clay layer over a saturated sand layer over a lower clay layer that changes to a clay till layer, which extended to the depth explored. Seepage and caving conditions were observed mainly from the surface and the sand layer (1.5m depth) after completion of drilling.

Due to high water table and soft surface material, the preferred foundation for the proposed multiple building structures is a system of driven friction piles (either concrete or timber) or cast-in-place friction piles with temporary sleeve. Alternatively, mechanically clean spread bored pile on very stiff clay till may be used. However, temporary sleeve is needed to seal off any seepage from the upper layers. A thickened edge slab on engineered fill clay may be used for lightly loaded building structures (preferably one-storey structures).

## **2.0 INTRODUCTION**

### **2.1 SCOPE OF WORK**

Silvestre Urbano was retained to undertake a soils investigation for the proposed facilities (multiple structures) at the southwest corner of Patricia Road and PTH #10 in Brandon, Manitoba. The purpose of this work was to establish the soil and groundwater conditions at the site and provide foundation recommendations for the proposed structures as well as comments on potential problems. Authorization to proceed with the work was provided by VBJ Development Ltd. *Note that the recommendations are generalized for the whole area. A detailed geotechnical investigation is still recommended for each building.*

### **2.2 PROPOSED FACILITIES**

The anticipated proposed structures will be multiple single-storey (low to high ceiling)

structures, light to medium loaded structures. The anticipated floor for the structure will be a slab on grade.

### **2.3 EXISTING SITE/ SITE DEVELOPMENT**

The proposed site is a vacant lot covered with rolling topography and some marsh-like conditions areas. The surface drainage at the proposed site is very poor. In view of this and the presence of extensive surface water, it is expected that significant site access problems (construction traffic) and groundwater problems may occur during the construction for the proposed structures.

To minimize construction problems relative to the surface water and shallow silt/sand layers, it is strongly recommended that prior to construction, a system of perimeter ditches leading to a lower spot (retention pond) be installed to drain surface water. These ditches should be provided with an adequate gradient to drain the water away from the site through a positive drainage outlet.

Due to the silty sand layers encountered beneath the topsoil in some areas of the site, construction measures should be developed which would prevent the disturbance of this layer. The site development should adopt measures such as providing a working platform for the construction at the silty sand areas.

Where soft but dry spots (assuming the dewatering is conducted) are encountered at the subgrade level, construction traffic should be restricted. Soft spots should be covered with non-woven geotextile. Any saturated subgrade conditions should be dried off quickly by excavation of sump pit or installation of permanent subdrains (600mm below the subgrade level) connected to positive outlet (catch basin) prior to placing the fill structure. Otherwise, the procedure of subcutting and replacing with 150mm down crush limestone over a non-woven geotextile with geogrid will be attempted. The depth of the subcut would entirely depend on the saturation of the subgrade. At these locations, the placing of fill should follow the geotextile specifications for soft grounds spot.

We assume that in order to attain a positive drainage throughout the site, fill either clay or pit-run compacted to 95% STD Proctor Density in 150mm lift be placed on some of the areasre

site. Prior to placing this fill, we recommend that any rootlets, organic and topsoil should be excavated with light construction equipment.

### **3.0 FIELD METHODOLOGY**

The subsoils encountered were visually classified to the full extent in the testhole and representative soil samples were recovered at regular depth intervals. Pocket penetrometer tests were conducted on cohesive soil to determine the approximate unconfined compressive strength and random Standard Penetration Testing (SPT) was conducted to determine the relative density. Groundwater seepage and sloughing encountered in the testholes were noted.

### **4.0 LABORATORY AND FIELD TESTING**

The field investigation was undertaken on July 24 and 25, 2013. A truck-mounted drill rig with a continuous flight auger was used to drill a total of 12 testholes, ten to 12.2m and two testholes to 18.3m depth. The testhole location is shown on the site plan in Appendix A.

Random pocket penetrometer and SPT testing were conducted in the testhole to determine the strength and relative density of the soil. Detailed descriptions of the soil profiles in each testhole are shown on the attached testhole logs, TH1000 to TH1011 in Appendix B.

### **5.0 SUBSURFACE CONDITIONS**

#### **5.1 SOIL PROFILE/GROUNDWATER**

Ten testholes drilled to 12.2m and two testholes drilled to 18.3m revealed a general soil profile consisting of a layer of topsoil underlain by an upper clay layer over a saturated sand layer over a lower clay layer that changes to clay till layer, which extended to the depth explored. Seepage and caving conditions were observed mainly from the surface and the silty sand layer (1.5m depth) after completion of drilling.

## **6.0 DISCUSSION AND RECOMMENDATIONS**

### **6.1 GENERAL**

The foundation recommendations are made on our understanding that the proposed structure s is light to medium loaded structures. The anticipated floor for the proposed structures will be a slab-on-grade floor.

### **6.2 FOUNDATIONS**

Foundation alternatives, which were considered, include conventional footings, cast-in-place (CIP) concrete friction piles with temporary sleeve and driven friction precast concrete piles or driven friction timber piles with temporary sleeve. Alternatively, thickened slab on engineered fill or steel-screw pile or mechanically cleaned spread bored piles end bearing on very stiff clay till maybe considered for lightly loaded structures. The later foundation system will also need a temporary sleeve.

Due to swelling, shrinkage and long-term settlement, a conventional footing on clay is not recommended.

*Due to the high groundwater table (expected seepage may occur between 1m to 4m depths), the preferred foundation, which may be utilized for the multiple structures, is a either a system of precast concrete or timber driven friction piles or cast-in-place friction piles with temporary sleeve. Note that if helical or steel screw pile is used, the SLS and ULS numbers using the selection table is attached.*

*Alternatively, a system of cast-in-place, mechanically, cleaned, spread-bored pile on clay till at about 8.5m to 10m depth with temporary sleeve could be used provided that the used of larger diameter piles would be expected.*

*The other alternative option is the use of thickened slab on engineered fill provided that immediate and long term foundation settlement of less than 25mm is acceptable. Note that this foundation system is recommended for lightly loaded structure.*



### 6.2.1 Precast, Prestressed Driven Friction Concrete/Timber Piles

Due to high water table, prestressed, precast driven friction pile maybe utilized for the proposed building. These concrete piles, should be driven to the required depth with a heavy hammer capable of delivering a rated energy of 40672.4 N-m (30,000 ft-lbs) per blow. For driven timber piles, a size 300mm (12") timber pile butt with 175mm (7 ") tip and 7.6m(25 ft) length, should be driven to the required depth using a hammer capable of delivering 20,337 Joules (15,000 ft - lbs) per blow.

Based on the shear strengths of the clay material, higher shear strength is encountered as it goes deeper. Using the appropriate pile lengths, an allowable shaft adhesion values are calculated and are shown in Table 1 for each testhole.

TABLE 1

TESTHOLE	PILE LENGTH, m	FRICTION VALUE, kPa
TH1000, TH1001	3 to 12.2m (10 to 40 ft)	18.8 (183 psf)
	3 to 13.7m (10 to 45 ft)	12.1 (252 psf)
	3 to 15.2m (10 to 50 ft)	17.5 (366 psf)
	3 to 18.3m (10 to 60 ft)	25.2 (527 psf)
TH1002, TH1003	3 to 10.7m (10 to 35 ft)	12.3 (258 psf)
	3 to 12.2m (10 to 40 ft)	17.5 (365 psf)
TH1004, TH1007	3 to 7.6m (10 to 25 ft)	15.4 (322 psf)
	3 to 9.1m (10 to 30 ft)	18.7 (391 psf)
	3 to 10.7m (10 to 35 ft)	23.9 (500 psf)
	3m to 12.2m (10 to 40 ft)	25.3 (530 psf)
TH1005, TH1006, TH1008	3 to 7.6m (10 to 25 ft)	13.7 (286 psf)
	3 to 9.1m (10 to 30 ft)	16.2 (339 psf)
	3 to 10.7m (10 to 35 ft)	17.4 (363 psf)
	3 to 12.2m (10 to 40 ft)	22.4 (469 psf)
TH1009, TH1010	3 to 7.6m (10 to 25 ft)	17.7 (369 psf)
	3 to 9.1m (10 to 30 ft)	23.7 (495 psf)
	3 to 10.7m (10 to 35 ft)	28.5 (596 psf)
	3 to 12.2m (10 to 40 ft)	31.7 (663 psf)

For the exterior piles, the upper 3.0m(10 ft) of the piles should be ignored. If heavier loads are

used, the utilization of a single, larger diameter friction pile is preferred.

With Limit State Design (LSD), the following bearing resistances at Unfactored Ultimate Limit State (ULS) and Serviceability Limit State (SLS) are recommended for this foundation system and shown in Table 2 below. For a factored ULS, the unfactored ULS should be multiplied with the applied resistance factor of 0.55.

TABLE 2

TESTHOLE	PILE LENGTH, m	SLS, kPa	UNFACTORED ULS, kPa	RESISTANCE FACTOR
TH1000, TH1001	3 to 12.2m (10 to 40 ft)	8.8 (183 psf)	21.9	0.55
	3 to 13.7m (10 to 45 ft)	12.1 (252 psf)	30.2	0.55
	3 to 15.2m (10 to 50 ft)	17.5 (366 psf)	43.8	0.55
	3 to 18.3m (10 to 60 ft)	25.2 (527 psf)	63.0	0.55
TH1002, TH1003	3 to 10.7m (10 to 35 ft)	12.3 (258 psf)	30.8	0.55
	3 to 12.2m (10 to 40 ft)	17.5 (365 psf)	43.8	0.55
TH1004, TH1007	3 to 7.6m (10 to 25 ft)	15.4 (322 psf)	38.5	0.55
	3 to 9.1m (10 to 30 ft)	18.7 (391 psf)	46.8	0.55
	3 to 10.7m (10 to 35 ft)	23.9 (500 psf)	59.8	0.55
	3m to 12.2m (10 to 40 ft)	25.3 (530 psf)	63.3	0.55
TH1005, TH1006, TH1008	3 to 7.6m (10 to 25 ft)	13.7 (286 psf)	34.3	0.55
	3 to 9.1m (10 to 30 ft)	16.2 (339 psf)	40.5	0.55
	3 to 10.7m (10 to 35 ft)	17.4 (363 psf)	43.5	0.55
	3 to 12.2m (10 to 40 ft)	22.4 (469 psf)	56.0	0.55
TH1009, TH1010	3 to 7.6m (10 to 25 ft)	17.7 (369 psf)	44.3	0.55
	3 to 9.1m (10 to 30 ft)	23.7 (495 psf)	59.3	0.55
	3 to 10.7m (10 to 35 ft)	28.5 (596 psf)	71.2	0.55
	3 to 12.2m (10 to 40 ft)	31.7 (663 psf)	79.3	0.55
TH1011	THIN CLAY LAYER	-----	-----	-----

### 6.2.2 Cast-in-Place Friction Piles

*Alternatively, cast-in-place friction piles(CIP) maybe used provided that temporary steel sleeve is used to seal off the seepage and caving conditions from the silty sand and silty clay layer (1m to 4m depths). The foundation contractor on site should determine the depth of temporary sleeve.*

*The design numbers should be the same as the driven friction piles.*

Considering potential long-term soil shrinkage away from the pile face, the upper 1.5m(5 ft) of the piles should be neglected in determining the capacity of all interior piles. For the exterior piles, the upper 3.0m(10 ft) of the piles should be ignored. If heavier loads are used, the utilization of a single, larger diameter friction pile is preferred.

Pile spacing should be at least three pile diameters, centre to centre. To minimize pile construction difficulties, the total number of pile holes left open at any given time should not be more than four and the pile holes should be poured with concrete as soon as they are drilled to the design diameters and depths.

Piles located in unheated areas should be provided with full-length reinforcements, a minimum pile length of 7.62m(25 ft) and the top 2.1m(7 ft) of the pile should be wrapped with greased sono tube to reduce the potential for frost jacking.

### **6.2.3 Mechanically Cleaned Spread Bored Pile on Clay Till**

Alternatively, the proposed structures can be supported by a system of mechanically cleaned spread-bore piles end bearing on the native undisturbed stiff clay till with *temporary sleeve* at a depth between 8.5m and 10m (28 to 33 ft) below grade. On this basis and subject to pile inspection by qualified geotechnical personnel, an allowable bearing pressure of 263.4 kPa (5500 psf) may be used for the pile design. The piles should be provided with minimum shaft and bell diameters of 400mm (16 in.) and 900mm (36 in.), respectively.

*The exception to this condition is at TH1011 where an allowable bearing pressure of 311 kPa (6500 psf) may be used for the pile design at a depth of 6.4m on DENSE SAND.*

*With Limit State Design (LSD), the following bearing resistances at Ultimate Limit State (ULS) and Serviceability Limit State (SLS) are recommended for this foundation system; Unfactored ULS: 605.8 kPa (unfactored) and SLS: 263.4 kPa. A resistance factor of 0.55 should be applied to the unfactored ULS to determine the factored ULS.*

*The LSD at TH1011 is 311 kPa for SLS and unfactored ULS of 715.3 kPa.*

Full length reinforcements should be utilized for each pile. Pile bells located closer than 2 bell diameters (centre to centre) should not be drilled and poured consecutively. A minimum pour time of 24 hours should be maintained.

*Pile installation may be adversely affected by loose backfill, concrete slabs and numerous silt inclusions. Thus, contract documents should properly cover these potential obstacles during pile installation. Temporary steel sleeves should be on-hand and used for preventing any soil sloughing and seepage into the pile holes. Depth of the temporary sleeve is entirely dependent on the foundation contractor.*

The performance of spread-bore piles is governed considerably by the construction procedures and type of bell tool used. Pile inspection by qualified geotechnical personnel should therefore be employed to ensure a satisfactory foundation installation. No more than four pile holes should be left open at any one time and each pile hole should be poured with concrete as soon as it is cleaned, inspected and approved. *Due to the compressible nature of clay till, immediate and long term foundation settlement of less than 25mm (1 in.) will always be expected (foundation on clay till). Adequate reinforcement to the foundation should be provided to account for this potential movement.*

#### **6.2.4 Thickened Edge Slab on Engineered Fill**

*The proposed lightly loaded structures maybe supported by a reinforced concrete thickened edge slab foundation founded on at least 600mm of compacted fill over a non-woven geotextile followed by an undisturbed stiff clay subgrade (measured from the underside of the thickened section of the slab) of which the lower foot will consist of subbase (50mm down ) granular. The upper 300mm will consist of base course material (20mm down granular fill). In this regard, the slab is thickened and adequately reinforced along the perimeter walls and at column points. To reduce differential foundation settlement, the compacted fill for the thickened edge slab should be prepared as follows:*

- Within the proposed structure and at least 1.8m beyond the structures perimeter, remove all organic material, peat moss, softened soil and ponded water to expose the underlying stiff brown or grey-black clay. Depth of site stripping is dependent on the location of testholes.
- Compact the stiff clay subgrade with *non-vibratory roller*, at least 10 passes which is equivalent to at least 95% Standard Proctor density (ASTM D698). Any soft spot should be subcut a foot and covered with geotextile (non-woven) and replaced with compacted 50mm down granular fill.
- *Once the subgrade is approved, place a non-woven geotextile over a 300mm thickness of subbase(50mm down) granular compacted to at least 98% Standard Proctor density (ASTM D698) across the entire width of the building areas and 1.8m beyond.* The upper 300mm which consist of 20mm down granular fill should be placed and uniformly compacted with a heavy *vibratory roller* to at least 98% Standard Proctor density (ASTM D698)
- Call for compaction testing of the upper and lower lift by qualified geotechnical personnel.
- If required, recompact and retest any area of low percent compaction to meet the specified compaction.
- For frost protection, place R20 thick extruded rigid insulation panels around the perimeter and extending at least 1.2m diagonally outward over the weeping tile and beyond the edges of the thickened slab or a minimum granular soil cover of at least 1.8m below grade.

The new fill surcharge should be limited to not more than 1m above the average ground surface elevation. To raise the existing grade more than 1.1m should not be attempted, without a detailed geotechnical evaluation.

On the foregoing basis and contingent upon a minimum width of 600mm for the thickened

sections of the slab, an allowable soil bearing pressure of 96 kPa may be used. The associated total soil movement is estimated to be between 25mm to 50mm. A differential movement of the thickened slab is expected to be at least 25mm.

With Limit State Design (LSD), the following bearing resistances at Ultimate Limit State (ULS) and Serviceability Limit State (SLS) are recommended for this foundation system; ULS: 220 kPa psf (unfactored) and SLS: 96 kPa. Note that the appropriate resistance factor of 0.55 should be applied.

To avoid potential long term settlement caused by the roots of fast growing trees, all existing and new trees should be offset from the edges of the thickened slab a minimum horizontal distance equal to the tree's mature height.

#### **6.2.5 Floor Slab**

The anticipated floor slab structure is slab-on-grade. Due to the swelling/shrinkage characteristics of the plastic clay at this location, a slab-on-grade floor without preparation will likely experience long-term movements of about 100 to 150mm. For this reason, a structural floor supported on piles or footings and separated from the underlying subsoils with a minimum 150mm void space is recommended. A similar void should be provided under grade beams and pile caps.

Where potential long-term slab movements of about 25mm are deemed acceptable to the owner, the main floor of the proposed buildings may be supported on clay subgrade. To minimize the rate and magnitude of total and differential floor movements, subgrade preparation for floor construction should include a complete removal of organics and rootlets. The exposed clay subgrade should be proof rolled with a heavy sheepsfoot roller (min. 20 passes) which translates to at least 95% Std Proctor thereby exposing any soft areas. Any softened encountered areas should be excavated an additional 300mm, covered with non-woven geotextile and replaced with 100mm down, crushed, clean limestone.

The main floor construction should include the placement of 150mm well-graded subbase topped with at least 150mm of well-graded base course ( a total of 300mm granular fill), all

uniformly compacted in maximum 150mm lifts to 95% and 100% standard Proctor density, respectively.

Saturated soil conditions if encountered should be dried off by quickly excavating sump pit or installing permanent subdrains connected to a catch basin prior to placing the slab-on-grade structure. The base course and subbase materials should conform to Manitoba Highway grading limit specifications. For permanent drainage, filter-protected perimeter and under-floor weeping tiles should be provided at least 300 mm below the underside of the slab and connected to a positive outlet.

Where heavier loading is anticipated at any given floor area, proper construction joint between the heavier loaded floor area and lightly loaded floor area should be constructed to accommodate possible relative movements between the two.

### 6.3 PAVEMENT RECOMMENDATIONS

*The anticipated subgrade for the whole site is an engineered clay fill/clay, since the drainage design has not been done. It is also assumed that dewatering has been conducted prior to construction of parking lot and access roads. Based on this assumption, (i.e. mainly a clay fill/ clay subgrade), the recommended asphaltic concrete pavement construction at this site, based on the assumption of using an Equivalent Single Axle Load (ESAL) of about 21,000 and 261,000 for light duty and heavy duty traffic respectively, should be as follows:*

**Pavement Structure**

	Light Duty Traffic Thicknesses	Heavy Duty Traffic Thicknesses	% Compaction
Asphalt	50 mm	75 mm	97% Marshall
Base Course	150 mm	175 mm	100% STD Proctor
Subbase	300 mm	500 mm	100% STD Proctor

The above pavement sections should be constructed on a prepared clay/ clay fill subgrade. The prepared subgrade should be proof rolled with a *non-vibratory* sheepfoot roller (min. 20

passes) which translates to at least 95% Std Proctor and reviewed by a qualified geotechnical engineer prior to the placement of the overlying granular fill.

*Where soft but dry spots are encountered at the subgrade level, construction traffic should be restricted. Soft spots should be excavated 300mm and covered with woven geotextile. The excavated material should be replaced with 300mm thick of 150mm down limestone. Any saturated subgrade conditions should be dried off quickly by excavation of sump pit or installation of permanent subdrains (600mm below the subgrade level) connected to positive outlet (catch basin) prior to placing the granular fill structure. At these locations, the placing of granular fill should follow the geotextile specifications for soft grounds spot.*

The granular base course and subbase materials should include organic-free, non-frozen, aggregate conforming to the Manitoba Highway gradation limits. The subbase materials should be either crushed limestone or crushed concrete aggregates.

The combined aggregate gradation limits and physical requirements of the asphaltic concrete should be in accordance with the Manitoba Highway specification as shown in Appendix D.

Sieve analysis and compaction testing of the granular base and subgrade materials should be conducted by qualified geotechnical personnel to monitor that the materials supplied and percent compactions are in accordance with design specifications.

For the hot mix asphaltic concrete, gradation analysis of the aggregates (i.e. stone, fines and additive), compaction testing and sampling of at least one representative hot mix asphalt mixture (during construction) for laboratory Marshall testing should be undertaken. This will provide data to confirm that the asphaltic concrete pavement complies with the project specification. Hot mix asphaltic concrete should not be placed at ambient temperatures lower than +4°C. During placement, the temperature of the paving mix should be in the range of +120°C to +150°C and compaction should not take place at paving mix temperatures lower than +85°C.

For any concrete apron, sidewalk, curbs, the pavement structure should consist of 150mm reinforced concrete followed by 150mm of compacted (98% Standard Proctor Density) base



course over the compacted subgrade. If a silt layer was encountered as subgrade, the application of woven geotextile over the silt layer is recommended. Exterior, grade supported concrete slabs will be subjected to some seasonal vertical movements related to frost. Exterior concrete slabs should not be tied into rigid structures such as grade beams, pile caps or interior slabs. In addition, localized subsurface drainage should be provided around the structure.

## **7.0 ADDITIONAL CONSIDERATIONS**

Concrete should be manufactured with sulphate-resistant (Type 50) cement, minimum compressive strength of 32 mPa and air content between 4% and 7%. Any concrete subject to cycles of freezing and thawing should be air entrained in accordance with the latest edition of CSA A23.1, Concrete Materials and Methods of Concrete Construction.

## **8.0 CLOSURE**

The findings and recommendations provided in this report were prepared in accordance with generally accepted professional engineering principles and practices. The recommendations are based on the results of field and laboratory investigations. If conditions encountered during construction appear to be different than those shown by the testholes at this site, this office should be notified immediately in order that the recommendations can be reviewed.

This report has been prepared by Silvestre Urbano for the benefit of the client to whom it is addressed. The information and data contained herein represent Silvestre Urbano best professional judgment in light of the knowledge and information available to the consultant at the time of preparation. Except as required by law, this report and the information and data contained herein are to be treated as confidential and may be used and relied upon only by the client, its officers and employees. The consultant denies any liability whatsoever to other parties who may obtain access to this report for any injury, loss or damage suffered by such parties arising from their use of, or reliance upon, this report or any of its contents without the express written consent of the consultant and the client.

Prepared by: Silvestre S. Urbano Jr., P.Eng.



## **APPENDIX A**

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### **Site Plan**



## **APPENDIX B**

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### **Testhole Logs**



Project No: SU-13-091-00-SU

**TH1000**

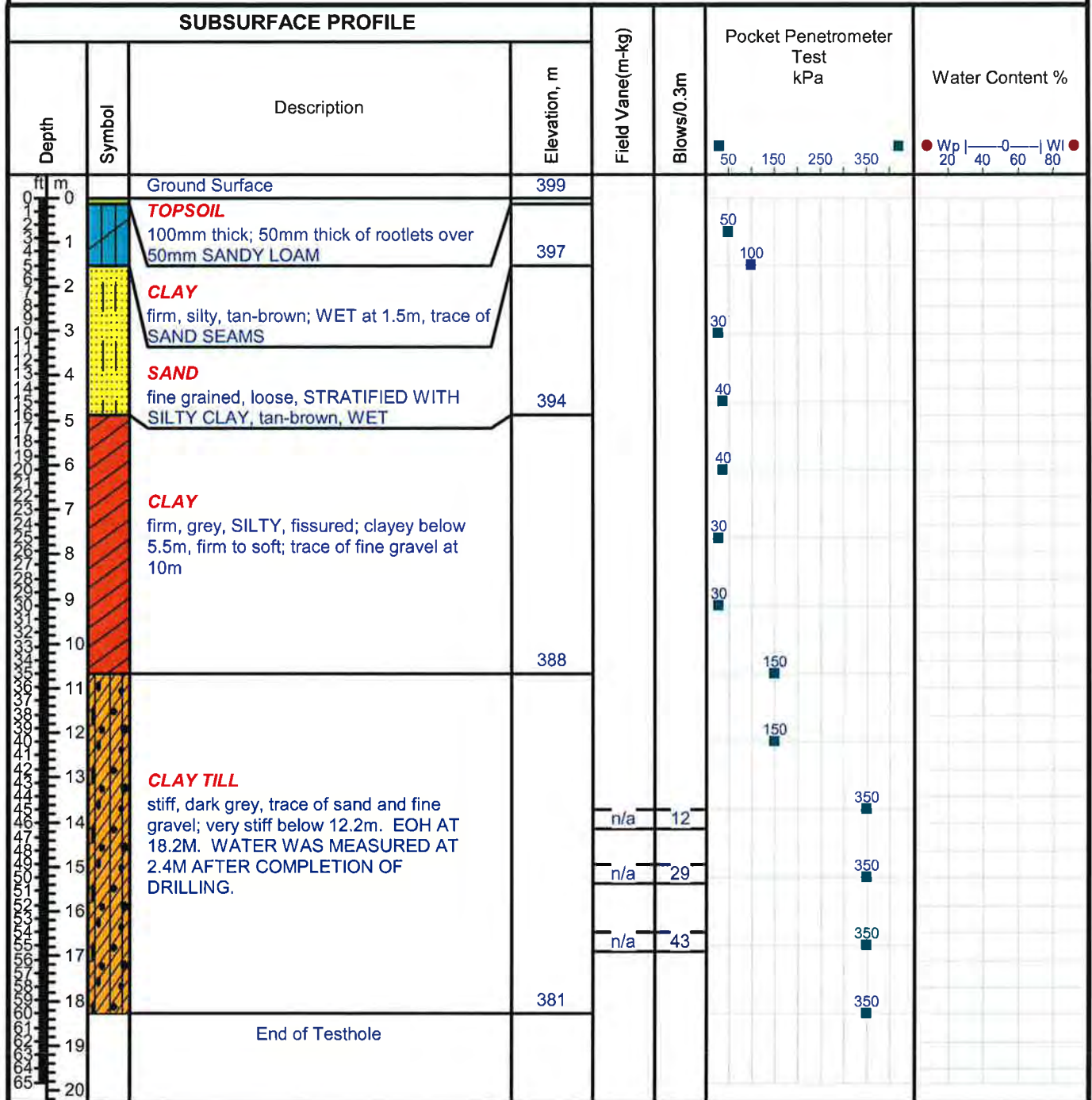
Project: PROPOSED BRANDON COMMERCIAL MIXED USE

Client: VBJ Developments Ltd.

Enclosure:

Location: N1/2 Sec.3-10-19 WPM, Brandon, MB.

Engineer: SSU



Drill Method: Continuous Auger

Datum: 399

Drill Date: July 24 and 25, 2013

Checked by: SSU

Hole Size: 125mm

Sheet: 1 of 1

Project No: SU-13-091-00-SU

**TH1001**

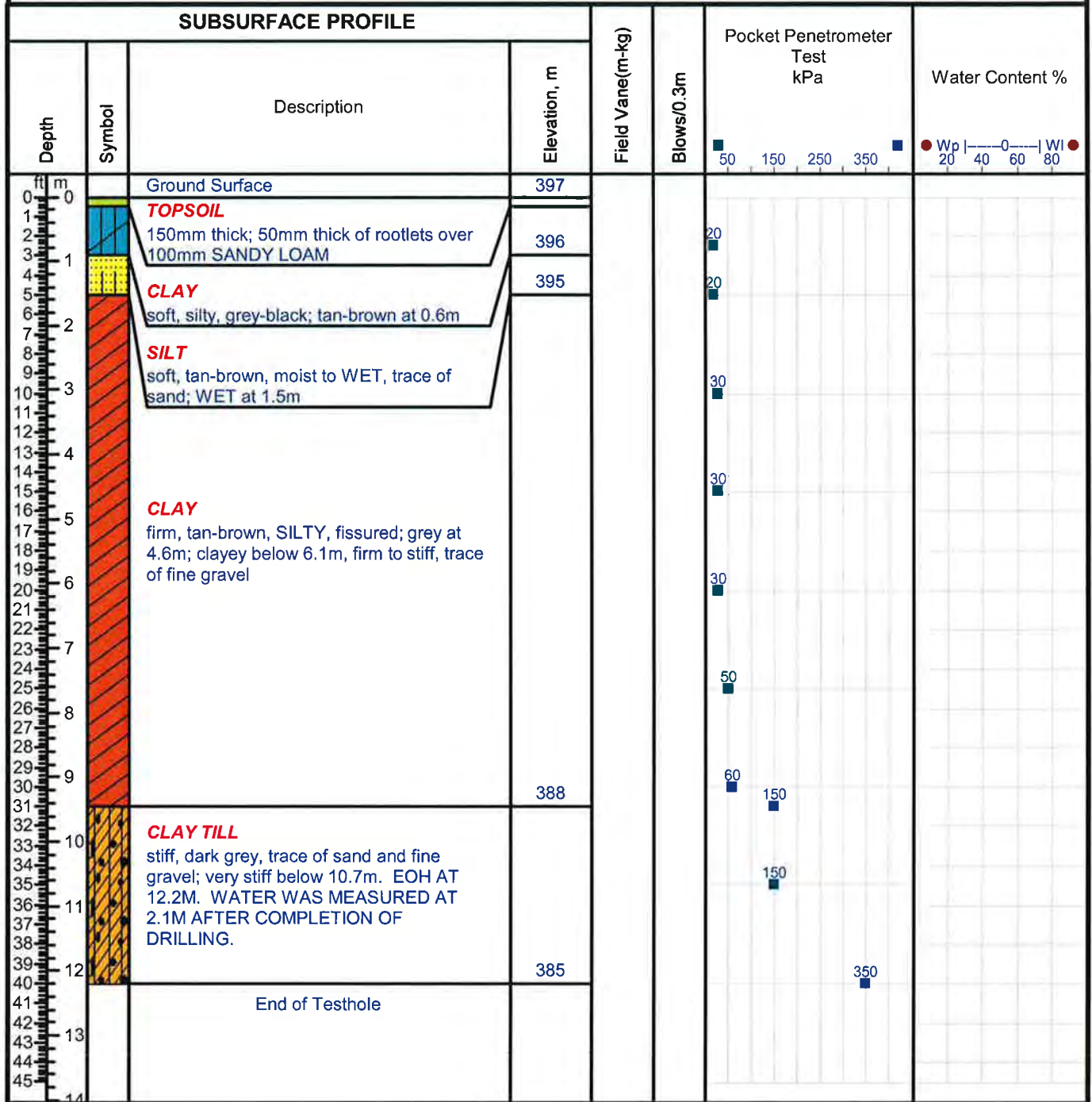
Project: PROPOSED BRANDON COMMERCIAL MIXED USE

Client: VBJ Developments Ltd.

Enclosure:

Location: N1/2 Sec.3-10-19 WPM, Brandon, MB.

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 397M

Drill Date: July 24 and 25, 2013

Checked by: SSU

Hole Size: 125mm

Sheet: 1 of 1

Project No: SU-13-091-00-SU

**TH1002**

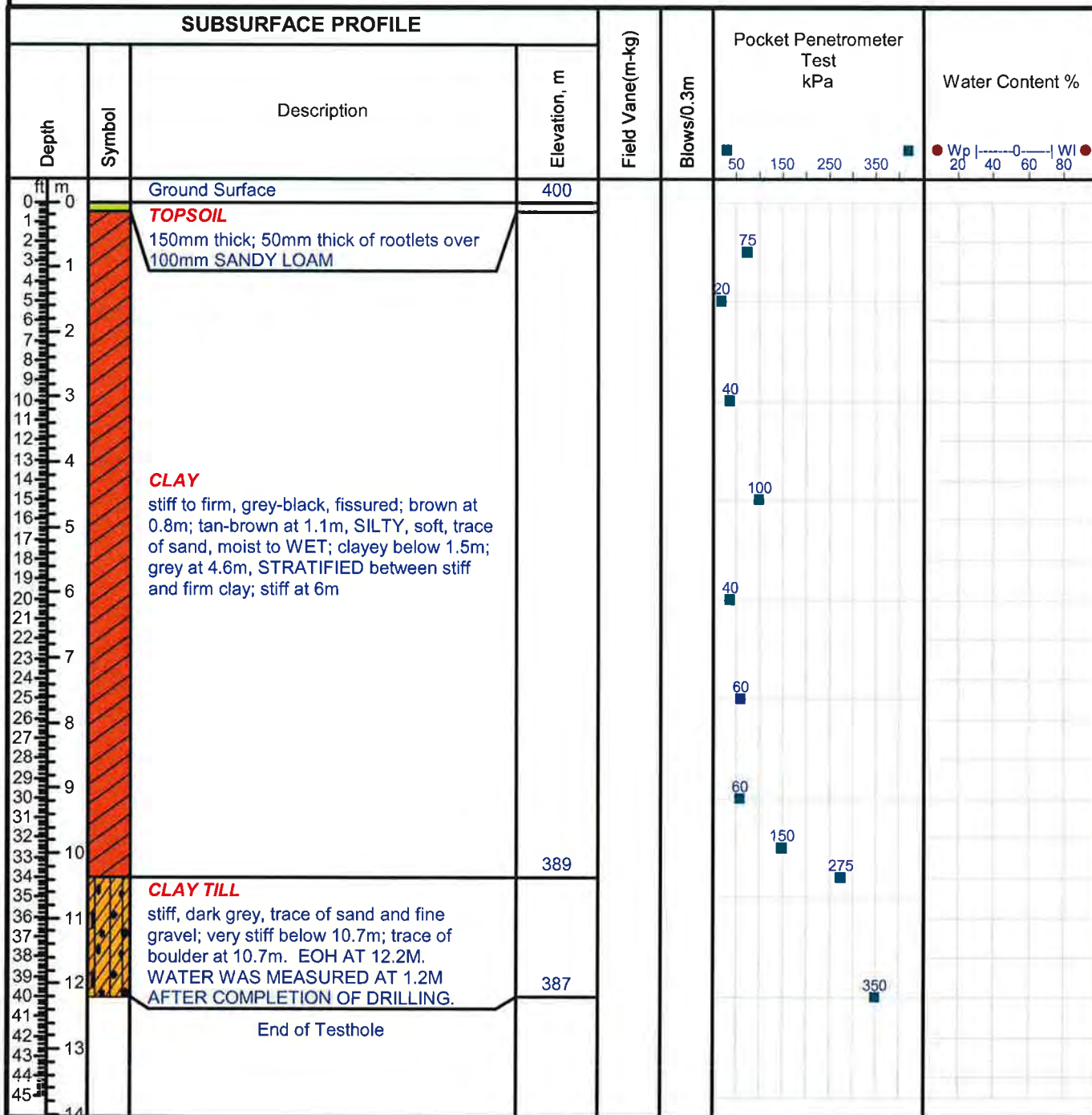
Project: PROPOSED BRANDON COMMERCIAL MIXED USE

Client: VBJ Developments Ltd.

Enclosure:

Location: N1/2 Sec.3-10-19 WPM, Brandon, MB.

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 399.5M

Drill Date: July 24 and 25, 2013

Checked by: SSU

Hole Size: 125mm

Sheet: 1 of 1



Project No: SU-13-091-00-SU

**TH1003**

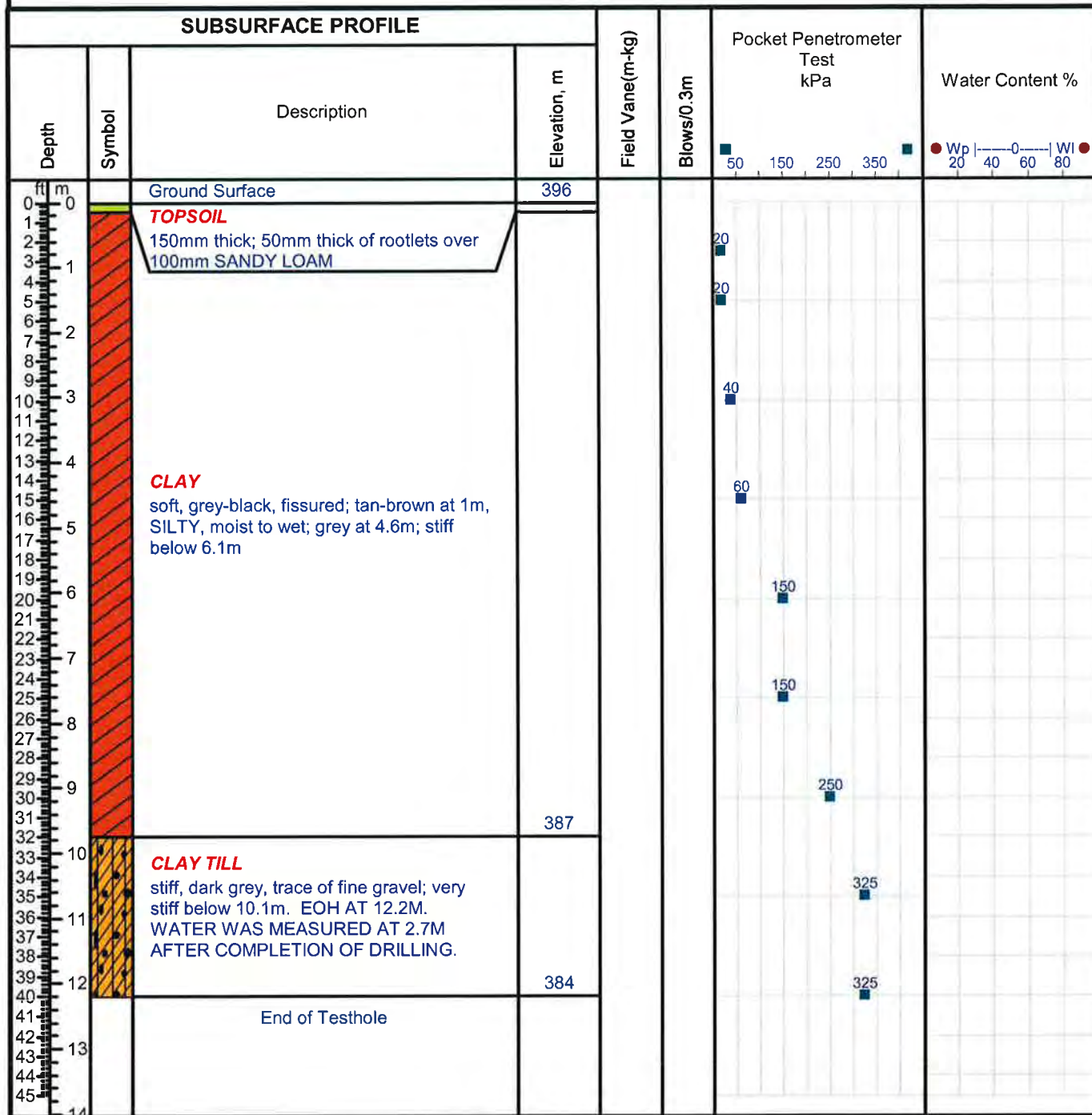
Project: PROPOSED BRANDON COMMERCIAL MIXED USE

Client: VBJ Developments Ltd.

Enclosure:

Location: N1/2 Sec.3-10-19 WPM, Brandon, MB.

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 396.5M

Drill Date: July 24 and 25, 2013

Checked by: SSU

Hole Size: 125mm

Sheet: 1 of 1

Project No: SU-13-091-00-SU

**TH1004**

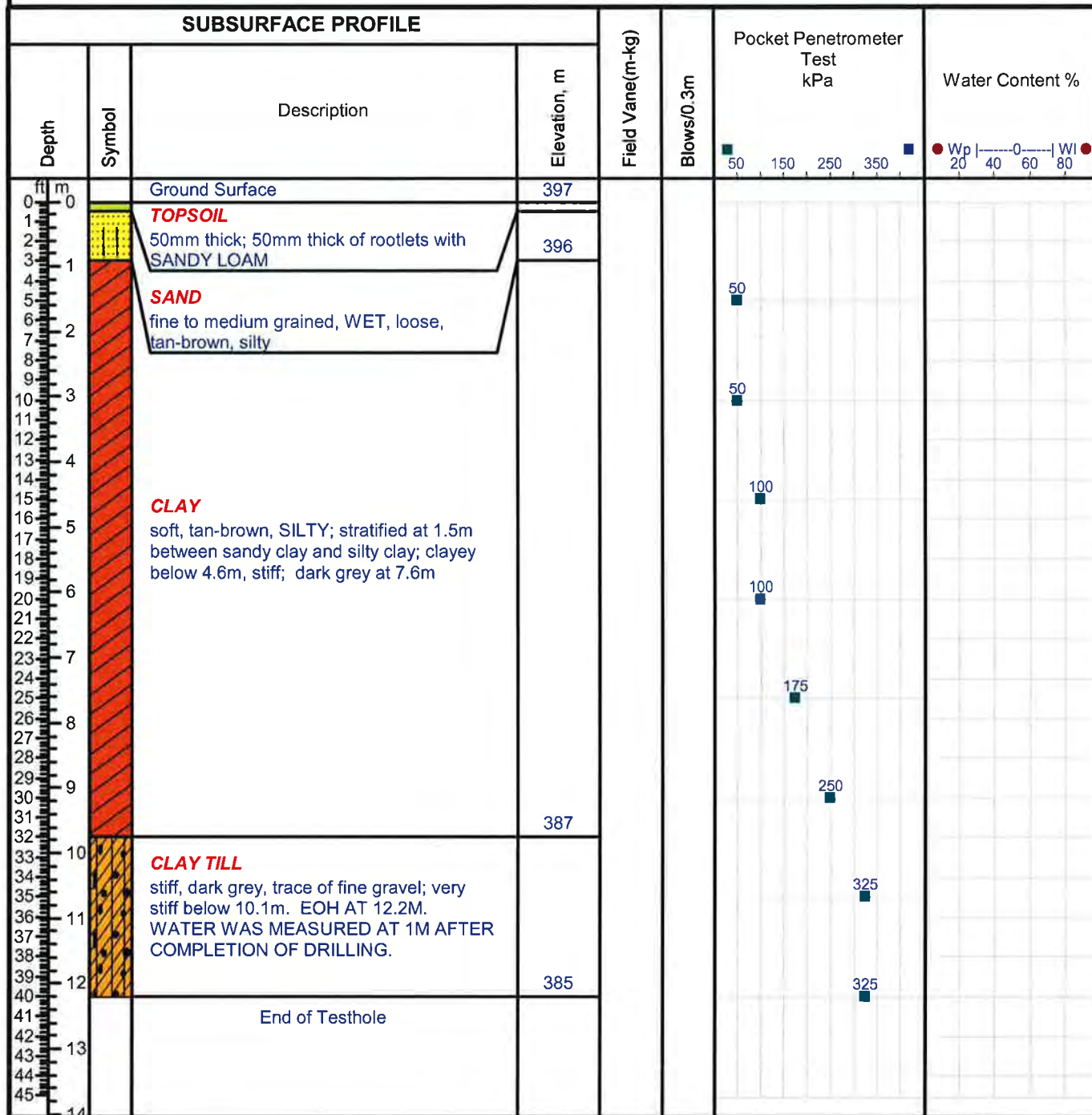
Project: PROPOSED BRANDON COMMERCIAL MIXED USE

Client: VBJ Developments Ltd.

Enclosure:

Location: N1/2 Sec.3-10-19 WPM, Brandon, MB.

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 397M

Drill Date: July 24 and 25, 2013

Checked by: SSU

Hole Size: 125mm

Sheet: 1 of 1

Project No: SU-13-091-00-SU

**TH1005**

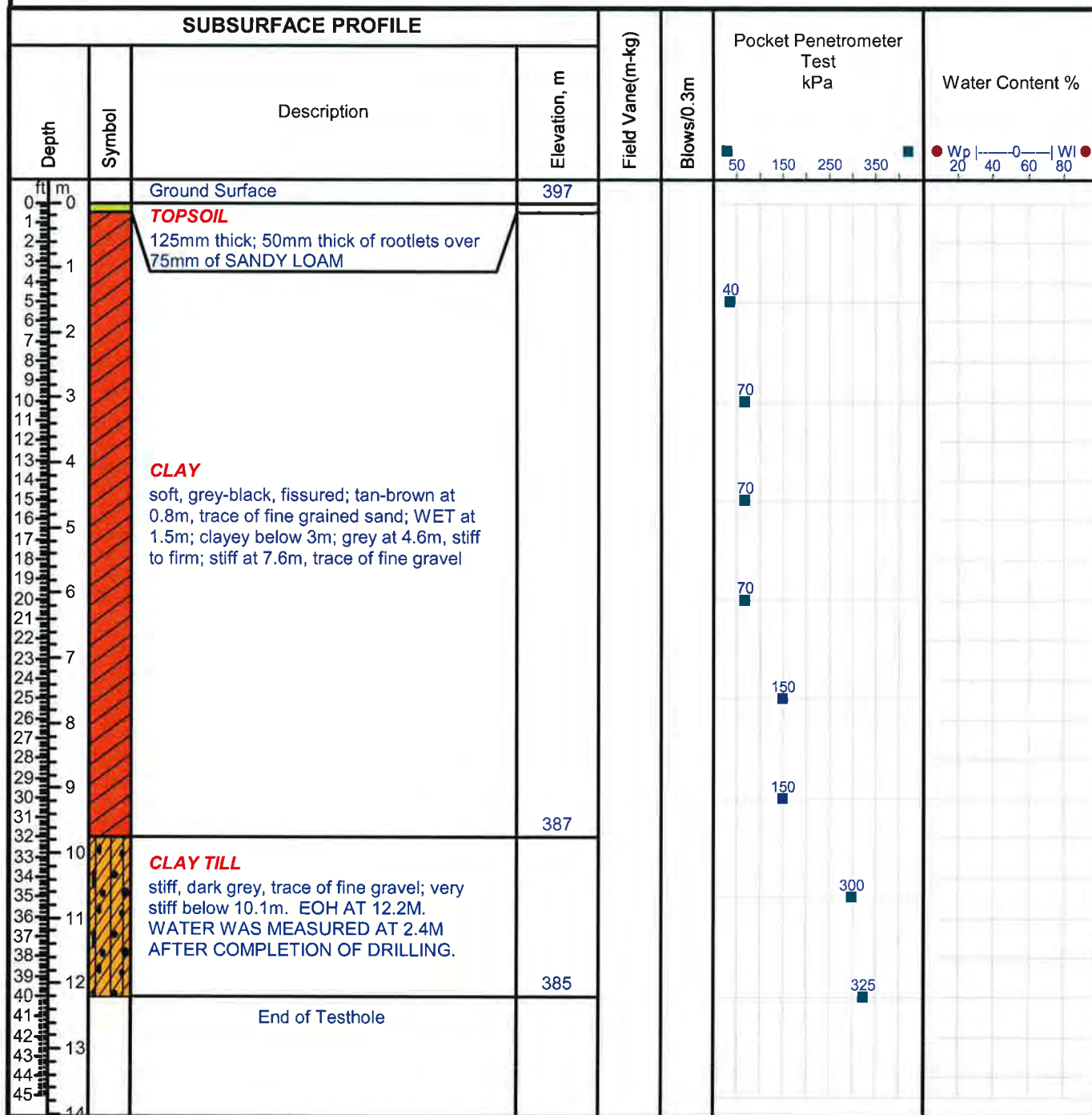
Project: PROPOSED BRANDON COMMERCIAL MIXED USE

Client: VBJ Developments Ltd.

Enclosure:

Location: N1/2 Sec.3-10-19 WPM, Brandon, MB.

Engineer: SSU



Project No: SU-13-091-00-SU

**TH1006**

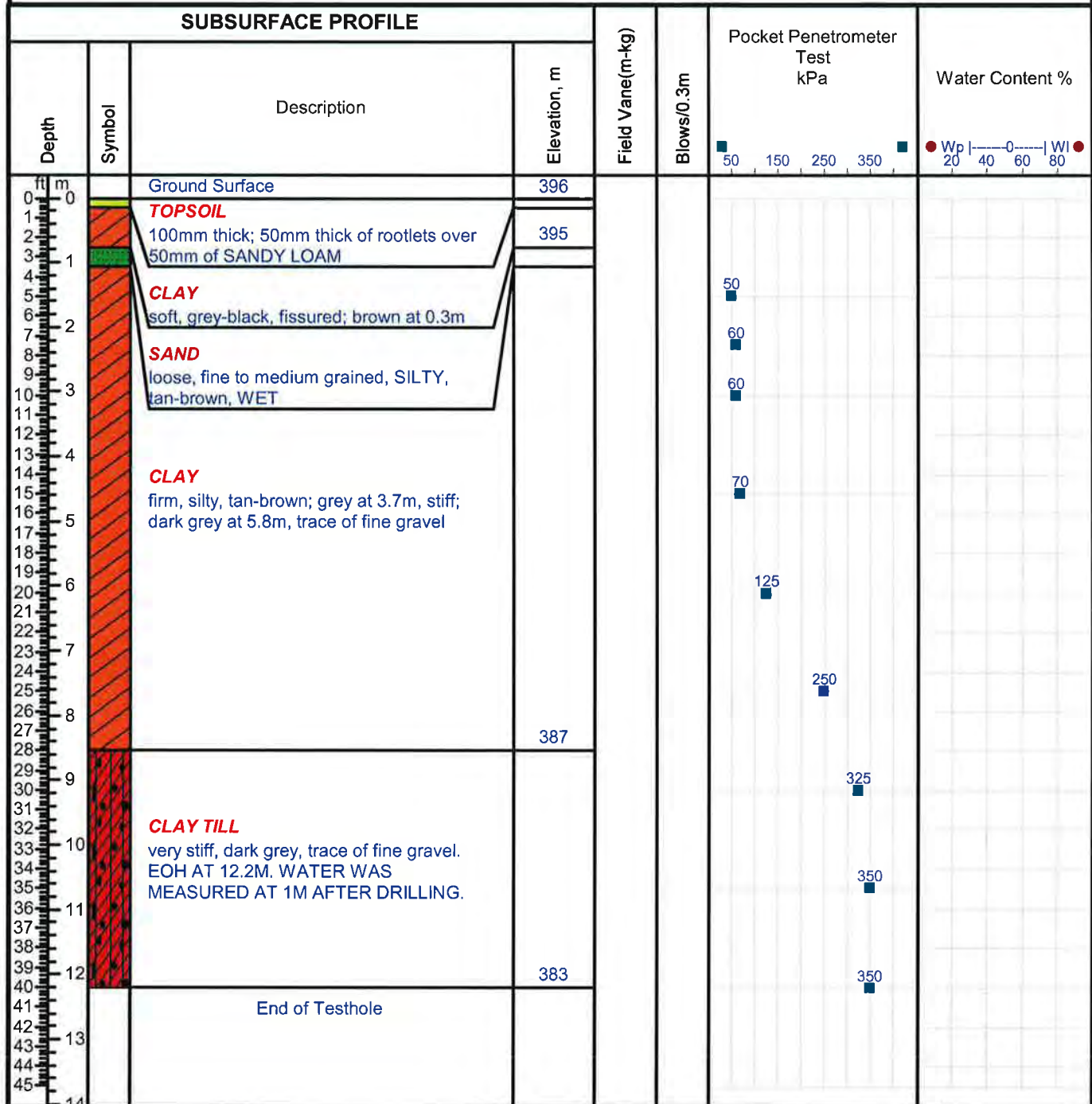
Project: PROPOSED BRANDON COMMERCIAL MIXED USE

Client: VBJ Developments Ltd.

Enclosure:

Location: N1/2 Sec.3-10-19 WPM, Brandon, MB.

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 396M

Drill Date: July 24 and 25, 2013

Checked by: SSU

Hole Size: 125mm

Sheet: 1 of 1



Project No: SU-13-091-00-SU

**TH1007**

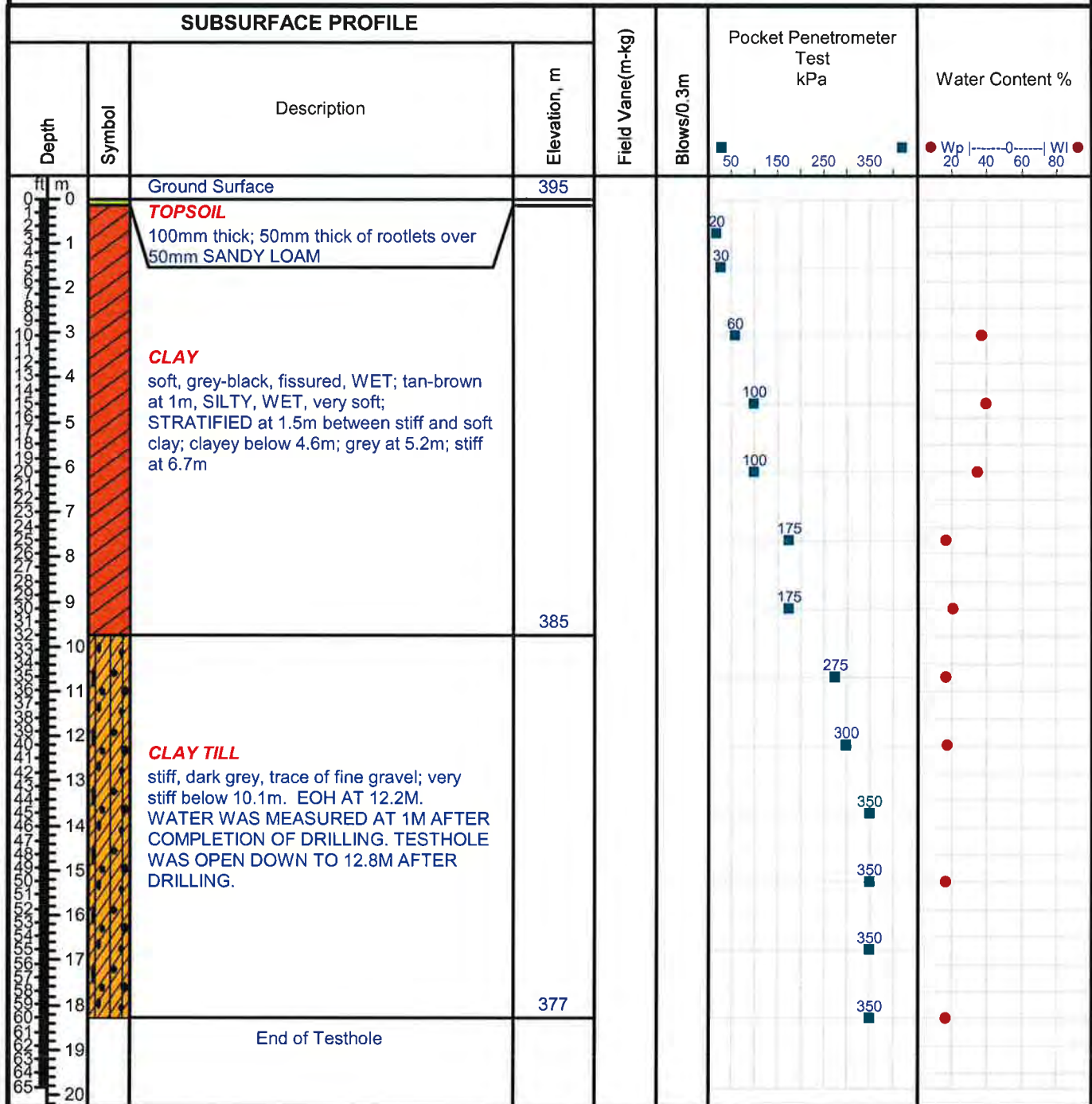
Project: PROPOSED BRANDON COMMERCIAL MIXED USE

Client: VBJ Developments Ltd.

Enclosure:

Location: N1/2 Sec.3-10-19 WPM, Brandon, MB.

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 395M

Drill Date: July 24 and 25, 2013

Checked by: SSU

Hole Size: 125mm

Sheet: 1 of 1

Project No: SU-13-091-00-SU

**TH1008**

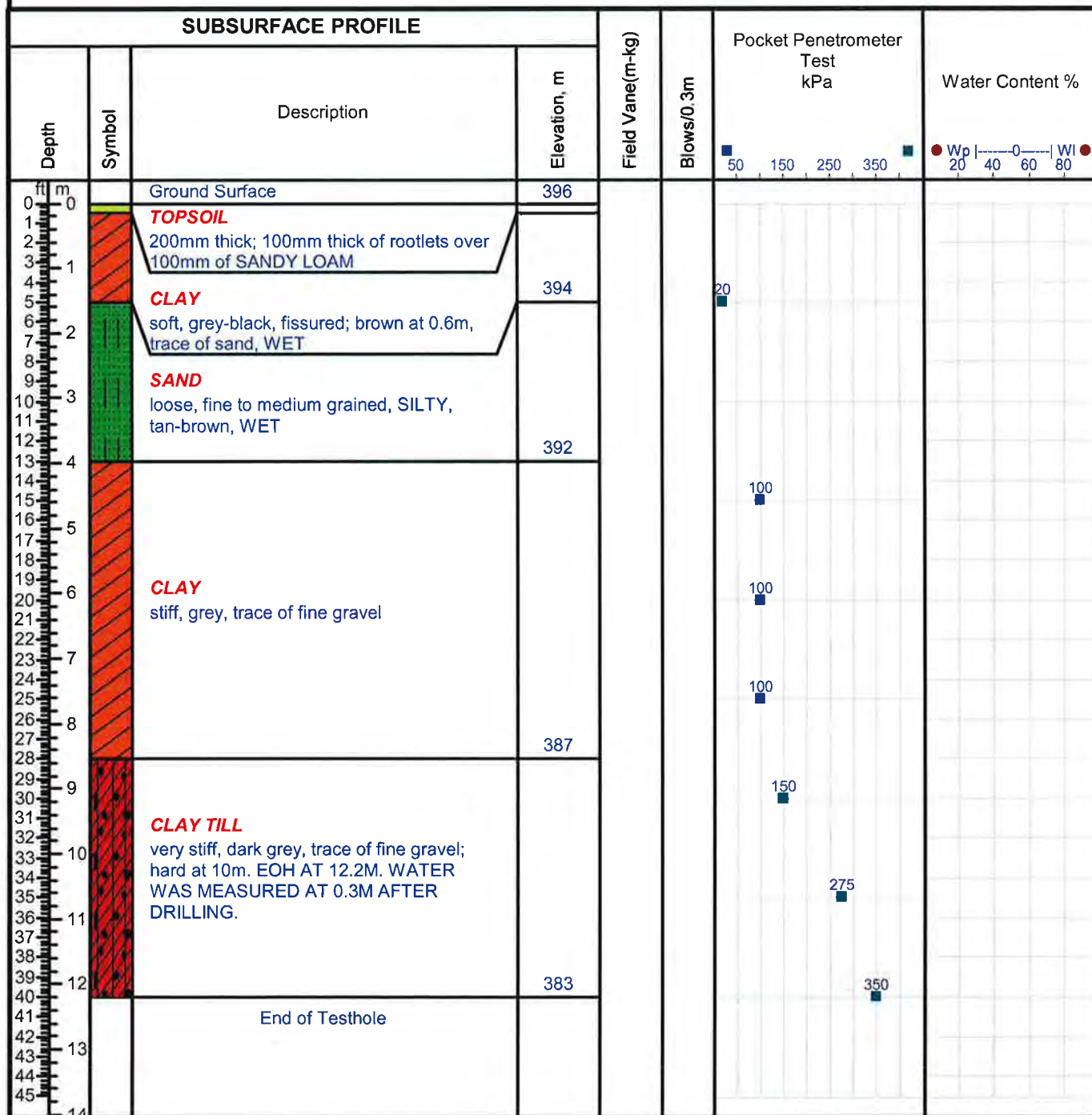
Project: PROPOSED BRANDON COMMERCIAL MIXED USE

Client: VBJ Developments Ltd.

Enclosure:

Location: N1/2 Sec.3-10-19 WPM, Brandon, MB.

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 395.5M

Drill Date: July 24 and 25, 2013

Checked by: SSU

Hole Size: 125mm

Sheet: 1 of 1



Project No: SU-13-091-00-SU

**TH1009**

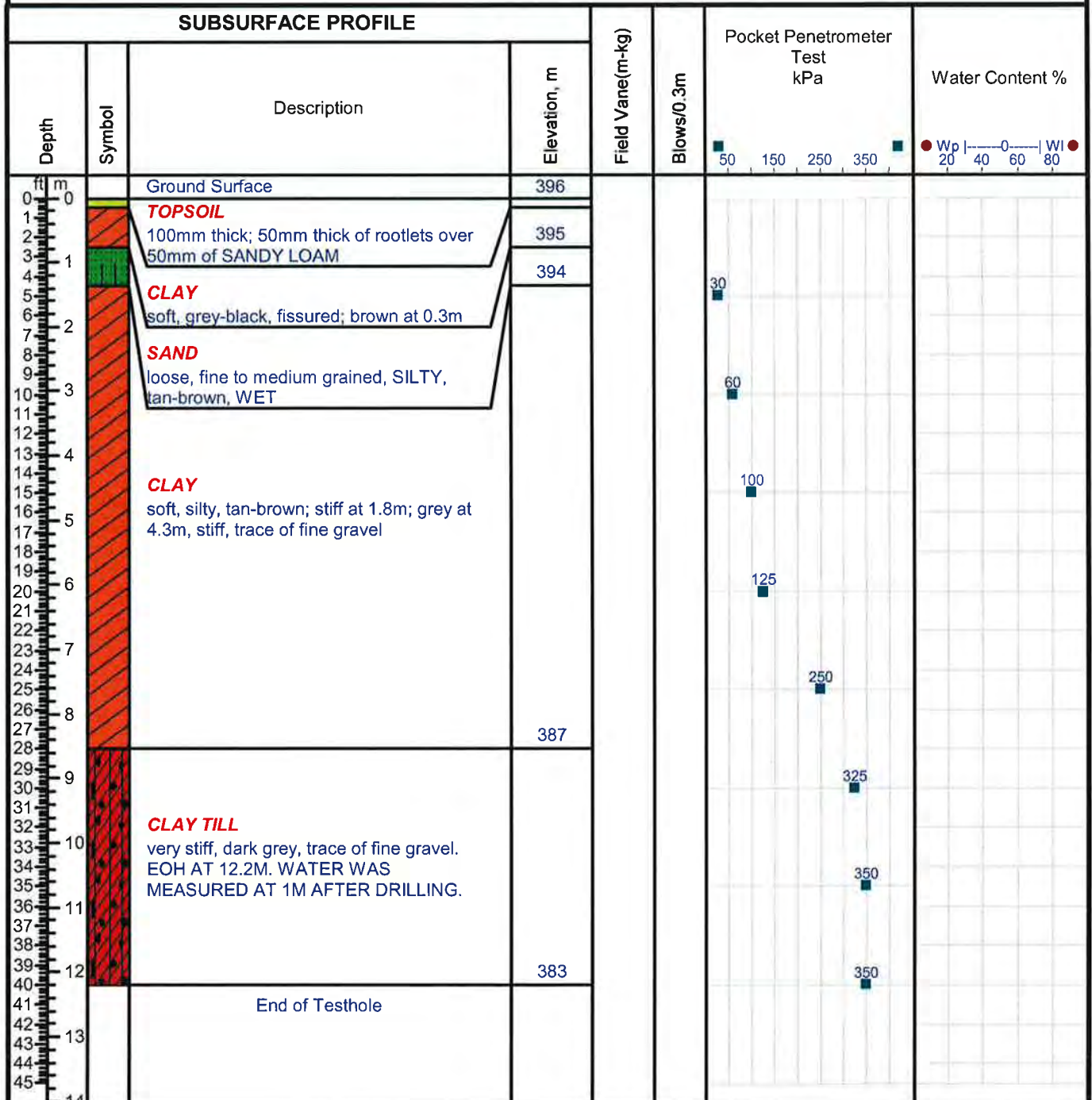
Project: PROPOSED BRANDON COMMERCIAL MIXED USE

Client: VBJ Developments Ltd.

Enclosure:

Location: N1/2 Sec.3-10-19 WPM, Brandon, MB.

Engineer: SSU



Project No: SU-13-091-00-SU

**TH1010**

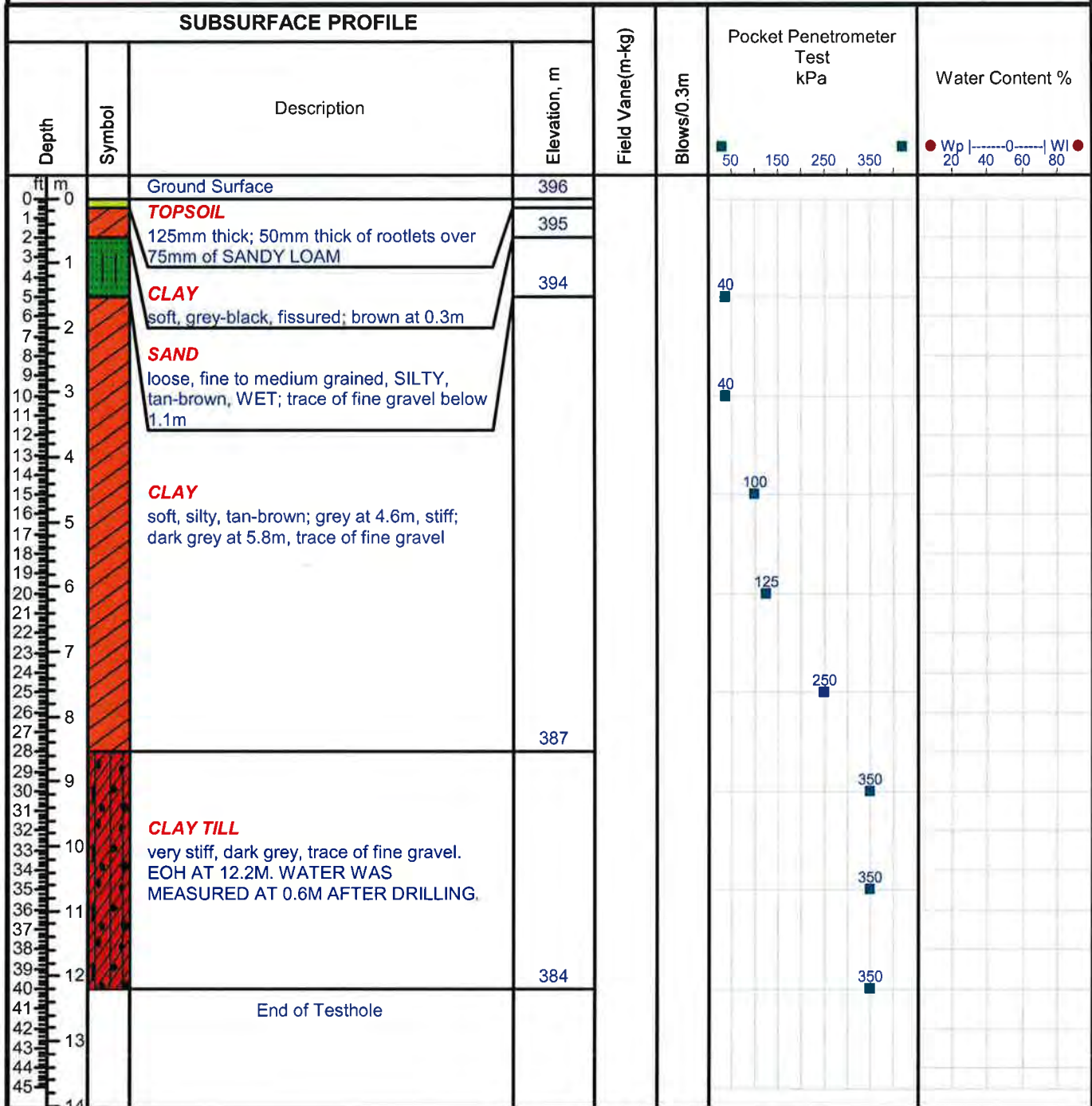
Project: PROPOSED BRANDON COMMERCIAL MIXED USE

Client: VBJ Developments Ltd.

Enclosure:

Location: N1/2 Sec.3-10-19 WPM, Brandon, MB.

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 396M

Drill Date: July 24 and 25, 2013

Checked by: SSU

Hole Size: 125mm

Sheet: 1 of 1

Project No: SU-13-091-00-SU

**TH1011**

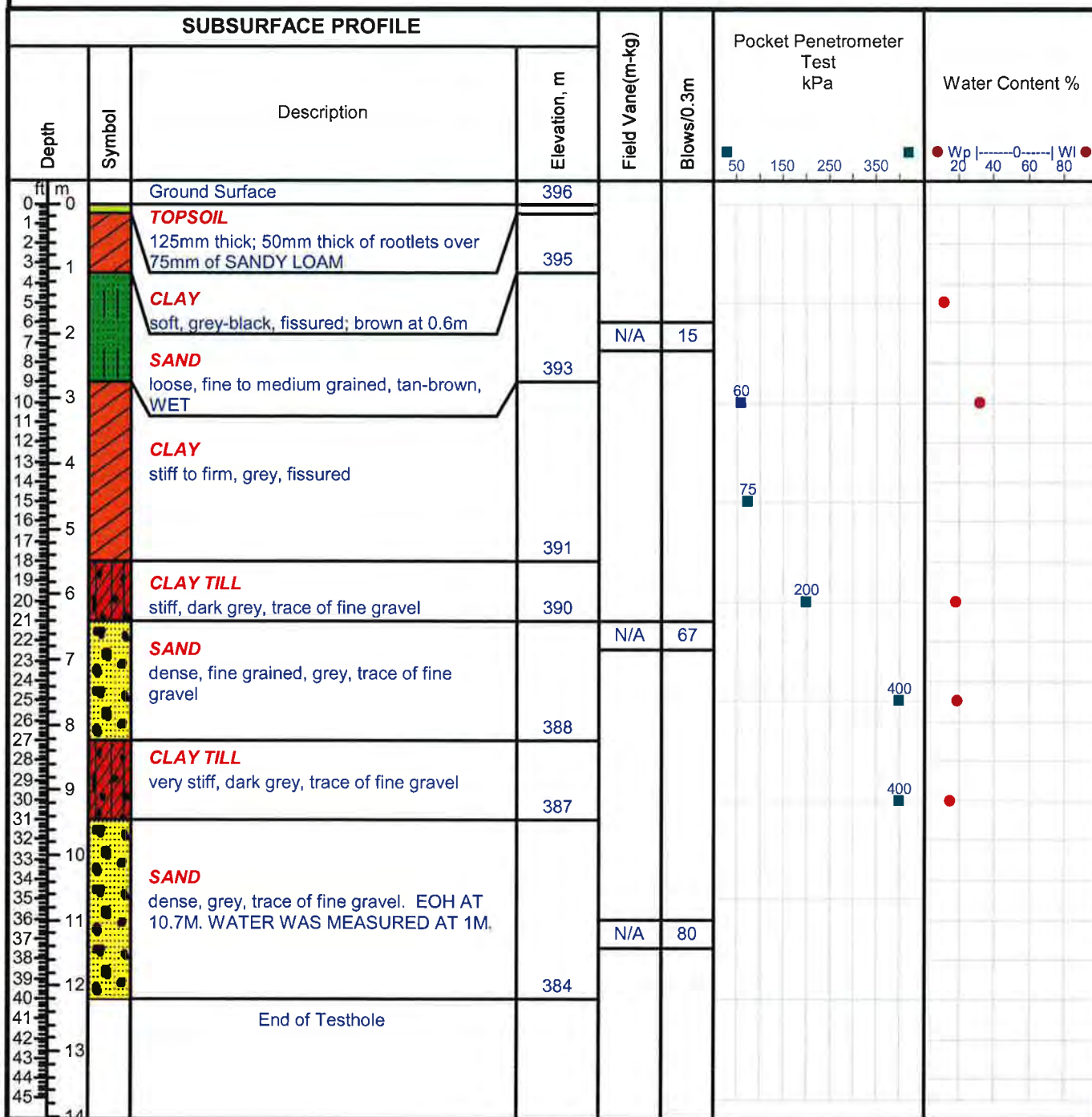
Project: PROPOSED BRANDON COMMERCIAL MIXED USE

Client: VBJ Developments Ltd.

Enclosure:

Location: N1/2 Sec.3-10-19 WPM, Brandon, MB.

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 396M

Drill Date: July 24 and 25, 2013

Checked by: SSU

Hole Size: 125mm

Sheet: 1 of 1

## **APPENDIX C**

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### **Laboratory Test Results**



**MOISTURE CONTENT OF SOIL**  
**ASTM D2216**

CLIENT: Silvestre Urbano	TEST NO: 1	PROJECT NO: 13-21
PROJECT: Brandon Land Dev.	DATE SAMPLED 29-Jul-13	SAMPLED BY: Client
PROJECT CONTACT: SU	DATE TESTED: / 29-Jul-13	TESTED BY: GM

<b>Test Hole No.</b>	<b>TH 1007</b>	<b>TH1007</b>	<b>TH1007</b>	<b>TH1007</b>	<b>TH1007</b>
Depth	10'	15'	20'	25'	30'
Wt Wet Sample + Tare	152.9	166.7	150.5	167.6	174
Wt Dry Sample + Tare	113	121.1	113.7	144.6	145.6
Wt Water	39.9	45.6	36.8	23	28.4
Wt Tare	7.2	7.2	7.2	7.1	7.0
Wt Dry Sample	105.8	113.9	106.5	137.5	138.6
<b>Moisture Content (%)</b>	<b>37.71</b>	<b>40.04</b>	<b>34.55</b>	<b>16.73</b>	<b>20.49</b>
<b>Test Hole No.</b>	<b>TH1007</b>	<b>TH1007</b>	<b>TH1007</b>	<b>TH1007</b>	<b>TH1011</b>
Depth	35'	40'	50'	60'	5'
Wt Wet Sample + Tare	176.3	176.6	180.4	184.2	227.5
Wt Dry Sample + Tare	151.5	151	155.3	159.3	203.8
Wt Water	24.8	25.6	25.1	24.9	23.7
Wt Tare	7.0	7.2	7.1	7.2	7.1
Wt Dry Sample	144.5	143.8	148.2	152.1	196.7
<b>Moisture Content (%)</b>	<b>17.16</b>	<b>17.80</b>	<b>16.94</b>	<b>16.37</b>	<b>12.05</b>
<b>Test Hole No.</b>	<b>TH1011</b>	<b>TH1011</b>	<b>TH1011</b>	<b>TH1011</b>	<b>TH1003</b>
Depth	10'	20'	25'	30'	10'
Wt Wet Sample + Tare	192.1	208.1	206.6	209.4	230.4
Wt Dry Sample + Tare	146.6	176.2	174.5	182.5	177
Wt Water	45.5	31.9	32.1	26.9	53.4
Wt Tare	7.2	7.2	7.1	7.1	6.9
Wt Dry Sample	139.4	169.0	167.4	175.4	170.1
<b>Moisture Content (%)</b>	<b>32.64</b>	<b>18.88</b>	<b>19.18</b>	<b>15.34</b>	<b>31.39</b>
<b>Test Hole No.</b>	<b>NO LABEL</b>				
Depth	NO LABEL				
Wt Wet Sample + Tare	221.1				
Wt Dry Sample + Tare	167.6				
Wt Water	53.5				
Wt Tare	7.2				
Wt Dry Sample	160.4				
<b>Moisture Content (%)</b>	<b>33.35</b>				

## **APPENDIX D**

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### **Granular Specification/ Helical Screw Piles Selection Table**

900. 3.2 - Aggregate Requirements (Cont'd)

The Los Angeles Abrasion Loss on granular base course aggregate will be based on the total sample submitted.

Shale Content is the percent by weight of the particles retained on a 4.75 sieve that are shale particles.

Clay balls are the percent by weight of particles retained on a 12.5 mm sieve that are clay particles.

The aggregate shall be well graded and shall not vary from maximum to minimum of the specification ranges for consecutive tests.

The requirements for each Class will be as follows:

GRANULAR BASE COURSE					
Passing Standard Sieves	CLASS "A"		CLASS "B"	CLASS "C"	
	Gravel	Limestone	Gravel or Limestone	Gravel	Limestone
37.5 mm sieve				100%	
25 mm sieve				85 - 100%	100%
19 mm sieve	100%	100%	100%		
16 mm sieve	80 - 100%				
4.75 mm sieve	40 - 70%	35 - 70%	30 - 75%	25 - 80%	25 - 80%
2 mm sieve	25 - 55%		25 - 65%		
425 um sieve	15 - 30%	15 - 30%	15 - 35%	15 - 40%	
75 um sieve	8 - 15%	8 - 17%	8 - 18%	8 - 18%	8 - 20%
Minimum Crush Count	35%	100%	25%	15%	100%
Maximum					
a) Los Angeles Abrasion Loss	35%	35%	35%	40%	40%
b) Shale Content	12%		12%	20%	
c) Clay Balls	10%		10%		



## Selection Table - Techno Metal Post

Techno Metal Post Model	Project Type	Maximum compressive bearing capacity <sup>1 2 3 4</sup>				Lateral bearing capacity <sup>5</sup>		Factored bending resistance	
		SLS		ULS		SLS		ULS	
		(lbs)	(kN)	(lbs)	(kN)	(lbs)	(kN)	(ft-lbs)	(kN.m)
P1 (O.D. 1.9 in / 48.3mm)	Light residential (deck, patio, etc.)	6800	30,2	9520	42,3	225	1,0	1010	1,4
P2 (O.D. 2.4 in / 60.3mm)	Medium residential and light commercial (carport, sunrooms, single storey residential addition, pedestrian bridge, etc.)	9600	42,7	13440	59,8	450	2,0	1785	2,4
P3 (O.D. 3.5 in / 88.9mm)	Heavy Residential, Light to Medium Commercial and Industrial (cottage, camp, mobile home, two storey residential addition, garden shed, supporting column, underpinning, pedestrian bridge etc.)	33750	150,1	47250	210,2	2250	10,0	6454	8,8
P4 (O.D. 4.0 in / 101.6mm)	Heavy Residential, Light to Medium Commercial and Industrial (cottage, camp, mobile home, supporting column, underpinning, pedestrian bridge etc.)	45000	200,2	63000	280,2	2700	12,0	9411	12,8
P3 sch 80 (O.D. 3.5 in / 88.9mm)	Heavy Residential, Light to Heavy Commercial and Industrial (supporting column, underpinning, etc.)	50625	225,2	70875	315,3	2250	10,0	9057	12,3
P4 sch 80 (O.D. 4.0 in / 101.6mm)	Heavy Residential, Light to Heavy Commercial and Industrial (supporting column, underpinning etc.)	50625	225,2	70875	315,3	2700	12,0	13394	18,2
P5 (O.D. 5.6 in / 141.3mm)	Heavy Residential, Light to Heavy Commercial and Industrial (cottage, camp, mobile home, supporting column, sign, lamp post, underpinning, pedestrian bridge, etc.)	50625	225,2	70875	315,3	4500	20,0	21316	28,9
P6 (O.D. 6.6 in / 168.3mm)	Heavy Residential, Light to Heavy Commercial and Industrial (cottage, camp, mobile home, supporting column, sign, lamp post, underpinning, pedestrian bridge, etc.)	50625	225,2	70875	315,3	6750	30,0	33876	45,9

### Notes :

1. The maximum tensile load capacity can be obtained, conservatively, by halving the values of the bearing capacity in compression shown in the selection table.
2. The maximum compressive load (SLS) shown in the selection table limit the settlements to 13 mm (1/2 inch).
3. The maximum compressive bearing capacity (SLS) is determined by the maximum torque allowable by the installation equipment used.
4. When the pile is laterally unsupported (soil very loose / soft, liquefiable soils, water and air), the structural strength of the pile must be approved by the technical department of Techno Metal Post.
5. The values of lateral capacity are average values and can be modified, more or less, depending on the characteristics of the existing soil.

### Comments :

- For any questions, please contact the technical department of Techno Metal Post.
- Larger Techno Metal Post can be used for applications requiring a lateral or bending resistance higher than shown in the selection table.



March 30, 2017

### **Servicing of South Urban Expansion Annexation Executive Summaries**

#### **Water Executive Summary**

In 2016 the City of Brandon retained Alliance Engineering Services Inc. (AESI) to conduct a water system capacity analysis for development within Southwest Brandon. The model prepared by AESI took into consideration existing demands along with new developments proposed for Southwest Brandon over the next 30 years. Utilizing Bentley WaterCAD and GIS contour data provided by the City, AESI concluded that by increasing pressure supplied by the existing pumping stations, to the levels they were originally designed for, there is sufficient capacity in the existing distribution network to support the proposed development within the urban expansion area which includes the proposed development within the annexation property.

Water service connection for the proposed commercial development shall be to the existing 300mm watermain that runs along Patricia Avenue (see figure below).



## **Executive Summary**

### **Wastewater (Sanitary) Servicing**

In 2013 the City of Brandon retained AECOM to conduct a wastewater system analysis for the South End Lift Station. In 2016 the City of Brandon retained AECOM to conduct a wastewater system analysis for Southwest Brandon. The 2016 AECOM analysis took into consideration existing wastewater flows along with new development flows proposed for Southwest Brandon over the next 30 years. Through the information provided from these studies it has been determined that there are both interim and ultimate servicing solutions for the proposed development within the annexation land.

Wastewater servicing Southwest Brandon can only be accomplished through investment into infrastructure. Initially, construction of a new lift station at 34<sup>th</sup> Street and Patricia Avenue and a new forcemain running from there to the South End Lift Station via Patricia Avenue and 1<sup>st</sup> Street is required (Stage 1). As development progresses and the South End Lift Station ceases to have any further capacity, a new lift station at 1<sup>st</sup> Street and Patricia Avenue will be constructed and the forcemain along Patricia Avenue will be extended east from 1<sup>st</sup> street along Highway 110 to the Municipal Pre-Treatment Facility (Stage 2).

These long term investments in infrastructure are ultimately tied to development of the area and the rate at which it occurs. Based on current projections, Stage 1 falls within the 2 to 10 year capital budget.

Regarding the proposed development within the annexation property, Engineering has examined options available for servicing of the commercial component only. Based on present growth, it would be premature to proceed with Stage 1 of the wastewater servicing improvement as there is insufficient flow discharged from the development to make a lift station viable. An interim solution would be for this development to connect to the 200mm domestic sewer that currently exists adjacent to the property (see the figure below). This interim solution solely allows for retail commercial development contributing a maximum of 2.1 L/s Peak Design Inflow.



In order to accommodate the interim wastewater servicing, it is required that the domestic sewer along Maryland Avenue between Tracey Street and 9<sup>th</sup> Street be upgraded at a cost of approximately \$420,000. These required upgrades were identified in the AECOM South End Lift Station study. As there are other benefitting properties from this upgrade, VBJ's approximate allocation of the capital cost will be \$50,000.

This improvement only relates to the construction of the commercial component of the development. Any further development within the catchment area of the proposed forcemain (which the annexation land falls within), particularly if it is residential, leisure commercial or other development that may produce high wastewater flows, would initiate the Stage 1 upgrade, estimated cost of \$7,053,500, and further contributions. At the time of Stage 1 forcemain construction, the wastewater service for the existing commercial development would be required to disconnect from the 200 mm domestic sewer and reconnect to the forcemain at the owners expense. The developer will then be responsible for their proportionate share of the capital cost of Stage 1.





October 17, 2016

Project No. 141-15057-01

Steve McMillan  
VBJ Developments Ltd.  
2404 Park Avenue  
Brandon, MB R7B 0S3

Dear Steve:

**Re: South Brandon Village  
Conceptual Drainage Plan**

## **Introduction**

VBJ Development Ltd. is proposing a development currently under the name, South Brandon Village. WSP has been retained to provide a conceptual drainage plan for the property in conjunction with the planning discussions which are currently underway. The conceptual drainage plan is intended to be a precursor to an in depth storm management report which would involve drainage modelling of the full development once a more defined development layout is confirmed. The conceptual drainage plan will advance a concept to incorporate the existing wetlands and to define a means to drain the property and meet City of Brandon and Conservation/Water Stewardship's requirements.

## **Existing Conditions**

The subject property is located in the RM of Cornwallis bordered by Patricia Avenue to the north, PTH #10 to the east, a line approximately 791m west of PTH #10 for a west boundary and the south limit of the NE ¼ section, 3-10-19 with the exception of Lot 3, Plan 36654 as the southern limit.

The site is currently undeveloped and zoned agricultural. A distinct feature of the property is a wetland area which has no natural outlet. The extent of the water retained in this feature varies, dependent on precipitation and snowfall totals. Under very wet periods the wetland has drained to the southwest and ultimately to the Gun Club Coulee. The coulee is an area drain which runs from west to east and crosses under PTH #10 approximately 725m south of the south limit of the development. The areas north of the site drain to the site through three culverts under Patricia Avenue. The discharge from the culverts flow into well-defined ditches that empty into the wetland area. The City of Brandon is in the



process of regrading the ditching on Patricia and eliminating the culvert directly west of 18<sup>th</sup> Street.

The topographic data of the site was determined from a client supplied survey which was undertaken by Richmond Surveys in 2012.

The area has approximately 4m of fall from Patricia Avenue to the south limit. The 400m (geodetic) contour generally follows Patricia Avenue west to east.

### **Drainage Boundary**

The contributing area that drains to the subject lands, starts north of Maryland Avenue at 34<sup>th</sup> Street ( see attached Dwg 01). Approximately 11.0 ha of land is included in the Bellafield Subdivision catchment. Including the lots that front onto the east side of 34<sup>th</sup> Street, the total area north of Patricia and west of the Brentwood Trailer Park is 77.2 ha. This area makes its way to the subject lands via ditches and culverts along Patricia Avenue. A portion of the Brentwood catchment drains south to Patricia, this area is approximately 28.3 ha. The lands to the west of the site generally drain in a southwest direction, eventually to the Gun Club Coulee. Therefore including the subject lands, the overall drainage area to be considered is 177.4 ha (438 acres). Much of this area is the Bellafield Catchment, this development has a proposed retention pond to store runoff and will discharge via pipe to the subject lands. The discharge will be designed to emulate pre-development conditions typically under a 1:5 year event.

### **Proposed Development Plan**

The proposed development for the subject property is a mix of low density and moderate density residential with a significant commercial area. The commercial area with the highest runoff potential is located north of the wetland site. Based on the proposed land use, we have calculated a composite run off coefficient for the site at 0.56. This was calculated as follows:

- 95 of residential at 0.45
- 40 acres of commercial at 0.9
- 16.4 acres of public reserve at 0.2
- 4.5 acres of Hydro Corridor at 0.2
- 9.5 acres of retention pond surface at 1.0.

### **Wetland Assessment**

An assessment of the wetland area was undertaken in July/August 2016 by the MMM Group. A summary of the findings are as follows:

- The area of the wetland is 36.4 ha consisting of 5.5 ha of Deep Marsh Zone, 11.4 ha of Shallow Marsh Zone, 9.5 ha of Wet Meadow Zone and 10.0 ha of Low Prairie Zone.
- The waterline (edge of the shallow marsh zone) at the time of the survey was used as the benchmark elevation contour for determining water volume, surface area and depth.
- The total area of standing water in the wetland at the time of the survey was 14.2 ha.
- Water volume was 55,525 m<sup>3</sup>.
- Average depth of the inundated zone including shallow marsh and deep marsh zone is 0.5 m.
- The deepest part of the wetland located in the deep marsh zone has a depth of 1.2 m at an elevation of 394.3.
- The elevation of the water surface at the time of the survey was 395.3.
- The wetland was classified as a Class IV Wetland.

## **Proposed Drainage Concept**

To make full use of the site, the area requires an engineered drainage outlet that manages the runoff from the overall drainage boundary. The natural gradient drains to the southwest, however to access the Gun Club Coulee, an outlet would have to cross private property. This option would provide a very short route to the coulee and would have very favourable hydraulic elevations for a piped outlet. The elevation of the coulee at this location is around 4-5m lower than the general grade of the subject site. However, this location is currently not accessible due to the private lands which must be crossed. It may be possible that in the future an easement agreement could be negotiated. However some of this land will become part of the right of way for the westerly extension of PTH 110 and acquired by the Province which could make access much easier. This location would be the preferred option for the area outlet. Another route to access the coulee is southeast to the west ditch of PTH #10. The ditch itself is not deep enough to surface drain a piped land drainage system, however, a pipe could be installed in the ditch alignment from the site to a point where the necessary elevation in the ditch becomes suitable.

The plan for a drainage system on the site would incorporate and maintain the wetland feature. The beneficial areas for stormwater purposes are the deep marsh and shallow marsh zones which have maintained their general shape, function and storage characteristics over time.

The wetland assessment recommends that if the wetland is modified a slope of 6:1 should be established to maintain a more naturalized border including a 10 m



buffer zone of shallow marsh zone. Preserving the majority of the main basin of the wetland would involve a pond of approximately 4.05 ha (10 acres). The bottom of the pond would be at 394.3 and a normal water level of 395.0. The top of the 6:1 slope would be at 396.6.

With the normal water level only 1.6 m below the general grade around the wetland pond, it may be difficult to install piping into the pond and maintain adequate cover to provide freeze protection for piping below the water line. To overcome this issue we intend to use a dry pond to provide hydraulic advantage for the piped land drainage system and provide extra storage for runoff. The dry pond would be interconnected to the wetland pond and sized to contain the 100 year event in conjunction with the storage provided in the wet pond.

The interconnection between the ponds would have a gate structure to control the wet pond elevation and vary the elevation as necessary to maintain the vegetation. The dry pond is also where the area outlet would be installed as well as being the receiving pond for the piped land drainage system. This feature will permit the pipe system to drain dry between events. With a proposed dry pond bottom elevation of 394, the outlet pipe needs to discharge at a location that provides sufficient grade for the pipe and the hydraulic gradient to release significant flow during peak periods. Suitable elevations in the PTH #10 ditch begin to occur south of the intersection with the PTH 110 bypass. This results in the discharge pipe being approximately 830m long and an outlet elevation of around 393. Under high water elevations in the storage ponds a 750mm pipe can discharge approximately 18 cfs, which provides for acceptable drawdown times.

The location of the outlet in the PTH #10 west ditch is in an area where the slope of the ditch is around 1.5% down to the coulee crossing. North of this location the ditch is running in the 0.27% range. This increased longitudinal slope greatly increases the ditch capacity and ability to handle the outlet. The outlet would be fitted with a headwall structure and rip rap apron to mitigate against erosion.

An overall system concept is provided on Drawing 2. This shows the retention pond in the Bellafield Subdivision with an outlet that interconnects with the proposed dry pond/wetland pond and ultimately discharging to the Gun Club Coulee through an east or west outlet.

## Summary

The South Brandon Village area already provides a vital role in the drainage of the southwest corner of the City. To develop this land, the existing drainage features need to be managed and maintained. As the various drainage elements will be draining public right of ways, the City of Brandon should take ownership of the infrastructure. The site should become part of the City of Brandon to facilitate the operational control and maintenance of the system.

The drainage from the Patricia Avenue right-of-way flows to the wetland area in a well-defined ditch. This type of feature should be retained in the future plans. This direct connection maintains a constant supply of runoff to the wetland pond area.

The wetland area can be reconfigured to maintain the most significant zone of the wetland and retain its natural function. A defined outlet is needed for the existing and new land drainage features. As discussed above, the existing and new elements can work together to provide the required conceptual drainage system.

The proposed drainage concept we have presented demonstrates the site can retain its current functionality and be expanded to provide for the planned development in conjunction with current drainage guidelines and criteria.

Yours truly,

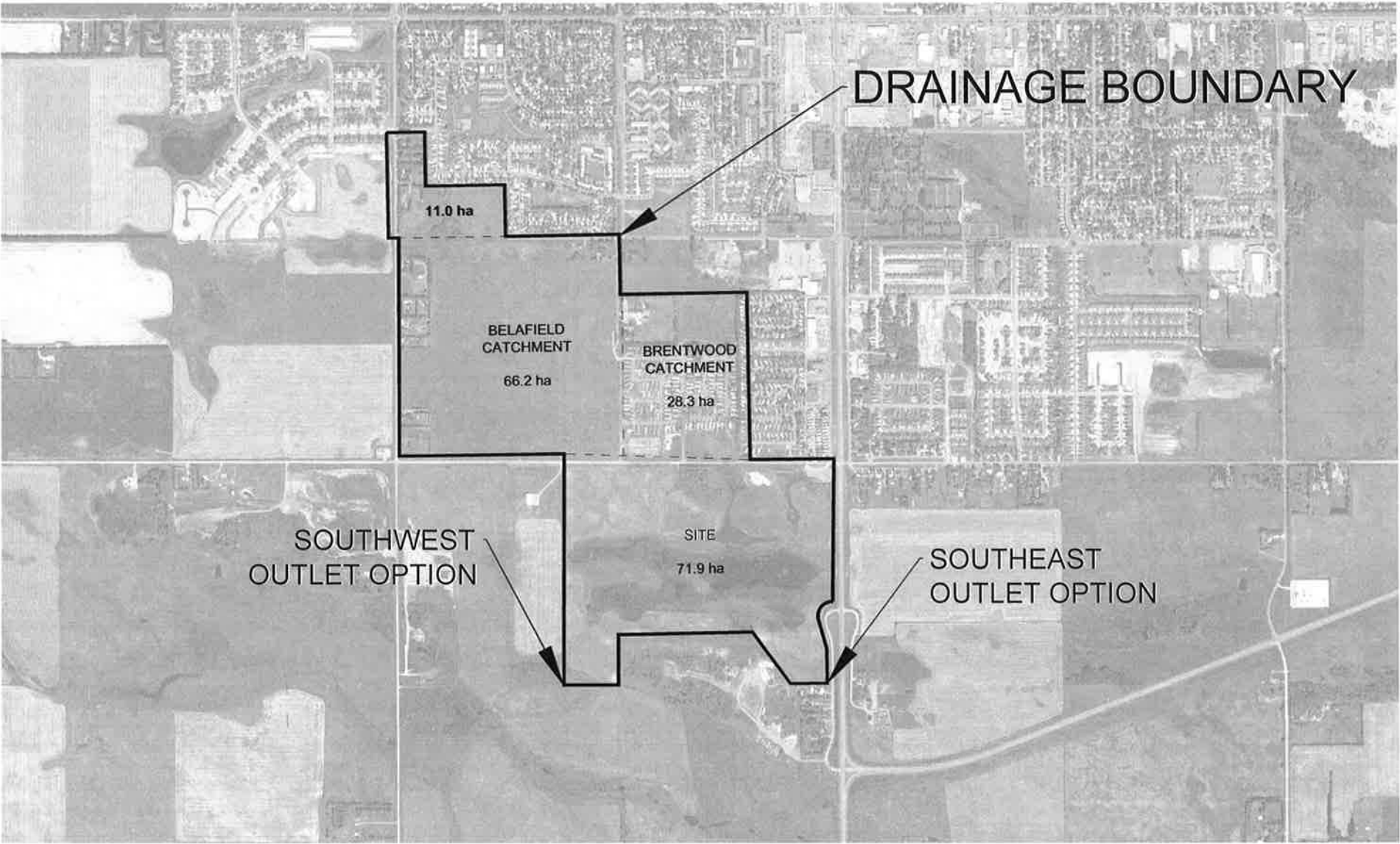
WSP Canada Inc.

A handwritten signature in blue ink, appearing to read 'I. McKinnon'.

**Ian McKinnon, P.Eng.**

Vice President Infrastructure, MB

IM/lr





1600 BUFFALO PLACE  
WINNIPEG MANITOBA CANADA R3T 6B8  
TEL.: 204-477-6650 | FAX: 204-474-2864 | WWW.WSPGROUP.COM

PROJECT:

**VBJ DEVELOPMENTS LTD.  
BRANDON SOUTH VILLAGE**

TITLE:

**STORMWATER MANAGEMENT  
DRAINAGE BOUNDARY PLAN**

SCALE:

1:20,000

DRAWN BY:

MBS

PROJECT NO:

141-15057-01

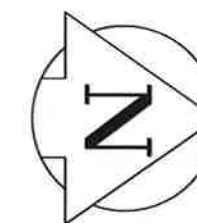
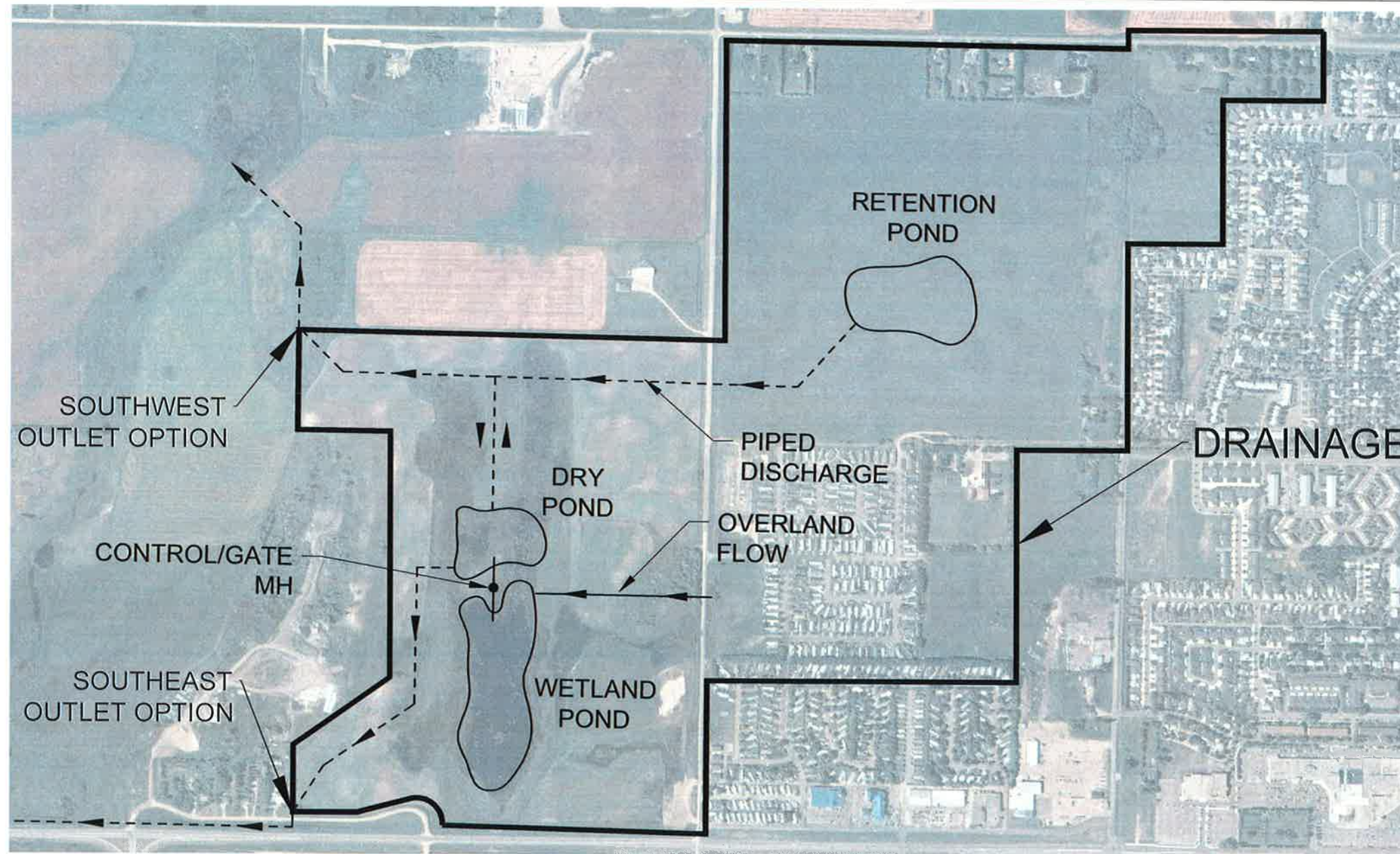
DATE:

2016-10-13

DRAWING NO:

01





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PROJECT:

**VBJ DEVELOPMENTS LTD.  
BRANDON SOUTH VILLAGE**

TITLE:

**STORMWATER CONCEPTUAL PLAN**

SCALE:

1:10,000

DRAWN BY:

MBS

PROJECT NO:

141-15057-01

DATE:

2016-10-14

DRAWING NO:

02

**DRAFT** – Preliminary Traffic Impact Study  
VBJ – Brandon South Village  
Commercial & Residential Development  
Part Section 3-T10-R19W  
Brandon, MB

November 2016

161-####-00



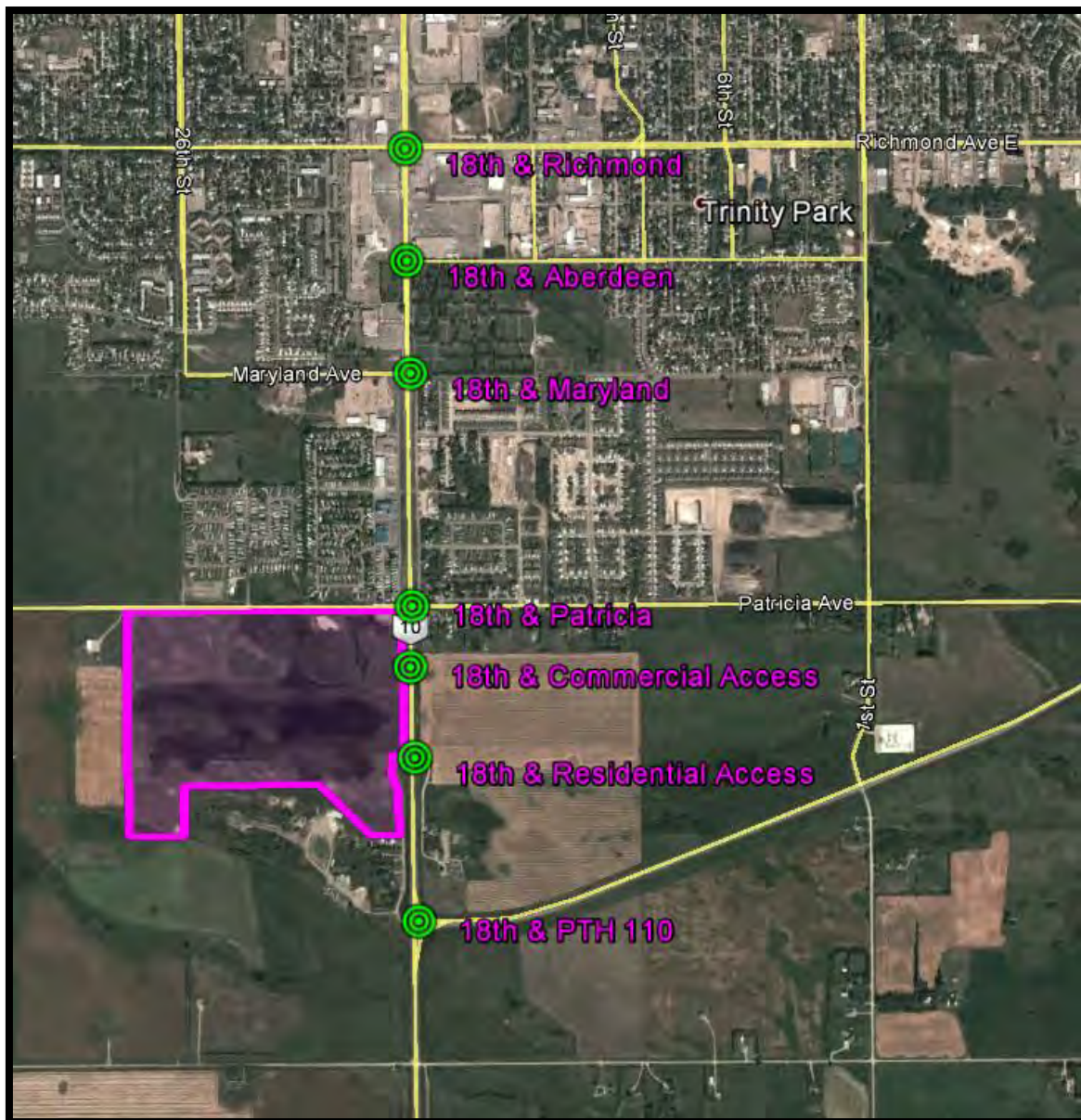
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## EXECUTIVE SUMMARY

The purpose of this Traffic Impact Study (TIS) is to estimate the high level impacts of the proposed ~170 Acre commercial and residential development on the adjacent roadway network; and identify intersections for further study once detailed development plans are established.

The area selected for study includes the signalized intersections along 18<sup>th</sup> Street from Richmond Avenue to PTH 110.



PM peak traffic was modelled to determine the impact of site generated traffic and background traffic on the adjacent roads and intersections.

Intersection	Traffic Type	2017				2027 - Full Buildout (100%)			
		LOS	ICU	Delay	Max V/C	LOS	ICU	Delay	Max V/C
Richmond Ave & PTH 10	Background	B	70%	14.6	0.86	C	79%	28.1	1.13
	Combined	-	-	-	-	D	91%	49	1.62
Aberdeen Ave & PTH 10	Background	A	46%	8.3	0.61	A	52%	9.4	0.67
	Combined	-	-	-	-	B	71%	11.3	0.84
Maryland Ave & PTH 10	Background	A	47%	6.1	0.59	A	52%	7.0	0.66
	Combined	-	-	-	-	B	74%	12.0	0.88
Patricia Ave & PTH 10	Background	A	42%	4.5	0.28	A	46%	5.9	0.41
	Combined	-	-	-	-	F	95%	ERR	ERR
PTH 110 & PTH 10	Background	A	26%	8.8	0.42	A	29%	8.3	0.37
	Combined	-	-	-	-	C	50%	8.7	0.57

The analysis shows that Richmond Avenue & 18th Street will need upgrading based on background traffic alone in 2027.

The following intersections may need upgrading to accommodate traffic from the proposed development at full buildout in 2027.

- Richmond Avenue & 18th Street
- Patricia Avenue & 18th Street

The two proposed commercial intersections will be designed to ensure that they are capable of providing the required level of service once the development plan is finalized.

All other intersections are projected to have sufficient capacity to accommodate both background and development traffic at full buildout in 2027.

Based on the above conclusions it is recommended that traffic at Richmond Avenue & 18th Street, and Patricia Avenue & 18th Street, be analysed further to determine the timing and required upgrades once detailed development plans are completed.



## Schedule I

## Brandon Land Inventory

## Residential Development to Buildout

Neighbourhood	Address	Use Type	Zoning	Units	Timeframe to Buildout
North Gateway Secondary Plan Area	Varies	Modular Homes / Single-Detached / Townhouse / Apartments	Varies	1,860	
	1501 Braecrest Dr	Apartments	RHD	300	11 + Years until Complete Buildout
Oakridge Estates	Varies	Single-Detached / Apartments	Varies	360	
	501 Braecrest Dr	Apartments	CG	48	3 - 10 Years until Complete Buildout
	1340 1st St N	Apartments	CG	48	3 - 10 Years until Complete Buildout
	1035 1st St N	Campus Housing	EI	300	11 + Years until Complete Buildout
	1620 Braecrest Dr	Townhouse / Apartments	RHD	54	0 - 2 Years until Complete Buildout
				<b>2,970</b>	
Neighbourhood	Address	Use Type	Zoning	Units	Timeframe to Buildout
North of Victoria	335 50th St	Residential	DR	300	11 + Years until Complete Buildout
South of Victoria	501 50th St	Residential	DR	300	11 + Years until Complete Buildout
	507 42nd St	Apartments	RMD	48	0 - 2 Years until Complete Buildout
	619 42nd St	Single-Detached	DR	7	3 - 10 Years until Complete Buildout
		Single-Detached	DR	9	3 - 10 Years until Complete Buildout
	805 42nd St	Single-Detached	DR	35	3 - 10 Years until Complete Buildout
	1610 Byng Ave	Apartments	RMD	120	11 + Years until Complete Buildout
	1200 Pacific Ave	Apartments	HMU	60	3 - 10 Years until Complete Buildout
The HUB Secondary Plan Area	Varies	Apartments	HES	40	0 - 2 Years until Complete Buildout
	3500 McDonald Ave	Apartments	CG	50	0 - 2 Years until Complete Buildout
	2200 Pacific Ave	Apartments	CG	88	0 - 2 Years until Complete Buildout
	Varies	Apartments	RMD	42	3 - 10 Years until Complete Buildout
	2105 Brandon Ave	Apartments	RMD	60	0 - 2 Years until Complete Buildout
	30 3rd St	Apartments	HTR	38	0 - 2 Years until Complete Buildout
	Varies	Apartments	IR	24	0 - 2 Years until Complete Buildout
	20 9th St	Apartments	HES	94	3 - 10 Years until Complete Buildout
	Varies	Single-Detached / Multi-Family	RMD	48	3 - 10 Years until Complete Buildout
	559 39th St	Single-Detached	RLD	2	3 - 10 Years until Complete Buildout
	513 39th St	Single-Detached	RLD	2	3 - 10 Years until Complete Buildout
	525 39th St	Single-Detached	RLD	2	3 - 10 Years until Complete Buildout
	537 39th St	Single-Detached	RLD	2	3 - 10 Years until Complete Buildout
				<b>1,391</b>	
Neighbourhood	Address	Use Type	Zoning	Units	Timeframe to Buildout
Woodlands	2005 Tracey St	Fourplex / Single-Detached	Varies	201	0 - 2 Years until Complete Buildout
The Elements		Townhouse	RLD	6	0 - 2 Years until Complete Buildout
Woodlands		Apartment	RMD	180	0 - 2 Years until Complete Buildout
		Low Density / Moderate Density / Single/Semi-Detached / Townhouse / Apartments	DR	927	
Ladyslipper		Single/Semi-Detached / Townhouse / Apartments	DR	369	11 + Years until Complete Buildout
Ladyslipper		Single/Semi-Detached	Varies	181	0 - 2 Years until Complete Buildout
North Brookwood	1660 34th St	Low Density / Moderate Density	DR	942	11 + Years until Complete Buildout
South Brookwood	1900 34th St	Single-Detached / Low Density / Moderate Density	Varies	1338	0 - 2 Years until Complete Buildout
Bellafield		Single-Detached	DR	69	11 + Years until Complete Buildout
Marquis Crescent Extension	2335 Patricia Ave	Modular Homes	RMH	41	0 - 2 Years until Complete Buildout
Brentwood Mobile Home Park	2210 Maryland Ave	Single-Detached	DR	55	11 + Years until Complete Buildout
	1905 26th St	Multi-Family	DR	190	11 + Years until Complete Buildout
	Varies	Apartments	RMD	440	
	1651 12th St	Apartments	IR	120	11 + Years until Complete Buildout
26th & Maryland School	5 Hummingbird Ln	Primary School	EI	15	11 + Years until Complete Buildout
Maryland Ave School	Maryland Ave	Primary School	OS	15	0 - 2 Years until Complete Buildout
				<b>5,089</b>	

# Non-Residential Development to Buildout

Address	Use Type	Area (sq m)	Area (ha)
1001 Middleton Ave	Commercial	11,629.39	1.16
900 Middleton Ave	Commercial	8,078.03	0.81
571 Middleton Ave	Commercial	8,361.15	0.84
1910 Hamilton Ave	Commercial	21,816.58	2.18
1745 18th St N	Commercial	15,800.65	1.58
1910 Bell Ave	Commercial	160,914.70	16.09
1725 18th St N	Commercial	10,106.60	1.01
1655 Clare Ave	Commercial	21,476.65	2.15
1555 18th St N	Commercial	38,979.58	3.90
1870 1st St N	Commercial	8,731.95	0.87
1620 1st St N	Commercial	8,732.65	0.87
1610 1st St N	Commercial	8,431.02	0.84
	Commercial	40,744.26	4.07
1310 1st St N	Commercial	3,587.53	0.36
1320 1st St N	Commercial	2,599.62	0.26
300 Agnew Dr	Industrial	6,276.38	0.63
400 Agnew Dr	Industrial	11,487.24	1.15
200 Agnew Dr	Industrial	9,077.24	0.91
205 McGill Dr	Industrial	2,385.92	0.24
100 Agnew Dr	Industrial	13,997.33	1.40
600 Aviation Ave	Industrial	6,069.36	0.61
300 McGill Dr	Industrial	7,459.00	0.75
100 Commonwealth Way	Industrial	4,183.66	0.42
Unit 6 - 301 Aviation Ave	Industrial	1,161.29	0.12
Unit 4 - 301 Aviation Ave	Industrial	1,161.30	0.12
Unit 3 - 301 Aviation Ave	Industrial	1,161.28	0.12
Unit 2 - 301 Aviation Ave	Industrial	1,161.28	0.12
Unit 1 - 301 Aviation Ave	Industrial	1,161.29	0.12
		<b>369,990.35</b>	<b>43.67</b>
Address	Use Type	Area (sq m)	Area (ha)
501 50th St	Commercial	56,144.89	5.61
4130 Victoria Ave	Commercial	466.28	0.05
4110 Victoria Ave	Commercial	1,342.46	0.13
530 38th St	Commercial	4,576.94	0.46
2016 Victoria Ave	Commercial	1,736.94	0.17
1920 Park Ave	Commercial	12,731.04	1.27
		<b>76,998.54</b>	<b>7.70</b>
Address	Use Type	Area (sq m)	Area (ha)
2222 Currie Blvd	Commercial	13,860.48	1.39
2059 Lyndale Dr	Commercial	4,308.76	0.43
1502 13th St	Commercial	1,670.71	0.17
1510 12th St	Commercial	556.83	0.06
1512 12th St	Commercial	1,113.65	0.11
1530 12th St	Commercial	2,227.27	0.22
1550 12th St	Commercial	1,663.75	0.17
1620 12th St	Commercial	3,564.50	0.36
1651 12th St	Commercial	30,460.59	3.05
1603 12th St	Commercial	580.21	0.06
1505 1st St	Commercial	4,379.57	0.44
1609 1st St	Commercial	1,204.64	0.12
1613 1st St	Commercial	1,095.16	0.11
1617 1st St	Commercial	1,095.17	0.11
1621 1st St	Commercial	1,095.19	0.11
1625 1st St	Commercial	1,095.21	0.11
1629 1st St	Commercial	1,095.21	0.11
1633 1st St	Commercial	1,178.91	0.12
1703 1st St	Commercial	10,020.48	1.00
1801 1st St	Commercial	9,519.58	0.95
	Commercial	166,770.02	16.68
		<b>258,555.89</b>	<b>25.86</b>

Address	Use Type	Area (sq m)	Area (ha)
116 Industrial Dr	Industrial	5,201.13	0.52
120 Industrial Dr	Industrial	3,016.87	0.30
124 Industrial Dr	Industrial	2,320.70	0.23
128 Industrial Dr	Industrial	2,928.57	0.29
1610 14th St E	Industrial	8,951.65	0.90
1620 14th St E	Industrial	8,951.62	0.90
1700 14th St E	Industrial	8,951.57	0.90
1710 14th St E	Industrial	8,951.54	0.90
1720 14th St E	Industrial	8,951.48	0.90
1800 14th St E	Industrial	10,447.50	1.04
1810 14th St E	Industrial	10,447.50	1.04
1820 14th St E	Industrial	10,447.50	1.04
1830 14th St E	Industrial	10,466.06	1.05
1805 14th St E	Industrial	11,325.94	1.13
10 Granite Rd	Industrial	20,369.28	2.04
6 Granite Rd	Industrial	20,345.52	2.03
14 Granite Rd	Industrial	20,363.89	2.04
18 Granite Rd	Industrial	20,340.93	2.03
22 Granite Rd	Industrial	20,329.21	2.03
33 Granite Rd	Industrial	17,607.00	1.76
37 Granite Rd	Industrial	17,596.20	1.76
26 Granite Rd	Industrial	21,659.78	2.17
30 Granite Rd	Industrial	21,659.78	2.17
34 Granite Rd	Industrial	21,659.78	2.17
41 Granite Rd	Industrial	48,807.93	4.88
2100 17th St E	Industrial	119,179.78	11.92
2301 Douglas St	Industrial	193,825.39	19.38
1900 17th St E	Industrial	35,786.48	3.58
2001 Victoria Ave E	Industrial	144,977.14	14.50
800 49th St E	Industrial	120,699.10	12.07
	Industrial	465,820.82	46.58
	Industrial	115,408.94	11.54
6501 Richmond Ave E	Industrial	11,148.51	1.11
2001 65th St E	Industrial	534,345.92	53.43
1801 65th St E	Industrial	46,275.72	4.63
6000 Richmond Ave E	Industrial	402,207.01	40.22
2002 65th St E	Industrial	527,367.15	52.74
2301 49th St E	Industrial	344,142.96	34.41
38 Limestone Rd	Industrial	103,004.41	10.30
26 Limestone Rd	Industrial	86,053.17	8.61
20 Limestone Rd	Industrial	14,771.78	1.48
14 Limestone Rd	Industrial	13,023.36	1.30
4800 Richmond Ave E	Industrial	394,831.45	39.48
1701 33rd St E	Industrial	416,821.96	41.68
	Industrial	134,882.99	13.49
4501 Patricia Ave	Industrial	394,482.60	39.45
1950 49th St E	Industrial	52,952.61	5.30
2010 49th St E	Industrial	40,746.37	4.07
2110 49th St E	Industrial	41,442.17	4.14
2200 33rd St E	Industrial	406,759.92	40.68
2000 33rd St E	Industrial	108,146.28	10.81
1900 33rd St E	Industrial	175,871.32	17.59
3000 Richmond Ave E	Industrial	72,954.38	7.30
		<b>5,880,028.62</b>	<b>588.00</b>

# Brandon Growth Forecast Final Report

Prepared For the City of Brandon

March 5, 2017

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# Executive Summary

The City of Brandon contracted SJ Services to update and build upon the 2016 Market Analysis and Development Forecast. In particular a City of Brandon and surrounding RMs (Cornwallis, Whitehead, and Elton) split was sought after as well a split between industrial, commercial, and institutional land demand.

Summary results are presented below:

Table 1: New Land Requirements per year in Hectares (vs.2015) Base Case City of Brandon and RMs by Aggregated Sector

New Land Requirements per year in Hectares (vs.2015) Base Case City of Brandon and RMs by aggregated Sector	2020	2025	2030	2035	2040	2045
Total Industrial	8	16	25	33	41	49
Brandon Industrial	7	14	21	29	36	43
RM Industrial	1	2	3	4	5	6
Total Commercial	17	33	50	67	83	100
Brandon Commercial	14	29	43	58	72	87
RM Commercial	2	4	7	9	11	13
Total Institutional	5	11	16	22	27	32
Brandon Institutional	5	9	14	19	24	28
RM Institutional	1	1	2	3	4	4

Table 2: New Land Requirements per year in Hectares (vs.2015) High Growth City of Brandon and RMs by Aggregated Sector

New Land Requirements per year in Hectares (vs.2015) High Growth City of Brandon and RMs by aggregated Sector	2020	2025	2030	2035	2040	2045
Total Industrial	11	21	32	42	53	64
Brandon Industrial	9	18	28	37	46	55
RM Industrial	1	3	4	6	7	8
Total Commercial	17	35	52	69	86	104
Brandon Commercial	15	30	45	60	75	90
RM Commercial	2	5	7	9	11	14
Total Institutional	5	11	16	22	27	33
Brandon Institutional	5	10	14	19	24	29
RM Institutional	1	1	2	3	4	4

Table 3: Housing Starts City of Brandon and Surrounding RMs

Base Case	2015	2020	2025	2030	2035	2040	2045
Total Starts	325	336	346	355	363	371	375
Brandon Starts	281	291	300	307	314	321	324
RM Starts	44	45	47	48	49	50	50
High Growth	2015	2020	2025	2030	2035	2040	2045
Total Starts	325	336	352	364	372	380	384



Brandon Starts	281	291	304	315	322	328	332
RM Starts	44	45	47	49	50	51	52

## Methodology and Results

The area under study is the Brandon Census Agglomeration which consists of the City of Brandon and the surrounding RMs of Cornwallis, Whitehead, Elton.

2015 to 2045 year estimations for the Brandon CA were undertaken by developing a customized economic model for the city and region. The model is a regional share of the latest Manitoba provincial input-output model (2011 at original project initiation). While the provincial model is rectangular in nature with 35 industries and 66 commodities and is based on the latest available Statistics Canada's Manitoba Input-Output tables, data limitations necessitated aggregation to the 25 industry level.

The Brandon economic model was developed using regional employment by industry to estimate regional output, a community hierarchy model to assess regional trade flows and leakages, and re-balancing to ensure model cohesiveness. A detailed discussion on the estimation of sub-provincial economic models is available in Appendix A.

Industry detail for the Brandon Economic Model is presented below:

Table 4: Industry Detail: Brandon Economic Model

Industry Detail: Brandon Economic Model
Crop and animal production
Forestry and logging
Fishing, hunting and trapping
Support activities for agriculture and forestry
Mining and oil and gas extraction
Utilities
Construction
Manufacturing
Wholesale trade
Retail trade
Transportation and warehousing
Information and cultural industries
Finance, insurance, real estate and rental and Leasing
Professional, scientific and technical services
Administrative and support, waste management and remediation services
Educational services
Health care and social assistance
Arts, entertainment and recreation
Accommodation and food services
Other services (except public administration)



Industry Detail: Brandon Economic Model
Operating, office, cafeteria, and laboratory supplies
Travel and entertainment, advertising and promotion
Transportation margins
Non-profit institutions serving households
Government sector

It should be noted that the Brandon Region does not contain Forestry and Logging and Fishing, Hunting and Trapping activity and the following industries are “fictive”, represent margins and do not have associated employment. As such, these 5 industries are excluded from the detailed forecast process.

### The Base Case Forecast

Under the Base Case Forecast, employment and GDP growth is expected to mirror the growth rate of the previous decade. It was first necessary to inflate the 2011 Brandon input-output tables to 2016 levels. This was accomplished using the Manitoba current dollar gross output 10 year average rate of change (4.48%) for gross output and gross domestic product. The latest Statistics Canada labour force survey for Brandon was used for employment by industry for 2016. The Manitoba current dollar gross output 10 year average rate of change (4.48%) was used to project the Brandon tables to 2045 in current dollars. Statistics Canada’s Manitoba industry deflators (current dollar GDP divided by constant dollar GDP) were utilized to convert Brandon current dollar GDP to constant dollar GDP. The rate of change in each industry deflator for the latest 5 years was used to project the deflators to 2045. Employment by industry was estimated by constructing a simple production function for each industry. Constant dollar GDP by industry was regressed against employment by industry. Efficiency gains were in labour were estimated by examining the relationship between constant dollar GDP (volume) and employment. Improvements in labour productivity over the previous 10 years were assumed to continue at the same annual rate for the next 30 years.

The base case forecast results are presented below:

Table 5: Constant Dollar Gross Domestic Product by Industry (2007 \$M) – Base Case Forecast

Constant Dollar Gross Domestic Product By Industry (2007 \$M) – Base Case Forecast							
	2015	2020	2025	2030	2035	2040	2045
Crop and Animal Production	41	42	38	39	36	37	34
Forestry and Logging	0	0	0	0	0	0	0
Fishing, Hunting and Trapping	0	0	0	0	0	0	0
Support Activities for Agriculture and Forestry	0	0	0	0	0	0	0
Mining and Oil and Gas Extraction	156	172	192	213	237	264	294
Utilities	63	69	75	82	90	98	108
Construction	168	204	250	306	375	459	562
Manufacturing	304	326	352	379	409	442	476

Constant Dollar Gross Domestic Product By Industry (2007 \$M) – Base Case Forecast

	2015	2020	2025	2030	2035	2040	2045
Wholesale Trade	116	136	160	188	222	262	309
Retail Trade	207	240	281	327	382	446	520
Transportation and Warehousing	104	122	144	169	199	235	277
Information and Cultural Industries	123	142	166	193	225	262	306
Finance, Insurance, Real Estate and Rental and Leasing	362	424	500	589	695	819	965
Professional, Scientific and Technical Services	58	65	73	83	93	105	118
Administrative and Support, Waste Management and Remediation Services	36	39	43	47	51	56	61
Educational Services	3	3	4	4	5	5	6
Health Care and Social Assistance	65	85	91	120	127	168	179
Arts, Entertainment and Recreation	16	18	20	22	24	26	28
Accommodation and Food Services	62	74	88	105	126	151	180
Other Services (Except Public Administration)	23	25	27	30	32	36	39
Operating, Office, Cafeteria and Laboratory Supplies	0	0	0	0	0	0	0
Travel, Entertainment, Advertising and Promotion	0	0	0	0	0	0	0
Transportation Margins	0	0	0	0	0	0	0
Non-Profit Institutions Serving Households	30	33	36	39	43	47	52
Government Sector	793	893	1012	1145	1297	1469	1663
Total	2729	3113	3550	4083	4670	5386	6177

Table 6: Employment by Industry – Base Case Forecast

Employment By Industry – Base Case Forecast

	2015	2020	2025	2030	2035	2040	2045
Crop and Animal Production	658	605	552	500	447	394	342
Forestry and Logging	0	0	0	0	0	0	0
Fishing, Hunting and Trapping	0	0	0	0	0	0	0
Support Activities for Agriculture and Forestry	13	12	11	10	9	8	7
Mining and Oil and Gas Extraction	177	181	185	188	192	196	199
Utilities	302	309	316	323	330	337	344
Construction	1,879	2,119	2,359	2,599	2,838	3,078	3,318
Manufacturing	2,886	3,034	3,181	3,329	3,476	3,624	3,771
Wholesale Trade	844	911	978	1,045	1,113	1,180	1,247
Retail Trade	3,735	4,091	4,448	4,804	5,161	5,517	5,873
Transportation and Warehousing	1,040	1,157	1,274	1,391	1,508	1,625	1,742

### Employment By Industry – Base Case Forecast

	2015	2020	2025	2030	2035	2040	2045
Information and Cultural Industries	532	597	663	728	793	858	924
Finance, Insurance, Real Estate and Rental and Leasing	1,213	1,344	1,474	1,605	1,735	1,866	1,996
Professional, Scientific and Technical Services	676	714	751	789	827	864	902
Administrative and Support, Waste Management and Remediation Services	681	730	780	830	880	929	979
Educational Services	112	124	135	147	158	170	181
Health Care and Social Assistance	920	1,011	1,102	1,193	1,284	1,375	1,466
Arts, Entertainment and Recreation	384	407	431	454	478	502	525
Accommodation and Food Services	2,177	2,433	2,690	2,947	3,203	3,460	3,716
Other Services (Except Public Administration)	575	597	618	640	661	683	704
Operating, Office, Cafeteria and Laboratory Supplies	0	0	0	0	0	0	0
Travel, Entertainment, Advertising and Promotion	0	0	0	0	0	0	0
Transportation Margins	0	0	0	0	0	0	0
Non-Profit Institutions Serving Households	705	721	738	755	772	788	805
Government Sector	9,190	10,003	10,816	11,628	12,441	13,254	14,066
Total	28,700	31,101	33,503	35,904	38,306	40,707	43,109

Land use requirements were based on a similar study conducted for the city of Edmonton. This study estimated floor area requirements per employee across 13 industries. Projected demand figures were then translated into land area requirements using site coverage ratios typical for each industry. Site coverage constitutes the percentage of a site that is covered by the built environment.

Base case land requirements by industry are presented below:

Table 7: New Land Requirements per year in Hectares (vs.2015) Base Case

New Land Requirements per year in Hectares (vs.2015) Base Case	2020	2025	2030	2035	2040	2045
Crop and Animal Production	0	0	0	0	0	0
Forestry and Logging	0	0	0	0	0	0
Fishing, Hunting and Trapping	0	0	0	0	0	0
Support Activities for Agriculture and Forestry	0	0	0	0	0	0
Mining and Oil and Gas Extraction	0	0	0	0	0	0
Utilities	0	0	0	1	1	1
Construction	5	10	16	21	26	31
Manufacturing	3	6	8	11	14	17
Wholesale Trade	1	3	4	5	7	8

New Land Requirements per year in Hectares (vs.2015) Base Case	2020	2025	2030	2035	2040	2045
Retail Trade	7	14	21	28	35	42
Transportation and Warehousing	4	8	11	15	19	23
Information and Cultural Industries	0	0	1	1	1	1
Finance, Insurance, Real Estate and Rental and Leasing	0	1	1	2	2	3
Professional, Scientific and Technical Services	0	0	0	0	1	1
Administrative and Support, Waste Management and Remediation Services	0	0	0	1	1	1
Educational Services	0	0	0	0	1	1
Health Care and Social Assistance	1	2	2	3	4	5
Arts, Entertainment and Recreation	0	0	1	1	1	1
Accommodation and Food Services	2	5	7	9	12	14
Other Services (Except Public Administration)	0	0	1	1	1	1
Operating, Office, Cafeteria and Laboratory Supplies	0	0	0	0	0	0
Travel, Entertainment, Advertising and Promotion	0	0	0	0	0	0
Transportation Margins	0	0	0	0	0	0
Non-Profit Institutions Serving Households	0	0	0	1	1	1
Government Sector	5	11	16	21	26	32
Total	30	61	91	121	152	182

**Results were aggregated into the larger components of industrial, commercial, and institutional based on the following industry distribution:**

Table 8: Industry Distribution-Industrial, Commercial, and Institutional

Industry Distribution: Industrial, Commercial, and Institutional	
Crop and animal production	Industrial
Forestry and logging	NA
Fishing, hunting and trapping	NA
Support activities for agriculture and forestry	Industrial
Mining and oil and gas extraction	Industrial
Utilities	Industrial
Construction	Industrial
Manufacturing	Industrial
Wholesale trade	Commercial
Retail trade	Commercial
Transportation and warehousing	Commercial
Information and cultural industries	Commercial
Finance, insurance, real estate and rental and Leasing	Commercial
Professional, scientific and technical services	Commercial
Administrative and support, waste management and remediation services	Commercial
Educational services	Commercial

Industry Distribution: Industrial, Commercial, and Institutional	
Health care and social assistance	Commercial
Arts, entertainment and recreation	Commercial
Accommodation and food services	Commercial
Other services (except public administration)	Commercial
Operating, office, cafeteria, and laboratory supplies	NA
Travel and entertainment, advertising and promotion	NA
Transportation margins	NA
Non-profit institutions serving households	Institutional
Government sector	Institutional

Aggregated results were, in turn, allocated between the City of Brandon and the surrounding RMs based on the employment by industry split between industrial, commercial, and institutional sectors in Brandon relative to the RMs. Data for this exercise was available in the 2011 Statistics Canada National Household Survey, the latest available.

The resulting disaggregation is below:

Table 9: New Land Requirements per year in Hectares (vs.2015) Base Case City of Brandon and RMs by Aggregated Sector

New Land Requirements per year in Hectares (vs.2015) Base Case City of Brandon and RMs by Aggregated Sector	2020	2025	2030	2035	2040	2045
Total Industrial	8	16	25	33	41	49
Brandon Industrial	7	14	21	29	36	43
RM Industrial	1	2	3	4	5	6
Total Commercial	17	33	50	67	83	100
Brandon Commercial	14	29	43	58	72	87
RM Commercial	2	4	7	9	11	13
Total Institutional	5	11	16	22	27	32
Brandon Institutional	5	9	14	19	24	28
RM Institutional	1	1	2	3	4	4

### The High Growth Forecast

A series of exogenous shocks (output and investment) to the Brandon economy over the next 30 years generated industry employment and output results over and above the base case results.

The high growth scenario was based on the following model inputs:

Table 10: High Growth Scenario Assumptions

	Estimated timing	Assumed Construction Year	Construction Cost (\$M)	Annual Incremental Output (\$M)	New Employment
Soybean processing 600,000 ton/yr (mechanical)	5 to 10 yrs	2022	60	70	40
Soybean Bio-Diesel 20 to 100 million litre	10 to 15 yrs	2028	20	50	15
Ethanol and Distiller Grains Production Plant	15 to 25 yrs	2025	70	100	30
Food Grade Oil, Tallow and Meat Co-Products Processing Plant	10 to 30 years	2035	na	na	na
		begins in 2020			
		complete in 2024			
Food Cluster 80 firms	5 to 10 yrs	Begins in 2016	3M/year	28	550
		complete is 2025			
Federal Infrastructure Program	0 to 10 years		13M/year	na	148
Reinvigorated Hog Sector	0 to 15 years	2023	38	6.5	0

Construction periods were based on the mid-point year in the range and assumed a 1 year construction period was assumed. The actual manufacturing begins the next year. Construction impacts are one-time and manufacturing impacts are on-going. Model generated indirect and induced employment are included in the results. Indirect impacts measure the secondary business transactions that result from the initial expenditures. Induced impacts are third round impacts from the spending of incremental labour income in the economy after removing a portion for taxes and savings. The discrepancies between GDP and employment impacts in the high growth scenario are due to the addition of plants producing hundreds of millions in new output with only 15 to 40 new employees.

High growth forecast results are presented below:

Table 11: Constant Dollar Gross Domestic Product by Industry (2007 \$M) – High Growth Forecast

Constant Dollar Gross Domestic Product By Industry (2007 \$M) – High Growth Forecast							
	2015	2020	2025	2030	2035	2040	2045
Crop and Animal Production	41	42	39	43	39	39	36
Forestry and Logging	0	0	0	0	0	0	0
Fishing, Hunting and Trapping	0	0	0	0	0	0	0
Support Activities for Agriculture and Forestry	0	0	0	0	0	0	0
Mining and Oil and Gas Extraction	156	172	195	231	254	279	307
Utilities	63	69	75	84	92	100	109
Construction	168	208	271	307	376	460	563
Manufacturing	304	326	376	584	587	597	611
Wholesale Trade	116	136	160	192	225	265	311
Retail Trade	207	241	281	328	382	446	521
Transportation and Warehousing	104	122	144	174	204	240	281



Constant Dollar Gross Domestic Product By Industry (2007 \$M) – High Growth Forecast

	2015	2020	2025	2030	2035	2040	2045
Information and Cultural Industries	123	142	166	196	228	265	308
Finance, Insurance, Real Estate and Rental and Leasing	362	424	500	591	696	820	967
Professional, Scientific and Technical Services	58	65	74	84	95	106	119
Administrative and Support, Waste Management and Remediation Services	36	39	43	48	52	57	62
Educational Services	3	3	4	4	5	5	6
Health Care and Social Assistance	65	85	91	120	128	169	179
Arts, Entertainment and Recreation	16	18	20	22	24	26	28
Accommodation and Food Services	62	74	88	105	126	151	180
Other Services (Except Public Administration)	23	25	27	30	32	36	39
Operating, Office, Cafeteria and Laboratory Supplies	0	0	0	0	0	0	0
Travel, Entertainment, Advertising and Promotion	0	0	0	0	0	0	0
Transportation Margins	0	0	0	0	0	0	0
Non-Profit Institutions Serving Households	30	33	36	40	43	47	52
Government Sector	793	893	1012	1148	1299	1470	1664
Total	2729	3614	4538	5951	7274	8914	10945

Table 12: Employment by Industry – High Growth Forecast

Employment By Industry – High Growth Forecast

	2015	2020	2025	2030	2035	2040	2045
Crop and Animal Production	658	630	603	576	548	521	494
Forestry and Logging	0	0	0	0	0	0	0
Fishing, Hunting and Trapping	0	0	0	0	0	0	0
Support Activities for Agriculture and Forestry	13	12	11	10	9	8	8
Mining and Oil and Gas Extraction	177	187	197	207	216	226	236
Utilities	302	312	322	332	342	352	362
Construction	1,879	2,122	2,364	2,606	2,848	3,090	3,333
Manufacturing	2,886	3,146	3,406	3,666	3,926	4,186	4,446
Wholesale Trade	844	917	990	1,063	1,136	1,209	1,282
Retail Trade	3,735	4,092	4,449	4,806	5,163	5,520	5,877
Transportation and Warehousing	1,040	1,170	1,299	1,429	1,559	1,688	1,818
Information and Cultural Industries	532	601	669	737	805	874	942
Finance, Insurance, Real Estate and Rental and Leasing	1,213	1,345	1,477	1,609	1,741	1,874	2,006

## Employment By Industry – High Growth Forecast

	2015	2020	2025	2030	2035	2040	2045
Professional, Scientific and Technical Services	676	719	762	805	848	891	934
Administrative and Support, Waste Management and Remediation Services	681	739	797	855	913	971	1,029
Educational Services	112	124	135	147	158	170	181
Health Care and Social Assistance	920	1,013	1,106	1,199	1,292	1,385	1,478
Arts, Entertainment and Recreation	384	407	431	454	478	502	525
Accommodation and Food Services	2,177	2,433	2,690	2,947	3,203	3,460	3,717
Other Services (Except Public Administration)	575	597	618	640	661	683	704
Operating, Office, Cafeteria and Laboratory Supplies	0	0	0	0	0	0	0
Travel, Entertainment, Advertising and Promotion	0	0	0	0	0	0	0
Transportation Margins	0	0	0	0	0	0	0
Non-Profit Institutions Serving Households	705	724	743	763	782	801	820
Government Sector	9,190	10,010	10,830	11,650	12,470	13,290	14,110
Total	28,700	31,300	33,901	36,501	39,101	41,701	44,302

**New land requirements are calculated using the same methodology as in the Base Case Forecast. These are presented below:**

Table 13: New Land Requirements per year in Hectares (vs.2015) High Growth

	2020	2025	2030	2035	2040	2045
Crop and Animal Production	0	0	0	0	0	0
Forestry and Logging	0	0	0	0	0	0
Fishing, Hunting and Trapping	0	0	0	0	0	0
Support Activities for Agriculture and Forestry	0	0	0	0	0	0
Mining and Oil and Gas Extraction	0	0	0	1	1	1
Utilities	0	0	1	1	1	1
Construction	5	11	16	21	26	32
Manufacturing	5	10	15	20	25	30
Wholesale Trade	1	3	4	6	7	9
Retail Trade	7	14	21	28	35	42
Transportation and Warehousing	4	8	13	17	21	25
Information and Cultural Industries	0	0	1	1	1	1
Finance, Insurance, Real Estate and Rental and Leasing	0	1	1	2	2	3
Professional, Scientific and Technical Services	0	0	0	1	1	1

New Land Requirements per year in Hectares (vs.2015) High Growth						
	2020	2025	2030	2035	2040	2045
Administrative and Support, Waste Management and Remediation Services	0	0	1	1	1	1
Educational Services	0	0	0	0	1	1
Health Care and Social Assistance	1	2	3	3	4	5
Arts, Entertainment and Recreation	0	0	1	1	1	1
Accommodation and Food Services	2	5	7	9	12	14
Other Services (Except Public Administration)	0	0	1	1	1	1
Operating, Office, Cafeteria and Laboratory Supplies	0	0	0	0	0	0
Travel, Entertainment, Advertising and Promotion	0	0	0	0	0	0
Transportation Margins	0	0	0	0	0	0
Non-Profit Institutions Serving Households	0	0	1	1	1	1
Government Sector	5	11	16	21	27	32
Total	33	67	100	133	167	200

A similar sector aggregation and regional breakdown was conducted with the high growth forecast:

Table 14: New Land Requirements per year in Hectares (vs.2015) High Growth City of Brandon and RMs by Aggregated Sector

New Land Requirements per year in Hectares (vs.2015) High Growth City of Brandon and RMs by aggregated Sector						
	2020	2025	2030	2035	2040	2045
Total Industrial	11	21	32	42	53	64
Brandon Industrial	9	18	28	37	46	55
RM Industrial	1	3	4	6	7	8
Total Commercial	17	35	52	69	86	104
Brandon Commercial	15	30	45	60	75	90
RM Commercial	2	5	7	9	11	14
Total Institutional	5	11	16	22	27	33
Brandon Institutional	5	10	14	19	24	29
RM Institutional	1	1	2	3	4	4

## Population Forecast

The population model is a simple cohort survival model using birth and death rates and migration data from Statistics Canada. In its basic form, a cohort-survival model estimates future population based on the previous period's population plus natural increase (births less deaths) and net migration:

$$\text{Population}[t+1] = \text{Population}[t] + \text{Natural Increase} + \text{Net Migration}$$

This is calculated for men and women for each age-group. The time interval is determined by the age cohorts. The smallest time interval for which an estimate can be made is the length of time it takes all the members of an age cohort (e.g., age 10 - 14) to pass on to the next age grouping (e.g., the 15 - 19 year-old group). All of the cohorts must be the same dimension (e.g., 5-year increments, 7-year

increments), since over the course of the analysis each group must pass from one cohort to the next. All estimates must use time-intervals which are multiples of the cohort size.

Natural increase is the difference between the number of children born and the number of people who die during one time interval. The analysis, however, is being done in terms of age-cohorts for each sex. Children can only be born into the first cohort but people die in all of the cohorts (including the birth cohort). Further, the number of males has no direct effect on the number of children born. Children are born only to women of childbearing age based on historical births per female population by age group. Deaths by age group are also based on historical deaths per age group population.

Migration, both in and out, includes international, inter-provincial, and intra-provincial. Migration data is largely unavailable for the region. However, migration data is readily available for Statistics Canada’s Manitoba Census Divisions (CD) 7 which contains the bulk of the population (including Brandon) of the region. The proportion of the region to CD population times the migration data was assumed to represent in and out migration for the region, and the average of the latest 5 years available was used to predict future baseline migration. Additional in-migration from the high growth scenario was added to the base case in-migration. The latest Manitoba birth rate by age of mother, death rate by age and gender, and propensity to in and out migrate by age group and gender from Statistic Canada were used for both the base case and high growth population forecast. Finally, 2011 census population was used as the starting point. Because this exercise is designed to measuring incremental impacts rather than an entire population count, these further assumptions were used as the basis for analysis:

- Migration is driven labour demand and demand for indirect and induced construction employment is assumed to follow the same peak as construction.
- Based on previous large scale resource projects, it can be assumed that 10% of the regional construction workforce (excluding indirect and induced) will relocate permanently to the region.
- Among those that in-migrate to the region, it can be expected that those earning higher wages will in-migrate with families. To model this, it is assumed that in-migrants will bring an average household to the region of 2.42 (regional population divided by number of households from latest Statistics Canada census) if the industry where demand occurs has an average wage higher than the provincial average. In this case new migration is broken down by age and gender by the age/gender split in the region. Where the industry average wage is below the provincial average, in-migrants will be single in-migrants and will be broken down by age and gender by the age and gender split of the region 20-64 (working age) age group.
- With 1,720 unemployed and an unemployment rate of 5.6%, current labour demand requirements will be met through the current levels of in-migration, new local entrants into the labour market, and 10% of the available local labour for having the skills required to meet future demand. This is the case until 2023-2024 when labour demand exceeds local labour force and in-migration availability.

Table 15: Population Forecast Base Case

Population Forecast Base Case							
	2015	2020	2025	2030	2035	2040	2045
0-4	3,741	4,030	3,988	3,886	3,918	4,039	4,079

Population Forecast Base Case							
	2015	2020	2025	2030	2035	2040	2045
5-9	3,688	3,856	4,145	4,103	4,001	4,033	4,106
10-14	3,354	3,814	3,981	4,270	4,228	4,126	4,160
15-19	3,292	3,560	4,018	4,186	4,473	4,432	4,447
20-24	3,582	3,250	3,517	3,973	4,140	4,426	4,474
25-29	4,893	3,939	3,608	3,874	4,328	4,495	4,689
30-34	4,351	5,174	4,224	3,895	4,159	4,612	4,660
35-39	4,020	4,332	5,152	4,206	3,878	4,141	4,236
40-44	3,623	4,048	4,359	5,173	4,233	3,908	3,908
45-49	3,265	3,648	4,069	4,376	5,180	4,251	4,046
50-54	3,591	3,213	3,589	4,003	4,305	5,095	5,188
55-59	3,360	3,446	3,075	3,442	3,848	4,144	4,485
60-64	2,897	3,283	3,365	3,006	3,361	3,754	3,753
65-69	2,569	2,877	3,245	3,324	2,980	3,318	3,426
70-74	1,752	2,400	2,684	3,026	3,098	2,778	2,752
75-79	1,371	1,530	2,093	2,336	2,635	2,695	2,727
80-84	1,010	1,039	1,166	1,605	1,790	2,025	2,120
85-89	719	645	665	750	1,035	1,151	1,225
90+	558	606	588	590	635	793	855
Total	55,638	58,692	61,532	64,022	66,225	68,213	69,334

Table 16: Population Forecast High Growth

Population Forecast High Growth							
	2015	2020	2025	2030	2035	2040	2045
0-4	3,741	4,030	4,068	3,986	4,025	4,156	4,196
5-9	3,688	3,856	4,234	4,233	4,101	4,140	4,216
10-14	3,354	3,814	4,083	4,415	4,357	4,225	4,260
15-19	3,292	3,560	4,125	4,348	4,618	4,560	4,569
20-24	3,582	3,250	3,598	4,145	4,302	4,571	4,615
25-29	4,893	3,939	3,646	4,008	4,500	4,656	4,847
30-34	4,351	5,174	4,298	3,984	4,292	4,783	4,828
35-39	4,020	4,332	5,232	4,344	3,967	4,274	4,380
40-44	3,623	4,048	4,468	5,332	4,370	3,996	4,001
45-49	3,265	3,648	4,198	4,585	5,338	4,386	4,173
50-54	3,591	3,213	3,704	4,231	4,510	5,250	5,337
55-59	3,360	3,446	3,172	3,641	4,071	4,344	4,676
60-64	2,897	3,283	3,443	3,170	3,554	3,970	3,967
65-69	2,569	2,877	3,313	3,447	3,137	3,502	3,614
70-74	1,752	2,400	2,748	3,126	3,213	2,923	2,902
75-79	1,371	1,530	2,152	2,425	2,722	2,795	2,833
80-84	1,010	1,039	1,211	1,678	1,860	2,092	2,189

Population Forecast High Growth							
	2015	2020	2025	2030	2035	2040	2045
85-89	719	645	705	799	1,082	1,196	1,269
90+	558	606	592	620	671	831	893
Total	55,638	58,692	62,989	66,517	68,688	70,648	71,764

Population was split between the City of Brandon and the surrounding RMs based on the 2011 Census population, the latest available final census figure adjusted for undercounting. Based on these figures, the population of Brandon accounts for 86.5 percent of the region's populations under study.

Table 17: Population forecast Breakdown City of Brandon vs. Surrounding RMs

	Base Case Forecast			High Growth Forecast		
	CA Population	City of Brandon Population	RMs Population	CA Population	City of Brandon Population	RMs Population
2015	55,638	48,145	7,492	55,638	48,145	7,492
2016	56,251	48,676	7,575	56,251	48,676	7,575
2017	56,872	49,213	7,659	56,872	49,213	7,659
2018	57,486	49,745	7,741	57,486	49,745	7,741
2019	58,093	50,270	7,823	58,093	50,270	7,823
2020	58,692	50,788	7,904	58,692	50,788	7,904
2021	59,283	51,300	7,983	59,283	51,300	7,983
2022	59,866	51,804	8,062	59,866	51,804	8,062
2023	60,436	52,297	8,138	60,436	52,297	8,138
2024	60,991	52,778	8,213	61,006	52,791	8,215
2025	61,532	53,246	8,286	62,989	54,507	8,482
2026	62,058	53,701	8,357	63,670	55,096	8,574
2027	62,561	54,136	8,425	64,168	55,527	8,641
2028	63,054	54,563	8,491	65,481	56,663	8,818
2029	63,550	54,992	8,558	66,052	57,157	8,895
2030	64,022	55,401	8,621	66,517	57,560	8,957
2031	64,483	55,800	8,684	66,971	57,952	9,019
2032	64,925	56,182	8,743	67,406	58,329	9,077
2033	65,363	56,561	8,802	67,837	58,702	9,135
2034	65,796	56,936	8,860	68,264	59,072	9,193
2035	66,225	57,307	8,918	68,688	59,438	9,250
2036	66,649	57,674	8,975	69,107	59,801	9,306
2037	67,059	58,028	9,030	69,511	60,151	9,361
2038	67,455	58,371	9,084	69,902	60,489	9,413
2039	67,839	58,704	9,135	70,281	60,817	9,464
2040	68,213	59,027	9,186	70,648	61,135	9,514
2041	68,574	59,340	9,234	71,004	61,442	9,562
2042	68,764	59,504	9,260	71,194	61,607	9,587
2043	68,954	59,669	9,286	71,384	61,771	9,613
2044	69,144	59,833	9,311	71,574	61,935	9,638
2045	69,334	59,998	9,337	71,764	62,100	9,664



Population forecasts were in turn, translated into housing starts based on the following methodology:

- Net migration divided by the average Brandon census agglomeration household size of 2.42 will meet net-in-migrant demand.
- Historical examination of net-migration versus household starts suggests there is a certain amount of latent household formation that occurs annually regardless of the level of net-in migration. This includes household break ups, offspring moving out, etc. and averages 0.37% of the regional population per year. This figure was multiplied by regional population for each year and added to housing starts required to meet net-in migration.
- Starts were split between the City of Brandon and the surrounding RMs based on the 2011 Census population.

Table 18: Housing Starts-City of Brandon vs. Surrounding RMs.

	Base Case Forecast				High Growth Forecast			
	CA Population	Starts total	Starts City of Brandon	Starts RMs	CA Population	Starts total	Starts City of Brandon	Starts RMs
2015	55,638	325	281	44	55,638	325	281	44
2016	56,251	327	283	44	56,251	327	283	44
2017	56,872	329	285	44	56,872	329	285	44
2018	57,486	331	287	45	57,486	331	287	45
2019	58,093	334	289	45	58,093	334	289	45
2020	58,692	336	291	45	58,692	336	291	45
2021	59,283	338	292	46	59,283	338	292	46
2022	59,866	340	294	46	59,866	340	294	46
2023	60,436	342	296	46	60,436	342	296	46
2024	60,991	344	298	46	61,006	344	298	46
2025	61,532	346	300	47	62,989	352	304	47
2026	62,058	348	301	47	63,670	354	306	48
2027	62,561	350	303	47	64,168	356	308	48
2028	63,054	352	304	47	65,481	361	312	49
2029	63,550	354	306	48	66,052	363	314	49
2030	64,022	355	307	48	66,517	364	315	49
2031	64,483	357	309	48	66,971	366	317	49
2032	64,925	359	310	48	67,406	368	318	50
2033	65,363	360	312	49	67,837	369	320	50
2034	65,796	362	313	49	68,264	371	321	50
2035	66,225	363	314	49	68,688	372	322	50
2036	66,649	365	316	49	69,107	374	324	50
2037	67,059	366	317	49	69,511	375	325	51
2038	67,455	368	318	50	69,902	377	326	51
2039	67,839	369	320	50	70,281	378	327	51
2040	68,213	371	321	50	70,648	380	328	51
2041	68,574	372	322	50	71,004	381	330	51
2042	68,764	373	322	50	71,194	382	330	51
2043	68,954	373	323	50	71,384	382	331	51
2044	69,144	374	324	50	71,574	383	331	52
2045	69,334	375	324	50	71,764	384	332	52

# Appendix A: Developing Community Level Input-output models

The latest available provincial input-output tables at the S-Level from Statistics Canada were used as the starting point. The table represents 25 industries and 18 components of final demand (based on the 2011 S-level aggregation). The tables were converted into industry-by-industry space.

In a square input-output table, each industry in the table can be represented as a column. For example industry 1 can be represented as follows:

Z <sub>11</sub>
Z <sub>12</sub>
.
.
.
Z <sub>125</sub>
W <sub>1</sub>
X <sub>1</sub>

$z_{ij}$  = purchases by industry  $i$  of products from industry  $j$ . The transactions matrix consists of  $z_{11}$  to  $z_{2525}$  comprise the transactions matrix of 625 ( $25 \times 25$ ) elements.

$W_1$  = value added or gross domestic product component of industry 1's output which includes wages, salaries, supplementary labour income, unincorporated business profits, incorporate income profits, other income, and depreciation.

$X_1$  = industry 1's total output, which equals  $W_1$  plus the sum of  $z_{11}$  to  $z_{25}$ .

To create sub-provincial models, four challenges must be overcome:

Allocation of provincial gross output by community/region

Estimation of technical coefficients by industry at a community/regional level

Estimation of components of gross domestic product by industry at a community/regional level

Allocation of provincial final demand output by community/region.

Census data on labour force by industry will be used to allocate gross output by industry for the region/community. Regional gross output for industry  $i$  is estimated:

$$X_i^R = \text{Labour Force}_i^R / \text{Labour Force}^{Mb_i} \times X^{Mb_i}$$

Where:

$X_i^R$  = regional gross output for industry  $i$

$\text{Labour Force}_i^R$  = regional labour force for industry  $i$

$\text{Labour Force}^{Mb_i}$  = provincial labour force for industry  $i$

$X^{Mb_i}$  = provincial gross output for industry  $i$

To estimate items in each regional transaction matrix ( $z_{ij}$ ) it will be assumed in all cases that the provincial input structure will apply to regional industries. The components of the regional transaction matrix are estimated:

$$z_{ij}^R = z_{ij}^{SK} / X^{Mb_i} \times X_i^R$$

Where:

$z_{ij}^R$  = an element of the regional transactions matrix.

$z_{ij}^{SK}$  = the corresponding element of the provincial transactions matrix.

The same methodology is used for estimating the components of GDP.

$$W_i^R = W^{Mb_i} / X^{Mb_i} \times X_i^R$$

Where:

$W_i^R$  = regional value added or gross domestic product component of industry i's output

$W^{Mb_i}$  = provincial value added or gross domestic product component of industry i's output

The components of final demand are estimated as follows. Personal expenditures are based on a per capita allocation of provincial spending.

$$PE_i^R = PE^{Mb_i} / Pop^{Mb} \times Pop^R$$

Where:

$PE_i^R$  = Regional personal expenditure on industry i's output

$PE^{Mb_i}$  = Provincial personal expenditure on industry i's output

$Pop^{Mb}$  = Provincial population

$Pop^R$  = Regional population

Gross capital formation (GFCF) or investment by industry is estimated applying the regional share industry to total provincial gross capital formation for each industry. The same approach is used to estimate exports (Xd), imports (M), and inventory changes by industry (VPC)

$$GFCF_i^R = X_i^R / X^{Mb_i} \times GFCF^{Mb_i}$$

$$Xd_i^R = X_i^R / X^{Mb_i} \times Xd^{Mb_i}$$

$$M_i^R = X_i^R / X^{Mb_i} \times M^{Mb_i}$$

$$VPC_i^R = X_i^R / X^{Mb_i} \times VPC^{Mb_i}$$

Where:

$GFCF_i^R$  = Regional investment spending on industry i's output.

$GFCF^{Mb_i}$  = Provincial investment spending on industry  $i$ 's output

$Xd^R_i$  = Regional exports of industry  $i$ 's output

$Xd^{Mb_i}$  = Provincial exports of industry  $i$ 's output

$M^R_i$  = Regional imports of industry  $i$ 's output

$M^{Mb_i}$  = Provincial imports of industry  $i$ 's output

$VPC^R_i$  = Regional inventory changes of industry  $i$ 's output

$VPC^{Mb_i}$  = Provincial inventory changes of industry  $i$ 's output

Regional public administration employment is used to allocate provincial government current expenditures by region.

$$GCE^R_i = PAE^R / PAE^{Mb} \times GCE^{Mb_i}$$

Where:

$GCE^R_i$  = Regional government current expenditures on industry  $i$ 's output

$PAE^R$  = Regional public administration labour force

$PAE^{Mb}$  = Provincial public administration labour force

$GCE^{Mb_i}$  = Provincial government current expenditures on industry  $i$ 's output

It is also necessary to adjust for leakages for intra-provincial imported factors of production. These are estimated residually: If the sum of the use (both Final Demand and Inter-industry sales) of industry  $i$ 's output is less than  $X_i$  then, intra-provincial exports are used to balance. Similarly, if use is greater than  $X_i$  intra-provincial imports are used the balance.

Intra-provincial exports/imports and exports due to out-shopping are estimated by calculating the marginal propensity to out-shop (the ratio of major community per capita retail sales to provincial per capita retail sales and multiplying by PE. Imports and exports are adjusted by this amount.

The estimation of intra-provincial imports into a region/community and incorporation of intra-provincial imports into the region/community model's leakages will constrain local multipliers to values not exceeding provincial level multipliers.

### **Developing Community/Regional Impact Models**

Industry outputs in response to a shock in final demand are calculated as  $(I - (I - \mu - \alpha - \beta)A)^{-1}((I - \mu - \alpha - \beta)e^* + (I - \mu - \beta)X_d + (I - \mu)X_r) = X$

Where:

$I$  = an identity matrix of industry by industry dimension

$A$  = a matrix of technical coefficients representing inter-industry purchases ( $z_{ij}$ ) divided by own industry gross output  $X_i$ .

$\mu$  = a diagonal matrix whose elements represent the ratio of imports to use

$\alpha$  = a diagonal matrix whose elements represent the ratio of government production to use

$\beta$  = a diagonal matrix whose elements represent the ratio of inventory withdrawals to use

$e^*$  = final demand categories of consumption, government purchases of goods and services, business and government investment, and inventory additions.

$X_d$  = final demand category of domestic exports

$X_r$  = final demand category of re-exports.

Employment is calculated as a fixed number of positions per dollar of industry output.

GDP components are calculated based on a fixed ratio of  $W_i$  to industry output.