re:	**Settlement Monitoring Plan** **Proposed Hillside Development I** **3277 St. Joseph Boulevard - Ottawa**
to:	Landric Homes - **Mr. Matthew Firestone** – matthew.firestone@landrichomes.com
to:	DCR Phoenix Homes - **Mr. Michael Boucher** - mboucher@phoenixhomes.ca
date:	April 28, 2022
file:	PG5625-MEMO.02 Revision 1

Further to your request and authorization, Paterson Group (Paterson) prepared a settlement monitoring plan for the existing Class V Gloucester Cumberland Trunk Sewer during construction of the proposed development at the aforementioned site. This trunk sewer bisects the central portion of this site in an approximate north-south direction.

This memo should be read in conjunction with the Geotechnical Investigation Report (Paterson Group Report PG5625-1 Revision 2 dated April 28, 2022) and the Vibration Monitoring Plan (Paterson Group Memo PG5625-MEMO.03 Revision 1 dated April 28, 2022).

1.0 Geotechnical Conditions

Based on the geotechnical investigation completed by Paterson, the subsurface profile at the subject site generally consists of topsoil overlying varying thicknesses of fill, which in turn is overlying stiff, brown silty clay and/or glacial till, followed by bedrock. The fill encountered at the site ranges in thickness from 1.5 to 8.7 m, and generally consists of silty sand to silty clay with gravel, cobbles, boulders, crushed stone and blast rock. In the northeast portion of the site, a hard to stiff, brown silty clay deposit was encountered underlying the fill.

It is our understanding that the excavation for the proposed multi-storey buildings will extend approximately 4 to 12 m below the existing ground surface to accommodate the underground parking levels.

2.0 Proposed Monitoring Configuration and Locations

During the excavation for the proposed development, the existing sewer pipe will require settlement monitoring during construction of the proposed underground parking levels.

Three (3) settlement monitoring points are recommended to be installed directly on top of the 1,200 mm diameter trunk sewer pipe for monitoring settlement. These approximate locations are shown on the attached sketch.

The settlement monitoring points shall consist of a length of 35 mm x 35 mm standard steel bar within a 200 mm diameter corrugated plastic sleeve. An approximately 50 mm thick concrete levelling pad shall be poured directly over the sewer pipe, followed by the placement of a 100 mm x 100 mm x 12 mm steel plate which shall be cast into the top of the concrete levelling pad. The annular spaces between the hydro-vac hole and sleeve pipe will be filled with bentonite. These settlement monitoring points shall be used to monitor vertical displacement (settlement) only. Refer to Figure 1, attached following this memo, for a detail illustration the settlement monitoring point construction.

The settlement monitoring points will be removed at the completion of construction. Rods, survey targets, and sleeve pipes shall be removed and the remaining hole backfilled with bentonite pellets and sand.

The inclinometer casing will consist of 70 mm diameter, PVC or ABS resin pipe, and will be installed to the bedrock surface.

Proposed Monitoring Frequency and Methodology

A baseline survey will be completed daily for 3 days prior to the start of construction.

The settlement monitoring points will then be surveyed daily for the first week of excavation in the vicinity of the existing trunk sewer, and then weekly until the foundation excavations in the vicinity of the existing trunk sewer have been backfilled.

All survey measurements will be referenced to a benchmark with an established geodetic elevation, such as a sewer manhole cover, located in the vicinity of the site. The settlement monitoring points will be surveyed using a traditional manual survey.

3.0 Settlement Criteria

Following the establishment of the baseline elevation (average of the pre-construction readings) at each settlement monitoring point, the following thresholds and exceedance protocol provided in Table 1, on the next page, are recommended during construction activities:

Table 1 - Settlement Criteria & Associated Actions		
Settlement Value	**Description of Event**	**Contractor Required Action**
Up to 10 mm	*Allowable Level*	- Work may continue, no action required.
10 to 14 mm	*Review Limit*	- Immediately notify all relevant emergency contact parties within 24 hours of the survey. - Complete an additional survey of all monitoring points for confirmation of the readings. Give verbal notification of the results to the Contract Administrator within 1 hour of the additional survey and a written report within 24 hours. - Review the potential cause of the settlement and adjust the monitoring program as required. - Work may continue, however the contractor should give consideration to adjusting construction activities accordingly to minimize potential further movement.
Over 15 mm	*Alert Limit*	- Stop excavation work immediately. - Immediately notify all relevant emergency contact parties within 2 hours of the survey. - Complete an additional survey of all monitoring points for confirmation of the readings. Give verbal notification of the results to the Contract Administrator within 1 hour of the additional survey and a written report within 24 hours. - Complete a geotechnical review of the site within 12 hours to identify any obvious visual indications of ground subsidence, movement, sink holes, etc. - Complete a structural review of the affected structure(s) within 12 hours. - Notify all relevant emergency contact parties of the additional survey, geotechnical, and structural reviews within 24 hours. - Coordinate a meeting with the owner, construction manager, and all relevant emergency contact parties to discuss the results, mitigative actions, and plan for moving forward. - Construction work shall not begin until the meeting group has reached a conclusion and appropriate actions are implemented.

4.0 Monitoring Reports

Weekly settlement monitoring reports will be prepared by Paterson and will be submitted to the construction manager presenting the following information:

- ❑ Settlement data
- ❑ Summary of non-compliance, where applicable
- ❑ Mitigation measures, where applicable (when review and action levels are exceeded)

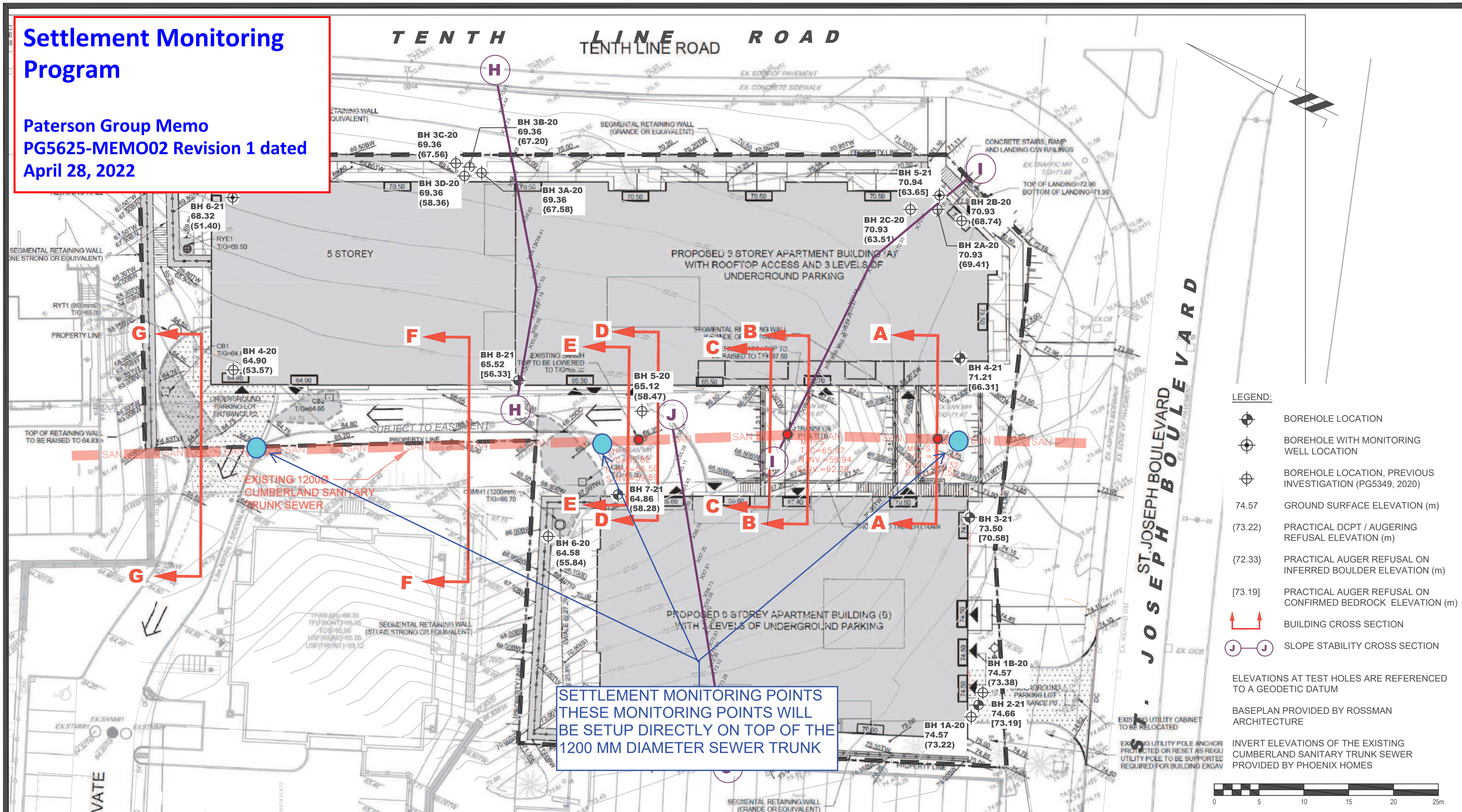
We trust that this information satisfies your immediate requirements.

Best Regards,

Paterson Group Inc.

Maha Saleh, Provisional P.Eng.

Scott S. Dennis, P.Eng.


Settlement Monitoring Program
Paterson Group Memo PG5625-MEMO02 Revision 1 dated April 28, 2022
TENTH LINE ROAD
ST. JOSEPH BOULEVARD
PROPOSED 9 STOREY APARTMENT BUILDING (A) WITH ROOFTOP ACCESS AND 3 LEVELS OF UNDERGROUND PARKING
PROPOSED 9 STOREY APARTMENT BUILDING (B) WITH 3 LEVELS OF UNDERGROUND PARKING
5 STOREY
EXISTING 1200Ø CUMBERLAND SANITARY TRUNK SEWER
SUBJECT TO EASEMENT
SETTLEMENT MONITORING POINTS
THESE MONITORING POINTS WILL BE SETUP DIRECTLY ON TOP OF THE 1200 MM DIAMETER SEWER TRUNK
BH 3C-20 69.36 {67.56}
BH 3B-20 69.36 {67.20}
BH 3D-20 69.36 (58.36)
BH 3A-20 69.36 {67.58}
BH 6-21 68.32 (51.40)
BH 5-21 70.94 [63.65]
BH 2B-20 70.93 {68.74}
BH 2C-20 70.93 (63.51)
BH 2A-20 70.93 {69.41}
BH 4-20 64.90 (53.57)
BH 8-21 65.52 [56.33]
BH 5-20 65.12 (58.47)
BH 4-21 71.21 [66.31]
BH 7-21 64.86 (58.28)
BH 6-20 64.58 (55.84)
BH 3-21 73.50 [70.58]
BH 1B-20 74.57 (73.38)
BH 2-21 74.66 [73.19]
BH 1A-20 74.57 (73.22)
LEGEND:
BOREHOLE LOCATION
BOREHOLE WITH MONITORING WELL LOCATION
BOREHOLE LOCATION, PREVIOUS INVESTIGATION (PG5349, 2020)
74.57 GROUND SURFACE ELEVATION (m)
(73.22) PRACTICAL DCPT / AUGERING REFUSAL ELEVATION (m)
{72.33} PRACTICAL AUGER REFUSAL ON INFERRED BOULDER ELEVATION (m)
[73.19] PRACTICAL AUGER REFUSAL ON CONFIRMED BEDROCK ELEVATION (m)
BUILDING CROSS SECTION
SLOPE STABILITY CROSS SECTION
ELEVATIONS AT TEST HOLES ARE REFERENCED TO A GEODETIC DATUM
BASEPLAN PROVIDED BY ROSSMAN ARCHITECTURE
INVERT ELEVATIONS OF THE EXISTING CUMBERLAND SANITARY TRUNK SEWER PROVIDED BY PHOENIX HOMES
0 5 10 15 20 25m

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NO.	REVISIONS	DATE	INITIAL
2	CONCEPTUAL PLAN UPDATED	23/02/2022	RG
1	2021 BOREHOLES ADDED, CONCEPTUAL PLAN UPDATED, SLOPE STABILITY INFORMATION ADDED	08/03/2021	RG

DCR PHOENIX C/O LANDRIC HOMES

GEOTECHNICAL INVESTIGATION - HILLSIDE DEVELOPMENT
PROPOSED MULTI-STOREY BUILDING - 3277 ST JOSEPH BLVD.

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale:	1:400	Date:	03/2021
Drawn by:	RCG	Report No.:	PG5625-1
Checked by:	RG	Dwg. No.:	PG5625-1
Approved by:	SD	Revision No.:	1

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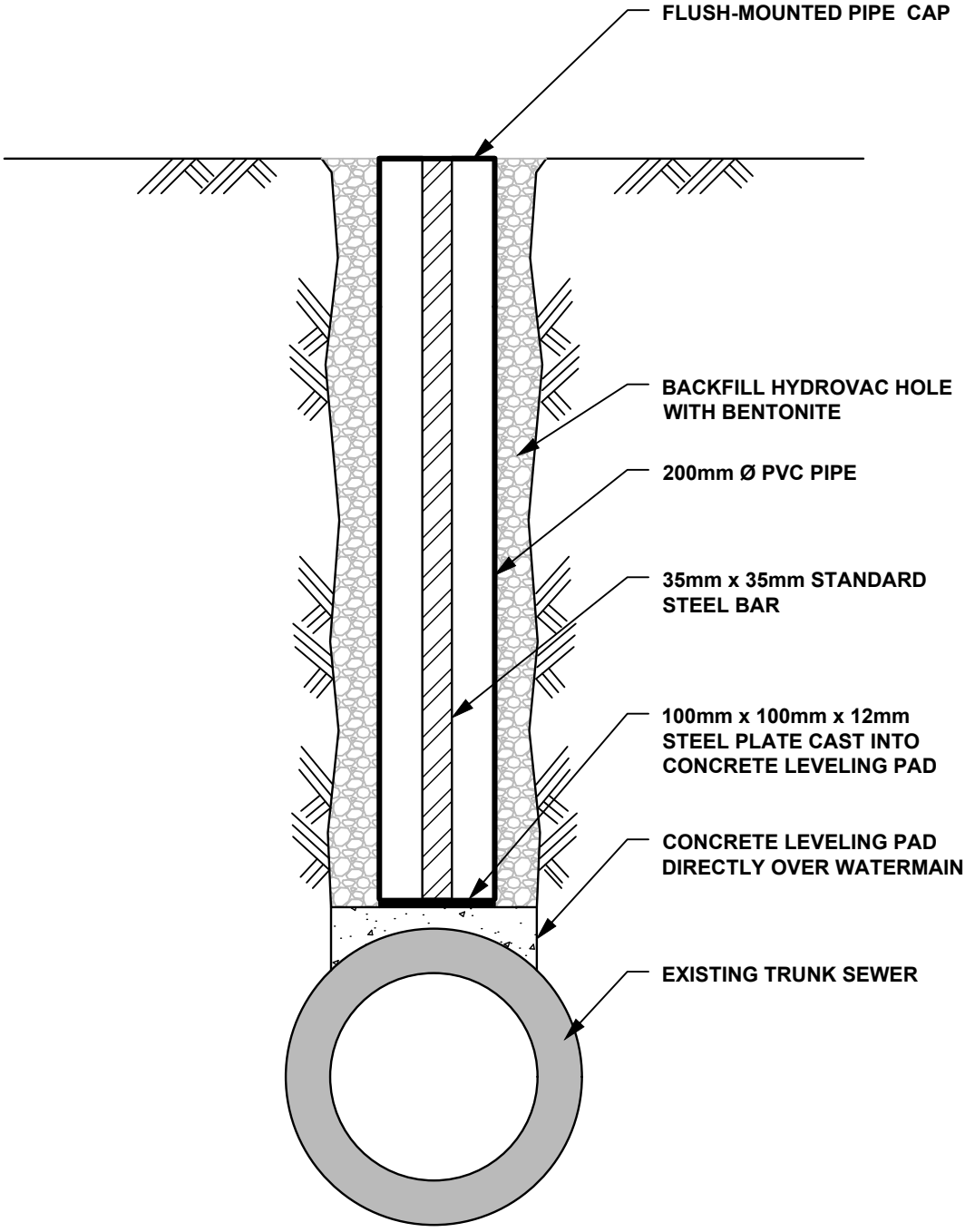

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CLARIDGE HOMES

PROPOSED MULTI-STOREY BUILDING
3277 ST. JOSEPH BOULEVARD
OTTAWA, ONTARIO

Title:

SEWER TRUNK SETTLEMENT MONITORING POINT INSTALLATION

Date: 03/2022		Report No.: PG5625-MEMO.02	
Scale: N.T.S.		Drawing No.: FIGURE 1	
Drawn by: NFRV	Checked by: SD		

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