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Manor Park Management
c/o Momentum - Planning and Communications
231 Brittany Drive, Suite D
Ottawa, Ontario
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Attention: **Mr. Dennis Jacobs**

Subject: **Floodproofing Design Report**
Proposed Multi-Storey Residential Building
263 Greensway Avenue - Ottawa

Dear Sir,

Further to your request, Paterson Group (Paterson) prepared the current report to provide flood mitigation recommendations for the proposed residential building to be constructed at the aforementioned site.

Background Information

Based on the available drawings, the proposed project at the aforementioned site will consist of a six storey residential building with two levels of underground parking. Associated paved parking areas, access lanes and landscaped areas are also anticipated as part of the proposed development.

Paterson completed the geotechnical investigation for the proposed development. Reference should be to the geotechnical investigation report for specific details regarding the subsurface profile encountered at the subject site.

As part of the site plan application, the Rideau Valley Conservation Authority (RVCA) was involved in the process and recommended that flood mitigation measures be implemented for the area located in proximity to a floodplain zone. The RVCA has provided the following comments to be addressed regarding the proposed site plan:

- ❑ “Structural details of foundation elements and specifications for fill materials and compaction procedures must be prepared or approved by a qualified Professional Engineer.” Structural details to be provided by the structural engineer for Paterson to include in the Floodproofing Design Report.
- ❑ “The responsible Professional Engineer shall certify in writing that the design has taken into account regulatory flood (velocity and depth of flow) and site (soil type, bearing capacity etc.) conditions encountered at the specific location of the development”
- ❑ “The Professional Engineer’s certificate must confirm that the foundation and building are designed to withstand hydrostatic pressures and / or impact loading that would develop under water level equivalent to the design storm [1:100 year flood level plus (minimum) 0.3 metres of freeboard]”
- ❑ “The responsible Professional Engineer must also identify all operation and maintenance requirements to be met in order to ensure the effective performance of the floodproofing measures over the design life of the structure.”

It should be further noted that the existing building (civic address 267 Greensway Avenue) was constructed over has been in place for over 50 years with no record of flooding issues. However, it is understood that specific recommendations regarding foundation drainage and the sump pump system within the basement are required to be provided. Paterson addressed the above noted RVCA comments in the following section which includes recommendations for site grading, foundation drainage for the basement levels, backfill and basement sump pump requirements.

Flood Mitigation Program

Site Grading

For the site grading, the following is suggested:

- ❑ The finished grading surrounding the buildings’ exterior should be shaped to promote surface runoff away from the subject building foundation.
- ❑ It is understood that the main floor will be set an elevation which is at least 300 mm above the 1:100 year flood level (elevation of 56.53 m). Therefore, the underside of the main floor slab will be at a minimum elevation of 56.83 m.

Waterproofing, Foundation Drainage and Backfill

Based on the depth of bedrock across the subject site, it is anticipated that the excavation will be partly through overburden soils (P1 level) and partly below the bedrock surface (P2 level). It is further anticipated that the portion of the foundation walls below the bedrock surface will consist of a blind-side pour against the bedrock surface and the foundation walls above the bedrock surface will be poured as a blind-side pour against the temporary shoring system.

Refer to Figure 1 - Floodproofing Detail attached to the present report for additional information.

Blind Side Pour Against Vertical Bedrock Surface or Temporary Shoring System

It is expected that insufficient room will be available for exterior backfill below the bedrock surface and/or where a temporary shoring system is installed. It is suggested that the foundation drainage system for blind side foundation wall pours can be as follows:

- Face of temporary shoring system or adequately prepared bedrock vertical surface (Grind the bedrock irregularities to create a smoother bedrock vertical surface).
- Waterproofing membrane securely fastened against the satisfactorily prepared bedrock surface or temporary shoring system. The waterproofing membrane can consist of a 150 mil bentonite surfacing laminated to a 20mil thick HDPE membrane. Install in horizontal lifts to manufacturers specifications in shingle fashion with the geotextile surface facing the bedrock and shoring system.
- A composite foundation drainage board (such as Miradrain G100N, Delta Drain 6000 or equivalent) should be securely fastened to the prepared vertical bedrock face and shoring surface over the waterproofing membrane with the geotextile side facing the bentonite waterproofing. The concrete foundation wall will then be poured against the composite foundation drainage board.
- A bentonite or PVC waterstop product, such as Waterstop RX, should be installed at the cold-joint between the footing and the foundation wall.
- It is recommended that the waterproofing membrane and composite drainage board extend down to the footing level. It is recommended that 150 mm diameter sleeves at 3 m centres be cast at the foundation wall/footing interface to allow the infiltration of water to flow to the interior perimeter drainage pipe. The perimeter drainage pipe and underfloor drainage system should direct water to the sump pit(s) within the lower basement area.

- ❑ It recommended that underfloor drainage be provided to control any water infiltration below the basement floor slab. For design purposes, we recommend that a 150 mm diameter perforated pipes be placed at 6 to 9 m centres. The spacing of the underfloor drainage system should be confirmed at the time of completing the excavation when water infiltration can be better assessed.

Below Slab Waterproofing

To minimize the amount of water infiltrating up into the underfloor drainage system, a waterproofing membrane should be installed below the floor slab as per the following details:

- ❑ A waterproofing membrane should be placed over an adequately prepared, horizontal bedrock surface. The bedrock surface should be relatively flat and grinded to remove significant undulations. Alternatively, a concrete mud slab can be poured over the bedrock surface prior to installing the waterproofing membrane.
- ❑ The waterproofing membrane should consist of a 150 mil bentonite surfacing laminated to a 20mil thick HDPE membrane (same membrane as described above for the foundation walls).
- ❑ The waterproofing membrane should be installed in shingle fashion over the horizontal bedrock surface or concrete mud slab with the bentonite side facing downwards. The membrane should cover the entire footprint of the building.
- ❑ Once laid down over the bedrock surface or concrete mud slab, the waterproofing membrane should be covered by a layer of concrete to provide a protective layer and working surface.
- ❑ The horizontally installed waterproofing membrane should be continued up the perimeter bedrock sidewalls to overlap the horizontally installed membrane below the slab to the vertically installed membrane behind the vertical foundation walls.

Foundation Walls with Two-Side Pours

It is anticipated that a temporary shoring will be required for the full perimeter of the building footprint. However, if two-sided pours are carried out at localized locations, the following is recommended:

- ❑ Once the formwork has been removed, it is recommended that the waterproofing membrane and composite foundation drainage board be extended up to ground surface. The drainage board should be installed directly onto the concrete wall with the geotextile side facing the concrete.

- ❑ The membrane should then be fastened directly to the concrete foundation wall over the drainage board with the HDPE side against the composite drainage layer.

Backfilling Recommendations

Once the waterproofing and floodproofing is completed, the following backfill procedure is recommended:

- ❑ To minimize rain/surface water from migrating down towards the buildings foundation drainage system, it is recommended that a silty clay backfill material be used to backfill against the foundation walls up to 500 mm below finished grade. The silty clay material will act as a clay seal and minimize the amount of water directed towards the buildings sump pit(s).
- ❑ To minimize frost heave potential below settlement sensitive areas, such as concrete sidewalks and exterior concrete entrance areas, the upper 500 mm of exterior backfill should consist of OPSS Granular B Type II. The Granular B Type II material should be placed in maximum 300 mm thick lifts and compacted to 98% of the materials standard Proctor maximum dry density (SPMDD).

Sump Pit Recommendations for Floodwater

Based on the configuration of the proposed building, it is expected that a sump pit chamber will be installed to handle water collected from the perimeter and underfloor drainage systems and should consider the following:

- ❑ It is recommended that a second sump pit chamber be provided to handle any additional water resulting from potential flooding periods.
- ❑ A second submersible sump pump should be placed within the main sump pit chamber with a backup outlet such that flood water can be discharged to the ground surface along the building exterior in the event that storm sewer backs up occur.
- ❑ The submersible sump pump should be sized to handle flows of 125 L/minute. A check back-up valve should be installed in the outlet pipe within the basement interior. A separate breaker should be used for the secondary sump pump electrical connection.
- ❑ The location of the sump pit chambers should be reviewed by Paterson.

Additional Comments

- Reference should be made to Subsection 5.6 - Basement Walls within the geotechnical investigation report for general recommendations regarding lateral earth pressure calculations and soil parameters. However, since the proposed building is within the floodplain zone, a hydrostatic pressure should be added to the retained soil weight for a water level equivalent to the design storm level (1:100 year flood level) plus an additional 0.3 m.
- It should be noted that the details contained within the present report have taken into account the regulatory flood and site conditions at the specific location of the development.

We trust this submission meets your immediate requirements.

Paterson Group Inc.



Colin Belcourt, P.Eng.



Carlos P. Da Silva, P.Eng., ing., QP_{ESA}

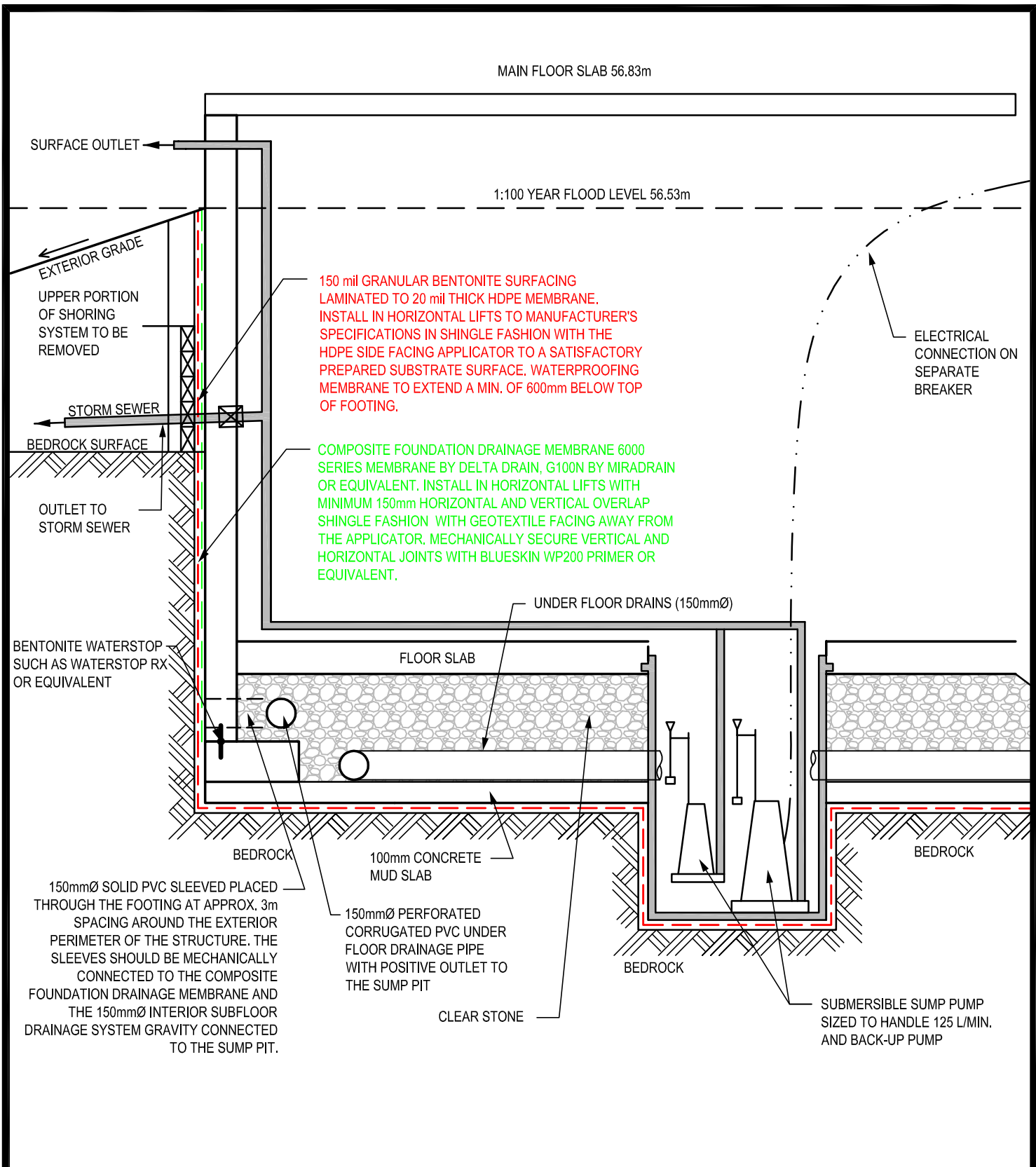


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		MPG	CB	