FINAL

Structural Assessment of Settlement Issues
École Notre Dame du Cap
Cap Saint-Georges, NL

Submitted to:
Department of Transportation and Works
Building Design and Construction Division
Fraser Mall, 230 Airport Boulevard
Gander, NL
A1V 1L7

Submitted by:
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15 March 2019
Wood Project #: TF18177142
Document No. TF19177142-0000-RPT-0001, REV. 0

IMPORTANT NOTICE

REPORT

FOR

STRUCTURAL ASSESSMENT OF SETTLEMENT ISSUES
ÉCOLE NOTRE DAME DU CAP
CAP SAINT-GEORGES, NL

FOR

DEPARTMENT OF TRANSPORTATION AND WORKS

PROVINCE OF NEWFOUNDLAND AND LABRADOR
PEG Newfoundland and Labrador PROFESSIONAL ENGINEERS AND GEOSCIENTISTS
PERMIT HOLDER
This Permit Allows
Wood Environment & Infrastructure Solutions
Chris Connolly Member No. 04664
To practice Professional Engineering in Newfoundland and Labrador.
Permit No. as issued by PEGNL N0844
which is valid for the year 2019.

REGISTERED PROFESSIONAL ENGINEER
PEG Newfoundland and Labrador PROFESSIONAL ENGINEERS AND GEOSCIENTISTS
CHRIS CONNOLLY
SIGNATURE
15 Mar. 2019
DATE
NEWFOUNDLAND & LABRADOR

REV.	DATE	REVISION(S)	PREPARED BY	CHECK	APP	CLIENT
0	15 Mar. 2019	Issued for Final	GB	CC	CC	
A	08 Mar. 2019	Issued for Review	GB	CC	CC	

wood.	REPORT FOR STRUCTURAL ASSESSMENT OF SETTLEMENT ISSUES ÉCOLE NOTRE DAME DU CAP CAP SAINT-GEORGES, NL	PROJECT NO. Wood Environment & Infrastructure Solutions Job No. TF19177142 REPORT **TF19177142-0000-RPT-0001** — REV. 0 PAGE 1 OF 1

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1.0 INTRODUCTION

Wood Environment and Infrastructure Solutions, a Division of Wood Canada Limited (Wood), has been retained by the Department of Transportation and Works, under the standing agreement for structural engineering services, to conduct a structural assessment of the foundation system and sub-floor for École Notre Dame du Cap in Cap Saint-Georges, Newfoundland. This request for Wood's services is included in Appendix A of this report. The request is in response to concerns raised by the current occupants of the school that the ground floor slab is moving downward near the outer edge of one side of the building. This movement, or settlement, has apparently been increasingly noticeable over the last 8 to 10 months. This report presents information about the school and its structural systems, observations made at the school location of the structural concerns, an engineering assessment of the problems that are causing the observed floor slab settlement, and concluding recommendations.

2.0 WOOD'S SCOPE OF WORK

Wood's Scope of Work entailed the following:

- Review of previous July 2013 reports completed by Atlantic Engineering Consultants Ltd and any available drawings showing the structural arrangements used for the construction of the school.
- A site visit to École Notre du Cap to observe, document and photograph the portions of the building that are showing evidence of ground slab settlement and possible other foundation issues. Observations from the occupants of the school were also gathered and investigated.
- Structural engineering review of the information gathered from the site visit as well as the drawings to determine the potential issues and problems that are contributing to the ongoing ground floor slab settlement.
- Preparation of a report outlining Wood's work, it observations, and the provision of conclusions and recommendations that address the observed structural problems.

3.0 OVERVIEW OF ÉCOLE NOTRE DAME DU CAP STRUCTURE

3.1 Location

École Notre Dame du Cap is located within the community of Cap Saint-Georges, NL and is 51 km west of Stephenville, NL. The school is situated on the north side of Hwy. 460 and its coordinates are: Lat. 48.48333, Long. -59.19148.

The address of the school is:

882 Oceanview Dr.
Cap Saint-Georges, NL
A0N 1T1

Further information showing the location of the school is presented in attached "Appendix B – Location".

3.2 Building Description

Exterior views of the school are presented in Figures 1 and 2 below:

Figure 1: École Notre Dame Du Cap - View to West

Figure 2: École Notre Dame Du Cap - View to North

École Notre Dame du Cap was constructed in 1976. It is a Butler pre-engineered rigid frame building with plan dimensions of 18.3 meters x 30.5 meters. Sometime after initial construction, a building extension at the south-west corner was constructed. This extension can be seen in Figure 2 above.

Two Butler drawings for the school are presented in attached "Appendix C – Original Butler Drawings". These two drawings provide key information about various structural components within the building. One drawing shows a staggered cross-section through the structure. Although not stated on the drawing, this view is most likely to the west. This drawing provides information about the rigid frames, the structural systems used to support the second floor, the slab-on-grade, the load bearing walls supporting the second floor, the cross-ties under the slab-on-grade, the foundations, and the grade beams.

The second Butler drawing is a foundation plan showing the plan dimensions of the building, and the size of the reinforced concrete pilasters, footings, and grade beams.

The two floors are located within the entire building except for the gymnasium area (also referred to as "multi-purpose room"). The following figure shows the layout of the two floors:

Figure 3: Floor Plans - École Notre Dame Du Cap

3.3 Structural Settlement Issues

3.3.1 July 2013 Report by Atlantic Engineering Consultants Ltd.

In July 2013, a report was prepared by Atlantic Engineering Consultants Ltd. (AECL) addressing concerns raised by the occupants of the school building regarding "visible floor slab settlement, in the order of 25 to 32 mm, at the front perimeter wall". A copy of this report is attached in "Appendix D – July 2013 AECL Report".

The report by AECL noted that the building's second floor is supported by inner and outer stud walls that bear directly onto the slab-on-grade. The outer load bearing walls are located along the exterior walls of the building and are supported by the outer edge of the slab-on-grade. The settlement issues noted by AECL are occurring at the base of the outer load bearing walls that are along the south side of the building.

AECL's report states that the observed settlement issues are "not uncommon". It attributes the settlement issues to poor quality backfill or compaction along the outer sides of the building. The report notes "that there are no structural integrity problems, and no imminent safety concerns, other than a possible tripping hazard at the main entrance vestibule, which can be easily rectified." AECL concludes that in their opinion, "some additional settlement may continue, over time, but should be very small."

3.3.2 February 2019

Almost six years have transpired since AECL's review of the settlement issues at École Notre Dame du Cap. The occupants of the school have noted that rather than seeing only very small increases in settlement as predicted in the AECL report, they are seeing increased settlements over the last 8 to 10 months. These recent observations by the occupants indicate that the school structure has significant issues that need to be reviewed and addressed immediately. On February 15, 2019, Wood visited the school site to discuss the observed structural issues with the occupants and to witness the issues first-hand.

4.0 SITE VISIT BY WOOD TO ÉCOLE NOTRE DAME DU CAP – FEBRUARY 15, 2019

The February 15, 2019 site visit to École Notre Dame du Cap noted above was conducted by Geoffery Park from Wood's Corner Brook, NL office. During this visit, Mr. Park engaged in discussions with the school's occupants to determine the extent of the structural issues they were observing. He also witnessed the locations that were showing evidence of settlement or associated problems that could potentially be related to the observed settlements. This included cracking in walls, floors, and excessive displacements. Photographs were also taken to provide supportive evidence of the settlement issues. Representative photos are presented in the attached "Appendix E – First Floor Photos" and "Appendix F – Second Floor Photos"

Key plans showing where the photographs in Appendix E were taken are presented below in Figures 4 and 5:

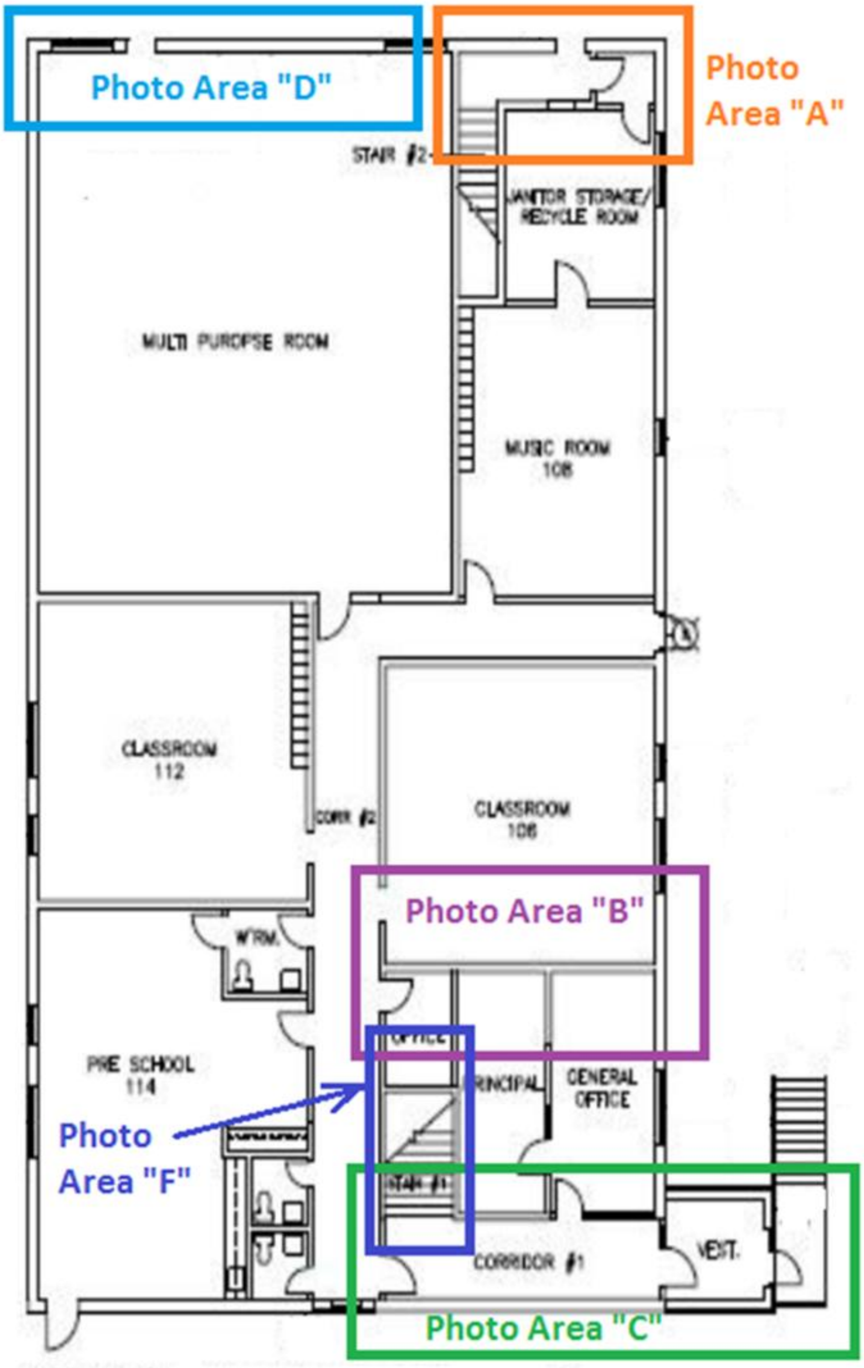


Figure 4: First Floor Photo Areas

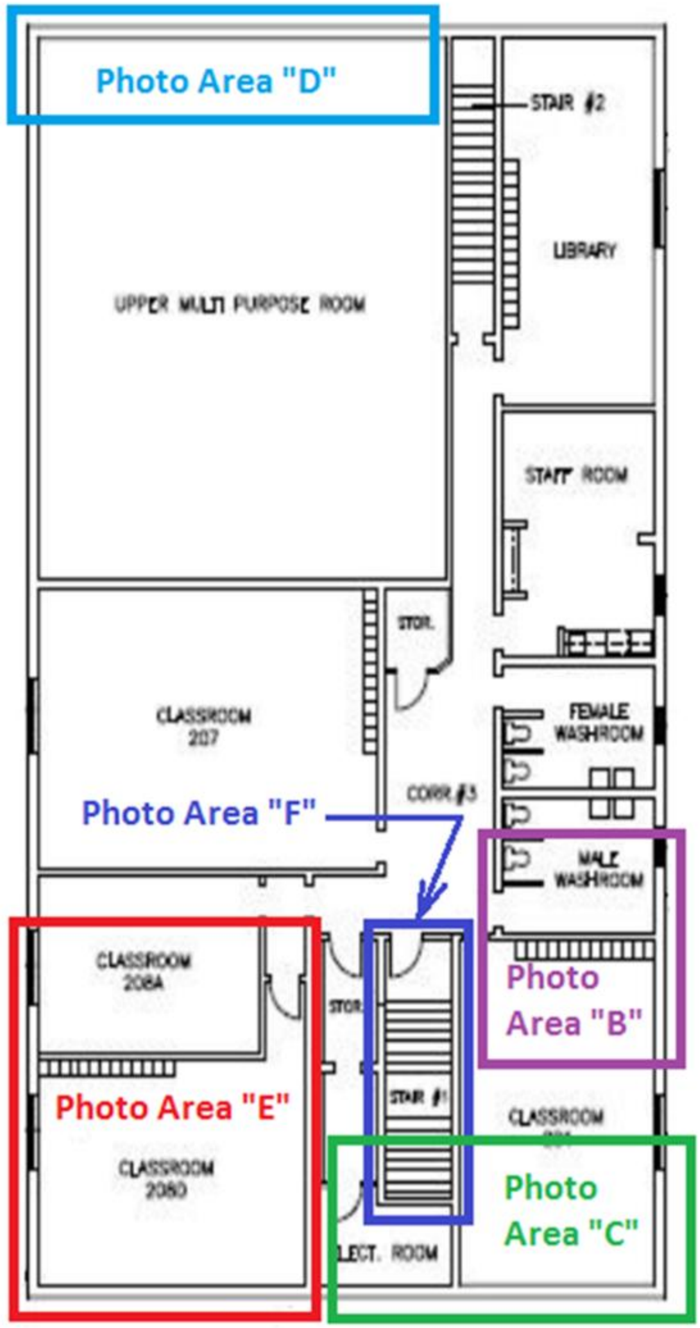


Figure 5: Second Floor Photo Areas

5.0 ASSESSMENT OF STRUCTURAL ISSUES

Figure 6 below is presented to help describe the structural issues being observed at École Notre du Cap. This figure attempts to simplify the relationships between the pre-engineered rigid frame building, the second floor partition walls, the second floor support beams, the outer and inner load bearing walls at the first floor, the grade beam around the perimeter of the building, and the ground floor slab-on-grade. All these structural elements will be referred to in Wood's assessment of structural issues.

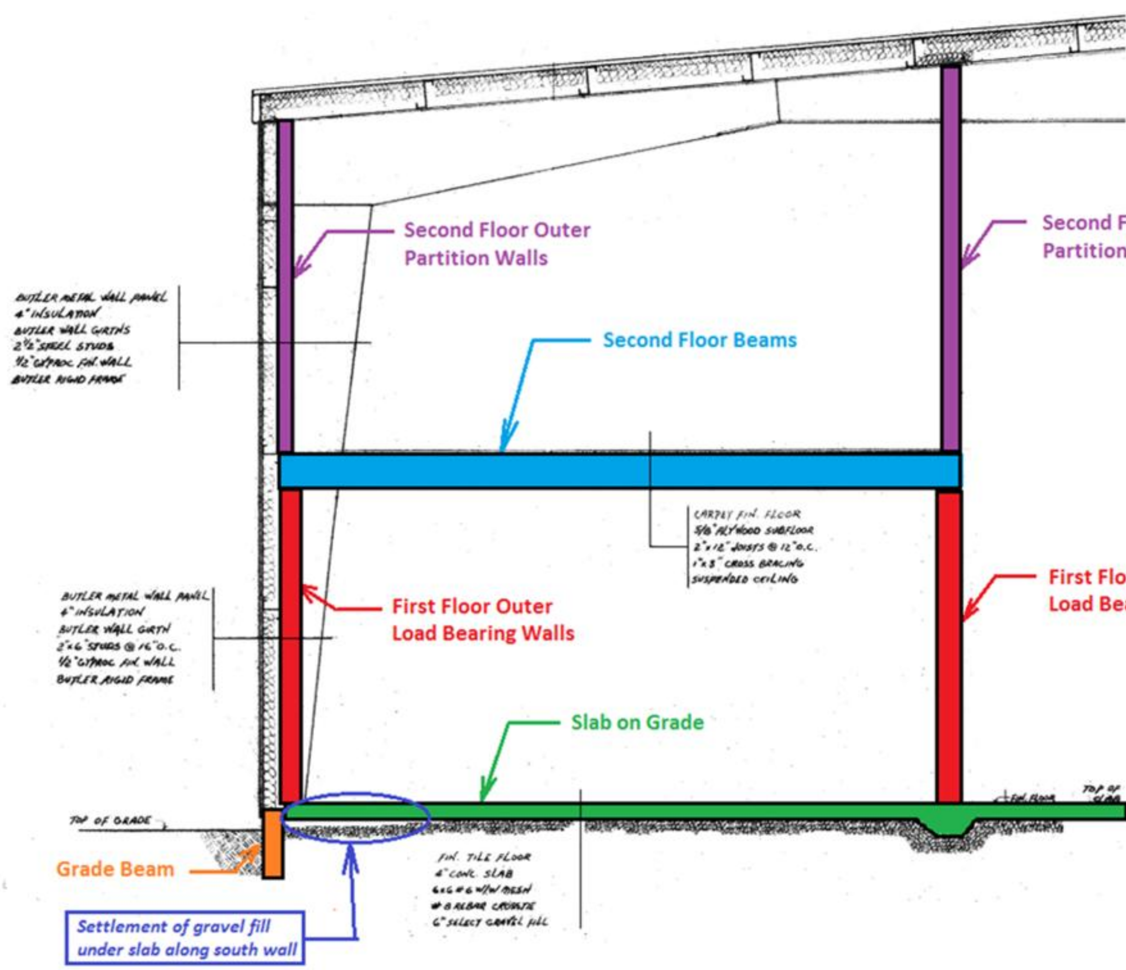


Figure 6: École Notre Dame Du Cap Section View to West

The following items provide a review of Wood's opinion about how particular loads and forces are currently being handled by the École Notre Dame du Cap building and the structural issues that are resulting from that. Many of these items make reference to Figure 6 above.

1. The blue coloured beams in Figure 6 support the second floor. These beams are supported at their ends by the red coloured load bearing walls. In addition to the second floor area dead and live loads, the blue beams also support the purple coloured second floor partition walls.

2. Information about how the tops of the purple second floor partition walls are connected to the pre-engineered building's roof steel and rigid frames is not known by Wood at this time. However, from one of the Butler drawings presented in attached Appendix C, there appears to be a strong possibility that the tops of these walls are directly connected to the building steel above. If so, this would result in a significant transfer of roof snow load down through the second floor partition walls, through the first floor load bearing walls, and then finally onto the green coloured concrete slab-on-grade. None of these three structural systems (i.e. partition walls, load bearing walls, and slab-on-grade) would have been designed to handle the significant forces associated with this unexpected transfer of roof snow load.

3. Figure 1 of this report shows that the school building was constructed on the side of a hill. Therefore, to provide a flat surface on which to construct the building's foundations and slab-on-grade, imported fill would have been placed along the southern portion of the building to achieve the required grades. If less than ideal methods were used to compact this imported fill, any foundations or slabs supported by it would be subjected to settlement. Settlements of foundations and slabs in areas that did not require imported fill, (i.e. north portion of the building) would be much less than those areas that did require fill.

   Theoretically, if the foundation and slab settlements would be the same over the entire plan area of the building, the structural impact would be much less severe than if only a portion of the building's foundations and slabs were subjected to settlement. Unfortunately, the latter is the case for École Notre Dame du Cap.

   Figure 6 shows an area of settlement along the south edge of the slab-on-grade that approximates what the building is currently experiencing. This localized settlement results in the slab-on-grade needing to act as a cantilever beam over the areas where fill has subsided. However, the slab-on-grade is not designed to act as such. The slab-on-grade used for this building is only 100 mm thick and has no reinforcing steel. The only steel in the slab is welded wire mesh used for crack control. The slab has no flexural capacity to act as a beam. Forcing this slab to act as a flexural member will result in structural failure of the slab.

4. The ends of the second floor beams closest to the outside wall of the building are supported by the outer first floor load bearing walls. These load bearing walls are located on the extreme outer edge of the slab-on-grade. Because settlement of the fill under the slab has resulted in the slab needing to act as a cantilever to support the applied loads, the slab has failed. What this means is that the outer load bearing walls no longer are being properly and safely supported. If the outer load bearing walls are no longer being safely supported, then it can also be concluded that the second floor beams requiring support from the outer load bearing walls are also no longer being properly and safely supported.

5. Referring to the Butler drawings in attached Appendix C, the columns on opposite sides of the building are tied together with a steel cross tie. This is a common approach in pre-engineered buildings. The tie-rods are used to handle the large horizontal reaction forces that want to push the opposing foundation columns away from each other. With support no longer being provided to the underside of the slab-on-grade and

with the slab-on-grade in a state of failure, the downward forces being delivered to the edge of the slab by the outer load bearing walls plus the first floor loads on the top of the slab could result in the cross ties being loaded in shear at the inside face of the concrete pilasters. A shear failure in the cross ties at this location would have the potential to result in a building collapse since the forces keeping the frames from kicking out have been eliminated.

6. Over the life history of this building, there has been evidence that water has infiltrated into the structure. This could possibly result in corrosion of the cross-ties near their connection points with the inside face of the concrete pilasters. The effects of many years of sustained corrosion on the cross-ties would result in the loss of available cross-sectional steel. Cross-ties with reduced cross sectional areas have reduced ability to take care of the tension loads they were originally designed for. Adding the need for deteriorated cross-ties to also handle unexpected shear loads resulting from the failure of the slab above will greatly add to the probability of failure of the cross-ties.

7. Figure 6 and the associated Butler drawings attached in Appendix C do not show how lateral stability is being provided to the second floor structure. It is clear from the drawings that the second floor is supported vertically by the first floor load bearing walls. What is not clear is how the second floor is supported horizontally to provide the required lateral stability. Without a proper horizontal restraint system, the second floor has the potential to shift sideways. This could possibly lead to a collapse of the second floor. The potential of this occurring increases when the outer load bearing walls are settling and continue to settle downward due to the failed portion of the slab-on-grade under these walls. This downward settlement is progressive and will not stop with time. Such deterioration and the resulting structural distortions and loss of verticality to the second floor support members increase the probability of structural failure and collapse of the second floor.

8. Cross Section A-A from Butler's "Foundation & Anchor Bolt Layout" drawing presented in attached Appendix C shows that the depth of frost cover for the foundations is less than 2 ft. – 4 in. (711 mm). Normally, frost cover required for this school's location would be at least 1800 mm. Therefore, because the foundations do not have sufficient depth below grade, it can be concluded that they have been subjected to many cycles of frost heaving since the structure's construction in 1976.

   Cross Section A-A shows that 1 inch thick insulation was attached to the inner face of the grade beam and inner face of the column pilasters for the entire perimeter of the building. This insulation only extends from the top of the footings to the top of the grade beams. The presence of this insulation does nothing to prevent the effects of frost acting on the foundations and the underside of the slab-on-grade. Therefore, it can be concluded that the outer portions of the slab-on-grade have also been subjected to many cycles of frost heaving.

   Frost heaving results in significant upward forces acting on the underside of the footings and the outer portions of the slab-on-grade. As noted previously, the slab-on-grade used for École Notre Dame du Cap has no ability to resist flexural loading. Upward acting frost heaving forces have the potential to cause the slab-on-grade to fail in flexure and shear. This is a serious consequence, since it is the slab-on-grade that is required to provide support to the load bearing walls that are carrying the second floor.

9. Detail B from Butler's "Staggered Cross Section A-A" drawing presented in attached Appendix C shows a thickened portion of concrete for the slab-on-grade at the locations where the inner load bearing walls will be located. No reinforcing steel has been added in the longitudinal direction parallel to the walls above.

Without longitudinal reinforcing steel, the thickened portion of the slab-on-grade does not have any flexural capacity. The thickened portion does not need to have any flexural capacity provided that the supporting soil under it is optimally compacted, has not settled with time, and has no significant vertical deformation due to applied loads from above. However, it is most likely that the existing soil conditions do not have these ideal characteristics. Therefore, these thickened portions of the slab-on-grade will be subject to flexural stress. Without longitudinal reinforcing, these thickened areas will not be able to accommodate the stresses imposed on them and structural failure will result. This is a serious consequence since all the load from the inner load bearing walls that are used to support the second floor is being supported by a system that has experienced structural failure.

10. One of the purposes of the grade beam shown in Figure 6 above is to retain the soils under the slab-on-grade. This grade beam spans between the columns. It is supported by the tops of the column footings. Normally, the grade beam is designed to carry its own self-weight plus the lateral pressures resulting from the soil adjacent to the beam. What the grade beam is probably not designed for is to handle the significant lateral surcharge load that results from the outer load bearing walls acting on the failed outer portions of the slab-on-grade. Evidence of overstress in the grade beams can be seen in the exterior photos presented for Photo Zone B in attached Appendix E.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The structural issues described in the previous section show that the École Notre Dame du Cap structure is in a state of progressive failure. Further occupancy of this building should be terminated as soon as possible. The safety of the occupants is currently being seriously jeopardized through continued use of the building.

It is recommended that after the occupants have been relocated from the school, steps be taken to determine the full extent and ramifications of the issues presented in this report. This can then be used to determine the scope of repairs required to restore the building to the required level of safety, stability, and functionality. These steps can then also be used to determine the estimated costs of construction, renovation, and repairs needed for the building. Knowing these costs would subsequently allow the Department of Transportation and Works to determine the feasibility of retaining the structure in an improved, restored and safe state.

The recommended steps for the next phase are:

1. Gather geotechnical information about the existing soils for the entire plan area of the building.
2. Determine amount of subsidence of the fill under the slab-on-grade.
3. Determine condition of cross-ties.
4. Obtain survey information for key locations inside and outside of the building.
5. Determine and document structural arrangements of the building to allow a structural engineer to make an in-depth review of all the critical structural components.
6. Prepare arrangement drawings that summarize the structural deficiencies and provide general information about the repairs that would be needed.
7. Prepare a report that provides an inventory of the repairs needed by the building as well as the estimated cost of implementing those repairs.

Completion of the above steps would then allow the Department of Transportation and Works to make a final decision about what should be done with the building. If it is decided to restore the building, the next phase would entail the preparation of detailed design drawings and specifications to facilitate the construction of the required repairs.

The school can be entered to remove/relocate furniture and other items needed for relocation of students. It is recommended to collect and immediately remove all furniture and other items from the second floor. Do not stack or stockpile items scheduled for removal on the second floor

Yours sincerely,

Wood Environment & Infrastructure Solutions,
a Division of Wood Canada Limited

Prepared by:	Reviewed by:
Gordon Boneschansker, P. Eng. Structural Engineering Lead	Chris Connolly, P. Eng. Associate Engineer - Structural

APPENDIX A: STANDING OFFER REQUEST FROM DEPT. OF TRANSPORTATION AND WORKS

Newfoundland Labrador

Department of Transportation and Works
Building Design and Construction

Standing Offer Structural Engineering Services Central/Western Region

Fee Request 005

Project Name	Structural inspection, floor
Project No.	TBD
Project Manager	Peter Parsons
Contract No.	CSUL18019
Building Name & No.	École NDC Building 95
Location	Cap Saint-Georges (blue, metal building, coordinates below) https://www.google.com/maps/@48.4834252,-59.1911712,251m/data=!3m1!1e3
Request Date	Feb 11, 2019
Due Date	asap

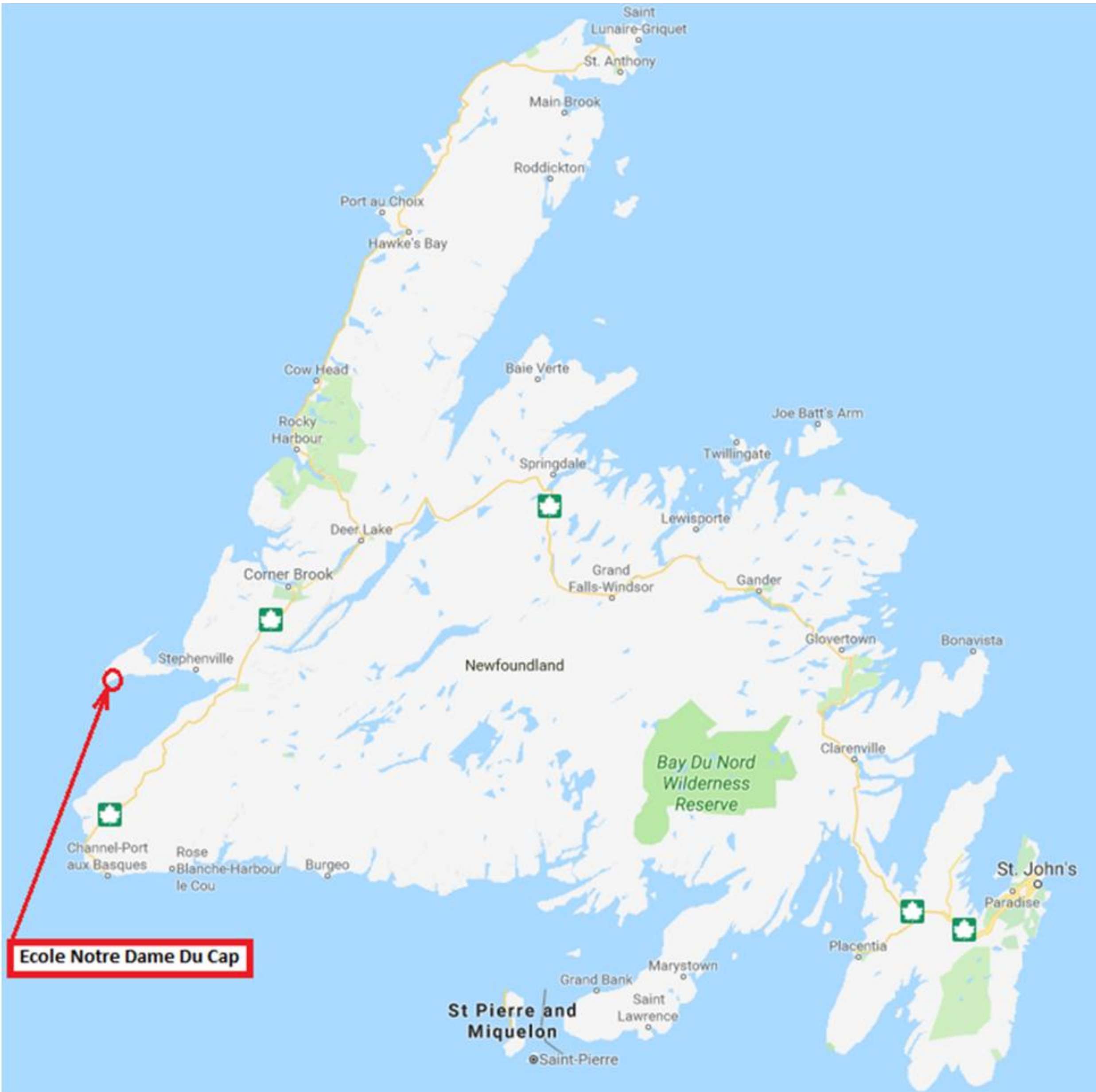
Scope of Work

Conduct a structural assessment of the school floor. Occupants report a "shift" in the floor near a pillar.

Structural assessment to include the following:

1. Complete a structural assessment of the foundation and subfloor.
2. Provide report, recommendations, drawings, specification for any repairs necessary.
3. Provide a cost estimate for repairs.

APPENDIX B: LOCATION OF ÉCOLE NOTRE DAME DU CAP

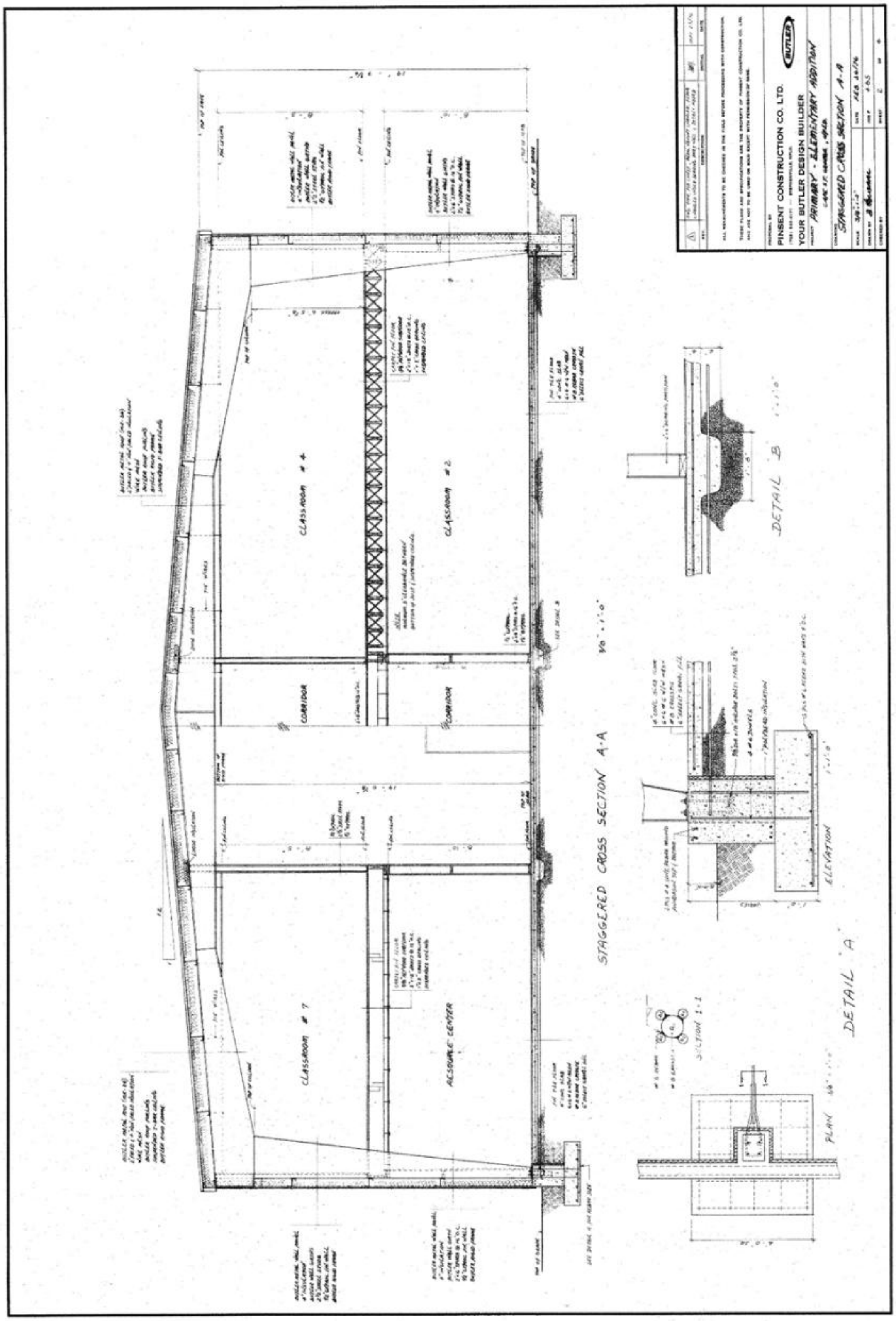


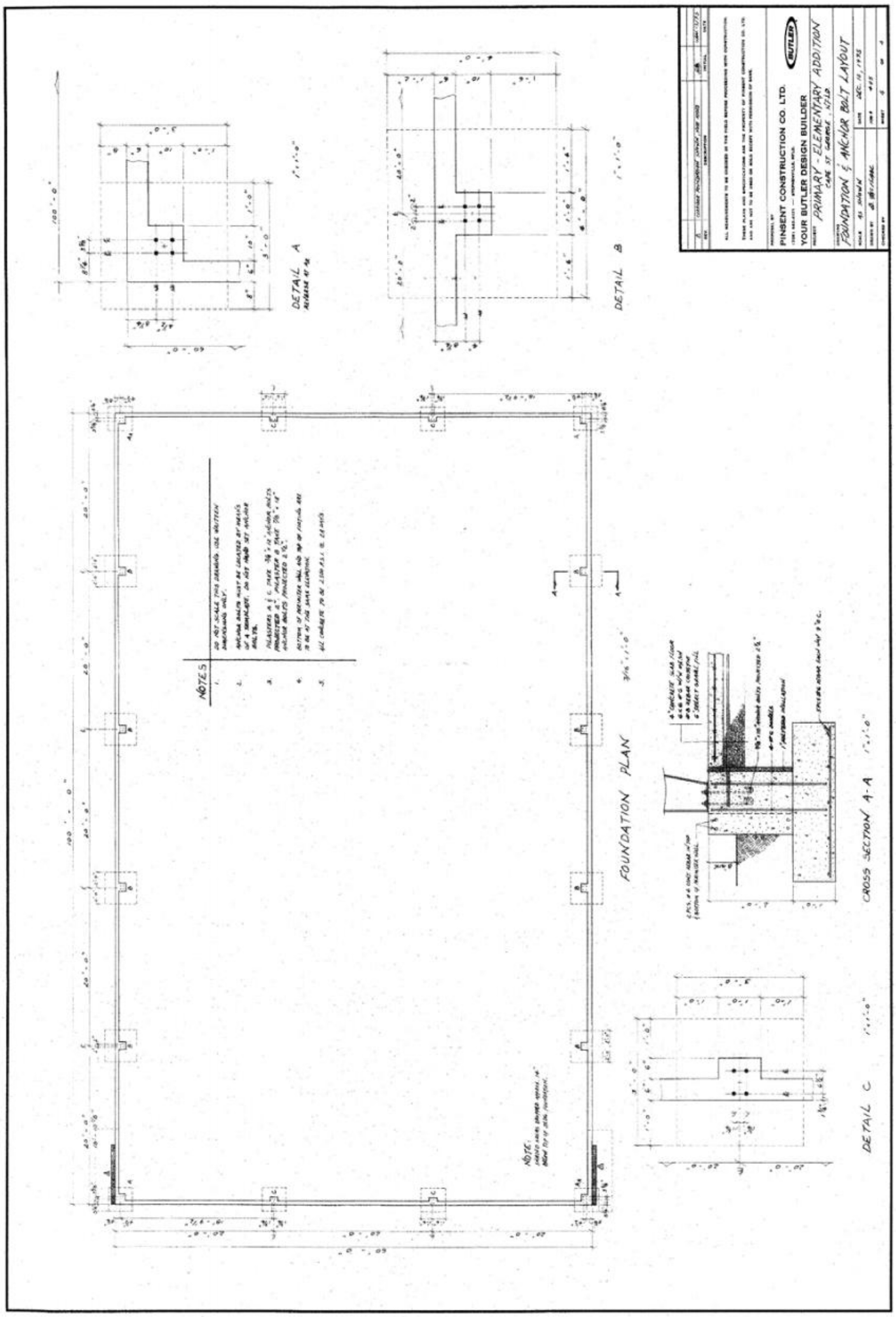
Location of Ecole Notre Dame Du Cap


De Grau
Grand Jardin
Petit Jardin
Cape Saint George
Ecole Notre Dame Du Cap


Ecole Notre Dame Du Cap
Lat. 48.48333 Long. -59.19148

APPENDIX C: ORIGINAL BUTLER DRAWINGS


STAGGERED CROSS SECTION A-A
DETAIL 'A'
DETAIL B
CLASSROOM # 4
CLASSROOM # 2
CLASSROOM # 7
RESOURCE CENTER
CORRIDOR
CORRIDOR
ELEVATION
PLAN
SECTION 1-1
PINSENT CONSTRUCTION CO. LTD.
YOUR BUTLER DESIGN BUILDER
PRIMARY - ELEMENTARY ADDITION
STAGGERED CROSS SECTION A-A


PINSENT CONSTRUCTION CO. LTD.
YOUR BUTLER DESIGN BUILDER
PRIMARY - ELEMENTARY ADDITION
FOUNDATION & ANCHOR BOLT LAYOUT
DETAIL A
DETAIL B
DETAIL C
NOTES
FOUNDATION PLAN
CROSS SECTION A-A

APPENDIX D: JULY 2013 AECL REPORT

ATLANTIC ENGINEERING CONSULTANTS LTD.
ENGINEERS & PROJECT MANAGERS

Client: **Department of Education**

Report: **Existing Windows Installation, Existing Gym Wall Construction & Exterior Wall Structural Investigation**

Prepared by: **Atlantic Engineering Consultants Ltd.**
34 Main Street
Corner Brook, NL A2H 1C3

Date: **July 3, 2013**

Further to Atlantic Engineering's completion of a building envelope assessment (BEA) and site review for a proposed window replacement project (March 2013). The following items required further evaluation.

1. *<u>Existing Windows Installation</u>*

(Refer to Photos – Appendix 'B' and Drawings/Details – Appendix 'D')

As indicated in the BEA (March 2013) there is evidence of water infiltration around the perimeter of existing windows.

Given the type and age of the building coupled with the extent of this perimeter water infiltration, it was deemed necessary to further evaluate exactly how these windows are positioned within the wall assembly.

In an effort to avoid the exposure of additional costly window installation repairs during the construction phase of the proposed windows replacement project, destructive investigation work was carried out as follows:

- Removal of existing siding panels at window (janitor storage/recycle room on first floor). Refer to photos – Appendix B.
- Removal of existing interior gypsum board around perimeter of window. Refer to photos – Appendix B.

Existing Conditions Observed:

Exterior

- Portions of original siding were still in place, below the new siding – at window sill.
- Continuous wood framing exists at sill of window supported by intermittent blocking and horizontal steel girt.
- A 38 x 140 wood framed wall @ 400c/c rests on the concrete floor slab and supports the interior gyproc sill extension.
- Gypsum board head, jamb and sill extensions extend from interior to exterior face of building.
- No vertical 'J' trim to receive siding exists at jamb of window.

Interior

- A 38 x 140 mm wood framed wall @ 400c/c c/w standard stud/jack stud framing at jambs and 3 – 38 x 184 mm wood lintel exists around perimeter of window.
- Gypsum board head, jamb and sill extensions extend from exterior to interior.

Recommendations

The following format is recommended for placement of existing windows.

- Remove existing window.
- Remove existing gypsum board around entire perimeter.
- Remove existing metal siding at exterior.
- Install new window to suit wood framed opening (RSO)
- Install new 'J' trim around perimeter of window (head, jambs, sill)
- Reinstate exterior siding (trim existing siding as required to fit new 'J' trim/window installation).
- Install new plywood head and jamb extensions and post formed laminate sills c/w wooden perimeter trims.

2. *Existing Gym Wall Construction*

(Refer to Photos – Appendix 'C' and Drawings/Details – Appendix 'D')

During the BEA related site visit, it was brought to the attention of AECL that the end wall of the gym was thought to be of insufficient strength to support the required basketball net. A decision was made by the Department of Education (in consultation with AECL and representatives of the Francophone School Board) to investigate the condition of this wall.

Destructive investigation work was carried out as follows:

- Existing interior plywood sheathing was removed from the wall adjacent the basketball net.

Existing Conditions Observed are as Follows:

- The plywood sheathing (approximately 12 mm thick) is currently supported with screws on 38 x 64 mm metal studs @ 400 c/c. These vertical metal studs are attached to the face of existing horizontal grits.

  Based on the light gauge and large vertical span of these metal studs, they are subject to deformation and movement.

Recommendations

- Remove existing basketball net.
- Cut existing plywood and metal studs in general area of basketball net.
- Install additional metal stud framing/tracks to secure remaining metal stud framing.
- Install new wood framing/blocking secured to horizontal grits.
- Reinstate plywood sheathing.
- Reinstall basketball net through plywood sheathing into new wood stud framing.

3. *Exterior Wall Structural Investigation*

Refer to attached Exterior Wall Structural Investigation report – Appendix 'A', Photos – Appendix 'B' and Original Building Drawings – Appendix 'D').

Based on observations on site during the development of the BEA (March 2013), there was visible floor slab settlement along the front exterior wall.

A decision was made by the Department of Education (in consultation with AECL and representatives of the Francophone School Board) to investigate this settlement.

APPENDIX ‘A’
EXTERIOR WALL STRUCTURAL INVESTIGATION

ATLANTIC ENGINEERING CONSULTANTS LTD.
ENGINEERS & PROJECT MANAGERS

ECOLE NOTRE DAME DU CAP
EXTERIOR WALL STRUCTURAL/INVESTIGATION

This 18.3 meters x 30.48 meters pre-engineered rigid frame structure was constructed in 1976 and except for the small recreation gym area, includes a second floor classrooms/washrooms and library area.

Steel frames, spaced at 6.1 meters, are supported on concrete pilasters and footings. Foundation wall between frames is a 150 mm concrete grade beam. The interior 38 x 140 mm stud perimeter wall, which supports the second floor joists, is supported on the edge of the slab-on-grade floor. (Refer to attached original drawings 2 of 4, staggered cross section 4 of 4 foundation and anchor bolt layout and photos).

This structural review was prompted by some visible floor slab settlement, in the order of 25 to 32 mm, at the front perimeter wall. Since the second floor is supported on a stud wall that rests on the floor slab, the settlement is also manifested as a slightly sloping floor on the second level.

Settlement of this nature, at the perimeter walls, is not uncommon, as in all probability, the perimeter was trenched in order to construct the foundation, while the center area was undisturbed. If subsequent backfill material was not of good quality, or insufficiently compacted, then, over time, settlement can occur. We would suspect this is the case.

A review of the second floor joists system showed the use of what appears to be, Douglas Fir full 57 x 280 joists at 400 c/c, which are quite adequate for the spans and loads involved.

It is our professional opinion, therefore, that there are no structural integrity problems, and no imminent safety concerns, other than a possible tripping hazard at the main entrance vestibule, which can be easily rectified.

The visible second floor manifestation of the settlement, which has occurred over almost 40 years, is primarily aesthetic and in our opinion, not cost-effective to rectify in a school of this age. It is also our opinion that some additional settlement may continue, over time, but should be very small.

Donald J. DiCesare, P. Eng.

July 5, 2013

APPENDIX E: FIRST FLOOR PHOTOGRAPHS

FIRST FLOOR PHOTO AREA "A"

FIRST FLOOR PHOTO AREA "B"

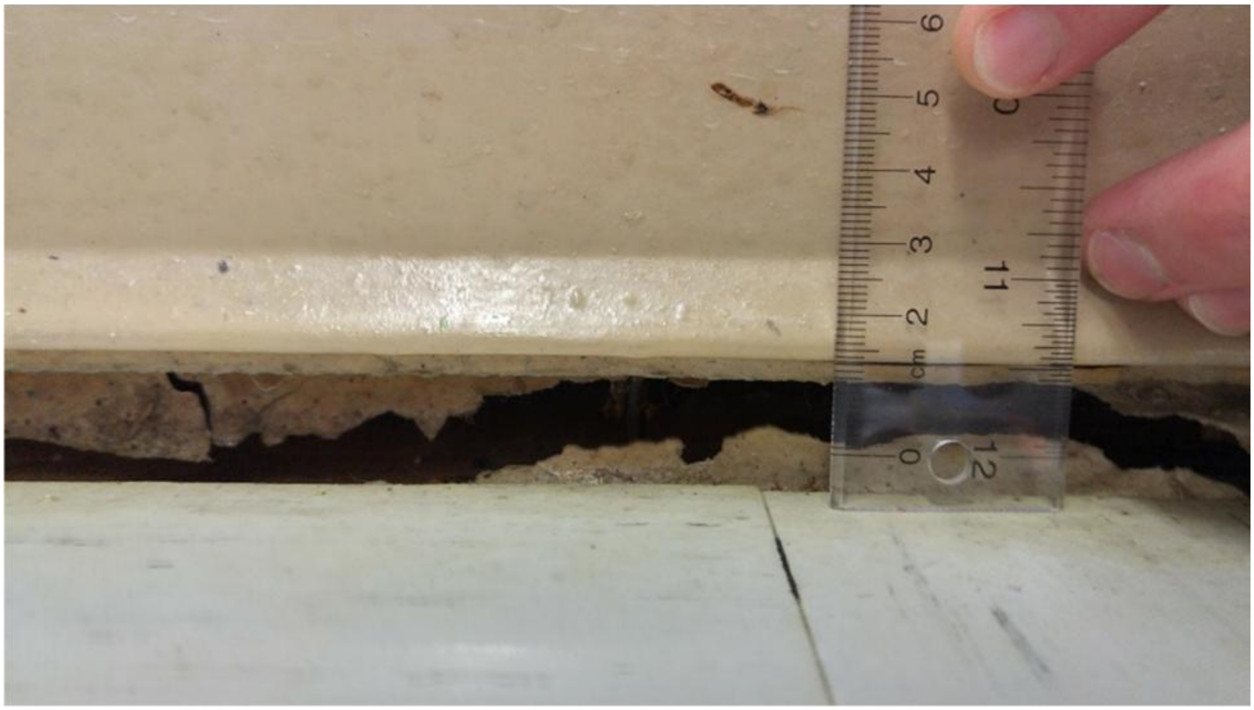
FIRST FLOOR PHOTO AREA "C"

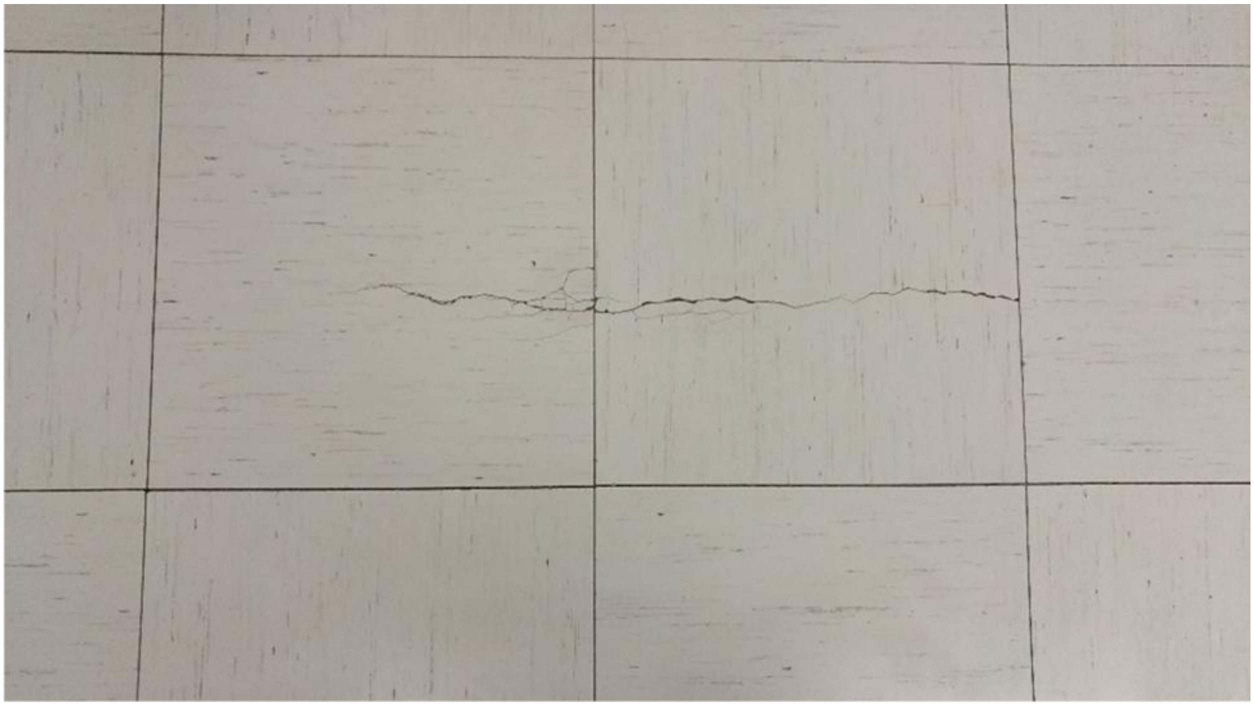
FIRST FLOOR PHOTO AREA "D"

FIRST FLOOR PHOTO AREA "F"

APPENDIX F: SECOND FLOOR PHOTOGRAPHS

SECOND FLOOR PHOTO AREA "B"





SECOND FLOOR PHOTO AREA "D"

SECOND FLOOR PHOTO AREA "E"

SECOND FLOOR PHOTO AREA "F"