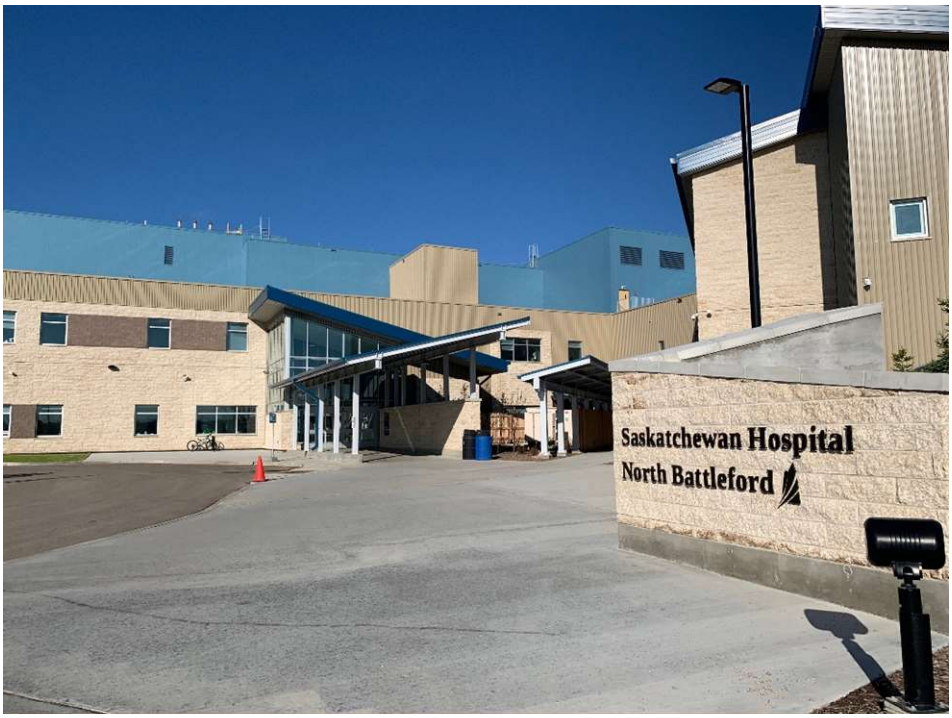
SASKATCHEWAN HOSPITAL NORTH BATTLEFORD BUILDING AUDIT



August 19, 2020

Final Report

JPH CONSULTING

CONTENTS

Separately attached:

Saskatchewan Hospital North Battleford Building Audit

FINAL REPORT

BACKGROUND

In 2011, the Saskatchewan Government announced that it would replace the existing Saskatchewan Hospital North Battleford with a modern, larger publicly-owned and operated provincial mental health facility. In April 2014, the Government announced its decision to move the project forward as an integrated mental health and correctional complex to be delivered under a public-private partnership (P3) model, which creates a partnership between the Government (the "Authority") and a private partner ("Project Co"). The Authority is itself a partnership of the of the Ministries of Health, Corrections and Policing, Central Services, the Saskatchewan Health Authority, and SaskBuilds. In August 2015, the Ministry of Central Services entered a design-build-finance-maintain Project Agreement with Access Prairies Partnership.

The Saskatchewan Hospital North Battleford (SHNB) achieved service commencement on September 6th, 2018. This 284-bed provincial psychiatric facility replaced the previous 156-bed hospital, including 188 psychiatric rehabilitation beds, and a 96-bed secure wing for offenders living with mental health issues. All patients from the existing facility moved to the new SHNB in November 2018.

JPH Consulting Ltd. was procured to perform a construction and process audit for the Ministry of Central Services and was delivered through the following three phases:

- Phase 1: Audit Summary Report of Findings (focusing on Schedule 3 of the Project Agreement)
- Phase 2: Process Audit (focusing on Schedule 2 of the Project Agreement)
- Phase 3: Performance Action Pan & Audit Follow-up Recommendations

The audit was augmented by the following consulting firms:

- Group2 Architecture Interior Design Ltd. (Architectural)
- JC Kenyon Engineering Inc. (Structural)
- TYZ Engineering Ltd. (Mechanical)
- Ritenburg & Associates Ltd. (Electrical)
- ISL Engineering and Land Services Ltd. (Civil)
- Crosby Hanna & Associates (Landscape)
- Read Jones Christoffersen Ltd. (Building Envelope)
- Bersch Consulting Ltd. (Environmental)

Saskatchewan Hospital North Battleford Building Audit

FINAL REPORT

PHASE 1 – CONSTRUCTION AUDIT SUMMARY

Scope

The scope of services for phase 1 is to verify the following:

1. The material and equipment quality and quantities were appropriate and actually installed and utilized, based on the contract terms.
2. The labour utilized during the construction phase was in alignment with the Project Agreement terms.
3. If any deviation from the project design happened during construction due to change orders, these deviations were based on approved change orders engineering change notices and scope modifications as per "Schedule 6: Changes" of the Project Agreement.
4. If any deviation from the project design happened during construction due to contract modifications or technical modifications, these deviations were based on approved changes by the Project Team, changes in building codes or regulations, market conditions for materials or equipment, or in-the-field conditions due to force majeure.
5. In the case of identifying poor labour performance or poor material and equipment utilization, this poor performance was noted and approved by the parties involved in the contract.
6. In the case of finding repeated poor performance of the same supplier or contractor, this issue was noted and approved by the parties involved in the contract.

Limitations

Please note that the above scope has the following limitations:

- The scope for phase 1 is a site audit, therefore not every instance of an installation was verified on site, but rather a sample was reviewed based on the following factors:
    - While a large majority of the rooms were reviewable, there were severe limitations to above ceiling reviews due to limited access due to congestion of building services and disease and infection control measures.
    - Repeated installation or equipment were spot checked. The sampling of the spot checks varied depending on the equipment to ensure an acceptable number were reviewed to identify any installation quality concerns.
    - No walls were exposed to confirm installation quality.
- The scope is related to material and equipment quality and quantities, therefore no performance-based verifications occurred.
- Not all documents were available during the phase 1 review, limiting the review of some Project Agreement clauses. These are noted in the recommendation column in appendix B.

Approach

The following approach was implemented to complete the phase 1 deliverable:

- Review the Project Agreement to determine the clauses in Schedule 3 that were verifiable based on scope statement #1. Not all clauses were verifiable due to the following reasons:
    - Inaccessible materials;
    - Performance based criteria; and
    - System based statement that would require detailed calculations.
- For the clauses that were verifiable, perform a documentation and site review to confirm scope statement #1.
- For the clauses that were deemed not to be in alignment with the Project Agreement, the variance was reviewed to confirm scope statements #3 and #4.
- Visual review of the facility on February 18th to 21st, 2020.
- Visual review of the landscape and civil scopes on site May 28th, 2020.
- A summary of the above is included as appendix B – Project Agreement and Schedule 3 Analysis, with appendix C – PlanGrid Task Report provides a full report of all items identified on site with photos where applicable.
- There is a Project Agreement tracker that was used by the Authority and Project Co to track agreed to changes, however, as these changes have not been formalized through a Change Certificate they are considered to be non-compliant for the purposes of this audit. Appendix B references all clauses noted in the Project Agreement Tracker.
- Provided preliminary findings to the Ministry of Central Services to review with the findings with their partners, included Project Co, to allow the immediate discussions and action while phase 2 and 3 were completed. This also allowed the opportunity for discussion and further if our preliminary findings required additional documentation. The preliminary findings were noted in the following documents:
    - Phase 1 preliminary submission on March 1, 2020.
    - Critical items letter on March 20, 2020 for life safety and critical building operational items.
    - Critical items letter on July 2, 2020 for civil and landscape items.
- Our audit acknowledges that the Project Agreement contains numerous subjective clauses. We have provided our analysis based on our professional opinion of each clause. This is why many clauses that indicated as appearing to not meet the Project Agreement have recommendations to review with Project Co, as the Authority and their compliance team during design and construction may have been satisfied with the installation but did not include it in the above noted Project Agreement Tracker.

Known Issues

There are several known site issues that were present at the time of the site review, where the root cause is not verifiable within the phase 1 scope statements.

- Water quality with lead and copper levels;
- Real time location system not active;
- Roof, various areas under replacement;
- Landscape repairs caused by the above noted roof repairs;
- Water leaks in showers;

- Condensation on windows; and
- Miscellaneous warranty repairs.

The above items were in various states of progress towards resolution during the site review.

Construction Audit Findings

Below are the critical items identified during the construction audit. Additional findings are included in appendices, A, B, and C.

1. **Fire Door Separations:** Instances where doors and frames do not have fire ratings were observed. Additional supporting information was provided to confirm the frames and doors have appropriate ratings and appropriate ULC stamps are to be applied.

2. **Anti-ligature:** Concern over anti-ligature strategy, with the highest concern regarding the use of parallel arm closers. Recommend reviewing with Project Co if found not to satisfy Authority practices.

3. **X-Y Gantry Tracks:** The installation creates a severe ligature risk and is separate from the above statement as it is a clear violation of the Project Agreement. There is a record of this situation being discussed as a non-compliance item, but the end solution is not aligned to the Project Agreement, even with the referenced clause noting "to the extent possible". Recommend reviewing with Project Co if found not to satisfy Authority practices.

4. **Egress Paths:** Egress paths in the Vocational area differ from what is indicated on the as-built drawings and appear non-compliant in some instances. Recommend reviewing occupancy limits and egress paths with the Authority Having Jurisdiction.

5. **Sound Transmission:** Numerous concerns regarding sound transmission through walls in sensitive spaces, with inconsistent insulation application in limited areas that were observable. Numerous instances were observed where door hardware typically required to meet STC requirements were either not included, or improperly installed (e.g. floor sweeps which were not in contact with the floor). A thorough review of the STC requirements for each space, a review of the hardware supplied and installed, and on-site verification of STC performance is recommended.

6. **Vibration Isolation:** Instances where mechanical equipment does not have proper vibration isolation, causing significant noise to the work area below. Recommend reviewing a Project Agreement compliant installation with Project Co.

7. **Infection Prevention & Control:** The main concerns noted during our initial review were the use of wood handrails throughout the facility, concrete saw cuts have not been caulked, and missing door operators where hands-free operation of doors was required. Additionally, it has come to our attention that there are plumbing problems which have compounded the potential spread of contaminants. It is our understanding that the Authority has not raised these as a concern previously and may accept these conditions. We recommend a thorough review of the required IP&C guidelines with Project Co and all Authority partners and the way in which they were addressed to determine if further action is required.

8. **X-Ray in Use:** No "X-ray in use" signs observed outside of rooms where fixed x-ray equipment is installed. Recommend reviewing with Project Co.

9. **RTLS/Nurse Call/Duress Systems:** The installed Real Time Location System do not meet the Project Agreement as there have been numerous revisions that have yet to proceed through a formal change process. The Authority and Project Co appear to have differing opinions on whether the installed system meets the yet to be approved revisions. We recommend a thorough review of the RTLS and its related Project Agreement sections to determine appropriate commissioning sequences prior to accepting the RTLS. [Note: this recommendation was completed as part of phase 2]

10. **Fire Alarm System (Pull Stations):** No pull stations are present inside the Secure Area, which may be compliant for a Group B Division 1 occupancy. However, the National Building Code and CAN/ULC S524 do not provide clarity on an exemption. Recommend reviewing condition with the Authority Having Jurisdiction.

11. **Fire Alarm System (Door Release):** The exits from the Secure and Non-Secure Client areas are secured by electromagnetic locks or other types of electronic locks that prevent egress during activation of the fire alarm system until stage 2. Further, electronic locks for the Client sleeping room doors also remain secure. What was described during the audit was that the nursing staff in the areas do not have a means to unlock the exit doors – security does from the security stations through programming. There was a 'button' being programmed into the nurses' station fire alarm annunciator supposedly to release the doors but it was not operational during the audit. It is unclear what fail safe measures may be present should the locks not release when required (this could be simple as a failure to a fire alarm relay that fails to disrupt power to the lock). Recommend reviewing condition with the Authority Having Jurisdiction.

12. **Fire Alarm Panel Wiring:** Wiring to fire alarm panels are run in conduit and appear to have no fire rating on the feeder, conduit or branch circuits. Recommend reviewing condition with the Authority Having Jurisdiction.

13. **Sally Port Exhaust:** No exhaust ventilation present in the vehicle sally port. Unclear what sequence is initiated by the local carbon monoxide detector. Recommend reviewing condition with the Authority Having Jurisdiction.

14. **Structural Anchor Bolts:** Between grid lines 36-38 and GG to FF the exposed anchor bolts for the exterior columns to the foundation were not galvanized. Rust was observed on the anchor bolts and nuts. Recommend that all exterior columns and exposed anchor bolts be reviewed to determine the full extent of the issue so that it can be addressed by Project Co.

15. **Humidification/Thermal Breaks:** Condensation was observed on interior surfaces of the exterior doors and windows. At the exterior doors unsealed junctions were noted between door frames and doors, leading to cold air infiltration and condensation on interior surfaces. Adjustment of the door sweeps and weather stripping would help alleviate this. Adjustments to the humidification and ventilation system is also anticipated. At the windows, condensation forms on colder interior surfaces when interior humidity levels are too high for the exterior temperatures. The thermal breaks between the glazing and frame nosing may also be contributing to this problem. Further review of the thermal breaks and glazing is therefore recommended. This will require selective removal of insulated glass units, at which time the thermal break can be examined and the glazing could be checked for glass type, thicknesses, and thermal performance.

16. **Air Leakage:** Air leakage was observed below sloped roofs between roof deck and top of walls. This appears to be related to both a material (detailing) and workmanship issue. Spray foam insulation appears to be used as the primary vapour barrier material, which does not appear to adequately seal the junctions between the exterior wall vapour barrier and the sloped roof deck. Detailing of these areas also fails to connect the roof vapour barrier with the spray foam and the exterior wall air vapour barrier membrane, resulting in air leakage at these junctions.

    There was a separate condition where patches of exterior insulation were missing along one office wing of the facility. The materials in this area were tested for mould, which was confirmed to not be present.

    Further review and repair of these areas is recommended.

17. **Occupational Health & Safety:** There is an occupational health and safety violation on the north roof where, in order to access equipment, personnel must walk within 2 meters of the edge of the roof where there is no guardrail 1 meter high. Recommend immediate installation of appropriate barriers by Project Co.

18. **Storm Infrastructure:** The surface overland flow and conveyance system demonstrated many substantial issues with the storm drainage. Examples are:

    - Improperly located and graded catch basins.
    - Multiple culverts do not have end-treatment or rip rap and erosion is evident.
    - There is standing water where there should be a flowing creek.
    - Infrastructure has been used that is not reflected with any design or detail.
    - Swale outlet to Pond 1 rip-rap is buried.

    Recommend reviewing conditions with the Project Co.

19. **Ponds:** Overall the ponds are not complete or are missing critical design elements. All ponds are intended to be dry outside of a rainfall event. Items include:

    - Pond bottoms are designed flat and will not drain dry.
    - There is standing water in Pond 1, and the east inlet structure is higher than the pond bottom.
    - Pond 1 Emergency Escape Route is missing.
    - There is standing water in Pond 2.
    - Pond 2 missing emergency escape, end treatment and rip-rap.
    - Pond 2 culvert missing inlet structure, control plate, and rip-rap.

    Recommend reviewing conditions with the Project Co.

20. **Grading:** Overall the site grading has significant grading and drainage issues. Items include:

    - Minimal grades in softscapes, causing ponding.
    - A lack of positive drainage away from the buildings.
    - Roof drainage directed towards building foundation or draining across sidewalks.
    - Landscaping grades exceeding 4:1slopes, creating maintenance safety concerns.
    - Many examples of erosion.
    - Many examples of freezing prone areas.

Recommend reviewing conditions with the Project Co.

21. **Accessibility:** Generally, the site is accessible as it relates to pedestrian routes. One exception exists at a walkway from the southeastern most parking lot where pedestrian ramps are missing from either end of the walkway. Recommend reviewing condition with Project Co.

22. **Construction Quality:** Appendix C notes a large amount of items that can be classified as construction deficiencies, warranty repairs, or latent defects in materials. The quantity of items identified indicate inconsistent quality control, the potential of rushed work, and instances of poor quality installation across most trades. Below are some examples that have instances that were too numerous to document:

    - Access panels for patient washroom toilets had inconsistent application of insulation, with one wing having no insulation
    - Caulking application
    - Door frame sweep installation and inconsistency
    - Stair stringer gaps
    - Missing corner guards
    - Numerous pipe and insulation leaks
    - Failing floor welds
    - Missing flooring transitions
    - Uninsulated roof drains
    - Mixing valves providing fluctuating or temperatures that are too hot

Out of Scope

During our review, we identified items that did not align with the scope of our services, as there was not a specific Project Agreement clause to relate to the item, but were included for the Ministry of Central Services information, which are included as part of appendix C – PlanGrid Task Report.

- Inconsistencies with the as-built documents was prevalent throughout the design. Not all instances were documented, but several have been noted in appendix C.
- Noise levels in excess of 60 dBA was noted in several locations. The Project Agreement does not provide for a finite threshold for unacceptable noise levels in general spaces within the facility, however, in our opinion there are several areas where the noise levels cause a great distraction to the operation of the space. These locations should be reviewed with Project Co.
- The sanitary sewers themselves could not be observed, however, a foul odor near the main entrance came from the sanitary grease trap. We note that the specific unit used may be inappropriate for this purpose. While the unit protects against floatables, it also collects sediment and solids. The unit smells as it is likely full of grease, sanitary solid waste and sediment; and needs to be cleaned out.

Saskatchewan Hospital North Battleford Building Audit

FINAL REPORT

PHASE 2 – PROCESS AUDIT SUMMARY

Scope

The process review is intended to assess the implemented processes of the design & construction period against the requirements of the Project Agreement, with particular focus on the "Schedule 2: Design & Construction Protocols" and related appendices, and identify the extent to which these agreed to processes were adhered.

The processes that were selected for review include:

1. Appointment of Representatives and Replacement
2. Project Co's Responsibilities
3. Design
4. Change Approval
5. Construction
6. Equipment Supply and Installation
7. Quality Management
8. Project Schedule
9. Commissioning
10. Operational Readiness
11. Service Commencement

The Real Time Location System (RTLS) was included as part of the phase 2 process with scope limited to confirmation that its current configuration was aligned to the Project Agreement and to recommend options to verify the system.

Limitations

Please note that the above scope has the following limitations:

- Some requested documents to validate that processes were adhered have not been provided. This report assumes that these documents do not exist.
- The process review includes those created as part of submittals, but not the actual submittal contents. Examples of the processes that are created as part of the submittal are the Quality Assurance Plan and the Commissioning Plan.

Approach

The following approach was implemented to complete the phase 2 deliverable:

- Review the Project Agreement to determine the clauses in Schedule 2 and its related appendices that define an aspect of a process or a submittal that establishes processes. For example the commissioning requirements in the Project Agreement are very high level, while the plan that is created as part of the Project Agreement requirement includes a number of processes that are applicable to the scope of this audit.
- Review the relevant documentation available to confirm if the process was adhered.
- Assign a 'pass' or 'fail' grade if the process was not substantially followed.
- Review the preliminary findings with the Authority and Project Co to allow for clarity on how to address the missing documentation.
- A summary of the individual processes is included as appendix D – Process Analysis.

For the RTLS scope, the following process was implemented:

1. Review 'promises' during design relating to the RTLS to confirm if they are project requirements that need to be included in the final Project Agreement.
2. Review performance-based requirements in the Project Agreement relating to the RTLS and associated systems and compare against commissioning documentation provided by Project Co.
3. Generate a list of Project Agreement clauses and contractual requirements that have not been fully confirmed through commissioning activities.
4. Recommend options for verifying the quality of the system delivered is consistent with what was committed during the design and construction period.

Process Findings

Below are the key items identified from our review. Please note that documentation may exist to counter these findings, but at time of review the audit team had not been provided the appropriate documentation. Additional findings are included in appendix D – Process Analysis.

1. **Appointment of Representatives and Replacement:** Only minor process concerns found.

2. **Project Co's Responsibilities:** No process concerns found.

3. **Design:** The design process was very voluminous with many full or partial re-submissions required. We were not able to conclusively confirm if Project Co began construction on a particular component before being granted 'reviewed status'. With the great number or re-submissions, it is likely this occurred, however, it is at Project Co's risk as the Project Agreement has clear recourse if design had changed an already constructed item.

4. **Change Approval:** The 'add/omits' process is created to manage smaller design changes and allow for acknowledgement of Project Agreement variances that are created. The process implemented was not strictly managed as evident by the numerous Project Agreement variances with undocumented changes found in phase 1. Additionally, the tracking form that was provided is still incomplete with no reasoning for all the revisions, recommended resolutions, or acknowledgement by the Authority.

   In addition, the 'add/omits' list was not drafted into a change certificate within 90 days of Service Commencement as required by the Project Agreement and remains outstanding.

5. **Construction:**

    a. The infection control plan during construction was not compliant at all times. The process to remedy identified items was not always timely and there were numerous repeated violations of the plan.
    b. It appears that the as-built drawings were not maintained and accurate at the time of Service Commencement.

6. **Equipment Supply and Installation:** A complete asset register was not created. We anticipate this document exists as it is imperative to the facility maintenance services, however, the complete asset register has not been provided.

7. **Quality Management**

    a. The Quality Assurance Plan created by Project Co appears to substantially meet the requirements of the Project Agreement. However, it appears that the Quality Assurance Plan was not fully implemented during construction. The primary quality assurance document that is referenced in the Quality Assurance Plan to manage quality assurance of construction is the Inspection and Test Plan (ITP), whose "purpose… is to put together in a single document all of the inspection and testing requirements relevant to the proper execution of the SHNB – ICF project". While the ITP is intended to be a living document, the final version is dated September 25th, 2017, nearly a full year prior to Service Commencement, and includes numerous incomplete fields.
        i) One of the incomplete ITP sections is the Standing Seam Metal Roof, which should have been completed as there are a series of quality assurance field reports for the roof from a third-party firm.
        ii) Additionally, there are instances where items are raised in quality assurance reports and were permitted to proceed unrectified. However, there were a substantial amount of items that were remedied appropriately when identified during quality assurance reviews.
    b. Additional documents to confirm the full quality assurance process were not provided. Specific examples include:
        i) Records of the checklists completed as part of the monthly quality review.
        ii) Records of the completed ITP. The final document is dated over eleven months prior to Service Commencement, leading the audit team to have concern of the quality processes in place after this date.
        iii) Records of the Multi-Discipline Team being provided with checklists to confirm areas are complete.
        iv) Records of hyperchlorination prior to Service Commencement.
        v) Records of Legionella testing before, during, and after construction of the plumbing system.
    c. Additionally, there are other factors that lead the audit team to conclude that quality management processes were not fully adhered to:
        i) The infection control processes during construction were not compliant at all times.
        ii) There were a substantial amount of inconsistencies and deficiency items found on site at the time of our review roughly a year and half after Service Commencement.

8. **Project Schedule:** Minor concern with the late delivery of the Facility Move-in Schedule, however, this was due to the uncertainty of the Service Commencement date.

9. Commissioning

a. The Commissioning Plan created by Project Co appears to substantially meet the requirements of the Project Agreement. However, it appears that the Commissioning Plan was not fully implemented during construction.
b. The commissioning agent provided a letter at the time of Service Commencement noting, "confirms that the commissioning process for the major building systems has been substantially completed in accordance with the requirements of the Commissioning Plan. Currently systems are operational some with a deficiency rectification process in progress". While the systems may have been operational, they appear to not have been ready for use due to incomplete commissioning processes.
c. The following documents were not included at Service Commencement (* denotes documents that were also not included in the final commissioning report):
    i) Fire alarm system verification report. Please note that it appears that the Fire Protection System Verification letter, which is in regards to the fire sprinkler system, may have mistakenly been accepted as fire alarm system verification report, which is in regards to the fire monitoring system. The operational state of the fire alarm system at Service Commencement is unclear.
    ii) Door access verification reports for all door sequences. *
    iii) Envelope water, air test, and heat loss scan. *
    iv) HVAC start-up reports.
    v) Air and water balancing reports. *
    vi) Building automation system calibration and point-to-point checks. *
    vii) Thermographic survey of electrical equipment. *
    viii) Integrated system testing.

10. **Operational Readiness:** No process concerns found.

11. **Service Commencement:** In relation to the findings related to the commissioning process, it appears that the facility was not ready for use when Service Commencement was granted. While there are many items listed in phase 1 of this report related to Service Commencement that may be viewed as subjective, the lack of a fire alarm verification report (or partial report for spaces able to be occupied) is a fundamental oversight by all parties involved, including the Authority Having Jurisdiction. The audit team does acknowledge that fire alarm system training appears to have been completed before Service Commencement, but this is not a replacement for a proper verification report. No fire alarm verification report at the time of Service Commencement has been provided.

12. **Real Time Location Services (RTLS):** Separate from the concerns related to the commissioning process, appendix D includes a significant list of items that have not been properly verified. This section also includes a summary of Project Agreement clauses to be officially removed or revised if they are not Authority requirements.

Saskatchewan Hospital North Battleford Building Audit

FINAL REPORT

PHASE 3 – PERFORMANCE ACTION PLAN & FOLLOW-UP RECOMMENDATIONS

Scope

Phases 1 and 2 identified materials, workmanship, and implemented processes of the design & construction period against the requirements of the Project Agreement and identify the extent to which these agreed to processes were adhered.

Phase 3's scope was to review the findings of phase 1 and 2 and provide a Performance Action Plan and Follow-up Recommendations.

Performance Action Plan

Below are the items to immediately resolve materials, quality of installation, or processes that are not aligned to the Project Agreement that form our recommended Performance Action Plan.

1. **Critical Item Resolution:** Fully resolve the critical items identified in phase 1 and ensure resolutions consider the entire facility.
2. **Material Deficiencies Resolution:** Review the material deficiencies and low quality installations identified in phase 1 with Project Co and collaborate for mutually agreed resolution for the numerous non-critical items that are not in alignment to the Project Agreement. Ensure the frequently identified items are thoroughly investigated for the entire facility. See the 'Recommended next steps' column in appendix B for more details.
3. **Finalize Project Agreement Revisions:** Revise the Project Agreement to align with agreed changes. There is great risk to the partnership with a high number of undocumented variations this far after Service Commencement. This may include material deficiencies identified in phase 1 (noted above).
4. **Complete Quality Assurance Audit:** The quality assurance documents requested during phase 2 that have not been provided should be reviewed for alignment to the Quality Management Plan. This will assist in better defining the lessons learned in the Follow-up Recommendations section below.
5. **Complete Commissioning Process:** Ensure the commissioning requirements of the Commissioning Plan are upheld. With the large number of documents not available, it cannot be confirmed that the commissioning process has been completed for all systems.
6. **Audit Schedule 14:** The large number of documents not readily available causes concern that requirements of Schedule 14 – Records and Reports are not currently being achieved.

Follow-up Recommendations

The items below are recommendations that can be used as lessons learned for future projects.

1. **Ensure Complete Compliance Team Oversight**

a. While the Authority retained the services of a compliance team to assist with design reviews and conduct inspections during construction, the following are recommendations to improve this process as it did not lead to full compliance of the Project Agreement.
   a) Engage a complete compliance team in development of the Project Agreement.
      i) The primary disciplines of Architectural, Structural, Mechanical, and Electrical appear to have been engaged, however it is unclear if Landscape and Civil professionals were engaged in the development of the Project Agreement. The Project Agreement is very generic in many Landscape and Civil requirements, making enforcement challenging.
   b) Engage a complete compliance team in all disciplines throughout design.
      i) It is unclear if all disciplines participated in all design reviews and were active in the resolution to issues during the design period.
   c) Engage a complete compliance team in all disciplines throughout construction.
      i) More frequent compliance reviews during construction may have assisted in identifying further issues. There were only eleven compliance reviews conducted by the Architectural team over the 36 months of construction, with only two reviews completed at 16 months of construction. Monthly reviews for all disciplines with active construction is recommended, with potential for additional reviews in advance of construction milestones required for a project of this scale.
      ii) Complete compliance team reviews may have assisted in identifying non-compliance items during construction. There were no site reviews provided from the Structural, Civil, or Landscape professionals of the Authority's compliance team.

2. **Process Improvement**

a. The Authority implemented a non-compliance process during design and construction, where Project Co was notified formally of any perceived severe non-compliance to Project Agreement requirements. While it is an effective way to communicate severe non-compliance, it is not a formal Project Agreement process. Both partners appear to have accepted items as resolved through responses to this process, however these should have been followed up with formal Project Agreement change management processes when required.

3. **Enact Additional Third-party Reviews**

a. The Independent Certifier model could be expanded to include a formal audit of the quality assurance process. A third-party process audit mid-construction would be beneficial, as the findings in this report are too late to benefit the project.
b. To follow industry best practice, the Commissioning Agent should be independent from Project Co, with a model similar to the Independent Certifier being a valid option for the risk profile of a P3 project. There were several concerns with the commissioning documentation noted in phase 2, along with several process concerns noted by Midgard Project Management Ltd. in their observation reports in July and August of 2018, which leads to a larger concern that the Owner's interest was not maintained throughout the commissioning process.

4. Authority Governance

a. While the Authority's Project Implementation Plan (PIP) version 4 establishes specific roles for governance during the design and construction period, the following are recommendations to improve this structure.
   a) The Authority's Project Management Team did not have a central project manager role. Elements of this role were spread over three roles, the Design & Construction Lead, the Project Agreement Lead, and the Project Coordinator. In addition, neither of these three roles required a Project Management Professional certification, which is recommended for a project of this scale.
   b) No single role accountable for Schedule 2 compliance. The Authority's Project Management Team did have a tracker for the various Schedule 2 requirements. The requirements appear to have be managed by the larger group, however, there were still numerous Schedule 2 requirements and Authority rights that were not upheld (as noted in phase 2).
   c) Establish regular updates of the PIP, as it was not updated during the 36 month design & construction period. Quarterly reviews or at the completion of project milestones is recommended.

5. Miscellaneous

a. Require geomatic site survey at the completion of construction. This would enable proper verification of various site related requirements.