North Dakota Renewable Energy Program
Status Report

Recipient: MHA Nation
Contract Number: R-042-052
Report for time period of: 8/21/20 - 10/20/20

Description of Project
The project includes the third phase of a round residential design that will exceed ENERGY STAR standards and be engineered with the capacity to meet net-zero goals. Construction methods, materials, and production efficiencies achieved during the project will result in a renewable energy home kit and ready to manufacture at an affordable price.

Project Tasks
There have been delays in the project and several of the objectives are being accomplished later than anticipated. Most of the delays in reaching the objectives as per the timeline are COVID-19 related either directly, as for a time many services were not available due to temporary business closures, or indirectly, in that once these businesses started again they had a backlog of jobs to catch up on.

MHA Nation experienced two waves of COVID-19 outbreak which decreased the finance office staff capacity substantially. Some office workers became infected with the virus and were off work. This has slowed our payment processes for the work that has been completed to date but we are still making good progress.

Objective 1:
Create a Renewable Energy Plan for Modifying Living Stone Lodge Home Design

Progress Achieved:

Task: Modify Architectural & Structural Drawings

QTR 1
Architectural drawings are 80% complete and structural drawings are 50% complete. Expected completion within six weeks.

QTR 2
The Architectural drawings are 95% complete and the Structural drawings are 75% complete. These were expected to be done in quarter two but modifications to the energy corridor design required changes in the drawings which are being done now.

QTR 3
There has been no progress from Quarter 2 reporting. Neither the architectural or structural drawings are 100% complete because of a delay in the payment process with MHA Nation. The Finance office has been closed or extremely limited for over 3 months due to COVID.
Task:  Design & Engineer Energy Corridor

QTR 1
The energy corridor will be started once the architectural and structural drawings are completed.

QTR 2
The energy corridor design has been completed but the drawings still need to be finished. (This is the 5% of the Architectural drawings that need to be completed.) The Structural & Architectural engineers have agreed on the energy corridor design. These are the only drawings that are left to be finished.

QTR 3
There has been no additional progress on the energy corridor due to incomplete drawings.

Task:  Design & Engineer Electrification Conversion

QTR 1
Design and Engineering for the electrification conversion are 70% complete and expected to be complete within four weeks.

QTR 2
The energy conversion is complete. During the conversion planning a decision was made to model two different types of heating systems for the electrification: geothermal ground source and air-to-water heat pump. The results were better than expected.

Geothermal ground source works best for cold weather climates and is a reasonable cost to set up using off-the-shelf items.

The air-to-water heat pump is a new technology system manufactured by Chilltrix. The modeling is 100% complete with exceptional results. This technology is an inverter driven air-to-water heat pump that is a less expensive system than geothermal and will perform exceptionally well when building in more moderate climates.

Chilltrix is reviewing the idea to produce and manufacture the system with the Living Stone Lodge name and logo on the products.

QTR 3
The energy conversion plan was completed in quarter 2 with two heating systems chosen to model for electrification.

The Air-to-Water heat pump is completed and all equipment has been sourced. The order will be completed once pricing negotiations are done.

The geothermal design is partially complete. The geothermal wells have been successfully drilled and plumbed into the house.
Task: Create Renewable Energy Plan

QTR 1
The Energy plan will be started once the above tasks are completed.

QTR 2
The Renewable Energy Plan has not been started as it required the electrification conversion to be completed first. It was expected to be finished in the second quarter of the project, but with the current building schedule, we anticipate this task may not be completed until the end of the third quarter of the project.

QTR 3
The Renewable Energy Plan has been started but there has been no additional progress as this is dependent upon other tasks as yet incomplete.

Objective 2:
Develop manufacturing process and affordable efficiencies for commercialization

Progress Achieved:

Task: Design Detailed Architectural & Structural shop drawings and specifications

QTR 1
Drawings have been completed for the steel parts and sent to the production shop where they are tooling up to manufacture the parts.
Drawings that still need to be completed include SIPS roof panels and ICF Block Wall Design.

QTR 2
The SIPS roof panels and ICF Block Wall shop drawings and specifications are completed and the manufacturers are set to produce the parts.
There are drawings for pre-manufactured wedges for the upper loft deck that still need to be completed, as well as a new window buck system that reduces heat transfer.

QTR 3
The drawings for the pre-manufactured wedges for the upper loft deck are completed and are currently being manufactured in North Dakota.
The window buck system is still under review by the Amvic company who will be manufacturing the system.

Task: Design Detailed Mechanical & Electrical shop drawings and specifications

QTR 1
This task will begin once the Objective one tasks have been accomplished and the electrification conversion plan is complete.
QTR 2
These drawings were expected to be completed in quarter two, but the electrical components required for the mechanical room are just now being decided upon by the engineers. Once the components are chosen and mounting solutions agreed upon the mechanical and electrical engineers will be able to finish the drawings.

QTR 3
All electrical & mechanical drawings are completed for the air-to-water system requirements for the mechanical room. The drawings have not yet been started for the geothermal heat pump.

Task: Develop ICF Custom Mold

QTR 1
The COVID-19 pandemic has halted business with the Canadian business contractor responsible for designing the mold. It is anticipated the design work will begin in June.

The project development team has created a process to achieve similar results to ensure the project moves forward until this mold can be completed. Amvic, the manufacturer, has agreed to custom cut the ICF corner blocks to replicate a molded block until the custom mold is produced.

QTR 2
The Custom Mold Design is complete. Once Amvic receives payment, they will be starting production of the mold. COVID-19 has caused a delay in the processing of payments from the MHA Nation Finance Office.

QTR 3
Payment has been processed and production has begun but has not been completed yet. No time frame has been given by the manufacturer due to COVID delays.

Task: Engage Manufacturers for parts and production bids

QTR 1
Rock Industries: The steel parts contract is completed and Rock Industries is beginning production on the parts.

Bertch Cabinets: The replicated, affordable designs are completed and the order is being negotiated for delivery in July.

Farrow Roof Trusses: Custom designed trusses for loft frames and fixtures are completed. Pricing has been established and the order will be filled in July.

Bayer Built Doors: Interior and Exterior doors have been designed to LSL specifications for maximum efficiency and affordability. The entire order has been received on-site and is stored in the Living Stone Lodge warehouse.

Pella Windows: A direct manufacturer buying relationship has been established with Pella Windows. The windows have been priced, ordered, and are arriving June 3, 2020.

Manus Products: Adhesive foam kit for the roof panels and exterior doors is being priced. Testing of the samples has been completed and approved.
Intercept SIPS Panels: Contract and designs are in process. Expected to be complete by the middle of June. **QTR 2**

Agreements with all of the Manufacturers are complete and delivery has been received with the exception of a new high-density foam sealant manufacturer. A change was required due to a quality issue with the Manus foam kit after testing was completed.  

**QTR 3**

This is complete and an agreement with Hilti for foam sealant is in place to replace the failed Manus foam kit.

**Task: Manufacture and production for home parts to be delivered June/July**

**QTR 1**

This schedule has been impacted by the lock-down due to the COVID-19 pandemic, which closed some of the manufacturers we work with, but the parts are expected to be received in June, July and August and the delay will not impact the homes' completion during the 2020 building season.  

**QTR 2**

The home parts have been delivered with the modified components and the homes are on schedule. This task is Complete.  

**QTR 3**

This task was completed on schedule in the second quarter.

**Task: Create a Builder's Manual**

**QTR 1**

The contract has been signed and the initial outline with chapters and design layout is in process and on schedule. Photography and drafting illustrations have been ongoing since February and are also on schedule.  

**QTR 2**

The Builder's Manual is in process.  

**QTR 3**

The chapter outline is complete. The final layout is waiting for new content and photos as the building process was altered from the initial techniques to more efficient building methods. The task is still on schedule as one of the last activities of the project to be completed.
**Objective 3**

Build Two Model Homes

**Progress Achieved:**

**QTR 1**

All excavation on the homesites and the underground and rough-in plumbing is completed. Both concrete foundations have been poured and are completed. The electrical contract with McKenzie Electric has been signed and the construction for onsite power has begun. We are on schedule to complete the homes within the time frame stated within the proposal.

**QTR 2**

The ICF walls are complete, all the beams that support the roof panels are in place, and the window bucks are installed. The roof panels will be delivered the third week of September and roofing will begin soon after they arrive.

**QTR 3**

All roof panels received and installed. Houses are roofed, dried in and heated. This is on schedule to be completed in accordance with the timeline.

**Objective 4**

All Objective 4 tasks include activities that can only be accomplished when the project is complete in the last quarter of the project.

**Task: Complete Energy Audit & Comparison Report**

**Progress Achieved:** TBD

**Task: Verify Energy Performance Goals**

**Progress Achieved:** TBD

**Task: Prepare & Publish Case Study**

**Progress Achieved:** TBD
Deliverables

Renewable energy strategy for electrification
Electrification is 100% complete. The research and modeling for ground performance for geothermal and air-to-water heat pump have been completed.

Model homes constructed with renewable energy (geothermal ground source heat pumps and passive solar energy)
The homes are on schedule to be completed within the time frame stated within the proposal.

Renewable energy corridor capable of adding solar or wind energy easily
The Structural & Architectural engineers have agreed on the energy corridor design and drawings are completed.

Custom mold for 22.5-degree ICF Corner Blocks
The design work for the custom mold has been completed. The manufacturer is currently building the mold.

Architectural, Engineering and Electrical design drawings of high-performance home
Architectural design drawings are 95% complete. Engineering drawings are 75% complete. Electrical drawings have been started. All drawings are expected to be completed in quarter four.

Detailed shop drawings with all specifications for manufacturing
All manufacturers have been identified for this network and all contracts are in place.

Published Builder's Manual
The initial outline, chapters, content, and design layout are in process. The photography and drafting illustrations have been ongoing.

Photographs are key to the visual manual and are being taken as the project is being completed to provide accurate training images.

Energy audit and documentation of energy performance goals
TBD (due in final quarter of project)

Manufacturing-ready, affordable, energy-efficient Kit Home
TBD (due at completion of project)
Geothermal Wells
### Expenditures

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