

**MINGO COUNTY REDEVELOPMENT AUTHORITY
MINGO COUNTY, WEST VIRGINIA**

**KERMIT AQUAPONICS FACILITY
THRASHER PROJECT #101-030-3155**

**ADDENDUM #3
January 18, 2019**

Prospective Bidders:

This Addendum forms a part of the Contract Documents and modifies the original Bidding Documents dated January 2, 2019 and any prior addenda. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

CLARIFICATIONS:

1. Partition separating office/processing areas and Production Floor (113) shall be insulated with R-13 min. batt insulation in stud cavity.
2. Attic access ladder to be Precision Ladders, LLC Super Simplex.

SPECIFICATIONS:

1. ADDED: Door Hardware Specification.

BIDDER QUESTIONS:

Q1: Does the project require prevailing wage?

A1: The project does not require prevailing wage.

Q2: Will the contractor be responsible for purchasing and placing the gravel within the gravel beds, if so is there a specification for the type of gravel required?

A2: Yes, the contractor will be responsible for purchasing and placing the gravel within the gravel beds. This gravel shall be of the same size and quality as the gravel subbase provided for the concrete slab.

Q3: AFB Page 1 & 2: The AFB states the project is to be substantially complete by June 1, 2019. The AFB also states a bid hold of 90 days. A bid hold period of 90 days means the General Contractor may not receive the Notice to Proceed until Monday, April 8, 2019. This would give the Contractor a total of 54 calendar days or 40 working calendar days to perform the work:

Q3A: Could the bid hold period be minimized to a 30 day hold period?

A: The bid hold period will remain 90 days.

Q3B: Could an explanation as to why June 1, 2019 is set for the substantial completion date?

A: Although not anticipated, if the bids are held, the completion date would be negotiated to be extended an appropriate amount of time.

Q3C: Is the Owner requesting the Contractor to include an accelerated schedule, therefore, inflating the cost to perform the construction activities within the time-line identified in the specifications?

A: No, it is not the Owner's intention to accelerate the construction schedule.

Q3D: Will weather days be granted since the bulk of the work is earthwork?

A: The Owner will entertain granting weather days, but no weather days will be guaranteed. Weather days may be granted due to inclement weather that is atypical of the time of year. The contractor should not assume that all contract days will be conducive to performing work, nor should the contractor assume that all inclement weather days will be grounds for extension. Delays due to weather conditions must be documented in compliance with 15.1.6.2, will be reviewed accordingly and granted or denied based on documentation provided by the Contractor and the Owner's own accounting of the weather period in question.

Q4: Is burning trees/shrubs on site permitted with Burn permit?

A4: It is the Owner's preference that this material be dealt with in a more sustainable manner, but burning will be allowed with an appropriate burn permit.

Q5: Funding Source:

Q5A: Where is the funding coming from for this project?

A: The funding comes through the DEP, but it's federally appropriated by the Office of Surface Mine Reclamation and Enforcement through the AML Pilot Program.

Q5B: If funding is coming from Federal Grants, could the Grant names be provided?

A: See response to Q5A above.

Q5C: Is this project Davis Bacon?

A: See response to Q1.

- Q6: The Bid Schedule does not have a line item for the building construction:
Q6A: Will a revised bid form be provided?
A: A revised bid form will be issued in a subsequent addendum.
Q6B: For clarification, the Contractor will be paid per unit cost of all bid items installed, based upon a unit of measure per the Unit Price Specifications. Is this correct?
A: That is correct. The project will be awarded on the lowest total bid amount (sum of all unit prices), but the Contractor will be paid for actual quantities of work performed per the Unit Price supplied with the bid.
- Q7: Summary: 1.3 Work by Owner or Others:
Q7A: The drawings indicate the Grow Lights are by others. Is this correct?
A: This is correct.
Q7B: The drawings (E2.01) seem to indicate the 1-14 aquaponic equipment schedule is by others. Is this correct?
A: Correct.
- Q8: Could a detail description of how the Owner intends to occupy the area of construction be provided?
A8: The Owner will not occupy the site or premises until Substantial Completion is reached.
- Q9: There does not appear to be any of the following specifications:
Q9A: Will they be provided or do we bid per the plans?
A: See responses below.
Q9B: Plumbing Specifications?
A: Reference drawing sheet P0.00 for Plumbing Specifications.
Q9C: HVAC Specifications?
A: Reference drawing sheet M0.00 for Mechanical Specifications.
Q9D: Electrical Specifications?
A: Reference drawing sheet E0.00 for Electrical Specifications.
- Q10: Investigative Reports:
Q10A: Is there a bore log and/or geo-tech report available for review?
A: A geotechnical report is **attached** to this addendum.
Q10B: Has a Phase I or Phase II assessment be conducted of the property and is the assessment available for Contractor review?
A: No Phase I or Phase II ESA has been conducted.

Q11: Summary: 1.7 Permits:

Q11A: Typically, DOH permit is provided by the Engineer of Record during design. Has the Engineer acquired all DOH permits, if any is required by the DOH?

A: Applicable DOH permits have been acquired by the design team.

Q11B: Will the Owner provide the building permit?

A: A building permit is not required by the City for this project. If another entity requires/requests the Contractor obtain a building permit, the Contractor shall be responsible for obtaining it.

Q11C: Has the Engineer acquired all storm water permits, if required by the DEP?

A: The site is covered under a NOI permit from the DEP and the permit number is WVR108868.

Q12: Borrow Material & Spoils:

Q12A: Does the Owner have a borrow area for fill materials?

A: As long as the undercut all is suitable to backfill the over excavation then the site is balanced. There should not be a need to import or export any large amounts of material. Depending on the soil conditions compared to what we assume for design there may be a small amount of difference from actual to design but should be minimal. In this event, the Contractor should be able to borrow or waste within the LOD to balance the site.

Q12B: Does the Owner have a location for spoils?

A: See response above.

Q13: When is the last day for questions?

A13: Refer to Addendum No. 2

Q14: Appears the door hardware specifications are missing from the Specifications and I have reviewed the plan sheets and do not see the door hardware specifications. Will door hardware specifications be provided?

A14: A door hardware specification is attached to this addendum.

Q15: Cannot locate any specifications for casework. Is the casework by Owner or Contractor? If by Contractor can specifications be provided?

A15: Contractor shall provide all casework. Specification attached to this addendum.

Q16: Due to (X) amount of information may be added to the bidding documents. Would the Owner entertain extending the bid date?

A16: Bid date extended by Addendum No. 2

- Q17: I realize we have a specification for aluminum-framed entrances. For clarification, are the window frames hollow metal or aluminum-framed. I cannot find any references on the drawings. This question is for window types 1 & 2.
- A17: Type 1 & 2 windows shall be aluminum. Refer to specification section 085113 – Aluminum Windows.
- Q18: Due to the substantial completion date and bid hold period, how many working calendar days will the AOR need during the construction phase for review of all submittals?
- A18: AOR will make every attempt to be as expeditious in review as possible especially when specifically requested by Contractor for critical and long-lead items. However, AOR's review period shall be 20 days as defined in specification section 013300 – Submittal Procedures.
- Q19: Due to the substantial completion date and bid hold period not allowing many days for on site construction as identified below, how many working calendar days will the AOR need during the construction phase for review each rfi?
- A19: AOR's review period for RFI's shall be 14 day.

Sincerely,



THE THRASHER GROUP, INC.

Josh Lyons
Architect



SECTION 08 71 00 – DOOR HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes:

- 1. Mechanical and electrified door hardware for:
 - a. Swinging doors.
- 2. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

- B. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:

- 1. Windows
- 2. Cabinets (casework), including locks in cabinets
- 3. Signage
- 4. Toilet accessories
- 5. Overhead doors

- C. Related Sections:

- 1. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
- 2. Division 09 sections for touchup, finishing or refinishing of existing openings modified by this section.

1.03 REFERENCES

- A. UL - Underwriters Laboratories

- 1. UL 10B - Fire Test of Door Assemblies
- 2. UL 10C - Positive Pressure Test of Fire Door Assemblies
- 3. UL 1784 - Air Leakage Tests of Door Assemblies

4. UL 305 - Panic Hardware
- B. DHI - Door and Hardware Institute
 1. Sequence and Format for the Hardware Schedule
 2. Recommended Locations for Builders Hardware
 3. Key Systems and Nomenclature
- C. ANSI - American National Standards Institute
 1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties

1.04 SUBMITTALS

- A. General:
 1. Submit in accordance with Conditions of Contract and Division 01 requirements.
 2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
 3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article, herein.
- B. Action Submittals:
 1. Product Data: Technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 2. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
 3. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:
 - a. Door Index; include door number, heading number, and Architects hardware set number.
 - b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
 - c. Quantity, type, style, function, size, and finish of each hardware item.
 - d. Name and manufacturer of each item.
 - e. Fastenings and other pertinent information.
 - f. Location of each hardware set cross-referenced to indications on Drawings.

- g. Explanation of all abbreviations, symbols, and codes contained in schedule.
- h. Mounting locations for hardware.
- i. Door and frame sizes and materials.
- j. Name and phone number for local manufacturer's representative for each product.

4. Key Schedule:

- a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
- b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
- c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
- d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
- e. Provide one complete biting list of key cuts and one key system schematic illustrating system usage and expansion.
 - 1) Forward biting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
- f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

5. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory or shop prepared for door hardware installation.

C. Informational Submittals:

- 1. Qualification Data: For Supplier, Installer and Architectural Hardware Consultant.
- 2. Product data for electrified door hardware:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
- 3. Certificates of Compliance:
 - a. UL listings for fire-rated hardware and installation instructions if requested by Architect or Authority Having Jurisdiction.
 - b. Installer Training Meeting Certification: Letter of compliance, signed by Contractor, attesting to completion of installer training meeting specified in "QUALITY ASSURANCE" article, herein.
 - c. Electrified Hardware Coordination Conference Certification: Letter of compliance, signed by Contractor, attesting to completion of electrified hardware coordination conference, specified in "QUALITY ASSURANCE" article, herein.
- 4. Warranty: Special warranty specified in this Section.

D. Closeout Submittals:

- 1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:

- a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
- b. Catalog pages for each product.
- c. Factory order acknowledgement numbers (for warranty and service)
- d. Name, address, and phone number of local representative for each manufacturer.
- e. Parts list for each product.
- f. Final approved hardware schedule, edited to reflect conditions as-installed.
- g. Final keying schedule
- h. Copies of floor plans with keying nomenclature
- i. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.05 QUALITY ASSURANCE

- A. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
 1. Warehousing Facilities: In Project's vicinity.
 2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
 4. Coordination Responsibility: Assist in coordinating installation of electronic security hardware with Architect and electrical engineers and provide installation and technical data to Architect and other related subcontractors.
 - a. Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.
- B. Architectural Hardware Consultant Qualifications: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 1. For door hardware, DHI-certified, Architectural Hardware Consultant (AHC).
 2. Can provide installation and technical data to Architect and other related subcontractors.
 3. Can inspect and verify components are in working order upon completion of installation.
 4. Capable of producing wiring diagrams.
 5. Capable of coordinating installation of electrified hardware with Architect and electrical engineers.
- C. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- D. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure

and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

- E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in “REFERENCES” article, herein.
- F. Keying Conference
 - 1. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 - d. Requirements for access control.
 - e. Address for delivery of keys.
- G. Pre-installation Conference
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Inspect and discuss preparatory work performed by other trades.
 - 3. Inspect and discuss electrical roughing-in for electrified door hardware.
 - 4. Review sequence of operation for each type of electrified door hardware.
 - 5. Review required testing, inspecting, and certifying procedures.
- H. Coordination Conferences:
 - 1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
 - 2. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
 - 1. Deliver each article of hardware in manufacturer's original packaging.
- C. Project Conditions:
 - 1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

2. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- D. Protection and Damage:
1. Promptly replace products damaged during shipping.
 2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
 3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- E. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
- F. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.07 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.08 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Beginning from date of Substantial Completion, for durations indicated.
 - a. Closers:
 - 1) Mechanical: 25 years.
 - b. Exit Devices:
 - 1) Mechanical: 3 years.
 - c. Locksets:
 - 1) Mechanical: 10 years.
 - d. Continuous Hinges: Lifetime warranty.
 - e. Key Blanks: Lifetime
 2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

1.09 MAINTENANCE

- A. Maintenance Tools: Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Approval of manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- B. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect’s approval.

2.02 MATERIALS

A. Fasteners

1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
4. Install hardware with fasteners provided by hardware manufacturer.

B. Modification and Preparation of Existing Doors: Where existing door hardware is indicated to be removed and reinstalled.

1. Provide necessary fillers, Dutchmen, reinforcements, and fasteners, compatible with existing materials, as required for mounting new opening hardware and to cover existing door and frame preparations.
2. Use materials which match materials of adjacent modified areas.
3. When modifying existing fire-rated openings, provide materials permitted by NFPA 80 as required to maintain fire-rating.

- C. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
 - 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.03 HINGES

A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product: Ives 5BB series.
- 2. Acceptable Manufacturers and Products: Hager BB series, McKinney TA/T4A series, Stanley FBB Series.

B. Requirements:

- 1. Provide hinges conforming to ANSI/BHMA A156.1.
- 2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
- 3. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
- 4. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
- 5. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
- 6. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
- 7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
- 8. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
- 9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component.
- 10. Provide mortar guard for each electrified hinge specified.

11. Provide spring hinges where specified. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Provide one additional bearing hinge for each 30 inches (762 mm) of additional door height.

2.04 CONTINUOUS HINGES

A. Aluminum Geared

1. Manufacturers:

- a. Scheduled Manufacturer: Ives.
- b. Acceptable Manufacturers: Select, Stanley.

2. Requirements:

- a. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
- b. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
- c. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
- d. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
- e. On fire-rated doors, provide aluminum geared continuous hinges that are classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
- f. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with sufficient number and wire gage to accommodate electric function of specified hardware.
- g. Install hinges with fasteners supplied by manufacturer.
- h. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.06 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

2.07 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage ND series.
2. Acceptable Manufacturers and Products: Sargent 11-Line, Corbin-Russwin CL3100 series.

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3 hour fire doors.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw. Provide proper latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets.
8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
 - a. Lever Design: Schlage Sparta trim

2.08 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Von Duprin 99/33A series.
2. Acceptable Manufacturers and Products: Precision APEX 2000 series, Sargent 80 series.

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to “KEYING” article, herein.
3. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide flush end caps for exit devices.
7. Provide exit devices with manufacturer’s approved strikes.
8. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
9. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
10. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
11. Concealed Vertical Cable Exit Devices: provide cable-actuated concealed vertical latch system in two-point for non-rated or fire rated wood doors up to a 90 minute rating and less bottom latch (LBL) configuration for non-rated or fire rated wood doors up to 20 minute rating. Vertical rods not permitted.
 - a. Cable: Stainless steel with abrasive resistant coating. Conduit and core wire ends snap into latch and center slides without use of tools.
 - b. Wood Door Prep: Maximum 1 inch x 1.1875 inch x 3.875 inches top latch pocket and 1 inch x 1.1875 inch x 5 inches bottom latch pocket which does not require the use of a metal wrap or edge for non-rated or fire rated wood doors up to a 45 minute rating.
 - c. Latchbolts and Blocking Cams: Manufactured from sintered metal low carbon copper- infiltrated steel, with molybdenum disulfide low friction coating.
 - d. Top Latchbolt: Minimum 0.38 inch (10 mm) and greater than 90 degree engagement with strike to prevent door and frame separation under high static load.
 - e. Bottom Latchbolt: Minimum of 0.44 inch (11 mm) engagement with strike.
 - f. Product Cycle Life: 1,000,000 cycles.
 - g. Latch Operation: Top and bottom latch operate independently of each other. Top latch fully engages top strike even when bottom latch is compromised. Separate trigger mechanisms not permitted.
 - h. Latch release does not require separate trigger mechanism.
 - i. Cable and latching system characteristics:
 - 1) Installed independently of exit device installation, and capable of functioning on door prior to device and trim installation.
 - 2) Connected to exit device at single point in steel and aluminum doors, and two points for top and bottom latches in wood doors.
 - 3) Bottom latch height adjusted, from single point for steel and aluminum doors and two points for wood doors, after system is installed and connected to exit device, while door is hanging
 - 4) Bottom latch position altered up and down minimum of 2 inches (51 mm) in steel and aluminum doors without additional adjustment. Bottom latch deadlocks in every adjustment position in wood doors.
 - 5) Top and bottom latches in steel and aluminum doors and top latch in wood doors may be removed while door is hanging.

12. Top latch mounting: double or single tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
13. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
 - a. Tactile Warning (Knurling): Where required by authority having jurisdiction. Provide on levers on exterior (secure side) of doors serving rooms considered to be hazardous.

2.09 CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage Everest 29 S.
2. Acceptable Manufacturers and Products: Corbin-Russwin Patented Keyway, Sargent DG1.

B. Requirements:

1. Provide cylinders/cores, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
 - a. Conventional Patented Open: cylinder with interchangeable core with open keyway.
3. Nickel silver bottom pins.

C. Construction Keying:

1. Replaceable Construction Cores.
 - a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - 1) 3 construction control keys
 - 2) 12 construction change (day) keys.
 - b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2.10 KEYING

- A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- B. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- C. Requirements:

1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - a. Master Keying system as directed by the Owner.
2. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
3. Provide keys with the following features:
 - a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
4. Identification:
 - a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Do not provide blind code marks with actual key cuts.
 - b. Identification stamping provisions must be approved by the Architect and Owner.
 - c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - d. Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
5. Quantity: Furnish in the following quantities.
 - a. Change (Day) Keys: 3 per cylinder/core.
 - b. Permanent Control Keys: 3.
 - c. Master Keys: 6.

2.11 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN 4050 series.
2. Acceptable Manufacturers and Products: Falcon SC70A series, Norton 7500 series, Sargent 351 series.

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
3. Closer Body: 1-1/2 inch (38 mm) diameter with 11/16 inch (17 mm) diameter heat-treated pinion journal and full complement bearings.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and all weather requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.

5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide stick on templates, special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.12 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Requirements:

1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.13 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Requirements:

1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes of plates:

- a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
- b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
- c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.14 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers: Glynn-Johnson.
2. Acceptable Manufacturers: Rixson, Sargent.

B. Requirements:

1. Provide heavy duty concealed mounted overhead stop or holder as specified.

2.15 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.16 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer: Zero International.
2. Acceptable Manufacturers: National Guard, Reese.

B. Requirements:

1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.

2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Size of thresholds:
 - a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width
 - b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width
4. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.17 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives.
2. Acceptable Manufacturers: Burns, Rockwood.

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.18 FINISHES

A. Finish: BHMA 626/652 (US26D); except:

1. Continuous Hinges: BHMA 628 (US28)
2. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
3. Protection Plates: BHMA 630 (US32D)
4. Overhead Stops and Holders: BHMA 630 (US32D)
5. Door Closers: Powder Coat to Match
6. Wall Stops: BHMA 630 (US32D)
7. Weatherstripping: Clear Anodized Aluminum
8. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

- B. Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.
- C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- H. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as indicated in keying section.
- I. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- J. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

- K. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- L. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- M. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- N. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 FIELD QUALITY CONTROL

- A. Engage qualified manufacturer trained representative to perform inspections and to prepare inspection reports.
 - 1. Representative will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.04 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, Installer's Architectural Hardware Consultant must examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.05 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.06 DOOR HARDWARE SCHEDULE

- A. Hardware items are referenced in the following hardware. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

B. Hardware Sets:

SpeXtra: 465716

HDW SET 01

DOOR(S) MARKED:

100

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	CD-9949-EO	626	VON
1	EA	PANIC HARDWARE	CD-9949-NL-OP-110MD	626	VON
1	EA	RIM HOUSING	20-079	626	SCH
3	EA	FSIC CORE	23-030	626	SCH
3	EA	FSIC CORE	23-030 ICX	622	SCH
2	EA	MORTISE CYLINDER	20-059 XQ11-948	626	SCH
2	EA	90 DEG OFFSET PULL	8190EZHD 12" O	630-316	IVE
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	4050 EDA	689	LCN
2	EA	PA MOUNTING PLATE	4050-18PA	689	LCN
2	EA	BLADE STOP SPACER	4050-61	689	LCN
2	EA	CUSH SHOE SUPPORT	4050-30	689	LCN
1	EA	THRESHOLD	566A-223	A	ZER

SEALS BY DOOR SUPPLIER

Mingo County Redevelopment Authority
 Kermit Aquaponics Facility
 #101-030-3155
 HDW SET 02

ADDED
 Addendum No. 3
 January 18, 2019

DOOR(S) MARKED:

108

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	112HD	628	IVE
2	EA	MANUAL FLUSH BOLT	FB458 12"	626	IVE
1	EA	CLASSROOM LOCK	ND70TD SPA 14-028	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
2	EA	OH STOP & HOLDER	100H	630	GLY
2	EA	SURFACE CLOSER	4050 EDA	689	LCN
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
1	EA	GASKETING	429AA-S	AA	ZER
1	EA	OVERLAPPING ASTRAGAL	FURNISHED BY DOOR SUPPLIER		
2	EA	DOOR SWEEP	8198AA	AA	ZER

HDW SET 03

DOOR(S) MARKED:

119

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	CD-99-L-17	626	VON
2	EA	FSIC CORE	23-030 ICX	622	SCH
1	EA	RIM HOUSING	20-079	626	SCH
1	EA	MORTISE CYLINDER	20-059 XQ11-948	626	SCH
2	EA	FSIC CORE	23-030	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4050 EDA	689	LCN
1	EA	GASKETING	429AA-S	AA	ZER
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	566A-223	A	ZER

Mingo County Redevelopment Authority
Kermit Aquaponics Facility
#101-030-3155
HDW SET 04

ADDED
Addendum No. 3
January 18, 2019

DOOR(S) MARKED:

102

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50TD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE

HDW SET 05

DOOR(S) MARKED:

103

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S SPA	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE

HDW SET 06

DOOR(S) MARKED:

104 111

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	ND40S SPA	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE

HDW SET 07

DOOR(S) MARKED:

105A 105B

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70TD SPA 14-028	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	OH STOP	100S	630	GLY

Mingo County Redevelopment Authority
 Kermit Aquaponics Facility
 #101-030-3155
 HDW SET 08

ADDED
 Addendum No. 3
 January 18, 2019

DOOR(S) MARKED:

109

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA 14-028	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4050 REG OR PA AS REQ	689	LCN
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188SCL PSA	CL	ZER

HDW SET 09

DOOR(S) MARKED:

110

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA 14-028	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4050 REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188SCL PSA	CL	ZER

HDW SET 10

DOOR(S) MARKED:

107

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50TD SPA	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	OH STOP & HOLDER	100H	630	GLY
1	EA	SURFACE CLOSER	4050 REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

Mingo County Redevelopment Authority
 Kermit Aquaponics Facility
 #101-030-3155
 HDW SET 11

ADDED
 Addendum No. 3
 January 18, 2019

DOOR(S) MARKED:

112A 112B

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70TD SPA 14-028	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4050 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188SCL PSA	CL	ZER
1	EA	DOOR BOTTOM	355AA	AA	ZER

HDW SET 12

DOOR(S) MARKED:

106 114

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458 12"	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	ND70TD SPA 14-028	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
2	EA	OH STOP & HOLDER	100H	630	GLY
2	EA	SURFACE CLOSER	4050 EDA	689	LCN
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
1	EA	GASKETING	188SCL PSA	CL	ZER
1	EA	OVERLAPPING ASTRAGAL	FURNISHED BY DOOR SUPPLIER		
2	EA	DOOR BOTTOM	351AA	AA	ZER

Mingo County Redevelopment Authority
Kermit Aquaponics Facility
#101-030-3155
HDW SET 13

ADDED
Addendum No. 3
January 18, 2019

DOOR(S) MARKED:

113

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P 12"	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	ND70TD SPA 14-028	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB2F	689	IVE
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	4050 EDA	689	LCN
1	EA	GASKETING	188SCL PSA	CL	ZER
2	EA	DOOR BOTTOM	351AA	AA	ZER

HDW SET 14

DOOR(S) MARKED:

118

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA 14-028	626	SCH
1	EA	FSIC CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4050 REG OR PA AS REQ	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE

END OF SECTION

Mark Numbers	HwSet#
114	12
110	09
105A	07
105B	07
106	12
109	08
111	06
113	13
100	01
102	04
104	06
103	05
112B	11
108	02
112A	11
107	10
118	14
119	03



**GEOTECHNICAL INVESTIGATION
AQUAPONICS PROJECT
MINGO COUNTY, WEST VIRGINIA**

NGE PROJECT No. W17011

SUBMITTED TO:

**THRASHER
BRIDGEPORT, WEST VIRGINIA**

SUBMITTED BY:

**NGE, LLC
ST. ALBANS, WEST VIRGINIA**

FEBRUARY 2017



February 27, 2017

Ms. April Rohrbaugh
Thrasher
600 White Oaks Blvd.
Bridgeport, WV 26330

Subject: Geotechnical Investigation
Aquaponics Project
Mingo County, West Virginia
NGE Project No. W17011

Dear Ms. Rohrbaugh:

In accordance with your request, we have performed a geotechnical investigation for the proposed Aquaponics Project in Mingo County, West Virginia. Our services were performed in accordance with the scope of work outlined in our Proposal No. PW17502, dated January 16, 2017.

This report presents the results of the field investigation performed to evaluate subsurface conditions and provides our conclusions and recommendations pertaining to design and construction of the project earthwork and structure foundations.

We appreciate the opportunity to assist you with this project. Please contact us if you have any questions concerning this report, or if we can provide any further assistance with this project.

Respectfully submitted,
NGE, LLC

A handwritten signature in black ink, appearing to read 'Noah Stevens'.

Noah Stevens, E.I.
Staff Engineer



A handwritten signature in black ink, appearing to read 'John E. Nottingham'.

John E. Nottingham, P.E.
Principal Engineer

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FIGURES

Figure 1 – Boring Location Plan

Figures 2 to 17 – Test Boring Logs for B-1 through B-15

APPENDICES

APPENDIX A - Results of Laboratory Testing

1.0 SCOPE OF SERVICES

The purpose of our investigation was to evaluate subsurface conditions and develop recommendations for the site earthwork and structure foundation design. The results of our field exploration and geotechnical engineering evaluation are presented in the following report. Our actual scope of services consisted of the following items:

- Field coordination including site reconnaissance, drilling supervision and sample logging.
- Drilling of 15 test borings with standard penetration testing and sampling.
- Laboratory testing of selected soil samples.
- Preparation of a geotechnical engineering report to address the following items:
 - A description of the subsurface conditions encountered at the test boring locations;
 - Results of our laboratory testing;
 - Recommendations for site preparation;
 - Fill placement and compaction recommendations;
 - Cut slope design recommendations.
 - Recommendations for structure foundation design and construction;
 - Floor slab-on-grade subgrade preparation recommendations;

2.0 SITE & PROJECT DESCRIPTION

The proposed site for the Aquaponics Project is located in a hollow northeast of WV Route 52 in Kermit, West Virginia. The site consists of abandoned mine land which includes a high wall, mine portal opening, coal refuse piles, and retention ponds. The north side of the site is partially situated on a moderately to steeply sloping hillside while the southern portion of the site is relatively level to gently sloping.

The project will include construction of a greenhouse/aquaponics building. The building will be a 50 by 180 ft. two story steel-frame structure with metal sheeting exterior walls. The greenhouse/aquaponics building is to be situated in the vicinity of Borings B-2 and B-3 (see Figure 1) with a first floor elevation of 631 feet. Existing ground elevations in the building area range from about 628 to 636 feet. We understand that the existing mine opening may be utilized for a geothermal system. Figure 1 shows the existing contours as well as the proposed layout of the greenhouse/aquaponics building, the location of the existing mine opening, and other site features.

3.0 DRILLING & SAMPLING PROCEDURES

A total of 15 test borings were drilled to evaluate subsurface conditions at the site. The boring locations were chosen by our engineer and staked by Thrasher's surveyor. The approximate boring locations are shown on Figure No. 1 in the back of this report. The test borings were drilled to depths ranging from 6.5 to 60.5 feet using a track-mounted rotary drilling rig equipped with 3-1/4 inch I.D. hollow stem augers. Standard penetration testing and sampling was performed at 2.5 to 5 ft. intervals. The standard penetration testing and sampling was performed in accordance with ASTM D-1586 procedures.

Standard penetration testing is performed by driving a 2.0 inch O.D. split-barrel sampler into the soil with a 140-lb. hammer dropping a distance of 30 inches. The drill used for this project was equipped with a hydraulic powered auto-hammer. The sampler is driven a distance of 18 inches in three 6-inch increments, and the number of hammer blows required to produce the last two 6-inch increments of penetration is termed the Standard Penetration Number or "N" value. These values provide an indication of the consistency or relative density of the soil. A 1-3/8 inch diameter soil/rock sample was retrieved from the split-barrel sampler in conjunction with each penetration test. A representative portion of each split-barrel sample was placed in an air-tight glass jar.

Rock coring was performed using wireline methods within Boring B-1. The rock coring was performed in five foot long runs using a NQ sized double tube core barrel equipped with a diamond impregnated cutting bit. Continuous 2-inch diameter bedrock samples were recovered from each core run and placed in a partitioned wooden box. The core recovery and rock quality designation (RQD) were measured for each core run.

Upon completion of drilling, all soil and rock samples were delivered to our laboratory where they were examined by a geologist and geotechnical engineer. Soil and rock descriptions, standard penetration numbers, and other pertinent subsurface information are provided on the boring logs included in the back of this report.

4.0 SUBSURFACE CONDITIONS

Details of the subsurface conditions encountered by the soil test borings are shown on the boring logs. The boring logs represent our interpretation of the subsurface conditions based on examination of the split-spoon and rock core samples. The stratification lines indicated on the boring logs represent approximate boundaries between soil and rock types; however, the actual transition may be gradual. Conditions represented by the test borings should be considered applicable only at the boring locations. It should be assumed that the reported conditions might be different at other locations. The general subsurface conditions encountered and their pertinent characteristics are described in the following paragraphs.

4.1 Soil Conditions

We encountered old fill material as the upper soil layer in Borings B-2 through B-9, including the area of the planned building. It is apparent that the old fill is mine spoil which was dumped in the area in a non-engineered manner and without proper compactive effort. The spoil fill consists primarily of variable mixture of clay, silt, sand, and rock fragments. Standard penetration testing N-values within the old fill ranged from 2 to 22 blows per foot of penetration.

Most of the old fill was observed to be soft and poorly compacted. The fill extended to bedrock in Borings B-3, B-5, and B-9.

Colluvial soil consisting of silty to sandy clay and clayey to silty sand with rock fragments was encountered on the hillside in Borings B-10 through B-15. The colluvial soil extended to a depth of about 5 feet in all of these borings. Colluvial soils are deposited by downslope movement of soil and are typically indicative of old landslide and/or erosion activity. Colluvial soils are typically weaker and more slide prone than natural residual type soils.

Natural silty to sandy clay with rock fragments was encountered as the upper soil in Boring B-1, beneath the fill material Boring B-2, and beneath the colluvium in Borings B-11 through B-15. The natural soil encountered in Boring B-8 consisted of clayey to silty sand.

4.2 Results of Laboratory Testing

Laboratory testing of recovered soil specimens included natural moisture content, and Atterberg liquid and plastic limits. The results of the Atterberg limit testing are shown on the boring logs and summarized in **Table 4.1** below. The results of all the individual laboratory tests are provided in Appendix A.

Table 4.1– Summary of Laboratory Classification Testing

Boring & Depth	Atterberg Limits		Soil Description
	LL	PI	
B-2 / S-4 7.5 – 9.0 ft.	30	11	Brown SANDY CLAY (CL)
B-9 / S-4 7.5 – 9.0 ft.	33	10	Brown SANDY CLAY (CL)
B-14 / S-4 7.5 – 9.0 ft.	44	15	Brown CLAYEY SILT (ML)

4.3 Bedrock Conditions

Bedrock was encountered in 12 of the test borings. The depth to bedrock varied between 5.0 and 25.5 feet at these boring locations. The bedrock encountered in the borings consisted primarily of interbedded layers of very soft to medium hard shale and soft to hard sandstone. Relatively thin coal layers were encountered in Borings B-5 and B-13. In addition, a medium hard siltstone layer was encountered in Boring B-5.

Rock coring was performed in Boring B-1 in an effort to determine the depth to the existing mine. The top of the mine was encountered at an approximate depth of 51.8 feet below the ground surface (approximate elevation 630.8 feet) and the base of the mine was encountered at an approximate depth of 58.8 feet below the ground surface (approximate elevation 623.8 feet).

4.4 Groundwater

Water was encountered in Boring B-8 at a depth of 10 feet during drilling and at a depth of 15 feet upon completion. The remaining borings were noted to be dry during drilling and sampling and upon completion. The presence or absence of groundwater in the boreholes at the time of drilling does not necessarily mean that groundwater will not be present at other times or locations. Seasonal variations in rainfall will cause fluctuations in groundwater levels and influence the presence of water in upper soils.

4.5 Mine Void Piezometer

A 1.5 inch diameter PVC piezometer with a 10 feet section of slotted screen was installed in Boring B-1 upon completion of rock coring. The piezometer bottom was set at a depth of 60 feet below the existing ground surface, corresponding to an elevation of 622.6 feet. Water level and temperature readings were obtained within the mine void horizon in the piezometer on January 27, 2017 and February 3, 2017. The readings are summarized in Table 4.2 below.

Table 4.2– Summary of Piezometer Readings

DATE	DEPTH TO WATER (ft.)	WATER TEMPERATURE (°F)	AIR TEMPERATURE IN PIEZOMETER (°F)
1-27-17	58.25	49.7	52.6
2-3-17	58.30	48.6	51.1

5.0 SITE DEVELOPMENT RECOMMENDATIONS

5.1 Site Preparation

All existing topsoil and vegetation located within the development area should be stripped prior to beginning site grading. Any underground utility lines located in the developed area should be removed and/or relocated. All voids created by removal of underground items should be properly backfilled in accordance with Section 5.3 of this report.

The development of the site should address surface drainage. Appropriate drainage should be provided both during and after site grading is complete such that surface water does not become ponded or entrapped around the building or pavement. Any groundwater seeps which are encountered during site grading operations should be reported to **NGE** for evaluation.

Proof-rolling of soil subgrades using suitable construction equipment should be performed prior to placing fill. The proof-rolling will cause rutting and deformations of softer soils, and densify firmer soils. Undercutting and replacement of soft and/or wet soils should be performed. The proof-rolling operations should be inspected and documented by a qualified soils technician or engineer.

5.2 Excavation Considerations

Based on the site grading (as shown on Figure 1), development of the site will require a minor cut slope on the northwest side of the building. A rock catchment ditch is also planned at the base of the cut slope.

All excavations should be sloped, shored or braced in accordance with all applicable local, state, and federal requirements, including current OSHA guidelines. We recommend permanent soil cut slopes at the site are inclined no steeper than a 2H:1V ratio. If desired, cut slopes within competent shale and sandstone bedrock may be steepened to a 1H:1V ratio.

Small, isolated groundwater seeps or springs encountered within soil cut slope areas should be collected with a permanent underdrain or the slope could become unstable. Any soil cut slope areas exhibiting significant groundwater seepage may have to be reconfigured at a flatter slope and/or the clay soil over-excavated and replaced with free draining crushed or shot rock to maintain adequate stability. All soil cut slopes should be seeded and mulched as soon as practical after final grading to reduce the occurrence of erosion and minor slips.

5.3 Fill Material Placement & Compaction

Fill material placed for the project can consist of non-organic soil and rock material with a maximum particle size of 4 inches. Soil fill should be placed in maximum 9-inch thick loose lifts. Each lift of fill should be compacted to at least 98 percent of the maximum dry density as determined by the standard Proctor laboratory test (ASTM D698). All fill should be moisture conditioned to within three percentage points of the material's optimum moisture content as determined by the standard Proctor test. A minimum of 3 field moisture/density tests should be performed on each lift of fill placed to verify and document that the required fill density is achieved. We recommend soil fill be restricted to material with a plasticity index not higher than 16 percent. We recommend permanent fill slopes for the project be inclined no steeper than a 2H:1V ratio.

Due to the moderately plastic nature of the clayey soils present at this site, pumping conditions could develop during construction if the soil is subjected to excessive construction traffic and/or if the soil is excessively moist. If pumping conditions should develop, measures such as over-excavation and placement of stabilization fabric and/or a thick layer of rock fill may be necessary to facilitate proper fill compaction and/or slab on grade subgrade preparation.

5.4 Limited Space Backfilling

Limited spaces are defined as areas where backfill operations are restricted to the use of small mechanical compaction equipment. Most deficiencies in compacted backfill around subsurface structures have occurred in limited spaces where required densities are difficult to achieve because of restricted working room and relatively low compaction effort or use of equipment that is too lightweight. All structural backfill, including that placed in limited spaces must be systematically compacted to the project requirements, even if crushed aggregate is placed. Fill placement in limited access areas should have a loose lift thickness limited to 4 to 6 inches. In extremely tight spaces, use of alternate backfill materials such as flowable fill should be considered.

6.0 FOUNDATION RECOMMENDATIONS

6.1 Greenhouse/Aquaponics Building Foundations

Based on our assessment of the subsurface conditions, we do not recommend construction of spread foundation bearing in the existing fill material. As previously discussed, it is apparent that the existing fill was placed in a non-engineered manner. Structures supported on this type of fill are likely to undergo excessive differential settlement to foundations and concrete slabs-on-grade. We believe the best alternative to support the structure is to undercut the existing upper 10 feet of mine soil fill and replace it with engineered fill. After placement of engineered fill, the structure can be constructed using a conventional spread foundation system. Our recommendations for excavation of the upper soils and replacement with engineered fill are outlined below:

- We recommend the existing old mine spoil fill be excavated to a depth of 10 feet below the planned floor slab subgrade elevation. The base of the excavation should extend at least 5.0 feet beyond the exterior perimeter of the building. The sidewalls of the excavation should be sloped not steeper than 1.5H:1V for worker safety.
- We expect most of the excavated soil can be used as engineered fill. Any excavated soil with contains an excessive quantity of organic material, debris and/or oversized rock will have to be hauled offsite and wasted. Any material wasted offsite will have to be replaced with imported fill material which meets the fill requirements outlined in Section 5.3 of this report. It may also be necessary to spread and dry some of the excavated soil to allow for drying. All new engineered fill should be placed within three percent of the material optimum moisture content as established from standard Proctor testing.
- After completion of the excavation to a depth of 10.0 feet, the excavation base should be compacted to the extent possible using a minimum 10-ton sheeps-foot roller. Compaction of the excavation base should be inspected by our engineer. Any isolated areas which are deemed excessively soft should be undercut further as determined by the engineer.
- After compaction of the excavation base and approval by the engineer, the excavation should be backfilled in accordance with the recommendations provided in Section 5.3 of this report.

Upon completion of the backfill placement, the building can be supported using conventional spread foundations bearing on the new backfill. Spread foundations bearing on the engineered backfill can be designed using a maximum allowable bearing pressure of 2,000 psf provided the recommendations herein are followed. All exterior foundations should be constructed at least 30 inches below final exterior grade to provide adequate frost protection. Minimum foundation widths of 2.0 and 3.0 feet are recommended for continuous wall and individual column footings, respectively. Although these dimensions may not fully utilize the recommended bearing pressure, they should be maintained to reduce the potential for local shear or “punching” type failure of the bearing materials.

The soil bearing materials are susceptible to softening if exposed to standing water which could result from precipitation during construction. Therefore, footing concrete should be placed as soon as possible following completion of the footing excavations. Surface runoff should be drained away from the excavations and not be allowed to pond. If possible, all footing concrete should be poured during the same day the footing excavation is made. Any water present in the foundation excavations should be entirely removed prior to concrete placement.

Site grading plans should provide for positive drainage away from the building. The contractor should be directed to conduct grading operations in such a manner as to provide positive drainage during the construction period. All roof drains should be directed away from foundations and positive drainage should be established and maintained to minimize the amount of surface water entering the near surface soils.

6.2 Foundation Settlement Considerations

Foundation settlement was estimated based on the assumption that the recommendations provided in Section 6.1 are followed. Soil compression parameters were estimated based on the bearing soil type, lab test results and our past experience with similar conditions. Based on this information, we estimate a total maximum long term foundation settlement of approximately 1-1/2 inches and maximum differential settlement of about 3/4 inch or less.

The effect of differential settlement which may occur along masonry walls (if any are used) can be reduced by the use of vertical control joints constructed at an aspect ratio of 1.5 or less (aspect ratio is wall section length to height ratio). For example, the maximum vertical control joint spacing for a 12 feet high wall = 12 ft. x 1.5 = 18.0 feet. In addition, vertical control joints should be provided at locations of stress concentrations such as: changes in wall height, changes in wall thickness, near one or both sides of door and window openings, and adjacent to corners of walls or intersections within a distance equal to half the control joint spacing.

6.3 Floor Slabs-on-Grade

As previously discussed in section 6.1 of this report, we recommend the upper 10 feet of existing mine spoil fill be undercut from beneath the floor slab subgrade and replaced with engineered fill. The engineered fill should provide adequate support for the concrete floor slab.

As a minimum, we recommend the upper four inches of slab subgrade consist of free draining crushed stone, such as No. 57 stone to serve as a capillary water barrier and a leveling surface. The use of a vapor barrier between the gravel layer and bottom of the floor slab should be at the discretion of the architect who can evaluate the potential impact of water vapor transmission on floor coverings and interior furnishings. In order to control slab cracking, floor slabs should be jointed as per ACI guidelines and any crack control inclusion such as wire mesh should be permanently supported in its proper position and not pulled up with hook bars during concrete placement.

Often there is some delay between initial grading and the time when the contractor is ready to construct the slab-on-grade. Although the near surface soils may have been thoroughly compacted and passed initial proof-roll testing, exposure to weather, excess moisture and/or construction traffic can destroy the integrity of the subgrade soils. We

recommend that the construction specifications include provisions for the restoration of the subgrade soils to an acceptable condition prior to construction of floor slabs.

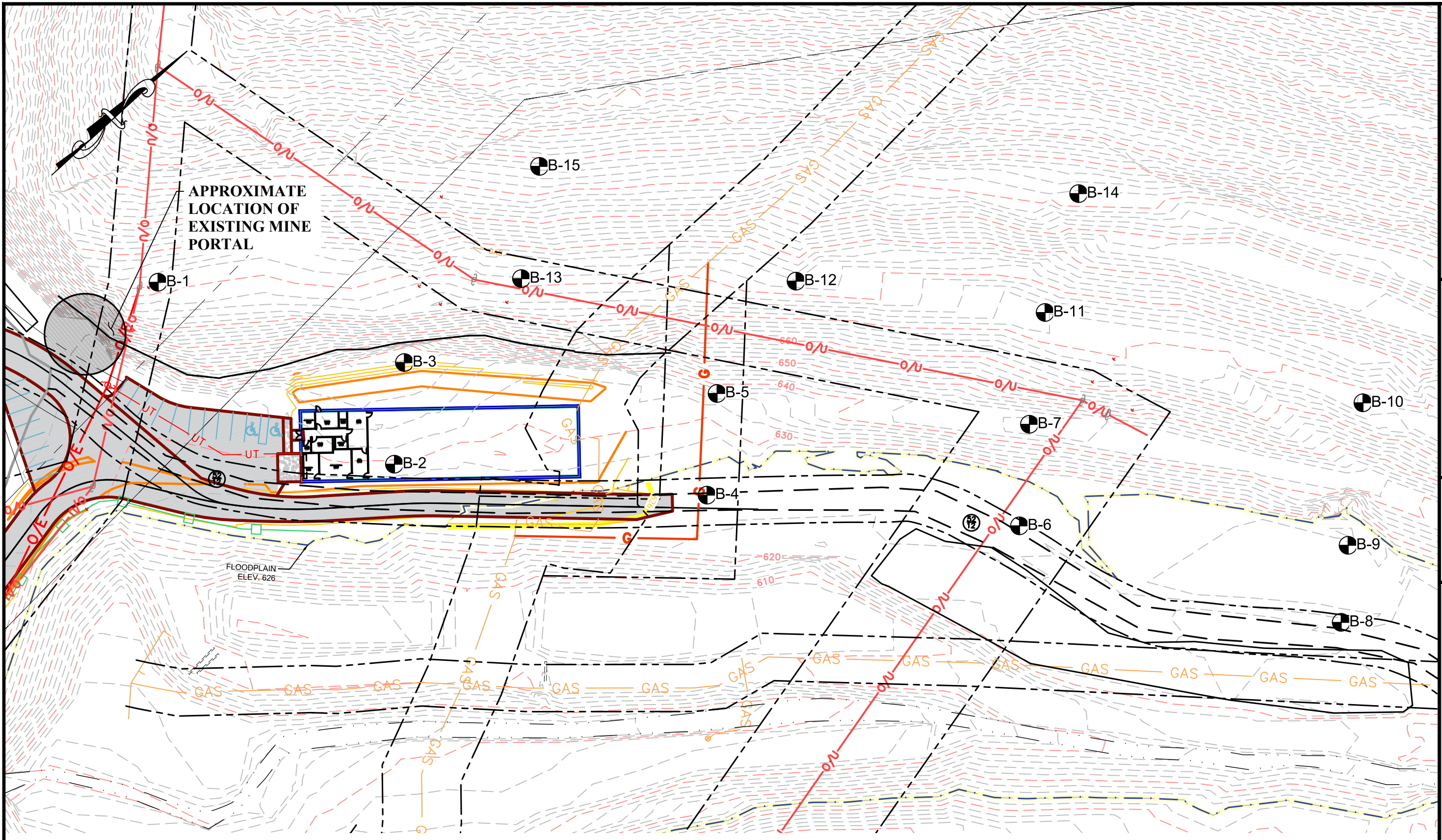
7.0 CONSTRUCTION TESTING

We recommend that a qualified geotechnical firm be retained by the owner to provide a comprehensive construction-testing program to assist the owner in determining that certain aspects of construction are being carried out in conformance with the applicable plans and specifications. This construction testing primarily includes foundation preparation for fill areas, testing of fill materials during placement, inspection of drilled concrete caissons, and testing of construction materials as required by the project's specifications.

8.0 REPORT LIMITATIONS

- This report has been prepared for the exclusive use of project's owner and designers. All recommendations contained in this report have been made in accordance with generally accepted soil and foundation engineering practices in the area and at the time where the services were performed. No other warranties are implied or expressed.
- The scope of this investigation did not include an investigation or study to assess the potential for damage due to possible mine subsidence. The scope of services represented by this report does not include an environmental assessment, or exploration for the presence or absence of wetlands, hazardous, or toxic material at the site.
- The analyses and recommendations submitted in this report are based, in part, upon the data obtained from a limited number of soil test borings. The nature and extent of variations in soil conditions between the borings may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report and provide additional recommendations.
- It is emphasized that the data and recommendations contained in this report are for design information purposes only and may not be sufficient to prepare accurate bids. Any conclusions drawn by contractors regarding subsurface conditions, quantities of unsuitable soils, presence and condition of rock, groundwater or methods and means of construction are at their sole risk.
- It is important that the geotechnical engineer be provided the opportunity to review the final construction plans and specifications to verify that the recommendations in this report are properly interpreted and incorporated in the design.

Figures

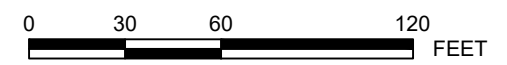


NOTES

1. BORING LOCATION PLAN IS FOR ILLUSTRATIVE PURPOSES ONLY; BORING LOCATIONS ARE APPROXIMATE.
2. SITE PLAN IS BASED ON DRAWING PROVIDED BY THRASHER ENGINEERING.

LEGEND

⊙ B-# APPROXIMATE LOCATION OF BORING



NO.	REVISION

NGE
 Environmental & Geotechnical Engineering Services
 Geotechnical & Environmental Engineering Services
 650 MacCorkle Avenue West
 Salt Lake City, Utah 84119
 (304) 201-5180 FAX 201-5182
 www.ngeconsulting.com

PROJECT: AQUAPONICS PROJECT
 CLIENT: THRASHER ENGINEERING
 SHEET: BORING LOCATION PLAN

Project No.	NA
Drawn:	NLS
Checked:	JEN
Approved:	JEN
Scale:	1" = 60'
Date:	2-23-17
CAD File #	NA

FIGURE No. 1



Project Name: **Aquaponics Project**
Mingo County, West Virginia

Project Number: **W17011**

BORING NO.
B- 1

Elevation	Depth, feet	Sample Type	Symbol / USCS	Location: See Figure 1 Offset:		Recovery %	RQD	Penetration Blows / 6 inches	HCSI	Moisture %	Silt and Clay %	Sand %	Liquid Limit	Plasticity Index
				Surface El.: 682.6 ft.										
				☒ Split Spoon ☒ Shelby Tube ■ Rock Core □ Bag Sample		MATERIAL DESCRIPTION								
				TOPSOIL				2-1-2						
				Brown SILTY to SANDY CLAY with rock fragments, moist, soft to very stiff				2-3-3						
	5			- brown and gray from 5.0 ft.				7-8-12						
	8.0			Gray SHALE , soft, weathered				15-30-20						
	10			- carbonaceous (8.0 - 10.0 ft.)				16-42-42						
	15			- soft to medium hard from 15.0 ft.				50/3"						
	18.0			- silty to sandy from 18.0 ft.		83	17							
	20.5			Gray SANDSTONE medium hard to hard, fine to medium grained		100	76							
	25					100	75							
	27.0			Gray SILTY SHALE , medium hard										
	28.0													
	30			Gray SANDSTONE medium hard to hard, medium to coarse grained, with occasional iron stains		100	100							
	34.0			- diagonal fracture @ 34.0 ft.										
	34.0			- w/occasional carbonaceous laminations from 34.0 ft.										

WV/DOT LOG REPORTS.GPJ NGELOG.GDT 2/23/17

Completion Depth: **60.5 ft.**

Date Boring Started: **1/19/17**

Date Boring Completed: **1/19/17**

Engineer/Geologist: **CEM**

Driller: **NGE**

Remarks: **Boring was noted to be dry during soil augering and sampling**

Depth to Water @ 24 hrs.: ---



Project Name: **Aquaponics Project**
Mingo County, West Virginia

Project Number: **W17011**

BORING NO.
B- 1

Elevation	Depth, feet	Sample Type	Symbol / USCS	Location: See Figure 1 Offset: Surface El.: 682.6 ft.		Recovery %	RQD	Penetration Blows / 6 inches	HCSI	Moisture %	Silt and Clay %	Sand %	Liquid Limit	Plasticity Index
				<input type="checkbox"/> Split Spoon <input type="checkbox"/> Shelby Tube <input type="checkbox"/> Rock Core <input type="checkbox"/> Bag Sample	MATERIAL DESCRIPTION									
645			✓		Gray SANDSTONE medium hard to hard, medium to coarse grained, with occasional iron stains	100	78							
	40		✓		- iron stained (34.5 - 38.0 ft.) - diagonal fracture @ 36.0 ft.									
640			✓			100	90							
	45		✓											
635			✓			100	78							
	50		✓											
	51.8					80	76							
630					VOID									
	53.8													
	55		✓		Gray SANDSTONE medium hard to hard, medium grained, highly fractured									
	55.4					28	0							
					VOID , partially collapsed, with rubble									
625					- base of mine @ 58.8 ft.									
	58.8													
	60		✓		Gray SANDSTONE medium hard medium grained	100	13							
	60.5													
					Bottom of Test Boring @ 60.5 ft.									
620					Piezometer installed @ 60.0 ft. w/10 ft. screen									
	65													
615														
	70													

WV/DOT LOG REPORTS.GPJ NGELOG.GDT 2/23/17

Completion Depth: **60.5 ft.**

Date Boring Started: **1/19/17**

Date Boring Completed: **1/19/17**

Engineer/Geologist: **CEM**

Driller: **NGE**

Remarks: **Boring was noted to be dry during soil augering and sampling**

Depth to Water @ 24 hrs.: ---



Project Name: **Aquaponics Project**
Mingo County, West Virginia

BORING NO.

Project Number: **W17011**

B- 2

Elevation	Depth, feet	Sample Type	Symbol / USCS	Location: See Figure 1 Offset: Surface El.: 629.3 ft.		Recovery %	RQD	Penetration Blows / 6 inches	HCSI	Moisture %	Silt and Clay %	Sand %	Liquid Limit	Plasticity Index
				☒ Split Spoon ☒ Shelby Tube ■ Rock Core □ Bag Sample	MATERIAL DESCRIPTION									
								2-2-2						
625	5					6.0		2-2-2						
								2-2-3		22				
								4-4-5		24			30	11
620	10							2-2-3						
								2-2-3						
615	15							2-2-3						
								2-3-4						
610	20					20.0		3-4-6						
605	25					25.5		15-25-45						
						26.5								
600	30													

WV/DOT LOG REPORTS.GPJ NGELOG.GDT 2/23/17

Completion Depth: 26.5 ft.	Remarks: Boring was noted to be dry during drilling operations and at boring completion
Date Boring Started: 1/17/17	
Date Boring Completed: 1/17/17	
Engineer/Geologist: CEM	
Driller: NGE	
Depth to Water @ 24 hrs.: ---	



Project Name: **Aquaponics Project**
Mingo County, West Virginia

BORING NO.

Project Number: **W17011**

B- 4

Elevation	Depth, feet	Sample Type	Symbol / USCS	Location: See Figure 1 Offset:		Recovery %	RQD	Penetration Blows / 6 inches	HCSI	Moisture %	Silt and Clay %	Sand %	Liquid Limit	Plasticity Index
				Surface El.: 624.4 ft.										
				Split Spoon Shelby Tube Rock Core Bag Sample	MATERIAL DESCRIPTION									
				COAL REFUSE with some clay			2-2-3							
620	5				5.0		5-1-2							
				Brown and gray SANDY CLAY TO CLAYEY SAND with rock and coal fragments, moist, soft to medium stiff			2-1-2							
615	10						2-2-2							
				- FILL -			2-2-1							
610	15						2-2-3							
605	20				20.0		2-2-2							
				Gray SILTY TO CLAYEY SAND with sandstone rock fragments, very moist, very loose			WOH- WOH-3							
600	25													
				- POSSIBLE NATURAL -			1-1-2							
					26.5									
				Bottom of Test Boring @ 26.5 ft.										
595	30													

WV/DOT LOG REPORTS.GPJ NGELOG.GDT 2/23/17

Completion Depth:	26.5 ft.
Date Boring Started:	1/17/17
Date Boring Completed:	1/17/17
Engineer/Geologist:	CEM
Driller:	NGE

Remarks: **Boring was noted to be dry during drilling operations and at boring completion**

Depth to Water @ 24 hrs.: ---



Project Name: **Aquaponics Project**
Mingo County, West Virginia

Project Number: **W17011**

BORING NO.
B- 7

Elevation	Depth, feet	Sample Type	Symbol / USCS	Location: See Figure 1 Offset: Surface El.: 644.3 ft.		Recovery %	RQD	Penetration Blows / 6 inches	HCSI	Moisture %	Silt and Clay %	Sand %	Liquid Limit	Plasticity Index
				MATERIAL DESCRIPTION										
				Brown and gray SANDY CLAY TO CLAYEY SAND with rock and coal fragments, moist, medium stiff to very stiff				2-2-3						
640	5			- black and gray with coal fragments (0.0 - 5.0 ft.)				7-10-11		13				
				- more sandy from 5.0 ft.				7-6-5		18				
				- FILL -				7-8-8		16				
635	10					10.0								
				Gray SILTY SAND with sandstone fragments, damp, dense				10-15-22						
						13.5								
630	15			Gray SANDY SHALE soft to medium hard				15-15-50/6"						
								50/6"						
625	20			- auger refusal @ 22.5 ft.		22.5		50/6"						
620	25			Bottom of Test Boring @ 22.5 ft.										
615	30													

WV/DOT LOG REPORTS.GPJ NGELOG.GDT 2/23/17

Completion Depth:	22.5 ft.
Date Boring Started:	1/20/17
Date Boring Completed:	1/20/17
Engineer/Geologist:	CEM
Driller:	NGE

Remarks: **Boring was noted to be dry during drilling operations and at boring completion**

Depth to Water @ 24 hrs.: ---



Project Name: **Aquaponics Project**
Mingo County, West Virginia

Project Number: **W17011**

BORING NO.
B- 8

Elevation	Depth, feet	Sample Type	Symbol / USCS	Location: See Figure 1 Offset: Surface El.: 623.0 ft.		Recovery %	RQD	Penetration Blows / 6 inches	HCSI	Moisture %	Silt and Clay %	Sand %	Liquid Limit	Plasticity Index
				MATERIAL DESCRIPTION										
				COAL REFUSE with some sandstone boulders				10-25-36						
620								27-36-25						
	5					5.5				21				
				Brown and gray SANDY CLAY TO CLAYEY SAND with rock and coal fragments, moist, soft				2-1-2						
615				- FILL -				2-1-2						
	10					10.0								
				Gray CLAYEY to SILTY SAND wet, very loose to loose				4-2-2						
610								2-1-1						
	15							2-2-4						
605														
	20							2-4-4						
600														
	25					25.0		2-1-2						
				Gray SILTY CLAY , moist, soft		26.5								
595				Bottom of Test Boring @ 26.5 ft.										

WV DOT LOG REPORTS.GPJ NGELOG.GDT 2/23/17

Completion Depth:	26.5 ft.
Date Boring Started:	1/17/17
Date Boring Completed:	1/17/17
Engineer/Geologist:	CEM
Driller:	NGE

Remarks: **Water was noted at a depth of 10.0 ft. during drilling operations and 15.0 ft. at boring completion.**

Depth to Water @ 24 hrs.: ---



Project Name: **Aquaponics Project**
Mingo County, West Virginia

BORING NO.

Project Number: **W17011**

B- 9

Elevation	Depth, feet	Sample Type	Symbol / USCS	Location: See Figure 1 Offset: Surface El.: 623.2 ft.		Recovery %	RQD	Penetration Blows / 6 inches	HCSI	Moisture %	Silt and Clay %	Sand %	Liquid Limit	Plasticity Index
				☒ Split Spoon ☒ Shelby Tube ■ Rock Core □ Bag Sample	MATERIAL DESCRIPTION									
								1-2-2						
620								6-6-8						
	5							4-8-10						
615								6-7-8	19			33	10	
	10							6-8-9						
610								14-21-35						
	15							14-20-50/6"						
605														
	20													
600														
	25													
595														
	30													

Completion Depth: **16.5 ft.**
 Date Boring Started: **1/19/17**
 Date Boring Completed: **1/19/17**
 Engineer/Geologist: **CEM**
 Driller: **NGE**

Remarks: **Boring was noted to be dry during drilling operations and at boring completion**

Depth to Water @ 24 hrs.: ---

WV/DOT LOG REPORTS.GPJ NGELOG.GDT 2/23/17



Project Name: **Aquaponics Project**
Mingo County, West Virginia

BORING NO.

Project Number: **W17011**

B-10

Elevation	Depth, feet	Sample Type	Symbol / USCS	Location: See Figure 1 Offset: Surface El.: 667.8 ft.		Recovery %	RQD	Penetration Blows / 6 inches	HCSI	Moisture %	Silt and Clay %	Sand %	Liquid Limit	Plasticity Index
				☒ Split Spoon ☒ Shelby Tube ■ Rock Core □ Bag Sample	MATERIAL DESCRIPTION									
665	5	☒	☒	Brown SILTY to SANDY CLAY moist, soft to medium stiff - w/sandstone fragments from 2.5 ft. - POSSIBLE COLLUVIUM -	5.0		1-2-2		15					
660	5	☒	☒	Brown SANDSTONE soft, weathered - auger refusal @ 6.5 ft.	6.5		50/5"							
660	6.5			Bottom of Test Boring @ 6.5 ft.										

WV/DOT LOG REPORTS.GPJ NGELOG.GDT 2/23/17

Completion Depth:	6.5 ft.
Date Boring Started:	1/20/17
Date Boring Completed:	1/20/17
Engineer/Geologist:	CEM
Driller:	NGE

Remarks: **Boring was noted to be dry during drilling operations and at boring completion**

Depth to Water @ 24 hrs.: ---



Project Name: **Aquaponics Project**
Mingo County, West Virginia

BORING NO.

Project Number: **W17011**

B-11

Elevation	Depth, feet	Sample Type	Symbol / USCS	Location: See Figure 1 Offset: Surface El.: 672.1 ft.		Recovery %	RQD	Penetration Blows / 6 inches	HCSI	Moisture %	Silt and Clay %	Sand %	Liquid Limit	Plasticity Index
				☒ Split Spoon ☒ Shelby Tube ■ Rock Core □ Bag Sample	MATERIAL DESCRIPTION									
					0.3			2-2-2						
670														
								3-3-4						
	5				5.5					12				
								4-4-5						
665					7.0									
					8.0			50/1"						
	10													
660														
	15													
655														
	20													
650														
	25													
645														
	30													

Completion Depth:	8.0 ft.
Date Boring Started:	1/20/17
Date Boring Completed:	1/20/17
Engineer/Geologist:	CEM
Driller:	NGE

Remarks: **Boring was noted to be dry during drilling operations and at boring completion**

Depth to Water @ 24 hrs.: ---

WVDOT LOG REPORTS.GPJ NGELOG.GDT 2/23/17



Project Name: **Aquaponics Project**
Mingo County, West Virginia

Project Number: **W17011**

BORING NO.
B-12

Elevation	Depth, feet	Sample Type	Symbol / USCS	Location: See Figure 1 Offset: Surface El.: 683.9 ft.	Recovery %	RQD	Penetration Blows / 6 inches	HCSI	Moisture %	Silt and Clay %	Sand %	Liquid Limit	Plasticity Index
				☒ Split Spoon ☒ Shelby Tube ■ Rock Core □ Bag Sample									
				MATERIAL DESCRIPTION									
				TOPSOIL 0.3			2-3-4						
				Brown SANDY CLAY with rock fragments, moist, medium stiff to stiff - large root fragment (2.5 - 4.0 ft.) - COLLUVIUM -			3-4-6		17				
680	5			5.0			4-6-7						
				Brown and gray SILTY CLAY , moist, stiff to hard			12-15-20						
675	10			10.0			50/3"						
				Brown SILTY SHALE medium hard - auger refusal @ 11.0 ft. 11.0									
				Bottom of Test Boring @ 11.0 ft.									
670	15												
665	20												
660	25												
655	30												

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Completion Depth:	11.0 ft.
Date Boring Started:	1/20/17
Date Boring Completed:	1/20/17
Engineer/Geologist:	CEM
Driller:	NGE

Remarks: **Boring was noted to be dry during drilling operations and at boring completion**

Depth to Water @ 24 hrs.: ---



Project Name: **Aquaponics Project**
Mingo County, West Virginia

Project Number: **W17011**

BORING NO.
B-13

Elevation	Depth, feet	Sample Type	Symbol / USCS	Location: See Figure 1 Offset: Surface El.: 681.8 ft.		Recovery %	RQD	Penetration Blows / 6 inches	HCSI	Moisture %	Silt and Clay %	Sand %	Liquid Limit	Plasticity Index
				<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> Split Spoon </div> <div style="text-align: center;"> Shelby Tube </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <div style="text-align: center;"> Rock Core </div> <div style="text-align: center;"> Bag Sample </div> </div>										
MATERIAL DESCRIPTION														
			TOPSOIL	0.2'				2-2-2						
680		X		Brown SANDY CLAY with rock fragments, moist, soft to stiff										
	5		- COLLUVIUM -	5.0				5-6-5						
	5	X		Brown SILTY to SANDY CLAY moist, very stiff				5-7-10						
675		X		Brown SILTY to SANDY CLAY moist, very stiff										
	8.0		■	COAL , soft, highly weathered	8.0			15-25-22						
	8.8		■	COAL , soft, highly weathered	8.8									
	10	X		Gray SILTY SHALE , soft to medium hard				50/6"						
670		X		Gray SILTY SHALE , soft to medium hard										
	13.5			- auger refusal @ 13.5 ft.	13.5			50/3"						
	15			Bottom of Test Boring @ 13.5 ft.										
665														
	20													
660														
	25													
655														
	30													

WV/DOT LOG REPORTS.GPJ NGELOG.GDT 2/23/17

Completion Depth:	13.5 ft.
Date Boring Started:	1/20/17
Date Boring Completed:	1/20/17
Engineer/Geologist:	CEM
Driller:	NGE

Remarks: **Boring was noted to be dry during drilling operations and at boring completion**

Depth to Water @ 24 hrs.: ---



Project Name: **Aquaponics Project**
Mingo County, West Virginia

Project Number: **W17011**

BORING NO.
B-14

Elevation	Depth, feet	Sample Type	Symbol / USCS	Location: See Figure 1 Offset: Surface El.: 711.2 ft.		Recovery %	RQD	Penetration Blows / 6 inches	HCSI	Moisture %	Silt and Clay %	Sand %	Liquid Limit	Plasticity Index
				☒ Split Spoon ☒ Shelby Tube ■ Rock Core □ Bag Sample	MATERIAL DESCRIPTION									
710				TOPSOIL	0.3			4-5-6						
				Brown SANDY CLAY with rock fragments, moist, stiff										
				- COLLUVIUM -				6-6-7		17				
	5				5.0									
705				Brown SILTY to SANDY CLAY moist, stiff to very stiff				10-15-15						
				- clayey silt (7.5 - 9.0 ft.)										
								4-6-6		17		44	15	
	10			Gray SILTY SHALE hard	10.0			50/1"						
700				- auger refusal @ 11.5 ft.	11.5									
				Bottom of Test Boring @ 11.5 ft.										
	15													
695														
	20													
690														
	25													
685														
	30													

WV/DOT LOG REPORTS.GPJ NGELOG.GDT 2/23/17

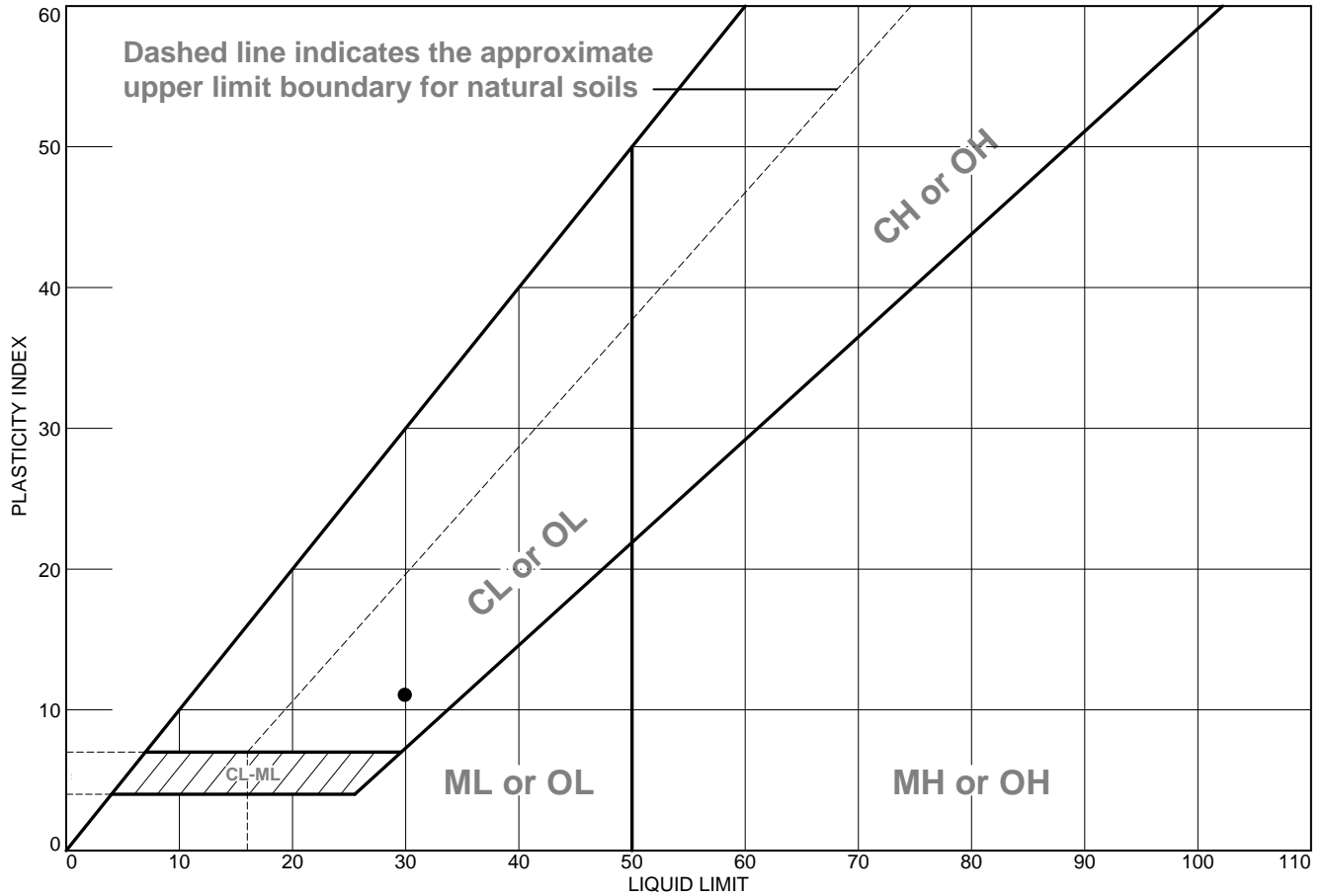
Completion Depth:	11.5 ft.
Date Boring Started:	1/20/17
Date Boring Completed:	1/20/17
Engineer/Geologist:	CEM
Driller:	NGE

Remarks: **Boring was noted to be dry during drilling operations and at boring completion**

Depth to Water @ 24 hrs.: ---

Appendix A

LIQUID AND PLASTIC LIMITS TEST REPORT



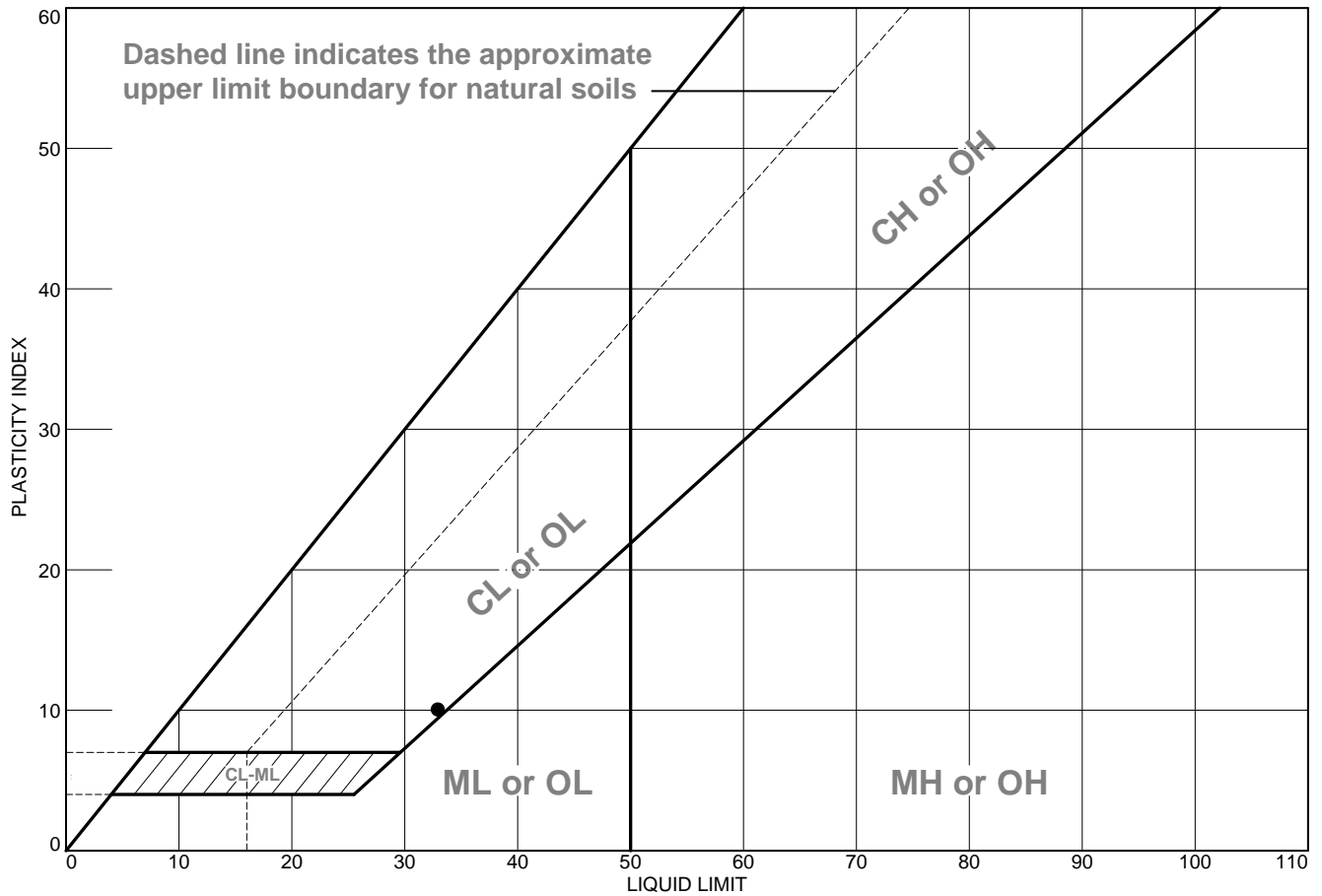
	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown SANDY CLAY	30	19	11			

<p>Project No. W17011 Client: Thrasher</p> <p>Project: Aquaponics Project</p> <p>● Source of Sample: B-2 Depth: 7.5 - 9.0 ft. Sample Number: S-4</p>	<p>Remarks:</p>
<p>NGE, LLC</p> <p>St. Albans, West Virginia</p>	

Figure

Tested By: CTD **Checked By:** NLS

LIQUID AND PLASTIC LIMITS TEST REPORT



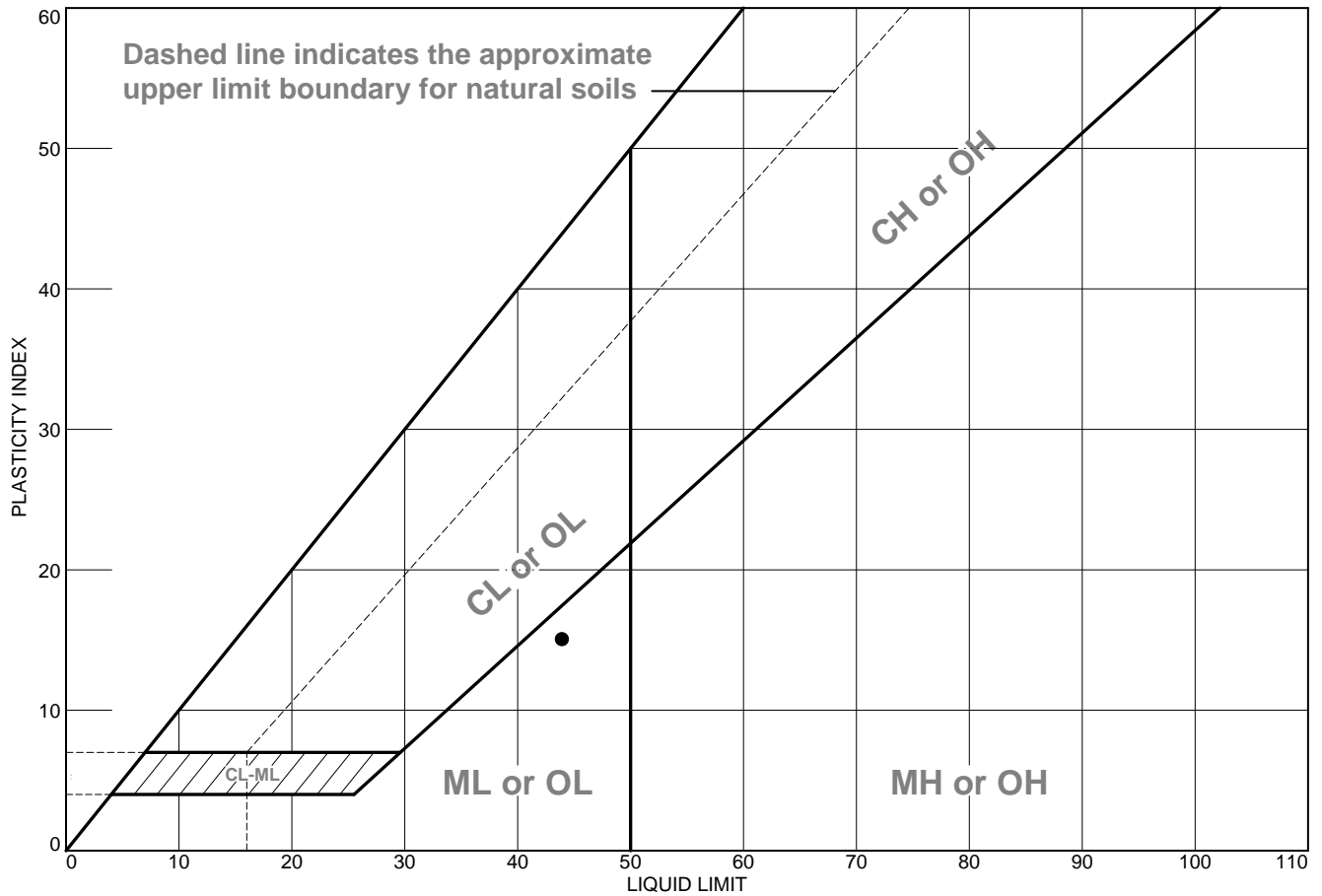
	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown SANDY CLAY	33	23	10			

<p>Project No. W17011 Client: Thrasher</p> <p>Project: Aquaponics Project</p> <p>● Source of Sample: B-9 Depth: 7.5 - 9.0 ft. Sample Number: S-4</p>	<p>Remarks:</p>
<p>NGE, LLC</p> <p>St. Albans, West Virginia</p>	

Figure

Tested By: CTD **Checked By:** NLS

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown CLAYEY SILT	44	29	15			

<p>Project No. W17011 Client: Thrasher</p> <p>Project: Aquaponics Project</p> <p>● Source of Sample: B-14 Depth: 7.5 - 9.0 ft. Sample Number: S-4</p>	<p>Remarks:</p>
<p>NGE, LLC</p> <p>St. Albans, West Virginia</p>	

Figure

Tested By: CTD **Checked By:** NLS