**ADDENDUM NO. 1**

March 05, 2012

The Cottage at Thornapple
2580 Nashville Road
Hastings, MI 49058

**Owner:**
Barry County / Thornapple Manor
2700 Nashville Road
Hastings, MI 49058

**Architect:**
Eckert Wordell, L.L.C.
161 E. Michigan Avenue, Suite 200
Kalamazoo, MI 49007

**Construction Manager:**
CM Contracting
310 Custer Drive
Battle Creek, MI 49017

Project No. 2011-11-021

Contents



DISTRIBUTION TO: Bidders, Owner, Construction Manager, Architect, Civil Engineer, Structural Engineer, Mechanical Engineer, Electrical Engineer and Food Service Consultant.

The Contract Documents shall be amended and/or revised by Addendum hereinafter specified and all Work affected by Addendum shall be included.

Except as may be otherwise described, labor and material for the Work hereinafter specified shall conform to all requirements of the Original Contract Documents.

**GENERAL ITEMS**

ADM1-G1 PRE-BID MEETING SIGN-IN

1. Sign-in sheet included as attachment.

ADM1-G2 EXISTING BUILDING LOWER LEVEL SKETCH

1. REFER to existing building lower level sketch included as attachment. Drawing should be used for reference only. Contractor responsible for field verifying existing conditions and new conduit routing.

**SPECIFICATIONS**

ADM1-SP1 SECTION 00 0100 TABLE OF CONTENTS

1. ADD - 00 8000 GEOTECHNICAL REPORT
2. ADD - 08 5213 ALUMINUM-CLAD WOOD CASEMENT WINDOWS

ADM1-SP2 SECTION 00 3000 TRADE PACKAGES SCOPE OF WORK

1. REFER to Trade Package 06B. REMOVE the following:

   08 1113 Steel Doors and Frames
   08 1416 Flush Wood Doors
   08 7100 Door Hardware (Aluminum Door Hardware is in Trade Package 8B)
   10 2800 Toilet and Bath Accessories

   End of Trade Package 06B – Lumber and Siding Package

ADM1-SP3 SECTION 00 4000 BID FORM, STIPULATED SUM

1. DELETE the words "Tuesday, March 13, 2012 at 2:00 p.m. EDT" and INSERT in their place:

   "*Wednesday, March 21, 2012 at 2:00 p.m. EDT*."

ADM1-SP4 SECTION 00 8000 GEOTECHNICAL REPORT

1. ADD section in its entirety.

ADM1-SP5 SECTION 01 2900 PAYMENT PROCEDURES

1. REFER to Paragraph 1.2.A. REVISE the following:

   2. Submit the schedule of values to ~~Architect~~ *Construction Manager* at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

2. REFER to Paragraph 1.3. REVISE the following:

B. Payment Application Times: Submit *pencil copies of the* Application for Payment to ~~Architect~~ *Construction Manager* by the ~~25th~~ *18th* of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

ADM1-SP6 SECTION 01 3100 PROJECT MANAGEMENT AND COORDINATION

1. REFER to Paragraph 1.6.A. REVISE the following:

1. ~~Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.~~ *RFIs shall originate with Construction Manager. RFIs submitted by entities other than Construction Manager will be returned with no response.*

ADM1-SP7 SECTION 06 1753 SHOP-FABRICATED WOOD TRUSSES

1. REFER to Paragraph 1.5. ELIMINATE in its entirety:

~~E. Forest Certification: Provide metal-plate-connected wood trusses produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."~~

ADM1-SP8 SECTION 07 2413 POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM

1. REFER to Paragraph 3.1. REVISE the following:

F. Waterproof Adhesive/Base Coat: To exposed surfaces of ~~insulation~~ *gypsum substrate*, apply in minimum thickness recommended in writing by DEFS manufacturer over where ~~indicated on Drawings~~ *over sloped surfaces and other areas as recommended by manufacturer*.

2. REFER to Paragraph 3.2. REVISE the following:

A. Special Inspections: ~~Owner will engage~~ *Engage* a qualified special inspector to perform the following special inspections:

B. Testing Agency: ~~Owner will engage~~ *Engage* a qualified testing agency to perform tests and inspections.

ADM1-SP9 SECTION 08 2100 HIGH IMPACT RESISTANT WOOD DOORS

1. REFER to Paragraph 2.1. REVISE and ADD the following:

A. ~~Subject to compliance with all requirements, provide products by Construction Specialties, Inc. Acrovyn Door Systems. No substitutions~~. *Basis-of-Design Product: Subject to compliance with requirements, provide Construction Specialties, Inc. Acrovyn Door Systems or comparable product by one of the following:*

*1. Inpro Corporation*

ADM1-SP10 SECTION 08 5213 ALUMINUM-CLAD WOOD CASEMENT WINDOWS

1. ADD section in its entirety.

ADM1-SP11 SECTION 08 7100 DOOR HARDWARE

1. REFER to Paragraph 2.11.B.1. ADD the following:

   *c. Record-USA*

ADM1-SP12 SECTION 23 3423 POWER VENTILATORS

1. REFER to Paragraph 2.1.B. ADD the following:

   *5. S & P*

ADM1-SP13 SECTION 23 3600 TERMINAL UNITS

1. REFER to Paragraph 2.1.A.1. ADD the following:

   *h. Sigma*
   *i. Modine*

2. REFER to Paragraph 2.1.A.2. ADD the following:

   *d. Sigma*
   *e. Modine*
   *f. Sterling*

3. REFER to Paragraph 2.1.A.3. ADD the following:

   *h. Sigma*
   *i. Modine*

ADM1-SP14 SECTION 23 3616 VAV BOXES

1. REFER to Paragraph 2.1.A. ADD the following:

   *5. Nailor*
   *6. Krueger*

ADM1-SP15 SECTION 23 3713 AIR OUTLETS AND INLETS

1. REFER to Paragraph 2.1.B. ADD the following:

   *6. Nailor*

2. REFER to Paragraph 2.4.D. ADD the following:

   *e. Nailor*
   *f. Pottorff*

ADM1-SP16 SECTION 23 5100 BREECHINGS, CHIMNEYS AND STACKS

1. REFER to Paragraph 2.2.D. ADD the following:

   *5. VanPacker*

ADM1-SP17 SECTION 23 6423 AIR COOLED SCROLL WATER CHILLERS

1. REFER to Paragraph 1.3.A. ADD the following:

   *d. Carrier*

ADM1-SP18 SECTION 23 7313 CENTRAL STATION AIR HANDLING UNITS

1. REFER to Paragraph 2.1.A. ADD the following:

   *4. Carrier*

ADM1-SP19 SECTION 23 8126 SPLIT-SYSTEM AIR-CONDITIONING UNITS

1. REFER to Paragraph 2.1.A. ADD the following:

   *6. Carrier*

ADM1-SP20 SECTION 32 1313 CONCRETE PAVING

1. REFER to Paragraph 2.2. REVISE the following:

   F. Color Pigment: ~~none~~. *(for patios east and west of building only): ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.*

   *G. Color: As selected by Architect from manufacturer's full range.*

ADM1-SP21 SECTION 32 3113 FENCES

1. REFER to Paragraph 1.04. REVISE the following:

   D. Shop Drawings showing ~~fence design~~ *fence and dumpster screening and layout.*

2. REFER to Paragraph 2.01.B. REVISE the following:

   2. Style Name ~~Monarch~~ *Countess with Midrail*
   3. Color Match Bufftech ~~white~~ *Almond*
   *4. Gate hardware and latch by others*

3. REFER to Paragraph 2.04. REVISE the following:

   C. Latch: ~~Manufacturers' standard self-latching, glass-filled nylon and stainless steel composition single or dual-access gravity latch. Provide one latch per gate~~. *Provided by others.*

ADM1-SP22 SECTION 33 2100 SANITARY LIFT STATION SYSTEM

1. REFER to Paragraph 2.1.A. REVISE the following:

   1. Diameter: ~~72~~ *48* inches (1800 mm) minimum, unless otherwise indicated.
   *9. Pour a concrete fillet in the bottom of wetwell to keep solids moving toward pumps in center.*

2. REFER to Paragraph 2.4.A.1. REVISE the following:

   d. Wilo, MTS ~~40-143~~ *40E/95 2 Hp, 3450 RPM* grinder pumps.

**DRAWINGS**

**CIVIL**

ADM1-C1 REFER TO SHEET C200

1. ADD note – Guardrail at new parking spaces west of the existing Thornapple Manor building shown as demolished to be salvaged and re-used at newly created parking spaces.

ADM1-C2 REFER TO SHEET C201

1. ADD note at east and west patios - Pour colored concrete patio and fence with PVC fence per specifications.

2. ADD note at new parking spaces west of the existing Thornapple Manor building – Reinstall salvaged guardrail between retaining wall and parking. Replace posts, rail, or connections as necessary.

ADM1-C3 REFER TO SHEET C203

1. REVISE noted scale. Drawing scale is 1” = 40’-0”.

ADM1-C4 REFER TO SHEET C204

1. REVISE note on Duplex Pump Station Detail to read: 4’ WET WELL I.D.

2. REVISE note on Duplex Pump Station Detail to read: INSTALL 2 – WILO, MTS 40E/95, 2 HP, 3450 RPM, 3 PHASE PUMPS.

3. REVISE notes on Dumpster Pad & Screen Detail to read: PVC SCREENING FENCE TO MATCH STYLE AND COLOR OF PATIO FENCES. SEE SPECIFICATIONS.

**ARCHITECTURAL**

ADM1-A1 REFER TO SHEET A900

1. REVISE CC-1 to be Maharam Sentiment 511430-001 Beach.

ADM1-A2 REFER TO SHEET A920

1. Hardware set #26 is to be used at the gates that are part of the exterior fenced in areas at either end of the building.

**ELECTRICAL**

ADM1-E1 REFER TO SHEETS E100, E400 AND E500

1. ADD breaker, conduit and wire to lift station located across drive near utility transformer. Provide 25A, 3P, CB in panel EM4 and run wiring underground to factory control panel at lift station. Coordinate with Civil contractor. Refer attached sketches ESK-01, ESK-02 and ESK-03.

ADM1-E2 REFER TO RE-ISSUED SHEET E100

1. RE-ISSUE sheet with corrected 1" = 30'-0" scale.

ADM1-E3 REFER TO SHEET E111

2. REFER to Fire Alarm Note. ADD the following - Existing facility has 118 rooms each with an attached restroom (98 private (single-bed) and 20 semi-private (two-bed) rooms). Contractor is responsible to obtain all approvals necessary including Bureau of Fire Services.

3. ADD note – 6" U.G. conduit for fiber to transition to 4" EMT conduit inside existing building and continue to existing IT room.

END OF ADDENDUM NO. 1

CMC
Beyond the Building

# CM CONTRACTING, INC.

*Meeting Sign-In Sheet*

**Project:** The Cottage at Thornapple

**Date:** Feb. 29, 2012

| NAME | COMPANY | PHONE | FAX |
|---|---|---|---|
| Don Drennan | Mall City Mech | (616) 453-5483 | 453-7111 |
| Brad Bender | CBH Building + Development | 616-827-9415 | 616 827-2958 |
| Tom Starck | Leavitt and Starck Excavating Inc | 517-202-5068 | 517-338-0767 |
| Ken Feller | Union Electric | 269 962-7583 | 269-962 5520 |
| TOM MARTIN | ALARMTEC of Michigan | 616-754-8050 | 616-754-8050 |
| Seth Nelson | Buist Electric | 616-583-5228 | 616-878-0872 |
| Al Jeurink email: ajeurink@burgessconcrete.com p (616) 877-0008 f (616) 877-0073 | Burgess Concrete | | |
| CAROLE HARROLD | B.L. HARROLD | 269.345.8657 | 269.345.8684 |
| Stephen Foster | Jackson Automatic Sprinkler | 517 750-3136 | 517 750-3191 |
| Denny Moline | Control Resource | 616-784-4040 | 616-785-7900 |
| Mike Sweeney | Hurst Mechanical | 616-784-4040 | 616-785-7900 |
| Mitch Bareman | EPS Security | 616-459-0281 | |
| Justin Meberley | RW Collins | 269-388-2045 | 269-388-4523 |
| Wayne Schease | GreenScape Services | 968 4977 | 968-0424 |
| Scott CARR | QUALITY ASPHALT PAVING | 574-971-7488 | 517 568 5894 |
| JOE HALLIGAN | HALLIGAN PAINTING INC. | 616-791-4717 813-7961 | 616-791-0859 |
| Greg Sears | J & L Electric Inc. | 269-962-0774 | 866-454-2490 |

# CM CONTRACTING, INC.

*Meeting Sign-In Sheet*

Beyond the Building

**Project:** The Cottage at Thornapple

**Date:** Feb. 29, 2012

| NAME | COMPANY | PHONE | FAX |
|---|---|---|---|
| Les Amon | INS Group | 248-789-5631 | 586-757-9038 |
| Chad Labadie | Hi-Tech Electric Co | 269 323-1111 | 269 323-7956 |
| Kevin O'Dell | Allied Electric Inc | 616-791-1164 | 616-791-9361 |
| Dean Bissell | Painting | 616 667-108 | 616 667-1080 |
| Joe Park | Q3 Technologies | 269 388-6330 | 269-324-6579 |
| Jake Welch | Kentwood Exc | (616) 949-5250 | -5497 |
| Aaron Tobias | Century Construction | 517-712-6042 | 517-999-8201 |
| Dendel Craven | Choice Concrete | 616-723-5012 | 616-452-5424 |
| Gordie McCall | Standard Lumber | 269-818-7045 | |
| Joe Akers | Chelsea Lumber Co | 734-475-9126 | 734-475-3658 |
| Herb Rathes | Flooring America Carpet Studio | 517-351-6310 | 517-351-1579 |
| Greg Finnila | Michigan Paving + Materials | 269 343 4659 | 269 343 8980 |
| Craig Wyman | CM Contracting | 269 420-5136 | |
| Mark Hires | CM Contracting Inc | 269-660-9294x123 | 269-660-9467 |
| | | | |
| | | | |
| | | | |
| | | | |

# CM CONTRACTING, INC.

*Meeting Sign-In Sheet*

**Project:** The Cottage at Thornapple

**Date:** Feb. 29, 2012

| NAME | COMPANY | PHONE | FAX |
|---|---|---|---|
| MATT HILL | SIMPLEX GRINNEL | 616 498 1257 | |
| TIM MACLEOD | | | |
| Dave Taylor | Moss | 616-451-9933 | 616-451-8187 |
| Jim Arndt | Maxwell & Associates | 269-381-1162 | 269-381-2986 |
| Dan Yoder | Brigade Fire Prot. | 616-784-1644 | 616-784-1140 |
| David Evans | LT Trumble Builders LLC | 517 203 6556 | 517 664 9424 |
| Chris Moran | Pella Windows & Doors by Horne | 616-456-1776 | 616-234-1970 |
| SCOTT AHMARMALI | ET MACKENZIE | 517-627-8408 | 517-627-4470 |
| Gayle Smith-Rinker | B.L. Harroun & Son | 269-345-8657 | 269-345-8684 |
| BRAD TRUMAN | TRUMAN TOWER | 616-877-0944 | 616-877-0950 |
| Don Cermia | DeVos Insulation | 1-616-292-3972 | 616-877-4113 |
| Brian Westmaas | Welch Tile & marble | 1-616-862-4189 | 269 488-8203 |
| Jim Hayden | R&B Electric Inc. | 1-269-963-2665 | 269-963-3885 |
| Scott Grove | Driesenga & Associates | 269.599.1464 | |
| MIKE BEEMAN | CENTRAL CEILING WEST | 616 878 6700 | 616 878 7010 |
| Mark Cochran | Esper Electric | 269-806-9236 | 269-~~342-2190~~ 342 |
| Scott Robertson | Associated Construction | 269 9683391 | 9683388 |
| Mike Slachter | K-S Excavating | 616-437-3333 | 616-891-2448 |

# CM CONTRACTING, INC.

*Meeting Sign-In Sheet*

Beyond the Building

**Project:** The Cottage at Thornapple

**Date:** Feb. 29, 2012

| NAME | COMPANY | PHONE | FAX |
|---|---|---|---|
| BRIAN KOEMPEN | GREAT LAKES EXC | 616 437-9277 | 616 896-9421 |
| JAMES WEGLER | CONSOLIDATED ELECTRIC | 616 430-8683 | 517-484-4421 |
| JENNIFER WYATT | ECKERT WORDELL | 269-388-7313 | 269-388-7330 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Information To Build On
Engineering • Consulting • Testing

August 29, 2011

Mr. Donald Haney
Controller
Thornapple Manor
2700 Nashville Road
Hastings, MI 49058

**RE: Geotechnical Exploration and Engineering Report**
Proposed Cottages at Thornapple Manor
2580 Nashville Road
Hastings, MI 49058
PSI Project No. 0525-379

Dear Mr. Haney:

In compliance with your instructions, Professional Service Industries, Inc. (PSI) has developed a geotechnical engineering report for the referenced project. The results of this exploration, together with our recommendations, are presented in the accompanying report, a copy of which is being transmitted herewith.

After plans and specifications are complete, PSI should review the final design and specifications in order to verify that the earthwork and foundation recommendations are properly interpreted and implemented. **It is considered imperative that the geotechnical engineer and/or its representative be present during earthwork operations and foundation installations to observe the field conditions with respect to the design assumptions and specifications. PSI will not be responsible for interpretations and field quality control observations made by others.**

PSI appreciates the opportunity to provide geotechnical engineering and consulting services for your project and looks forward to working with you again. PSI provides additional consulting services, which include construction materials testing and observation services, environmental services, roof consulting and observation services, pavement and asphalt testing services and specialty engineering and testing. If you have any questions regarding this report, or if we may be of further service, please feel free to contact this office at your convenience.

Respectfully,

**PROFESSIONAL SERVICE INDUSTRIES, INC.**

| | | |
|---|---|---|
| Edward S. Rahe, E.I.T. | Randal H. Pail, P.E. | Mark J. Carlson, P.E. |
| Staff Engineer | Principal Consultant | Chief Engineer |

ESR/RHP/MJC/mas

# GEOTECHNICAL EXPLORATION
# AND ENGINEERING REPORT

**FOR THE:**

**PROPOSED COTTAGES AT THORNAPPLE MANOR**
**2580 NASHVILLE ROAD**
**HASTINGS, BARRY COUNTY, MICHIGAN**

**PREPARED FOR:**

**THORNAPPLE MANOR**
**2700 NASHVILLE ROAD**
**HASTINGS, MICHIGAN 49058**

**PREPARED BY:**

**PROFESSIONAL SERVICE INDUSTRIES, INC.**
**3120 SOVEREIGN DRIVE, SUITE C**
**LANSING, MICHIGAN 48911**

**AUGUST 29, 2011**

**PSI PROJECT NO. 0525379**

## TABLE OF CONTENTS

# GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT
# PROPOSED COTTAGES AT THORNAPPLE MANOR
# 2580 NASHVILLE ROAD, HASTINGS, MICHIGAN

## PROJECT INFORMATION

### Project Authorization

This report presents the results of our geotechnical engineering exploration performed relative to the proposed construction of a new single-story building and appurtenant paved automobile parking and access drives to be located at 2580 Nashville Road in Hastings, Barry County, Michigan. This exploration was performed for Thornapple Manor.

The services for this project were performed in accordance to the Proposal titled, *Proposal for Geotechnical Exploration, Proposed Thornapple Manor Cottage, Hastings, Michigan, PSI Proposal No. 052550110*, dated July 29, 2011. The Proposal included a proposed Scope-of-Services, fees, time schedule, and PSI's General Conditions. Authorization to perform this exploration and analysis was in the form of an acceptance of PSI's Proposal signed on July 29, 2011 by Mr. Donald Haney of Thornapple Manor. Due to site access (i.e., large trees blocking access to Borings B-2 and B-3), PSI was authorized to re-mobilize to the project site in the form of an acceptance of PSI's Confirmation of Contract Change (Change Order No.: CO-0525379-1) signed on August 16, 2011 by Mr. Donald Haney of Thornapple Manor.

### Project Description

A drawing was provided to PSI by Eckert Wordell, LLC titled, *Boring Locations, Thornapple Manor Cottage* drawn by Eckert Wordell, LLC, dated July 5, 2011. PSI understands that it is envisioned to construct a new assisted living facility at 2580 Nashville Road in Hastings, Barry County, Michigan. The proposed site is located approximately 500 feet west of the existing Thornapple Manor assisted living facility and approximately 400 feet south of Nashville Road. We understand that it is planned to construct a new, single-story, slab-on-grade structure with either wood-frame or cold-rolled steel bearing wall/truss construction (with no basement level). The proposed building will encompass approximately 84 feet by 200 feet and total approximately 16,800 square feet in plan area. It is reported that cut/fill sections of less than about two (2) feet are expected in order to develop the finished grade elevations in the building and pavement areas. Paved drives are planned in order to access the site via Nashville Road to the north and via an unnamed drive to the east (extending toward the existing Thornapple Manor assisted living facility). A drive will surround the building with paved automobile parking planned on the north and south sides of the proposed Cottages at Thornapple Manor building. According to Eckert Wordell personnel, wall and column loads are planned to be on the order of 1.8 kips per lineal foot and 25 kips, respectively.

If any of the information noted above is incorrect or has changed, PSI must be informed immediately so that the recommendations may be reviewed and revised as necessary at an additional cost to the client.

The geotechnical engineering recommendations presented in this report are based on the available project information, and the results of our geotechnical exploration. If any of the noted information is considered incorrect or is changed, please inform PSI in writing so that we may amend the recommendations presented in this report if appropriate and if desired by the client. PSI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project. Once the structure design has been finalized, additional subsurface investigation will be necessary.

**Purpose and Scope of Services**

The purpose of this exploration was to evaluate the subsurface conditions at the site and to develop geotechnical design criteria for support of foundations and pavements for the planned project. The scope of the exploration and analysis included a reconnaissance of the project site, completion of five (5) soil borings, field and laboratory testing of recovered samples, and an engineering analysis and evaluation of the subsurface materials encountered.

The geotechnical scope of services did not include an environmental assessment for determining the presence or absence of wetlands, hazardous or toxic materials in the soil, bedrock, surface water, groundwater or air on, below or around this site. Any statement in this preliminary report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes. Prior to the development of any site, an environmental assessment is advisable.

PSI did not provide any service to investigate or detect the presence of moisture, mold or other biological contaminates in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence of the amplification of the same. Thornapple Manor acknowledges that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. Thornapple Manor further acknowledges that site conditions are outside of PSI's control, and that mold amplification will likely occur, or continue to occur, in the presence of moisture. As such, PSI cannot and shall not be held responsible for the occurrence or recurrence of mold amplification.

PSI also provides an array of complementary environmental and industrial hygiene services to assist our clients in successfully assessing and developing properties such as the one referenced in this report. PSI's environmental consultants apply their experience, local geologic knowledge and thorough understanding of ASTM standards, environmental risk, and regulatory knowledge to conduct due diligence assessments of a wide range of property types and proposed developments.

If requested by you, we would be pleased to provide your team with a proposal for this and other services regularly provided by PSI. Our familiarity with the site from the Geotechnical scope of work will enable our environmental professionals to proceed quickly in preparing a cost effective and pragmatic Phase I ESA.

## SITE AND SUBSURFACE CONDITIONS

### Site Location and Description

The project site is located at 2580 Nashville Road in Hastings, Barry County, Michigan. The assisted living facility will encompass approximately 16,800 square feet in plan area. The site of the proposed development currently consists of wooded cover over much of the building location with brush and weeds covering the remainder of the site. Access to the site was from Nashville Road located to the north of the subject property.

The surface of the site is relatively flat and level. Site clearing was necessary to access Borings B-2 and B-3 and (after clearing), the surface was somewhat soft and difficulty was experienced in accessing these Borings.

### Field Exploration and Laboratory Testing

The site subsurface conditions were determined by completion of five (5) soil test borings advanced to terminal depths of approximately ten (10) to twenty-five (25) feet below the existing grade. The boring locations and depths were established by Eckert Wordell, LLC and provided to PSI on a drawing titled, *Boring Locations, Thornapple Manor Cottage* drawn by Eckert Wordell, LLC, dated July 5, 2011. PSI located the borings in the field utilizing conventional measuring techniques, based on site references. The approximate boring locations are depicted on the Boring Location Diagram included in the Appendix. Ground surface elevation at the boring locations was not provided to PSI nor was it included in the agreed Scope-of-Services. Prior to design and construction, it is recommended that a registered surveyor determine the exaction location and elevation of the borings and provide the information to PSI for review.

The Borings were completed by means of a CME-55 truck-mounted drilling rig equipped with a rotary head utilizing 3-1/4 inch, hollow-stem augers to advance the boreholes. Relatively representative samples were recovered employing split-barrel sampling procedures in general accordance with "Penetration Test and Split-Barrel Sampling of Soils" (ASTM D1586). After completion of each Boring, drill holes were backfilled with the excavated soils.

Free groundwater level measurements were recorded in each Boring during and after completion of the drilling operations. Groundwater levels encountered are noted on the Boring Logs which are presented in the Appendix. Seasonal variations may influence the depths to the groundwater, and groundwater quantities and flow volumes will largely depend on the permeability of the soil profile.

In addition to the field exploration, a laboratory-testing program was conducted to evaluate engineering characteristics of the subsurface materials. The laboratory-testing program included visual classification of the recovered samples. Phases of the laboratory-testing program were conducted in general accordance with applicable ASTM specifications. The results of these tests are located on the Boring Logs, and are included in the Appendix. Additionally, pH tests were performed on select samples and the results can be found in the following Table:

| pH Test Results | | |
|---|---|---|
| **Boring No.** | **Approximate Depth Range (feet)** | **pH Results** |
| B-1 | 1 to 2½ | 5 |
| B-2 | 3½ to 5 | 6 |
| B-3 | 1 to 2½ | 5 |
| B-4 | 3½ to 5 | 6 |
| B-5 | 1 to 2½ | 4 |

**Subsurface Conditions**

At the time of our field exploration, the near ground surface (at the boring locations) was covered with about seven (7) to sixteen (16) inches of topsoil. It should be expected that the thickness of the surface organic/topsoil layer will vary between boring locations. The topsoil was underlain by thick sand strata with a clayey sand deposit noted within the upper five (5) feet at Borings B-1, B-4 and B-5. Apparent cobbles were noted at several boring locations, generally below a depth of about ten (10) feet.

The relative density of the sand layers ranged from loose to dense with N-values ranging from about 4 to 71 blows per foot of penetration. Larger N-values may be attributable to gravel and cobbles encountered during the split-spoon sampling.

The stratification shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratification represents the approximate boundary between subsurface materials; however, the actual transition may be gradual. Water level information obtained during the field operations is also shown on the boring logs. The boring logs were prepared on the basis of the laboratory testing and supplemental visual engineering classification, as well as the field logs of the soil conditions encountered. In the absence of foreign substances, it is difficult to distinguish between native soils and clean fill soil.

**Groundwater Information**

Groundwater was only encountered during drilling operations in Borings B-2, B-3 and B-4 at depths ranging from about eighteen-and-a-half (18½) to twenty (20) feet below site grades. The remaining shallow Borings did not encounter groundwater during drilling operations within the terminal depth of about ten (10) feet.

The groundwater observation presented in this report represents conditions at the time of the field activities. Groundwater levels on this site are likely to vary as a result of seasonal conditions, and fluctuations should be anticipated. It is recommended that the contractor determine the actual groundwater levels at the time of the construction to evaluate groundwater impact on construction procedures.

## EVALUATION AND RECOMMENDATIONS

The following geotechnical related recommendations have been developed on the basis of the subsurface conditions encountered and PSI's understanding of the proposed development. Should changes in the project criteria occur, a review must be made by PSI to determine if modifications to our recommendations will be required.

### Site Preparation

Topsoil can undergo high and variable volume changes when subjected to loads, resulting in detrimental performance of pavements, floor slabs, structural fills and shallow foundations placed on it. It is recommended that all topsoil be stripped from the construction areas and wasted or stockpiled for later use in non-settlement sensitive areas. The approximate topsoil stripping depths at the subject site is expected to be on the order of seven (7) inches to sixteen (16) inches in order to encounter suitable, native soils. The thickness of these materials will likely vary throughout the site and other, possibly more extensive, deposits could be encountered during the site work activities. The exact depth of removal of these soils should be determined by PSI during the stripping activities.

Considering that construction has occurred nearby the site with the construction of the existing Thornapple Manor assisted care facility located to the east of the proposed site, it is possible that areas of fill and/or buried topsoil deposits that were not identified by the field exploration program could be encountered at this site. Where any organic, soft or otherwise unsuitable soils (including old fill and debris materials) are identified, they should be completely removed and replaced with engineered fill. Any non-organic fill soils that are encountered should be characterized with respect to the structural application that they will be subjected to before they are utilized as fill or allowed to remain in place. Additional soil borings and/or test pits may be required to evaluate uncontrolled fill soils.

After unsuitable soils (including surface topsoil and undocumented fill, if encountered) have been removed from the areas of construction and cut sections are performed, the exposed subgrade should be proofrolled using a fully-loaded tandem-axle dump truck or other suitable equipment to identify soft unstable areas. Unstable areas should be undercut and replaced with engineered fill or stabilized using other suitable methods. Unstable areas must be removed and stabilized prior to backfilling the excavation. Based on the field and laboratory data for the native cohesionless soils encountered at the site, some instability and pumping of the subgrade should be expected, particularly where very loose clayey sand soils were noted. Undercutting and replacement with engineered fill or discing and recompacting may be suitable remedies. However, more extensive subgrade stabilization measures can not be ruled out.

After the subgrade has been stabilized, the surface should be compacted to 95 percent of the maximum dry density within three (3) percent of the optimum moisture content as determined in accordance with ASTM Method D-1557 (Modified Proctor). Any engineered fill required may then be placed. The engineered fill should consist of an environmentally clean, well-graded material such as MDOT Class II. Proper control of the placement and compaction of engineered fills should be monitored by PSI. The new materials should be free of organic

matter and placed in individual lifts not exceeding 8 inches in loose thickness. Each lift is to be compacted to 95 percent of the maximum dry density within three (3) percent of the optimum moisture content as determined in accordance with ASTM Method D-1557 (Modified Proctor). A sufficient number of in-place density tests should be performed on compacted subgrade surface and each lift of the fill. The tests should be performed in accordance with appropriate ASTM procedures. The fine to medium sand encountered below the surface topsoil is considered suitable for re-use as engineered fill on this site provided these materials are free of organics or other deleterious materials.

Construction traffic should be restricted from the exposed subgrade to help reduce the potential for loosening of the subgrade soils, particularly where excess moisture is present from groundwater and/or precipitation. PSI recommends that the fill be strategically placed so that the construction equipment remains on newly placed fill soils and not on the exposed subgrade during fill placement.

## Shallow Foundation Recommendations

Considering the site subsurface conditions, recommended site preparation activities, and the proposed construction, it is recommended that the proposed Cottages at Thornapple Manor building be founded on conventional spread and continuous wall footings founded on the native brown sand or clayey sand (which have been compacted as described below) encountered below the topsoil in the soil borings. Estimated total settlements should be less than 1 inch with differential settlement of ½ of the total settlement provided the following design and construction details are incorporated.

Footings should bear on the native sandy soils which have been properly compacted or on newly placed and compacted engineered fill emplaced on the suitable native soils. Interior and exterior continuous wall and column footings may be proportioned for a net allowable soil bearing pressure of up to **2,500 pounds per square foot** where they bear directly on compacted native sand or on newly placed and compacted engineered fill placed over suitable native soils.

In order to protect against frost action, all perimeter footings, exterior footings and footings located in unheated areas must bear at a depth of 3½ feet below final surface grades. Interior footings not subject to frost action may be founded at a depth of 18 inches below the floor slab, provided they will be bearing on suitable native soils, or on properly placed engineered fill. Where foundations bear on newly placed compacted fill, this fill must be placed in accordance with the requirements described in this report. Shallow footing excavations must be protected from the effects of frost action if construction is carried out during the winter months.

Footings supporting individual columns should have a minor dimension of no less than 24 inches, and continuous footings should have a width of not less than 18 inches, even if those dimensions result in stresses below the allowable bearing capacity. The purpose of limiting the footing size is to prevent "punching" shear deformation and to provide for vertical stability.

Any fill placed below the footings where unsuitable soils are removed should extend 1 foot outside of the footing limits for every 1 foot in thickness between the intended bearing surface and the native, suitable underlying soils. PSI should observe the bearing surfaces prior to placing concrete or reinforcing steel to verify the bearing capacity.

Unsuitable bearing materials may be encountered in the foundation excavations. As recommended previously, where soft or otherwise unsuitable soils are present at the design bearing elevation, those materials should be removed and replaced with engineered fill or the footings should be extended to bear on underlying higher strength soils. The decision as to removal or extension of footings should be made by PSI at the time of construction. Any fill placed below the footings where unsuitable soils are removed should extend 1 foot outside of the footing limits for every 1 foot in thickness between the intended bearing surface and the native, suitable underlying soils. PSI should observe the bearing surfaces prior to placing concrete or reinforcing steel to verify the bearing capacity.

**Concrete Slabs-on-grade**

The subgrade soils utilized for the support of slabs-on-grade should be prepared as indicated in the Site Preparation Section of this report. After preparation, it appears the existing native sand and clayey sand soils and engineered fill placed upon them will be adequate for support of concrete slabs. If soft, loose or unsuitable fill soils are encountered at the subgrade level, we recommend that these materials be undercut to an adequate depth and replaced with properly compacted granular or low plasticity fill soil. Proofrolling, as discussed earlier in this report, should be performed to identify any soft or unsuitable soils, which should then be removed from the floor slab area prior to fill placement and/or floor slab construction.

A granular mat should be provided between the floor slab and the subgrade soil. It should be 4 inches or greater in thickness and be properly compacted as recommended in this report. The granular mat materials should comply with the current version of ACI 302.1.

Slabs should be suitably reinforced to make them as rigid as necessary. Proper joints should be provided at the junctions of the slab and the foundation system so that a small amount of independent movement can occur without causing damage. The floor areas should be provided with joints at frequent intervals to compensate for concrete volume changes during curing. If a vapor retarder/barrier will be utilized, placement should be in compliance with the current version of ACI 302.1, local building codes and the recommendations of the flooring manufacturer. A modulus of subgrade reaction for compacted native soils or imported fills specified and conditioned as described in this report of **125 psi/in** may be used for the floor slab design. This value may be confirmed in the field by performing a 1 foot by 1 foot plate load test. However, depending on how the slab load is applied, the value will have to be geometrically modified.

**Pavement Support Recommendations**

The subgrade soils utilized for the support of pavements should be prepared as indicated in the Site Preparation Section of this report. After preparation, it appears the existing native sand and clayey sand soils and engineered fill placed upon them will be adequate for support of flexible and rigid pavements. If soft, loose or unsuitable fill soils are encountered at the subgrade level, we recommend that these materials be undercut to an adequate depth and replaced with properly compacted granular or low plasticity fill soil. Proofrolling, as discussed earlier in this report, should be performed to identify any soft or unsuitable soils, which should then be removed from the pavement areas prior to fill placement and/or pavement construction.

In lieu of extensive testing for determination of pavement subgrade support characteristics, we have made assumptions based on our laboratory analysis and our experience in the general site area with similar subgrade soils.

- Native Subgrade CBR = 3
- Effective Roadbed Soil Resilient Modulus, $M_R$ = 4,000 psi

The CBR value should be verified by formal laboratory testing and specific traffic frequencies and axle loading determined prior to pavement design acceptance. Periodic maintenance should be expected and performed on all pavements during the service life. All pavement materials and construction procedures should conform to (Michigan Department of Transportation) MDOT or appropriate local requirements.

Pavements may be placed after the subgrade has been properly prepared as outlined in this report. Unstable areas should be treated as outlined therein. Appropriate drainage, including finger drains around catch basins and perimeter drainage must be incorporated into the pavement design. **Inadequate drainage will result in heaving and significant distress to the pavement.**

In heavy truck lanes or turn areas or where refuse containers or other similar objects are to be placed on the pavement so that a considerable load is transferred from relatively small steel supports, it is recommended that rigid concrete pavement be provided. This will provide for the proper distribution of loads to the subgrade without causing deformation of the surface especially during hot weather. It will also resist the wear resulting from dumpster pick-ups and vehicle traffic.

Vehicle traffic or the loading of a partially constructed pavement section will likely cause premature pavement failure. All vehicle traffic or pavement loading should be restricted until the pavement section has been completely constructed or the partial pavement section must be designed for this purpose, particularly if construction traffic will use the partial pavement.

If the materials encountered upon PSI's visual observation of the exposed subgrade after the removal of any topsoil or otherwise unsuitable materials are not similar to our findings in this report, additional soil borings and/or test pits will be necessary.

## CONSTRUCTION CONSIDERATIONS

### Drainage and Groundwater Considerations

Due to the depth at which groundwater was noted in the boring relative to the anticipated foundation and earthwork activities, little difficulty is expected to be encountered during site preparation and construction of the proposed foundations. However, every effort should be made to keep the excavations and any other prepared subgrades dry if water is encountered or if rainfall or snowmelt occurs during construction. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather. This is particularly relevant where the native clayey sand soils have sufficient clay content to retain moisture.

Water should not be allowed to collect in foundation or subsurface level excavations or other prepared subgrades of the construction area, either during or after construction. Water accumulation should be removed from shallow excavations by pumping from sump pits placed around the perimeter of the excavation.

Positive site surface drainage should be provided to reduce infiltration of surface water. The grades should be sloped away from the proposed building structures and surface drainage should be collected and discharged.

### Excavation Safety Considerations

Care must be taken so that all excavations made for the foundations are properly backfilled with suitable material compacted in accordance with the procedures outlined in this report. Before the backfill is placed, all water and loose debris should be removed from these excavations.

Materials removed from the excavation should not be stockpiled immediately adjacent to the excavation, inasmuch as this load may cause a sudden collapse of the embankment. The contractor should establish a minimum lateral distance from the crest of the slope for all vehicles and spoil piles. Likewise, the contractor should establish protective measures for exposed slope faces and preventative measures for the buildup of moisture in the excavation sidewalls, which can cause slope instability. A slope stability analysis should be performed to determine the factor of safety for cut and fill depths if the depth of the excavations warrant. If temporary shoring of excavation sidewalls is performed, a qualified registered professional engineer must design it. Formed foundations will be required if placed on or within granular soils.

In Federal Register, Volume 54. No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, subpart P". This document was issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that all excavations, whether they be utility trenches or footing excavations, be constructed in accordance with the current OSHA guidelines. It is PSI's understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable and safe, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's responsible person, as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

All earthwork and foundation placement operations should be conducted in accordance with the project specifications and under the observation of a representative of the geotechnical engineer. We are providing this information solely as a service to Thornapple Manor. PSI does not assume responsibility for construction site safety or the contractor’s or other parties’ compliance with local, state and federal safety or other regulations. Such responsibility is not being implied and should not be inferred.

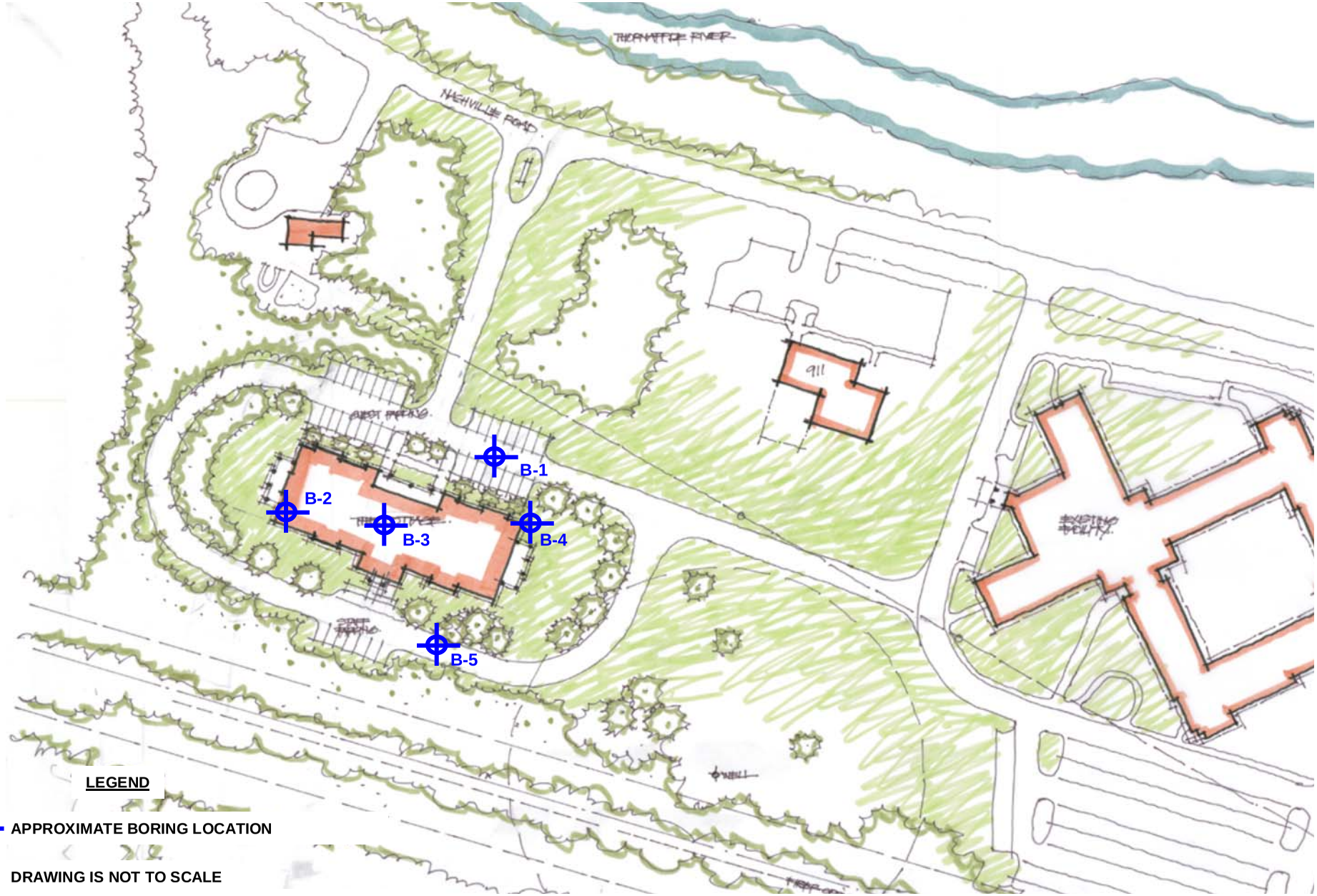
## REPORT LIMITATIONS

The recommendations submitted for the proposed Cottages at Thornapple Manor are based on the available soil information and the design details furnished by Thornapple Manor and Eckert Wordell, LLC for the proposed project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI must be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not retained to perform these functions, PSI can not be responsible for the impact of those conditions on the performance of the project.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are complete, PSI should be retained to review the final design plans and specifications. This review is required to verify that the engineering recommendations are appropriate for the final configuration, and that they have been properly incorporated into the design documents. This report has been prepared for the exclusive use of Thornapple Manor for specific application to the proposed Cottages at Thornapple Manor envisioned at 2580 Nashville Road in Hastings, Barry County, Michigan.

# APPENDIX




**LEGEND**

⊕ APPROXIMATE BORING LOCATION

DRAWING IS NOT TO SCALE

DRAWING PROVIDED BY ECKERT WORDELL, LLC

psi Information To Build On
Engineering • Consulting • Testing

**BORING LOCATION PLAN**
PROPOSED THORNAPPLE MANOR COTTAGE
2580 NASHVILLE ROAD
HASTINGS, BARRY COUNTY, MICHIGAN

**FIGURE NO. 1**

PSI PROJECT NO. 0525379
DRAWN BY: ESR
DATE: 08/26/11

Professional Service Industries, Inc.
3120 Sovereign Drive, Suite C
Lansing, MI 48911
Telephone: (517) 394-5700
Fax: (517) 394-5796

# LOG OF BORING B-1



PSI Job No.: 0525379
Project: Proposed Thornapple Manor Cottage
Location: 2580 Nashville Road
Hastings, Barry County, Michigan

Drilling Method: 3 1/4" HSA
Sampling Method: SS
Hammer Type: Automatic
Boring Location: See Boring Location Plan

WATER LEVELS

| | |
|---|---|
| While Drilling | N/A |
| Upon Completion | N/A |
| Dry Cave Depth | 5 feet |

Station: N/A
Offset: N/A

| Elevation (feet) | Depth, (feet) | Graphic Log | Sample Type | Sample No. | Recovery (inches) | MATERIAL DESCRIPTION | USCS Classification | SPT Blows per 6-inch (SS) | Moisture, % | STANDARD PENETRATION TEST DATA N in blows/ft ◎ / STRENGTH, tsf | Additional Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | 12" TOPSOIL | TOPSOIL | | | | |
| | | | | 1 | | POORLY GRADED SAND (SP), brown, moist, loose, fine to medium sand, trace fine gravel | SP | 2-2-2 N=4 | | | |
| | | | | 2 | | CLAYEY SAND (SC), brown, moist, low to medium plastic, loose, fine to medium sand, trace coarse sand | SC | 2-3-4 N=7 | | | |
| | 5 | | | 3 | | POORLY GRADED SAND (SP), brown, moist, medium dense, fine to coarse sand, trace fine gravel | SP | 3-5-7 N=12 | | | |
| | | | | 4 | | | | 6-9-13 N=22 | | | |
| | 10 | | | | | Boring terminated 10 feet below existing ground surface. | | | | | |

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

| | |
|---|---|
| Completion Depth: | 10.0 ft |
| Date Boring Started: | 8/12/11 |
| Date Boring Completed: | 8/12/11 |
| Logged By: | E. Motcheck |
| Drilling Contractor: | PSI |

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig: CME-55
Remarks: None

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
3120 Sovereign Drive, Suite C
Lansing, MI 48911
Telephone: (517) 394-5700
Fax: (517) 394-5796

# LOG OF BORING B-2



PSI Job No.: 0525379
Project: Proposed Thornapple Manor Cottage
Location: 2580 Nashville Road
Hastings, Barry County, Michigan

Drilling Method: 3 1/4" HSA
Sampling Method: SS
Hammer Type: Automatic
Boring Location: See Boring Location Plan

WATER LEVELS

| | |
|---|---|
| While Drilling | 20 feet |
| Upon Completion | N/A |
| Dry Cave Depth | 16.5 feet |

Station: N/A
Offset: N/A

| Elevation (feet) | Depth, (feet) | Graphic Log | Sample Type | Sample No. | Recovery (inches) | MATERIAL DESCRIPTION | USCS Classification | SPT Blows per 6-inch (SS) | Moisture, % | Additional Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | 8" TOPSOIL | TOPSOIL | | | |
| | | | | 1 | | POORLY GRADED SAND (SP), brown, moist, loose to dense, fine to medium sand, some coarse sand, trace silt/clay, trace fine gravel | | 2-2-2 N=4 | | |
| | 5 | | | 2 | | | | 4-7-11 N=18 | | |
| | | | | 3 | | | | 9-12-17 N=29 | | |
| | 10 | | | 4 | | | SP | 7-11-17 N=28 | | |
| | | | | 5 | | | | 13-16-21 N=37 | | |
| | 15 | | | | | | | | | |
| | | | | 6 | | POORLY GRADED SAND (SP), brown, moist to wet, very dense, medium to coarse sand with fine to coarse gravel, occasional cobbles | SP | 16-24-38 N=62 | | Low recovery >> |
| | 20 | | | | | POORLY GRADED SAND (SP), brown, wet, very dense, coarse sand with fine to coarse gravel, ocasional cobbles | | | | |
| | | | | | | | SP | | | |
| | | | | 7 | | Cobbles | | 20-29-42 N=71 | | Low recovery >> |
| | 25 | | | | | Boring terminated 25 feet below existing ground surface. | | | | |

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50

STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

| | |
|---|---|
| Completion Depth: | 25.0 ft |
| Date Boring Started: | 8/24/11 |
| Date Boring Completed: | 8/24/11 |
| Logged By: | E. Motcheck |
| Drilling Contractor: | PSI |

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig: CME-55
Remarks: None

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
3120 Sovereign Drive, Suite C
Lansing, MI 48911
Telephone: (517) 394-5700
Fax: (517) 394-5796

# LOG OF BORING B-3



PSI Job No.: 0525379
Project: Proposed Thornapple Manor Cottage
Location: 2580 Nashville Road
Hastings, Barry County, Michigan

Drilling Method: 3 1/4" HSA
Sampling Method: SS
Hammer Type: Automatic
Boring Location: See Boring Location Plan

WATER LEVELS

| | |
|---|---|
| While Drilling | 19.5 feet |
| Upon Completion | N/A |
| Dry Cave Depth | 15 feet |

Station: N/A
Offset: N/A

| Elevation (feet) | Depth, (feet) | Graphic Log | Sample Type | Sample No. | Recovery (inches) | MATERIAL DESCRIPTION | USCS Classification | SPT Blows per 6-inch (SS) | Moisture, % | Additional Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | 8" TOPSOIL | TOPSOIL | | | |
| | | | | 1 | | POORLY GRADED SAND (SP), brown, moist, loose to medium dense, fine to medium sand, trace fine gravel, trace coarse sand, trace silt/clay | | 1-2-2 N=4 | | |
| | | | | 2 | | | | 4-6-8 N=14 | | |
| | 5 | | | 3 | | | | 8-11-16 N=27 | | |
| | | | | 4 | | | SP | 8-12-15 N=27 | | |
| | 10 | | | | | | | | | |
| | | | | 5 | | | | 7-12-16 N=28 | | |
| | 15 | | | | | | | | | |
| | | | | 6 | | POORLY GRADED SAND (SP), brown, moist to wet, dense, medium to coarse sand and gravel, occasional cobbles | SP | 13-19-26 N=45 | | Low recovery |
| | 20 | | | | | POORLY GRADED SAND (SP), brown, wet, very dense, coarse sand and gravel, ocasional cobbles | | | | |
| | | | | | | | SP | | | |
| | | | | 7 | | | | 19-28-35 N=63 | | Low recovery >> |
| | 25 | | | | | Boring terminated 25 feet below existing ground surface. | | | | |

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
× Moisture ◪ PL ✚ LL
0 25 50

STRENGTH, tsf
▲ Qu ✳ Qp
0 2.0 4.0

| | |
|---|---|
| Completion Depth: | 25.0 ft |
| Date Boring Started: | 8/24/11 |
| Date Boring Completed: | 8/24/11 |
| Logged By: | E. Motcheck |
| Drilling Contractor: | PSI |

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig: CME-55
Remarks: None

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
3120 Sovereign Drive, Suite C
Lansing, MI 48911
Telephone: (517) 394-5700
Fax: (517) 394-5796

# LOG OF BORING B-4



PSI Job No.: 0525379
Project: Proposed Thornapple Manor Cottage
Location: 2580 Nashville Road
Hastings, Barry County, Michigan

Drilling Method: 3 1/4" HSA
Sampling Method: SS
Hammer Type: Automatic
Boring Location: See Boring Location Plan

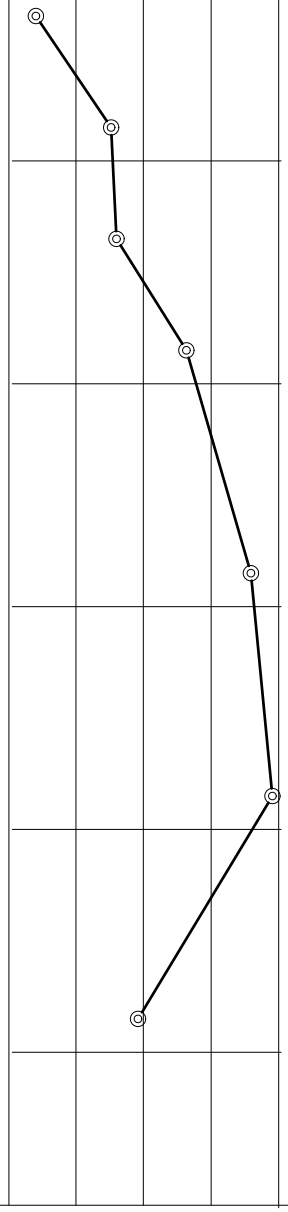
WATER LEVELS

| | |
|---|---|
| While Drilling | 18.5 feet |
| Upon Completion | N/A |
| Dry Cave Depth | 16 feet |

Station: N/A
Offset: N/A

| Elevation (feet) | Depth, (feet) | Graphic Log | Sample Type | Sample No. | Recovery (inches) | MATERIAL DESCRIPTION | USCS Classification | SPT Blows per 6-inch (SS) | Moisture, % | Additional Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | 7" TOPSOIL | TOPSOIL | | | |
| | | | | 1 | | CLAYEY SAND (SC), brown, moist, low to medium plastic, loose to medium dense, fine to medium sand, trace fine gravel, occasional poorly graded sand seams | SC | 4-2-3 N=5 | | |
| | 5 | | | 2 | | | | 4-9-10 N=19 | | |
| | | | | 3 | | POORLY GRADED SAND (SP), brown, moist to wet, medium dense to dense, fine to coarse sand, trace fine gravel | | 7-9-11 N=20 | | |
| | 10 | | | 4 | | | | 9-14-19 N=33 | | |
| | | | | 5 | | | SP | 16-19-26 N=45 | | |
| | 15 | | | | | | | | | |
| | 20 | | | 6 | | | | 16-22-27 N=49 | | |
| | | | | 7 | | | | 8-10-14 N=24 | | |
| | 25 | | | | | Boring terminated 25 feet below existing ground surface. | | | | |

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
Moisture ✕ PL ◪ LL ✚
0 25 50
STRENGTH, tsf
Qu ▲ Qp ✳
0 2.0 4.0



| | |
|---|---|
| Completion Depth: | 25.0 ft |
| Date Boring Started: | 8/12/11 |
| Date Boring Completed: | 8/12/11 |
| Logged By: | E. Motcheck |
| Drilling Contractor: | PSI |

Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig: CME-55
Remarks: None

The stratification lines represent approximate boundaries. The transition may be gradual.

Professional Service Industries, Inc.
3120 Sovereign Drive, Suite C
Lansing, MI 48911
Telephone: (517) 394-5700
Fax: (517) 394-5796

# LOG OF BORING B-5



PSI Job No.: 0525379
Project: Proposed Thornapple Manor Cottage
Location: 2580 Nashville Road
Hastings, Barry County, Michigan

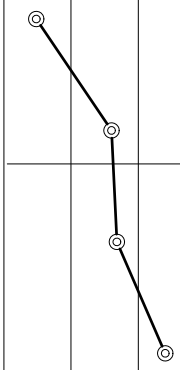
Drilling Method: 3 1/4" HSA
Sampling Method: SS
Hammer Type: Automatic
Boring Location: See Boring Location Plan

| WATER LEVELS | |
|---|---|
| While Drilling | N/A |
| Upon Completion | N/A |
| Dry Cave Depth | 5.5 feet |

Station: N/A
Offset: N/A

| Elevation (feet) | Depth, (feet) | Graphic Log | Sample Type | Sample No. | Recovery (inches) | MATERIAL DESCRIPTION | USCS Classification | SPT Blows per 6-inch (SS) | Moisture, % | Additional Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | | | | | 16" TOPSOIL | TOPSOIL | | | |
| | | | | 1 | | CLAYEY SAND (SC), brown, moist, low to medium plastic, loose, fine to medium sand, some coarse sand, trace fine gravel, occasional poorly graded sand seams | SC | 2-3-3 N=6 | | |
| | | | | 2 | | POORLY GRADED SAND (SP), brown, moist, medium dense to dense, fine to coarse sand, trace fine gravel | | 6-8-12 N=20 | | |
| | 5 | | | 3 | | | SP | 6-10-11 N=21 | | |
| | | | | 4 | | | | 8-12-18 N=30 | | |
| | 10 | | | | | Boring terminated 10 feet below existing ground surface. | | | | |

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
Moisture ✕ PL ◪ LL ✚
0 25 50
STRENGTH, tsf
Qu ▲ Qp ✳
0 2.0 4.0



| | |
|---|---|
| Completion Depth: | 10.0 ft |
| Date Boring Started: | 8/12/11 |
| Date Boring Completed: | 8/12/11 |
| Logged By: | E. Motcheck |
| Drilling Contractor: | PSI |

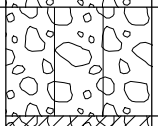
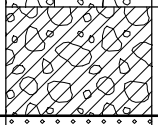
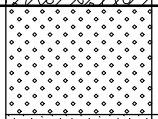
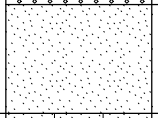
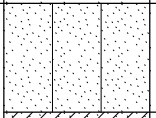
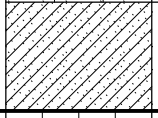
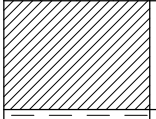
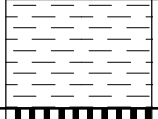
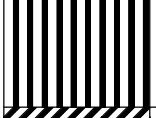
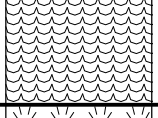
Sample Types:
Auger Cutting
Split-Spoon
Rock Core
Shelby Tube
Hand Auger
Calif. Sampler
Texas Cone

Latitude:
Longitude:
Drill Rig: CME-55
Remarks: None

The stratification lines represent approximate boundaries. The transition may be gradual.

# SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

| MAJOR DIVISIONS | | | SYMBOLS: GRAPH | SYMBOLS: LETTER | TYPICAL DESCRIPTIONS |
|---|---|---|---|---|---|
| COARSE GRAINED SOILS<br>MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE | GRAVEL AND GRAVELLY SOILS<br>MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE | CLEAN GRAVELS<br>(LITTLE OR NO FINES) |  | GW | WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES |
| | | |  | GP | POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES |
| | | GRAVELS WITH FINES<br>(APPRECIABLE AMOUNT OF FINES) |  | GM | SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES |
| | | |  | GC | CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES |
| | SAND AND SANDY SOILS<br>MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE | CLEAN SANDS<br>(LITTLE OR NO FINES) |  | SW | WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES |
| | | |  | SP | POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES |
| | | SANDS WITH FINES<br>(APPRECIABLE AMOUNT OF FINES) |  | SM | SILTY SANDS, SAND - SILT MIXTURES |
| | | |  | SC | CLAYEY SANDS, SAND - CLAY MIXTURES |
| FINE GRAINED SOILS<br>MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE | SILTS AND CLAYS | LIQUID LIMIT LESS THAN 50 |  | ML | INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY |
| | | |  | CL | INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS |
| | | |  | OL | ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY |
| | SILTS AND CLAYS | LIQUID LIMIT GREATER THAN 50 |  | MH | INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS |
| | | |  | CH | INORGANIC CLAYS OF HIGH PLASTICITY |
| | | |  | OH | ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS |
| HIGHLY ORGANIC SOILS | | |  | PT | PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS |

psi

# GENERAL NOTES

## SAMPLE IDENTIFICATION

The Unified Soil Classification System (USCS), AASHTO 1988 and ASTM designations D2487 and D-2488 are used to identify the encountered materials unless otherwise noted. Coarse-grained soils are defined as having more than 50% of their dry weight retained on a #200 sieve (0.075mm); they are described as: boulders, cobbles, gravel or sand. Fine-grained soils have less than 50% of their dry weight retained on a #200 sieve; they are defined as silts or clay depending on their Atterberg Limit attributes. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size.

## DRILLING AND SAMPLING SYMBOLS

SFA: Solid Flight Auger - typically 4" diameter flights, except where noted.
HSA: Hollow Stem Auger - typically 3¼" or 4¼ I.D. openings, except where noted.
M.R.: Mud Rotary - Uses a rotary head with Bentonite or Polymer Slurry
R.C.: Diamond Bit Core Sampler
H.A.: Hand Auger
P.A.: Power Auger - Handheld motorized auger

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
RC: Rock Core
TC: Texas Cone
BS: Bulk Sample
PM: Pressuremeter
CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings

## SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. Split-Spoon.
$N_{60}$: A "N" penetration value corrected to an equivalent 60% hammer energy transfer efficiency (ETR)
$Q_u$: Unconfined compressive strength, TSF
$Q_p$: Pocket penetrometer value, unconfined compressive strength, TSF
w%: Moisture/water content, %
LL: Liquid Limit, %
PL: Plastic Limit, %
PI: Plasticity Index = (LL-PL),%
DD: Dry unit weight, pcf
▼,▽,⧩ Apparent groundwater level at time noted

## RELATIVE DENSITY OF COARSE-GRAINED SOILS

| Relative Density | N - Blows/foot |
|---|---|
| Very Loose | 0 - 4 |
| Loose | 4 - 10 |
| Medium Dense | 10 - 30 |
| Dense | 30 - 50 |
| Very Dense | 50 - 80 |
| Extremely Dense | 80+ |

## ANGULARITY OF COARSE-GRAINED PARTICLES

| Description | Criteria |
|---|---|
| Angular: | Particles have sharp edges and relatively plane sides with unpolished surfaces |
| Subangular: | Particles are similar to angular description, but have rounded edges |
| Subrounded: | Particles have nearly plane sides, but have well-rounded corners and edges |
| Rounded: | Particles have smoothly curved sides and no edges |

## GRAIN-SIZE TERMINOLOGY

| Component | Size Range |
|---|---|
| Boulders: | Over 300 mm (>12 in.) |
| Cobbles: | 75 mm to 300 mm (3 in. to 12 in.) |
| Coarse-Grained Gravel: | 19 mm to 75 mm (¾ in. to 3 in.) |
| Fine-Grained Gravel: | 4.75 mm to 19 mm (No.4 to ¾ in.) |
| Coarse-Grained Sand: | 2 mm to 4.75 mm (No.10 to No.4) |
| Medium-Grained Sand: | 0.42 mm to 2 mm (No.40 to No.10) |
| Fine-Grained Sand: | 0.075 mm to 0.42 mm (No. 200 to No.40) |
| Silt: | 0.005 mm to 0.075 mm |
| Clay: | <0.005 mm |

## PARTICLE SHAPE

| Description | Criteria |
|---|---|
| Flat: | Particles with width/thickness ratio > 3 |
| Elongated: | Particles with length/width ratio > 3 |
| Flat & Elongated: | Particles meet criteria for both flat and elongated |

## RELATIVE PROPORTIONS OF FINES

| Descriptive Term | % Dry Weight |
|---|---|
| Trace: | < 5% |
| With: | 5% to 12% |
| Modifier: | >12% |

# GENERAL NOTES

(Continued)

## CONSISTENCY OF FINE-GRAINED SOILS

| $Q_U$ - TSF | N - Blows/foot | Consistency |
|---|---|---|
| 0 - 0.25 | 0 - 2 | Very Soft |
| 0.25 - 0.50 | 2 - 4 | Soft |
| 0.50 - 1.00 | 4 - 8 | Firm (Medium Stiff) |
| 1.00 - 2.00 | 8 - 15 | Stiff |
| 2.00 - 4.00 | 15 - 30 | Very Stiff |
| 4.00 - 8.00 | 30 - 50 | Hard |
| 8.00+ | 50+ | Very Hard |

## MOISTURE CONDITION DESCRIPTION

| Description | Criteria |
|---|---|
| Dry: | Absence of moisture, dusty, dry to the touch |
| Moist: | Damp but no visible water |
| Wet: | Visible free water, usually soil is below water table |

## RELATIVE PROPORTIONS OF SAND AND GRAVEL

| Descriptive Term | % Dry Weight |
|---|---|
| Trace: | < 15% |
| With: | 15% to 30% |
| Modifier: | >30% |

## STRUCTURE DESCRIPTION

| Description | Criteria |
|---|---|
| Stratified: | Alternating layers of varying material or color with layers at least ¼-inch (6 mm) thick |
| Laminated: | Alternating layers of varying material or color with layers less than ¼-inch (6 mm) thick |
| Fissured: | Breaks along definite planes of fracture with little resistance to fracturing |
| Slickensided: | Fracture planes appear polished or glossy, sometimes striated |
| Blocky: | Cohesive soil that can be broken down into small angular lumps which resist further breakdown |
| Lensed: | Inclusion of small pockets of different soils |
| Layer: | Inclusion greater than 3 inches thick (75 mm) |
| Seam: | Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample |
| Parting: | Inclusion less than 1/8-inch (3 mm) thick |

## SCALE OF RELATIVE ROCK HARDNESS

| $Q_U$ - TSF | Consistency |
|---|---|
| 2.5 - 10 | Extremely Soft |
| 10 - 50 | Very Soft |
| 50 - 250 | Soft |
| 250 - 525 | Medium Hard |
| 525 - 1,050 | Moderately Hard |
| 1,050 - 2,600 | Hard |
| >2,600 | Very Hard |

## ROCK BEDDING THICKNESSES

| Description | Criteria |
|---|---|
| Very Thick Bedded | Greater than 3-foot (>1.0 m) |
| Thick Bedded | 1-foot to 3-foot (0.3 m to 1.0 m) |
| Medium Bedded | 4-inch to 1-foot (0.1 m to 0.3 m) |
| Thin Bedded | 1¼-inch to 4-inch (30 mm to 100 mm) |
| Very Thin Bedded | ½-inch to 1¼-inch (10 mm to 30 mm) |
| Thickly Laminated | 1/8-inch to ½-inch (3 mm to 10 mm) |
| Thinly Laminated | 1/8-inch or less "paper thin" (<3 mm) |

## ROCK VOIDS

| Voids | Void Diameter |
|---|---|
| Pit | <6 mm (<0.25 in) |
| Vug | 6 mm to 50 mm (0.25 in to 2 in) |
| Cavity | 50 mm to 600 mm (2 in to 24 in) |
| Cave | >600 mm (>24 in) |

## GRAIN-SIZED TERMINOLOGY

(Typically Sedimentary Rock)

| Component | Size Range |
|---|---|
| Very Coarse Grained | >4.76 mm |
| Coarse Grained | 2.0 mm - 4.76 mm |
| Medium Grained | 0.42 mm - 2.0 mm |
| Fine Grained | 0.075 mm - 0.42 mm |
| Very Fine Grained | <0.075 mm |

## ROCK QUALITY DESCRIPTION

| Rock Mass Description | RQD Value |
|---|---|
| Excellent | 90 -100 |
| Good | 75 - 90 |
| Fair | 50 - 75 |
| Poor | 25 -50 |
| Very Poor | Less than 25 |

## DEGREE OF WEATHERING

| | |
|---|---|
| Slightly Weathered: | Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact. |
| Weathered: | Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife. |
| Highly Weathered: | Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife. |

# SECTION 08 5213 - ALUMINUM-CLAD WOOD CASEMENT WINDOWS

## PART 1 – GENERAL

### 1.1 SUMMARY

A. Section includes aluminum-clad wood casement windows.
B. Related Section: See Section 06 4600 “Wood Trim” for staining unfinished wood components of windows.

### 1.2 PERFORMANCE REQUIREMENTS

A. Window Unit Air Leakage, ASTM E 283, 1.57 psf (25 mph): 0.05 cfm per square foot of frame or less.
B. Window Unit Water Penetration: No water penetration through window unit when tested in accordance with ASTM E 547, under static pressure of 7.5 psf (52 mph) after 4 cycles of 5 minutes each, with water being applied at a rate of 5 gallons per hour per square foot.

### 1.3 SUBMITTALS

A. Comply with Division 01 requirements.
B. Product Data: Submit manufacturer's product data, including installation instructions.
C. Shop Drawings: Submit manufacturer's shop drawings, indicating dimensions, construction, component connections and locations, anchorage methods and locations, hardware locations, and installation details.
D. Samples: Submit full-size or partial full-size sample of window illustrating glazing system, quality of construction, and color of finish.
E. Warranty: Submit manufacturer’s standard warranty.

### 1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site undamaged in manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.
B. Storage: Store materials in an upright position, off ground, under cover, and protected from weather, direct sunlight, and construction activities.
C. Handling: Protect materials and finish during handling and installation to prevent damage.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURER

A. Provide products by Pella Corporation. No substitutions.

### 2.2 ALUMINUM-CLAD WOOD CASEMENT WINDOWS

A. Aluminum-Clad Wood Casement Windows: Designer Series factory-assembled aluminum-clad wood windows with outward-opening sash installed in frame and fixed unit(s).

B. Frame:

1. Select woods, water-repellent, preservative-treated with EnduraGuard® in accordance with WDMA I.S.-4. EnduraGuard includes water-repellency, three active fungicides and an insecticide applied to the frame.
2. Interior Exposed Surfaces: Pine.
3. Exterior Surfaces: Clad with aluminum.
4. Overall Frame Depth: 5 inches (127 mm).

C. Sash:

1. Select woods, water water-repellent, preservative-treated with EnduraGuard in accordance with WDMA I.S.-4. EnduraGuard includes water-repellency, three active fungicides and an insecticide applied to the sash.
2. Interior Exposed Surfaces: Pine.
3. Exterior Surfaces: Clad with aluminum, lap-jointed at corners.
4. Corners: Mortised and tenoned, glued and secured with metal fasteners.
5. Sash Thickness: 2-3/16 inches.

D. Weather Stripping:

1. Dual weather stripping.
2. Continuous, flexible, Santoprene material in dual-durometer design.
3. Units shall have welded corners, compressed between frame and sash for positive seal on all 4 sides.
4. Secondary PVC leaf-type weather strip between sash and frame for positive seals on all 4 sides.

## 2.3 GLAZING

A. Glazing:

1. Float Glass: ASTM C 1036, Quality 1.

   a. Tempered Glass: ASTM C 1048.

2. Triple-Pane Glazing System: 5/8-inch annealed/heat strengthened dual-seal insulating glass, silicone-glazed, bronze air-filled multi-layer, Low-E coated. Interior-hinged glass panel set in veneer covered aluminum frame, fitted to sash with continuous gasket seal, clear.

## 2.4 OPTIONS

A. Insect Screens: Standard.

1. Compliance: ASTM D 3656 and SMA 1201.
2. Screen Cloth: Vinyl-coated fiberglass, 18/16 mesh.
3. Set in aluminum frame fitted to inside of window.
4. Complete with necessary hardware.
5. Screen Frame Finish: Baked enamel.

   a. Color: White.

B. Blinds: Slimshade.

1. 15 mm aluminum slat raise and lower blinds with polyester cord ladder.
2. Installed in Designer glazing system between panes of glass.
3. Operated with cordless operator.
4. Controlled by built-in operating mechanism.
5. Type: Snap-in/snap-out, attached to top of hinged-glass panel.
6. Color: Bisque.

C. Removable Between-the-Glass Grilles:

1. Profile: 3/4 inch by 3/16 inch.
2. Contoured aluminum grille installed with clips on to edge of interior-hinged glass panel.
3. Joined with stainless steel pins at intersections.
4. Grille Interior Color: Unfinished wood veneer, ready for site finishing.
5. Aluminum Grille Exterior Color: Match exterior cladding color.

D. Interior Jamb Extensions:

1. Jamb Extensions: Provide manufacturer's standard, straight extension jambs around three sides of interior windows, full depth of jamb.

    a. Installer to field verify depth of jamb prior to fabrication.

2. Finish: Unfinished wood veneer, ready for site finishing.

2.5 HARDWARE

A. Operator:

1. Steel worm-gear operator with hardened gears.
2. Operator Base: Zinc die cast with painted finish.
3. Operator Linkage, Hinge Slide, and Hinge Arms: 300 series stainless steel.
4. Exposed Fasteners: Stainless steel.
5. External Hardware Salt Spray Exposure, ASTM B 117: Exceed 1,000 hours.
6. Provide limiting hardware.

B. Crank Handle Finish

1. Integrated Folding Crank: Baked enamel, brown.

C. Locking System: SureLock System.

1. Single-handle locking system.
2. Operate positive-acting arms that reach out and pull sash into locked position.
3. Casement Windows: One installed on sash 29 inches and smaller in frame height, 2 unison operating locks installed on sash over 29 inches in frame height.
5. Lock Handle Finish: Baked enamel, brown.

2.6 TOLERANCES

A. Windows shall accommodate the following opening tolerances:

1. Vertical Dimensions Between High and Low Points: Plus 1/4 inch, minus 0 inch.
2. Width Dimensions: Plus 1/4 inch, minus 0 inch.
3. Building Columns or Masonry Openings: Plus or minus 1/4 inch from plumb.

2.7 FINISH

A. Exterior Finish System: Pella EnduraClad.

1. Exterior aluminum surfaces shall be finished with the following multi-stage system:

a. Clean and etch aluminum surface of oxides.
b. Pre-treat with chrome phosphate conversion coating.
c. Pre-treat with chromic acid sealer/rinse.
d. Top coat with baked-on polyester enamel.

2. Color: Classic white.
3. Performance Requirements: Exterior aluminum finishes shall meet or exceed the following performance requirements of AAMA 2605:

a. Dry Film Hardness: Eagle Turquoise Pencil, F minimum.
b. Film Adhesion: 1/16-inch crosshatch, dry, wet, boiling water.
c. Impact Resistance: 1/10-inch distortion, no film removal.
d. Abrasion Resistance: Falling sand coefficient value of 20 minimum.
e. Chemical Resistance: 10 percent Muriatic acid, 15 minutes. Mortar pat test, 24 hours.
f. Detergent Resistance: 3 percent at 100 degrees F, 72 hours.
g. Corrosion Resistance: Humidity, 3,000 hours. Salt spray exceeds 3,000 hours.

B. Exterior Finish System Performance Requirements: Pella EnduraClad.

1. Exterior aluminum finishes shall meet or exceed following performance requirements:

a. Ozone Deterioration, ASTM D 1149, Modified: 5 ppm ozone, 160 degrees F, 60 percent relative humidity, 100 hours exposure, little or no loss of cure.
b. Filiform Corrosion Resistance of Organic Coatings on Metal, ASTM D 2803: No corrosion.
c. Taber Abrasion Resistance, ASTM D 4060: 500 g weight, CS-10 wheel, 500 cycles, less than 25 g weight loss.
d. Cyclic Acidified Salt Fog Test, ASTM G 85, Appendix A-2.

C. Interior Finish: Unfinished, ready for site finishing.

2.8 INSTALLATION ACCESSORIES

A. Flashing/Sealant Tape: Pella SmartFlash.

1. Aluminum-foil-backed butyl window and door flashing tape.
2. Maximum Total Thickness: 0.013 inch.
3. UV resistant.
4. Verify sealant compatibility with sealant manufacturer.

B. Insulating-Foam Sealant: Dow Great Stuff Window & Door.

1. Low-pressure, polyurethane window and door insulating-foam sealant.

2.9 SOURCE QUALITY CONTROL

A. Factory Testing: Factory test individual standard operable windows for air infiltration in accordance with ASTM E 283, to ensure compliance with this specification.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine areas to receive windows. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install windows in accordance with manufacturer's instructions and approved shop drawings.
B. Install windows to be weather-tight and freely operating.
C. Maintain alignment with adjacent work.
D. Secure assembly to framed openings, plumb and square, without distortion.
E. Integrate window system installation with exterior water-resistant barrier using flashing/sealant tape. Apply and integrate flashing/sealant tape with water-resistant barrier using watershed principles in accordance with window manufacturer's instructions.
F. Place interior seal around window perimeter to maintain continuity of building thermal and air barrier using insulating-foam sealant.
G. Seal window to exterior wall cladding with sealant and related backing materials at perimeter of assembly.
H. Leave windows closed and locked.

3.3 FIELD QUALITY CONTROL

A. Field Testing: Field-test windows in accordance with AAMA 502, Test Method A. Manufacturer’s representative shall be present.

3.4 CLEANING

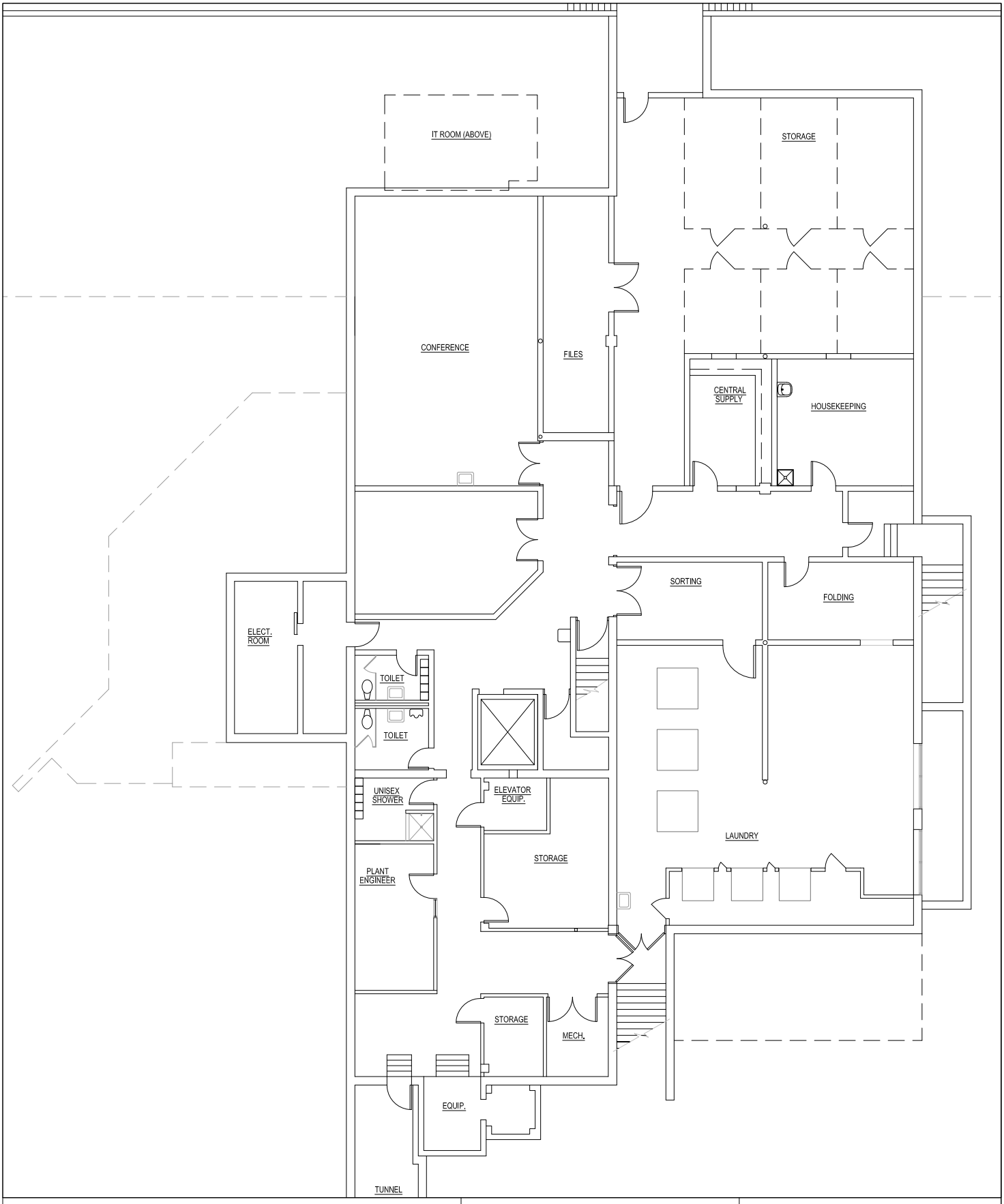
A. Clean window frames and glass in accordance with Division 1 requirements.
B. Do not use harsh cleaning materials or methods that would damage finish.
C. Remove labels and visible markings.

3.5 PROTECTION

A. Protect installed windows to ensure that, except for normal weathering, windows will be without damage or deterioration at time of substantial completion.

END OF SECTION 08 5213

THIS PAGE INTENTIONALLY LEFT BLANK



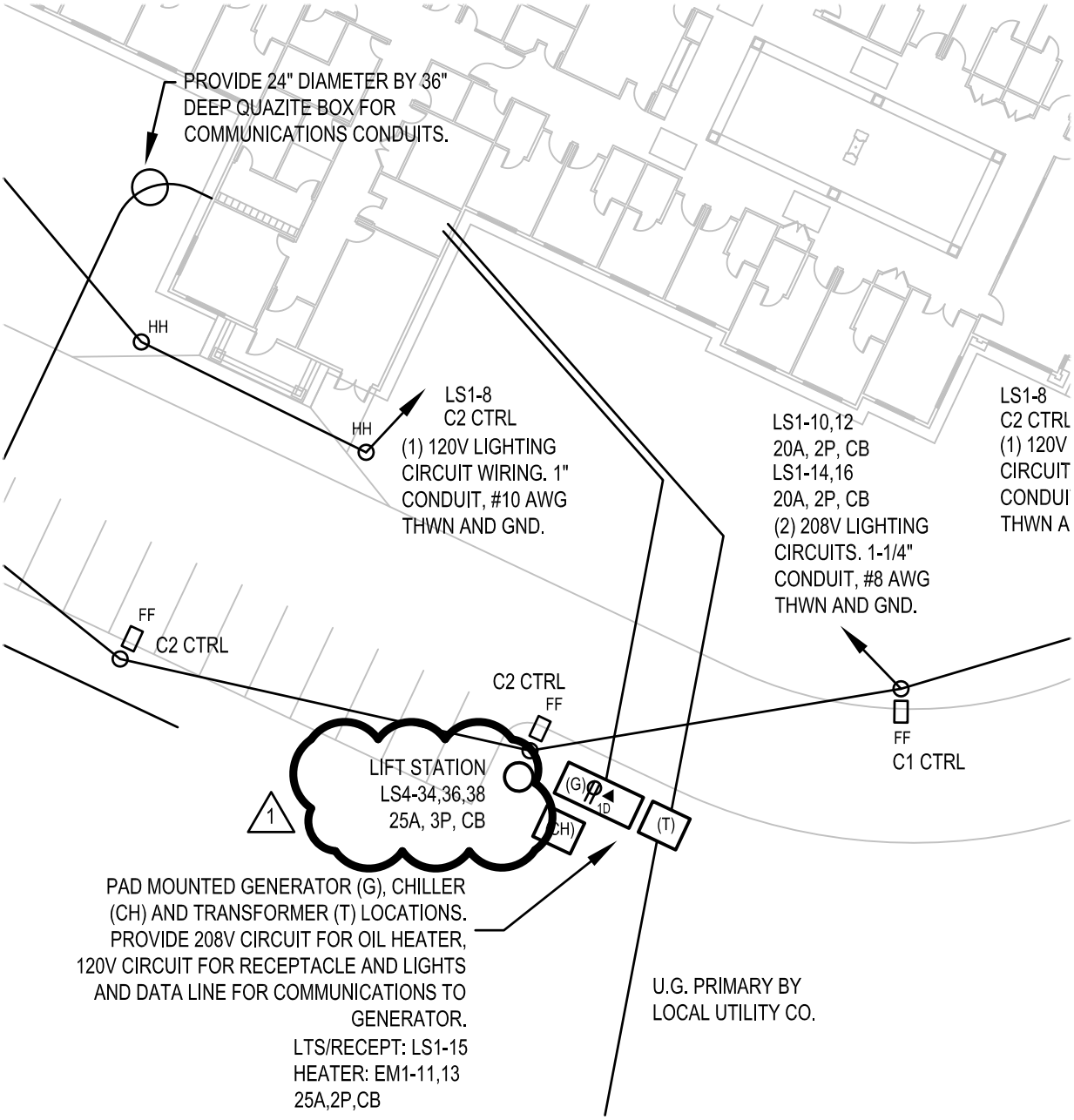

**FOR REFERENCE ONLY** | **SCALE: 1/16" = 1'-0"** | **ADDENDUM #1**

ECKERT WORDELL
ARCHITECTURE ENGINEERING INTERIOR DESIGN
161 East Michigan Ave, Ste. 200 Kalamazoo, MI 49007
269 388 7313 269 388 7330 Fax


THE COTTAGE
at
THORNAPPLE
HASTINGS, MICHIGAN

03/05/12

2011-11-021




# 1 SITE PLAN

SCALE: 1"=30'-0"

| REFERENCE SHEET E100 | SCALE: 1" = 30'-0" | ADDENDUM #1 |
|---|---|---|

E2W ENGINEERING
161 East Michigan Ave
Suite 200
Kalamazoo, MI 49007
**PHONE:** (269) 373-8000
**FAX:** (269) 373-5641



ECKERT WORDELL
ARCHITECTURE • ENGINEERING • INTERIOR DESIGN
161 East Michigan Ave Kalamazoo, MI 49007
269 388 7313 269 388 7330 Fax


THE COTTAGE at THORNAPPLE
Hastings, MI

3-5-2012
2011-11-021

ESK 01

E2W ENGINEERING
161 East Michigan Ave
Suite 200
Kalamazoo, MI 49007
**PHONE:** (269) 373-8000
**FAX:** (269) 373-5641



| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | STARTER | | 20A, 1P, CB |
| VAV-101 TO 105 | VARIABLE AIR VOLUME BOX | 120V | 1PH | 5.0 A | 0.6 KW | N/A | N/A | FACTORY SWITCH | #12 AWG | EM2-17 20A, 1P, CB |
| VAV-106 TO 110 | VARIABLE AIR VOLUME BOX | 120V | 1PH | 5.0 A | 0.6 KW | N/A | N/A | FACTORY SWITCH | #12 AWG | EM2-18 20A, 1P, CB |
| VAV-111 TO 115 | VARIABLE AIR VOLUME BOX | 120V | 1PH | 5.0 A | 0.6 KW | N/A | N/A | FACTORY SWITCH | #12 AWG | EM2-19 20A, 1P, CB |
| VAV-116 TO 122 | VARIABLE AIR VOLUME BOX | 120V | 1PH | 7.0 A | 0.8 KW | N/A | N/A | FACTORY SWITCH | #12 AWG | EM2-20 20A, 1P, CB |
| VAV-201 TO 205 | VARIABLE AIR VOLUME BOX | 120V | 1PH | 5.0 A | 0.6 KW | N/A | N/A | FACTORY SWITCH | #12 AWG | EM3-17 20A, 1P, CB |
| VAV-206 TO 210 | VARIABLE AIR VOLUME BOX | 120V | 1PH | 5.0 A | 0.6 KW | N/A | N/A | FACTORY SWITCH | #12 AWG | EM3-18 20A, 1P, CB |
| VAV-211 TO 215 | VARIABLE AIR VOLUME BOX | 120V | 1PH | 5.0 A | 0.6 KW | N/A | N/A | FACTORY SWITCH | #12 AWG | EM3-19 20A, 1P, CB |
| VAV-216 TO 221 | VARIABLE AIR VOLUME BOX | 120V | 1PH | 6.0 A | 0.7 KW | N/A | N/A | FACTORY SWITCH | #12 AWG | EM3-20 20A, 1P, CB |
| H-1 | HUMIDIFIER #1 | 208V | 3PH | 83.3 A | 30.0 KW | N/A | 110A | 200A, 3P | #1/0 AWG | MDP 125A, 3P, CB |
| H-2 | HUMIDIFIER #2 | 208V | 3PH | 55.5 A | 20.0 KW | N/A | 70A | 100A, 3P | #1 AWG | MDP 100A, 3P, CB |
| AC-1 | SPLIT SYSTEM INDOOR UNIT | 208V | 1PH | 1.0 A | 0.2 KW | N/A | N/A | N/A | #10 AWG | EM1-20,22 30A, 2P, CB |
| ACCU-1 | OUTDOOR SPLIT SYSTEM CONDENSOR | 208V | 1PH | 14.4 A | 3.0 KW | N/A | 30A | 30A, 3P | #10 AWG | EM1-20,22 30A, 2P, CB |
| LIFT STATION | LIFT STATION | 208V | 3PH | 14 A | 5.0 KW | (2) 2 HP | N/A | FACTORY CTRL PNL | #10 AWG | EM4-34,36,38 25A, 3P, CB 1 |

VFD AND MANUAL MOTOR STARTERS TO BE CONTROLLED BY BUILDING MANAGEMENT SYSTEM. COORDINATE WITH M.C. TO VERIFY IF ANY CONTROL RELAYS, 4-20mASIGNALS OR DEVICES ARE REQUIRED TO OPERATE VFDS, PUMPS, VAV BOXES OR FANS.

PROVIDE 100VA, 120V TO 24V CONTROL TRANSFORMER ON EACH VAV BOX.

**REFERENCE SHEET E400** | **N.T.S.** | **ADDENDUM #1**

ECKERT WORDELL
ARCHITECTURE • ENGINEERING • INTERIOR DESIGN
161 East Michigan Ave Kalamazoo, MI 49007
269 388 7313 269 388 7330 Fax


THE COTTAGE at THORNAPPLE
Hastings, MI

3-5-2012
2011-11-021

ESK 02

E2W ENGINEERING
161 East Michigan Ave
Suite 200
Kalamazoo, MI 49007
**PHONE:** (269) 373-8000
**FAX:** (269) 373-5641



# Panelboard Schedule EM4

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| )le Cottage | Job Number: | 2011-11-021 | Panel: | EM3 | Location: | MECH 814 | |
| '/120V | Mains: | 225 MLO | Mounting: | FLUSH | Fed From: | EMDP | |

| Voltamps | | | Breaker | | | | Breaker | | Voltamps | | | | Load/Location |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LTG | HEAT | MTR | AMP | P | | | P | AMP | RECEPT | LTG | HEAT | MTR | |
| | | | 20 | 1 | 1 | 2 | 1 | 20 | 360 | | | | RECEPTS. MECH. |
| | | 180 | 20 | 1 | 3 | 4 | 1 | 20 | | | 1,200 | | B-1 |
| | 1,200 | | 20 | 1 | 5 | 6 | 1 | 20 | | | 1,000 | | WH-1 |
| | 1,100 | | 20 | 1 | 7 | 8 | 1 | 20 | | | | 100 | UH-1 |
| | | 2,100 | | | 9 | 10 | | | | | | 2,100 | |
| | | 2,100 | 30 | 3 | 11 | 12 | 3 | 30 | | | | 2,100 | P-2 |
| | | 2,100 | | | 13 | 14 | | | | | | 2,100 | |
| | | 800 | 20 | 1 | 15 | 16 | | | | | | 730 | |
| | | 730 | | | 17 | 18 | 3 | 20 | | | | 730 | P-4 |
| | | 730 | 20 | 3 | 19 | 20 | | | | | | 730 | |
| | | 730 | | | 21 | 22 | 1 | 20 | | | | 700 | P-6 |
| | | 700 | 20 | 1 | 23 | 24 | | | | | | 3,833 | |
| | | 3,833 | | | 25 | 26 | 3 | 50 | | | | 3,833 | P-8 |
| | | 3,833 | 50 | 3 | 27 | 28 | | | | | | 3,833 | |
| | | 3,833 | | | 29 | 30 | 1 | 20 | | | | 900 | P-10 |
| | | 700 | 20 | 1 | 31 | 32 | 1 | 20 | | | | 700 | P-12 |
| | | 300 | 20 | 1 | 33 | 34 | | | | | | 1,681 | |
| | | | 20 | 1 | 35 | 36 | 3 | 25 | | | | 1,681 | LIFT STATION |
| | | | 20 | 1 | 37 | 38 | | | | | | 1,681 | |
| | | | 20 | 1 | 39 | 40 | 1 | 20 | | | | | SPARE |
| | | | 20 | 1 | 41 | 42 | 1 | 20 | | | | | SPARE |
| 0 | 2,200 | 22,769 | | | | | | | 360 | 0 | 2,200 | 21,689 | |

1

Totals

**REFERENCE SHEET E500** | **N.T.S.** | **ADDENDUM #1**

ECKERT WORDELL
ARCHITECTURE • ENGINEERING • INTERIOR DESIGN
161 East Michigan Ave Kalamazoo, MI 49007
269 388 7313 269 388 7330 Fax



THE COTTAGE at THORNAPPLE
Hastings, MI

3-5-2012
2011-11-021

ESK 03