

January 20, 2021

ATTENTION ALL REQUEST FOR BID (RFB) HOLDERS

**RFB NO. 319032 - ADDENDUM NO. 1
HIGHWAY SATTELITE BUILDING-ALBION**

BIDS DUE: TUESDAY, JANUARY 26, 2021 2:00 PM. DUE DATE AND TIME ARE NOT CHANGED BY THIS ADDENDUM.

This Addendum is issued to modify, explain or clarify the original Request for Bid (RFB) and is hereby made a part of the RFB. Please attach this Addendum to the RFB.

PLEASE MAKE THE FOLLOWING CHANGES:

- 1. Section 32 12 16 Asphalt Paving**
Add Section 32 12 16; issued with this Addendum to Bid Documents
- 2. Section 08 71 00**
Page 4 - Delete reference for automatic swing door operator.
- 3. Sheet Exhibit #3 – Asphalt Boundary**
Add Sheet Exhibit #3 Asphalt Boundary, issued with this Addendum.

PLEASE NOTE THE FOLLOWING CONTRACTOR SUBMITTED QUESTIONS:

- Q,** These building's specs call for R-38 fiberglass system with liner panel in the roof and the walls call for R-25 with 6 mil poly for a vapor barrier. That's not uncommon if there's full height liners but the drawings only show liners up to 8'. I just want to be sure that is what is really required. The drawings aren't specific but they show something even different (R-33 roof w/ vapor barrier and R-19 wall will 6 mil poly). For the roof, it shows no liner panels so I assume they want either a liner system or long tab banded. Can you find out what is correct?
A: The roof and wall insulation should be held in place using a fabric liner system and 1" wide straps, plus a vapor barrier on the warm side of the insulation. On the interior side of the walls, there is vertical ribbed metal panels up to 8'-0". Above that the fabric liner system will be exposed. R-value should be roof R-38, wall R-30.
- Q,** We have a question on the insulation system and are requesting an approved equal substitution below for both of these jobs.
The exterior metal wall panel is called out in the specification as VP Tech Four panel. This panel has a 2" cavity in it. The 2" cavity in the panel plus the 8" girt cavity is 10". The insulation called out in the specification is 8" R-25. This will not fill the entire 10" cavity and will leave air voids in the envelope which will cause condensation problems. Our suggestion, if the panel is to stay as a tech four panel, is to use 16" unfaced friction fit insulation in the panel cavity and 8" to 10" unfaced insulation in the girt cavity that is supported by barbed hangers (insulhold).

Also, 8" insulation is R-25 or u value of .059. Climate zone 6, I believe, calls for a minimum of .052 which would be equal to 10" insulation (R-30). Please advise what insulation thickness and system to use.

A: The wall insulation should be 10" for the entire cavity for an R value of (R-30). The Wall panel can be an equal to the VP Tech Four panel.

3. **Q**, I saw that you have specified a Stanley Magic Access Automatic Swing Door Operator on page 4 of Section 087100 for this project and was wondering what we would need to do to bid our Tormax as an equal product?

A: No automatic swing door operator required on this project – delete reference.

4. **Q**, I'm looking at this project and see that it is a pre-engineered building. Will all the electrical be completed by the building manufacturer or will this be completed on site by an EC? This is a gray area for these pre-fabricated buildings now, sometimes them arrive on site all inclusive.

A: Electrical to be completed on site by an electrical contractor.

5. **Q**, What type of conduit and fittings do you require for the Class 1 Division 2 area? The NEC recommends various conduit and fittings that can be used in these locations. Just curious if you had anything specific that needs to be installed in these locations.

A: Rigid metal conduit, intermediate metal conduit (IMC) shall be used per NEC. Liquidtight flexible metal conduit with listed fittings may be used where a flexible connection is required per NEC. Provide conduit seals leaving Class 1 Div 2 area per NEC. Boxes and fittings not required to be explosion proof if they contain no arcing devices per NEC. Explosion proof boxes and fittings are required if they contain arcing devices.

6. **Q**, Discussing both these building projects with our metal building vendor and insulation vendor, I have some questions/clarifications below. I have attached information per WI energy code requirements for PEMB and insulation requirements.

1. Are the buildings heated storage or held above freezing?

A: Yes

2. Is the roof insulation system, a two layer insulation system w/ fabric? Ex. Simple Saver System. If so, R-36 is minimum. 8" plus 3" over the purlins.

A: Yes R-36 is required - 8" plus 3" over the purlins.

- 2A. If two layer system is required, the roof panel should be Standing Seam Roof (SSR) not ribbed panel?

A: It is not required to do a standing seam roof system, if your system requires the roof to be a standing seam then that is what you are required to bid.

3. The wall insulation system to meet WI energy code requirements should be a minimum of R-30, which is 8" single layer system. Confirm this wall insulation system will be changed?

A: Per above, the wall cavity must be 100% filled with insulation 2" wall panel + 8" purlin total insulation 10" R30.

4. Cable/rod x-bracing for walls is required. Some windows will have to allow for x-bracing or should PEMB be priced with half-loaded frames for end walls and portal frame for low sidewall to remove x-bracing?

A: X-bracing is allowed to go over windows

5. Elevation 4 (West) on A202 of Verona set and Elevation 4 (North) on A202 of Albion set shows window placed where metal building wind column is shown. For pricing, window framed opening to be 1'-0" off frame line B?

A: OK to move window

6. What all needs to be priced for the future bathroom? HM frame & door? Plumbing fixtures?

- A: Include any underground plumbing for future toilet room fixtures, capped flush with finished floor.*
7. Room Schedule 101 shows metal panel on all walls. Vinyl base over metal liner panel? Drywall needed with insulation system fabric? Vinyl base over CMU walls?
A: 101 will not have vinyl Base (VB) on any of the walls.
8. Paint Schedule: Walls to be painted are the CMU walls only, correct? Want to paint metal liner panel when has a finish already?
A: The CMU and the primed steel is required to be painted. The factory finished liner panel does not need to be repainted.
7. **Q,** We are a Metallic Building dealer and would like to get them approved as a metal building supplier for these projects. Please see the attached letter from Metallic. As you can see they are part of Cornerstone Building Brands as well as Star and Ceco who are already approved metal building suppliers in the specifications.
A: Metallic Building Systems is approved to bid on this project, must meet or exceed the specifications.
8. **Q,** We are an American Buildings dealer who is an approved supplier for this project however there is specific Tech Four wall panel which is specific to VP. I would like to get an approved liner & wall panel from American Buildings for this project.
A: American Buildings is approved to bid on this project, must meet or exceed the specifications.
9. **Q,** The plan calls for a 2,000 Gal tank. The spec calls for a 6,000 tank.
A: The intent is 2000 gallon storage tank, and it should not be with grease intercepting and oil separation. It should just be a holding tank, since the holding tank will be pumped out. This tank is for the floor drains, not future sanitary/septage
10. **Q,** County Materials would like to submit our CMU units on this project. I've attached a Letter of Compliance for our Concrete Masonry Units, as a comparable product specific to the Concrete Masonry Units for Division 04 20 00 - 4 of the specifications that meet or exceed all ASTM C90 standards and testing methods of ASTM C140.
A: County Materials CMU products are acceptable to bid on this project, must meet or exceed the specifications.
11. **Q,** Your specifications refer to soil borings that were done and we're hoping that you can include the borings in the pending addendums.
A: Per the pre bid there are no soiling borings for the Verona site. A geotechnical report has been included for the Albion site.
12. **Q,** Are there more plan sheets coming out on this project? The plan notes keep referencing E508 but that sheet is not in the plan sets.
A: All reference to plan sheet E508 should be E501.
13. **Q,** We have had some specific questions come our way regarding the Landscaping Plan. We have directed our subs to look in the spec book for the answers they need as the specs say to refer to the landscape plan / drawing, however there isn't a plan. Is there a landscape plan being released at a later time that you know of?!
A: See Quam Engineering sheet for required landscaping under Restoration Notes for the Albion site. A grading plan for Verona will be issued with Addendum #2, but grading will be limited to excavation for building footings, concrete around the building and limited site work. No stormwater facilities need to be constructed.

- 14. Q,** Could you give a better explanation of the class 1 division 2 area at the ceiling. Are we to use explosion proof boxes and fittings everywhere? Or is the class 1 division 2 area meant to have rigid conduit at the ceiling to protect it from physical damage. I'm having trouble interpreting what they are asking for. Are we supposed to run rigid on the ceiling and then once below the 18" below the ceiling, we can use EMT and set screw fittings everywhere else? Do we need to use conduit seal offs for the conduit existing the classified area where the CNG equipment may interfere with electrical?
- A: Rigid metal conduit, intermediate metal conduit (IMC) shall be used per NEC. Liquidtight flexible metal conduit with listed fittings may be used where a flexible connection is required per NEC. Provide conduit seals leaving Class 1 Div 2 area per NEC. Boxes and fittings not required to be explosion proof if they contain no arcing devices per NEC. Explosion proof boxes and fittings are required if they contain arcing devices.*
- 15. Q,** What is the design code version? (IBC 2012?)
- A: The applicable building code is the Wisconsin Commercial Building Code (SPS 361-366) and IBC 2015.*
- 16. Q,** is the ground snow 30 psf?
- A: Yes.*
- 17. Q,** Min roof snow load is 21 psf?
- A: Yes, based on ASCE 7-10.*
- 18. Q,** Is the dead load to be 7 psf?
- A: Yes, or more if the building that is bid requires it.*
- 19. Q,** And the collateral load to be 5 psf?
- A: Yes.*
- 20. Q,** Are all column to be recessed -8" per details 8 & 9/S901?
- A: Yes.*
- 21. Q,** Specification section 133419 1.2.D.1 b.8 calls for deflection limits on 'office addition' and 'west bay addition? Are these typos from a previous job?
- A: The maximum roof and exterior wall deflection is L/240.*
- 22. Q,** Specification section 133419 1.7.B calls for '50 yr weathertightness endorsement. Behlen offers a roof panel 20 yr standard weathertightness warranty- Is this acceptable? No weathertightness warranty can be offered for wall panel systems.
- A: Provide a roof panel 20 yr standard weathertightness warranty*
- 23. Q,** Specification section 133419 2.1.B.12 calls for Primer FS-TT-P-31 White. Specification section 133419 2.3.E.1 calls for TT-P-636 This is no longer a valid specification section. SSPC paint requirements are the current standard. Behlen Dark Gray primer is applied per SSPC Paint 15 over steel cleaned per SSPC SP-2. Is this acceptable?
- A: Yes Behlen Dark Gray primer Is acceptable or equal.*
- 24. Q,** Specification section 133419 2.1.P.4 calls for red primer- Behlen standard is dark Gray primer. Is this acceptable?
- A: Yes Behlen Dark Gray primer Is acceptable or equal.*

- 25. Q,** Specification section 133419 2.3.E.1a calls for purlins to be dip tank coated in electro-deposition method.
All Behlen secondary members are fabricated with pre-galvanized G40 material. Is this acceptable?
A: pre-galvanized G40 material is acceptable.
- 26. Q,** The wall panels specified as VP Tech Four cannot be matched with panels from any of our current vendors-
Are McElroy MSR panels an acceptable substitute since the soffit panels are also specified as McElroy?
The difference is that the VP panels are 2” deep with 4 sections and these are 3” deep with 3 sections.
(see enclosed data sheets)
A: Yes McElroy MSR panels are acceptable substitute, if wall cavity changes contractor must supply a 100% filled insulated cavity with a minimum R-30.
- 27. Q ,** Several panel sections call for panel material of ASTM A653 but Behlen standard coil material is per ASTM A792 AZ50 – Is this acceptable?
A: Yes Behlen standard coil material is acceptable as long as it meets or exceeds the specifications
- 28. Q,** Are roof panels to be Galvalume or Kynar finish? Are wall panels to be Kynar or Cerm-a-star (siliconized polyester?)
A: Roof panels to be Kynar finish or Equal and wall panels to be Kynar or Cerm-a-star (siliconized polyester?) or equal.
- 29. Q,** Plans call for R-33 roof insulation – section 133419 2.1.K calls for R-38 double layer system.
We will bid the R-38 option unless directed otherwise.
And specification section 133419 2.1.O.3 calls for Guardian R-40 Energy Saver system?
A: R-38 double layer system
- 30. Q,** Are thermal blocks required?
A: No thermal bridging allowed, if your system requires thermal blocks then yes they need to be provided.
- 31. Q,** Detail 8 on Sheet S901 calls out (4) #9 vertical bars and the schedule calls out (4) #8 vertical bars.
Which is correct?
A: Follow the schedule – (4) #8 bars.
- 32. Q,** Will all the electrical be completed by the building manufacturer or will this be completed on site by an EC? This is a gray area for these pre-fabricated buildings now, sometimes they arrive on site all inclusive.
A: The entire bid is under a general contractor how you group the sub bids together are up to you. Typically, the electrical is not completed by the building manufacture.
- 33. Q,** Specification section 133419 1.7.C calls for ‘extended life endorsement’ on coated steel. What is the term required for roof and wall panel finishes?
A: 5 Year warranty is acceptable.
- 34. Q,** Specification section 133419 1.6 lists alternates in section 01 2300 but there is no section in this packet Are there any alternates to be priced?
A: No Alternates on these projects.
- 35. Q,** Specification section 133419 1.7.A calls for ‘Mfr’s std warranty covering complete assembly-Is this for materials and workmanship? Behlen offers a 5yr coverage – is this acceptable? If not, what is the term of the warranty and what items are to be covered?

A: 5 Year warranty is acceptable.

36. Q, Will the utility company trench and provide the secondary conductors and conduit from the transformer to the meter pedestal?

A:: Yes

37. Q, Confirm asphalt paving is required per Quam Engineering site plan dated 8/13/20. There is no information is specs.

A: See the asphalt specification and clarification drawing included with this addendum for the Albion site. Asphalt paving is not anticipated for the Verona site.

38. Q, I was told that there is asphalt on this project. I wanted to clarify on the area that you are looking for. I attached a highlighted plan that would be around 22,500 SQFT of new asphalt. Let me know if this is the area that you are looking to have the new asphalt.

A: See the asphalt specification and clarification drawing included with this addendum for the Albion site. Asphalt paving is not anticipated for the Verona site.

39. Q, The smoke detectors talked about being tied into a fire alarm panel. I don't see one on the print under electrical. Is there a fire alarm panel for this project?

A: There is no fire alarm panel.

40. Q, Is the mechanical division providing the smoke detectors?

A: Refer to mechanical drawings. No smoke detectors required under electrical work. There are sensors for CO and NO2 for ventilation. See electrical power and systems sheet note #4.

41. Q, Is Rm. 101 considered a damp location? It's confusing if we are to use EMT in the unclassified area or if we need to use rigid conduit.

A: Yes, damp location. Rigid or IMC shall be used per NEC in Class 1 Division 2 space. Liquidtight flexible metal conduit may be used per NEC where flexile connections are required. Provide seals as required by code. Conduit below Class 1 Division 2 space is EMT.

42. Q, The plan shows a 200AMP Meter Pedestal but a 250AMP MLO Electrical Panel feed from a 200AMP Main Circuit Breaker...can we confirm the amperages?

A: Main circuit breaker is 200 Amp and feeder is 200 Amp per power and systems sheet notes 8 and 9.

Panel A may be 200 Amp or 225 Amp. 250 Amp on panel schedule is incorrect.

If any additional information about this Addendum is needed, please contact Ryan Shore at 608/445-0109, shore@countyofdane.com.

Sincerely,

Ryan L Shore

Project Manager

Enclosures:

Section 32 12 16

Drawing Exhibit 3 Asphalt Boundary

Geotechnical Report & Appendix

SECTION 32 12 16

ASPHALT PAVING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Asphalt materials.
 - 2. Aggregate materials.
 - 3. Pavement-marking paint.
- B. Related Sections:
 - 1. Section 01 00 00 - Basic Requirements
 - 2. Section 01 74 19 - Recycling
 - 3. Section 32 11 23 – Dense Graded Base

1.2 MEASUREMENT AND PAYMENT

- A. Basis of Payment. HMA Pavement mixture of this type or types, accepted as stated above, shall be measured by lump sum of mixed aggregate and asphaltic material laid and compacted in place and shall include all work necessary to provide quality management programs in accordance with Section 460 of State of Wisconsin, Department of Transportation Standard Specifications for Highway and Structure standard: Sections: 455 and 460 for HMA Type 3 MT 58-28S and 4 MT 58-28H.
- B. Method of Payment. Payment will be made only for supplied material accompanied by ticket containing this information:
 - 1. Ticket number, date, and time
 - 2. Type of material
 - 3. Gross and net weights
- C. Copy of tickets will be given to County inspector on job site.

1.3 REFERENCES

- A. State of Wisconsin, Department of Transportation Standard Specifications for Highway and Structure standard.

1.4 SUBMITTALS

- A. Product Data:
 - 1. Submit product information for asphalt and aggregate materials.
 - 2. Submit mix design with laboratory test results supporting design.
- B. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Mixing Plant: Conform to State of Wisconsin, Department of Transportation Highway and Structure standard.
- B. Perform Work in accordance with State of Wisconsin, Department of Transportation Standard Specifications for Highway and Structure standard.

1.6 QUALIFICATIONS

- A. Installer: Company specializing in performing work of this section with minimum three (3) years experience.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if these conditions are not met:
 - 1. Tack Coat: Minimum surface temperature of 60 degrees F (15.6 degrees C).
 - 2. Asphalt Base Course: Minimum surface temperature of 40 degrees F (4.4 degrees C) and rising at time of placement.
 - 3. Asphalt Surface Course: Minimum surface temperature of 60 degrees F (15.6 degrees C) at time of placement.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at minimum ambient or surface temperature of 40 degrees F (4.4 degrees C) for oil-based materials or 55 degrees F (12.8 degrees C) for water-based materials, and not exceeding 95 degrees F (35 degrees C).

PART 2 PRODUCTS

2.1 HMA PAVEMENT - 3 MT 58-28S & 4 MT 58-28H

Description: Materials covered under this provision shall conform to State of Wisconsin, Department of Transportation's specifications for each "Type" mix. The asphaltic pavement shall be 5", installed in a 3" binder lift and a 2" surface layer. The said pavement mix shall be 3 MT 58-28S in the binder layer and 4 MT 58-28 H in the surface layer in conformance with WisDOT Standard Spec Section 460. The binder lift nominal maximum gradation shall be 19.0 millimeters. The surface lift nominal maximum gradation shall be 12.5 millimeters. All surface pavement lateral pavement seams shall be offset a minimum of 6" from binder pavement lateral seams and be compacted with a hot roller. Trucks transporting the asphaltic material shall be covered with a tarp at all times until paving operations begin for that load. The material shall have a temperature of 270°F -300°F at time of paving and loads of asphalt that are less than 250°F or more than 350°F shall be rejected.

- A. Contractor will be responsible for providing mix design(s) and for testing required to insure uniformity of mix and adequacy of compaction. Mix design must be submitted to

County for approval within 30 days after execution of contract. In no case will paving be allowed to begin until County is in receipt of said mix design(s).

- B. Mix designs must be prepared by approved materials engineering consultant. Designs from previous years will not be allowed unless certification is included as to proposed aggregate and asphalt source, quality and consistency being equal to previous years. Separate mix design must be submitted for both upper and lower courses, if both are required. Separate mix designs shall be provided for each different source of aggregate.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder and Surface Course shall be in accordance with State of Wisconsin, Department of Transportation Standard Specifications for Highway and Structure standard:

2.3 AGGREGATE MATERIALS

- A. All Aggregate shall be in accordance with State of Wisconsin, Department of Transportation Standard Specifications for Highway and Structure standard.

2.4 AUXILIARY MATERIALS

- A. Pavement-Marking Paint: MPI #97 Latex Traffic Marking Paint.
- B. Color: Yellow Conventional, 4 inch width.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions before starting work.

3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Owner.
- B. Allow paving to age for 24 hours minimum before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide minimum wet film thickness of 15 mils (0.4 mm).

3.3 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections.

- B. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

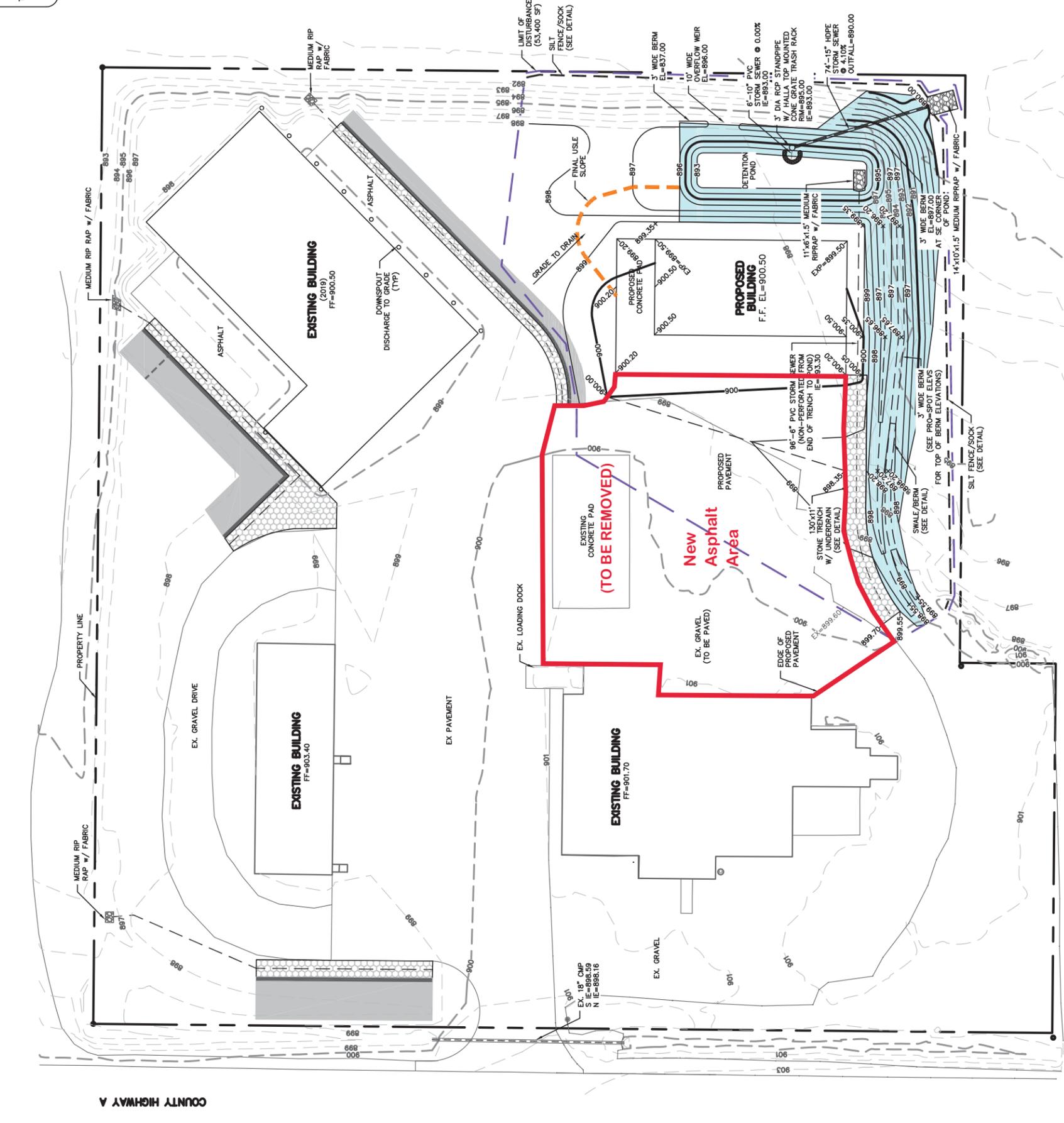
3.4 PROTECTION OF FINISHED WORK

- A. Immediately after placement, protect paving from mechanical injury for 48 hours or until surface temperature is less than 140 degrees F (60 degrees C).

END OF SECTION

LEGEND:

- INSTALL WISDOT CLASS I TYPE 'B' EROSION MAT
- DRAINAGE ARROW



TO OBTAIN LOCATION OF PARTICIPANTS' UNDERGROUND FACILITIES BEFORE YOU DIG IN WISCONSIN CALL DIGGERS HOTLINE 1-800-242-8511 TOLL FREE

WIS. STATUTE 182.0775 (1974) REQUIRES 14 DAYS NOTICE BEFORE YOU EXCAVATE

TOB(FOR THE HEARING IMPAIRED)(608)542-2289

EROSION NOTES:

EROSION CONTROL MAT IS TO BE MAINTAINED BY THE CONTRACTOR IN A CASING GRAVEL TRACKS PRESENT. BACK OF MAT TO BE CURED TO THE ADJACENT PUBLIC STREETS. SEDIMENT REACHING THE PUBLIC ROAD SHALL BE REMOVED BY STREET CLEANING (NOT HYDRAULIC FLUSHING) BEFORE THE END OF EACH WORKDAY.

EROSION CONTROL DEVICES SHALL BE INSTALLED PRIOR TO GRADING OPERATIONS AND SHALL BE PROPERLY MAINTAINED FOR MAXIMUM EFFECTIVENESS UNTIL VEGETATION IS ESTABLISHED. ALL EROSION CONTROL MEASURES AND STRUCTURES SERVING THE SITE MUST BE INSPECTED AT LEAST WEEKLY OR WITHIN 24 HOURS OF A 0.5 INCH RAIN EVENT. ALL MAINTENANCE WILL FOLLOW AN INSPECTION WITHIN 24 HOURS.

CUT AND FILL SLOPES SHALL BE NO GREATER THAN 3:1.

ALL DISTURBED AREAS MUST BE TEMPORARILY STABILIZED WITHIN 14 DAYS OF LAST ACTIVITY. ALL DISTURBED AREAS SHOULD BE STABILIZED WITHIN 7 DAYS OF FINAL GRADING.

PERMETER CONTROL SHOULD BE INSTALLED AROUND STOCKPILES AND STOCKPILES SHOULD BE STABILIZED THAT WILL REMAIN INACTIVE FOR 7 DAYS OR LONGER.

EROSION CONTROL IS THE RESPONSIBILITY OF THE CONTRACTOR UNTIL ACCEPTANCE OF THIS PROJECT. EROSION CONTROL MEASURES AS SHOWN SHALL BE THE MINIMUM FOR PROTECTING THE SITE FROM EROSION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RECOGNIZING AND CORRECTING ALL EROSION CONTROL PROBLEMS THAT ARE A RESULT OF CONSTRUCTION ACTIVITIES. ADDITIONAL EROSION CONTROL MEASURES, AS REQUESTED IN WRITING BY THE STATE OR LOCAL INSPECTORS, OR THE DEVELOPER'S ENGINEER, SHALL BE INSTALLED WITHIN 24 HOURS.

TIME SCHEDULE:

APRIL 1 - APRIL 15, 2021

APRIL 15 - SEPTEMBER 15, 2021

SEPTEMBER 15, 2021

RESTORATION NOTES:

RESTORATION WILL OCCUR AS SOON AFTER THE DISTURBANCE AS PRACTICAL. SLOPES GREATER THAN 20% SHALL BE RESTORED WITHIN 30 DAYS.

ALL PVIOUSLY DISTURBED AREAS SHALL RECEIVE A MINIMUM OF FOUR (4) INCHES OF TOPSOIL. SEED, MULCH, AND FERTILIZER SHALL BE APPLIED TO ALL RESTORED AREAS. RESTORATION SHALL OCCUR WITHIN 30 DAYS OF THE END OF CONSTRUCTION. RESTORATION SHALL BE USED ON ALL DISTURBED AREAS EXCEPT FOR THE DETENTION POND. THE DETENTION POND BOTTOM SHALL BE RESTORED WITH WET PRAIRIE SEED MIX SUPPLIED BY AGRECOL OR EQUIVALENT. MIXTURES SHALL BE IN ACCORDANCE WITH SECTION 630 OF D.O.T. SPECIFICATIONS. AN EQUAL AMOUNT OF ANNUAL RYEGRASS SHALL BE ADDED TO THE MIX.

FERTILIZER SHALL BE THE FOLLOWING MINIMUM REQUIREMENTS: NITROGEN, NOT LESS THAN 16% PHOSPHORIC ACID, NOT LESS THAN 8% POTASH, NOT LESS THAN 8% FERTILIZER SHALL BE APPLIED AT THE RATE OF FOUR (4) POUNDS PER 1000 SQUARE FEET. SEED MIXTURES SHALL BE APPLIED AT THE RATE OF FOUR (4) POUNDS PER 1000 SQUARE FEET. MIXTURES SHALL CONSIST OF HAY OR STRAW APPLIED AT THE RATE OF TWO (2) TONS PER ACRE.

SEEDING FROM OCTOBER 1 THROUGH NOVEMBER 15 SHOULD BE AVOIDED TO PREVENT FERTILIZER FROM WASHING AWAY. WINTER WHEAT SEED AT ONE POUND PER 1,000 SQUARE FEET FOR SEEDING AFTER NOVEMBER 15.

OWNER:

W. DORR ENGINEERING, LLC
210 WRIGHT STREET
MADISON, WI 53704

ENGINEER:

QUAM ENGINEERING, LLC
4604 SIGELKOW ROAD, SUITE A
MCFARLAND, WI 53558

ROCK CHECK DAM DETAIL

6" THICK LAYER OF
2" WASHED STONE

FLOW

SILT SOCK DETAIL

80% STAFFE (10' 8" x 8" x 8")
NOMINAL 1/2" x 3/8" MIN

FLUXEY SILTSOCK (OR EQUAL)
12" DIA

SHEET FLOW

4" x 2" x 2" (MIN.)
WOOD POST

FILTER FABRIC

SHEET FLOW

EXTEND FABRIC TO BELOW SURFACE

2' MINIMUM

SILT SOCK INSTALLATION SHALL CONFORM TO WISCONSIN DNR TECHNICAL STANDARD #1056

SILT FENCE CONSTRUCTION (SHEET FLOW)

1015 COUNTY HIGHWAY A - 50'x100' BUILDING
GRADING AND EROSION CONTROL PLAN
EXHIBIT #3 Asphalt Boundary
DATED: AUGUST 13, 2020

QUAM ENGINEERING, LLC
Residential and Commercial Site Design Consultants
www.quamengineering.com
4604 Sigelkow Road, Suite A - McFarland, Wisconsin 53558
Phone (608) 838-7750; Fax (608) 838-7752

SWALE/BERM CROSS SECTION

3' WIDE BERM

3:1 (MAX)

1' MIN

3:1 (MAX)

2' WIDE

INSTALL CLASS I TYPE 'B' EROSION MAT UP SIDE SLOPES

STONE TRENCH DETAIL

PAVEMENT

TOP WIDTH SEE PLAN VIEW

DEPTH

1:1 SIDE SLOPE MAX.

3' LIMESTONE TRENCH

6" PERFORATED UNDERDRAIN I.E.=893.30

PLAN VIEW

0.5' MIN.

RRAP PERIMETER ELEVATION

SECTION A - A

GEOTEXTILE FABRIC

% PASSING BY WEIGHT	SIZE (INCHES)
100	20
50-85	15
20-50	10
5-20	5
0-5	2

RRAP SHALL BE PLACED AS DEFINED IN SECTION 606 OF WISCONSIN D.O.T. SPECIFICATIONS. STONE PIECES SHALL BE WELL GRADED, RANGING IN DIAMETER AS DESCRIBED IN THE ADJACENT CHART.

SIZES CALCULATED IN BEST D.S.Z

August 4, 2017

Strand Associates, Inc.
910 West Wingra Drive
Madison, WI 53715

Attn: Mr. Brett Oftedahl, P.E.

Re: Geotechnical Exploration Report
Project ID 1007-11-01
IH 39
Illinois State Line – Madison
USH 51 Intch Area/CTH A Salt Shed
Dane County
PSI Report No: 00521771R1

Geotechnical Report for WisDOT review.

This report addressed Strand's comments provided to PSI on July 26, 2017.

Additional Strand comments for WisDOT consideration are indicated within this report.

Dear Mr. Oftedahl:

Professional Service Industries, Inc. (PSI) is pleased to submit our Geotechnical Exploration Report for the Proposed CTH A Salt Shed Project located in Dane County, Wisconsin. This report includes the results of field and laboratory testing, recommendations for foundations, floor slabs, pavements, and a stormwater management device, as well as general site development recommendations.

PSI appreciates the opportunity to perform this geotechnical study and we look forward to continued participation during the design and construction phases of this project. If you have any questions pertaining to this report, or if we may be of further service, please contact our office.

Respectfully submitted,

PROFESSIONAL SERVICE INDUSTRIES, INC



Benjamin J. Kroeger, E.I.T.
Staff Engineer
Geotechnical Services



Ted A. Cera, P.E.
Department Manager
Geotechnical Services

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GEOTECHNICAL ENGINEERING
SERVICES REPORT

For the

Proposed CTH A Salt Shed
Project ID 1007-11-01
IH 39
Illinois State Line – Madison
USH 51 Intch Area/CTH A Salt Shed
Dane County
Town of Albion, Wisconsin

Prepared for:
Strand Associates, Inc.
910 West Wingra Drive
Madison, WI 53715

Prepared by:

Professional Service Industries, Inc.
821 Corporate Court
Waukesha, WI 53189
(262) 521-2125
Fax (262) 521-2471

PSI Report Number: 00521771R1

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Benjamin J. Kroeger, E.I.T.
Staff Engineer
Geotechnical Services



Ted A. Cera, P.E.
Department Manager
Geotechnical Services

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Information To Build On

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PROJECT INFORMATION

Project Authorization

PSI proceeded with the services based on authorization from the signed Task Order for Geotechnical Services (Task Order Number 16-02).

Project Description

It is PSI's understanding that the proposed project includes construction of a new salt storage shed and a stormwater management basin in Albion, Wisconsin. The following Table lists the material and information provided for this project:

DESCRIPTION OF MATERIAL	PROVIDER/SOURCE	DATE
Site Plan with Proposed Building and Pond Locations	Joe Bunker / Email	4/27/2017
Preliminary Traffic Loading and Building Elevations	Brett Oftedahl / Email	6/21/2017

PSI understands that the project may include the demolition and removal of up to 3 of the existing buildings in addition to the construction of a new 13,529 square foot salt shed along with, possibly, a stormwater management basin. Based on discussions with Strand Associates it is understood that one of the existing buildings may remain on the site for use as a cold storage facility (denoted as Existing Building #2). In addition, the existing structure that may remain will be surrounded by asphalt pavement and the planned salt shed is to be partially surrounded by asphalt pavement. This proposal is based on the proposed new salt storage structure being a single story high-bay structure with a finished floor elevation being at or near existing grade.

Based on discussions with Strand, WisDOT is considering raising the site grades around existing building #2 on the site to accommodate the use of that building. The finish floor elevation of building #2 is approximately 4 feet above the surrounding site grades. Strand has indicated that the site design concept around existing building #2 has not yet been established. Based on preliminary site grading information, the finished floor elevation of the salt shed will be an elevation of approximately EL. 902 if existing building #2 remains and the site is raised in elevation. However, if existing building #2 is removed, the finished floor elevation of the salt shed will be approximately EL. 899. It is also understood that the incorporation of a stormwater management basin is uncertain at the time of this report.

It is understood that the building is planned to be a contractor-designed structure. However, based on the information provided by Strand, wall loads are anticipated to be in the range of 2 to 3 kips per linear foot. The anticipated structure type for the planned salt shed is to consist of wood side walls with columns and bracing at 8 feet on center around the building. The wall loads from the building will be transferred to individual spread footings at approximately 8 feet on center. It is understood that a continuous strip footing around the building perimeter is not anticipated for this type of structure. In

addition, it is also unknown if lateral bracing anchors are planned to be incorporated into the design of the salt shed.

The anticipated floor loading for the salt shed is as follows. The stored salt pile within the shed may be as high as 30 feet above the floor at the center of the pile, and will reduce to about 12 feet at the side walls. It is understood that the unit weight of the salt to be used for design of the floor slab is 100 pounds per cubic foot (pcf). Multiplying this load by the anticipated height of the pile will result in a loading intensity on the floor slab of approximately 1,200 pounds per square foot (psf) at/near the side walls and a maximum loading of approximately 3,000 psf at the very center of the pile. The anticipated floor for the salt shed will consist of asphalt.

Based on the preliminary information, a large front-end loader will be used on site, it is anticipated that it will take about 4 buckets to fill the dump trucks. It is also anticipated that the large front-end loader is to be used for snow removal of the site. In addition, it is understood the site will be used by fully loaded tractor trailers (WB-65) and large dump trucks. The exact frequency of trucks on this site is unknown, however, Strand estimated the shed to be filled once per year, requiring approximately 400 loads (from the WB-65 trucks) of salt to fill the shed. It is also anticipated that during a winter storm 50 salt trucks (large dump trucks) will be loaded per storm. It was also estimated for frequency of traffic loading that one storm will occur per week, over a 3-month period from December through March.

For purposes of this report, it is estimated that the large dump trucks would consist of quad-axle dump trucks with a gross weight of 69,000 pounds. The fully loaded tractor trailers (WB-65) are estimated to have a gross weight of 80,000 pounds. The large front-end loader was estimated to have gross weight of 42,000 pounds. The axle weights for the respective trucks were assigned based on the maximum axle loading weights specified by WisDOT.

Traffic loading information with regards to access to the site by passenger vehicles was not provided at the time of this report. However, for purposes of this report the anticipated traffic loading/frequency for any standard-duty pavements is estimated to result in a total of 30,000 ESAL's based on a service life of 20 years. Based on the traffic loading information provided by Strand, along with the aforementioned assumptions, it is estimated that traffic loading/frequency for the asphalt or concrete heavy-duty pavements will result in approximately 222,197 and 283,788 ESALs, respectively, based on a service life of 20 years. In addition, based on the estimated traffic loading/frequency for the asphalt or concrete heavy-duty pavements located within and around the salt shed, it is anticipated that the pavement will be subject to approximately 1,281,062 and 1,335,761 ESALs, respectively, based on a service life of 20 years.

The following Table lists the structural loads and site features that are required for or are the design basis for the conclusions contained in this report:

STRUCTURAL LOAD/PROPERTY	REQUIREMENT/DESIGN BASIS	
SALT SHED		
Finish Floor Elevation	EL. 902± to EL. 899±	R
Maximum Wall Loads	4 kips per lineal foot (klf)	B
Maximum Floor Loads and Size	3,000 pounds per square foot (psf)	B
Settlement Tolerances	1-inch total; ¾-inch differential between adjacent columns	B
PAVEMENTS		
Pavement 18-kip ESAL (cycle & duration) With a life expectancy of 20 years	Standard Duty – 30,000 ESALs (flexible) Heavy Duty – 222,197 ESALs (flexible) / 283,788 ESALs (rigid) Salt Shed Area – 1,281,062 ESALs (flexible) / 1,335,761 ESALs (rigid)	B

B = Report has been prepared based on this parameter or loading in the absence of information at the time of this report

R = Information supplied by Strand Associates, Inc.

The geotechnical recommendations presented in this report are based on the available project information, building location, and the subsurface materials described in this report. If the noted information is incorrect, please inform PSI in writing so that we may amend the recommendations presented in this report if appropriate and if desired by Strand Associates. PSI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

Purpose and Scope of Services

The purpose of this study was to explore the subsurface conditions at the site and develop geotechnical design criteria regarding foundations, floor slabs, pavements and stormwater basin for the planned project. In addition, PSI was also requested to provide recommended thicknesses for the pavements. Subgrade preparation recommendations and construction considerations are also provided. PSI's scope of services included drilling a total of seven soil borings, select laboratory testing, and preparation of this geotechnical report.

With respect to the proposed stormwater management area, the field and laboratory work for classification of the subgrade soils was performed to provide information for use by the basin design personnel when considering requirements of Chapter NR151 of the Wisconsin Administrative Code, and of WDNR Technical Standard 1002, "Site Evaluation for Stormwater Infiltration" guidelines. The design of the proposed possible stormwater management area was beyond PSI's scope of services for this project.

PSI's scope of services did not include an environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater, or air on or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

PSI did not provide any service to investigate or detect the presence of moisture, mold or other biological contaminants 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.

SITE AND SUBSURFACE CONDITIONS

Site Location and Description

The project site is generally located within the area bounded to the east by Interstate Highway 39, bounded to the west by County Trunk Highway A, bounded to the north by U.S. Highway 51, and bounded to the south by Maple Grove Road. The site, which was formerly owned by Marling Lumber, is currently owned by the Wisconsin Department of Transportation. The site consists of 4 buildings surrounded by a gravel drive. The current site grades have not been provided at the time of this report, however based on aerial imagery, in addition to the elevation of the performed soil borings, the site appears to be relatively flat.

Site Pedology

The U.S. Department of Agriculture *Soil Survey of Dane County, Wisconsin* was reviewed with regard to the pedological classification of the soils in the project area. The soil survey indicates that the soils generally consist of Dodge silt loam and St. Charles silt loam. These soils are described as well drained, and they exhibit variable water table depths of about 40 to 80 inches. These soils are typically classified as silty clay (CL-ML) and sandy lean clay (CL) using the USCS classification system; and as A-4/A-6 using the AASHTO Soil Classification system. The soil survey indicates that the above soil series generally exhibit moderate to poor subgrade support characteristics, with low to high shrink-swell potential, and can exhibit low bearing when wet. These soils are generally assigned Design Group indexes of 13 to 15; a frost index of F-3; and subgrade modulus values of 125 pci.

Subsurface Conditions

The subsurface conditions were explored with seven soil test borings (B-1 to B-7). The following Table indicates the general locations, approximate elevations and depths to which the borings were completed.

BORING NUMBER	GENERAL LOCATION	APPROXIMATE ELEVATION (FEET)	COMPLETION DEPTH (FEET)
B-1	Proposed Salt Shed – SW Corner	898	25
B-2	Proposed Salt Shed – NW Corner	897	25
B-3	Proposed Salt Shed – SE Corner	898	25
B-4	Proposed Salt Shed – NE Corner	898	25
B-5	Proposed Stormwater Basin	898	20
B-6	Proposed Stormwater Basin	898	20
B-7	Proposed Asphalt Drive	899	10

The borings were located in the field by the drill crew utilizing conventional taping procedures referenced to existing site features. In addition, the elevations of the borings were measured in the field by the drill crew utilizing conventional leveling techniques. The boring elevations were referenced to the finish floor elevation of existing building #2, with a known elevation of EL. 903. The locations of the borings are considered to be accurate within a few feet. The elevations are considered to be accurate to within about a foot. The approximate boring locations can be found within the appendix of this report. The borings were advanced utilizing hollow-stem auger drilling methods and soil samples were routinely obtained during the drilling process. Drilling and sampling techniques were accomplished generally in accordance with ASTM procedures. Representative soil samples were obtained from the soil borings and were returned to PSI's laboratory where they were visually classified using the Unified Soil Classification System (USCS) as a guideline. Further, PSI conducted limited laboratory testing on select soil samples to aid in identifying and describing the physical characteristics of the soils and to aid in defining the site soil stratigraphy. The results of the field exploration and laboratory tests were used in PSI's engineering analysis and in the formulation of our engineering recommendations.

USCS Classification (B-1 to B-7)

The surface materials encountered at borings B-2, B-4, and B-6 consisted of about 3 to 6 inches of topsoil. Surficial materials encountered at boring B-7 consisted of about 5 inches of aggregate base.

Surficial materials encountered at borings B-1, B-3, B-5 consisted of about 12 inches of fill material generally consisting of sand and gravel, which was found to be in moist condition. In addition, trace root matter was observed within boring B-5.

Below the above described surficial materials, fill soils were observed in borings B-1 to B-6 extending to depths ranging from about 5½ to 8 feet below the ground surface (EL. 892½± to EL. 889±). Typically, the existing fill materials were observed to consist of lean clay and silty sand with gravel with considerable amounts of concrete and asphalt rubble. In addition, varying amounts of intermixed topsoil was observed within boring B-1. The moisture contents of the fill material were observed to be in the range of 11% to

15%, indicating a moist condition. The granular fill materials were found to be very dense with “N-Values” obtained from Standard Penetration Tests (SPT) of about 50+ blows per foot (bpf). However, these N-values are considered to be artificially elevated due to the presence of considerable amounts of rubble within the fill. The cohesive fill soils were medium stiff with estimated unconfined compressive strengths of 2 to 2.25 tons per square foot (tsf).

Below the above described surficial and/or fill materials, native soils were observed extending to the boring termination depths (EL. 899± to EL. 872±). Typically, the native soils were observed to consist of brown lean clay, light brown silty fine sand, as well as some sandy silt, clayey sand and sandy clay. The moisture contents of the native lean clay soils were observed to be in the range of about 15% to 26%, indicating a moist to wet condition. The native lean clay soils were stiff to very stiff in consistency with estimated unconfined compressive strengths of 1 to 3 tons per square foot (tsf), but most typically near 2 tsf. The moisture contents of the native granular soils were found to be in the range of about 7% to 15%, but more typically in the range of about 8% to 9%, indicating a moist condition. The granular native soils were found to be loose to very dense in consistency with “N-Values” in the range of about 8 to 55 bpf, but more typically in the range of about 15 to 31 bpf.

USDA Soil Classification – Proposed Stormwater Pond Borings B-5 and B-6

Borings B-5 and B-6, located in the area of the proposed stormwater pond, were additionally classified in accordance with the USDA Textural Soil Classification System for infiltration and stormwater design purposes. The surficial soils encountered at the location of boring B-6 consisted of about 3 inches of topsoil. Surficial soils encountered at the location of boring B-5 consisted of about 12 inches of fill material comprising of a dark yellowish brown gravelly loamy sand.

Below the above described surficial materials fill soils consisting of a light yellowish brown to brown gravelly loamy sand were observed extending to depths of about 5½ to 8 feet below the ground surface (EL. 892½± to EL. 890±). Below the above described fill soils were native cohesive soils generally consisting of dark yellowish-brown clay, clay loam and sandy clay loam to depths of about 10½ to 15½ feet (EL. 882½± to EL. 887½±). Below the cohesive soils was a yellowish brown gravelly sandy loam, extending to the boring termination depths (EL. 878±).

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the appendix should be reviewed for specific information at individual boring locations. These records include soil descriptions, stratifications, penetration resistances, locations of the samples and laboratory test data. The stratifications 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 stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on these boring logs. The samples that were not discarded during classification or altered by

laboratory testing will be retained for 60 days from the date of this report and then will be discarded.

Groundwater Information

Groundwater observations were made during the drilling operations, and in the open boreholes at completion. No groundwater was encountered during auger advancement in any of the borings performed. Upon completion and removal of the augers, groundwater was not present in any of the borings above the caved soils. However, it should be noted that a zone of wet soils was encountered within boring B-2 from 11.5 to 16.5 feet below the ground surface (EL. 886½± to EL. 880½±). These wet soils appear to be indicative of a perched or trapped condition at boring B-2.

The groundwater level at the site will fluctuate based on variations in rainfall, snowmelt, evaporation, surface run-off and other related hydrogeologic factors. The water level measurements presented in this report are the levels that were measured at the time of PSI's field activities.

EVALUATION AND RECOMMENDATIONS

Geotechnical Discussion

There are five primary geotechnical related concerns at this site. The following summarizes these concerns:

- 1) Existing fill material was encountered within the borings performed within the proposed salt storage structure footprint (borings B-1 to B-4) extending to depths of approximately 5½ to 8± feet below existing ground surface (EL. 892½± to EL. 889±). In addition, intermixed topsoil was encountered within the fill boring B-1 at a depth of about 3 to 5½ feet below the existing ground surface (EL. 895± to 892½±). These fill soils are not recommended for foundation support within the proposed building area. It should be anticipated that the depth and consistency of the unsuitable existing fill materials may change vary between and beyond boring locations, and between sampling intervals.***

Based on the borings, the fill material encountered within borings B-1 through B-4 appears to contain considerable amounts of asphalt and concrete rubble. Typically, fill soils such as these are indicative of uncontrolled fills. Large pieces of asphalt and concrete rubble can artificially elevate N-values, and can result in voids in the deposit. As such, these existing fill materials are not considered suitable for foundation support due to their potential for excessive overall and/or differential settlement, and resulting distress to the overlying foundation elements. **PSI does not recommend that new foundations be supported upon the existing undocumented fill, or newly placed**

structural fill placed upon these materials. Within foundation subgrade excavations, full removal of any existing fill soils and any buried organics to expose the underlying suitable natural soils, is therefore recommended. Shallow foundation systems supported on suitable natural soils, compacted engineered fill, or lean mix concrete founded upon suitable underlying natural cohesive soils, may be used for building support provided the site is prepared as outlined below and the recommendations contained herein are followed. The footing observation program discussed in this report will be critical in terms of foundation performance.

It is anticipated that for the most part, the existing fill within the proposed salt shed area, provided it has been observed and tested by a qualified geotechnical engineer during construction, will be suitable for subgrade support within the floor area as well as for the site pavement portions of the project. Therefore, complete removal of the existing fill is generally not considered to be required in these areas provided the owner can accept the inherent risk of some possible differential settlement and reduced service life of the pavement by relying upon existing fill soils for structural support.

The adherence to the initial site preparation recommendations is considered critical to verify a suitable subgrade exists, prior to the placement of new fills required to obtain project grades. Depending upon the moisture conditions at the time of construction, some surficial instability may be encountered across the site due to the moisture sensitive nature of the soils. The project geotechnical engineer must be available throughout construction to provide guidance where necessary.

2) When excavations extend into the existing fill material, sloughing/caving of the sidewalls can occur. Significantly widened excavations may result, or be required for stability.

Fill materials containing apparent considerable amounts of concrete and asphalt rubble were observed within borings B-1 through B-4, performed within the proposed building footprint. These soils have the potential for instability when excavations extend through them due to the variable nature of the fill materials.

3) It should be anticipated that the near surface silty and clayey soils at this site may be in a very moist to wet condition in areas once exposed below the surface materials, which will result in these materials being unstable.

Higher moisture contents, if encountered during construction, will cause the silty and clayey soils to be unstable, especially when subjected to construction traffic. Where observed during construction, very moist or wet, unstable clay soils may either be scarified, dried, and recompact ~~according to WisDOT Standard Specifications section 207.3.6.3 for Special Compaction, or excavated below subgrade (EBS), and replaced with a select granular material such as those specified in Sections 209, 305, or 312 of the WisDOT Standard Specifications.~~ Special Compaction, rather than Standard Compaction, is specifically recommended due to the presence of existing, undocumented fill soils, and fine-grained soils which were in a very moist condition during the exploration. In areas of EBS, excavation below subgrade to a depth of about

Does WisDOT have a preference for the materials that are being recommended by PSI? Does WisDOT agree with the recommendation for special compaction that is provided throughout the report?

1 to 2 feet and the placement of select granular fill, along with the placement of a geogrid such as BX1200, if necessary, can generally be used to improve the stability of the subgrade. Additionally, in order to lessen the “bath tub” effect, the bottom of over-excavations in pavement areas should be sloped to drain to a 4-inch draitile that is in turn sloped to drain (minimum slope of 1 percent) to the nearest catch basin, or daylighted to an appropriate area of the site.

It must be recognized that soil stability can be dependent on such factors as soil type and moisture content, weather conditions at the time of construction, and also construction disturbance. Thus, the need to perform EBS, or not, generally must be determined based upon field observations made during subgrade preparation. However, clayey soils are very sensitive to moisture and disturbance. As such, at least some EBS of these soils should be expected to be necessary during subgrade preparation.

4) Perched water conditions were apparent within boring B-2. Excavations required to extend below the depth of perched water will require temporary dewatering methods such as the use of sump pits and pumps.

The methods for dewatering the excavation must ultimately be determined by the contractor so as to prevent standing water in the trench during construction activities. Based upon PSI’s past experience, the apparent perched conditions encountered should generally be able to be managed through the use of properly placed and sized sump pits and pumps.

5) Due to the predominance of low permeability clay soils encountered within the pavement subgrade, adequate drainage of the aggregate base will be imperative for maintaining as dry of a subgrade condition as possible to maximize subgrade support and reduce the effects of freeze-thaw cycles. Minimum drain tile placement, as described in the Pavement Recommendation section, should be provided below the entire length of the roadway replacement in order to improve drainage of the aggregate base materials.

In order to provide adequate drainage for the aggregate base, minimum drain tile placement, as described in the Pavement Recommendations section, should be used in the pavement design to help provide a drained condition within the aggregate base below the asphalt pavement. A drained condition will help reduce heaving and softening of the subgrade soils.

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

Prior to the placement of new fill or preparation of the construction area subgrade, PSI recommends that any surficial topsoil materials, vegetation, or other unsuitable soils be removed from within and to a minimum distance of 10 feet beyond proposed structural areas (buildings and pavements).

Old building foundations, building remnants, associated underground utilities not intended for reuse, or unsuitable backfill materials, should be completely removed from within and a minimum of 10 feet beyond new building areas. The resulting excavations should then be backfilled with select granular materials such as those described in WisDOT Standard Specifications Sections 209, 305, or 312, which are compacted by Special Compaction as specified in WisDOT Standard Specifications 207.3.6.3. In order to utilize backfill soils for support of the new structure and pavements, the backfill materials must be placed in a controlled manner, to the specified level, which is monitored by the project geotechnical engineer. Complete removal of foundations, foundation walls or concrete floor slabs need not be completely removed from within pavement and landscape areas; however, PSI recommends they be removed to a minimum depth of 2 feet below planned subgrade elevation (bottom of aggregate base course elevation) to provide a more uniform subgrade condition.

Higher moisture content soils may be exposed during the above operations. These soils will be sensitive to moisture and disturbance when the confining weight of the overburden materials is removed. These soils may require some form of stabilization and must be prepared according to WisDOT Standard Specifications section 211. Accordingly, any unstable subgrade areas should be over-excavated and subsequently backfilled as directed by the project geotechnical engineer.

Prior to placement of new fills, and subsequent to cutting high areas of the site to planned grades, the subgrades within the building and pavement areas should be proof compacted and proof rolled. Proof compaction should be performed with a heavy (minimum 10-ton static weight) compactor. A fully-loaded tandem axle dump truck, or rubber tired vehicle of similar size and weight, typically 9 tons/axle, should then be used for the proof roll. Soils that are observed to rut or deflect excessively under the moving load (typically greater than about 1 inch), should be undercut and replaced with properly compacted fill. The proof rolling is important to identify soft or loose zones under buildings and pavements. The proof rolling and undercutting activities should be documented by a representative of a qualified geotechnical engineer and should be performed during a period of dry weather. The subgrade soils should be scarified and compacted according to Special Compaction due to the presence of existing undocumented fill soils, and very moist fine-grained soils, which will likely require at least some moisture conditioning to achieve the required density and a stable condition. The depth of scarification should not be less than six inches below the surface. Drying or wetting of the subgrade soils, typically to within 3% of the optimum moisture content, may be advised to facilitate compaction.

New structural fill materials should include select granular materials such as those

specified in WisDOT Standard Specifications sections 209, 305, or 312. As stated, the select granular materials should be placed in maximum lifts of eight inches of loose material and should be compacted within 3% of the optimum moisture and to a minimum of 95 percent of the maximum dry density as determined by the standard Proctor test (ASTM D 698/AASHTO T99), as specified for Special Compaction. If water is to be added, it should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. Each lift of compacted select granular materials should be observed and tested by the project geotechnical engineer prior to placement of subsequent lifts. The lateral extent of the over-excavation of poor soil and subsequent placement and compaction of the select granular materials should be equal to or greater than the depth of over-excavation below finished floor elevation. As for the pavement areas, the newly placed compacted select granular materials should extend laterally a distance at least equal to the necessary thickness of fill required to reach planned development grades.

When excavations encroach upon or extend below the groundwater or perched zones, and into sandy or silty soils, subgrade instability and sloughing/caving of sidewalls can occur. Some over-excavation of softened or loosened soils, in conjunction with the use of a crushed stone working mat, may be necessary. Additionally, significantly widened excavations may result, or be required for stability. Dewatering, such as with the use of sump pits and pumps, will be required.

The selection of fill materials for various applications should be done in consultation with the soils engineer. Similarly, the evaluation of the subgrade and placement and compaction of fill for structural applications should be monitored and tested by a qualified representative of the soils engineer.

The adherence to the initial site preparation recommendations are considered critical to verify a suitable subgrade exists, prior to the placement of any new fills required to obtain project grades. Some surficial instability should be anticipated across the site due to the moisture sensitive nature of the clay and silt soils and the presence of variable fill. During earthwork operations, a representative of the geotechnical engineer should be present on-site on a full-time basis to verify the subgrade conditions and placement and compaction of new fills.

Foundation Recommendations

Based on borings B-1 through B-4 performed within the proposed footprint of the Salt Shed, the proposed structure may be supported by individual concrete spread footings, or conventional continuous wall and/or column footings, which bear upon suitable native soils, or upon newly placed and compacted fill or lean concrete placed upon suitable native soils. However, based the borings and the estimated finish floor elevation (EL. 902 and EL. 899 for the two different options, respectively), the soils at the approximate footing bearing elevations (EL. 898± or EL. 895±) are estimated to consist mainly of fill with variable amounts of concrete and asphalt rubble. These fill soils are not considered to be suitable for foundation support. All footings must therefore be extended through any existing fill to bear upon suitable bearing underlying natural soils. Fill soils were present within borings B-1 to B-4 extending to depths of about 5½ to 8±

feet below existing ground surface (EL. 892½± to EL. 889±). Over-excavation depths below frost footing grade of about 5½ to 9 feet or 2½ to 6 feet will generally be required, depending upon the finished floor elevation chosen.

Based on the foundations bearing upon suitable native soils, or newly compacted engineered fill or lean concrete placed upon suitable bearing native soils that have been observed and tested, PSI recommends that footings be designed for a maximum net allowable soil bearing pressure of **3,000 pounds per square feet (psf)** for column footings and wall footings based on dead load plus design live load. Minimum dimensions of 20 inches for continuous footings and 30 inches for any column footings should be used in foundation design to minimize the possibility of a local bearing capacity failure, even if the allowable bearing pressure recommended herein is not fully utilized.

Where unsuitable bearing soils are encountered in a footing excavation, the excavation should be deepened to competent bearing soil, and the footing could be lowered or an over-excavation and backfill procedure could be performed. An over-excavation and backfill treatment would require widening the deepened excavation in all directions at least 6 inches beyond the edge of the footing for each 12 inches of over-excavation depth. The over-excavation should then be backfilled with select granular materials such as those described in WisDOT Standard Specifications sections 209, 305, or 312 which are compacted according to Special Compaction. In order to utilize backfill soils for support of the foundation, the backfill materials must be placed in a controlled manner, to the specified level, which is monitored by the project geotechnical engineer.

As an alternative to supporting the footings at deeper elevations or on structural backfill properly placed with Special Compaction methods, footings may also be designed to bear upon a lean concrete founded upon suitable bearing natural soils. If this option is chosen, the footing excavation should extend a minimum of 6 inches beyond each face of the footing.

A method for evaluating the acceptability of the natural soils under the footing would involve hand auger and static cone or dynamic cone penetrometer testing below the footing bearing level. Based on the recommended net allowable bearing pressure of 3,000 psf for the proposed salt shed, suitable bearing natural clay soils should be at least medium in consistency with minimum penetrometer values of 1.5 tons per square foot (tsf); and suitable bearing granular soils must have dynamic cone penetrometer values commensurate with a Standard Penetration Test N-value of at least about 10 bpf.

Exterior footings and footings in unheated areas should be located at a depth of at least 48 inches below the final exterior grade to provide adequate frost protection. If the building is to be constructed during the winter months or if footings will likely be subjected to freezing temperatures after foundation construction, then the footings and concrete should be adequately protected from freezing.

Where perched water is encountered, the need for some dewatering should be anticipated. The methods for dewatering the excavation must ultimately be determined by the contractor so as to prevent standing water in the trench during construction activities.

Dewatering is generally recommended to be performed to a depth of at least 2 feet below the lowest anticipated depth of excavation.

After opening, PSI recommends that the soils at foundation bearing elevation in the footing excavations be observed and tested by a representative of a qualified geotechnical engineer prior to concrete placement, to evaluate the suitability and uniformity of the bearing materials for support of the design foundation loads. Once the support soils are observed and tested, the concrete should be placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond. If it is required that footing excavations be left open for more than one day, they should be protected to reduce evaporation or entry of moisture.

Lateral Bracing Anchor Recommendations

The incorporation of lateral bracing anchors for the proposed salt shed walls was unknown at the time of the report. However, where their use is considered, the following recommendations should be followed.

The lateral bracing forces may be resisted by conventional, reinforced cast-in-place concrete piers or deadmen, or a continuous wall or strip footing foundation. Vertical uplift forces may be resisted by the weight of the concrete and overlying backfill soil, if applicable. Horizontal forces may be resisted by the passive pressure developed by the adjacent supporting soil. Proper placement and/or compaction of the backfill soils above and adjacent to the anchor foundations will be essential for the development of uplift and lateral resistance. The soil mass for resisting uplift forces may be estimated by a line extending from the top outer edge of the horizontal projection of the footing to the ground surface, rotated outward from the footing 30° from the vertical. If the anchor footing does not have a horizontal projection then this contribution would not apply. A well-graded granular material, such as those recommended in WisDOT Standard Specifications sections 209, 305, or 312, is recommended for use as backfill above and alongside the lateral bracing foundations. The backfill must be placed in lifts not exceeding 8 inches in thickness, at moisture contents near optimum, and be compacted according to Special Compaction in order to develop the required lateral support and uplift.

For the recommended well-graded granular soils, a soil moist unit weight of 125 pounds per cubic foot, an internal friction angle of 32°, passive pressure coefficient (K_p) of 3.2, and an at-rest pressure coefficient (K_o) of 0.47, may be used for design of the anchors. For these values to be applicable, the backfill must extend around the foundations for a lateral distance of at least equal to the height of the foundation or 4 feet, whichever is less. Surface soils that are subject to strength loss due to freeze/thaw cycles within the upper 4 feet may not provide sufficient passive earth pressure resistance. Therefore, consideration must be made in this regard for design calculations. An appropriate safety factor must be applied to all design values. Additionally, it must be recognized that significant foundation movement will likely be required in order to develop full passive resistance, and should be considered in the design. Proper tensioning of the lateral bracing to develop lateral resistance will also be necessary.

Exterior/Unheated Area Slabs

Entry slabs, sidewalks, aprons, and other slabs in exterior or unheated areas will likely bear upon clay soils. Such materials are frost susceptible and poorly drained. Slabs placed directly upon such soils are subject to heaving and subsequent settlement due to freeze/thaw cycles. This can result in cracking, misalignment, and other related effects (especially at joints). Where encountered in exterior/unheated area slabs, it is recommended that consideration be given to limited undercutting of the frost susceptible materials to a depth of 1 to 2 feet below the slabs, and replacement with select materials similar to materials specified in WisDOT Standard Specifications sections 209, 305, or 312, which are compacted by Special Compaction methods. A properly designed underdrain system connected to the municipal sewer (if permissible) or directed to on-site storm water management devices should also be incorporated to reduce the potential effects of freeze/thaw cycles.

Seismic Site Class

The 2009 International Building Code requires a site class for the calculation of earthquake design forces. This class is a function of soils type (i.e. depth of soil and strata types). Based on the estimated density of the soils observed within the boring locations, **Site Class “D”** is recommended.

Pavement Recommendations

It is anticipated that the existing fill within the proposed salt shed area, provided it has been observed and tested by a qualified geotechnical engineer during construction, will generally be suitable for subgrade support within the floor area as well as for the site pavement portions of the project. Therefore, complete removal of the existing fill is generally not considered to be required in these areas provided the owner can accept the inherent risk of some possible differential settlement and reduced service life of the pavement by relying upon existing fill soils for structural support.

PSI understands that new asphalt paved access roads and parking areas are planned for the project. Additionally, it is understood that the interior salt shed floor will be constructed as an asphalt pavement section to alleviate concerns with potential corrosivity of salt to a concrete floor slab option. Based on the borings, PSI anticipates the subgrade soils within the pavement areas will consist of areas of native lean clay, areas of existing fill, as well as areas with newly placed and compacted select granular materials, or a combination thereof. PSI recommends that the subgrade soils for the pavements be prepared in accordance with the Site Preparation section of this report. The following subgrade parameters are recommended for the pavement design based on the predominance of cohesive subgrade soils, when the subgrade is prepared as discussed in the site preparation section of this report.

AASHTO Soil Classification	Material	SSV	DGI	Subgrade Reaction Modulus, k (pci)	Resilient Modulus, M _R (psi)	CBR	Frost Index
A-6	II-Poorly Sorted	4.0	14	125	2,800	3	F-3

Note: The above parameters were estimated based upon the soil classification, boring information and were not measured in the laboratory.

The CBR value given above has been estimated. For a less conservative CBR value, PSI recommends that actual CBR tests be performed on each type of material, including the proposed base course material. Preparation of the existing ground surface and construction of the new subgrade and pavements should be in accordance with the Wisconsin Department of Transportation Standard Specifications (Standard Specifications).

Based upon the soil survey review and engineering judgement, PSI estimated the additional soil parameter values shown in the following table based on the predominance of cohesive subgrade soils that were observed beneath the surficial materials in the majority of the soil borings. PSI understands that these parameters are required for pavement design using AASHTOware software. PSI was only requested to provide the following parameters and not perform any AASHTOware analysis.

LABORATORY TEST		ESTIMATED VALUES FOR LEAN CLAY SOIL SUBGRADE
Maximum Dry Density-AASHTO T99 (pcf)		125±
Optimum Moisture Content (%)		15±
Specific Gravity		2.69±
Atterberg Limits	Liquid Limit	<45
	Plasticity Index	>11
Grain Size Distribution (Percent Passing)	#4 Sieve	100-95±
	#10 Sieve	100-90±
	#40 Sieve	95-85±
	#200 Sieve	95-65±
Depth to Bedrock		>25

PSI was additionally requested to provide recommended pavement thickness for the pavements on the site. The anticipated floor loading for the salt shed is as follows. The stored salt pile within the shed may be as high as 30 feet above the floor at the center of the pile, and will reduce to about 12 feet at the side walls. Strand indicated that the unit weight of the salt to be used for design of the floor slab is 100 pounds per cubic foot (pcf). Multiplying this load by the anticipated height of the pile will result in a loading intensity on the floor slab of approximately 1,200 pounds per square foot (psf) at/near the side walls and a maximum loading of approximately 3,000 psf at the very center of the pile. It is understood that the floor for the salt shed will consist of asphalt.

Based on the preliminary information provided, a large front-end loader will be used on-site to load and handle the salt. It is also anticipated that the large front-end loader is to be used for snow removal of the site. In addition, it is understood that the site will be used by fully loaded tractor trailers (WB-65) and large dump trucks. The exact frequency of trucks on this site is unknown, however, Strand has estimated the shed will be filled once per year, requiring approximately 400 loads (from the WB-65 trucks) of salt to fill the shed. It is also anticipated that during a winter storm that 50 salt trucks (large dump trucks) will be loaded per storm. It is also estimated that one storm will occur per week over a 5-month period from December through March.

For purposes of this report, it is estimated that the large dump trucks would consist of quad-axle dump trucks with a gross weight of 69,000 pounds. The fully loaded tractor trailers (WB-65) are estimated to have a gross weight of 80,000 pounds. The large front-end loaders are estimated to have gross weight of 42,000 pounds. The axle weights for the respective trucks were assigned based on the maximum axle loading weights specified by WisDOT.

Traffic loading information with regards to access to the site by passenger vehicles was not provided at the time of this report. However, for purposes of this report the anticipated traffic loading/frequency for any standard-duty pavements is estimated to result in a total of 30,000 ESAL's based on a service life of 20 years. Based on the traffic loading information provided, along with the aforementioned assumptions, it is estimated that traffic loading/frequency for the asphalt or concrete heavy-duty pavements will result in approximately 222,197 and 283,788 ESAL's, respectively, based on a service life of 20 years. In addition, based on the estimated traffic loading/frequency for the asphalt or concrete heavy-duty pavements located within and around the salt shed, it is anticipated that the pavement will be subject to approximately 1,281,062 and 1,335,761 ESAL's, respectively, based on a service life of 20 years.

If these traffic loads are not indicative of the actual loads, PSI must be contacted immediately to review this data. The existing native clay soils encountered below the surficial topsoil and fill materials are considered medium subgrade materials, having a minimum CBR value of 3 according to the Wisconsin Asphalt Pavement Association Design Guide. Select granular materials used to raise existing grades within parking and drive areas should meet or exceed this CBR value. The following design factors were used in developing the recommended pavement sections:

DESIGN FACTOR	ASPHALT	CONCRETE
Design Life	20 years	20 years
Reliability	0.85	0.85
Overall Deviation	0.45	0.35
Modulus of Rupture	-	600 (4,000 psi concrete)
Modulus of Elasticity	-	4,000,000 psi
Load Transfer Coefficient	-	3.2
Drainage Coefficient	1	1
Modulus of Subgrade Reaction	125 pci	125 pci
CBR/Resilient Modulus	3 / 2,800 psi	3 / 2,800 psi
Initial Serviceability	4.2	4.5
Terminal Serviceability	2.0	2.0
Design Traffic (Standard Duty)	30,000 ESALs	-
Design Traffic (Heavy Duty)	222,197 ESALs	283,788 ESALs
Design Traffic (Heavy Duty – Salt Shed Area)	1,281,062 ESALs	1,335,761 ESALs
Assumes large front-end loader used for snow plowing		

If during the final design phase these values are determined to be incorrect, PSI must be contacted to provide revised pavement recommendations. Based upon the soil borings, laboratory data and provided the subgrade soils are prepared as outlined in this report, the following flexible pavement sections are recommended for areas used by passenger vehicles (Standard-Duty), and drive lanes for the trucks (Heavy-Duty). In addition, a preliminary Heavy-Duty pavement section for the asphalt floor of the Salt Storage Facility, as well as the immediate area around the facility, has also been provided. It is assumed that this area will be heavily traveled by the front-end loader. This must be verified after the final loading conditions on the floor have been determined.

Recommended Asphalt Pavement Section Thickness

PAVEMENT COMPONENTS	STANDARD DUTY* AREAS	HEAVY DUTY AREAS	SALT SHED AREA	STRUCTURAL COEFFICIENTS
Hot Mix Asphalt Surface Course	1½"	2"	3	WisDOT FDM 14-10, Attach. 5.1 (a=0.44)
Hot Mix Asphalt Binder Course	2"	2½"	3½	WisDOT FDM 14-10, Attach. 5.1 (a=0.44)
Aggregate Base Course (Upper)	8"	4"	4"	WisDOT FDM 14-10, Attach. 5.1 1.25" Crushed Stone (a=0.14)
Aggregate Base Course (Lower)	-	8"	10"	WisDOT FDM 14-10, Attach. 5.1 3" Crushed Stone (a=0.14)

***If a front-end loader is used to clear snow in this area, PSI recommends placing a BX1200 geogrid below the base course or adding 2 inches of base course to the section.**

The granular base course should consist of well-graded crushed stone meeting the requirements from sections 209, 305, or 312 of the WisDOT Standard Specifications, and should be compacted according to Special Compaction. Special Compaction, rather than Standard Compaction, is recommended due to the heavy loads anticipated at this site. The upper and lower layers of stone should consist of 1¼ inch and 3-inch sized aggregate, respectively. If a material other than crushed stone is used, such as crushed gravel or crushed concrete, the structural coefficients in the table above must be revised. A representative of a qualified geotechnical engineer must test the base course material prior to, and during, placement.

In addition, it is recommended that a geotextile fabric be used to prevent migration of the aggregate base course into the subgrade over time for the heavy duty and salt shed pavements. A subgrade-aggregate-separation (SAS) type fabric, specified under section 645.2.2.2 of the State of Wisconsin Standard Specifications for Highway and Structure Construction, is recommended.

Asphaltic binder and surface courses should meet the requirements from Section 460 of the State of Wisconsin Standard Specifications for Construction. Asphaltic courses should be placed and compacted to the minimum required density contained within section 460 of the Standard Specifications. An adequate number of in-place density tests should be performed during construction to document the placement compaction. The pavements should be sloped to provide positive surface drainage. Water should not be allowed to pond on or adjacent to the pavement as this could saturate the subgrade and cause premature pavement deterioration. The granular base course should be protected from water inflow along drainage paths. Additionally, the granular base course should extend beyond the edges of the pavement in low areas to allow any water that enters the base course stone a path for exit.

It may be advantageous to utilize rigid Portland Cement Concrete pavement at dumpster pad areas and at entrance and exit aprons. It is recommended that a minimum of 7 inches of 4,000 psi, air-entrained concrete (5 to 7 percent) be utilized along with a 6-inch thickness of aggregate base for a rigid pavement section. The construction materials and procedures should be in accordance with Section 415 and Section 305 (for concrete and base course, respectively) of the WisDOT Standard Specification.

The paved areas are recommended to be constructed with attention to final grades to facilitate drainage. Otherwise, a storm sewer system may be appropriate to carry away storm run-off water. Construction of the subgrade and pavements should be in accordance with the project specifications.

PSI recommends that subsurface drains be installed. If placed properly, subsurface drains will greatly reduce the amount of trapped water under the pavement surfaces. Trapped water leads to subgrade degradation and increases pavement heave during winter months. It is recommended that underdrains be placed within the subgrade, just below the granular base. Minimally, these drains should be placed in low spots in the pavement, at the toe of slopes that are draining toward pavement surfaces, undercuts

that have been filled with select granular fill, and as finger drains. At a minimum, finger drains should consist of installing 3 to 4 drain tiles extending radially outward, 20 feet from each interior catch basin. In addition, drain tiles should extend along curb lines, 20 feet up the slope from curb inlets. The drain tile details should follow the Facilities Development Manual Chapter 13, Section 40.

Periodic pavement maintenance is required to keep a pavement, under normal traffic and environmental conditions, as near as possible to its constructed condition. Maintenance is necessary to reduce the effects of pavement stress caused by changes in temperature and moisture, repetitive traffic loadings, and movement of the subgrade soils. As pavement distress is observed, it should be repaired as quickly as possible. Unrepaired areas will generally lead to more severe and widespread distress, and eventually, pavement disintegration. Therefore, periodic maintenance consisting of crack sealing, seal coating every 3 to 5 years, and other necessary repairs at least annually, will be required to obtain the design service life.

Infiltration Characteristics of Subgrade Soils

Borings B-5 and B-6 were performed within the proposed stormwater management basin to the south of the proposed Salt Shed. Field infiltration testing was not requested at the time of field exploration. However, for design purposes the following table provides estimates of design infiltration rates for different soil textures and is based on Table 2 of the Site Evaluation for Stormwater Infiltration (1002) document, which is published by the Wisconsin Department of Natural Resources Conservation Practice Standards.

SOIL TEXTURE	DNR 1002 TABLE 2, DESIGN INFILTRATION RATE WITHOUT MEASUREMENT (IN/HOUR)
Coarse sand or coarser (COS)	3.60
Loamy coarse sand (LCOS)	3.60
Sand (S)	3.60
Loamy sand (LS)	1.63
Sandy loam (SL)	0.50
Loam (L)	0.24
Silt loam (SIL)	0.13
Sandy clay loam (SCL)	0.11
Clay loam (CL)	0.03
Silty Clay loam (SICL)	0.04
Sandy clay (SC)	0.04
Silty clay (SIC)	0.07
Clay (C)	0.07

NR-151 guidelines indicate infiltration rates shall be based on the least permeable soil horizon within 5 feet of the bottom elevation of the proposed infiltration system. The bottom elevation of the proposed stormwater management basin has not been provided to PSI at the time of this report.

The fill material at borings B-5 and B-6, located within the proposed stormwater management basin, were classified as a gravely loamy sand (LS) with a design infiltration rate of 1.63 inches per hour based on Table 2 above, making them non-exempt from infiltration according to Wisconsin Administrative Code NR 151. However, it must be recognized that the actual infiltration rates of the in-place fill soils can vary significantly from the estimated table values depending on the uniformity and in-place density. This is especially true of fill soils containing varying amounts of asphalt and concrete rubble.

The Clay (C), Clay Loam (CL), Sandy Clay Loam (SCL) soils observed below the fill material at borings B-5 and B-6, have design infiltration rates of 0.11 to 0.03 inches per hour based on Table 2 above. These infiltration rates are less than 0.6 inches per hour, and this soil is therefore exempt from the infiltration requirements of NR151.12(5)(c) under NR151.12(5)(c)6a.

The Gravelly Sandy Loam (SL) soils encountered have an estimated infiltration rate of 0.5 inches per hour, based on Table 2 above. This infiltration rate is less than 0.6 inches per hour. However, field verification testing of the actual in-situ infiltration rate for these materials is required under Step C5 of the Site Evaluation for Stormwater Infiltration document, to confirm they are exempt from the infiltration requirements of NR151.12(5)(c) under NR151.12(5)(c)6a.

If the basin is designed as a wet pond, the clay soil encountered are generally considered to be of low permeability, and may be suitable for such purpose. However, zones of more permeable granular soils may be present within upper portions of the basin sidewalls, or along the bottom in areas beyond borings B-5 and B-6. It may therefore be necessary to install a properly designed clay liner along at least portions of the basin side walls and bottom. This must be of adequate thickness and low permeability. Natural or clay liner materials along the bottom and sidewalls of the basin are generally recommended to have a hydraulic conductivity of 1×10^{-7} cm/sec or less. Past experience has shown that soils which have a grain size distribution of at least 50 to 75 percent passing the No. 200 sieve, a clay content of 25 to 50 percent, a liquid limit of 25 or more, and a plasticity index of 12 or more, have the potential to exhibit a hydraulic conductivity of 1×10^{-7} cm/sec when properly compacted. However, the above properties are general guidelines. The permeability of the liner material can vary significantly depending upon its consistency, density, compaction level, as well as other factors. It is recommended that the liner design be performed by an experienced engineer, in accordance with applicable regulations and guide lines. It is also recommended that proper testing of the clay soils be performed during construction to verify estimated properties.

The liner and natural soils used for the basin perimeter must be sufficient to resist lateral earth and water pressure, as well as outward migration that may occur, possibly through tension or shrinkage type cracks. Where it is necessary to raise grades around the basin, the fill soils must consist of clay soils that have relatively low permeabilities when properly placed and compacted. The on-site non-organic clay, silty clay, clay loam and sandy clay loam soils are expected to be suitable for liner and embankment

construction purposes when properly placed and compacted to at least 95% of the maximum dry density as determined by Standard Proctor Method. However, additional confirmation testing is recommended.

The preceding infiltration rate estimates are intended only for use in preliminary planning. In-situ testing, such as with a double ring infiltrometer, along with test pits in other areas of the basins are recommended to allow more detailed evaluation of subsurface conditions, including groundwater levels, and to provide more representative infiltration rates to be used in the final basin design. It is recommended that the bottom of the stormwater management area be observed by qualified geotechnical personnel at the time of construction to verify the soil types. The type of basin and intended use, such as being “wet” or “dry”, must be carefully considered when evaluating infiltration rates.

It must be recognized that actual infiltration rates will be somewhat variable depending upon the uniformity, in-place density, and/or grading of the subsoils below the individual basin or trench footprint. It should also be recognized that the performance of the basin could be affected by other factors such as densification by construction equipment and sedimentation. A maintenance program must be developed to address the removal of sedimentation and or organic materials should they develop. Additionally, it is recommended that the basin design be performed by an experienced civil engineering firm, and that thorough review of applicable codes (especially NR151) and regulations be performed. Proper design and construction of sidewalls and berms will also be essential for proper basin performance.

CONSTRUCTION CONSIDERATIONS

The project geotechnical engineer must be available throughout construction. PSI will not accept any responsibility for any conditions that deviated from those described in this report, nor for the performance of the foundation or pavement if we are not engaged to also provide construction observation and testing for this project.

Moisture Sensitive Soils/Weather-Related Concerns

The soils encountered at this site are expected to be sensitive to disturbances caused by construction traffic and changes in moisture content. 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.

Water should not be allowed to collect in the foundation excavation, on floor slab or pavement areas, or on prepared subgrades during or after construction. Areas should be sloped to facilitate removal of collected rainwater, groundwater, or surface runoff.

Positive site drainage should be provided to reduce infiltration of surface water around the perimeter of buildings, beneath floor slabs, and within pavement areas. The grades should be sloped away from buildings and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill and floor slab areas of the building.

Drainage and Groundwater Concerns

Perched water conditions were apparent within boring B-2. Excavations required to extend below the depth of perched water are anticipated to require temporary dewatering methods such as the use of sump pits and pumps.

The methods for dewatering the excavation must ultimately be determined by the contractor so as to prevent standing water in the trench during construction activities. If excavations extend only a few inches or so below groundwater or perched zones, it is expected that filtered sump pumps or other conventional means should suffice to control the groundwater. However, for deeper excavations, or for substantial perched zones, prolonged dewatering with a series of sumps or well points and high capacity sump pumps, or other more comprehensive means may be necessary to facilitate construction. Dewatering is typically recommended to be performed to a depth of at least 2 feet below anticipated excavation depths.

Fluctuations in the groundwater level should be anticipated throughout the year depending on variations in climatological conditions and other factors not apparent at the time the borings were performed. The possibility of groundwater level fluctuation should be considered when developing the design and construction plans for the project.

Excavations

It is mandated that excavations, whether they be for utility trenches, basement excavations or footing excavations, be constructed in accordance with current Occupational Safety and Health Administration (OSHA) guidelines to protect workers and others during construction. PSI recommends that these regulations be strictly enforced; otherwise, workers could be in danger and the owner(s) and the contractor(s) could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, 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.

PSI is providing this information solely as a service to our client. 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.

GEOTECHNICAL RISK

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools which geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free and, more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations presented in the preceding section constitutes PSI's professional estimate of those measures that are necessary for the proposed structure to perform according to the proposed design based on the information generated and referenced during this evaluation, and PSI's experience in working with these conditions.

REPORT LIMITATIONS

PSI's recommendations are based on the available subsurface information obtained by PSI and design details furnished by others. 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 recommendations are required. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the project.

PSI 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 must be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At this time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use by Strand Associates for the Proposed WisDOT CTH A Salt Shed to be located in Albion, Wisconsin.

APPENDIX

BORING LOCATION PLAN

LOG OF BORINGS

SOIL EVALUATION-STORM FORM

USDA CLASSIFICATION CHARTS

GENERAL NOTES

APPENDIX

BORING LOCATION PLAN

LOG OF BORINGS

SOIL EVALUATION-STORM FORM

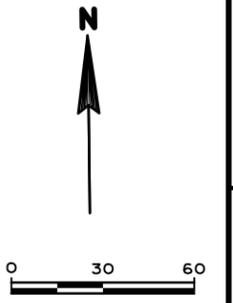
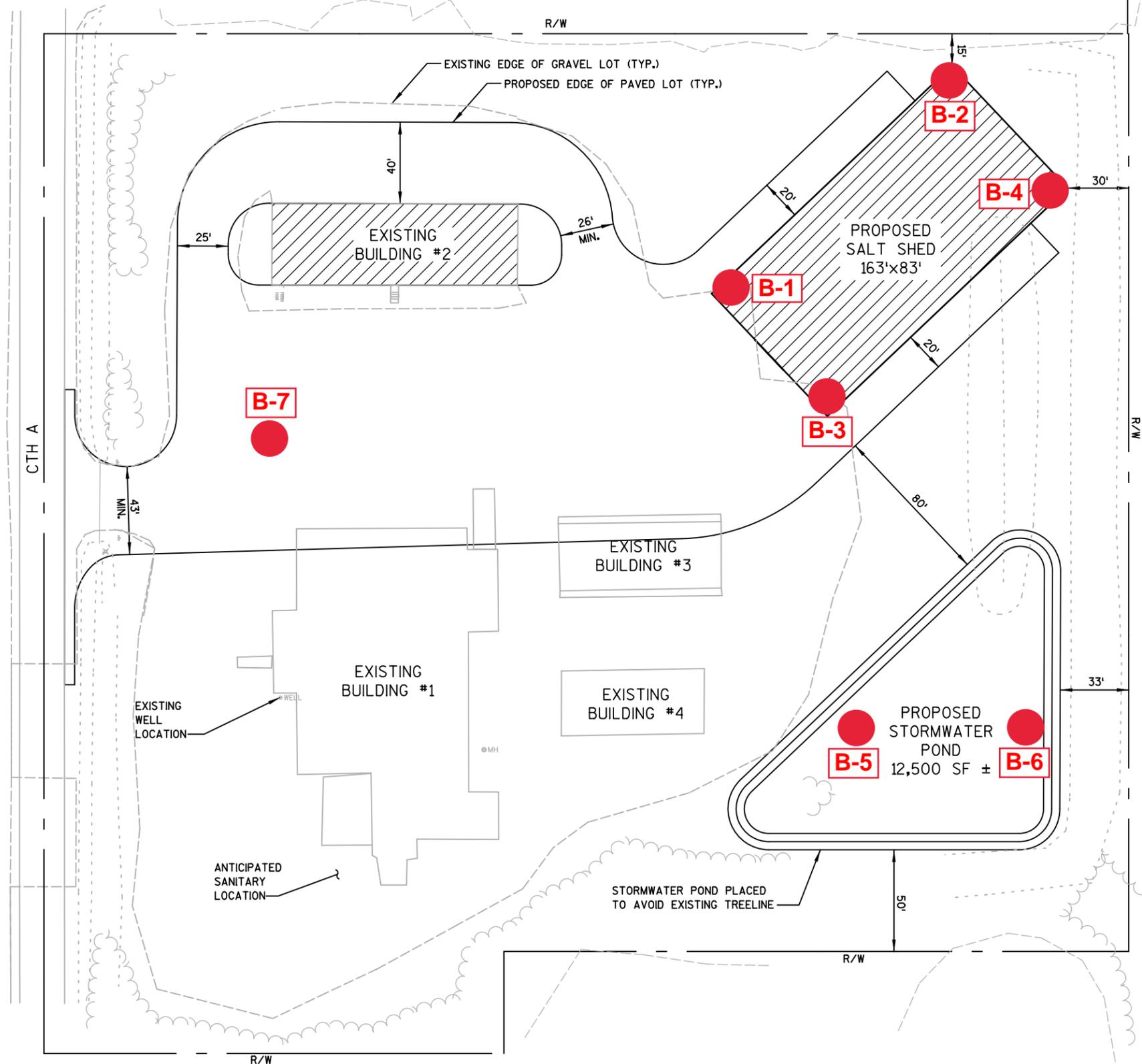
USDA CLASSIFICATION CHARTS

GENERAL NOTES

SITE FEATURES

- 1. EXISTING BUILDINGS 1, 3, AND 4 TO BE REMOVED
- 2. EXISTING BUILDING 2 TO REMAIN AS COLD STORAGE
- 3. NEW SALT SHED CONSTRUCTED
- 4. NEW STORMWATER POND CONSTRUCTED

 BUILDINGS TO BE CONSTRUCTED OR TO REMAIN



**Boring Location Plan
Proposed WIS DOT Salt Shed
CTH A
Town of Albion, WI
PSI Project No: 00521771**



Professional Service Industries, Inc.
 821 Corporate Court, Suite 100
 Waukesha, WI 53189
 Telephone: (262) 521-2125
 Fax: (262) 521-2471

LOG OF BORING B-01

PSI Job No.: 00521771
 Project: WisDOT Salt Shed
 Location: ID 1007-11-01
 Dane County, WI

Drilling Method: Hollow Stem Auger
 Sampling Method: 2-in SS
 Hammer Type: Automatic
 Boring Location: Proposed Salt Shed - SW Corner

WATER LEVELS	
▽ While Drilling	Not Obsvd
▼ Upon Completion	Not Obsvd
⏸ Delay	N/A

Elevation (feet)	Depth (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	Station: N/A Offset: 9' East Due to Auger Refusal on Probable Cobble MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	STANDARD PENETRATION TEST DATA		Additional Remarks
									N in blows/ft		
Surface Elev.: 898 ft											
	0					Fill, Poorly Graded Gravel With Silt, Trace Sand, Moist	FILL				
	5			1	18	Fill, Brown Sandy Lean Clay, Trace Gravel, Moist, Very Stiff	FILL	5-6-5 N=11	10	⊗	*
	10			2	18	Fill, Brown and Dark Brown Lean Clay, Some Intermixed Topsoil, Trace to Little Sand and Gravel, Moist	FILL	3-2-2 N=4	14	⊗	*
	15			3		Fill, Brown Lean Clay, Trace Gravel, Moist (Possible Construction Rubble)	Fill	8-50/2"	15	⊗	>> No Recovery (Auger Sample)
	20			4	3	Light Brown Silty Fine to Medium Sand, Trace to Little Gravel, Moist, Medium Dense (Possible Cobbles and Boulders)		7-6-7 N=13		⊗	Poor Recovery
	25			5	12		SM	9-8-13 N=21	8	⊗	
	30			6	18	Light Brown Silty Fine Sand with Gravel, Moist, Very Dense to Dense (Possible Cobbles and Boulders)		12-21-32 N=53	8	⊗	>> ⊗
	35			7	18		SM	15-17-16 N=33	8	⊗	
	40					End of Boring at 25' Cave-In at 19'					

Completion Depth: 25.0 ft
 Date Boring Started: 5/25/17
 Date Boring Completed: 5/25/17
 Logged By: DP
 Drilling Contractor: PSI, Inc.

Sample Types:

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

Latitude:
 Longitude:
 Drill Rig: Marooka D-50 ATV - Rig 395
 Remarks:

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



Professional Service Industries, Inc.
 821 Corporate Court, Suite 100
 Waukesha, WI 53189
 Telephone: (262) 521-2125
 Fax: (262) 521-2471

LOG OF BORING B-02

PSI Job No.: 00521771
 Project: WisDOT Salt Shed
 Location: ID 1007-11-01
 Dane County, WI

Drilling Method: Hollow Stem Auger
 Sampling Method: 2-in SS
 Hammer Type: Automatic
 Boring Location: Proposed Salt Shed - NW Corner

WATER LEVELS	
▽ While Drilling	Not Obsvd
▼ Upon Completion	11.5
▽ Delay	N/A

Elevation (feet)	Depth (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	Station: N/A Offset: N/A	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	STANDARD PENETRATION TEST DATA		Additional Remarks
										N in blows/ft		
							Surface Elev.: 897 ft			Moisture, % X Moisture PL LL		
							Topsoil (6"± Thick)	OL		STRENGTH, tsf ▲ Qu * Qp		
895				1	12		Fill, Light Brown Lean Clay, with Sand Seams, Trace Gravel, Trace Asphalt Rubble, Very Moist	FILL	3-4-5 N=9	20	⊙ X *	
	5			2	6		Fill, Light Brown to Brown Silty Sand with Gravel, Trace to Some Asphalt Rubble, Moist	FILL	6-50/3"			>> ⊙ Poor Recovery
890				3	10		Brown Lean Clay, with Gray Mottling, Very Moist, Stiff	CL	4-4-4 N=8	26	⊙ * X	Q _r = 1.7 tsf
	10			4	8		Brown Lean Clay, with Silt Seams, Wet, Medium Stiff	CL	4-2-2 N=4	26	⊙ X	
885				5	6	▼	Light Brown Sandy Silt, Wet, Loose (Possible Perched Water from 13' to 16.5')	ML	4-5-4 N=9	15	⊙ X	
	15			6	8		Light Brown Silty Fine Sand with Gravel, Moist, Dense (Possible Cobbles and Boulders)	SM	4-16-18 N=34			⊙ Poor Recovery
880				7	8							
875				8	12				12-20-22 N=42	8	X ⊙	
	25						End of Boring at 25' Cave-In at 20'					

Completion Depth: 25.0 ft
 Date Boring Started: 5/25/17
 Date Boring Completed: 5/25/17
 Logged By: DP
 Drilling Contractor: PSI, Inc.

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

Latitude:
 Longitude:
 Drill Rig: Marooka D-50 ATV - Rig 395
 Remarks:

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



Professional Service Industries, Inc.
 821 Corporate Court, Suite 100
 Waukesha, WI 53189
 Telephone: (262) 521-2125
 Fax: (262) 521-2471

LOG OF BORING B-03

PSI Job No.: 00521771
 Project: WisDOT Salt Shed
 Location: ID 1007-11-01
 Dane County, WI

Drilling Method: Hollow Stem Auger
 Sampling Method: 2-in SS
 Hammer Type: Automatic
 Boring Location: Proposed Salt Shed - SE Corner

WATER LEVELS	
▽ While Drilling	Not Obsvd
▼ Upon Completion	Not Obsvd
⏸ Delay	N/A

Elevation (feet)	Depth (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	Station: N/A Offset: N/A	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	STANDARD PENETRATION TEST DATA		Additional Remarks
										N in blows/ft		
							Surface Elev.: 898 ft			Moisture, % 0 25 50 X Moisture PL LL STRENGTH, tsf ▲ Qu * Qp 0 2.0 4.0		
	0						Fill, Brown Silty Sand and Gravel, Moist	FILL				
	895			1	3		Fill, Grayish Light Brown Silty Sand with Gravel, Little to Some Concrete Rubble, Moist to Very Moist	FILL	10-50/3"			>>⊙ Poor Recovery
	5			2	10				9-50/4"	15	X	>>⊙
	890			3	10		Brown Lean Clay Trace Sand, Very Moist, Very Stiff to Stiff	CL	6-3-3 N=6	26	⊙ *	Q _r = 2.1 tsf
	10			4	12				4-3-4 N=7	25	⊙ * X	Q _r = 1.7 tsf
	885			5	8		Light Brown Silty Fine Sand, Trace to Little Gravel, Moist, Medium Dense	SM	6-7-8 N=15	8	X ⊙	
	880			6	8		Light Brown Silty Fine Sand, Little to Some Gravel, Moist, Dense to Very Dense (Possible Cobbles and Boulders)	SM	6-16-29 N=45	8	X ⊙	
	875			7	10				22-31-24 N=55	7	X ⊙	>>⊙
	25						End of Boring at 25' Cave-In at 17'					

Completion Depth: 25.0 ft
 Date Boring Started: 5/25/17
 Date Boring Completed: 5/25/17
 Logged By: DP
 Drilling Contractor: PSI, Inc.

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

Latitude:
 Longitude:
 Drill Rig: Marooka D-50 ATV - Rig 395
 Remarks:

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



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LOG OF BORING B-04

PSI Job No.: 00521771
 Project: WisDOT Salt Shed
 Location: ID 1007-11-01
 Dane County, WI

Drilling Method: Hollow Stem Auger
 Sampling Method: 2-in SS
 Hammer Type: Automatic
 Boring Location: Proposed Salt Shed - NE Corner

WATER LEVELS	
▽ While Drilling	Not Obsvd
▼ Upon Completion	Not Obsvd
⏸ Delay	N/A

Elevation (feet)	Depth (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	Station: N/A Offset: N/A	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	STANDARD PENETRATION TEST DATA		Additional Remarks		
										N in blows/ft				
							Surface Elev.: 898 ft			Moisture, % X Moisture PL LL				
							Topsoil (4"± Thick)	OL		STRENGTH, tsf ▲ Qu * Qp				
				1	8		Fill, Brown Clayey Sand, with Gravel, Concrete and Asphalt Rubble, Moist		14-44-50/3"	13	X	>>⊙		
895				2	3			FILL	5-50/3"			>>⊙	Poor Recovery	
5				3	6				6-50/3"			>>⊙	Poor Recovery	
890				4	16		Brown Lean Clay, Trace Sand, Very Moist, Very Stiff	CL	7-6-7 N=13	24	⊙	X	*	Q _r = 3.0 tsf
10				5	12		Light Brown Silty Fine Sand, Trace to Little Gravel, Very Moist, Loose	SM	2-3-5 N=8	10	⊙	X		
885				6	18		Light Brown Silty Fine Sand, Little Gravel, Moist, Dense (Possible Cobbles and Boulders)	SM	7-14-17 N=31	8	X	⊙		
20				7	18				10-16-20 N=36	8	X	⊙		
875							End of Boring at 25'							
							Cave-In at 14'							

Completion Depth: 25.0 ft
 Date Boring Started: 5/25/17
 Date Boring Completed: 5/25/17
 Logged By: DP
 Drilling Contractor: PSI, Inc.

Sample Types:

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

Latitude:
 Longitude:
 Drill Rig: Marooka D-50 ATV - Rig 395
 Remarks:

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



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 Waukesha, WI 53189
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LOG OF BORING B-05

Sheet 1 of 1

PSI Job No.: 00521771
 Project: WisDOT Salt Shed
 Location: ID 1007-11-01
 Dane County, WI

Drilling Method: Hollow Stem Auger
 Sampling Method: 2-in SS
 Hammer Type: Automatic
 Boring Location: Proposed Stormwater Basin

WATER LEVELS	
▽ While Drilling	Not Obsvd
▼ Upon Completion	Not Obsvd
⏸ Delay	N/A

Elevation (feet)	Depth (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	Station: N/A Offset: N/A	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	STANDARD PENETRATION TEST DATA		Additional Remarks
										N in blows/ft	Moisture, %	
							Surface Elev.: 898 ft					
	0			1	3		Fill, Dark Yellowish Brown Clayey Sand With Gravel, Trace Root Matter, Very Moist	FILL	21-50/1"			>>⊙ Poor Recovery
895	5			2	5		Fill, Light Yellowish Brown Silty Sand with Concrete Rubble, Some Gravel, Moist	FILL	10-50/2"	11	×	>>⊙
				3	15		Dark Yellowish Brown Lean Clay, Trace Sand, Very Moist to Moist, Very Stiff to Stiff	CL	5-4-5 N=9	23	⊙ × *	
890	10			4	18				2-3-2 N=5	17	⊙ * ×	
				5	6		Yellowish Brown Silty Fine Sand, Little to Some Gravel, Moist to Very Moist, Very Dense to Medium Dense (Possible Cobbles and Boulders)		5-50/2"	8	×	>>⊙
885	15			6	18			SM	11-14-10 N=24	9	×	⊙
880	20			7	18				9-12-17 N=29	12	×	⊙
							End of Boring at 20' Cave-In at 13'					

Completion Depth: 20.0 ft
 Date Boring Started: 5/26/17
 Date Boring Completed: 5/26/17
 Logged By: DP
 Drilling Contractor: PSI, Inc.

Sample Types:

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

Latitude:
 Longitude:
 Drill Rig: Truck Mounted Rig - 431
 Remarks:

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



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LOG OF BORING B-06

PSI Job No.: 00521771
 Project: WisDOT Salt Shed
 Location: ID 1007-11-01
 Dane County, WI

Drilling Method: Hollow Stem Auger
 Sampling Method: 2-in SS
 Hammer Type: Automatic
 Boring Location: Proposed Stormwater Basin

WATER LEVELS	
▽ While Drilling	Not Obsvd
▼ Upon Completion	Not Obsvd
⏸ Delay	N/A

Elevation (feet)	Depth (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	Station: N/A Offset: N/A	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	STANDARD PENETRATION TEST DATA		Additional Remarks	
										N in blows/ft	Moisture, %		
							Surface Elev.: 898 ft						
							Topsoil (3"± Thick)	OL					
							Fill, Brown Silty Sand and Gravel with Concrete Rubble, Trace Clay, Moist to Very Moist		7-32-25 N=57	13	×	>>⊙	
895	5							FILL	29-50/3"	15	×	>>⊙	
									7-10-18 N=28	18	×	⊙	
890	10						Dark Yellowish Brown Lean Clay, Trace Sand, Very Moist, Very Stiff	CL	9-6-6 N=12	25	⊙	×	*
							Dark Yellowish Brown Sandy Clay with Sand Pockets, Little Gravel, Moist, Stiff	CL	2-2-5 N=7	18	⊙	*	×
885	15								3-3-6 N=9		⊙		Poor Recovery
							Yellowish Brown Silty Fine Sand with Gravel, Moist, Medium Dense	SM	7-9-12 N=21	9	×	⊙	
880	20								8-10-14 N=24	8	×	⊙	
							End of Boring at 20'						
							Cave-In at 11'						

Completion Depth: 20.0 ft
 Date Boring Started: 5/26/17
 Date Boring Completed: 5/26/17
 Logged By: DP
 Drilling Contractor: PSI, Inc.

Sample Types:

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

Latitude:
 Longitude:
 Drill Rig: Truck Mounted Rig - 431
 Remarks:

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



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 821 Corporate Court, Suite 100
 Waukesha, WI 53189
 Telephone: (262) 521-2125
 Fax: (262) 521-2471

LOG OF BORING B-07

PSI Job No.: 00521771
 Project: WisDOT Salt Shed
 Location: ID 1007-11-01
 Dane County, WI

Drilling Method: Hollow Stem Auger
 Sampling Method: 2-in SS
 Hammer Type: Automatic
 Boring Location: Proposed Asphalt Drive

WATER LEVELS	
▽ While Drilling	Not Obsvd
▼ Upon Completion	Not Obsvd
⚡ Delay	N/A

Elevation (feet)	Depth (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	Station: N/A Offset: N/A	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	STANDARD PENETRATION TEST DATA		Additional Remarks
										N in blows/ft		
							Surface Elev.: 899 ft			Moisture, % 0 25 50 X Moisture ◐ PL ◑ LL		
	0			1	12		Aggregate Base, Light Brown Crushed Stone with Fines, Moist (5"± Thick) Brown Lean Clay, Very Moist, Very Stiff	FILL				
	895			2	18		Brown Clayey Sand, Moist, Loose	CL	3-3-3 N=6	23	◐ X *	Q _r = 2.3 tsf
	5			3	18		Light Brown Silty Fine Sand, Little Gravel, Moist, Medium Dense	SC	6-5-3 N=8	12	◐ X	
	890			4	18			SM	5-5-7 N=12	8	X ◐	
	10						End of Boring at 10' Cave-In at 8'		10-8-7 N=15	8	X ◐	

Completion Depth: 10.0 ft
 Date Boring Started: 5/25/17
 Date Boring Completed: 5/25/17
 Logged By: DP
 Drilling Contractor: PSI, Inc.

Sample Types:

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

Latitude:
 Longitude:
 Drill Rig: Marooka D-50 ATV - Rig 395
 Remarks:

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

SOIL EVALUATION - STORM

In accordance with SPS 382.365 and 385, Wis. Adm. Code

Attach complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not be limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and BM referenced to nearest road.

County Dane	
Parcel I.D. 051209291604	
Reviewed by Kenneth R. Wojtanowski, P.E.	Date 6/9/2017

Please print all information

Personal information you provide may be used for secondary purposes (Privacy Law, s. 15.04 (1) (m)).

Property Owner WI DOT				Property Location Govt. Lot _____ 1/4 _____ 1/4 S _____ T _____ N R _____ E			
Property Owner's Mailing Address 2101 Wright St.				Lot #	Block #	Subd. Name or CSM#	
City Madison	State WI	Zip Code 53704	Phone Number ()	<input type="checkbox"/> City	<input type="checkbox"/> Village	<input checked="" type="checkbox"/> Town	Nearest Road Albion CTH A

Drainage area _____ <input type="checkbox"/> sq. ft. <input type="checkbox"/> acres Optional: Test Site Suitable for (check all that apply) <input type="checkbox"/> Irrigation <input type="checkbox"/> Bioretention trench <input type="checkbox"/> Trench(es) <input type="checkbox"/> Rain garden <input type="checkbox"/> Infiltration Pond <input type="checkbox"/> Reuse <input type="checkbox"/> infiltration trench <input type="checkbox"/> Retention Pond <input type="checkbox"/> Other _____	Hydraulic Application Test Method: <input checked="" type="checkbox"/> Morphological Evaluation <input type="checkbox"/> Double-Ring Infiltrometer <input type="checkbox"/> Other (specify) _____
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

B-5	Obs. #	<input checked="" type="checkbox"/> Boring	<input type="checkbox"/> Pit	Ground surface elev. <u>.898</u> ft.	Depth to limiting factor <u>.66</u>
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Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	NRCS Infiltration Rate	
									Inches/Hr	
1	0-12	10YR 4/4	-	GRLS (Fill)	0, SG	mfr	C	>15	1.63	
2	12-66	10YR 6/4	-	GRLS (Fill)	0, SG	mfr	C	>15	1.63	
3	66-126	10YR 4/4	-	CL	2, CO, SBK	mfi	C	<15	0.03	
4	126-240	10YR 5/6	-	GRSL	0, SG	mfr	C	>15	0.50	

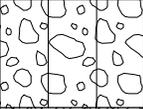
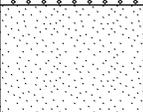
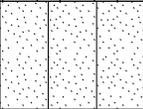
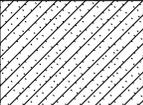
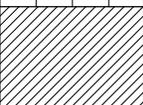
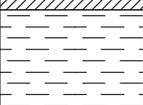
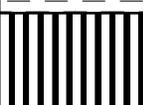
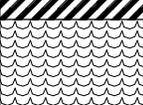
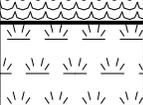
B-6	Obs. #	<input checked="" type="checkbox"/> Boring	<input type="checkbox"/> Pit	Ground surface elev. <u>.898</u> ft.	Depth to limiting factor <u>.96</u>
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Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	NRCS Infiltration Rate	
									Inches/Hr	
1	0-3	10YR 2/2	-	SiCL (Topsoil)	0, SG	mvfr	C	<15	0.04	
2	3-96	10YR 4/3	-	GRLS (Fill)	0, SG	mfr	C	>15	1.63	
3	96-126	10YR 4/4	-	C	2, CO, SBK	mfi	C	<15	0.07	
4	126-186	10YR 4/4	-	SCL	2, CO, SBK	mfi	C	<15	0.11	
5	186-240	10YR 5/8	-	GRSL	0, SG	mfr	C	>15	0.50	

CST/PSS Name (Please Print) Kenneth R. Wojtanowski, P.E.		Signature 	WI-CST Number 1263332
Address 821 Corporate Court, Waukesha, Wisconsin 53189		Date Evaluation Conducted 6/9/2017	Telephone Number 262-347-0898

SOIL CLASSIFICATION CHART

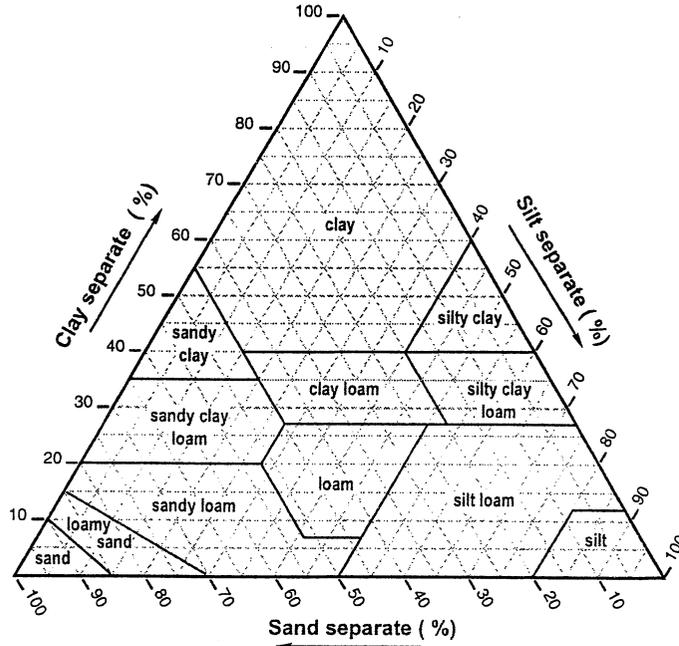
NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

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



Texture Triangle:

Fine Earth Texture Classes (———)



TEXTURE MODIFIERS - Conventions for using "Rock Fragment Texture Modifiers" and for using textural adjectives that convey the "% volume" ranges for Rock Fragments - Size and Quantity.

Fragment Content % By Volume	Rock Fragment Modifier Usage
< 15	No texture adjective is used (noun only; e.g., <i>loam</i>).
15 to < 35	Use adjective for appropriate size; e.g., <i>gravelly</i> .
35 to < 60	Use "very" with the appropriate size adjective; e.g., <i>very gravelly</i> .
60 to < 90	Use "extremely" with the appropriate size adjective; e.g., <i>extremely gravelly</i> .
≥ 90	No adjective or modifier. If ≤ 10% fine earth, use the appropriate noun for the dominant size class; e.g., <i>gravel</i> . Use Terms in Lieu of Texture .

(SOIL) TEXTURE

This is the numerical proportion (percent by weight) of sand, silt, and clay in a soil. Sand, silt, and clay content is estimated in the field by hand (or quantitatively measured in the office/lab by hydrometer or pipette) and then placed within the texture triangle to determine **Texture Class**. Estimate the **Texture Class**; e.g., *sandy loam*; or **Subclass**; e.g., *fine sandy loam* of the fine earth (≤ 2 mm) fraction, or choose a **Term in Lieu of Texture**; e.g., *gravel*. If appropriate, use a **Textural Class Modifier**; e.g., *gravelly silt loam*.

NOTE: **Soil Texture** encompasses only the fine earth fraction (≤ 2 mm). **Particle Size Distribution (PSD)** encompasses the whole soil, including both the fine earth fraction (≤ 2 mm; weight %) and rock fragments (> 2 mm; volume %).

TEXTURE CLASS

Texture Class or Subclass	Code	
	Conv.	NASIS
Coarse Sand	cos	COS
Sand	s	S
Fine Sand	fs	FS
Very Fine Sand	vfs	VFS
Loamy Coarse Sand	lcos	LCOS
Loamy Sand	ls	LS
Loamy Fine Sand	lfs	LFS
Loamy Very Fine Sand	lvfs	LVFS
Coarse Sandy Loam	cosl	COSL
Sandy Loam	sl	SL
Fine Sandy Loam	fsl	FSL
Very Fine Sandy Loam	vfsl	VFSL
Loam	l	L
Silt Loam	sil	SIL
Silt	si	SI
Sandy Clay Loam	scl	SCL
Clay Loam	cl	CL
Silty Clay Loam	sicl	SICL
Sandy Clay	sc	SC
Silty Clay	sic	SIC
Clay	c	C

TEXTURE MODIFIERS - (adjectives)

ROCK FRAGMENTS: Size & Quantity ¹	Code		Criteria: Percent (By Volume) of Total Rock Fragments and Dominated By (name size): ¹
	Conv.	PDP/ NASIS	
ROCK FRAGMENTS (> 2 mm; ≥ Strongly Cemented)			
Gravelly	GR	GR	≥ 15% but < 35% gravel
Fine Gravelly	FGR	GRF	≥15% but < 35% fine gravel
Medium Gravelly	MGR	GRM	≥15% but < 35% med. gravel
Coarse Gravelly	CGR	GRC	≥ 15% but < 35% coarse gravel
Very Gravelly	VGR	GRV	≥ 35% but < 60% gravel
Extremely Gravelly	XGR	GRX	≥ 60% but < 90% gravel
Cobbly	CB	CB	≥ 15% but < 35% cobbles
Very Cobbly	VCB	CBV	≥ 35% but < 60% cobbles
Extremely Cobbly	XCB	CBX	≥ 60% but < 90% cobbles
Stony	ST	ST	≥ 15% but < 35% stones
Very Stony	VST	STV	≥ 35% but < 60% stones
Extremely Stony	XST	STX	≥ 60% but < 90% stones
Bouldery	BY	BY	≥ 15% but < 35% boulders
Very Bouldery	VBY	BYV	≥ 35% but < 60% boulders
Extremely Bouldery	XBY	BYX	≥ 60% but < 90% boulders
Channery	CN	CN	≥ 15% but < 35% channers
Very Channery	VCN	CNV	≥ 35% but < 60% channers
Extremely Channery	XCN	CNX	≥ 60% but < 90% channers
Flaggy	FL	FL	≥ 15% but < 35% flagstones
Very Flaggy	VFL	FLV	≥ 35% but < 60% flagstones
Extremely Flaggy	XFL	FLX	≥ 60% but < 90% flagstones
PARAROCK FRAGMENTS (> 2 mm; < Strongly Cemented) ^{2, 3}			
Parabouldery	PBY	PBY	(same criteria as bouldery)
Very Parabouldery	VPBY	PBYV	(same criteria as very bouldery)
Extr. Parabouldery	XPBY	PBYX	(same criteria as ext. bouldery)
etc.	etc.	etc.	(same criteria as non-para)

¹ The "Quantity" modifier (e.g., *very*) is based on the total rock fragment content. The "Size" modifier (e.g., *cobbly*) is independently based on the largest, dominant fragment size. For a mixture of sizes (e.g., *gravel and stones*), a smaller size-class is named only if its quantity (%) sufficiently exceeds that of a larger size-class. For field texture determination, a smaller size-class must exceed 2 times the quantity (vol. %) of a larger size class before it is named (e.g., 30% gravel and 14% stones = *very gravelly*, but 20% gravel and 14% stones = *stony*). For more explicit naming criteria see NSSH-Part 618, Exhibit 618.11(Soil Survey Staff, 2001b).



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.
- N₆₀: 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 ANGULARITY OF COARSE-GRAINED PARTICLES

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+

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

<u>Q_u - TSF</u>	<u>N - Blows/foot</u>	<u>Consistency</u>
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

<u>Description</u>	<u>Criteria</u>
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

<u>Descriptive Term</u>	<u>% Dry Weight</u>
Trace:	< 15%
With:	15% to 30%
Modifier:	>30%

STRUCTURE DESCRIPTION

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

<u>Q_u - TSF</u>	<u>Consistency</u>
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

<u>Description</u>	<u>Criteria</u>
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

<u>Voids</u>	<u>Void Diameter</u>
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

<u>(Typically Sedimentary Rock)</u>	
<u>Component</u>	<u>Size Range</u>
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

<u>Rock Mass Description</u>	<u>RQD Value</u>
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.