RUSH

ROUTING: ~~Routine~~

Contract Routing Form

printed on: 07/09/2019

Contract between: Joe Daniels Construction Co., Inc.
and Dept. or Division: Engineering Division
Name/Phone Number:

Project: Fire Station No. 14 Training Tower

Contract No.: 8427
Enactment No.: RES-19-00492
Dollar Amount: 193,300.00

File No.: 56232
Enactment Date: 07/05/2019

(Please DATE before routing)

Signatures Required	Date Received	Date Signed
City Clerk	7/9/19	7/9/19
Director of Civil Rights	7/9/19	7/15/19
Risk Manager	7-15-19	7/15/19 RM
Finance Director	7-15-19	7/15/19 MAE
City Attorney 848	7-17-19	7-17-19
Mayor	7.17.19	7.19.19

Please return signed Contracts to the City Clerk's Office
Room 103, City-County Building for filing.

Original + 2 Copies

07/09/2019 09:14:44 enjls - Mike Schuchardt 261-9249

Dis Rights: OK / N/A / Problem - Hold
Prev Wage: AA / Agency / No
Contract Value:________
AA Plan: Approved
Amendment / Addendum #________
Type: POS / Dvlp / Sbdv / Gov't / Grant / PW / Goal / Loan / Agrmt

City of Madison

Legislation Details (With Text)

File #:	56232 **Version:** 1	**Name:**	Awarding Public Works Contract No. 8427, Fire Station No. 14 Training Tower.
Type:	Resolution	**Status:**	Passed
File created:	6/7/2019	**In control:**	Engineering Division
On agenda:	7/2/2019	**Final action:**	7/2/2019
Enactment date:	7/5/2019	**Enactment #:**	RES-19-00492

Title: Awarding Public Works Contract No. 8427, Fire Station No. 14 Training Tower. (16th AD)

Sponsors: BOARD OF PUBLIC WORKS

Indexes:

Code sections:

Attachments: 1. Contract 8427.pdf

Date	Ver.	Action By	Action	Result
7/2/2019	1	COMMON COUNCIL	Adopt Under Suspension of Rules 2.04, 2.05, 2.24, and 2.25	Pass
6/19/2019	1	BOARD OF PUBLIC WORKS	RECOMMEND TO COUNCIL TO ADOPT UNDER SUSPENSION OF RULES 2.04, 2.05, 2.24, & 2.25 - REPORT OF OFFICER	Pass
6/7/2019	1	Engineering Division	Refer	

The proposed resolution awards the contract for the Training Tower at Fire Station No. 14 project at a total estimated cost of the project is $208,760. Funding is available in the Fire Station 14 project (Munis 17451).
Awarding Public Works Contract No. 8427, Fire Station No. 14 Training Tower. (16th AD)
BE IT RESOLVED, that the following low bids for miscellaneous improvements be accepted and that the Mayor and City Clerk be and are hereby authorized and directed to enter into a contract with the low bidder contained herein, subject to the Contractor's compliance with Section 39.02 of the Madison General Ordinances concerning compliance with the Affirmative Action provisions **and subject to the Contractor's compliance with Section 33.07 of the Madison General Ordinances regarding Best Value Contracting:**

BE IT FURTHER RESOLVED, that the funds be encumbered to cover the cost of the projects contained herein.

See attached document (Contract No. 8427) for itemization of bids.

S0N2

PROJECT	CONTRACTOR	AMOUNT OF BID
CONTRACT NO. 8427 FIRE STATION NO. 14 TRAINING TOWER		
	JOE DANIELS CONSTRUCTION CO., INC.	$193,300.00

Acct. No. 17451-30-140: 53310 (90924)	$193,300.00
Contingency 8%±	15,460.00
GRAND TOTAL	$208,760.00

Jurisdiction: Wisconsin

Demographics

Company Name: Cincinnati Insurance Company, The
SBS Company Number: 54220104
Domicile Type: Foreign
NAIC Group Number: 244 - CINCINNATI FIN GRP
Merger Flag: No

NAIC CoCode: 10677
State of Domicile: Ohio
Organization Type: Stock

Short Name:
FEIN: 31-0542366
Country of Domicile: United States
Date of Incorporation: 08/02/1950

Address

Business Address
6200 S GILMORE RD
FAIRFIELD, OH 45014-5141
United States

Mailing Address
PO BOX 145496
CINCINNATI, OH 45250-5496
United States

Statutory Home Office Address
6200 S GILMORE RD
FAIRFIELD, OH 45014-5141
United States

Main Administrative Office Address
6200 S GILMORE RD
FAIRFIELD, OH 45014-5141
United States

Phone, Email, Website

Phone

Type	Number
Fax Phone	(513) 603-5500
Business Primary Phone	(513) 870-2000

Email
No results found.

Website
No results found.

Company Type

Company Type: Property and Casualty
Status: Active
Effective Date: 10/01/1974
Issue Date: 10/01/1974
Articles of Incorporation Received: No

Status Reason:
Legacy State ID: 112170
Approval Date:
Article No:

Status Date: 10/01/1974
Expiration Date:
File Date:
COA Number:

Appointments

Show 10 entries

Showing 1 to 2 of 3016 entries

mckenn

Licensee Name	License Number	NPN	License Type	Line of Authority	Appointment Date	Effective Date	Expiration Date
PATRICK MCKENNA	650765	650765	Intermediary (Agent) Individual	Property	08/17/2007	01/11/2019	03/15/2020
PATRICK MCKENNA	650765	650765	Intermediary (Agent) Individual	Casualty	08/17/2007	01/11/2019	03/15/2020

First Previous 1 Next Last

Line Of Business

Line of Business	Citation Type	Effective Date
Aircraft	Aircraft	10/01/1974
Automobile	Automobile	10/01/1974
Disability Insurance	Disability Insurance	10/01/1974
Fidelity Insurance	Fidelity Insurance	10/01/1974
Fire, Inland Marine and Other Property Insurance	Fire, Inland Marine and Other Property Insurance	10/01/1974
Liability and Incidental Medical Expense Insurance (other than automobile)	Liability and Incidental Medical Expense Insurance (other than automobile)	10/01/1974
Miscellaneous	Miscellaneous	10/01/1974
Ocean Marine Insurance	Ocean Marine Insurance	10/01/1974
Surety Insurance	Surety Insurance	10/01/1974
Workers Compensation Insurance	Workers Compensation Insurance	10/01/1974

Contact

Contact Type	Preferred Name	Name	E-mail	Phone	Address
Registered Agent for Service of Process		MICHAEL MURRAY			**Other** KASDORF LEWIS & SWIETLIK SC 1 PARK PLZ 11270 W PARK PL 5TH FL MILWAUKEE, WI United States County 53224

Company Merger

No results found.

Name Change History

Previous Name	New Name	Effective Date
	Cincinnati Insurance Company, The	

$193,300.00
FILE COPY

BID OF JOE DANIELS CONSTRUCTION CO., INC.

2019

PROPOSAL, CONTRACT, BOND AND SPECIFICATIONS

FOR

FIRE STATION NO. 14 TRAINING TOWER

CONTRACT NO. 8427

MUNIS NO. 17451

IN

MADISON, DANE COUNTY, WISCONSIN

AWARDED BY THE COMMON COUNCIL
MADISON, WISCONSIN ON **JULY 2, 2019**

CITY ENGINEERING DIVISION
1600 EMIL STREET
MADISON, WISCONSIN 53713

https://bidexpress.com/login

FIRE STATION NO. 14 TRAINING TOWER
CONTRACT NO. 8427

INDEX

This Proposal, and Agreement have
been prepared by:

CITY ENGINEERING DIVISION
CITY OF MADISON
MADISON, DANE COUNTY, WISCONSIN

Robert Phillips

Robert F. Phillips, P.E., City Engineer

RFP: rw

SECTION A: ADVERTISEMENT FOR BIDS AND INSTRUCTIONS TO BIDDERS

REQUEST FOR BID FOR PUBLIC WORKS CONSTRUCTION
CITY OF MADISON, WISCONSIN

A BEST VALUE CONTRACTING MUNICIPALITY

PROJECT NAME:	FIRE STATION NO. 14 TRAINING TOWER
CONTRACT NO.:	8427
SBE GOAL	6%
BID BOND	5%
SBE PRE BID MEETING (1:00 P.M.)	MAY 31, 2019
PREQUALIFICATION APPLICATION DUE (2:00 P.M.)	MAY 30, 2019
BID SUBMISSION (2:00 P.M.)	JUNE 6, 2019
BID OPEN (2:30 P.M.)	JUNE 6, 2019
PUBLISHED IN WSJ	MAY 16, 23 & 30, 2019

SBE PRE BID MEETING: Representatives of the Affirmative Action Department will be present to discuss the Small Business Enterprise requirements at 1600 Emil Street, Madison Wisconsin.

PREQUALIFICATION APPLICATION: Forms are available on our website, www.cityofmadison.com/business/pw/forms.cfm. If not currently prequalified in the categories listed in Section A, an amendment to your Prequalification will need to be submitted prior to the same due date. Postmark is not applicable.

BIDS TO BE SUBMITTED by hand to 1600 EMIL ST., MADISON, WI 53713 or online at www.bidexpress.com.

THE BID OPENING is at 1600 EMIL ST., MADISON, WI 53713.

STANDARD SPECIFICATIONS

The City of Madison's Standard Specifications for Public Works Construction - 2019 Edition, as supplemented and amended from time to time, forms a part of these contract documents as if attached hereto.

These standard specifications are available on the City of Madison Public Works website, www.cityofmadison.com/Business/PW/specs.cfm.

The Contractor shall review these Specifications prior to preparation of proposals for the work to be done under this contract, with specific attention to Article 102, "BIDDING REQUIREMENTS AND CONDITIONS" and Article 103, "AWARD AND EXECUTION OF THE CONTRACT." For the convenience of the bidder, below are highlights of three subsections of the specifications.

SECTION 102.1: PRE-QUALIFICATION OF BIDDERS

In accordance with Wisconsin State Statutes 66.0901 (2) and (3), all bidders must submit to the Board of Public Works proof of responsibility on forms furnished by the City. The City requires that all bidders be qualified on a biennial basis.

Bidders must present satisfactory evidence that they have been regularly engaged in the type of work specified herein and they are fully prepared with necessary capital, materials, machinery and supervisory personnel to conduct the work to be contracted for to the satisfaction of the City. All bidders must be pre-qualified by the Board of Public Works for the type of construction on which they are bidding prior to the opening of the bid.

In accordance with Section 39.02(9)(a)l. of the General Ordinances, all bidders shall submit in writing to the Affirmative Action Division Manager of the City of Madison, a Certificate of Compliance or an Affirmative Action Plan at the same time or prior to the submission of the proof of responsibility forms.

The bidder shall be disqualified if the bidder fails to or refuses to, prior to opening of the bid, submit a Certificate of compliance, Affirmative Action Plan or Affirmative Action Data Update, as applicable, as defined by Section 39.02 of the General Ordinances (entitled Affirmative Action) and as required by Section 102.11 of the Standard Specifications.

SECTION 102.4 PROPOSAL

No bid will be accepted that does not contain an adequate or reasonable price for each and every item named in the Schedule of Unit Prices.

A lump sum bid for the work in accordance with the plans and specifications is required. The lump sum bid must be the same as the total amounts bid for the various items and it shall be inserted in the space provided.

All papers bound with or attached to the proposal form are considered a part thereof and must not be detached or altered when the proposal is submitted. The plans, specifications and other documents designated in the proposal form will be considered a part of the proposal whether attached or not.

A proposal submitted by an individual shall be signed by the bidder or by a duly authorized agent. A proposal submitted by a partnership shall be signed by a member/partner or by a duly authorized agent thereof. A proposal submitted by a corporation shall be signed by an authorized officer or duly authorized registered agent of such corporation, and the proposal shall show the name of the State under the laws of which such corporation was chartered. The required signatures shall in all cases appear in the space provided thereof on the proposal.

Each proposal shall be placed, together with the proposal guaranty, in a sealed envelope, so marked as to indicate name of project, the contract number or option to which it applies, and the name and address of the Contractor or submitted electronically through Bid Express (www.bidexpress.com). Proposals will be accepted at the location, the time and the date designated in the advertisement. Proposals received after the time and date designated will be returned to the bidder unopened.

SECTION 102.5: BID DEPOSIT (PROPOSAL GUARANTY)

All bids, sealed or electronic, must be accompanied with a Bid Bond (City of Madison form) equal to at least 5% of the bid or a Certificate of Annual/Biennial Bid Bond or certified check, payable to the City Treasurer. Bid deposit of the successful bidders shall be returned within forty-eight (48) hours following execution of the contract and bond as required.

MINOR DISCREPENCIES

Bidder is responsible for submitting all forms necessary for the City to determine compliance with State and City bidding requirements. Nothwithstanding any language to the contrary contained herein, the City may exercise its discretion to allow bidders to correct or supplement submissions after bid opening, if the minor discrepancy, bid irregularity or omission is insignificant and not one related to price, quality, quantity, time of completion or performance of the contract.

Bidders for this Contract(s) must be Pre-Qualified for at least one of the following type(s) of construction denoted by an ☒

Building Demolition

- 101 ☐ Asbestos Removal
- 120 ☐ House Mover
- 110 ☐ Building Demolition

Street, Utility and Site Construction

- 201 ☐ Asphalt Paving
- 205 ☐ Blasting
- 210 ☐ Boring/Pipe Jacking
- 215 ☐ Concrete Paving
- 220 ☐ Con. Sidewalk/Curb & Gutter/Misc. Flat Work
- 221 ☐ Concrete Bases and Other Concrete Work
- 222 ☐ Concrete Removal
- 225 ☐ Dredging
- 230 ☐ Fencing
- 235 ☐ Fiber Optic Cable/Conduit Installation
- 240 ☐ Grading and Earthwork
- 241 ☐ Horizontal Saw Cutting of Sidewalk
- 242 ☐ Infrared Seamless Patching
- 245 ☐ Landscaping, Maintenance
- 246 ☐ Ecological Restoration
- 250 ☐ Landscaping, Site and Street
- 251 ☐ Parking Ramp Maintenance
- 252 ☐ Pavement Marking
- 255 ☐ Pavement Sealcoating and Crack Sealing
- 260 ☐ Petroleum Above/Below Ground Storage Tank Removal/Installation
- 262 ☐ Playground Installer
- 265 ☐ Retaining Walls, Precast Modular Units
- 270 ☐ Retaining Walls, Reinforced Concrete
- 275 ☐ Sanitary, Storm Sewer and Water Main Construction
- 276 ☐ Sawcutting
- 280 ☐ Sewer Lateral Drain Cleaning/Internal TV Insp.
- 285 ☐ Sewer Lining
- 290 ☐ Sewer Pipe Bursting
- 295 ☐ Soil Borings
- 300 ☐ Soil Nailing
- 305 ☐ Storm & Sanitary Sewer Laterals & Water Svc.
- 310 ☐ Street Construction
- 315 ☐ Street Lighting
- 318 ☐ Tennis Court Resurfacing
- 320 ☐ Traffic Signals
- 325 ☐ Traffic Signing & Marking
- 332 ☐ Tree pruning/removal
- 333 ☐ Tree, pesticide treatment of
- 335 ☐ Trucking
- 340 ☐ Utility Transmission Lines including Natural Gas, Electrical & Communications
- 399 ☐ Other______________________________

Bridge Construction

- 501 ☐ Bridge Construction and/or Repair

Building Construction

- 401 ☐ Floor Covering (including carpet, ceramic tile installation, rubber, VCT
- 402 ☐ Building Automation Systems
- 403 ☐ Concrete
- 404 ☐ Doors and Windows
- 405 ☐ Electrical - Power, Lighting & Communications
- 410 ☐ Elevator - Lifts
- 412 ☐ Fire Suppression
- 413 ☐ Furnishings - Furniture and Window Treatments
- 415 ☒ General Building Construction, Equal or Less than $250,000
- 420 ☐ General Building Construction, $250,000 to $1,500,000
- 425 ☐ General Building Construction, Over $1,500,000
- 428 ☐ Glass and/or Glazing
- 429 ☐ Hazardous Material Removal
- 430 ☐ Heating, Ventilating and Air Conditioning (HVAC)
- 433 ☐ Insulation - Thermal
- 435 ☐ Masonry/Tuck pointing
- 437 ☐ Metals
- 440 ☐ Painting and Wallcovering
- 445 ☐ Plumbing
- 450 ☐ Pump Repair
- 455 ☐ Pump Systems
- 460 ☐ Roofing and Moisture Protection
- 464 ☐ Tower Crane Operator
- 461 ☐ Solar Photovoltaic/Hot Water Systems
- 465 ☐ Soil/Groundwater Remediation
- 466 ☐ Warning Sirens
- 470 ☐ Water Supply Elevated Tanks
- 475 ☐ Water Supply Wells
- 480 ☐ Wood, Plastics & Composites - Structural & Architectural
- 499 ☐ Other______________________________
____

State of Wisconsin Certifications

- 1 ☐ Class 5 Blaster - Blasting Operations and Activities 2500 feet and closer to inhabited buildings for quarries, open pits and road cuts.
- 2 ☐ Class 6 Blaster - Blasting Operations and Activities 2500 feet and closer to inhabited buildings for trenches, site excavations, basements, underwater demolition, underground excavations, or structures 15 feet or less in height.
- 3 ☐ Class 7 Blaster - Blasting Operations and Activities for structures greater than 15 ' in height, bridges, towers, and any of the objects or purposes listed as "Class 5 Blaster or Class 6 Blaster".
- 4 ☐ Petroleum Above/Below Ground Storage Tank Removal and Installation (Attach copies of State Certifications.)
- 5 ☐ Hazardous Material Removal (Contractor to be certified for asbestos and lead abatement per the Wisconsin Department of Health Services, Asbestos and Lead Section (A&LS).) See the following link for application: www.dhs.wisconsin.gov/Asbestos/Cert. State of Wisconsin Performance of Asbestos Abatement Certificate must be attached.
- 6 ☐ Certification number as a Certified Arborist or Certified Tree Worker as administered by the International Society of Arboriculture
- 7 ☐ Pesticide application (Certification for Commercial Applicator For Hire with the certification in the category of turf and landscape (3.0) and possess a current license issued by the DATCP)
- 8 ☐ State of Wisconsin Master Plumbers License.

SECTION B: PROPOSAL

Please refer to the Bid Express Website at https://bidexpress.com look up contract number and go to Section B: Proposal Page

You can access all City of Madison bid solicitations for FREE at www.bidexpress.com

Click on the "Register for Free" button and follow the instructions to register your company and yourself. You will be asked for a payment subscription preference, since you may wish to bid online someday. Simply choose the method to pay on a 'per bid' basis. This requires no payment until / unless you actually bid online. You can also choose the monthly subscription plan at this time. You will, however, be asked to provide payment information. Remember, you can change your preference at anytime. You will then be able to complete your free registration and have full access to the site. Your free access does not require completion of the 'Digital ID' process, so you will have instant access for viewing and downloading. To be prepared in case you ever do wish to bid online, you may wish to establish your digital ID also, since you cannot bid without a Digital ID.

If you have any problems with the free registration process, you can call the bidexpress help team, toll free at 1-888-352-2439 (option 1, option1).

SECTION C: SMALL BUSINESS ENTERPRISE

Instructions to Bidders
City of Madison
SBE Program Information

2 Small Business Enterprise (SBE) Program Information

2.1 Policy and Goal

The City of Madison reaffirms its policy of nondiscrimination in the conduct of City business by maintaining a procurement process which remains open to all who have the potential and ability to sell goods and services to the City. It is the policy of the City of Madison to allow Small Business Enterprises (SBE) maximum feasible opportunity to participate in City of Madison contracting. The bidder acknowledges that its bid has been submitted in accordance with the SBE program and is for the public's protection and welfare.

Please refer to the "ADVERTISEMENT FOR BIDS" for the goal for the utilization of SBEs on this project. SBEs may participate as subcontractors, vendors and/or suppliers, which provide a commercially useful function. The dollar value for SBE suppliers or 'materials only' vendors shall be discounted to 60% for purposes of meeting SBE goals.

A bidder which achieves or exceeds the SBE goal will be in compliance with the SBE requirements of this project. In the event that the bidder is unable to achieve the SBE goal, the bidder must demonstrate that a good faith effort to do so was made. Failure to either achieve the goal or demonstrate a good faith effort to do so will be grounds for the bidder being deemed a non-responsible contractor ineligible for award of this contract.

A bidder may count towards its attainment of the SBE goal only those expenditures to SBEs that perform a commercially useful function. For purposes of evaluating a bidder's responsiveness to the attainment of the SBE goal, the contract participation by an SBE is based on the percentage of the total base bid proposed by the Contractor. The total base bid price is inclusive of all addenda.

Work performed by an SBE firm in a particular transaction can be counted toward the goal only if it involves a commercially useful function. That is, in light of industry practices and other relevant considerations, does the SBE firm have a necessary and useful role in the transaction, of a kind for which there is a market outside the context of the SBE Program, or is the firm's role a superfluous step added in an attempt to obtain credit towards goals? If, in the judgment of the Affirmative Action Division, the SBE firm will not perform a commercially useful function in the transaction, no credit towards goals will be awarded.

The question of whether a firm is performing a commercially useful function is completely separate from the question of whether the firm is an eligible SBE. A firm is eligible if it meets the definitional criteria and ownership and control requirements, as set forth in the City of Madison's SBE Program.

If the City of Madison determines that the SBE firm is performing a commercially useful function, then the City of Madison must then decide what that function is. If the commercially useful function is that of an SBE vendor / supplier that regularly transacts business with the respective product, then the City of Madison will count 60% of the value of the product supplied toward SBE goals.

To be counted, the SBE vendor / supplier must be engaged in selling the product in question to the public. This is important in distinguishing an SBE vendor / supplier, which has a regular trade with a variety of customers, from a firm which performs supplier-like functions on an ad hoc basis or for only one or two contractors with whom it has a special relationship.

A supplier of bulk goods may qualify as an eligible SBE vendor / supplier if it either maintains an inventory or owns or operates distribution equipment. With respect to the distribution equipment; e.g., a fleet of trucks, the term "operates" is intended to cover a situation in which the supplier leases the equipment on a regular basis for its entire business. It is not intended to cover a situation in which the firm simply provides drivers for trucks owned or leased by another party; e.g., a prime contractor, or leases such a party's trucks on an ad hoc basis for a specific job.

If the commercially useful function being performed is not that of a qualified SBE vendor / supplier, but rather that of delivery of products, obtaining bonding or insurance, procurement of personnel, acting as a broker or manufacturer's representative in the procurement of supplies, facilities, or materials, etc., only the fees or commissions will apply towards the goal.

For example, a business that simply transfers title of a product from manufacturer to ultimate purchaser; e. g., a sales representative who re-invoices a steel product from the steel company to the Contractor, or a firm that puts a product into a container for delivery would not be considered a qualified SBE vendor / supplier. The Contractor would not receive credit based on a percentage of the cost of the product for working with such firms.

Concerning the use of services that help the Contractor obtain needed supplies, personnel, materials or equipment to perform a contract: only the fee received by the service provider will be counted toward the goal. For example, use of a SBE sales representative or distributor for a steel company, if performing a commercially useful function at all, would entitle the Contractor receiving the steel to count only the fee paid to the representative or distributor toward the goal. This provision would also govern fees for professional and other services obtained expressly and solely to perform work relating to a specific contract.

Concerning transportation or delivery services: if an SBE trucking company picks up a product from a manufacturer or a qualified vendor / supplier and delivers the product to the Contractor, the commercially useful function it is performing is not that of a supplier, but simply that of a transporter of goods. Unless the trucking company is itself the manufacturer or a qualified vendor / supplier in the product, credit cannot be given based on a percentage of the cost of the product. Rather, credit would be allowed for the cost of the transportation service.

The City is aware that the rule's language does not explicitly mention every kind of business that may contribute work on this project. In administering these programs, the City would, on a case-by-case basis, determine the appropriate counting formula to apply in a particular situation.

2.2 Contract Compliance

Questions concerning the SBE Program shall be directed to the Contract Compliance Officer of the City of Madison Department of Civil Rights, Affirmative Action Division, 210 Martin Luther King, Jr. Blvd., Room 523, Madison, WI 53703; telephone (608) 266-4910.

2.3 Certification of SBE by City of Madison

The Affirmative Action Division maintains a directory of SBEs which are currently certified as such by the City of Madison. Contact the Contract Compliance Officer as indicated in Section 2.2 to receive a copy of the SBE Directory or you may access the SBE Directory online at www.cityofmadison.com/dcr/aaTBDir.cfm.

All contractors, subcontractors, vendors and suppliers seeking SBE status must complete and submit the **Targeted Business Certification Application** to the City of Madison Affirmative Action Division by the time and date established for receipt of bids. A copy of the Targeted Business Certification Application is available by contacting the Contract Compliance Officer at the address and telephone indicated in Section 2.2 or you may access the Targeted Business Certification Application online at www.cityofmadison.com/dcr/aaTBDir.cfm. Submittal of the Targeted Business Certification Application by the time specified does not guarantee that the applicant will be certified as a SBE eligible to be utilized towards meeting the SBE goal for this project.

2.4 Small Business Enterprise Compliance Report

2.4.1 Good Faith Efforts

Bidders shall take all necessary affirmative steps to assure that SBEs are utilized when possible and that the established SBE goal for this project is achieved. A contractor who self performs a portion of the work, and is pre-qualified to perform that category of work, may subcontract that portion of the work, but shall not be required to do so. When a bidder is unable to achieve the established SBE goal, the bidder must demonstrate that a good faith effort to do so was made. Such a good faith effort should include the following:

2.4.1.1 Attendance at the pre-bid meeting.

2.4.1.2 Using the City of Madison's directory of certified SBEs to identify SBEs from which to solicit bids.

2.4.1.3 Assuring that SBEs are solicited whenever they are potential sources.

2.4.1.4 Referring prospective SBEs to the City of Madison Affirmative Action Division for certification.

2.4.1.5 Dividing total project requirements into smaller tasks and/or quantities, where economically feasible, to permit maximum feasible SBE participation.

2.4.1.6 Establishing delivery schedules, where requirements permit, which will encourage participation by SBEs.

2.4.1.7 Providing SBEs with specific information regarding the work to be performed.

2.4.1.8 Contacting SBEs in advance of the deadline to allow such businesses sufficient time to prepare a bid.

2.4.1.9 Utilizing the bid of a qualified and competent SBE when the bid of such a business is deemed reasonable (i.e. 5% above the lowest bidder), although not necessarily low.

2.4.1.10 Contacting SBEs which submit a bid, to inquire about the details of the bid and confirm that the scope of the work was interpreted as intended.

2.4.1.11 Completion of Cover Page (page C-6), Summary Sheet (page C-7) and SBE Contact Reports (pages C-8 and C9) if applicable.

2.4.2 Reporting SBE Utilization and Good Faith Efforts

The Small Business Enterprise Compliance Report is to be submitted by the bidder with the bid: This report is due by the specified bid closing time and date. Bids submitted without a completed SBE Compliance Report as outlined below may be deemed non-responsible and the bidder ineligible for award of this contract. Nothwithstanding any language to the contrary contained herein, the City may exercise its discretion to allow bidders to correct or supplement submissions after bid opening, if the minor discrepancy, bid irregularity or omission is insignificant and not one related to price, quality, quantity, time of completion, performance of the contract, or percentage of SBE utilization.

2.4.2.1 If the Bidder meets or exceeds the goal established for SBE utilization, the Small Business Enterprise Compliance Report shall consist of the following:

2.4.2.1.1 **Cover Page,** Page C-6; and
2.4.2.1.2 **Summary Sheet,** C-7.

2.4.2.2 If the bidder does not meet the goal established for SBE utilization, the Small Business Enterprise Compliance Report shall consist of the following:

2.4.2.2.1 **Cover Page,** Page C-6;
2.4.2.2.2 **Summary Sheet,** C-7; and
2.4.2.2.3 **SBE Contact Report,** C-8 and C-9. (A separate Contact Report must be completed for each applicable SBE which is not utilized.)

2.5 Appeal Procedure

A bidder which does not achieve the established goal and is found non-responsible for failure to demonstrate a good faith effort to achieve such goal and subsequently denied eligibility for award of contract may appeal that decision to the Small Business Enterprises Appeals Committee. All appeals shall be made in writing, and shall be delivered to and received by the City Engineer no later than 4:30 PM on the third business day following the bidder's receipt of the written notification of ineligibility by the Affirmative Action Division Manager. Postmark not acceptable. The notice of appeal shall state the basis for the appeal of the decision of the Affirmative Action Division Manager. The Appeal shall take place in accordance with Madison General Ordinance 33.54.

2.6 SBE Requirements After Award of the Contract

The successful bidder shall identify SBE subcontractors, suppliers and vendors on the subcontractor list in accordance with the specifications. The Contractor shall submit a detailed explanation of any variances between the listing of SBE subcontractors, vendors and/or suppliers on the subcontractor list and the Contractor's SBE Compliance Report for SBE participation.

No change in SBE subcontractors, vendors and/or suppliers from those SBEs indicated in the SBE Compliance Report will be allowed without prior approval from the Engineer and the Affirmative Action Division. The contractor shall submit in writing to the City of Madison Affirmative Action Division a request to change any SBE citing specific reasons which necessitate such a change. The Affirmative Action Division will use a general test of reasonableness in approving or rejecting the contractor's request for change. If the request is approved, the Contractor will make every effort to utilize another SBE if available.

The City will monitor the project to ensure that the actual percentage commitment to SBE firms is carried out.

2.7 SBE Definition and Eligibility Guidelines

A Small Business Enterprise is a business concern awarded certification by the City of Madison. For the purposes of this program a Small Business Enterprise is defined as:

A. An independent business operated under a single management. The business may not be a subsidiary of any other business and the stock or ownership may not be held by any individual or any business operating in the same or a similar field. In determining whether an entity qualifies as a SBE, the City shall consider all factors relevant to being an independent business including, but not limited to, the date the business was established, adequacy of its resources for the work in which it proposes to involve itself, the degree to which financial, equipment leasing and other relationships exist with other ineligible firms in the same or similar lines of work. SBE owner(s) shall enjoy the customary incidents of ownership and shall share in the risks and profits commensurate with their enjoyment interests, as demonstrated by an examination of the substance rather than form or arrangements that may be reflected in its ownership documents.

B. A business that has averaged no more than $4.0 million in annual gross receipts over the prior three year period and the principal owner(s) do not have a personal net worth in excess of $1.32 million.

Firm and/or individuals that submit fraudulent documents/testimony may be barred from doing business with the City and/or forfeit existing contracts.

SBE certification is valid for one (1) year unless revoked.

SECTION D: SPECIAL PROVISIONS

FIRE STATION NO. 14 TRAINING TOWER
CONTRACT NO. 8427

It is the intent of these Special Provisions to set forth the final contractual intent as to the matter involved and shall prevail over the Standard Specifications and plans whenever in conflict therewith. In order that comparisons between the Special Provisions can be readily made, the numbering system for the Special Provisions is equivalent to that of the Specifications.

Whenever in these Specifications the term "Standard Specifications" appears, it shall be taken to refer to the City of Madison Standard Specifications for Public Works Construction and Supplements thereto.

SECTION 102.11 BEST VALUE CONTRACTING

This Contract shall be considered a Best Value Contract if the Contractor's bid is equal to or greater than $62,500 for a single trade contract; or equal to or greater than $306,000 for a multi-trade contract pursuant to MGO 33.07(7).

ARTICLE 103 AWARD AND EXECUTION OF THE CONTRACT

The awarded Contractor shall completely execute the signing of all contract documents and submit them to City Engineering prior to **12:00pm on July 8, 2019**. No exceptions or extensions to the above date will be permitted. The Payment and Performance Bonds shall be dated no sooner than **Wednesday, July 3, 2019**

ARTICLE 104: SCOPE OF WORK

This contract is for the Construction a training tower to be located at the Madison Fire Station No. 14 site. The Training tower is a stand-alone 800 square feet tri-level treated wood structure. This wood structure will be used to provide realistic training opportunities to teach the basics of search and rescue.

The scope of work includes the furnishing of all labor, materials, equipment, tools, and other services necessary to complete the work in accordance with the intent of this contract. The Contractor shall use properly functioning equipment capable of performing the tasks required. The Contractor shall furnish workers who perform quality work and who are experienced and knowledgeable in the work proposed.

SECTION 104.1 LANDS FOR WORK

Lands for work shall include all of the following:

- General outlines for the Lands for Work for this contract are represented on the Civil drawings. All use of the City Lands for Work – by the Contractor - shall be reviewed and approved by the City's Project Manager.

- No tobacco product use is allowed on the Lands for Work.

SECTION 104.2 INTENT AND COORDINATION OF CONTRACT DOCUMENTS

The contract documents are complementary to each other and consist of all of the following:
The contract documents are complimentary of each other and consist of all of the following:

- The City Standard Specifications for Public Works Construction, 2019 Edition
- These Special Provisions including all plans and specifications as noted below.
- All Addenda to the bidding documents.

PLANS AND SPECIFICATIONS:
Exhibit A Bid Document Drawing Set dated **April 5, 2019**

Exhibit B Bid Document Specification Volume 1 contract and special provisions dated **April 5, 2019**

SECTION 105.5: <u>INSPECTION OF WORK</u>

The Contractor shall coordinate directly with any and all regulatory agencies having jurisdiction over the licensing, permitting, and inspection, of work as described in these construction documents.

SECTION 105.6: <u>CONTRACTORS RESPONSIBILITY FOR WORK</u>

The Contractor shall not take advantage of any discrepancy in the plans or specifications. This shall include but not be limited to apparent errors, omissions, and interpretations involving codes, regulations, and standards.

Any Contractor who identifies such a discrepancy during the bidding process shall notify the Project Architect and City Project Manager of the discrepancy prior to the "Questions and Clarifications Deadline" as noted in Section A of the bid documents.

Any Contractor who identifies such a discrepancy during the abatement process shall immediately notify the Project Architect and City Project Manager in writing and request clarification on how to proceed. See Specification 01 26 13-Request for Information (RFI).

If a conflict exists within the Specifications or exists within the Drawings, the Contractor shall perform the work that most closely fits the City's intent of this contract.

SECTION 105.7: <u>CONTRACT DOCUMENTS</u>

The General Contractor is responsible for reproducing all construction documents necessary to complete the Work at their own cost. This shall include plans, specifications, addenda for the General Contractor and all Sub-contractors.

SECTION 105.9: <u>SURVEYS, POINTS AND INSTRUCTIONS</u>

The General Contractor is responsible for providing all survey, benchmarks, points, and elevations required for this project.

SECTION 105.12: <u>COOPERATION BY THE CONTRACTOR</u>

The Contractor shall notify adjacent property owners for any work affecting neighboring facilities. Contractor shall provide sufficient notification time to avoid any disruption to neighboring facility operations.

The Contractor shall review all other specifications within the construction documents for other requirements and coordination of work associated with this contract.

SECTION 107.2 <u>PROTECTION AND RESTORATION OF PROPERTY</u>

The Contractor shall follow these general guidelines while performing work associated with this contract:

- All damage, not consistent with requirements of the contract documents, to either building shall be repaired or replaced to the original or better condition at the Contractor's expense.
- The Contractor shall be responsible for protecting adjacent grass and all mature trees including limbs and branches during all exterior construction activities. This shall include the use of any equipment required to assist work being completed under this contract.

SECTION 108.2 <u>PERMITS AND LICENSING</u>

The Contractor shall be required to provide to apply, pay for and obtain all permits or licenses that may be required by these contract documents regardless of ordinance, statute, or other regulatory requirement.

SECTION 109.7 <u>TIME OF COMPLETION</u>

Work shall begin only after the contract is completely executed and the start work letter is received. It is anticipated that the start work letter shall be issued on or about **July 22, 2019.**

The Contractor shall have reached a level of Construction Closeout **NO LATER THAN September 30, 2019.** This milestone by definition in the specifications includes Owner Occupancy of the Training tower project.

NON STANDARD BID ITEMS

BID ITEM 90001 – BASE BID

DESCRIPTION: The BASE BID shall include the complete installation of all building components; the accepted testing, and commissioning of all systems; and the completion, and turn-in of all deliverables as outlined in the plans and specifications.

METHOD OF MEASUREMENT: The BASE BID shall be measured as Lump Sum of the required construction and installations described in the plans and specifications.

BASIS OF PAYMENT: The BASE BID shall be paid at the contract unit price. Partial payments shall be reviewed and authorized as described in the above referenced specifications.

POINTS OF CONTACT

We ask all Contractors with questions and concerns regarding the bidding of these contract documents to do so by email so we may properly log, track and respond to all issues.

*** Reference Training Tower contract 8427 in the subject line of all emails**

The Project Manager for City Engineering for this contract is:

Mike Schuchardt
City of Madison
Department of Public Works
Engineering Division - Facilities and Sustainability
City-County Building, Room 115
210 Martin Luther King, Jr. Blvd.
Madison, WI 53703-3342
608-261-9249

The Project Architect for this contract is:

Mark Kruser AIA

PROJECT MANAGER

OPN Architects

d: (608) 819-0260 | c: (608) 807-7494 | mkruser@opnarchitects.com

301 N. Broom St. Suite 100, Madison, Wisconsin 53703

Project Manual

Training Tower Fire Station 14

City of Madison Fire Department

Volume 1 of 1

Bid Documents

April 5, 2019

Madison Project No. 17451
Madison Contract No. 9400
OPN Project No. 19607000

ARCHITECTS

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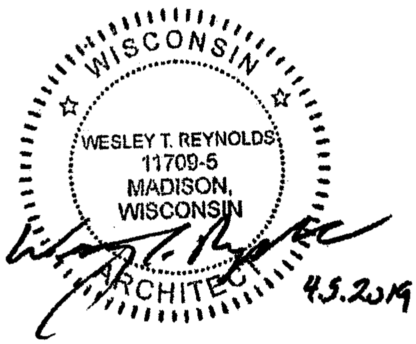
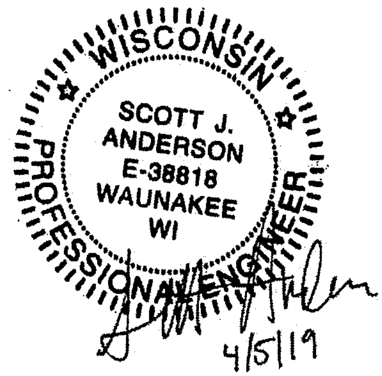
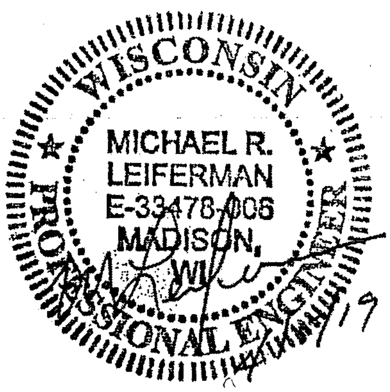
SEALS PAGE



Architect's Seal
Wesley T. Reynolds
OPN Architects, Inc.
301 North Broom Street, Suite 100
Madison, WI 53703
Telephone: (608) 819-0260



Civil Engineer's Seal
Scott J. Anderson
Snyder & Associates, Inc.
5010 Voges Road
Middleton, WI 53718
Telephone: (608) 838-0444



Structural Engineer's Seal
Mmichael Leiferman
Strategic structural Design
725 Hartland Trail, Suite 203
Madison, WI 53717
Telephone: (608) 658-0436

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SECTION 00 01 15
LIST OF DRAWING SHEETS

VOLUME I of I

GENERAL

A000 COVER, DRAWING SHEET INDEX
A001 GENERAL DRWING INFORMATION, CODE SUMMARY

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C100 SITE AND EROSION CONTROL PLAN
C200 PROJEC DETAILS

ARCHITECTURAL

A100 FLOOR PLANS, DETAILS
A200 ELEVATIONS, DETAILS
A300 BUILDING SECTIONS, DETAILS

STRUCTURAL

S001 STRUCTURAL GENERAL NOTES
S002 STRUCTURAL GENERAL NOTES
S101 FOUNDATION PLAN
S202 FRAMING PLANS
S401 FRAMING DETAILS
S402 FRAMING DETAILS

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SECTION 00 31 00
AVAILABLE PROJECT INFORMATION

PART 1 – GENERAL

1.1. EXISTING CONDITIONS

A. Copies of the following reports are provided for informational purposes:
1. Wetland Delineation Report: Entitled Wetland Delineation Report - Fire Station #14, dated August 8, 2013, prepared by NES Ecological Services.
   a. A copy of this report is included after this section.
2. 2013 Geotechnical Report: Entitled Preliminary Geotechnical Exploration Report - Proposed Fire Station No. 14 & Fire Training Facility, dated August 9, 2013, prepared by CGC, Inc.
   a. A copy of this report is included after this section.
3. 2017 Addendum to Geotechnical Report: Entitled Geotechnical Exploration Report - Proposed Fire Station No. 14, dated July 13, 2017, prepared by CGC, Inc.
   a. A copy of this report is included after this section.
4. Seismic Testing Report: Entitled Seismic Site Classification at the Proposed Madison Fire Station, Madison, Wisconsin, dated August 3, 2017, prepared by GEI Consultants.
   a. A copy of this report is included after this section.
5. Helical Pier Bore and Geotechnical Report: Entitled Supplemental Geotechnical Exploration Report Proposed Fire Station No. 14 - Helical Pier Alternative, dated September 26, 2017, prepared by CGC, Inc.
   a. A copy of this report is included after this section.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

END OF SECTION

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WETLAND DELINEATION REPORT
FIRE STATION #14

Prepared for

City of Madison - Engineering
210 Martin Luther King Jr. Boulevard, Room 406
Madison, Wisconsin 53703-3345
Project #15220004

Authored By:

August 8, 2013

NES
COLOGICAL SERVICES

4664 Golden Pond Park Cou
Hobart, Wisconsin 5415
Phone: 920-499-578
Fax: 920-662-914
www.neswi.co

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INTRODUCTION

NES Ecological Services (NES) – A Division of Robert E. Lee & Associates, Inc., under contract with the City of Madison, conducted a wetland delineation within the Fourth Addition to World Dairy Center (Lots 34,35,36, Part of Lot 51, 52 & 53) in the City of Madison, Dane County, Wisconsin (Appendix A). The area investigated is approximately 14.6 acres in size and contains approximately 0.49 acre of wetland. The delineation was conducted to detect wetland resources that may be impacted during the construction of a proposed municipal fire station and training center.

NES is a natural resources firm focusing entirely on issues associated with wetlands, native habitat restoration and wildlife management. NES staffs ecologists specializing in wetlands, botany, and wildlife who are well qualified to assist individuals, companies, and municipalities with a variety of wetland services, ecological surveys, natural resource planning, and native habitat restoration projects. The wetland ecologists involved with this project are Theran Stautz and Troy Anderson. Mr. Stautz has a B.S. in Forest Science and over seven years of wetland delineation, monitoring and restoration experience. Mr. Anderson has fifteen years of restoration ecology experience.

Mr. Stautz is a Wisconsin Department of Natural Resources (WDNR) Assured Wetland Delineator.

PRE-FIELD REVIEW

An initial review of the United States Geological Survey (USGS) Topographic Map (National Geographic Society, 2013), the Wisconsin Department of Natural Resources (WDNR) Surface Water Data Viewer (2013), 1995, 2000, 2005 and 2010 Dane County orthophotos, the Natural Resource Conservation Service (NRCS) Web Soil Survey (2013), the NRCS Official Soil Series Descriptions, and the NRCS Hydric Soils List of Wisconsin was performed prior to the wetland delineation in order to gain familiarity with the site's topography, existing wetland vegetation and soils data.

Topography

The USGS topographic map indicates the project area is flat (Appendix A).

Past Land Uses

Based on the 1995 and 2000 aerial photographs, it appears that several businesses occupied the project area. Several lots are cleared in the 2005 photograph and Dairy Drive has been constructed. The 2010 photograph indicates that all the lots have gone fallow.

Wetland Mapping

The WDNR Wetlands Inventory indicates the presence of a forested/emergent wetland (T3/E1K) and narrow-leaved emergent wetland (E2K) within the project area (Appendix B).

Mapped Soils

The NRCS Web Soil Survey indicates the presence of five soil series within the site (Table 1 and Appendix B). A description of these soils can be found in Appendix C.

Table 1. Mapped Soil Units within Project Area.

Soil Series	Hydric Inclusion*	Drainage	Percent Composition On-Site**
Houghton muck (Ho) †	--	Very poorly drained	9.2
Palms muck (Pa) †	--	Very poorly drained	0.6
Sable silty clay loam, 0-3% slopes (SaA) †	--	Poorly drained	24.7
Virgil silt loam, gravelly substratum 0-3% slopes (VwA)	Wetter soils	Somewhat poorly drained	45.9
Wacousta silty clay loam (Wa) †	--	Very poorly drained	19.5

* NRCS Wisconsin Hydric Soils List (2013)
**Source: Calculated using NRCS Web Soil Survey website (2013).
† NRCS Listed Hydric Soil

Precipitation

The wetland delineation was conducted during the middle part of the growing season, which tends to be a drier period due to less frequent precipitation events and increased evapotranspiration. Based on the data displayed in Table 2, the summer of 2013 was much wetter than normal (102%). In the two weeks prior to conducting field work, 1.66" of precipitation was recorded.

Table 2. Summary of Precipitation between April and June, 2013 in the Madison Area, Wisconsin.

Category	April	May	June
Recorded Precipitation	5.83	6.57	10.86
Average Monthly Precipitation	3.40	3.55	4.54
Amount Above/Below Average	+2.43	+3.02	+6.32

·Precipitation values are measured in inches
Source: National Weather Service website – 2013 (Appendix D).

METHODOLOGY

Wetland boundaries were established based on a combination of the routine and comprehensive wetland delineation method as defined in the *Regional Supplement to the 1987 Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regions* (NC/NE Supplement) (USACE ERDC, 2012).

Equipment & Materials Utilized:

- Base Maps
- NC/NE Supplement Data Forms
- Compass
- 25-foot tape
- Soil Auger
- Sharp Shooter Spade
- Munsell Soil Color Charts (Munsell Color, 2010)

Vegetation, soils and hydrology data were collected and recorded on NC/NE Supplement Data Forms (Appendix E) at a total of nine sample plots. These plots were chosen because NES felt they adequately covered and characterized the subject areas.

Vegetation

At each sample plot, the percent cover for each species within the vicinity of the plot was visually estimated and recorded on the NC/NE Supplement data forms. Herbaceous, shrub/sapling/vine and tree layers were measured within 5-foot, 15-foot and 30-foot radius plots, respectively. Dominant species were then determined by applying the 50/20 rule and Prevalence Index and their wetland indicator status was taken from *The National Wetland Plant List: 2013 wetland ratings* (Lichvar, 2013). After the indicators were applied, a decision regarding the dominance of hydrophytic vegetation was made.

Soils

At the sample plots, a soil pit was dug with a spade to a depth of at least 20", where possible. One plot could not to be excavated to that depth due to the presence of compacted soil. The presence and abundance of mottling, matrix color, and texture were then recorded for each of the soils found. The Munsell Soil Color Charts were used to determine the hue, value and chroma of all soils that were observed when moist.

The profiles were also observed to determine the presence of hydric indicators that are listed in the NC/NE Supplement. The presence or absence of these indicators was then used to determine if hydric soils exist at the sample plot.

Hydrology

Prior to conducting the on-site investigation, all available background data were reviewed to determine the presence of saturated soil conditions or standing water. If present, surface water depths were measured and recorded at each sample plot; however, if standing water was absent, the presence of free standing water and/or soil saturation within the excavated soil pit was measured. Soil pits are typically left open for at least one hour prior to recording data. In addition to measuring water depths, the site was investigated for other primary and secondary indicators listed on the data forms.

RESULTS

Site Description

Current Land Uses

The project area is located in a fallow area north of Femrite Drive and on the east and west sides of Dairy Drive. Several gravel roads and concrete pads remain from the business that was formerly on-site.

Water Features/Hydrology

Primary wetland hydrology indicators A1 (Surface Water), A2 (High Water Table), A3 (Saturation), C1 (Hydrogen Sulfide Odor) and/or C3 (Oxidized Rhizospheres along Living Roots) were present at the wetland plots during the investigation. Secondary wetland hydrology indicators D2 (Geomorphic Position) and D5 (FAC-Neutral Test) were also present.

Soils

Two wetland plots matched the A4 (Hydrogen Sulfide) and one plot matched the F6 (Redox Dark Surface) Hydric Soil Indicators.

One upland plot matched the A12 (Thick Dark Surface) Hydric Soil Indicator, but it was considered a relic due to the lack of wetland hydrology during an extremely wet period.

Plant Communities

Five communities (three upland and two wetland) were identified on-site (Table 3).

Table 3. Summary of Plant Communities.

Upland Communities	Wetland Communities
Fallow Field	Wet Meadow
Forest	
Meadow	

Findings

Wetland Communities

The delineation conducted by NES during a site visit on July 17, 2013 resulted in the identification of one wetland (Appendix F).

Wetland 1, a wet meadow (E2K), is 0.49 acre in size (Plots 2, 5 and 7). The wetland corresponds with the emergent wetland mapped by the Wisconsin Wetland Inventory.

Photo 1 – Wetland 1, looking west from Agriculture Drive.

Plot 2: Dominant vegetation is *Phalaris arundinacea*. The Dominance Test and Prevalence Index is 100% and 2.020. Surface water is 1 inch deep. Primary wetland hydrology indicators A1, A2, A3 & C3 and secondary indicators D2 & D5 are present. The soil matches the F6 NRCS Hydric Soil Indicator.

Plot 5: Dominant vegetation is *P. arundinacea*. The Dominance Test and Prevalence Index is 100% and 2.000. The water table is present at 13 inches and saturation is present at 10 inches below the surface. Primary wetland hydrology indicators A3 & C1 and secondary indicators D2 & D5 are present. The soil matches the A4 NRCS Hydric Soil Indicator.

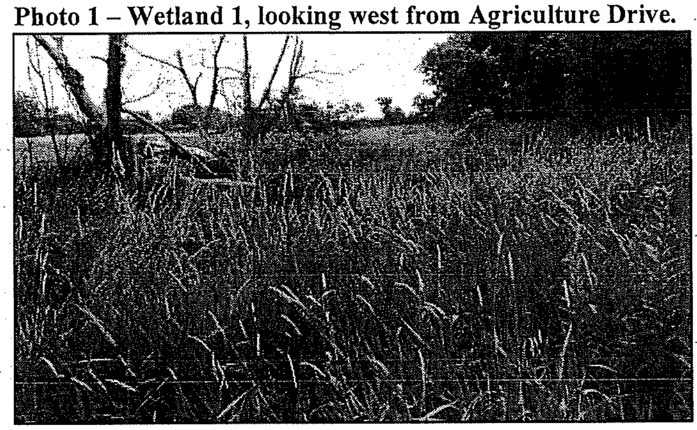

Photo 2 – Wetland 1, looking east from Plot 5.

Plot 7: Dominant vegetation is *P. arundinacea*. The Dominance Test and Prevalence Index is 75% and 2.039. Surface water is 2 inches deep. Primary wetland hydrology indicators A1, A2, A3 & C1 and secondary indicators D2 & D5 are present. The soil matches the A4 NRCS Hydric Soil Indicator.

The wetland boundary was established based on wetland hydrology, hydric soil, topography and professional judgment.

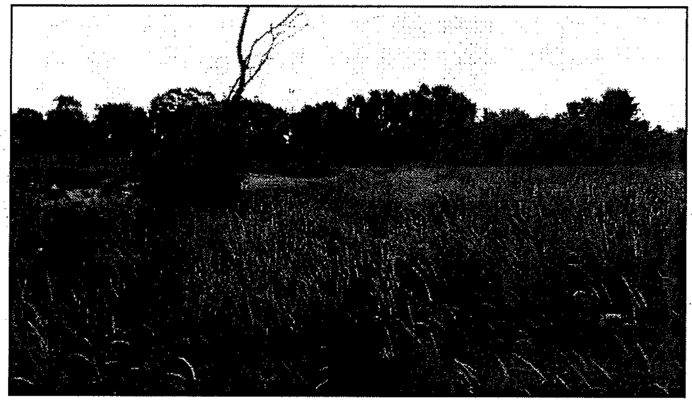

Photo 3 – Wetland 1, looking south from NE corner of project area.

CONCLUSION

Wetland boundaries established on the property are NES' best estimate of their locations based upon the conditions and field indicators observed at the time of our site investigation. Our wetland boundaries are seldom changed; however, the regulating agencies (USACE, WDNR and other local governing units) decide their ultimate location. As a result, our wetland boundaries could be adjusted slightly during an agency review. Weather factors and the time of year reviewed are just two factors that could change a wetland's appearance and result in a boundary change. Because changes could occur, it is NES' policy to recommend to all our clients that they receive agency concurrence from both the WDNR and the USACE.

However, since Mr. Stautz is a Professional Wetland Delineator assured by the WDNR, he will not need WDNR concurrence. The WDNR has thoroughly reviewed his education, field experience and report preparation capabilities and accepted him into their program, which means automatic concurrence on any project in which he is the lead field investigator and report author. As part of the program requirements, however, he is still required to send a copy of the report to the WDNR in Madison. Unfortunately, the USACE does not yet have a similar program so we will send them a copy of the report to ensure they agree with the wetland boundary established by NES. Agency concurrence will also guarantee that this delineation is valid for the next five years.

LITERATURE CITED

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Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. *Official Soil Series Descriptions.* http://soils.usda.gov/technical/classification/osd/index.html. USDA-NRCS, Lincoln, NE. Last accessed: August 6, 2013.

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United States Army Corps of Engineers. 2012. *Regional Supplement to the 1987 Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region.* Engineering Research and Development Center. ERDC/EL TR-21-1.

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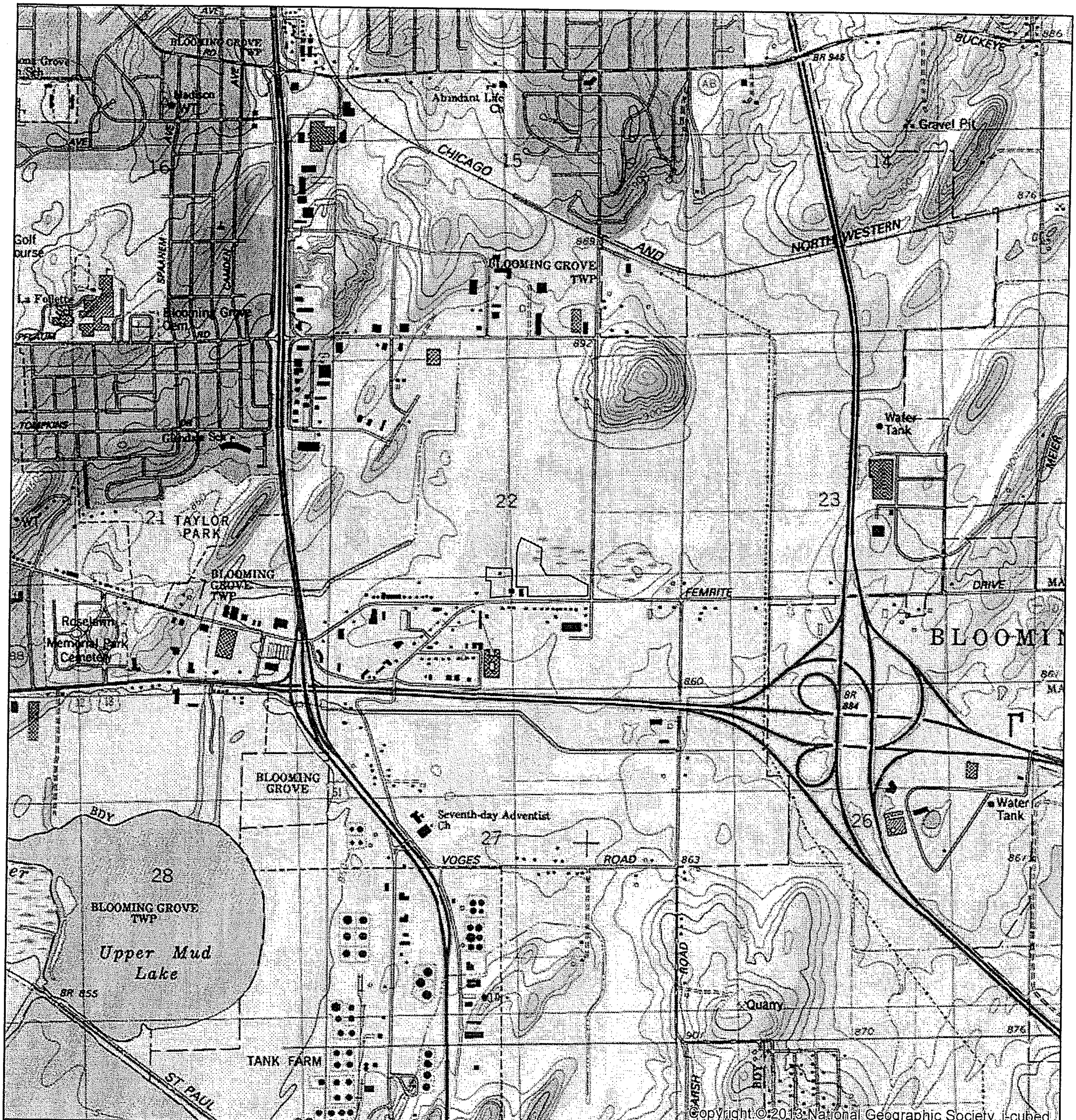
A

APPENDIX A

Site Location



Legend

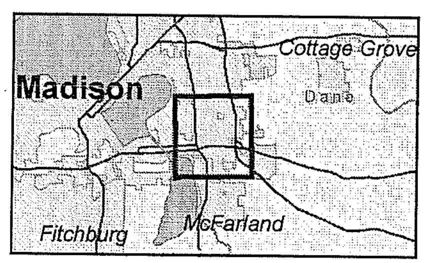
Project Area (+/- 14.6 acres)

Appendix A
Site Location

Located in part of the S 1/2, Section 22, T7N, R10E, City of Madison, Dane County, Wisconsin

City of Madison
Fire Station #14
Project No. 15220004
City of Madison, Dane County, Wisconsin

0 1,000 2,000
Feet



Extent of large view shown in red.

NES
ECOLOGICAL SERVICES
A Division of Robert E. Lee & Associates, Inc.

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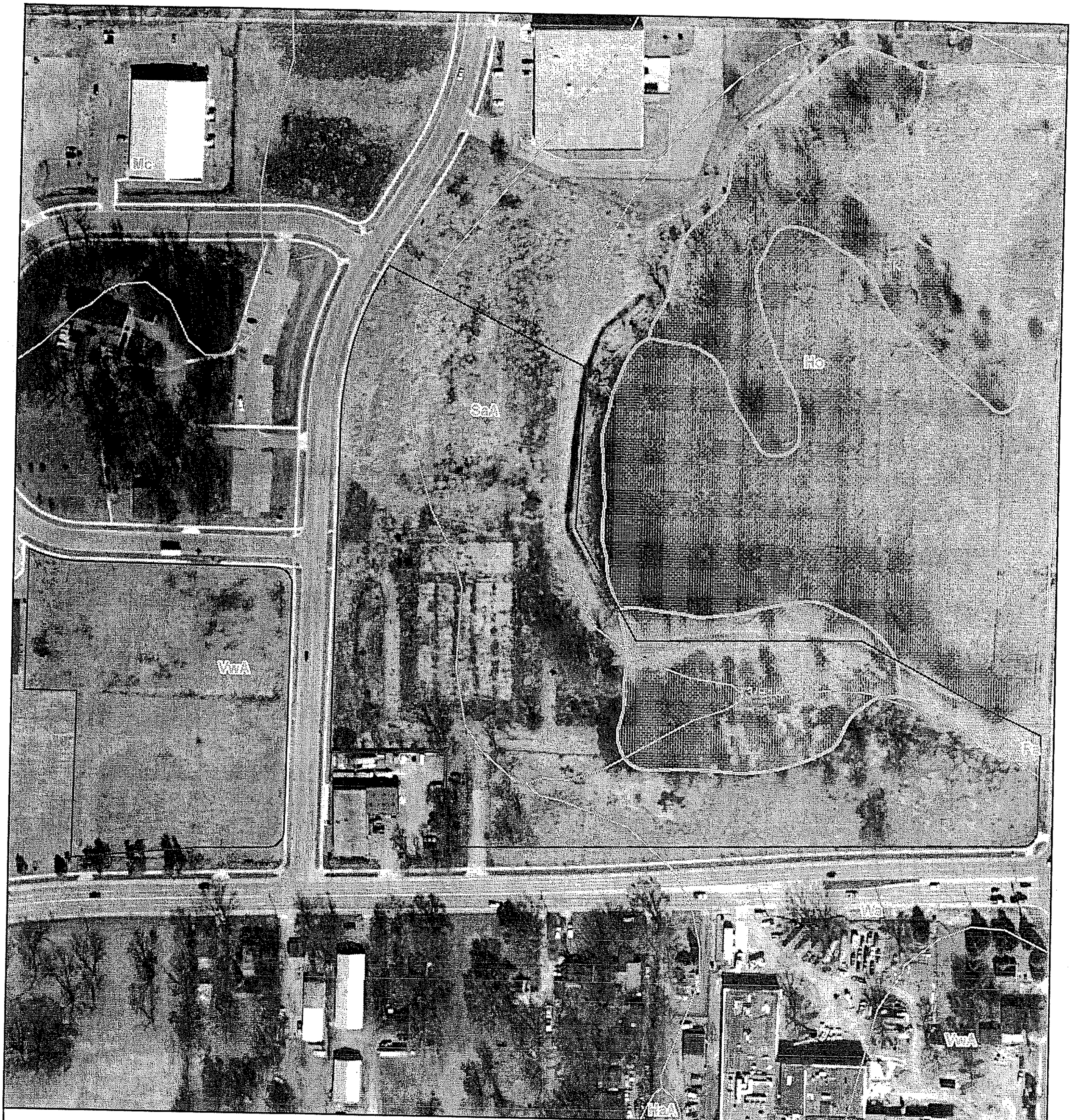
August 6, 2013

B

APPENDIX B

Soil Survey of Dane County and Wisconsin Wetland Inventory



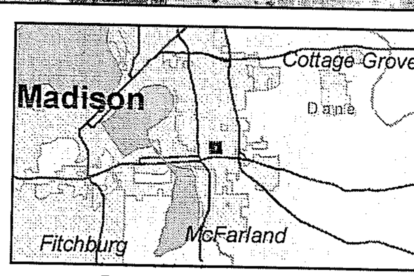
Legend

- Project Area (+/- 14.6 acres)
- Soil Map Unit
- Upland
- Wetland
- Filled or Drained Wetland

0 100 200
Feet

Appendix B
Soil Survey of Dane County and Wisconsin Wetland Inventory

City of Madison
Fire Station #14
Project No. 15220004
City of Madison, Dane County, Wisconsin



Extent of large view shown in red.

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NES
ECOLOGICAL SERVICES
A Division of Robert E. Lee & Associates, Inc.

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August 6, 2013

C

APPENDIX C

Natural Resource Conservation Service Official Soil Series Descriptions

LOCATION HOUGHTON MI+IA IL IN MN WI

Established Series
Rev. LWB-WEF-RAB
06/2011

HOUGHTON SERIES

The Houghton series consists of very deep, very poorly drained soils formed in herbaceous organic materials more than 130 cm (51 inches) thick in depressions on lake plains, outwash plains, ground moraines, end moraines, and floodplains. Slope ranges from 0 to 2 percent. Mean annual precipitation is about 889 mm (35 inches), and mean annual temperature is about 10.0 degrees C (50 degrees F).

TAXONOMIC CLASS: Euic, mesic Typic Haplosaprists

TYPICAL PEDON: Houghton muck, on a level area in a cultivated field. (Colors are for moist soils unless otherwise stated.)

Oa1--0 to 23 cm (9 inches); black (N 2.5/) broken face and rubbed muck (sapric material); about 5 percent fiber, a trace rubbed; weak coarse subangular blocky structure; neutral [pH 7.0 in KCl]; abrupt smooth boundary.

Oa2--23 to 33 cm (9 to 13 inches); black (N 2.5/) broken face, very dark brown (7.5YR 2/2) rubbed muck (sapric material); about 5 percent fiber, a trace rubbed; weak medium granular structure; neutral [pH 7.0 in KCl]; abrupt smooth boundary.

Oa3--33 to 61 cm (13 to 24 inches); dark reddish brown (5YR 3/2) broken face, dark reddish brown (5YR 2/2) rubbed muck (sapric material); about 15 percent fiber, less than 5 percent rubbed; massive, breaking to thick platy fragments; neutral [pH 7.0 KCl]; abrupt smooth boundary.

Oa4--61 to 81 cm (24 to 32 inches); black (5YR 2/1) broken face and rubbed muck (sapric material); about 10 percent fiber, a trace rubbed; massive; about 1 percent woody fragments; neutral [pH 7.0 in KCl]; clear wavy boundary.

Oa5--81 to 122 cm (32 to 48 inches); dark reddish brown (5YR 2/2) broken face, black (5YR 2/1) rubbed muck (Sapric material); about 20 percent fiber, less than 10 percent rubbed; massive, breaking to thick platy fragments; neutral [pH 7.0 in KCl]; abrupt smooth boundary.

Oa6--122 to 203 cm (48 to 80 inches); dark reddish brown (5YR 2/2) broken face and rubbed muck (sapric material); about 10 percent fiber, less than 10 percent rubbed; massive; slightly sticky; about 15 percent mineral soil; neutral [pH 7.0 in KCl].

TYPE LOCATION: Clinton County, Michigan; about 3 miles northeast of the village of Bath; 200 feet north and 400 feet east of the southwest corner of sec. 12, T. 5 N., R. 1 W.; USGS Bath topographic quadrangle; lat. 42 degrees 49 minutes 43.4 seconds N. and long. 84 degrees 52 minutes 56.9 seconds W.; NAD 27.

RANGE IN CHARACTERISTICS:
Thickness of the organic material: more than 130 cm (51 inches)
Organic fibers: derived primarily from herbaceous plants, but some layers contain as much as 30 percent woody material
Woody fragment content: averages less than 15 percent by volume in the control section
Reaction: very strongly acid to slightly alkaline throughout

Oa horizon:
Hue: 5YR to 10YR, or is neutral
Value: 2, 2.5 or 3
Chroma: 0 to 3
Organic material: dominantly muck (sapric material), or to lesser extent mucky peat (hemic material) that has a combined thickness of less than 25 cm (10 inches) or peat (fibric material) that is less than 13 cm (5 inches) thick

Some pedons have coprogenous material or marly material below 130 cm (51 inches).

COMPETING SERIES: These are the Carlisle, Catden, Lena, Peteetneet, Saltese, and Semiahmoo series. Carlisle soils derived dominantly from woody materials and contain an average of 15 to 30 percent woody fragments in the control section. Lena soils contain carbonates throughout the control section. Peteetneet soils are not massive in the bottom tier. Saltese soils have lenses of diatomaceous earth and volcanic ash within a depth of 130 cm (51 inches). Semiahmoo soils are in areas with warm dry summers and mild moist winters, and typically are more acidic throughout the control section.

GEOGRAPHIC SETTING: Houghton soils are in closed depressions on lake plains, outwash plains, ground moraines, end moraines, and flood plains. Slope gradients are less than 2 percent. Houghton soils formed in herbaceous organic materials more than 130 cm (51 inches) thick. Mean annual precipitation ranges from 762 to 1067 mm (30 to 42 inches). Mean annual temperature ranges from 8.9 to 11.7 degrees C (48 to 53 degrees F).

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Adrian, Edselton, Edwards, Moston, Muskego, Palms, and Willette soils. Edselton and Edwards soils are underlain by marly material at depths of 41 to 130 cm (16 to 51 inches). Moston, and Muskego soils are underlain by coprogenous material at depths of 41 to 130 cm (16 to 51 inches). Poorly or very poorly drained mineral soils are commonly associated along the margins of the bogs.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Very poorly drained. Depth to the seasonal high water table ranges from 61 cm (2 feet) above the surface in ponded phases to 30 cm (1 foot) below the surface between September and June in normal years. Potential for surface runoff is very slow or ponded. Saturated hydraulic conductivity is moderately high or high. Permeability is moderately slow to moderately rapid.

USE AND VEGETATION: A considerable area of these soils is used for cropland or pasture. Common crops are onions, lettuce, potatoes, celery, radishes, carrots, mint, and some corn. Native vegetation is primarily of marsh grasses, sedges, reeds, buttonbrush, and cattails, with some water-tolerant trees near the margins of the bogs.

DISTRIBUTION AND EXTENT: Mostly in MLRAs 95B, 98, 111B, and 111C, and to lesser extent in MLRAs 89, 95A, 96, 97, 99, 103, 104, 105, 108A, 108B, 108C, 110, 111A, 111C, 111D, and 115C in Michigan, Wisconsin, Indiana, Iowa, Minnesota, and Illinois. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Indianapolis, Indiana.

SERIES ESTABLISHED: Roscommon County, Michigan, 1924.

REMARKS: Diagnostic horizons and features recognized in this pedon are:
Muck (sapric material): from the surface to a depth of 203 cm (80 inches) (Oa1, Oa2, Oa3, Oa4, Oa5, Oa6 horizons).

ADDITIONAL DATA: Soil Interpretation Record - (MI0024, MI0291 (PONEED), MI0532 (SLOPING), MI0390 (MAAT>50), MI0383 (FREQUENTLY FLOODED).

LOCATION PALMS MI+IA IL IN MA MN NY PA VA WI

Established Series
Rev. LWB-WEF-DAG
08/2012

PALMS SERIES

The Palms series consist of very deep, very poorly drained soils formed in herbaceous organic materials 41 to 130 cm (16 to 51 inches) thick and the underlying loamy deposits in closed depressions on moraines, lake plains, till plains, outwash plains, and hillside seep areas, and on backswamps of flood plains. Slope ranges from 0 to 6 percent. Mean annual precipitation is about 889 mm (35 inches), and mean annual temperature is about 10.0 degrees C (50 degrees F).

TAXONOMIC CLASS: Loamy, mixed, euic, mesic Terric Haplosaprists

TYPICAL PEDON: Palms muck, on 1 percent slope under marsh vegetation at an elevation of 198 meters (648 feet) above mean sea level. (Colors are for moist soil unless otherwise stated.)

Oa1--0 to 36 cm (14 inches); black (10YR 2/1) broken face and rubbed muck (sapric material); about 5 percent fiber, less than 5 percent rubbed; moderate medium granular structure; slightly sticky; about 20 to 25 percent mineral material; slightly acid [pH 6.5 in water]; abrupt smooth boundary.

Oa2--36 to 71 cm (14 to 28 inches); black (10YR 2/1) broken face and rubbed muck (sapric material); about 5 percent fiber, less than 5 percent rubbed; massive parting to weak coarse subangular blocky structure; slightly sticky; 10 to 20 percent mineral material; strongly acid [pH 5.5 in water]; clear smooth boundary.

Oa3--71 to 89 cm (28 to 35 inches); black (N 2.5/) rubbed muck (sapric material); about 5 percent fiber, less than 5 percent rubbed; massive; slightly sticky; 10 to 20 percent mineral material; moderately acid [pH 6.0 in water]; abrupt smooth boundary. [Combined thickness of the Oa horizon is 41 to 130 cm (16 to 51 inches).]

Cg--89 to 203 cm (35 to 80 inches); gray (10YR 5/1) clay loam; massive; friable; common medium distinct dark yellowish brown (10YR 4/4) masses of oxidized iron in the matrix; neutral in upper part, slightly effervescent; moderately alkaline in lower part.

TYPE LOCATION: Gratiot County, Michigan; north of the flood plain of the Maple River and about 200 feet south of the upland; 1,420 feet south and 820 feet west of the northeast corner of sec. 27, T. 9 N., R. 2 W.; USGS Pompeli topographic quadrangle; lat. 43 degrees 8 minutes 31.3 seconds N. and long. 84 degrees 31 minutes 34.7 seconds W., NAD 27; UTM Zone 16, 701165 easting and 4779557 northing, NAD 83.

RANGE IN CHARACTERISTICS:
Depth to the loamy C horizon: 41 to 130 cm (16 to 51 inches)

Organic material: derived primarily from herbaceous plants, but some layers contain as much as 15 percent woody material

Surface tier (Oa1 or Oap horizon):
Hue: 5YR to 10YR, or is neutral
Value: 2, 2.5, or 3
Chroma: 0 to 2
Organic material: dominantly muck (sapric material), or less commonly mucky peat (hemic material)
Reaction: strongly acid to slightly alkaline

Subsurface and bottom tiers (Oa, Oe, or Oi horizons):
Hue: 5YR to 10YR, or is neutral
Value: 2 to 4
Chroma: 0 to 3
Organic material: some pedons have thin layers less than 25 cm (10 inches) thick of mucky peat (hemic material) or thin layers less than 13 cm (5 inches) thick of fibric material; some pedons have a thin layer of sedimentary peat above the C horizon.
Reaction: strongly acid to slightly alkaline, some pedons have carbonates

Some pedons have a thin A horizon above the C horizon.

C or Cg horizon:
Hue: 10YR to 5Y, 5GY, or is neutral
Value: 3 to 7
Chroma: 0 to 4
Texture: loamy very fine sand, sandy loam, fine sandy loam, loam, silt loam, silty clay loam, clay loam, or sandy clay loam, or the gravelly analogues of these textures; thin strata of fine sand, loamy sand, or silt in some pedons
Clay content: upper 30 cm (12 inches) averages between 10 and 35 percent clay
Rock fragment content: 0 to 25 percent gravel to stones
Reaction: moderately acid to moderately alkaline; some pedons contain carbonates

Sandy substratum, gravelly substratum, and overwash phases are recognized.

COMPETING SERIES: These are the Klossner, Linwood, Medo, Natchaug, Philbon, and Shalcar series. Klossner soils have A horizons directly below the organic matter that is more than 20 cm (8 inches) thick. Linwood soils formed mainly in woody fibers. Medo soils have less than 10 percent clay in the lower one third of the series control section. Natchaug soils are in areas where the mean annual precipitation is greater than 1092 mm (43 inches). Philbon soils have dominantly fibric and hemic material in the upper 30 cm (12 inches). Shalcar soils have a difference between mean annual summer and mean annual winter temperatures that is less than 26 degrees F.

GEOGRAPHIC SETTING: Palms soils are in closed depressions on lake plains, till plains, outwash plains, moraines, and hillside seep areas, and in backswamps on flood plains. Slope ranges from 0 to 6 percent. Palms soils formed herbaceous organic materials and the underlying loamy deposits. The soils on nearby uplands are generally loamy. Mean annual temperature ranges from 8.9 to 11.7 degrees C (48 to 53 degrees F). Mean annual precipitation ranges from 762 to 1092 mm (30 to 43 inches). Frost-free period is 120 to 180 days. Elevation is 177 to 466 meters (580 to 1,530 feet) above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: The Houghton soils are the most common associate and are on similar landform positions. Poorly drained or very poorly drained loamy mineral soils are at the edges of the bogs and are adjacent to Palms soils.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Very poorly drained. Depth to the top of an apparent seasonal high water table ranges from 30 cm (1 foot) above the surface to 30 cm (1 foot) below the surface between November and May in normal years. Potential for surface runoff is negligible. Saturated hydraulic conductivity is moderately high or high in the organic material and moderately high in the loamy material. Permeability is moderately slow to moderately rapid in the organic material and moderate or moderately slow in the loamy material.

USE AND VEGETATION: Most areas of this soil are in marsh vegetation of grasses, reeds, and sedges; and alder, aspen, willow, and dogwood. Some areas have been drained and are used for pasture, corn, and some truck crops.

DISTRIBUTION AND EXTENT: MLRAs 89, 95A, 95B, 97, 98, 99, 101, 102A, 103, 104, 105, 108A, 108B, 110, 111A, 111B, 111C, 111D, 115C, 127, 140, 142, 144A, 144B, and 145 in the southern parts of lower Michigan, Wisconsin, Illinois, Indiana, Iowa, Massachusetts, Minnesota, New York, and other northeastern states. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: AMHERST, MASSACHUSETTS

SERIES ESTABLISHED: Sanilac County, Michigan; 1955.

REMARKS: Diagnostic horizons and features recognized in this pedon are:
Muck (sapric material) from the surface to a depth of 89 cm (35 inches) (Oa1, Oa2, and Oa3 horizons).
Terric feature: mineral material from a depth of 89 to 203 cm (35 to 80 inches) (Cg horizon).

ADDITIONAL DATA: Lab characterization data is available from the National Soil Survey Laboratory, Lincoln, NE.

National Cooperative Soil Survey
U.S.A.

LOCATION SABLE IL+IA IN WI

Established Series
Rev. JCD-KDH-AAC
02/2011

SABLE SERIES

The Sable series consists of very deep, poorly drained, moderately permeable soils formed in loess on nearly level broad summits of moraines and stream terraces. Slope ranges from 0 to 2 percent. Mean annual temperature is about 10.6 degrees C (51 degrees F)., and mean annual precipitation is about 889 mm (35 inches).

TAXONOMIC CLASS: Fine-silty, mixed, superactive, mesic Typic Endoaquolls

TYPICAL PEDON: Sable silty clay loam - nearly level in a cultivated field at an elevation of about 223 meters (732 feet) above mean sea level. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 20 cm (0 to 8 inches); black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; firm; moderately acid; abrupt smooth boundary.

A--20 to 48 cm (8 to 19 inches); black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine angular blocky structure; firm; few fine spherical dark reddish brown (5YR 3/2) very weakly cemented iron-manganese concretions throughout; slightly acid; clear smooth boundary. [Combined thickness of A horizon ranges from 25 to 51 cm (10 to 20 inches).]

AB--48 to 58 cm (19 to 23 inches); very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine angular blocky structure; firm; few faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine spherical dark reddish brown (5YR 3/2) very weakly cemented iron-manganese concretions throughout; slightly acid; clear smooth boundary.[0 to 15 cm (0 to 6 inches) thick]

Bg--58 to 74 cm (23 to 29 inches); dark gray (10YR 4/1) silty clay loam; moderate fine and medium subangular blocky structure; firm; common faint very dark gray (10YR 3/1) organic coatings on faces of peds; common fine and medium spherical dark reddish brown (5YR 3/2) very weakly cemented iron-manganese concretions throughout; common medium distinct brown (10YR 5/3) masses of oxidized iron-manganese in the matrix; few medium faint dark grayish brown (10YR 4/2) iron depletions in the matrix; neutral; clear smooth boundary.

Btg1--74 to 97 cm (29 to 38 inches); grayish brown (2.5Y 5/2) silty clay loam; moderate medium and coarse subangular blocky structure; firm; few distinct dark gray (10YR 4/1) clay films on faces of peds; many fine and medium spherical dark reddish brown (5YR 3/2) very weakly cemented iron-manganese concretions throughout; many medium prominent yellowish brown (10YR 5/6) masses of oxidized iron in the matrix; neutral; clear wavy boundary.

Btg2--97 to 119 cm (38 to 47 inches); gray (N 5/0) silt loam; weak medium prismatic structure parting to weak medium and coarse angular blocky; firm; few distinct grayish brown (10YR 5/2) clay films on faces of prisms; common fine spherical dark reddish brown (5YR 3/2) very weakly cemented iron-manganese concretions throughout; many medium prominent yellowish brown (10YR 5/6) masses of oxidized iron in the matrix; slightly alkaline; gradual smooth boundary. [Combined thickness of the B horizon ranges from 33 to 117 cm (13 to 46 inches).]

Cg--119 to 152 cm (47 to 60 inches); gray (N 6/0) silt loam; massive; friable; many medium prominent yellowish brown (10YR 5/6) masses of oxidized iron in the matrix; slightly effervescent; slightly alkaline.

TYPE LOCATION: Warren County, Illinois; about 3 miles northwest of Roseville; 97 feet west and 1,281 feet south of the northeast corner, sec. 14, T. 9 N., R. 3 W.; USGS Kirkwood East topographic quadrangle; lat. 40 degrees, 46 minutes, 22.5 seconds N., long. 90 degrees, 41 minutes, 34.2 seconds W.; UTM Zone 15T 0694708 easting and 4516111 northing, NAD 83.

RANGE IN CHARACTERISTICS:
Depth to the base of the cambic horizon: 102 to 152 cm (40 to 60 inches)
Thickness of the mollic epipedon: 31 to 61 cm (12 to 24 inches) and extends into the upper part of the B horizon in some pedons.
Particle-size control section: averages between 27 and 35 percent clay
Average sand content in the series control section: commonly less than 5 percent, but ranges to 8 percent.
Depth to carbonates: greater than 102 cm (40 inches)
Mean annual soil temperature: 8.9 to 13.3 degrees C (48 to 56 degrees F)
Special features: Krotovina are common features in many pedons.

Ap or A horizon:
Hue: 10YR, 2.5Y, 5Y or n (neutral)
Value: 2 to 3
Chroma: 0 or 1
Texture: commonly silty clay loam, but in some pedons it is silt loam.
Clay content: less than 35 percent
Reaction: moderately acid to neutral

AB or BA horizon;
Hue; 10YR, 2.5Y, 5Y or N (neutral)
Value: 2 to 3
Chroma: 0 or 1
Texture: silty clay loam
Reaction: moderately acid to neutral

Btg, Bg, BC, and/or BCg horizons;
Hue: 10YR, 2.5Y, 5Y or N (neutral)
Value: 3 to 6
Chroma: 0 to 2
Texture: silty clay loam in the upper part and silty clay loam or silt loam in the lower part

Clay content: 24 to 35 percent
Reaction: moderately acid to neutral except that the lowest subhorizons in some pedons range to slightly alkaline.
Content of total phosphorous: lowest values in the upper part of the B horizon and is less than 400 ppm.

Cg horizon:
Hue: 10YR, 2.5Y, 5Y or N (neutral)
Value: 3 to 6
Chroma: 0 to 2
Texture: typically silt loam, but includes silty clay loam in the upper part in some pedons.
Clay content: 20 to 28 percent
Reaction: neutral to moderately alkaline
Other features: Some pedons do not have carbonates in the upper part of the Cg horizon.

An overwash phase is recognized where recent deposition from adjacent higher parts of the landscape has buried the original A horizon. A stratified substratum phase is also recognized. (see remarks.)

COMPETING SERIES: These are the Chalmers, Chetomba, Dolbee, Drummer, Dunham, Elpaso, Elvira, Garwin, Gillett Grove, Hartsburg, Madelia, Marcus, Mascoutah, Maxcreek, Maxfield, Maxmore, Ossian, Patton, Pella, Rushmore, and Wacousta series. Chalmers soils have less than 20 percent clay in the lower part of the series control section. Chetomba, Drummer, Dunham, Elpaso, Elvira, Gillett Grove, Maxcreek, Maxfield, Maxmore, Pella, and Rushmore soils average more than 8 percent sand in the lower part of the series control section. Dolbee soils formed in alluvium and have a less systematic increase or decrease in silt- and clay-size particles with depth. Garwin soils are higher in total phosphorus and organic phosphorus, contain less clay films and dark coatings on faces of prisms in the lower part of the B horizons, are lower in iron oxides in the lower part of the B and C horizons, and contain more total clay sized particles to a depth of 152 cm (60 inches). Hartsburg, Madelia, and Wacousta soils have carbonates within a depth of 102 cm (40 inches). Marcus average more than 35 percent clay in the surface layer. Mascoutah and Patton soils have a mean annual soil temperature of more than 13.3 degrees C (56 degrees F). Ossian soils have lower clay content in the upper 76 to 122 cm (2 1/2 to 4 feet) of the sola, have a less pronounced structural development in the B horizon, and in general have a less systematic increase or decrease in silt- and clay-size particles in the sola.

GEOGRAPHIC SETTING: Sable soils are on level or nearly level summits of loess-covered moraines and stream terraces. Typically, they are on broad interstream divides of till plains, and less commonly on unglaciated hills and on terraces. Slope gradients range from 0 to 2 percent. Sable soils formed entirely in loess. Mean annual temperature ranges from 7.8 to 12.2 degrees C (46 to 54 degrees F)., mean annual precipitation ranges from 760 to 1020 mm (30 to 40 inches), frost free days range from 140 to 180 days, and elevation ranges from 104 to 311 meters (340 to 1020 feet) above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Denny, Ipava, Muscatune, Osco, and Tama soils. The poorly drained Denny soils are in shallow closed depressions and have an albic horizon and an argillic horizon. Also, they contain more than 35 percent clay in the particle-size control section. The somewhat poorly drained Ipava and Muscatune soils are commonly on narrow interstream divides, near the edges of broad divides, or on slightly higher or more sloping positions. The moderately well drained Osco soils and well drained Tama soils are on narrow or rounded crests and more sloping parts of the landscape.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Poorly drained. Where drained, the depth to an apparent seasonal high water table is 15 cm (0.5 foot) above the surface to 31 cm (1.0 foot) below the surface at some time between January and May in most years. In the few remaining undisturbed areas, the depth to an apparent seasonal high water table is 15 cm (0.5 foot) above the surface to 15 cm (0.5 foot) below the surface at some time between November and June of most years. The potential for surface runoff is negligible. Saturated hydraulic conductivity is moderately high to high (4.23 to 14.11 micrometers per second). Permeability is moderate.

USE AND VEGETATION: Most areas are used to grow corn and soybeans. Some areas are used to grow small grain and meadow crops. Native vegetation is marsh grasses and sedges.

DISTRIBUTION AND EXTENT: These soils are in Illinois, Wisconsin, Iowa, and Indiana. Sable soils are extensive, over 608,000 acres have been correlated in MLRAs 95B, 104, 105, 108A, 108B, 110, 111D, and 115C.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Indianapolis, Indiana

SERIES ESTABLISHED: Livingston County, Illinois, 1938.

REMARKS: The overwash phase and the stratified substratum phase will be evaluated during the update of MLRA 108 to determine where best to correlate these soils.

Additional Data: For lab analysis refer to Soil Survey Nos. S57IL-94-1-(1-8) in SSIR-19. Lab data from the University of Illinois Pedology lab for an additional 35 pedons is available in the state office.
Diagnostic horizons and features recognized in this pedon are:
mollic epipedon -- the zone from the surface to a depth of 58 cm (23 inches) (Ap, A, and AB horizons);
cambic horizon -- the zone from 58 to 119 cm (23 to 47 inches) (Bg, Btg1, and Btg2 horizons);
Aquic conditions -- redox concentrations and/or depletions from the surface to a depth of 152 cm (60 inches) (assumed to extend to 203 cm (80 inches).

National Cooperative Soil Survey
U.S.A.

LOCATION VIRGIL IL+WI

Established Series
Rev. JCD-SKH-SLE
03/2011

VIRGIL SERIES

The Virgil series consists of very deep, somewhat poorly drained soils on outwash plains, stream terraces, or till plains. These soils formed in loess or other silty material and in the underlying loamy outwash or sandy loam till. Slope ranges from 0 to 6 percent. Mean annual air temperature is about 8.3 degrees C (47 degrees F). Mean annual precipitation is about 890 mm (35 inches).

TAXONOMIC CLASS: Fine-silty, mixed, superactive, mesic Udollic Endoaqualfs

TYPICAL PEDON: Virgil silt loam on a northeast facing, 1 percent slope in a cultivated field at an elevation of about 233 meters (765 feet) above mean sea level. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 18 cm (0 to 7 inches); black (10YR 2/1) silt loam, grayish brown (10YR 5/2) dry; weak medium granular structure; friable; common fine roots; neutral; abrupt smooth boundary. [18 to 25 cm (7 to 10 inches) thick]

E--18 to 33 cm (7 to 13 inches); dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) silt loam, light brownish gray (10YR 6/2) dry; weak thin platy structure parting to moderate fine granular; friable; many fine roots; few faint black (10YR 2/1) organic coatings on faces of peds and on surfaces along root channels; few fine distinct brown (7.5YR 4/4) masses of oxidized iron-manganese in the matrix; strongly acid; clear smooth boundary. [5 to 20 cm (2 to 8 inches) thick]

Bt1--33 to 43 cm (13 to 17 inches); grayish brown (10YR 5/2) and brown (10YR 5/3) silty clay loam; moderate fine subangular blocky structure; firm; common fine roots; few faint dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct light gray (10YR 7/2) (dry) clay depletions on faces of peds; few fine distinct black (10YR 2/1) iron-manganese concretions throughout; few fine distinct brown (7.5YR 4/4) masses of oxidized iron-manganese and few prominent strong brown (7.5YR 5/6) masses of oxidized iron in the matrix; strongly acid; clear smooth boundary.

Bt2--43 to 64 cm (17 to 25 inches); grayish brown (10YR 5/2) and brown (10YR 5/3) silty clay loam; moderate fine subangular blocky structure; firm; common fine roots; common faint dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) clay films on faces of peds; common faint light gray (10YR 7/2) (dry) clay depletions on faces of peds; few fine distinct black (10YR 2/1) iron-manganese concretions throughout; few fine distinct brown (7.5YR 4/4) masses of oxidized iron-manganese and prominent strong brown (7.5YR 5/6) masses of oxidized iron in the matrix; strongly acid; gradual smooth boundary.

Btg1--64 to 89 cm (25 to 35 inches); light brownish gray (2.5Y 6/2) silty clay loam; moderate fine and medium subangular blocky structure; firm; few fine roots; many faint grayish brown (2.5Y 5/2) clay films on faces of peds; few distinct light gray (10YR 7/2) (dry) clay depletions on faces of peds; many fine prominent black (10YR 2/1) iron-manganese concretions hroughout; common fine prominent strong brown (7.5YR 5/6 and 7.5YR 5/8) masses of oxidized iron in the matrix; strongly acid; clear smooth boundary.

Btg2--89 to 112 cm (35 to 44 inches); light brownish gray (2.5Y 6/2) silty clay loam; moderate medium and coarse subangular and angular blocky structure; firm; few fine roots; common faint grayish brown (2.5Y 5/2) clay films on faces of peds; few distinct light gray (10YR 7/2) (dry) clay depletions on faces of peds; many fine prominent black (10YR 2/1) iron-manganese nodules and concretions throughout; many medium prominent brown (7.5YR 4/4) masses of oxidized iron-manganese and strong brown (7.5YR 5/6) masses of oxidized iron in the matrix; moderately acid; clear smooth boundary.

Btg3--112 to 124 cm (44 to 49 inches); grayish brown (2.5Y 5/2) silty clay loam; weak medium and coarse angular blocky structure; firm; few fine roots; few prominent gray (N 5/) clay films on faces of peds; many fine prominent black (10YR 2/1) iron-manganese nodules and concretions throughout; many medium prominent brown (7.5YR 4/4) masses of oxidized iron-manganese and strong brown (7.5YR 5/6) masses of oxidized iron in the matrix; moderately acid; clear smooth boundary. [Combined thickness of the Bt and Btg horizons is 51 to 102 cm (20 to 40 inches)]

2Btg4--124 to 147 cm (49 to 58 inches); grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) loam; weak coarse angular blocky structure; firm; few prominent dark gray (N 4/) clay films on faces of peds; few fine prominent black (10YR 2/1) iron-manganese concretions throughout; many medium prominent brown (7.5YR 4/4) masses of oxidized iron-manganese and strong brown (7.5YR 5/6) masses of oxidized iron in the matrix; neutral; gradual smooth boundary. [10 to 43 cm (4 to 17 inches) thick]

2C--147 to 152 cm (58 to 60 inches); brown (10YR 4/3) and dark yellowish brown (10YR 4/4) sandy loam; massive; friable; common fine distinct dark gray (10YR 4/1) and gray (10YR 5/1) iron depletions in the matrix; moderately alkaline.

TYPE LOCATION: Stephenson County, Illinois; about 1 mile south of Freeport; 1,346 feet east and 300 feet south of the northwest corner of sec. 8, T. 26 N., R. 8 E.; USGS Freeport East topographic quadrangle; lat. 42 degrees 16 minutes 20 seconds N., and long. 89 degrees 36 minutes 23 seconds W., UTM Zone 16T, 0285052 easting and 4683325 northing; NAD 83.

RANGE IN CHARACTERISTICS:
Thickness of the solum: typically 122 to 152 cm (48 to 60 inches) but ranges from 107 to 178 cm (42 to 70 inches).
Depth to the horizon with more than 40 percent sand: commonly 114 and 127 cm (45 and 50 inches), but ranges from 102 to 152 cm (40 to 60 inches).
Depth to carbonates: 114 to 178 cm (45 to 70 inches)
Particle-size control section (weighted average): 27 to 35 percent clay

A or Ap horizon:
Hue: 10YR

Value: 2 or 3
Chroma: 1 or 2
Texture: silt loam
Reaction: slightly acid to slightly alkaline

E or Eg horizon:
Hue: 10YR
Value: 4 to 6
Chroma: or 2
Texture: silt loam
Reaction: strongly acid to neutral
Other features: Some pedons have redoximorphic features.

Bt and/or Btg horizons:
Hue: 10YR, 2.5Y or 5Y
Value: 4 to 6
Chroma: 2 to 4
Texture: silty clay loam
Clay content: averages 27 to 35 percent
Sand content: averages less than 10 percent
Reaction: strongly acid to slightly acid, but some pedons range to slightly alkaline in the lower part.
Redoximorphic features have hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 2 to 8.

2Bt, 2Btg, 2BC, and/or 2BCg horizons:
Hue: 10YR, 2.5Y or 5Y
Value: 4 to 6
Chroma: 2 to 8
Texture: loam, sandy loam, clay loam, silt loam or silty clay loam
Average sand content: 20 to 60 percent
Content of rock fragments: less than 10 percent
Redoximorphic features: It has redoximorphic features throughout. It typically has low chroma colors in the matrix and higher chroma in the redoximorphic features.
Reaction: moderately acid to slightly alkaline

2C or 2Cg horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6
Chroma: 2 to 8
Texture: sandy loam, loam, sandy clay loam, loamy sand, clay loam, silt loam or is sandy loam till
Sand content: 20 to 80 percent
Content of rock fragments: less than 15 percent
Reaction: slightly acid to moderately alkaline

COMPETING SERIES: These are the Atterberry, Bethalto, Canoe, Curran, Emery, Franklin, Koszta, Millbrook, Mulvey, and Wauconda series. Atterberry, Bethalto, Canoe, and Koszta series average less than 20 percent sand in the lower part of the series control section. Curran soils average less than 27 percent clay in the middle part of the series control section. Emery soils do not have a layer in the lower part of the series control section that has more than 25 percent sand. Millbrook, Franklin, and Wauconda soils have horizons with more than 10 percent sand within a depth of 102 cm (40 inches). Mulvey soils average less than 15 percent clay and greater than 15 percent gravel in the lower part of the series control section.

GEOGRAPHIC SETTING: Virgil soils are nearly level or gently sloping low broad summits on outwash plains, stream terraces, and till plains. Slope ranges from 0 to 6 percent. These soils formed in 102 to 152 cm (40 to 60 inches) of loess or other silty sediments and in the underlying loamy outwash or sandy loam till. The dominant clay mineral in the loess is smectite, and in the outwash or till is illite. Summers are hot and winters are cold. Mean annual air temperature ranges from 6.7 to 12.2 degrees C (44 to 54 degrees F). Mean annual precipitation ranges from 760 to 1070 mm (30 to 42 inches). Frost-free days range from 120 to 190 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Batavia, Drummer, Elburn, Emery, Harvard, Kendall, Millbrook, Plano, St. Charles, and Thorp soils. The well drained Batavia soils are on adjacent, slightly higher parts of the landscape. The poorly drained Drummer soils are on lower parts of the landscape and have a mollic epipedon. Elburn soils have a mollic epipedon and are on similar parts of the landscape nearby but generally are on broad landscape areas farther from the drainageways. Emery soils are on adjacent dissected till plains and average less than 20 percent sand in the lower part of the series control section. The well drained Harvard soils are on adjacent, slightly higher parts of the landscape and formed in loess less than 102 cm (40 inches) thick. Kendall soils are on similar parts of the landscape nearby but generally are adjacent to or nearer the drainageways and do not have a dark colored surface layer. Millbrook soils are on similar parts of the stream terraces and outwash plains where the loess is thinner. The well drained Plano soils have a mollic epipedon and are on adjacent, slightly higher parts of the landscape. The well drained St. Charles soils are on adjacent, slightly higher parts of the landscape and do not have dark colored surface layer. The poorly drained Thorp soils have a mollic epipedon and are on lower parts of the landscape.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Somewhat poorly drained. An intermittent apparent high water table is at a depth of 31 to 61 cm (1.0 to 2.0 feet) below the surface in most years. Saturated hydraulic conductivity is moderately high or high (4.23 to 14.11 micrometers per second) in the upper part of the solum and high (14.11 to 42.34 micrometers per second) in the lower part. Permeability is moderate in the upper part of solum and ranges moderate to moderately rapid in the lower part. The potential for surface runoff is low to medium as related to slope.

USE AND VEGETATION: Most areas are cultivated. Corn, soybeans, small grain, and forages for hay are the principal crops. Native vegetation is mixed grasses and trees.

DISTRIBUTION AND EXTENT: Northern Illinois and southern Wisconsin. LRR's K and M, MLRA's 95A, 95B, 108A, 108B and 115C. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Indianapolis, Indiana

SERIES ESTABLISHED: Kendall County, Illinois, 1941.

REMARKS: A gravelly substratum phase is recognized. This soil will be investigated during MLRA update activities. Possibly a new series will be developed.

Diagnostic horizons recognized in this pedon are:
Ochric epipedon - from a depth of 0 to 33 cm (0 to 13 inches) (Ap and E horizons)
Albic horizon--from a depth of 18 to 33 cm (7 to 13 inches) (E horizon)
Argillic horizon--from a depth of 33 to 150 cm (13 to 59 inches) (Bt1, Bt2, Btg1, Btg2, Btg3, 2Btg4, and 2C horizons)
Udic moisture regime; Mesic temperature regime.

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LOCATION WACOUSTA IA+MN WI

Established Series
Rev. TEF-RJW-TWN
08/2007

WACOUSTA SERIES

The Wacousta series consists of very deep, very poorly drained soils formed in silty lacustrine sediments. These soils are in broad depressions and swales on till plains, moraines, and stream terraces. Slope ranges from 0 to 2 percent. Mean annual air temperature is about 8 degrees C. Mean annual precipitation is about 775 millimeters

TAXONOMIC CLASS: Fine-silty, mixed, superactive, mesic Typic Endoaquolls

TYPICAL PEDON: Wacousta silty clay loam, in a depression with a slope of less than 1 percent, in a cultivated field. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 20 centimeters; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; weak fine and medium granular structure; friable; many fine and medium roots; neutral; abrupt smooth boundary.

A--20 to 43 centimeters; black (N 2/0) silty clay loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; friable; many fine and medium roots; neutral; abrupt smooth boundary. (Combined thickness of the A horizon is 20 to 49 centimeters.)

Bg--43 to 64 centimeters; dark gray (5Y 4/1) silty clay loam; weak medium subangular blocky structure; friable; many fine and medium roots; common fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; neutral; clear smooth boundary. (5 to 15 centimeters thick)

Cg1--64 to 104 centimeters; gray (5Y 5/1) silt loam; massive; friable; common fine and medium roots; few fine rounded light gray (10YR 7/2) carbonate concretions; common medium prominent yellowish red (5YR 5/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; clear smooth boundary.

Cg2--104 to 150 centimeters; gray (5Y 5/1) silt loam; massive; friable; few fine and medium roots; few fine black (10YR 2/1) iron-manganese concretions; few fine rounded light gray (10YR 7/2) carbonate concretions; common coarse prominent strong brown (7.5YR 5/6) redoximorphic concentrations; slightly effervescent; slightly alkaline; clear smooth boundary.

Cg3--150 to 200 centimeters; light olive gray (5Y 6/2) silt loam; massive; friable; thin strata of loam and sandy loam textured material at 152 to 170 centimeters; few fine and medium rounded light gray (10YR 7/2) carbonate concretions; common coarse prominent yellowish red (5YR 5/8) redoximorphic concentrations; strongly effervescent; moderately alkaline.

TYPE LOCATION: Major Land Resource Area (MLRA) 103-Central Iowa and Minnesota Till Prairies, Humboldt County, Iowa subset; located about 1,500 feet north and 150 feet east of the southwest corner of section 6, T. 92 N., R. 29 W.; USGS Bode topographic quadrangle; lat. 42 degrees 48 minutes 30 seconds N.

and long. 94 degrees 19 minutes 28 seconds W., NAD 83.

RANGE IN CHARACTERISTICS:
Thickness of the mollic epipedon--20 to 49 centimeters
Depth to carbonates--30 to 50 centimeters
Clay content of the particle-size control section (weighted average)--24 to 35 percent
Sand content of the particle-size control section (weighted average)--5 to 15 percent

Ap or A horizon:
Hue--10YR, 2.5Y, or is neutral
Value--2
Chroma--0 or 1
Texture--silty clay loam, silt loam, or mucky silt loam
Clay content--15 to 40 percent
Sand content--5 to 20 percent
Reaction--slightly acid to slightly alkaline

Maximum clay content is typically in the lower part of the A horizon or in the Bg horizon

Bg horizon:
Hue--5Y
Value--4 to 6
Chroma--1 or 2
Texture--silty clay loam, silty clay, clay loam, or silt loam
Clay content--15 to 45 percent
Sand content--5 to 45 percent
Reaction--neutral or slightly alkaline

Cg horizon:
Hue--5Y
Value--5 or 6
Chroma--1 or 2
Texture--silt loam or silty clay loam
Clay content--18 to 30 percent
Sand content--5 to 15 percent
Rock fragment content--0 percent
Reaction--slightly alkaline or moderately alkaline
Moist bulk density--1.30 g/cc to 1.40 g/cc

Some pedons have a 2Cg horizon below a depth of 150 centimeters with stratified textures of loam, silt loam, very fine sandy loam or clay loam

COMPETING SERIES: These are the Chalmers, Chetomba, Dolbee, Drummer, Dunham, Elpaso, Elvira, Garwin, Gillett Grove, Hartsburg, Madelia, Marcus, Mascoutah, Maxcreek, Maxfield, Maxmore, Ossian, Patton, Pella, Rushmore, and Sable series.
Chalmers--have clay content of 12 to 18 percent in the lower third of the series control section
Chetomba--have a sand content of more than 15 percent fine sand or coarser in the lower third of the series

control section
Dolbee--do not have carbonates within a depth of 125 centimeters
Drummer--do not have carbonates within a depth of 100 centimeters
Dunham--have a rock fragment content of 15 to 70 percent in the lower third of the series control section
Elpaso--do not have carbonates within a depth of 90 centimeters and have a rock fragment content of 1 to 10 percent in the lower third of the series control section
Elvira--do not have carbonates within a depth of 125 centimeters
Garwin--do not have carbonates within a depth of 125 centimeters
Gillett Grove--have a moist bulk density range of 1.6 g/cc to 1.8 g/cc in the lower third of the series control section
Hartsburg--have a sand content that averages less than 5 percent in the particle-size control section
Madelia--do not have carbonates within a depth of 50 centimeters
Marcus--do not have carbonates within a depth of 60 centimeters
Mascoutah--do not have carbonates within a depth of 100 centimeters
Maxfield--do not have carbonates within a depth of 100 centimeters
Maxcreek--do not have carbonates within a depth of 65 centimeters
Maxmore--have a moist bulk density range of 1.75 g/cc to 1.90 g/cc in the lower third of the series control section
Ossian--do not have carbonates within a depth of 100 centimeters
Patton--do not have carbonates within a depth of 100 centimeters
Pella--have stratified materials with a sand content that averages more than 10 percent in the lower third of the series control section
Rushmore--have a moist bulk density range of 1.6 g/cc to 1.8 g/cc in the lower third of the series control section
Sable--do not have carbonates within a depth of 100 centimeters

GEOGRAPHIC SETTING:
Parent material--silty lacustrine sediments
Landform--broad depressions and swales on till plains, moraines, and stream terraces
Slopes--0 to 2 percent
Elevation--200 to 400 meters above sea level
Mean annual air temperature--6 to 10 degrees C
Mean annual precipitation--585 to 965 millimeters
Frost-free period--150 to 200 days

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Harps, Nicollet, Okoboji, and Webster soils.
Harps--are at slightly higher landscape positions on rims of depressions and have a sand content that averages 30 to 55 percent in the particle-size control section
Nicollet--are at higher landscape positions on slightly convex rises and have a sand content that averages 20 to 55 percent in the particle-size control section
Okoboji--are on landscape positions similar to that of the Wacousta soils and have a mollic epipedon 60 to 150 centimeters thick
Webster--are at slightly higher landscape positions on flats and have a sand content that averages more than 15 percent in the particle-size control section

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY:
Drainage class--very poorly drained--in undrained conditions, a frequently saturated zone occurs at the surface

to a depth of 0.3 meters during the wettest periods of years when precipitation is within one standard deviation of the 30 year mean of annual precipitation
Saturated hydraulic conductivity--1.00 to 10.00 micrometers per second
Ponding--frequently ponded for long duration

USE AND VEGETATION:
Where drained, these areas are cultivated. The principal crops are corn, soybeans, and small grain. The native vegetation is big bluestem, western wheatgrass, sedges, blue grama and other species of the tall grass prairie that are tolerant of excessive wetness.

DISTRIBUTION AND EXTENT:
Physiographic Division--Interior Plains
Physiographic Province--Central Lowland
Physiographic sections--Western lake section and Eastern lake section
MLRAs--Central Iowa and Minnesota Till Prairies (103) and Southern Wisconsin and Northern Illinois Drift Plain (95B)
LRR M;--central and north-central Iowa, south-central Minnesota, and southern Wisconsin
Extent--moderate

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: St. Paul, Minnesota

SERIES ESTABLISHED: Humboldt County, Iowa, 1958.

REMARKS:
Particle-size control section--the zone from a depth of 25 to 100 centimeters;
series control section--the zone from the surface of the soil to a depth of 150 centimeters.

Diagnostic horizons and features recognized in this pedon include:
mollic epipedon--the zone from the surface of the soil to a depth of 43 centimeters (Ap and A horizons);
cambic horizon--the zone from a depth of 43 to 64 centimeters (Bg horizon);
aquic moisture regime.

The type location was moved because the previous location had been disturbed.

Cation-exchange activity class is inferred from lab data from similar soils in the surrounding area.

Taxonomy version--Keys to Soil Taxonomy, tenth edition, 2006.

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D

APPENDIX D

NOAA Online Precipitation Data for the Madison Area, Wisconsin

NOWData - NOAA Online Weather Data

Madison Area (ThreadEx Station)
Monthly Totals/Averages
Precipitation (inches)
Year: 2013

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2013	2.87	2.41	2.41	5.83	6.57	10.86	1.66	-	-	-	-	-	32.61

This station's record may include data from more than one, possibly incompatible, locations. It reflects the longest available record for the Madison Area.

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

Madison Area (ThreadEx Station)
Monthly Totals/Averages
Precipitation (inches)
Years: 1981-2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average	1.23	1.45	2.19	3.40	3.55	4.54	4.18	4.22	3.13	2.40	2.39	1.75	34.42

This station's record may include data from more than one, possibly incompatible, locations. It reflects the longest available record for the Madison Area.

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

NOWData - NOAA Online Weather Data

Madison Area (ThreadEx Station)
Observed Daily Data
Month: Jul 2013

Day	MaxT	MinT	AvgT	HDD	CDD	Pcpn	Snow	Snwg
1	79	55	67.0	0	2	0.00	0.0	0
2	76	54	65.0	0	0	0.00	0.0	0
3	73	53	63.0	2	0	0.00	0.0	0
4	82	60	71.0	0	6	0.00	0.0	0
5	84	67	75.5	0	11	0.00	0.0	0
6	85	67	76.0	0	11	0.00	0.0	0
7	89	70	79.5	0	15	0.00	0.0	0
8	88	72	80.0	0	15	0.53	0.0	0
9	85	71	78.0	0	13	1.13	0.0	0
10	79	60	69.5	0	5	T	0.0	0
11	81	56	68.5	0	4	0.00	0.0	0
12	82	56	69.0	0	4	0.00	0.0	0
13	83	64	73.5	0	9	0.00	0.0	0
14	87	60	73.5	0	9	0.00	0.0	0
15	90	66	78.0	0	13	T	0.0	0
16	92	74	83.0	0	18	T	0.0	0
17	93	74	83.5	0	19	T	0.0	0
18	92	75	83.5	0	19	0.00	0.0	0
19	M	M	M	M	M	M	M	M
20	M	M	M	M	M	M	M	M
21	M	M	M	M	M	M	M	M
22	M	M	M	M	M	M	M	M
23	M	M	M	M	M	M	M	M
24	M	M	M	M	M	M	M	M
25	M	M	M	M	M	M	M	M
26	M	M	M	M	M	M	M	M
27	M	M	M	M	M	M	M	M
28	M	M	M	M	M	M	M	M
29	M	M	M	M	M	M	M	M
30	M	M	M	M	M	M	M	M
31	M	M	M	M	M	M	M	M
Smry	84.4	64.1	74.3	2	173	1.66	0.0	0.0

This station's record may include data from more than one, possibly incompatible, locations. It reflects the longest available record for the Madison Area.

Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

E

APPENDIX E

Northcentral/Northeast Supplement Wetland Delineation Data Forms

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fire Station #14 **City/County:** Madison/Dane **Sampling Date:** 17-Jul-13

Applicant/Owner: City of Madison **State:** WI **Sampling Point:** 1

Investigator(s): Stautz/Anderson **Section, Township, Range: S.** 22 **T.** 7N **R.** 10E

Landform (hillslope, terrace, etc.): Footslope **Local relief (concave, convex, none):** convex **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Houghton muck (Ho) **NWI classification:** UPL

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc

Hydrophytic Vegetation Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ○ No ◉	

Remarks: (Explain alternative procedures here or in a separate report.)

Hydrologic conditions are not typical for this time of year (see hydrology remarks section). Although hydrophytic vegetation is dominant and hydric soil is present, the lack of wetland hydrology during a time when precipitation is 102% above normal indicates the sample plot is located in an upland fallow field.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	
Water Table Present?	Yes ○ No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches):	28

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Precipitation in the Madison Area for April-June was 102% above normal. 1.66" of precipitation were recorded in the two weeks prior to field work. The presence of only one secondary indicator at the sample plot does not provide evidence of wetland hydrology.

VEGETATION - Use scientific names of plants

Sampling Point: 1

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1. Populus tremuloides	0	☐	0.0%	FACU
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15')				
1. Acer negundo	10	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	10	= Total Cover		
Herb Stratum (Plot size: 5')				
1 Phalaris arundinacea	100	☑	90.1%	FACW
2 Cirsium arvense	10	☐	9.0%	FACU
3 Rubus occidentalis	1	☐	0.9%	UPL
4	0	☐	0.0%	
5	0	☐	0.0%	
6	0	☐	0.0%	
7	0	☐	0.0%	
8	0	☐	0.0%	
9	0	☐	0.0%	
10	0	☐	0.0%	
11	0	☐	0.0%	
12	0	☐	0.0%	
	111	= Total Cover		
Woody Vine Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	10	x 3 =	30
FACU species	10	x 4 =	40
UPL species	1	x 5 =	5
Column Totals:	121 (A)		275 (B)

Prevalence Index = B/A = 2.273

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

Dominant vegetation was determined through application of the 50/20 rule. Vegetation at the sample plot is hydrophytic.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR	2/1							Loam	
13-23	2.5Y	2.5/1							Clay Loam	
23-29	5Y	4/2		2.5Y	5/6	5%	C	M	Clay	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2] Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☑ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ◉ No ○

Remarks:

The soil at the sample plot matches the A12 Indicator (Thick Dark Surface) described in the Regional Supplement to the Army Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regions (2012).

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fire Station #14 **City/County:** Madison/Dane **Sampling Date:** 17-Jul-13

Applicant/Owner: City of Madison **State:** WI **Sampling Point:** 2

Investigator(s): Stautz/Anderson **Section, Township, Range:** S. 22 T. 7N R. 10E

Landform (hillslope, terrace, etc.): Toeslope **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Houghton muck (Ho) **NWI classification:** E2H

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc

Hydrophytic Vegetation Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?**	Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○		
Wetland Hydrology Present?	Yes ◉ No ○		

Remarks: (Explain alternative procedures here or in a separate report.)

Hydrologic conditions are not typical for this time of year (see hydrology remarks section). The sample plot is located in a wet meadow.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ◉ No ○	Depth (inches): 1
Water Table Present?	Yes ◉ No ○	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches): 0

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Precipitation in the Madison Area for April-June was 102% above normal. 1.66" of precipitation were recorded in the two weeks prior to field work. The presence of four primary and two secondary indicators at the sample plot provides evidence of wetland hydrology.

VEGETATION - Use scientific names of plants

Sampling Point: 2

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		
Sapling/Shrub Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		
Herb Stratum (Plot size: 5')				
1 Phalaris arundinacea	100	☑	99.0%	FACW
2 Cirsium arvense	1	☐	1.0%	FACU
3	0	☐	0.0%	
4	0	☐	0.0%	
5	0	☐	0.0%	
6	0	☐	0.0%	
7	0	☐	0.0%	
8	0	☐	0.0%	
9	0	☐	0.0%	
10	0	☐	0.0%	
11	0	☐	0.0%	
12	0	☐	0.0%	
	101	= Total Cover		
Woody Vine Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	0	x 3 =	0
FACU species	1	x 4 =	4
UPL species	0	x 5 =	0
Column Totals:	101 (A)		204 (B)

Prevalence Index = B/A = 2.020

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

Dominant vegetation was determined through application of the 50/20 rule. Vegetation at the sample plot is hydrophytic.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR	2/1		10YR	4/6	2%	C	PL	Loam	
4-20	10YR	2/1							Loam	
20-26	2.5Y	4/3							Sand	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☑ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ◉ No ○

Remarks:

The soil at the sample plot matches the F6 Indicator (Redox Dark Surface) described in the Regional Supplement to the Army Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regions (2012).

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fire Station #14 **City/County:** Madison/Dane **Sampling Date:** 17-Jul-13

Applicant/Owner: City of Madison **State:** WI **Sampling Point:** 3

Investigator(s): Stautz/Anderson **Section, Township, Range: S.** 22 **T.** 7N **R.** 10E

Landform (hillslope, terrace, etc.): Footslope **Local relief (concave, convex, none):** flat **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Sable silty clay loam, 0-3% slopes (SaA) **NWI classification:** UPL

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ● **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ● No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc

Hydrophytic Vegetation Present?	Yes ● No ○	**Is the Sampled Area within a Wetland?** Yes ○ No ●
Hydric Soil Present?	Yes ○ No ●	
Wetland Hydrology Present?	Yes ○ No ●	

Remarks: (Explain alternative procedures here or in a separate report.)

Hydrologic conditions are not typical for this time of year (see hydrology remarks section). Although hydrophytic vegetation is dominant the lack of wetland hydrology and hydric soil indicates the sample plot is located in an upland forest.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ●	Depth (inches):	
Water Table Present?	Yes ○ No ●	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○ No ●	Depth (inches):	

Wetland Hydrology Present? Yes ○ No ●

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Precipitation in the Madison Area for April-June was 102% above normal. 1.66" of precipitation were recorded in the two weeks prior to field work. No evidence of wetland hydrology was observed at the sample plot.

VEGETATION - Use scientific names of plants

Sampling Point: 3

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1. Salix nigra	40	☑	100.0%	OBL
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	40	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15')	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1. Acer negundo	60	☑	84.5%	FAC
2. Lonicera tatarica	10	☐	14.1%	FACU
3. Fraxinus pennsylvanica	1	☐	1.4%	FACW
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	71	= Total Cover		

Herb Stratum (Plot size: 5')	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1 Alliaria petiolata	90	☑	89.1%	FACU
2 Leonurus cardiaca	1	☐	1.0%	UPL
3 Arctium minus	5	☐	5.0%	FACU
4 Parthenocissus quinquefolia	5	☐	5.0%	FACU
5	0	☐	0.0%	
6	0	☐	0.0%	
7	0	☐	0.0%	
8	0	☐	0.0%	
9	0	☐	0.0%	
10	0	☐	0.0%	
11	0	☐	0.0%	
12	0	☐	0.0%	
	101	= Total Cover		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	66.7%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	40	x 1 =	40	
FACW species	1	x 2 =	2	
FAC species	60	x 3 =	180	
FACU species	110	x 4 =	440	
UPL species	1	x 5 =	5	
Column Totals:	212	(A)	667	(B)

Prevalence Index = B/A = 3.146

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

Dominant vegetation was determined through application of the 50/20 rule. Vegetation at the sample plot is hydrophytic.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR	2/1						Loamy Sand	
14-20	5YR	4/1	50%					Clay Loam	
14-20	N	2.5/1	30%					Clay	
14-20	10YR	4/2	20%					Sandy Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ○ No ◉

Remarks:

The soil at the sample plot does not meet any of the criteria described in the Regional Supplement to the Army Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regions (2012).

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fire Station #14 **City/County:** Madison/Dane **Sampling Date:** 17-Jul-13

Applicant/Owner: City of Madison **State:** WI **Sampling Point:** 4

Investigator(s): Stautz/Anderson **Section, Township, Range: S.** 22 **T.** 7N **R.** 10E

Landform (hillslope, terrace, etc.): Footslope **Local relief (concave, convex, none):** convex **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Houghton muck (Ho) **NWI classification:** UPL

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ● **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ● No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc

Hydrophytic Vegetation Present?	Yes ● No ○	**Is the Sampled Area within a Wetland?** Yes ○ No ●
Hydric Soil Present?	Yes ○ No ●	
Wetland Hydrology Present?	Yes ○ No ●	

Remarks: (Explain alternative procedures here or in a separate report.)

Hydrologic conditions are not typical for this time of year (see hydrology remarks section). Although hydrophytic vegetation is dominant and hydric soil is present, the lack of wetland hydrology during a time when precipitation is 102% above normal indicates the sample plot is located in an upland fallow field.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ●	Depth (inches):	
Water Table Present?	Yes ○ No ●	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○ No ●	Depth (inches):	**Wetland Hydrology Present?** Yes ○ No ●

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Precipitation in the Madison Area for April-June was 102% above normal. 1.66" of precipitation were recorded in the two weeks prior to field work. The presence of only one secondary indicator at the sample plot does not provide evidence of wetland hydrology.

VEGETATION - Use scientific names of plants

Sampling Point: 4

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1. Acer negundo	20	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	20	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15')	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1. Acer negundo	5	☑	100.0%	FAC
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	5	= Total Cover		

Herb Stratum (Plot size: 5')	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1 Phalaris arundinacea	100	☑	98.0%	FACW
2 Ambrosia trifida	1	☐	1.0%	FAC
3 Cirsium arvense	1	☐	1.0%	FACU
4	0	☐	0.0%	
5	0	☐	0.0%	
6	0	☐	0.0%	
7	0	☐	0.0%	
8	0	☐	0.0%	
9	0	☐	0.0%	
10	0	☐	0.0%	
11	0	☐	0.0%	
12	0	☐	0.0%	
	102	= Total Cover		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	26	x 3 =	78
FACU species	1	x 4 =	4
UPL species	0	x 5 =	0
Column Totals:	127 (A)		282 (B)

Prevalence Index = B/A = 2.220

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

Dominant vegetation was determined through application of the 50/20 rule. Vegetation at the sample plot is hydrophytic.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR	2/1						Sandy Loam	
12-20	2.5Y	4/2						Sand	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ○ No ◉

Remarks:

The soil at the sample plot does not meet any of the criteria described in the Regional Supplement to the Army Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regions (2012).

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fire Station #14 **City/County:** Madison/Dane **Sampling Date:** 17-Jul-13

Applicant/Owner: City of Madison **State:** WI **Sampling Point:** 5

Investigator(s): Stautz/Anderson **Section, Township, Range:** S. 22 T. 7N R. 10E

Landform (hillslope, terrace, etc.): Toeslope **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Houghton muck (Ho) **NWI classification:** E2K

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc

Hydrophytic Vegetation Present?	Yes ◉ No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Hydric Soil Present?	Yes ◉ No ○	
Wetland Hydrology Present?	Yes ◉ No ○	

Remarks: (Explain alternative procedures here or in a separate report.)

Hydrologic conditions are not typical for this time of year (see hydrology remarks section). The sample plot is located in a wet meadow.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☑ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	
Water Table Present?	Yes ◉ No ○	Depth (inches):	13
Saturation Present? (includes capillary fringe)	Yes ◉ No ○	Depth (inches):	10

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Precipitation in the Madison Area for April-June was 102% above normal. 1.66" of precipitation were recorded in the two weeks prior to field work. The presence of two primary and two secondary indicators at the sample plot provides evidence of wetland hydrology.

VEGETATION - Use scientific names of plants

Sampling Point: 5

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species? Rel.Strat. Cover		Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		
Sapling/Shrub Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		
Herb Stratum (Plot size: 5')				
1 Phalaris arundinacea	100	☑	100.0%	FACW
2	0	☐	0.0%	
3	0	☐	0.0%	
4	0	☐	0.0%	
5	0	☐	0.0%	
6	0	☐	0.0%	
7	0	☐	0.0%	
8	0	☐	0.0%	
9	0	☐	0.0%	
10	0	☐	0.0%	
11	0	☐	0.0%	
12	0	☐	0.0%	
	100	= Total Cover		
Woody Vine Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	100.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	0	x 1 =	0	
FACW species	100	x 2 =	200	
FAC species	0	x 3 =	0	
FACU species	0	x 4 =	0	
UPL species	0	x 5 =	0	
Column Totals:	100	(A)	200	(B)

Prevalence Index = B/A = 2.000

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

Dominant vegetation was determined through application of the 50/20 rule. Vegetation at the sample plot is hydrophytic.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)		Redox %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR	3/1		10YR	3/6	1%	C	PL	Loam	
9-20	2.5Y	4/2	75%						Sand	
9-20	2.5Y	4/1	25%						Sand	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2] Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☑ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks:

The soil at the sample plot matches the A4 Indicator (Hydrogen Sulfide) described in the Regional Supplement to the Army Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regions (2012).

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fire Station #14 **City/County:** Madison/Dane **Sampling Date:** 17-Jul-13

Applicant/Owner: City of Madison **State:** WI **Sampling Point:** 6

Investigator(s): Stautz/Anderson **Section, Township, Range: S.** 22 **T.** 7N **R.** 10E

Landform (hillslope, terrace, etc.): Footslope **Local relief (concave, convex, none):** convex **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Houghton muck (Ho) **NWI classification:** UPL

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc

Hydrophytic Vegetation Present?	Yes ◉	No ○	**Is the Sampled Area within a Wetland?**	Yes ○ No ◉
Hydric Soil Present?	Yes ○	No ◉		
Wetland Hydrology Present?	Yes ○	No ◉		

Remarks: (Explain alternative procedures here or in a separate report.)

Hydrologic conditions are not typical for this time of year (see hydrology remarks section). Although hydrophytic vegetation is dominant and hydric soil is present, the lack of wetland hydrology during a time when precipitation is 102% above normal indicates the sample plot is located in an upland fallow field.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○	No ◉	Depth (inches):
Water Table Present?	Yes ○	No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ◉	No ○	Depth (inches): 25

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Precipitation in the Madison Area for April-June was 102% above normal. 1.66" of precipitation were recorded in the two weeks prior to field work. The presence of only one secondary indicator at the sample plot does not provide evidence of wetland hydrology.

VEGETATION - Use scientific names of plants

Sampling Point: 6

Tree Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Sapling/Shrub Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Herb Stratum (Plot size: 5')

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1 Phalaris arundinacea	100	☑	90.9%	FACW
2 Cirsium arvense	10	☐	9.1%	FACU
3	0	☐	0.0%	
4	0	☐	0.0%	
5	0	☐	0.0%	
6	0	☐	0.0%	
7	0	☐	0.0%	
8	0	☐	0.0%	
9	0	☐	0.0%	
10	0	☐	0.0%	
11	0	☐	0.0%	
12	0	☐	0.0%	
	110	= Total Cover		

Woody Vine Stratum (Plot size: ______)

	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	0	x 3 =	0
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	110 (A)		240 (B)

Prevalence Index = B/A = 2.182

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

Dominant vegetation was determined through application of the 50/20 rule. Vegetation at the sample plot is hydrophytic.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)	Redox %	Type [1]	Loc [2]	Texture	Remarks
0-25	N	2.5/1						Loam	
25-28	2.5Y	5/3						Sand	
25-28	2.5Y	3/2						Sandy Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: __________

Depth (inches):__________

Hydric Soil Present? Yes ○ No ◉

Remarks:

The soil at the sample plot does not meet any of the criteria described in the Regional Supplement to the Army Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regions (2012).

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fire Station #14 **City/County:** Madison/Dane **Sampling Date:** 17-Jul-13

Applicant/Owner: City of Madison **State:** WI **Sampling Point:** 7

Investigator(s): Stautz/Anderson **Section, Township, Range:** S. 22 T. 7N R. 10E

Landform (hillslope, terrace, etc.): Toeslope **Local relief (concave, convex, none):** concave **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Houghton muck (Ho) **NWI classification:** E2K

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ● **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ● No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc

Hydrophytic Vegetation Present?	Yes ● No ○	**Is the Sampled Area within a Wetland?**	Yes ● No ○
Hydric Soil Present?	Yes ● No ○		
Wetland Hydrology Present?	Yes ● No ○		

Remarks: (Explain alternative procedures here or in a separate report.)

Hydrologic conditions are not typical for this time of year (see hydrology remarks section). The sample plot is located in a wet meadow.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☑ Surface Water (A1)
- ☑ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☑ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☑ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ● No ○	Depth (inches):	2
Water Table Present?	Yes ● No ○	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes ● No ○	Depth (inches):	0

Wetland Hydrology Present? Yes ● No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Precipitation in the Madison Area for April-June was 102% above normal. 1.66" of precipitation were recorded in the two weeks prior to field work. The presence of four primary and two secondary indicators at the sample plot provides evidence of wetland hydrology.

VEGETATION - Use scientific names of plants

Sampling Point: 7

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		
Sapling/Shrub Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		
Herb Stratum (Plot size: 5')				
1 Phalaris arundinacea	100	☑	98.0%	FACW
2 Cirsium arvense	2	☐	2.0%	FACU
3	0	☐	0.0%	
4	0	☐	0.0%	
5	0	☐	0.0%	
6	0	☐	0.0%	
7	0	☐	0.0%	
8	0	☐	0.0%	
9	0	☐	0.0%	
10	0	☐	0.0%	
11	0	☐	0.0%	
12	0	☐	0.0%	
	102	= Total Cover		
Woody Vine Stratum (Plot size:)				
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	0	x 3 =	0
FACU species	2	x 4 =	8
UPL species	0	x 5 =	0
Column Totals:	102 (A)		208 (B)

Prevalence Index = B/A = 2.039

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☑ **Dominance Test is > 50%**
- ☑ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks: (Include photo numbers here or on a separate sheet.)

Dominant vegetation was determined through application of the 50/20 rule. Vegetation at the sample plot is hydrophytic.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR	2.5/1						Loam	
11-20	2.5Y	4/2	80%					Sandy Clay Loam	
11-20	2.5Y	3/2	20%					Sandy Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☑ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ◉ No ○

Remarks:

The soil at the sample plot matches the A4 Indicator (Hydrogen Sulfide) described in the Regional Supplement to the Army Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regions (2012).

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fire Station #14 **City/County:** Madison/Dane **Sampling Date:** 17-Jul-13

Applicant/Owner: City of Madison **State:** WI **Sampling Point:** 8

Investigator(s): Stautz/Anderson **Section, Township, Range:** S. 22 T. 7N R. 10E

Landform (hillslope, terrace, etc.): Undulating **Local relief (concave, convex, none):** flat **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Virgil silt loam, gravelly substratum, 0-3% slopes (VwA) **NWI classification:** UPL

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc

Hydrophytic Vegetation Present?	Yes ○ No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉	
Wetland Hydrology Present?	Yes ○ No ◉	

Remarks: (Explain alternative procedures here or in a separate report.)

Hydrologic conditions are not typical for this time of year (see hydrology remarks section). The sample plot is located in an upland meadow.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):
Water Table Present?	Yes ○ No ◉	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Precipitation in the Madison Area for April-June was 102% above normal. 1.66" of precipitation were recorded in the two weeks prior to field work.
No evidence of wetland hydrology was observed at the sample plot.

VEGETATION - Use scientific names of plants

Sampling Point: 8

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Herb Stratum (Plot size: 5')	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1 Elymus repens	5	☐	4.4%	FACU
2 Poa pratensis	100	☑	88.5%	FACU
3 Phalaris arundinacea	1	☐	0.9%	FACW
4 Lotus corniculatus	5	☐	4.4%	FACU
5 Solidago canadensis	2	☐	1.8%	FACU
6	0	☐	0.0%	
7	0	☐	0.0%	
8	0	☐	0.0%	
9	0	☐	0.0%	
10	0	☐	0.0%	
11	0	☐	0.0%	
12	0	☐	0.0%	
	113	= Total Cover		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	0.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	1	x 2 =	2
FAC species	0	x 3 =	0
FACU species	112	x 4 =	448
UPL species	0	x 5 =	0
Column Totals:	113 (A)		450 (B)

Prevalence Index = B/A = 3.982

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0 [1]**
- ☐ **Morphological Adaptations [1] (Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation [1] (Explain)**

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

Dominant vegetation was determined through application of the 50/20 rule. Vegetation at the sample plot is not hydrophytic.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-7	2.5Y 3/2						Sandy Loam	
7-18	10YR 4/4						Sandy Clay Loam	gravel
18+							Compacted Soil	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: __________

Depth (inches): __________

Hydric Soil Present? Yes ○ No ◉

Remarks:

The presence of a compacted soil layer at 18" did not allow the observation of a complete soil profile. The soil at the sample plot does not meet any of the criteria described in the Regional Supplement to the Army Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regions (2012).

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Fire Station #14 **City/County:** Madison/Dane **Sampling Date:** 17-Jul-13

Applicant/Owner: City of Madison **State:** WI **Sampling Point:** 9

Investigator(s): Stautz/Anderson **Section, Township, Range:** S. 22 T. 7N R. 10E

Landform (hillslope, terrace, etc.): **Local relief (concave, convex, none):** **Slope:** 0.0 % / 0.0 °

Subregion (LRR or MLRA): LRR K **Lat.:** **Long.:** **Datum:**

Soil Map Unit Name: Virgil silt loam, gravelly substratum, 0-3% slopes (VwA) **NWI classification:** UPL

Are climatic/hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ **(If no, explain in Remarks.)**

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **significantly disturbed?** **Are "Normal Circumstances" present?** Yes ◉ No ○

Are Vegetation ☐ **, Soil** ☐ **, or Hydrology** ☐ **naturally problematic?** **(If needed, explain any answers in Remarks.)**

Summary of Findings - Attach site map showing sampling point locations, transects, important features, etc

Hydrophytic Vegetation Present?	Yes ○ No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Hydric Soil Present?	Yes ○ No ◉	
Wetland Hydrology Present?	Yes ○ No ◉	

Remarks: (Explain alternative procedures here or in a separate report.)

Hydrologic conditions are not typical for this time of year (see hydrology remarks section). The sample plot is located in an upland meadow.

Hydrology

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of 2 required)

- ☐ Surface Soil Cracks (B6)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ○ No ◉	Depth (inches):	
Water Table Present?	Yes ○ No ◉	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ○ No ◉	Depth (inches):	

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Precipitation in the Madison Area for April-June was 102% above normal. 1.66" of precipitation were recorded in the two weeks prior to field work.
No evidence of wetland hydrology was observed at the sample plot.

VEGETATION - Use scientific names of plants

Sampling Point: 9

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Sapling/Shrub Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
	0	= Total Cover		

Herb Stratum (Plot size: 5')	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1. Dipsacus fullonum	2	☐	1.6%	FACU
2. Poa pratensis	90	☑	73.8%	FACU
3. Solidago canadensis	20	☐	16.4%	FACU
4. Cirsium arvense	10	☐	8.2%	FACU
5.	0	☐	0.0%	
6.	0	☐	0.0%	
7.	0	☐	0.0%	
8.	0	☐	0.0%	
9.	0	☐	0.0%	
10.	0	☐	0.0%	
11.	0	☐	0.0%	
12.	0	☐	0.0%	
	122	= Total Cover		

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Rel.Strat. Cover	Indicator Status
1.	0	☐	0.0%	
2.	0	☐	0.0%	
3.	0	☐	0.0%	
4.	0	☐	0.0%	
	0	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	0	(A)
Total Number of Dominant Species Across All Strata:	1	(B)
Percent of dominant Species That Are OBL, FACW, or FAC:	0.0%	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:		
OBL species	0	x 1 =	0	
FACW species	0	x 2 =	0	
FAC species	0	x 3 =	0	
FACU species	122	x 4 =	488	
UPL species	0	x 5 =	0	
Column Totals:	122	(A)	488	(B)

Prevalence Index = B/A = 4.000

Hydrophytic Vegetation Indicators:

- ☐ **Rapid Test for Hydrophytic Vegetation**
- ☐ **Dominance Test is > 50%**
- ☐ **Prevalence Index is ≤3.0** [1]
- ☐ **Morphological Adaptations** [1] **(Provide supporting data in Remarks or on a separate sheet)**
- ☐ **Problematic Hydrophytic Vegetation** [1] **(Explain)**

[1] **Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

Definitions of Vegetation Strata:

Tree - Woody plants, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub - Woody plants less than 3 in. DBH and greater than 3.28 ft (1m) tall..

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ○ No ◉

Remarks: (Include photo numbers here or on a separate sheet.)

Dominant vegetation was determined through application of the 50/20 rule. Vegetation at the sample plot is not hydrophytic.

*Indicator suffix = National status or professional decision assigned because Regional status not defined by FWS.

Soil

Sampling Point: 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)		%	Redox Features Color (moist)		%	Type[1]	Loc[2]	Texture	Remarks
0-5	2.5Y	3/3							Clay Loam	
5-16	10YR	4/3							Clay Loam	
16-20	10YR	4/6		7.5YR	5/6	2%	C	M	Clay Loam	

[1] Type: C=Concentration. D=Depletion. RM=Reduced Matrix, CS=Covered or Coated Sand Grains [2]Location: PL=Pore Lining. M=Matrix

Hydric Soil Indicators:

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) (LRR R, MLRA 149B)
- ☐ Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- ☐ Thin Dark Surface (S9) (LRR R, MLRA 149B)
- ☐ Loamy Mucky Mineral (F1) LRR K, L)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils : [3]

- ☐ 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- ☐ Coast Prairie Redox (A16) (LRR K, L, R)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- ☐ Dark Surface (S7) (LRR K, L, M)
- ☐ Polyvalue Below Surface (S8) (LRR K, L)
- ☐ Thin Dark Surface (S9) (LRR K, L)
- ☐ Iron-Manganese Masses (F12) (LRR K, L, R)
- ☐ Piedmont Floodplain Soils (F19) (MLRA 149B)
- ☐ Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- ☐ Red Parent Material (F21)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ○ No ◉

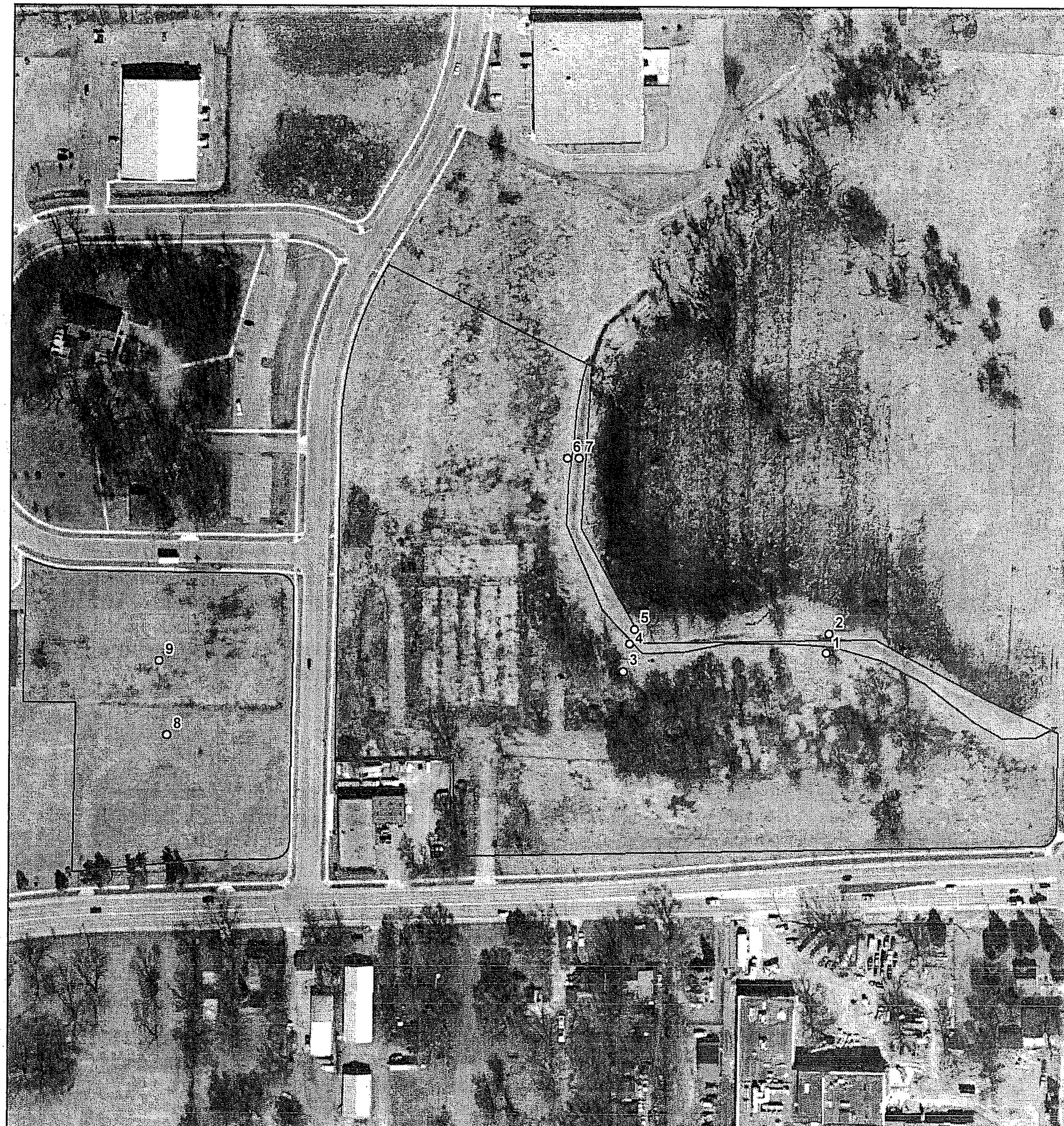
Remarks:

The soil at the sample plot does not meet any of the criteria described in the Regional Supplement to the Army Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regions (2012).

F

APPENDIX F

Site Survey

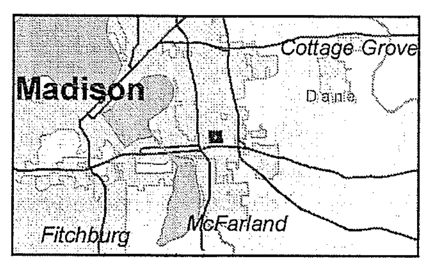


Legend

- o Sample Plot
- Project Area (+/- 14.6 acres)
- Wetland (+/-0.49 acre)

Appendix F
Site Survey

City of Madison
Fire Station #14
Project No. 15220004
City of Madison, Dane County, Wisconsin



Extent of large view shown in red.

0 100 200
Feet

N

NES
ECOLOGICAL SERVICES
A Division of Robert E. Lee & Associates, Inc.

August 6, 2013

CGC, Inc.

Construction • Geotechnical
Consulting Engineering/Testing

August 9, 2013
C13064-7

Mr. Randy Wiesner
City Engineering, Management Section
210 Martin Luther King Jr. Blvd, Room 115
Madison, WI 53703

Re: Preliminary Geotechnical Exploration Report
Proposed Fire Station No. 14 & Fire Training Facility
Femrite Drive and Dairy Drive
Madison, Wisconsin

Dear Mr. Wiesner:

Construction • Geotechnical Consultants, Inc. (CGC) has completed the *preliminary* geotechnical exploration program for the proposed Fire Station No. 14 and Fire Training Facility. The purpose of this exploration program was to evaluate the subsurface conditions within the five parcels being considered for purchase by the City for this project and to provide preliminary geotechnical recommendations regarding site preparation, foundation, floor slab, and pavement design/construction, as well as stormwater infiltration potential. We are sending you one paper copy of this report and can provide a paper copy upon request.

PROJECT DESCRIPTION

We understand that five parcels along Femrite Drive and Dairy Drive in the World Dairy Center are being considered to house Fire Station No. 14 and Fire Training Facilities. The project potentially will include the following components, with a brief description, as available:

- Fire Station No. 14, which would be a slab-on-grade (no basement) building with masonry and steel stud construction,
- Classroom and Administrative space, which would be similar construction to the fire station,
- Burn Training Structure consisting of a three-story concrete structure, and
- Physical Fitness Training Building of unspecified building type and structural system.

The locations, elevations, loads of the structures have not been determined at this time, although buildings will likely not be located near the high-pressure gas line easement traversing along the southern to middle portions of the area. Associated with these structures would be pavement areas for both light-duty and heavy-duty traffic loading. Stormwater management areas will also be incorporated into the development.

SITE CONDITIONS

The proposed project area involves five parcels located north of Femrite Drive and east and west of Dairy Drive. The two lots west of Dairy Drive (3202 and 3218 Dairy Drive) are vacant grass-covered sites that extend from Prairie Dock Drive to Femrite Drive that generally have flat to gently-sloping site grades. An east-west running drainage ditch exists between these lots, as well as long the east property line. The three parcels east of Dairy Drive (3101 and 3201 Dairy Drive and 5152 Femrite Drive) form an essentially 'L-shaped' area that extends from Blazing Star Drive south to Femrite Drive and then east to Agriculture Drive. A small parcel exists at the northeast corner of Dairy Drive and Femrite Drive that contains an occupied single-story structure with related parking area that is not included in the project area. The north and east legs of the L-shaped parcel are bounded by a wetland, which is owned by the City. The area east of Dairy Drive is a mixture of grass-covered land in the northern and southern portions, with moderately to heavily-wooded land adjacent to the wetland and fairly widespread on the 3201 Dairy Drive parcel. Site grades appear to slope down gently to the east. The parcels at 3101 Dairy Drive and 5152 Femrite Drive do not appear to have been previously developed, but the parcel at 3201 Dairy Drive includes an asphalt drive off of Femrite Drive and evidence that previous structures existed, but have been demolished; there is also evidence that some grading (cutting and filling) has occurred on the 3201 Dairy Drive property. A 50-ft wide easement for a large high pressure gas line traverses the south end of the 5152 Femrite Drive and 3201 Dairy Drive properties and the north end of the 3218 Dairy Drive property.

SUBSURFACE CONDITIONS

Subsurface conditions on site were explored by drilling a total of 20 Standard Penetration Test (SPT) soil borings to planned depths of 10 to 30 ft below existing site grades at locations selected by the City of Madison and located in the field by Burse Survey and Engineering (Burse). Note that Boring 3 was offset 75 ft east due to a fallen tree blocking the path to the boring, and this boring was extended to 35 ft due to very loose to loose soil conditions at 30 ft. Boring 5 was also offset 10 ft east due to downed tree blocking the path to the boring. The borings were drilled on July 22 through 25, 2013 by Badger State Drilling (under subcontract to CGC) using ATV-mounted CME-750 and truck-mounted D-120 rotary drill rigs equipped with hollow-stem augers, mud rotary equipment and automatic SPT hammers. The boring locations are shown in plan on the Soil Boring Location Map attached in Appendix B. Ground surface elevations at the boring locations were surveyed by Burse.

The subsurface profiles at the boring locations varied somewhat at shallow depths due to previous site grading, but the profiles were fairly similar with depth. A generalized soil profile included the following strata, in descending order:

- 4 to 18 in. of ***topsoil/topsoil fill***, except in Borings 8, 9 and 13 where topsoil was absent at the surface; over
- 1 to 5.5 ft of ***fill*** or ***possible fill*** in Borings 8, 9, 10, 13 through 18 and 20 consisting of loose to medium dense sand with variable silt, clay and gravel content or soft to very stiff silty to lean clay with topsoil and wood/roots in some locations; followed by
- 1.5 to 5.5 ft of soft to hard ***lean clay*** with variable sand content or loose to medium dense ***clayey sand***; this layer was not encountered in Borings 2, 8, 9 and 10; followed by

- Very loose to dense ***sand*** with variable silt content and scattered silt seams or ***sandy silt*** to the maximum depth explored.

As exceptions to the above profile, 1-ft thick clay layers were encountered between sand layers in Borings 2 and 3. Additionally, 3.5-ft thick ***probable buried topsoil layers*** were encountered below the fill in Borings 8 and 9. The organic content (as measured by loss-on-ignition) on the buried topsoil layer ranged from 6.5% to 9.1%, where soils with loss on ignition exceeding 4% are considered organic.

The shallow clay layer ranged from soft to very stiff, with moisture contents that ranging from 17.0% to 29.5% on representative samples.

Groundwater was encountered in the borings during or shortly after drilling at 3.5 to 8.5 ft below existing site grades. Groundwater was generally shallowest on the eastern end of the area and slightly deeper to the west. Groundwater levels can be expected to fluctuate with seasonal variations in precipitation, infiltration, evapotranspiration, the level of nearby streams and lakes, the pumping rate of nearby wells and other factors. A more detailed description of the site soil and groundwater conditions is presented on the Soil Boring Logs attached in Appendix B.

DISCUSSION AND PRELIMINARY RECOMMENDATIONS

Subject to the limitations described below and based on the subsurface exploration, it is our opinion that these sites are generally suitable for the proposed construction and that structures can likely be supported by conventional spread footing foundations. However, the following soil issues exist at the site that will impact foundation, floor slab and pavement design and construction:

- Widespread presence of very loose to loose sands;
- Scattered areas of soft to medium stiff clay;
- Existing fill and buried topsoil in some areas; and
- Shallow groundwater table;

The extent to which the above soil conditions will impact building and pavement design and the strategies that can be used to address the soil issues will depend on the following:

- Building location and elevation;
- Foundation and floor slab loads; and
- Pavement grades and traffic loads.

With the above soil conditions and as of yet unknown building and pavement information in mind, our *preliminary* geotechnical recommendations regarding site preparation, foundation, floor slab, and stormwater infiltration design/construction are presented in the following subsections. Additional information regarding the conclusions and recommendations presented in this report is discussed in Appendix C.

1. **Site Preparation**

We recommend that the topsoil/vegetation and pavement be stripped/removed at least 10 ft beyond the proposed construction areas, including areas required for cuts and fills beyond building footprints or pavement limits. The topsoil can be stockpiled on-site and re-used as fill in landscaped areas. Trees and tree roots should be removed in conjunction with topsoil stripping. Topsoil thicknesses varied from 0 to 18 in. the borings, but thicker topsoil deposits could be encountered due to previous grading activities.

Where areas containing fill (e.g, on the two parcels east of Dairy Drive and the large parcel at the northeast corner of Dairy Drive and Femrite Drive) fall within building footprints, we recommend that follow-up soil borings and/or test pits be completed to better determine the extent and composition of the fill. Although the fill will likely need to be removed below foundations, suitably firm, non-organic fill may be able to remain in-place below floor slab areas. *Note that 3.5 ft of buried topsoil was encountered below 2.5 to 5.5 ft of fill in Borings 8 and 9. If these areas will be within building footprints, we recommend that the fill and buried topsoil be undercut/removed during the initial site preparation, as the buried topsoil is considered unacceptable for foundation and floor slab support.*

Remnants of former buildings (slabs, foundations, foundation walls, abandoned utilities, etc.) that are located within planned building areas should be removed, with grade restored with granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557). Old foundations and slabs can potentially remain in-place in landscape and pavement areas provided slabs are broken up to allow drainage, are at least 2 ft below the bottom of the base course layer in the pavement section and do not interfere with new utility installation.

Prior to fill placement (where needed) or where the site is at-grade, the soils exposed below the topsoil should be carefully checked for soft/yielding areas by proof-rolling with a loaded tri-axle dump truck or other large rubber-tired piece of construction equipment (e.g., loaded scraper, off-road dump truck or front-end loader). If soft/yielding areas are encountered, these areas should be undercut and replaced with compacted granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557). Alternatively, 3-in. dense graded base can be used to stabilize soft clay subgrades and/or to restore grades in undercut areas. If groundwater is encountered at the bottom of the undercut, a 6 to 12 in. thick layer of compacted crushed clear stone will likely be required to stabilize the soils prior to subsequent granular fill placement. If the clear stone layer exceeds 12 in., the stone layer should be overlain by a non-woven geotextile fabric (e.g., Mirafi 160N or equivalent) to prevent migration of soil into the clear stone.

As an alternative to undercutting/stabilization in pavement areas, the shallow clayey soils could potentially be aerated (dried) and then recompacted to create a stable platform for fill placement. However, drying and recompacting is highly weather dependent and could require multiple cycles of drying and recompacting to create an adequate subgrade. Lime stabilization could also be considered for improving the soft clay soils. We can provide additional details, if needed, but we recommend that the project budget include a generous contingency and schedule for improving, stabilizing or undercutting/replacing the soils within proposed buildings and parking lots.

Fill placement (where required) to establish grades can then proceed. We recommend using granular soils (i.e., compact in most weather conditions. The shallow clay soils, as well as the slightly deeper sands that contained significant silt and clay are not recommended as structural fill within the building because moisture conditioning will be required to achieve desired compaction levels, which could delay construction progress. Clay/silt soils may be used as fill in landscaped areas or in the lower portion of deeper fills in pavement areas provided the soils are adequately dried back to facilitate compaction. We recommend that fill/backfill be compacted to at least 95% compaction (ASTM D1557) in accordance with our Recommended Compacted Fill Specifications presented in Appendix D. Periodic field density tests should be taken by CGC staff within the fill/backfill to document the adequacy of compactive effort.

Based on the presence of slightly to moderately compressible soft to medium stiff clay and very loose to loose sands across the site, if site grades will be raised by more than about 1 to 2 ft, we recommend that the fill be placed to the floor slab subgrade elevation or pavement subgrade elevation early in the construction sequence to allow the clay soils to mostly consolidate under the weight of the fill prior to beginning building construction. (Note that settlement of the very loose to loose sands will also occur under the weight of the new fill, but settlement of sand will occur more quickly than consolidation of clay soils, so as long as fill placement occurs early in the construction sequence, settlement of the sands should occur prior to beginning building construction.) If thicker fills are expected a time-delay (i.e., on the order of several weeks to a few months) between fill placement and beginning building construction may be required. We can provide additional details as the project details develop and after supplemental borings are completed.

2. Preliminary Foundation Design

Based on the preliminary soil borings, it is our opinion that proposed structures can generally be supported on reinforced concrete spread footing foundations proportioned using a fairly low bearing pressure. The allowable bearing pressure will be limited by the very loose to loose sands and soft to medium stiff soils and may necessitate undercutting in some locations. (As noted above, we have assumed that the buried topsoil layer in Borings 8 and 9 will be undercut and replaced with compacted granular backfill.) Where high foundation loads exist, the bearing pressure could be increased by using an intermediate foundation system such as rammed aggregate piers (RAPs) or a mat foundation could be used to distribute the loads over a larger area resulting in a low overall foundation contact pressure. Another strategy to potentially increase the bearing pressure in the loose sands would be to conduct pressuremeter testing during a supplemental drilling phase, which has been shown on numerous projects in the Madison area to increase the bearing pressure in granular soils compared to conventional methods based solely on SPT blow counts (N-values). We can provide additional details about alternative foundation support systems and follow-up pressuremeter testing, if needed.

In general, the soils on the three lots east of Dairy Drive were relatively looser/softer than the on the two sites west of Dairy Drive. Assuming that unsuitable soils will be undercut below foundations, a relatively low bearing pressure in the range of 1,000 to 2,000 psf will likely feasible on the sites east of Dairy Drive, with a slightly higher bearing pressure range of 2,000 to 3,000 psf possible on the two sites west of Dairy Drive, as the clays are slightly stiffer and sands are slightly denser. The bearing pressure on the east end of the site can likely be increased if site grades are raised such that the footings bear on at least 2 ft of well-compacted granular fill over firm/stable natural soils. Additional parameters should be used for foundation design:

- Minimum foundation widths:
  - -- Continuous wall footings: 18 in.
  - -- Column pad footings: 30 in.

- Minimum footing depths:
  - -- Exterior/perimeter footings: 4 ft
  - -- Interior footings: no minimum requirement

Undercutting below footing grade will be required where very loose/disturbed sands or silts or native clays with pocket penetrometer readings (an estimate of the unconfined compressive strength of cohesive soils) of less than 0.5 tsf for a 1,000 psf bearing pressure to 1.5 tsf for a 3,000 psf bearing pressure are encountered at or slightly below footing grade. Such soils were located in numerous borings. Where undercutting is required, the base of the undercut excavation should be widened beyond the footing edges at least 0.5 ft in each direction for each foot of undercut depth for stress distribution purposes. Undercut depths are difficult to determine without more specific building locations and elevations, but undercut depths could be on the order of 3 to 8.5 ft below existing site grades.

Assuming that the bottom of the undercut is above the groundwater table, footing grade can be restored with granular backfill compacted to at least 95% (ASTM D1557). Alternatively, 3-in. dense graded base could be placed/compacted to re-establish footing grade. Where the base of the undercut extends near or below the water table, the soils at the bottom of the excavation should be stabilized with a 6 to 12 in. layer of compacted crushed clear stone. If the clear stone layer exceeds 12 in., the stone layer should be covered in a non-woven geotextile fabric (e.g., Mirafi 160N or equivalent). CGC should be present during footing excavations to check whether subgrades are satisfactory for the design bearing pressure and to advise on corrective measures, where necessary.

Based on the presence of shallow groundwater at this site, dewatering will likely be required in advance of and during some footing excavations, especially on the sites east of Dairy Drive where the undercut or footing excavations may extend near to a few feet below the water table. For groundwater drawdowns of less than 1 to 2 ft, dewatering can likely be controlled using pumps operating from filtered sump pits. Groundwater drawdowns of more than 1 to 2 ft typically require deep wells or closely-spaced well points. A stone layer may be required at the bottom of the excavation to stabilize the expected very moist to wet soil, and *supplemental* dewatering can be completed with submersible pumps operating from the stone layer.

We recommend using a smooth-edged backhoe bucket for footing excavations. Additionally, granular soils exposed at footing grade should be recompacted with a large vibratory plate compactor prior to formwork/concrete placement to densify soils loosened during the excavation process. Soils potentially susceptible to disturbance from compaction (e.g., silty or clayey soils) should be hand trimmed. Provided the foundation design/construction recommendations discussed above are followed, we estimate that total and differential settlements should be on the order of 1.0 and 0.5 in., respectively.

3. Floor Slabs

We anticipate that the soils exposed at floor slab subgrade within the building areas will consist of native clays or sands and granular fill where grades will be raised. In our opinion, the soft to medium stiff clays are considered marginal for slab support and will likely require partial undercutting and stabilization during slab preparation if not already completed during earlier site preparation activities. Prior to slab construction, the subgrades should be thoroughly proof-rolled/recompacted as described in the Site Preparation section of this report to densify soils that may become disturbed or loosened during construction activities. Areas that do not proof-roll satisfactorily or that remain loose after recompaction should be undercut and replaced with compacted 3-in. dense graded base or granular fill. The design subgrade modulus is based on a recompacted subgrade such that non-yielding conditions are developed. To serve as a capillary break, the final 4 to 6 in. of soil placed below the slab should consist of well-graded sand or gravel with no more than 5 percent by weight passing a No. 200 U.S. standard sieve. A subgrade modulus of 100 pci may be used for slab design on adequately stabilized native clay or recompacted sand fill. Note that some structural engineers require a 4 to 6 in. layer of dense graded base (e.g., 1.25-in. crushed aggregate base course) below the slab to increase the subgrade modulus. If 6 in. of dense graded base is included below the floor slab, the subgrade modulus can be increased to 150 pci. Fill and base layer material below the floor slab should be placed as described in the Site Preparation section of this report. To further minimize the potential for moisture migration, a 15-mil plastic vapor barrier can be also be utilized below the slab. The slab should be structurally separate from the foundations and have construction joints and reinforcement for crack control.

Note that in areas of high slab loads more extensive undercutting/replacement may be required to minimize long-term settlement from the higher slab loads. We recommend that if higher slab loads are anticipated, these areas be carefully explored with follow-up soil borings/test pits to better evaluate the ability of the soils to support the higher slab loads or determine remedial measures.

4. Seismic Design Category

As discussed above, the granular soils on the three sites east of Dairy Drive are slightly looser than the granular soils on the two sites west of Dairy Drive. East of Dairy Drive it is our opinion that the average soil/rock properties in the upper 100 ft of the site (based on SPT blow counts (N-values) of less than 15 blows/ft, on average, in the granular soils underlying the site) may be characterized as a soft soil profile. This characterization would place the site in Site Class E for seismic design according to the International Building Code (see Table 1613.5.2). The average SPT blow counts in the granular soils west of Dairy Drive generally exceed 15 blows/ft, which would classify the site as having a stiff soil profile with Site Class D.

5. Preliminary Pavement Design

We anticipate that the subgrade soils within the pavement areas will likely consist of native or fill soils that include significant areas of marginal soft to stiff cohesive soils or variable fill soils. Where grades are raised, pavement subgrades may consist of newly-placed granular fill soils. Pavement subgrades should be proof-rolled with a loaded tri-axle dump truck, as described in the Site Preparation section of this report, and stabilized as needed with 3-in. dense graded base or replaced with compacted granular fill.

As discussed in the Site Preparation section of this report, the presence of marginal shallow soils across the site will likely either necessitate an extensive program of drying/recompacting the native clays or partially undercutting the soft soils and restoring grade with 3-in. dense graded base, perhaps in combination with triaxial or biaxial geogrid. For budgetary purposes, we recommend that a contingency for a stabilization layer consisting of triaxial or biaxial geogrid (Tensar TX-5 or BX-1100 or equivalent) and 8 to 12 in. of 3-in. dense graded base be included. (Note that if standing water exists at the surface, the 3-in. dense graded base will likely need to be substituted with 3-in. clear stone.) If the soil conditions prove to be better than anticipated, the stabilization can be reduced or potentially eliminated, but if the soil conditions are worse, the stabilization section may need to be increased. We assume that the portions of the parking lot used primarily as automobile parking will experience light to moderate traffic loads (e.g., 1 to 5 equivalent 18-kip single-axle loads per day - ESALs), and the drive lanes used to access the loading docks will experience heavier traffic loads (of up to about 10 ESALs). The variable clay soils will control the pavement thickness design. Accordingly, the pavement sections tabulated below were selected assuming a CBR of approximately 0.5 to 1.0 for the native clays that improves to 3 to 5 with the inclusion of a stabilization layer and a design life of 20 years.

TABLE 1
RECOMMENDED PAVEMENT SECTIONS

Material	Thickness (in.)		WDOT Specification[1]
	Car Parking/Drives (1 to 5 ESALs)	Truck Drives (< 10 ESALs)	
Bituminous upper layer	1.75	1.75	Section 460, Table 460-1, 12.5 mm
Bituminous lower layer	1.75	2.25	Section 460, Table 460-1, 19.0 mm
Dense graded base	10.0	12.0	Sections 301 and 305, 31.5mm and 75mm
Stabilization Layer (4)	8.0	12.0	Section 305, 75 mm
Geogrid Reinforcement	Possibly	Yes	Tensar TX-5 or BX-1100
TOTAL THICKNESS	21.5	28.0	

Notes:

1. Wisconsin DOT *Standard Specifications for Highway and Structure Construction*, latest edition, including supplemental specifications, but excluding Section 460.3.2 relating layer thickness to aggregate size.

2. Compaction requirements:
   - Bituminous concrete: Refer to Section 460-3.
   - Base course: Refer to Section 301.3.4.2, Standard Compaction

3. Mixture Type E-0.3 bituminous pavement is recommended for car parking and drives and E-1 is recommended for truck drives; refer to Section 460, Table 460-2 of the *Standard Specifications.*

4. Stone stabilization may be reduced or deleted if subgrades proof-roll satisfactory during pavement subgrade preparation. Alternatively, the stone stabilization layer may need to be increased if very soft soil conditions are encountered.

Where pavement areas will experience heavier concentrated loads from fire trucks and related equipment, we recommend that rigid concrete pavement be used in pavement areas. Similarly, we recommend that dumpster pads or loading dock pads be constructed of concrete pavement. We recommend that rigid concrete pavement be designed using a subgrade modulus of 100pci, which assumes that concrete pavement will be underlain by a minimum of 6 in. of well-compacted dense graded base over a firm (adequately proof-rolled) subgrade. Depending on actual traffic loads, concrete pavement thickness is typically 6 to 9 in., and we recommend a minimum concrete pavement thickness of 6 in.

Note that if traffic volumes are greater than those assumed, CGC should be allowed to review the recommended pavement section and adjust them accordingly. The pavement design assumes a stable/non-yielding subgrade and a regular program of preventative maintenance. Alternative pavement designs may prove applicable and should be reviewed by CGC. If there is a delay between subgrade preparation and placing the base course, the subgrade should be recompacted.

6. Stormwater Infiltration Potential

Based on the soil borings, it is our opinion that this site will have very limited stormwater infiltration potential due to the generally shallow groundwater, as well as shallow silty clay loam soils that generally extended below the topsoil to near the groundwater depth in many locations. The natural clay also generally had redoximorphic features (redox or mottling), which indicates seasonal or past saturation and is considered a limiting layer to stormwater infiltration. According to NR151.12, this site may qualify as "exempted" based on estimated infiltration rates of less than 0.6 in./hr. The site may also be classified "excluded" based on less than 3 ft below of separation between the bottom of the infiltration basin and the high water level (or redox in the clay). In some areas sand soils with relatively high permeability had scattered silt loam seams, which will limit the infiltration rate.

having an infiltration rate greater than or equal to the design infiltration rate. Another strategy that could be implemented for sand soils with scattered silt loam seams would be to thoroughly mix the soil to break up the silt loam seams down to the groundwater level such that the mixed soil would have a particle size distribution and infiltration rate that would likely approach sandy loam or loamy sand. We recommend that gradations on samples of the mixed soil be completed during construction to document that the mixed soil has an appropriate gradation for the design infiltration rate.

The following parameters should be considered for design of infiltration features:

Infiltration Potential: The following infiltration parameters were estimated using Table 2 of the WDNR Conservation Practice Standard 1002, *Site Evaluation for Storm Water Infiltration*. The estimated infiltration rates are as follows:

• Silty clay loam	0.04 in./hr
• Silt loam	0.13 in./hr
• Loam	0.24 in./hr
• Sandy loam	0.5 in./hr
• Loamy sand	1.63 in./hr
• Sand	3.6 in./hr

Note that the infiltration rates should be considered very approximate. The Wisconsin Department of Safety and Professional Services soil evaluation forms for the borings are included in Appendix E.

Groundwater: Groundwater was encountered in the borings during or shortly after drilling at 3.5 to 8.5 ft below existing site grades. Redoximorphic features were also encountered in most of the shallow natural clays, which indicates seasonal or past saturation at levels above the water table. Groundwater levels should be expected to vary, as previously discussed.

Bedrock: Bedrock was not encountered in the borings to maximum depth explored.

During construction of the proposed buildings, pavement and related site work, appropriate erosion control should be provided to prevent eroded soil from contaminating the infiltration areas. Where appropriate, the basin design should include pretreatment to remove fine-grained soils (silt/clay) from stormwater prior to entering the infiltration area. Additionally, a regular maintenance plan should be developed to remove silt/clay soils that may accumulate in the bottom of the infiltration basin over time. Failure to adequately control fine-grained soils from entering the infiltration area or failure to regularly remove fine-grained soils that accumulate at the base of the infiltration basin will likely cause the basin to fail. Refer to WDNR Conservation Practice Standard 1002 and NR 151 for additional information.

CONSTRUCTION CONSIDERATIONS

Due to variations in weather, construction methods and other factors, specific construction problems are difficult to predict. Soil related difficulties that could be encountered on the site are discussed below:

- Due to the potentially sensitive nature of the on-site soils, we recommend that final site grading activities be completed during dry weather, if possible. Construction traffic should be avoided on prepared subgrades to minimize potential disturbance.

- Earthwork construction during the early spring or late fall could be complicated as a result of wet weather and freezing temperatures. During cold weather, exposed subgrades should be protected from freezing before and after footing construction. Fill should never be placed while frozen or on frozen ground.

- Excavations extending greater than 4 ft in depth below the existing ground surface should be sloped or braced in accordance with current OSHA standards.

- Based on observations made during the field exploration, groundwater infiltration into footing, undercut and utility excavations should be expected, and dewatering strategies were previously discussed. Additional water accumulating at the base of excavations as a result of precipitation or seepage should be controlled and quickly removed using pumps operating from filtered sump pits.

RECOMMENDED CONSTRUCTION MONITORING

The quality of the foundation, floor slab and pavement subgrades will be largely determined by the level of care exercised during site development. To check that earthwork and foundation construction proceeds in accordance with our recommendations, the following operations should be monitored by CGC:

- Topsoil stripping/subgrade proof-rolling within the construction areas;
- Fill/backfill placement and compaction;
- Foundation excavation/subgrade preparation; and
- Concrete placement.

SUPPLEMENTAL GEOTECHNICAL EXPLORATION

The preliminary soil borings were intended to provide an overview of the soil conditions across the sites and identify potential geotechnical concerns, such as the widespread very loose to loose sands, areas of marginal clay, areas with buried topsoil and shallow groundwater. Supplemental soil borings are recommended to provide more specific geotechnical recommendations as the project progresses and the locations and elevations of the building, pavement and stormwater management areas are determined. We would be happy to provide additional details and develop a supplemental geotechnical scope at the appropriate time.

* * * * *

It has been a pleasure to serve you on this project. If you have any questions or need additional consultation, please contact us.

Sincerely,

CGC, Inc.

David A. Staab, P.E., LEED AP
Consulting Professional

William W. Wuellner, P.E.
Senior Geotechnical Engineer

Encl: Appendix A - Field Exploration
Appendix B - Soil Boring Location Map
Logs of Test Borings (20)
Log of Test Boring-General Notes
Unified Soil Classification System
Appendix C - Document Qualifications
Appendix D - Recommended Compacted Fill Specifications
Appendix E - Perimeter Drain Details
Appendix F - Wisconsin Dept. of Safety and Professional Services – Soil Evaluation Forms (20 Borings)

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

A total of 20 Standard Penetration Test (SPT) soil borings were drilled to planned depths of 10 to 30 ft below existing site grades at locations selected by the City of Madison and located in the field by Burse Survey and Engineering (Burse). Note that Boring 3 was offset 75 ft east due to a fallen tree blocking the path to the boring, and this boring was extended to 35 ft due to very loose to loose soil conditions at 30 ft. Also, Boring 5 was offset 10 ft east due to downed tree blocking the path to the boring. The borings were drilled on July 22 through 25, 2013 by Badger State Drilling (under subcontract to CGC) using ATV-mounted CME-750 and truck-mounted D-120 rotary drill rigs equipped with hollow-stem augers, mud rotary equipment and automatic SPT hammers. The boring locations are shown in plan on the Soil Boring Location Map attached in Appendix B. Ground surface elevations at the boring locations were surveyed by Burse.

In each boring, soil samples were obtained at 2.5 foot intervals to a depth of 10 ft and at 5 ft intervals thereafter. The soil samples were obtained in general accordance with specifications for standard penetration testing, ASTM D 1586. The specific procedures used for drilling and sampling are described below.

1. Boring Procedures between Samples

   The boring is extended downward, between samples, by a hollow-stem auger.

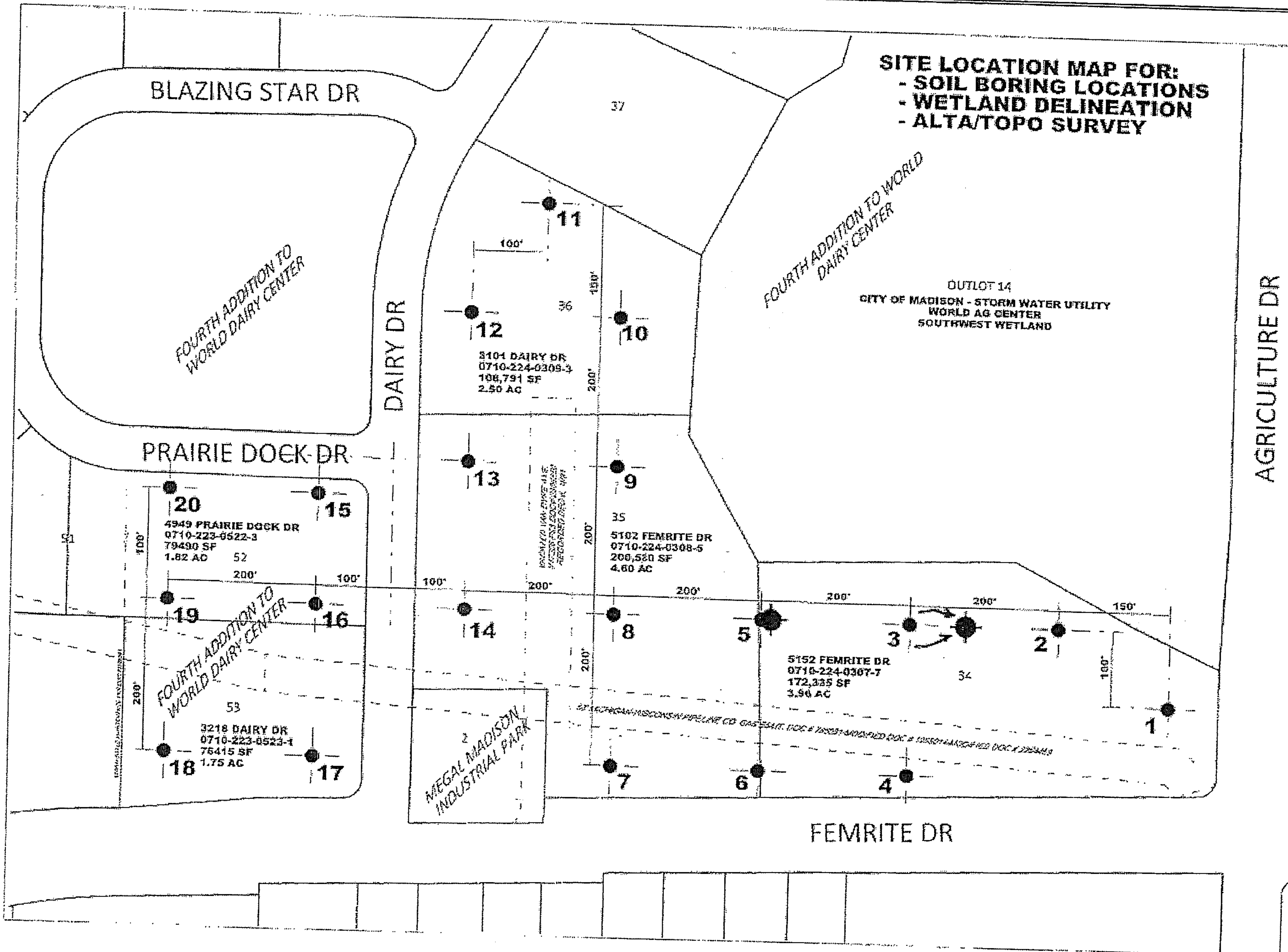
2. Standard Penetration Test and Split-Barrel Sampling of Soils
   (ASTM Designation: D 1586)

   This method consists of driving a 2-inch outside diameter split-barrel sampler using a 140-pound weight falling freely through a distance of 30 inches. The sampler is first seated 6 inches into the material to be sampled and then driven 12 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the log of borings and is known as the Standard Penetration Resistance.

During the field exploration, the driller visually classified the soil and prepared a field log. *Field screening of the soil samples for possible environmental contaminants was not conducted by the drillers as environmental site assessment activities were not part of CGC's work scope.* Water level observations were made in each boring during and after drilling and are shown at the bottom of each boring log. Upon completion of drilling, the borings were backfilled with bentonite (where required) to satisfy WDNR regulations and the soil samples were delivered to our laboratory for visual classification and laboratory testing. The soil samples were visually classified by a geotechnical engineer using the Unified Soil Classification System. The final logs prepared by the engineer and a description of the Unified Soil Classification System are presented in Appendix B.

APPENDIX B

SOIL BORING LOCATION MAP
LOGS OF TEST BORINGS (20)
LOG OF TEST BORING - GENERAL NOTES
UNIFIED SOIL CLASSIFICATION SYSTEM



Legend

Denotes Boring Location and Number

Scale: Unknown.

Notes

1. Borings drilled by Badger State Drilling on July 22 through 25, 2013.
2. Base map prepared by City of Madison.
3. Boring locations are approximate.

Job No. C13064-7	CGC, Inc.	SOIL BORING LOCATION MAP Proposed Fire Station No. 14 & Fire Training Center Femrite Drive and Dairy Drive Madison, WI
Date: 08/2013		

LOG OF TEST BORING

CGC Inc.

Project **Proposed Fire Station #14 & Fire Training Site**
Femrite Drive and Dairy Drive
Location **Madison, Wisconsin**

Boring No. **1**
Surface Elevation (ft) **859.8**
Job No. **C13064-7**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						13 in.± Clayey TOPSOIL (OL)					
1		6	M	4		Medium Stiff to Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL) USDA: 10YR 5/1 Silty Clay Loam (Redox: C2F 10YR 6/6)	(1.0)	26.3			
2		8	W	4	▽ (3.5)						
3		10	W	4	5	Very Loose to Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
4		7	W	5	10	Loose, Gray Fine SAND, Some Silt, Little to Some Gravel (SM) USDA: 10YR 5/2 Sandy Loam					
5		10	W	6	15	Loose to Medium Dense, Gray Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/2 Sand					
6		12	W	12	20						
7		10	W	10	25	Scattered Silt (Silt Loam) Seams Near 25 ft					
8		18	W	21	30						
					35	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 3.5' Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/23/13 End 7/23/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 10'-30' 0-10'; 3-7/8" RB/DM; Autohammer

LOG OF TEST BORING

CGC Inc.

Project: Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location: Madison, Wisconsin

Boring No. 2
Surface Elevation (ft) 859.9
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
					0–1.25	15 in.± Clayey TOPSOIL (OL)					
1		9	M	5		Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
2		10	W	6	▽ 3.5						
3		18	W	4	5						
4		18	W	5	10						
5		9	W	7	15	Loose, Gray Sandy SILT, Scattered Sand Seams (ML) USDA: 10YR 5/2 Loam					
6		18	W	11	20	Soft, Gray Silty CLAY, Trace Sand, Scattered Sand Seams (CL-ML) USDA: 10YR 5/2 Silty Clay	(0.25-0.5)	24.2			
						Medium Dense, Gray Fine to Coarse SAND, Trace to Little Silt, Little to Some Gravel (SP/SP-SM) USDA: 10YR 5/2 Sand					
7		3	W	27	25	Medium Dense, Gray-Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/2 Sand					
8		6	W	18	30						
					35	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 3.5'
Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/23/13 End 7/23/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0'-6' 3-7/8" RB/DM 6'-30'; Autohammer

CGC Inc.

LOG OF TEST BORING

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 3
Surface Elevation (ft) 861.0
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						15 in.± Clayey TOPSOIL (OL)					
1	■	5	M	5		Stiff to Very Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Little to Some Sand (CL) USDA: 10YR 5/1 Silty Clay Loam (Redox: C2F 10YR 6/6)	(2.0)				
2	■	10	W	8	▽ 5						
3	■	14	W	9		Very Loose to Loose, Light Brown Fine to Medium SAND, Trace to Little Silt, Little Gravel (SP/SP-SM) USDA: 10YR 6/3 Sand Scattered Silt (Silt Loam) Seams near 10 ft					
4	■	6	W	4	10						
5	■	12	W	4	15	Very Loose to Loose, Brown/Gray Fine SAND, Little to Some Silt (SP-SM/SM) USDA: 10YR 4/2 Sandy Loam					
6	■	14	W	7	20	Loose, Gray Silty Fine SAND, Trace Gravel, Scattered Silt Seams (SM) USDA: 10YR 5/2 Sandy Loam, Scattered Silt Loam Seams					
7	■	14	W	7	25	Loose, Brown/Gray Fine SAND, Little to Some Silt (SP-SM/SM) USDA: 10YR 4/2 Sandy Loam					
8	■	18	W	4	30	Stiff, Brown/Gray Lean CLAY, Trace Sand, Scattered Sand Seams (CL) USDA: 10YR 5/3 Silty Clay Loam	(1.75)				
9	■	14	W	11	35	Very Loose to Loose, Gray Fine SAND, Some Silt, Little to Some Gravel, Scattered Silt Seams (SM) USDA: 10YR 5/2 Sandy Loam, Scattered Silt Loam Seams					
						Medium Dense, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
					40	End of Boring at 35 ft Borehole Backfilled with bentonite chips and slurry					
					45	Boring offset 75 ft to the east of staked location (downed tree blocking path).					
					50						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 3.5' Upon Completion of Drilling ______
Time After Drilling
Depth to Water ▼
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/23/13 End 7/23/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 10'-30' 0-10'; 3-7/8" RB/DM; Autohammer

CGC Inc.

LOG OF TEST BORING

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 4
Surface Elevation (ft) 862.0
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						13 in.± Clayey TOPSOIL (OL)					
1		18	M	7		Very Stiff, Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL)	(2.25-2.5)				
2		18	M	6		USDA: 10YR 5/1 Silty Clay Loam (Redox: C2D 10YR 6/6)					
					5	Loose, Light Brown to Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM)					
3		18	W	4		USDA: 10YR 5/3, 6/3 Sand					
4		18	W	4							
					10	End of Boring at 10 ft					
						Borehole Backfilled with bentonite chips					
					15						
					20						
					25						
					30						
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0'   Upon Completion of Drilling

Time After Drilling				15 min.
Depth to Water				5.5' ▼
Depth to Cave in				6.0'

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/25/13 End 7/25/13
Driller BSD Chief DC Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; Autohammer

CGC Inc.

LOG OF TEST BORING

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 5
Surface Elevation (ft) 860.2
Job No. C13064-7
Sheet 1 of 2

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						13 in.± Clayey TOPSOIL (OL)					
1		4	M	4		Soft to Medium Stiff, Gray-Brown Lean CLAY, Some Sand, Scattered Sand Seams (CL) USDA: 10YR 4/2 Silty Clay Loam	(0.5)	17.0			
2		10	W	8	∇	Very Loose to Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel, Scattered Silt Seams (SP/SP-SM) USDA: 10YR 5/3 Sand, Scattered Silt Loam Seams					
3		12	W	2	5						
4		8	W	6	10	Color Change to Dark Brown (10YR 3/3) near 7.5 ft					
5		10	W	5	15						
6		7	W	8	20	Color Change to Gray (10YR 5/2) near 20 ft)					
7		7	W	31	25	Dense, Gray Silty Fine SAND, Trace Gravel (SM) USDA: 10YR 5/2 Sandy Loam					
8		10	W	15	30	Medium Dense, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
					35	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry Boring offset 10 ft east from staked location					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 3.5'   Upon Completion of Drilling ______
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/23/13 End 7/23/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; Autohammer

CGC Inc.

LOG OF TEST BORING

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 6
Surface Elevation (ft) 861.5
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Type	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						13 in.± Clayey TOPSOIL (OL)					
1		8	M	5		Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL) USDA: 10YR 5/1 Silty Clay Loam (Redox: C2D 10YR 6/6)	(1.5-1.75)	27.4			
2		18	M	5	5			15.3			2.1
3		12	W	6		Loose, Dark Gray Clayey Fine SAND, Trace Organics (SC) USDA: 10YR 3/1 Sandy Clay Loam					
4		18	W	4	10	Loose, Gray/Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/2 Sand					
						End of Boring at 10 ft					
						Borehole Backfilled with bentonite chips					

WATER LEVEL OBSERVATIONS

While Drilling	▽ 6.0'	Upon Completion of Drilling			
Time After Drilling				15 min.	
Depth to Water				5.8'	▼
Depth to Cave in				6.0'	

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/25/13 End 7/25/13
Driller BSD Chief DC Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; Autohammer

CGC Inc.

LOG OF TEST BORING

Project **Proposed Fire Station #14 & Fire Training Site**
Femrite Drive and Dairy Drive
Location **Madison, Wisconsin**

Boring No. **7**
Surface Elevation (ft) **862.2**
Job No. **C13064-7**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						12 in.± Clayey TOPSOIL (OL)					
1		8	M	8		Very Stiff, Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL) USDA: 10YR 5/2 Silty Clay Loam (Redox: C2D 10YR 6/6)	(2.0-2.75)				
2		3	M	8	5						
3		12	W	6	▼	Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel, Scattered Silt Seams in Upper Part of Layer (SP/SP-SM) USDA: 10YR 5/3 Sand, Scattered Silt Loam Seams					
4		18	W	6	10						
						End of Boring at 10 ft Borehole Backfilled with bentonite chips					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0' Upon Completion of Drilling ______
Time After Drilling ______ ______ ______ 15 min.
Depth to Water ______ ______ ______ 6.0' ▼
Depth to Cave in ______ ______ ______ 7.0'

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/25/13 End 7/25/13
Driller BSD Chief DC Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; Autohammer

LOG OF TEST BORING

CGC Inc.

Project: Proposed Fire Station #14 & Fire Training Site, Femrite Drive and Dairy Drive
Location: Madison, Wisconsin

Boring No. 8
Surface Elevation (ft) 863.8
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
1	18	M	15		FILL: Medium Dense, Tan Fine to Medium Sand, Some Silt and Gravel USDA: FILL - 2.5Y 5/3 Sandy Loam					
2	10	M	5	5	FILL: Soft to Medium Stiff, Dark Gray/Gray Lean Clay, Little to Some Sand, Trace Organics USDA: FILL - 10YR 3/1, 5/2 Silty Clay Loam	(0.5)	15.4			
3	8	M	5	▽	Medium Stiff, Dark Gray/Black Organic CLAY (OL - Probable Buried Topsoil) USDA: 10YR 2/1 Silty Clay Loam	(1.0)	26.6			9.1
4	18	W	10	10	Very Loose to Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
5	5	W	2	15						
6	3	W	4	20						
7	12	W	14	25	Medium Dense, Brown Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/3 Fine Sand					
8	8	W	21	30	Medium Dense, Gray-Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/2 Sand					
				35	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.0' Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______ ▼
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/22/13 End 7/22/13
Driller BSD Chief DC Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM; Autohammer

CGC Inc.

LOG OF TEST BORING

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 9
Surface Elevation (ft) 863.5
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
1		18	M	17		FILL: Medium Dense, Tan Fine to Medium Sand, Some Silt and Gravel USDA: FILL - 2.5Y 5/3 Sandy Loam					
2		15	M	5	5	Loose, Dark Gray/Black Organic Clayey SILT (OL - Probable Buried Topsoil) USDA: 10YR 2/1 Silt Loam		19.3			6.5
3		10	W	10	▽	Very Loose to Medium Dense, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
4		12	W	8	10						
5		18	W	3	15	Grades to Fine Sand near 15 ft					
6		3	W	10	20						
7		4	W	27	25						
8		12	W	9	30						
					35	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0' Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/23/13 End 7/23/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-15'; 3-7/8" RB/DM 15'-30'; Autohammer

LOG OF TEST BORING

CGC Inc.

Project **Proposed Fire Station #14 & Fire Training Site**
Femrite Drive and Dairy Drive
Location **Madison, Wisconsin**

Boring No. **10**
Surface Elevation (ft) **860.4**
Job No. **C13064-7**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						14 in.± Clayey TOPSOIL (OL)					
1		6	M	7		Loose, Gray Fine to Medium SAND, Some Silt, Trace Clay and Gravel (SM - Possible Fill) USDA: 10YR 5/1 Sandy Loam					
2		6	W	5	5	Very Loose to Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
3		12	W	3							
4		8	W	4	10	Color Change to Dark Brown (10YR 3/3) with Scattered Silt Seams near 7.5 ft					
5		10	W	4	15	Very Loose to Loose, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
6		9	W	9	20	Loose, Gray Fine SAND, Some Silt, Trace Gravel (SM) USDA: 10YR 5/2 Sandy Loam					
7		14	W	10	25	Loose, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
8		12	W	8	30	Scattered Silt Seams near 30 ft					
					35	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0' Upon Completion of Drilling ____
Time After Drilling ____
Depth to Water ____
Depth to Cave in ____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/24/13 End 7/24/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM; Autohammer

CGC Inc.	**LOG OF TEST BORING** Project **Proposed Fire Station #14 & Fire Training Site** **Femrite Drive and Dairy Drive** Location **Madison, Wisconsin**	Boring No. **11** Surface Elevation (ft) **861.2** Job No. **C13064-7** Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Type	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						15 in.± Clayey TOPSOIL (OL)					
1		12	M	7		Medium Stiff to Very Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Trace Sand and Organics (CL)	(2.5)				
2		8	M	3	5	USDA: 10YR 5/1 Silty Clay Loam (Redox: C2D 10YR 6/6)	(0.5-1.0)	20.4			
3		11	W	7		Scattered Sand Seams near 5 ft					
4		10	W	3	10	Very Loose to Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
5		6	W	9	15	Loose, Brown/Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/3 Fine Sand					
6		5	W	3	20	Very Loose to Medium Dense, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
7		9	W	14	25						
8		15	W	16	30	Medium Dense, Gray Sandy SILT, Scattered Sand Seams (ML) USDA: 10YR 5/2 Loam					
						End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **6.0'** Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **7/24/13** End **7/24/13**
Driller **BSD** Chief **KD** Rig **CME-750**
Logger **JM** Editor **DAS**
Drill Method **2.25" HSA; 0-10'; 3-7/8" RB/DM 10'30'; Autohammer**

LOG OF TEST BORING

CGC Inc.

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 12
Surface Elevation (ft) 863.2
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Type	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						12 in.± Clayey TOPSOIL (OL)					
1		10	M	9		Very Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL) USDA: 10YR 5/1 Silty Clay Loam (Redox: C2F 10YR 6/6)	(3.0)				
2		16	M	5	5	Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
3		12	W	5							
4		14	W	8	10						
5		12	W	5	15	3 in. Stiff, Gray/Brown Lean Clay Seam near 15 ft	(1.0-1.5)				
6		12	W	15	20	Medium Dense, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
7		16	W	15	25						
8		14	W	23	30						
						End of Boring at 30 ft					
					35	Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 6.0' Upon Completion of Drilling ____
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/24/13 End 7/24/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

CGC Inc.

LOG OF TEST BORING

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 13
Surface Elevation (ft) 862.2
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						12 in.± Sand and Gravel FILL					
1		5	M	8		Stiff to Very Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL - Possible Fill in Upper Few Feet of Layer)	(3.5)				
2		18	M	8	5	USDA: 10YR 5/1 Silty Clay Loam (Redox: C2D 10YR 6/6)	(1.0-1.5)	29.5			
3		18	W	4		Very Loose to Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM)					
4		18	W	4	10	USDA: 10YR 5/3 Sand					
5		3	W	4	15						
6		12	W	17	20	Medium Dense, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
7		12	W	27	25	Medium Dense, Brown Fine to Coarse SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
8		4	W	14	30						
						End of Boring at 30 ft					
					35	Borehole backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0' Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/22/13 End 7/22/13
Driller BSD Chief DC Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

LOG OF TEST BORING

CGC Inc.

Project **Proposed Fire Station #14 & Fire Training Site**
Femrite Drive and Dairy Drive
Location **Madison, Wisconsin**

Boring No. **14**
Surface Elevation (ft) **865.0**
Job No. **C13064-7**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						8 in.± Sandy TOPSOIL FILL (OL)					
1		12	M	12		FILL: Very Stiff, Brown/Gray Lean Clay, Trace to Little Sand USDA: FILL-10YR 4/3 Silty Clay Loam	(3.75-4.0)				
2		12	M	8	5	Stiff to Very Stiff, Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL) USDA: 10YR 5/2 Silty Clay Loam (Redox: C2D 10YR 6/6)	(2.0-2.5)				
3		18	M	8			(1.0-1.5)	24.7			
4		6	W	4	10	Very Loose to Medium Dense, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
5		18	W	4	15	Grades to Fine Sand near 15 ft					
6		6	W	2	20						
7		8	W	12	25						
8		18	W	20	30	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ⊻ 8.5' Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/22/13 End 7/22/13
Driller BSD Chief DC Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

CGC Inc.

LOG OF TEST BORING

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 15
Surface Elevation (ft) 863.6
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						18 in.± Clayey TOPSOIL FILL(OL)					
1		13	M	16		FILL: Stiff, Dark Gray-Brown Silty Clay, Intermixed with Topsoil, Scattered Wood/Roots USDA: FILL-10YR 3/2 Silty Clay	(1.5-2.0)				
2		14	M	6	5	Very Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL) USDA: 10YR 5/1 Silty Clay Loam (Redox: C2F 10YR 6/6)	(2.0-2.5)				
3		12	M/W	8							
4		17	W	15	10	Loose to Medium Dense, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
5		8	W	11	15						
6		6	W	16	20	Loose to Dense, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
7		12	W	7	25						
8		9	W	32	30						
					35	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 8.5' Upon Completion of Drilling ______
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/22/13 End 7/22/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

LOG OF TEST BORING

CGC Inc.

Project **Proposed Fire Station #14 & Fire Training Site**
Femrite Drive and Dairy Drive
Location **Madison, Wisconsin**

Boring No. **16**
Surface Elevation (ft) **863.3**
Job No. **C13064-7**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE / VISUAL CLASSIFICATION and Remarks / SOIL PROPERTIES

No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	Visual Classification and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						9 in.± Clayey TOPSOIL FILL (OL)					
1		18	M	14		FILL: Medium Dense, Orange-Brown Fine Sand, Little to Some Silt USDA: FILL - 10YR 5/6 Sandy Loam					
2		18	M	7	5	Very Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Little to Some Sand (CL) USDA: 10YR 5/1 Silty Clay Loam (Redox: C2F 10YR 6/6)	(2.25-2.5)				
3		16	M/W	7		Loose, Gray/Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/2, 5/3 Sand					
4		15	W	7	10						
5		18	W	10	15						
6		7	W	9	20	Loose, Gray Sandy SILT, Scattered Sand Seams (ML) USDA: 10YR 5/2 Loam					
7		5	W	19	25	Medium Dense, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
8		12	W	30	30	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.5' Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/22/13 End 7/22/13
Driller BSD Chief KD Rig D-120
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

CGC Inc.

LOG OF TEST BORING

Project **Proposed Fire Station #14 & Fire Training Site**
Femrite Drive and Dairy Drive
Location **Madison, Wisconsin**

Boring No. **17**
Surface Elevation (ft) **864.3**
Job No. **C13064-7**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						4 in.± Clayey TOPSOIL FILL (OL)					
1		6	M	12		FILL: Medium Dense, Gray/Brown Clayey Fine to Medium Sand USDA: FILL - 10YR 5/2, 4/3 Sandy Clay Loam					
2		12	M	7	5	Very Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Some Sand (CL) USDA: 10YR 5/1 Silty Clay Loam (Redox: C2F 10YR 6/6)	(2.0-2.5)				
3		16	W	8	▽	Loose, Gray Fine to Medium SAND, Some Silt, Trace Clay (SM) USDA: 10YR 5/2 Sandy Loam					
4		18	W	11	10	Medium Dense, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
5		7	W	13	15						
6		8	W	12	20						
7		10	W	15	25	Grades to Fine Sand near 25 ft					
8		13	W	25	30						
					35	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0'   Upon Completion of Drilling ____
Time After Drilling ____
Depth to Water ____
Depth to Cave in ____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/24/13 End 7/24/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

CGC Inc.

LOG OF TEST BORING

Project: Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location: Madison, Wisconsin

Boring No. 18
Surface Elevation (ft) 863.8
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
					4 in.± Clayey TOPSOIL FILL (OL)					
1	10	M	13		FILL: Very Stiff, Brown/Gray Lean Clay, Little to Some Gravel, Trace to Little Sand USDA: FILL-10YR 4/3 Silty Clay Loam	(2.5)				
2	12	M	8	5	Medium Stiff to Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL) USDA: 10YR 5/1 Silty Clay Loam (Redox: C2D 10YR 6/6)	(1.5)				
3	16	M/W	3			(0.5)	28.3			
4	13	W	15	10	Loose to Medium Dense, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
5	7	W	8	15						
6	14	W	15	20						
7	9	W	10	25	Grades to Fine Sand near 25 ft					
8	11	W	22	30	Scattered Silty Sand Seams near 30 ft					
					End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					
				35						

WATER LEVEL OBSERVATIONS

While Drilling ∇ 8.5' Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/24/13 End 7/24/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

CGC Inc.

LOG OF TEST BORING

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 19
Surface Elevation (ft) 863.2
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						5 in.± Clayey TOPSOIL (OL)					
1		10	M	11		Very Stiff, Brown (Mottled) Lean CLAY, Trace Sand USDA: 10YR 4/4 Silty Clay Loam (Redox: C2D 10YR 6/6)	(3.5)				
2		10	M	5	5	Loose, Gray Fine to Medium SAND, Some Silt, Little Clay, Scattered Soft Clay Seams (SM) USDA: 10YR 4/3 Sandy Loam, Silty Clay Loam Seams					
3		15	W	13	▽						
4		12	W	8	10	Loose to Medium Dense, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
5		3	W	18	15						
6		5	W	10	20	Color Changes to Gray near 20 ft					
7		10	W	14	25						
8		4	W	16	30						
					35	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0' Upon Completion of Drilling ________
Time After Drilling ________
Depth to Water ________ ▼
Depth to Cave in ________

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/24/13 End 7/24/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

CGC Inc.

LOG OF TEST BORING

Project **Proposed Fire Station #14 & Fire Training Site**
Femrite Drive and Dairy Drive
Location **Madison, Wisconsin**

Boring No. **20**
Surface Elevation (ft) **864.4**
Job No. **C13064-7**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Type	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						8 in.± Clayey TOPSOIL FILL (OL)					
1		16	M	17		FILL: Medium Dense, Brown Fine to Medium Sand, Some Silt and Gravel, Intermixed with Clay USDA: 10YR 4/3 Sandy Loam with Silty Clay Loam					
2		9	M	11			(4.5+)				
					5	Hard, Brown (Mottled) Lean CLAY, Trace Sand USDA: 10 YR 4/4 Silty Clay Loam (C2D 10YR 6/6)					
3		10	M	6							
					▽	Loose to Medium Dense, Brown Fine to Medium SAND, Trace Silt, Clay and Gravel, Scattered Silt Seams (SP/SP-SM) USDA: 10YR 5/3 Sand to Loamy Sand, Silt Loam Seams					
4		15	W	17							
					10	Medium Dense, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
5		18	W	11							
					15						
6		5	W	11		Medium Dense, Gray Fine SAND, Some Silt, Trace Gravel (SM) USDA: 10YR 5/2 Sandy Loam					
					20						
7		16	W	18							
					25						
8		12	W	26		Scattered Silty Sand Seams near 30 ft					
					30	End of Boring at 30 ft					
						Borehole Backfilled with bentonite chips and slurry					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.5' Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______ ▼
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/22/13 End 7/22/13
Driller BSD Chief KD Rig D-120
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

APPENDIX C

DOCUMENT QUALIFICATIONS

APPENDIX C
DOCUMENT QUALIFICATIONS

I. GENERAL RECOMMENDATIONS/LIMITATIONS

CGC, Inc. should be provided the opportunity for a general review of the final design and specifications to confirm that earthwork and foundation requirements have been properly interpreted in the design and specifications. CGC should be retained to provide soil engineering services during excavation and subgrade preparation. This will allow us to observe that construction proceeds in compliance with the design concepts, specifications and recommendations, and also will allow design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction. CGC does not assume responsibility for compliance with the recommendations in this report unless we are retained to provide construction testing and observation services.

This report has been prepared in accordance with generally accepted soil and foundation engineering practices and no other warranties are expressed or implied. The opinions and recommendations submitted in this report are based on interpretation of the subsurface information revealed by the test borings indicated on the location plan. The report does not reflect potential variations in subsurface conditions between or beyond these borings. Therefore, variations in soil conditions can be expected between the boring locations and fluctuations of groundwater levels may occur with time. The nature and extent of the variations may not become evident until construction.

II. IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one - not even you* - should apply the report for any purpose or project except the one originally contemplated.

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or project ownership.

As a general rule, , *always* inform your geotechnical engineer of project changes - even minor ones - and request an assessment of their impact. *CGC cannot accept responsibility or liability for problems that occur because our reports do not consider developments of which we were not Informed.*

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL OPINION

Site exploration identifies subsurface conditions only at those points where surface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgement to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ - sometimes significantly - from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A REPORT'S RECOMMENDATIONS ARE NOT FINAL

Do not over-rely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgement and opinion, geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *CGC cannot assume responsibility or liability for the report's recommendations if we do not perform construction observation.*

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having CGC participate in prebid and preconstruction conferences, and by providing construction observation.

DO NOT REDRAW THE ENGINEER'S LOGS

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

GIVE CONTRACTORS A COMPLETE REPORT AND GUIDANCE

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

READ RESPONSIBILITY PROVISIONS CLOSELY

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce such risks, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineer's responsibilities begin and end, to help others recognize their own responsibilities and risks. Read these provisions closely. Ask questions. Your geotechnical engineer should respond fully and frankly.

GEOENVIRONMENTAL CONCERNS ARE NOT COVERED

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

OBTAIN PROFESSIONAL ASSISTANCE TO DEAL WITH MOLD

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

RELY ON YOUR GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE

Membership in ASFE exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with CGC, a member of ASFE, for more information.

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ASFE/The Best People on Earth
881 Colesville Road, Suite G 106
Silver Spring, MD 20910

APPENDIX D

RECOMMENDED COMPACTED FILL SPECIFICATIONS

APPENDIX D

CGC, INC.

RECOMMENDED COMPACTED FILL SPECIFICATIONS

General Fill Materials

Proposed fill shall contain no vegetation, roots, topsoil, peat, ash, wood or any other non-soil material which by decomposition might cause settlement. Also, fill shall never be placed while frozen or on frozen surfaces. Rock, stone or broken concrete greater than 6 in. in the largest dimension shall not be placed within 10 ft of the building area. Fill used greater than 10 ft beyond the building limits shall not contain rock, boulders or concrete pieces greater than a 2 sq ft area and shall not be placed within the final 2 ft of finish subgrade or in designated utility construction areas. Fill containing rock, boulders or concrete pieces should include sufficient finer material to fill voids among the larger fragments.

Special Fill Materials

In certain cases, special fill materials may be required for specific purposes, such as stabilizing subgrades, backfilling undercut excavations or filling behind retaining walls. For reference, WisDOT gradation specifications for various types of granular fill are attached in Table 1.

Placement Method

The approved fill shall be placed, spread and leveled in layers generally not exceeding 10 in. in thickness before compaction. The fill shall be placed at moisture content capable of achieving the desired compaction level. For clay soils or granular soils containing an appreciable amount of cohesive fines, moisture conditioning will likely be required.

It is the Contractor's responsibility to provide all necessary compaction equipment and other grading equipment that may be required to attain the specified compaction. Hand-guided vibratory or tamping compactors will be required whenever fill is placed adjacent to walls, footings, columns or in confined areas.

Compaction Specifications

Maximum dry density and optimum moisture content of the fill soil shall be determined in accordance with modified Proctor methods (ASTM D1557). The recommended field compaction as a percentage of the maximum dry density is shown in Table 2. Note that these compaction guidelines would generally not apply to coarse gravel/stone fill. Instead, a method specification would apply (e.g., compact in thin lifts with a vibratory compactor until no further consolidation is evident).

Testing Procedures

Representative samples of proposed fill shall be submitted to CGC, Inc. for optimum moisture-maximum density determination (ASTM D1557) prior to the start of fill placement. The sample size should be approximately 50 lb.

CGC, Inc. shall be retained to perform field density tests to determine the level of compaction being achieved in the fill. The tests shall generally be conducted on each lift at the beginning of fill placement and at a frequency mutually agreed upon by the project team for the remainder of the project.

Table 1
Gradation of Special Fill Materials

Material	WisDOT Section 311	WisDOT Section 312	WisDOT Section 305			WisDOT Section 209		WisDOT Section 210
	Breaker Run	Select Crushed Material	3-in. Dense Graded Base	1 1/4-in. Dense Graded Base	3/4-in. Dense Graded Base	Grade 1 Granular Backfill	Grade 2 Granular Backfill	Structure Backfill
Sieve Size	Percent Passing by Weight							
6 in.	100							
5 in.		90-100						
3 in.			90-100					100
1 1/2 in.		20-50	60-85					
1 1/4 in.				95-100				
1 in.					100			
3/4 in.			40-65	70-93	95-100			
3/8 in.				42-80	50-90			
No. 4			15-40	25-63	35-70	100 (2)	100 (2)	25-100
No. 10		0-10	10-30	16-48	15-55	75 (2)		
No. 40			5-20	8-28	10-35	15 (2)	30 (2)	
No. 200			2-12	2-12	5-15	8 (2)	15 (2)	15 (2)

Notes:

1. Reference: Wisconsin Department of Transportation *Standard Specifications for Highway and Structure Construction.*
2. Percentage applies to the material passing the No. 4 sieve, not the entire sample.
3. Per WisDOT specifications, both breaker run and select crushed material can include concrete that is 'substantially free of steel, building materials and other deleterious material'.

Table 2
Compaction Guidelines

Area	Percent Compaction (1) Clay/Silt	Percent Compaction (1) Sand/Gravel
Within 10 ft of building lines		
Footing bearing soils	93 - 95	95
Under floors, steps and walks		
- Lightly loaded floor slab	90	90
- Heavily loaded floor slab and thicker fill zones	92	95
Beyond 10 ft of building lines		
Under walks and pavements		
- Less than 3 ft below subgrade	92	95
- Greater than 3 ft below subgrade	90	90
Landscaping	85	90

Notes:

1. Based on Modified Proctor Dry Density (ASTM D 1557)

APPENDIX E

TYPICAL PERIMETER DRAIN DETAILS

General Notes

1. This system's primary function is to intercept infiltrating surface water. These Alternates are not appropriate for use in situations of high groundwater (i.e., cases where the water table approaches floor slab elevation).
2. Grade surface cap to slope away from structure.
3. Exterior surface of walls below grade should be damp-proofed.
4. A plastic vapor barrier should be installed below the slab.
5. Recommended types of drain pipes:

Specification	Description
ASTM D2729	Polyvinyl Chloride (PVC) Drain Pipe
ASTM F405	Corrugated Polyethylene Drain Pipe
ASTM D2852	Styrene-Rubber Plastic Drain Pipe
AASHTO M136	Corrugated Metal Underdrain Pipe

6. Minimum slope of drain pipes should be 2 in. per 100 lin ft.
7. Place drain pipe below basement floor level and orient the perforations toward the bottom.
8. Clean-outs should be provided to service the pipe.
9. Collected field water should be discharged to a sump, storm sewer or drainage field.
10. The geotextile for Alternative Nos. 2 and 3 may be eliminated if filter requirements are satisfied between the wall and pipe backfill, as well as between backfill materials and natural soils.
11. Pipe backfill materials should satisfy filter requirements for the slot width or hole diameter of the perforated pipe.
12. Care should be taken during backfilling not to damage the integrity of the system. For compaction requirements, refer to geotechnical report.
13. Pipe, geotextile, and geocomposite should be installed according to manufacturer specifications.

CGC, Inc.

Typical Perimeter Drain Detail

General Notes

General Notes

1. This system's primary function is to intercept infiltrating surface water. These Alternates are not appropriate for use in situations of high groundwater (i.e., cases where the water table approaches floor slab elevation).
2. Grade surface cap to slope away from structure.
3. Exterior surface of walls below grade should be damp-proofed.
4. A plastic vapor barrier should be installed below the slab.
5. Recommended types of drain pipes:

Specification	Description
ASTM D2729	Polyvinyl Chloride (PVC) Drain Pipe
ASTM F405	Corrugated Polyethylene Drain Pipe
ASTM D2852	Styrene-Rubber Plastic Drain Pipe
AASHTO M136	Corrugated Metal Underdrain Pipe

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7. Place drain pipe below basement floor level and orient the perforations toward the bottom.
8. Clean-outs should be provided to service the pipe.
9. Collected field water should be discharged to a sump, storm sewer or drainage field.
10. The geotextile for Alternative Nos. 2 and 3 may be eliminated if filter requirements are satisfied between the wall and pipe backfill, as well as between backfill materials and natural soils.
11. Pipe backfill materials should satisfy filter requirements for the slot width or hole diameter of the perforated pipe.
12. Care should be taken during backfilling not to damage the integrity of the system. For compaction requirements, refer to geotechnical report.
13. Pipe, geotextile, and geocomposite should be installed according to manufacturer specifications.

CGC, Inc.	**Typical Perimeter Drain Detail** **General Notes**

APPENDIX F

WISCONSIN DEPARTMENT OF SAFETY & PROFESSIONAL SERVICES SOIL EVALUATION FORMS (20 Borings)

Wisconsin Department of Safety & Professional Development

SOIL EVALUATION - STORM

in accordance with Comm 82.365 & 85, Wis. Adm. Code

County	Dane
Parcel I.D.	071022403077
Review by	Date

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

Please print all information.

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

Property Owner: FHB Investments, LLC

Property Owner's Mailing Address: 1830 Meadow Lane, Suite A

City	State	Zip Code	Phone Number
Pewaukee	WI	53072	

Property Location: Govt. Lot 1/4 SE 1/4 S 22 T 07 N R 10 E

Lot #	Block #	Subd. Name or CSM#
34		4th Addition of World Dairy Center

[X] City [ ] Village [ ] Town — Madison

Nearest Road: 5152 Femrite Dr.

Drainage area ________ [ ] sq. ft. [ ] acres

Optional:
Test Site Suitable for (check all that apply)

[ ] Irrigation [ ] Bioretention trench [ ] Trench(es)
[ ] Rain Garden [ ] Grassed Swale [ ] Reuse
[ ] Infiltration trench [ ] SDS (>15' wide) [ ] Other ________

Hydraulic Application Test Method

[X] Morphological Evaluation
[ ] Double-Ring Infiltrometer
[ ] Other (Specify)________

Obs. # 1 [X] Boring [ ] Pit Ground Surface Elev. 859.8 ft Depth to limiting factor 13, 42 in.

Horizon	Depth In.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 13	10YR 2/1	None	SiCL	1msbk	mvfr	as	<5	0.04
2	13 - 42	10 YR 5/1	C2F 10YR6/6	SiCL	1msbk	mvfr	gs	<5	0.04
3	42 - 102	10 YR 5/3	None	S	0sg	ml	gs	<5	3.6
4	102 - 162	10 YR 5/2	None	SL	1msbk	mvfr	gs	10 - 15	0.5
5	162 - 360	10 YR 5/2	None	S	0sg	ml		<5	3.6
		Groundwater was encountered in boring at 42 in. below existing grade.							

Obs. # 2 [X] Boring [ ] Pit Ground Surface Elev. 859.9 ft Depth to limiting factor 42 in.

Horizon	Depth In.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 15	10YR 2/1	None	SiCL	1msbk	mvfr	as	<5	0.04
2	15 - 162	10 YR 5/3	None	S	0sg	ml	gs	<5	3.6
3	162 - 216	10 YR 5/2	None	L	0m	mvfr	gs	<5	0.24
4	216 - 228	10 YR 5/2	None	SiC	1msbk	mvfr	gs	<5	0.07
5	228 - 282	10 YR 5/2	None	S	0sg	ml	gs	10-15	3.6
6	282 - 360	10 YR 5/2	None	S	0sg	ml		<5	3.6
		Groundwater was encountered in boring at 42 in. below existing grade.							

CST/PSS Name (Please Print)	Signature	CST/PSS Number
David Staab	David Staab	1042602

Address	Date Evaluation Conducted	Telephone Number
3911 Mineral Point Road	7/25/2013	608/288-4100

3 Obs. #
[X] Boring
[ ] Pit Ground Surface Elev. 861.0 ft Depth to limiting factor 15, 42 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 15	10YR 2/1	None	SiCL	1msbk	mvfr	as	<5	0.04
2	15 - 42	10 YR 5/1	C2F 10YR6/6	SiCL	1msbk	mvfr	gs	<5	0.04
3	42 - 162	10 YR 6/3	None	S, SiL	0sg	ml	gs	10 - 15	0.13
4	162 - 222	10 YR 4/2	None	SL	1msbk	mvfr	gs	<5	0.5
5	222 - 282	10 YR 5/2	None	SL, SiL	1msbk	mvfr	gs	<5	0.13
6	282 - 342	10 YR 4/2	None	SL	1msbk	mvfr	gs	<5	0.5
7	342 - 354	10 YR 5/3	None	SiCL	1msbk	mvfr	gs	<5	0.04
8	354 - 402	10 YR 5/2	None	SL, SiL	1msbk	mvfr	gs	10 - 15	0.13
9	402 - 420	10 YR 5/2	None	FS	0sg	ml		<5	0.5
	Groundwater was encountered in boring at 42 in. below existing grade.								

4 Obs. #
[X] Boring
[ ] Pit Ground Surface Elev. 862.0 ft Depth to limiting factor 13, 66 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 13	10YR 2/1	None	SiCL	1msbk	mvfr	as	<5	0.04
2	13 - 36	10 YR 5/1	None	SiCL	1msbk	mvfr	gs	<5	0.04
3	36 - 120	10 YR 5/3, 6/3	None	S	0sg	ml		<5	3.6
		Groundwater was encountered in boring at 66 in. below existing grade.							

5 Obs. #
[X] Boring
[ ] Pit Ground Surface Elev. 860.2 ft Depth to limiting factor 42 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 13	10YR 2/1	None	SiCL	1msbk	mvfr	as	<5	0.04
2	13 - 42	10 YR 4/2	None	SiCL	1msbk	mvfr	gs	<5	0.04
3	42 - 282	10 YR 5/3, 3/3, 5/2	None	S, SiL	0sg	ml	gs	<5	0.13
4	282 - 342	10 YR 5/2	None	SL	1msbk	mvfr	gs	<5	0.5
5	342 - 360	10 YR 5/2	None	FS	0sg	ml		<5	0.5
		Groundwater was encountered in boring at 42 in. below existing grade.							

Property Owner FMB Investments, LLC Parcel ID# 71022403077

6 Obs. # [X] Boring [ ] Pit Ground Surface Elev. 861.5 ft Depth to limiting factor 70 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 13	10YR 2/1	None	SiCL	1msbk	mvfr	as	<5	0.04
2	13 - 42	10 YR 5/1	C2D 10 YR 6/6	SiCL	1msbk	mvfr	gs	<5	0.04
3	42 - 54	10 YR 3/1	None	SCL	0m	mvfr	gs	<5	0.11
4	54 - 120	10 YR 5/2	None	S	0sg	ml		<5	3.6
		Groundwater was encountered in boring at 70 in. below existing grade.							

Obs. # [ ] Boring [ ] Pit Ground Surface Elev. ____ ft Depth to limiting factor ____ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr

Obs. # [ ] Boring [ ] Pit Ground Surface Elev. ____ ft Depth to limiting factor ____ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr

Wisconsin Department of Safety & Professional Development

SOIL EVALUATION - STORM

in accordance with Comm 82.365 & 85, Wis. Adm. Code

County: Dane

Parcel I.D.: 071022403093, 071022403085

Review by | Date

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

Please print all information.

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

Property Owner: FHB Investments, LLC	Property Location: Govt. Lot 1/4 SE 1/4 S 22 T 07 N R 10 E
Property Owner's Mailing Address: 1830 Meadow Lane, Suite A	Lot #: 35,36 Block #: Subd. Name or CSM#: 4th Addition of World Dairy Center
City: Pewaukee State: WI Zip Code: 53072 Phone Number:	[X] City [ ] Village [ ] Town: Madison Nearest Road: 3101 and 3201 Dairy Drive

Drainage area ______ [ ] sq. ft. [ ] acres

Optional:
Test Site Suitable for (check all that apply)
[ ] Irrigation [ ] Bioretention trench [ ] Trench(es)
[ ] Rain Garden [ ] Grassed Swale [ ] Reuse
[ ] Infiltration trench [ ] SDS (>15' wide) [ ] Other ______

Hydraulic Application Test Method
[X] Morphological Evaluation
[ ] Double-Ring Infiltrometer
[ ] Other (Specify)______

7 Obs. # [X] Boring [ ] Pit Ground Surface Elev. 862.2 ft Depth to limiting factor 12, 72 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 12	10YR 2/1	None	SiCL	1msbk	mvfr	as	<5	0.04
2	12 - 36	10 YR 5/2	C2D 10YR6/6	SiCL	1msbk	mvfr	gs	<5	0.04
3	36 - 120	10 YR 5/3	None	S, SiL	0sg	ml		<5	0.13
		Groundwater was encountered in boring at 72 in. below existing grade.							

8 Obs. # [X] Boring [ ] Pit Ground Surface Elev. 863.8 ft Depth to limiting factor 96 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 36	2.5 Y 5/3	None	Fill - SL	Variable	Variable	as	20 - 30	0.5
2	36 - 66	10 YR 3/1, 5/2	None	Fill - SiCL	Variable	Variable	as	<5	0.04
3	66 - 108	10 YR 2/1	None	SiCL	1msbk	mvfr	gs	<5	0.04
4	108 - 282	10 YR 5/3	None	S	0sg	ml	gs	<5	3.6
5	282 - 342	10 YR 5/3	None	FS	0sg	ml	gs	<5	0.5
6	342 - 360	10 YR 5/2	None	S	0sg	ml		<5	3.6
		Groundwater was encountered in boring at 96 in. below existing grade.							

CST/PSS Name (Please Print)	Signature	CST/PSS Number
David Staab	David Staab	1042602
Address	Date Evaluation Conducted	Telephone Number
3911 Mineral Point Road	7/25/2013	608/288-4100

SBD-10793 (R.1/05)

9 Obs. # [X] Boring [ ] Pit Ground Surface Elev. 863.5 ft Depth to limiting factor 72 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 30	2.5 Y 5/3	None	Fill - SL	Variable	Variable	as	20 - 30	0.5
2	30 - 72	10YR 2/1	None	SiL	1msbk	mvfr	as	<5	0.13
3	72 - 360	10 YR 5/3	None	S	0sg	ml		<5	3.6
	Groundwater was encountered in boring at 72 in. below existing grade.								

10 Obs. # [X] Boring [ ] Pit Ground Surface Elev. 860.4 ft Depth to limiting factor 72 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 14	10 YR 2/1	None	SiCL	1msbk	mvfr	as	<5	0.04
2	14 - 42	10 YR 5/1	None	SL	1msbk	mvfr	gs	<5	0.5
3	42 - 162	10 YR 5/3, 3/3	None	S, SiL	0sg	ml	gs	<5	0.13
4	162 - 222	10 YR 5/2	None	FS	0sg	ml	gs	<5	0.5
5	222 - 282	10 YR 5/2	None	SL	1msbk	mvfr	gs	<5	0.5
6	282 - 360	10 YR 5/2	None	FS	0sg	ml		<5	0.5
		Groundwater was encountered in boring at 72 in. below existing grade.							

11 Obs. # [X] Boring [ ] Pit Ground Surface Elev. 861.2 ft Depth to limiting factor 72 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 15	10 YR 2/1	None	SiCL	1msbk	mvfr	as	<5	0.04
2	15 - 72	10 YR 5/1	C2D 10YR6/6	SiCL	1msbk	mvfr	gs	<5	0.04
3	72 - 162	10 YR 5/3	None	S	0sg	ml	gs	<5	3.6
4	162 - 222	10 YR 5/3	None	FS	0sg	ml	gs	<5	0.5
5	222 - 342	10 YR 5/3	None	S	0sg	ml	gs	<5	3.6
6	342 - 360	10 YR 5/2	None	L	1msbk	mvfr		<5	0.24
		Groundwater was encountered in boring at 72 in. below existing grade.							

12 Obs. # [X] Boring [ ] Pit Ground Surface Elev. 863.2 ft Depth to limiting factor 12, 72 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 12	10YR 2/1	None	SiCL	1msbk	mvfr	as	<5	0.04
2	12 - 42	10 YR 5/1	C2F 10 YR 6/6	SiCL	1msbk	mvfr	gs	<5	0.04
3	42 - 222	10 YR 5/3	None	S	0sg	ml	gs	<5	3.6
4	222 - 360	10 YR 5/2	None	FS	0sg	ml		<5	0.5
		Groundwater was encountered in boring at 72 in. below existing grade.							

13 Obs. # [X] Boring [ ] Pit Ground Surface Elev. 862.2 ft Depth to limiting factor 12, 72 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 12	10YR 2/1	None	SiCL	1msbk	mvfr	as	<5	0.04
2	12 - 66	10 YR 5/1	C2D 10 YR 6/6	SiCL	1msbk	mvfr	gs	<5	0.04
3	66 - 216	10 YR 5/3	None	S	0sg	ml	gs	<5	3.6
4	216 - 270	10 YR 5/2	None	FS	0sg	ml	gs	<5	0.5
5	270 - 360	10 YR 5/3	None	S	0sg	ml			3.6
		Groundwater was encountered in boring at 72 in. below existing grade.							

14 Obs. # [X] Boring [ ] Pit Ground Surface Elev. 865.0 ft Depth to limiting factor 42, 102 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 8	10YR 2/1	None	SCL - Fill	Variable	Variable	as	<5	0.11
2	8 - 42	10 YR 4/3	None	SiCL- Fill	Variable	Variable	gs	<5	0.04
3	42 - 84	10 YR 5/2	C2D 10YR6/6	SiCL	1msbk	mvfr	gs	<5	0.04
4	84 - 360	10 YR 5/3	None	S	0sg	ml		<5	3.6
		Groundwater was encountered in boring at 102 in. below existing grade.							

Wisconsin Department of Safety & Professional Development

SOIL EVALUATION - STORM

In accordance with Comm 82.365 & 85, Wis. Adm. Code

County	Dane
Parcel I.D.	071022305223, 071022305231
Review by	Date

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

Please print all information.

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

Property Owner	Property Location
FHB Investments, LLC	Govt. Lot 1/4 SE 1/4 S 22 T 07 N R 10 E
Property Owner's Mailing Address	Lot # 51, 52 & 53 / Block # / Subd. Name or CSM# 4th Addition of World Dairy Center
1830 Meadow Lane, Suite A	
City: Pewaukee / State: WI / Zip Code: 53072 / Phone Number:	[X] City [ ] Village [ ] Town — Madison / Nearest Road: 3202 & 3218 Dairy Drive

Drainage area ______ [ ] sq. ft. [ ] acres

Optional:

Test Site Suitable for (check all that apply)

[ ] Irrigation [ ] Bioretention trench [ ] Trench(es)

[ ] Rain Garden [ ] Grassed Swale [ ] Reuse

[ ] Infiltration trench [ ] SDS (>15' wide) [ ] Other ______

Hydraulic Application Test Method

[X] Morphological Evaluation

[ ] Double-Ring Infiltrometer

[ ] Other (Specify)______

15 Obs. # [X] Boring [ ] Pit Ground Surface Elev. 863.6 ft Depth to limiting factor 36, 102 in.

Horizon	Depth In.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 18	10YR 2/1	None	Fill - SiCL	Variable	Variable	as	<5	0.04
2	18 - 36	10 YR 3/2	None	Fill - SiC	Variable	Variable	gs	<5	0.07
3	36 - 72	10 YR 5/1	C2F 10YR6/6	SiCL	1msbk	mvfr	gs	<5	0.04
4	72 - 222	10 YR 5/3	None	S	0sg	ml	gs	<5	3.6
5	222 - 360	10 YR 5/2	None	FS	0sg	ml		<5	0.5
		Groundwater was encountered in boring at 102 in. below existing grade.							

16 Obs. # [X] Boring [ ] Pit Ground Surface Elev. 863.3 ft Depth to limiting factor 42,102 in.

Horizon	Depth In.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 9	10YR 2/1	None	Fill - SiCL	Variable	Variable	as	<5	0.04
2	9 - 42	10 YR 5/6	None	Fill - SL	Variable	Variable	gs	<5	0.5
3	42 - 72	10 YR 5/1	C2F 10YR6/6	SiCL	1msbk	mvfr	gs	<5	0.04
4	72 - 222	10 YR 5/2, 5/3	None	S	0sg	ml	gs	<5	3.6
5	222 - 282	10 YR 5/2	None	L	0m	mvfr	gs	<5	0.24
6	282 - 360	10 YR 5/2	None	FS	0sg	ml		<5	3.6
		Groundwater was encountered in boring at 102 in. below existing grade.							

CST/PSS Name (Please Print)	Signature	CST/PSS Number
David Staab	David Staab	1042602
Address	Date Evaluation Conducted	Telephone Number
3911 Mineral Point Road	7/25/2013	608/288-4100

Property Owner FMB Investments, LLC Parcel ID# 071022305223, 071022305231

Obs. # 17 [X] Boring [ ] Pit Ground Surface Elev. 864.3 ft Depth to limiting factor 42, 72 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 4	10YR 2/1	None	Fill - SiCL	Variable	Variable	as	<5	0.04
2	4 - 42	10 YR 5/2, 4/3	None	Fill - SCL	Variable	Variable	gs	<5	0.11
3	42 - 72	10 YR 5/1	C2F 10YR6/6	SiCL	1msbk	mvfr	gs	<5	0.04
4	72 - 102	10 YR 5/2	None	SL	1msbk	mvfr	gs	<5	0.5
5	102 - 360	10 YR 5/3	None	S	0m	mvfr	gs	<5	3.6
	Groundwater was encountered in boring at 72 in. below existing grade.								

Obs. # 18 [X] Boring [ ] Pit Ground Surface Elev. 863.8 ft Depth to limiting factor 36, 102 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 4	10YR 2/1	None	Fill - SiCL	Variable	Variable	as	<5	0.04
2	4 - 36	10 YR 4/3	None	Fill - SiCL	Variable	Variable	gs	10 - 15	0.04
3	36 - 102	10 YR 5/1	C2F 10YR6/6	SiCL	1msbk	mvfr	gs	<5	0.04
5	102 - 360	10 YR 5/3	None	S	0m	mvfr		<5	3.6
		Groundwater was encountered in boring at 102 in. below existing grade.							

Obs. # 19 [X] Boring [ ] Pit Ground Surface Elev. 863.2 ft Depth to limiting factor 5, 72 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 5	10YR 2/1	None	SiCL	1msbk	mvfr	as	<5	0.04
2	5 - 42	10 YR 4/4	C2D 10YR6/6	SiCL	1msbk	mvfr	gs	<5	0.04
3	42 - 72	10 YR 4/3	None	SL, SiCL	1msbk	mvfr	gs	<5	0.04
4	72 - 360	10 YR 5/3	None	S	0sg	ml		<5	3.6
		Groundwater was encountered in boring at 72 in. below existing grade.							

Property Owner FMB Investments, LLC Parcel ID# 071022305223, 071022305231

Obs. # 20 [X] Boring [ ] Pit Ground Surface Elev. 864.4 ft Depth to limiting factor 36, 102 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
1	0 - 8	10YR 2/1	None	Fill - SICL	Variable	Variable	as	<5	0.04
2	8 - 36	10 YR 4/3	None	Fill - SL/SICL	Variable	Variable	gs	20 - 25	0.04
3	36 - 54	10 YR 4/4	C2D 10YR6/6	SICL	1msbk	mvfr	gs	<5	0.04
4	54 - 102	10 YR 5/3	None	S/LS/SiL	0sg	ml	gs	<5	0.13
5	102 - 222	10 YR 5/3	None	S	0sg	ml	gs	<5	3.6
6	222 - 240	10 YR 5/2	None	SL	1msbk	mvfr		<5	0.5
		Groundwater was encountered in boring at 102 in. below existing grade.							

Obs. # [ ] Boring [ ] Pit Ground Surface Elev. ____ ft Depth to limiting factor ____ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr

Obs. # [ ] Boring [ ] Pit Ground Surface Elev. ____ ft Depth to limiting factor ____ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr

CGC, Inc.

Construction • Geotechnical
Consulting Engineering/Testing

July 13, 2017
C17051-15

Mr. Jon Evans, P.E., LEED AP-BD&C
Building Design Project Manager
Department of Public Works
Engineering Division
City-County Building, Room 115
210 Martin Luther King Jr. Blvd
Madison, WI 53703

Re: Geotechnical Exploration Report
Proposed Fire Station No. 14
3201 Dairy Drive
City of Madison, Dane County, Wisconsin

Dear Mr. Evans:

Construction • Geotechnical Consultants, Inc. (CGC) has completed the geotechnical exploration program for the proposed Fire Station No. 14 on Dairy Drive. The purpose of this exploration program was to evaluate the subsurface conditions within the planned construction area and to provide geotechnical recommendations regarding site preparation, foundation, floor slab and pavement design/construction. We are sending you one paper copy of this report and can provide a paper copy upon request.

PROJECT DESCRIPTION AND SITE CONDITIONS

We understand that Fire Station No. 14 is proposed for a vacant parcel on the east side of Dairy Drive, across from the intersection with Prairie Dock Drive. Most of the site is moderately to heavily-wooded, and site topography generally slopes down gently to the east. Based on a topographic site plan showing 1-ft contour lines, which was provided to us by OPN Architects, current site grades within the planned construction area range between approximately EL 862 and 865 ft.

Based on aerial photos dating back to the years 1995, 2000 and 2005, the site has been previously developed. A building can be identified in north portion of the site, with a greenhouse or similar structure extending into the center of the site. Apparent drives existed to the west and south of the previous structures. There is also evidence that some grading (cutting and filling) has occurred on the property. A 50-ft wide easement for a large high-pressure gas line traverses the south end of parcel.

The new fire station is proposed to be a one-story, slab-on-grade building with partial mezzanine. Finish first floor elevation is (tentatively) planned at EL 866.25 ft. Paved drives and parking areas are planned surrounding the new building. Structural loads have not been provided to us, be we expect loads resulting from the masonry and structural steel construction to be moderate to heavy. Previous fire

2921 Perry Street, Madison WI 53713
Telephone: 608/288-4100
FAX: 608/288-7887

stations of similar size have had maximum wall loads of 6 to 10 kips/ft and maximum column loads of 150 to 200 kips. Maximum floor slab live loads are anticipated to be 125 psf. Pavement areas are anticipated to be subjected to both light-duty and heavy-duty traffic loading.

SUBSURFACE CONDITIONS

Subsurface conditions within the proposed building footprint were explored by drilling five Standard Penetration Test (SPT) soil borings (labeled B-1A through B-5A) to planned depths of 30 ft below existing site grades. The boring locations were selected and field-staked by City of Madison personnel. The borings were drilled on June 27 and 28, 2017 by Badger State Drilling (under subcontract to CGC) using an ATV-mounted D-50 rotary drill rig equipped with hollow-stem augers, mud rotary equipment and an automatic SPT hammer. Ground surface elevations at the boring locations were interpolated by CGC using a topographic site plan (showing 1-ft contour lines), which was provided to us by OPN Architect, and should therefore be considered approximate.

In addition to the five borings recently performed within the building footprint, we have also included six previous SPT soil borings in our evaluation of the site. The six previous borings (labeled B-8 through B-10 and B-12 through B-14) are located in the vicinity of the proposed building, and were performed from July 22 to 24, 2013 by Badger State Drilling (under subcontract to CGC) to planned depths of 30 ft below site grades for a preliminary study of the site.

Specific procedures used for drilling and sampling are described in Appendix A, and the recent and previous boring locations are shown in plan on the Soil Boring Location Exhibit attached in Appendix B.

The subsurface profiles at the boring locations varied somewhat at shallow depths due to previous site development and grading, but the profiles were fairly similar with depth. The following strata were typically encountered (in descending order):

- About 8 to 14 in. of ***topsoil/topsoil fill*** in about half of the borings; over
- About 2.3 to 6 ft of ***fill*** or ***possible fill*** in most borings, consisting primarily of soft to very stiff clay with variable sand and gravel contents as well as occasional organic inclusions (roots and other organic matter), and secondarily of medium dense sand with considerable silt and gravel contents; followed by
- About 1.5 to 3.5 ft of natural, soft to very stiff ***lean to silty clay*** with varying sand content and very loose to loose ***clayey sand*** in most borings; and/or
- Very loose to medium dense ***sand*** with variable silt and gravel contents to the maximum depths explored in all borings.

Instead of *topsoil*, about 4 and 12 in. of ***sand/gravel surface*** was encountered in Borings 3A and 13, respectively, while borings 4A, 5A, 8 and 9 did not contain either. The *fill/possible fill* layer was not present in Boring 12, which featured a profile of topsoil over apparent natural clay that was underlain by natural sand strata. Conversely, *natural clays* were apparently missing in Borings 1A and 8 through 10. However, approximately 3.5-ft thick ***probable buried topsoil layers*** were encountered below the fill in Borings 8 and 9. The organic content (as measured by loss-on-ignition) on the buried topsoil layer ranged from 6.5% to 9.1%, where soils with loss on ignition exceeding 4% are considered organic. The shallow clays (fill and natural) were soft to very stiff, with moisture contents ranging from 14.9% to 29.5% in representative samples. Some of the on-site cohesive soils should therefore be considered slightly to moderately compressible. Possible clay fill samples obtained from Borings 1A and 4A containing apparent organic pockets had overall organic contents between 2.6% and 3.4%.

Groundwater was encountered in the borings during drilling at about 6 to 8.5 ft below site grades (corresponding to approximately EL 854.4 to 857.5 ft). Groundwater levels can be expected to fluctuate with seasonal variations in precipitation, infiltration, evapotranspiration, the level of nearby streams and lakes, the pumping rate of nearby wells and other factors. A more detailed description of the site soil and groundwater conditions is presented on the Soil Boring Logs attached in Appendix B, which also contain the laboratory test results.

DISCUSSION AND RECOMMENDATIONS

Subject to the limitations discussed below and based on the subsurface exploration, it is our opinion that the site is generally suitable for construction. *However, based on the presence of fairly deep, very loose sands within large portions of proposed building footprint, a conventional spread footing foundation system at a typical design bearing pressure is likely not feasible for most of the planned building, as adequate undercutting/replacement of marginal soils will likely be impractical due to shallow groundwater.* In our opinion, suitable foundation support will require ground improvement with rammed aggregate piers (RAPs) or supporting the building on deep foundations such as helical piers. Alternatively, conventional spread footings could potentially be designed for a low bearing pressure, provided that a partial undercut will be included below footings and the structure can tolerate settlement that may slightly exceed typical levels.

Accordingly, our recommendations for site preparation, foundation, floor slab and pavement design/construction along with our assessment of the site class for seismic design are presented in the following subsections. Additional information regarding the conclusions and recommendations presented in this report is discussed in Appendix C.

1. Site Preparation

We recommend that the topsoil be stripped at least 10 ft beyond the proposed construction areas, including areas required for fill beyond the building footprint or pavement limits. The topsoil can be stockpiled on-site and re-used as fill in landscaped areas. As noted above, topsoil ranged from 8 to 14 in. thick in the borings, but variable topsoil thicknesses may be encountered between boring locations due to previous development and grading activities. Brush, trees and tree roots should be removed from the construction areas in conjunction with topsoil stripping, and we recommend that remnants of the previous development (including utilities that are no longer in use) be removed in their entirety within the proposed building footprint. Where structures are removed, the soils at the base of the excavation should be checked for suitability prior to backfilling with engineered granular backfill. Remnants of previous structures can potentially remain in-place below new pavement areas assuming the former structures are at least 2 ft below proposed base course grades, and the former structures do not interfere with new utility construction. Old floor slabs should be broken up to allow drainage.

After topsoil stripping and where existing structures have been removed (if any), we recommend that the exposed soils in areas to remain at-grade or requiring fill be proof-rolled with a heavy piece of rubber-tire construction equipment, such as a loaded tri-axle dump truck, to check for soft/yielding areas. Granular soils exposed should be proof-compacted using a vibratory smooth-drum roller. If loose or soft/yielding areas are encountered or zones remain loose after recompaction, these areas should be undercut and replaced with granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557) in accordance with the Recommended Compacted Fill Specifications contained in Appendix D. Alternatively, 3-in. dense graded base (DGB) that is placed in loose lifts of 10 in. (or less) and compacted until deflection ceases can be used to restore grades in undercut areas. *Note that the shallow soils below the topsoil generally consist of marginal cohesive soils (natural and fill) that contain variable organic content, unstable soils or soils with elevated organic content. Therefore, partial undercutting/replacement of these layers may be required within pavement areas, with partial to complete undercutting/replacement required within the building footprint, which is discussed in more detail in the Foundation Design and Floor Slab sections of this report. We recommend that the budget include a generous contingency for soil correction.*

Fill placement to establish building and pavement grades can then proceed. We recommend using granular soils (i.e., sands/gravels) as structural fill within the building envelope and upper 2 to 3 ft in pavement areas because these soils are relatively easy to place and compact in most weather conditions, compared to fine-grained and cohesive soils. Clay/silt soils excavated on-site are not recommended as structural fill because moisture conditioning will generally be required to achieve desired compaction levels, which is highly weather dependent (i.e., warm, windy and dry conditions) and could potentially delay construction progress. Clay/silt soils are best used as fill in landscaping or potentially as lower lifts in pavement areas provided the moisture contents can be sufficiently lowered from the natural states to facilitate compaction efforts. We recommend that structural fill/backfill be compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557) following Appendix D guidelines. Periodic field density tests should be taken by CGC staff within the fill/backfill to document the adequacy of compactive effort.

We understand that fill heights may be on the order of 1 to 4 ft to establish floor slab subgrades within the building footprint, and site grades within surrounding pavement areas are anticipated to be adjusted accordingly. *Given the presence of slightly to moderately compressible cohesive soils within most of the site, we recommend a minimum time delay of approximately 2 to 4 weeks between fill placement and beginning footing construction to allow the compressive soils to largely consolidate and settle under the weight of the new fill and reduce post-construction settlement to typically tolerable levels.* The required time delay can potentially be reduced or eliminated if cohesive soils are partially or completely undercut and replaced within the building footprint. Settlement platforms (see detail in Appendix E) or monitoring points should be established in the areas of the building where settlement due to the weight of the new fill is a concern. The settlement monitoring points should be surveyed immediately after the full height of the fill reaches the floor slab subgrade elevation, and twice per week until three consecutive sets or survey readings indicate that settlement has ceased. The normal construction sequence can begin after the settlement data indicates that settlement has largely ceased. We can provide additional details upon request.

2. Foundation Design

A. Undercutting and Replacement of Soils Unsuitable for Foundation Support

Assuming finish first floor elevation of the proposed building at EL 866.25 ft and footing grades on the order of 2 to 5 ft below finish first floor elevation, we anticipate footings to bear within newly-placed engineered granular fill/backfill after undercutting (removal) of the existing fill and soft cohesive soils, which are considered unacceptable for foundation support. Undercut depths are expected to extend about 3.5 to 6 ft below grade, and potentially 8.5 ft below existing grade near Boring 4A. Very loose to loose sands extend to depths between about 8 and 22 ft below current site grades, which will limit the allowable bearing pressure. Fairly deep marginal soils (especially in southern portions of the proposed building) in conjunction with the relatively shallow groundwater table are expected to render extensive undercutting and replacement operations impractical, but a conventional spread footing foundation system could potentially be utilized by implementing a low bearing pressure and the following additional parameters for foundation design:

- Maximum net allowable bearing pressure (assuming undercutting of existing fill and soft clays): 1,000 psf
- Minimum foundation widths:
  - Continuous wall footings: 18 in.
  - Column pad footings: 30 in.
- Minimum footing depths:
  - Exterior/perimeter footings: 4 ft
  - Interior footings: no minimum requirement

Note that undercut depths may potentially increase if marginal soils are encountered at the bottom of undercut excavations. A CGC field representative should be present on-site during footing and undercut excavations to carefully check the subgrade soils for footing support suitability, and advise on corrective measures, if necessary. We recommend using a smooth-edged backhoe bucket for footing excavations. Additionally, granular soils exposed at footing grade and at the bottom of undercut excavations (that are at least 2 ft above the water table) should be thoroughly recompacted with a large vibratory plate compactor or an excavator-mounted hoe-pack prior to formwork/concrete placement or backfilling to densify soils loosened during the excavation process. Soils potentially susceptible to disturbance from compaction (e.g. silty or clayey soils or soils with elevated water content) should be hand-trimmed.

Where the bottom of undercut excavations extend near the water table, appropriate dewatering measures should be implemented, as determined by the contractor, to lower the water table at least 2 ft below the bottom of the excavation. Very moist to wet soils should be stabilized with a 6 to 12 in. thick layer of crushed clear stone that is compacted into the subgrade. If the stone layer exceeds 12 in., non-woven geotextile fabric (e.g., Mirafi 160N, or equivalent) should be utilized to envelop the stone layer in order to prevent migration of fines into the void spaces of the stone layer. Where undercutting is required, the base of the undercut excavation should be widened beyond the footing edges at least 0.5 ft in each direction for each foot of undercut depth for stress distribution purposes. In order to re-establish footing grade, we recommend using granular soils (i.e., sands/gravels) as backfill, that are compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557) following Appendix D guidelines. Alternatively, well-compacted 3-in. DGB can be used to restore grades in undercut areas. OSHA slope guidelines should be followed if workers need to enter excavations.

Provided the foundation design/construction recommendations discussed above are followed (including undercutting/replacement of unsuitable soils and early fill placement), we estimate that total and differential settlements should be on the order of 1.0 to 1.3 and 0.5 to 0.7 in., respectively.

B. Rammed Aggregate Pier Supported Spread Footing Foundation

In our opinion, a proprietary system known as rammed aggregate piers (RAPs or Geopiers™) designed and installed by Ground Improvement Engineering (GIE; formerly Geopier™ Foundation Company) would be a possible system to support the proposed structure. This system is not a pile foundation, but instead essentially stiffens the softer clays and loose sands to a sufficient depth below foundation grade such that a conventional foundation and slab system at a typical bearing pressure is feasible while limiting settlements to typically tolerable levels. Structure loads will generally be concentrated on the perimeter wall footings and exterior/interior column pads, with lower loads anticipated to be distributed more uniformly across the floor slab. Based on the expected, fairly concentrated load distribution, we anticipate that ground improvement elements (RAPs) would be installed in a fairly dense grid pattern below the structure footings in order to limit total settlement to about 1 inch. We do not anticipate RAPs to be required below floor slabs unless high floor slab loads exist, although undercutting/replacement of unsuitable fill and cohesive soils will be required, as discussed previously and in the Floor Slab section of this report. The use of RAPs in floor slab areas would likely reduce the need for undercutting/ replacement in floor slab areas.

Due to collapsible soils, we expect that a displacement system will be required to construct the piers. This system involves inserting a hollow mandrel to a specified depth (depending on soil conditions and building loads) at which point stone is introduced through the mandrel, which is compacted through a combination of down pressure and oscillations as the mandrel is systematically raised and lowered. The installation process not only creates a relatively strong and rigid aggregate pier but also improves the strength and compressibility properties of the soil around the pier. Based on preliminary discussions with GIE, we expect that RAPs will be installed after fill placement to establish floor slab subgrades. As discussed earlier, a time delay of a few weeks will be required after fill placement to allow the soils to partially consolidate under the weight of the new fill. During this time, settlement will be monitored to determine when settlement due to the new fill has largely ceased and foundation construction can begin. Full-time inspection is recommended during RAP installation to document their construction according to design requirements.

In our opinion and based on preliminary review by GIE, RAP-supported footings could be designed for a maximum net allowable soil bearing pressure of about 4,000 psf. The maximum allowable bearing pressure for footings bearing on RAPs will need to be confirmed by Ground Improvement Engineering once additional project information becomes available. RAPs have been used successfully on many projects in Wisconsin with similar soil conditions. Rammed aggregate piers can be bid as an alternative to undercutting the fill and soft clays (and use a low bearing pressure) or using helical piers for building support, with foundation design included in the package.

C. Helical Pier Supported Spread Footing Foundation

As an alternative to undercutting/replacement and RAPs, it is our opinion that the building foundations can be supported on helical piers that extend through the very loose sands, and bear within the underlying medium dense sands. Helical pier capacity will vary depending on the number and size of helices, depth of installation and bearing stratum. Floor slabs would likely be supported in a conventional fashion, as previously described.

Note that in order to gather more subsurface information for helical pier design, we recommend performing at least one more boring within the building footprint. The additional boring should extend at least 50 to 75 ft below current site grades in order to reach denser soil more suitable to develop higher helical pier capacities. If desired, we can provide additional details and develop a supplemental geotechnical scope at the appropriate time.

3. Seismic Site Class

In our opinion, the average soil properties in the upper 100 ft of the site (based on SPT blow counts "N-values" of less than 15 blows/ft, on average) can be characterized as a soft soil profile. This characterization would place the site in Class E for seismic design according to International Building Code (see Table 1613.5.2).

4. Floor Slab

The floor slab subgrade soils are expected to consist mainly of newly-placed engineered granular fill/backfill over soft to very stiff cohesive soils (natural or existing fill). (Note that due to anticipated light floor loads, we do not expect that the floor slabs will require support by RAPs or helical piers, although partial undercutting of existing fill/possible fill soils and lower strength natural soils will likely be required.) Prior to slab construction, the subgrade soils should be thoroughly proof-rolled/recompacted to densify soils that may become disturbed or loosened during construction activities. Areas of disturbed soil or where soils remain loose after recompaction should be undercut and replaced with compacted 3-in. DGB or granular fill. *As mentioned previously, some of the shallow fill/possible fill cohesive soils are considered marginal to unsuitable for direct slab support, and some undercutting/stabilization will likely be required within slab areas during general site grading prior to new fill placement to establish finish floor elevation. Undercut depths could be on the order of 2 to 4 ft (potentially deeper) within floor slab areas.*

To act as a capillary break, we recommend including a minimum 4 to 6-in. thick layer of well-graded sand/gravel with less than 5% passing the No. 200 U.S. standard sieve below the floor slab. To further minimize the potential for moisture migration through the slab, a plastic vapor barrier can also be utilized below the slab. Fill and base layer material below the floor slab should be placed as described in the Site Preparation section of this report. A subgrade modulus of 100 pci may be used for slab design on the sand/gravel layer above a firm or stabilized subgrade. The design subgrade modulus is based on a recompacted subgrade such that non-yielding conditions are developed. Note that some structural engineers require a 4 to 6-in. layer of DGB, such as 1¼-in. DGB, below the slab to increase the subgrade modulus immediately below the slab. If 6 in. of DGB is included below the floor slab, the subgrade modulus can be increased to 150 pci. The slab should be structurally separated from the foundations with a compressible filler and have construction joints and reinforcement for crack control.

5. Pavement Design

Pavement within at-grade parking areas and drives is anticipated to be constructed on a variety of soils, including newly-placed engineered granular fill, natural and/or existing fill granular soils and natural and/or existing fill cohesive/fine-grained soils. Subgrades should be prepared, as described in the Site Preparation section of this report, with undercutting/stabilization completed to develop suitable subgrades, where needed. *Due to the variable fill expected at pavement subgrades in some portions of* *the site, we recommend that the budget include a generous contingency for subgrade undercutting/ stabilization. For budgeting purposes, we recommend including an allowance for 12 in. of additional coarse aggregate (e.g., 3-in. DGB) over biaxial geogrid within about 50% of the pavement area.* The need for undercutting below the pavement section will likely be reduced when site grades are raised at least 2 ft above existing grade with high quality granular fill.

We anticipate that some asphalt pavement within parking lots will be exposed to primarily automobile traffic with less than one 18-kip equivalent single axle load (ESAL) per day. In view of this, we have assumed Traffic Class I following Wisconsin Asphalt Pavement Association (WAPA) recommendations for parking areas and driveways that are mainly used by light passenger vehicles. However, main sections of driveways are likely to experience heavier traffic loads due to truck traffic. For pavement areas where trucks will routinely travel, we have assumed a traffic load of less than 20 ESALs per day and Traffic Class II according to WAPA. We have also included a heavy duty pavement section where higher truck traffic loads including heavy fire truck traffic (up to 50 ESALs per day) are expected. The pavement sections summarized in Table 1 below were selected assuming a Soil Support Value "SSV" of 4.0 for a firm or adequately stabilized subgrade and a design life of 20 years.

TABLE 1 – Recommended Pavement Sections

Material	Thicknesses (in.)			WDOT Specification[1]
	Traffic Class I (Light Duty)	Traffic Class II (Medium Duty)	Traffic Class III (Heavy Duty)	
Bituminous Upper Layer[2,3]	1.5	1.75	2.0	Section 460, Table 460-1, 9.5 mm (light duty), 12.5 mm (medium and heavy duty)
Bituminous Lower Layer[2,3]	2.0	2.25	3.0	Section 460, Table 460-1, 12.5 mm (light duty), 19 mm (medium and heavy duty)
Dense Graded Base Course[2,4]	8.0	10.0	12.0	Sections 301 and 305, 3 in. and 1¼ in.
Total Thickness	**11.5**	**14.0**	**17.0**	

Notes:

1. Wisconsin DOT *Standard Specifications for Highway and Structure Construction*, latest edition, including supplemental specifications, and Wisconsin Asphalt Pavement Association *2016 Asphalt Pavement Design Guide*.

2. Compaction requirements:
   - Bituminous concrete: Refer to Section 460-3.
   - Base course: Refer to Section 301.3.4.2, Standard Compaction

3. Mixture Type LT bituminous; refer to Section 460, Table 460-2 of the *Standard Specifications*. Mixture type MT is recommended in heavy duty traffic areas. Note that an "H Grade" asphalt surface layer is recommended where there will be slow moving heavy truck traffic making turning movements.

4. The upper 4 in. should consist of 1¼-in. DGB; the bottom part of the layer can consist of 3-in. DGB.

Note that if traffic volumes are greater than those assumed, CGC should be allowed to review the recommended pavement sections and adjust them accordingly. The pavement design assumes a stable/non-yielding subgrade which will be evaluated using proof-rolling techniques. *As mentioned above, where pavement construction occurs fairly close to existing site grades, a stabilization layer that is underlain by a biaxial geogrid may potentially be required below the pavement sections summarized in Table 1 in order to develop suitable pavement subgrades on the existing fill soils.* Alternative pavement designs may prove acceptable and should be reviewed by CGC. If there is a delay between subgrade preparation and placing the base course, the subgrade should be recompacted.

Where concrete pavement may be used, such as in pavement areas subjected to concentrated wheel loads (e.g., dumpster pads, aprons around the apparatus bay, etc.), we recommend that the concrete pavement should be at least 6-in. thick (thicker concrete may be required within areas of heavy traffic loads due to fire trucks), be underlain by at least 6 in. of DGB and contain mesh reinforcement for crack control. Concrete slabs underlain by a minimum 6-in. thick dense graded base layer over a firm or stabilized subgrade can be designed utilizing a subgrade modulus of 150 pci. Note that a thicker pavement section (more than 6 in. of concrete) may be required depending on pavement loads, which should be evaluated by a structural engineer.

CONSTRUCTION CONSIDERATIONS

Due to variations in weather, construction methods and other factors, specific construction problems are difficult to predict. Soil related difficulties that could be encountered on the site are discussed below:

- Due to the potentially sensitive nature of some of the on-site soils, we recommend that final site grading activities be completed during dry weather, if possible. Construction traffic should be avoided on prepared subgrades to minimize potential disturbance.

- Contingencies in the project budget for subgrade stabilization with coarse aggregate in pavement and floor slab areas should be increased if the project schedule requires that work proceed during adverse weather conditions.

- Earthwork construction during the early spring or late fall could be complicated as a result of wet weather and freezing temperatures. During cold weather, exposed subgrades should be protected from freezing before and after footing construction. Fill should never be placed while frozen or on frozen ground.

- Excavations extending greater than 4 ft in depth below the existing ground surface should be sloped or braced in accordance with current OSHA standards.

- Based on observations made during the field exploration, we generally do not anticipate groundwater to be encountered during footing excavations. However, groundwater could be encountered at the base of undercut excavations that requires dewatering measures to lower the water during construction activities. Additionally, water accumulating at the base of excavations as a result of precipitation or seepage should be quickly removed, with dewatering means and methods the contractor's responsibility.

RECOMMENDED CONSTRUCTION MONITORING

The quality of the foundation, floor slab and pavement subgrades will be largely determined by the level of care exercised during site development. To check that earthwork and foundation construction proceeds in accordance with our recommendations, the following operations should be monitored by CGC:

- Topsoil stripping/subgrade proof-rolling;
- Fill/backfill placement and compaction;
- RAP or helical pier installation;
- Foundation excavation/subgrade preparation; and
- Concrete placement.

* * * * *

It has been a pleasure to serve you on this project. If you have any questions or need additional consultation, please contact us.

Sincerely,

CGC, Inc.

Tim F. Gassenheimer, E.I.T.
Staff Engineer

David A. Staab, P.E., LEED AP
Senior Consulting Professional

Encl: Appendix A - Field Exploration
Appendix B - Soil Boring Location Exhibit
Logs of Recent Test Borings (5)
Logs of Previous Test Borings (6)
Particle Size Distribution Test Reports (2)
Log of Test Boring-General Notes
Unified Soil Classification System
Appendix C - Document Qualifications
Appendix D - Recommended Compacted Fill Specifications
Appendix E - Settlement Platform

APPENDIX A

FIELD EXPLORATION REPORT

APPENDIX A

FIELD EXPLORATION

Subsurface conditions within the proposed building footprint were explored by drilling five Standard Penetration Test (SPT) soil borings (labeled B-1A through B-5A) to planned depths of 30 ft below existing site grades. The boring locations were selected and field-staked by City of Madison personnel. The borings were drilled on June 27 and 28, 2017 by Badger State Drilling (under subcontract to CGC) using an ATV-mounted D-50 rotary drill rig equipped with hollow-stem augers, mud rotary equipment and an automatic SPT hammer. Ground surface elevations at the boring locations were interpolated by CGC using a topographic site plan (showing 1-ft contour lines), which was provided to us by OPN Architect, and should therefore be considered approximate.

In addition to the five borings recently performed within the building footprint, we have also included six previous SPT soil borings in our evaluation of the site. The six previous borings (labeled B-8 through B-10 and B-12 through B-14) are located in the vicinity of the proposed building, and were performed from July 22 to 24, 2013 by Badger State Drilling (under subcontract to CGC) to planned depths of 30 ft below site grades for a preliminary study of the site.

In the previous borings, soil samples were obtained at 2.5 foot intervals to a depth of 10 ft and at 5 ft intervals thereafter. To better explore the extent of very loose sands, the recent borings were samples at 2.5 foot intervals to a depth of 20 ft and at 5 ft intervals thereafter. The soil samples were obtained in general accordance with specifications for standard penetration testing, ASTM D 1586. The specific procedures used for drilling and sampling are described below.

1. <u>Boring Procedures between Samples</u>

   The boring is extended downward, between samples, by a hollow-stem auger.

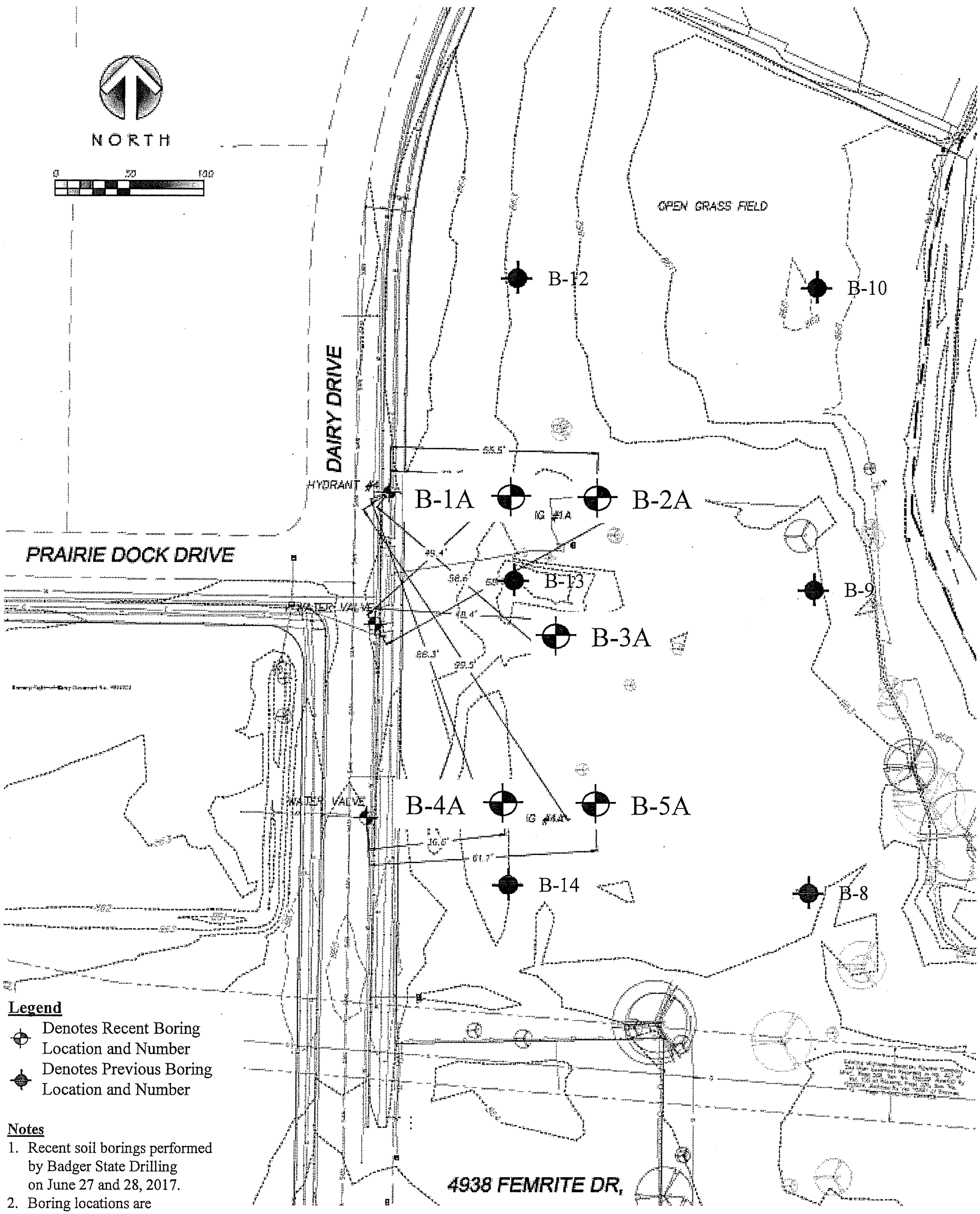
2. <u>Standard Penetration Test and Split-Barrel Sampling of Soils</u>
   (ASTM Designation: D 1586)

   This method consists of driving a 2-inch outside diameter split-barrel sampler using a 140-pound weight falling freely through a distance of 30 inches. The sampler is first seated 6 inches into the material to be sampled and then driven 12 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the log of borings and is known as the Standard Penetration Resistance.

During the field exploration, the driller visually classified the soil and prepared a field log. *Field screening of the soil samples for possible environmental contaminants was not conducted by the drillers as environmental site assessment activities were not part of CGC's work scope.* Water level observations were made in each boring during and after drilling and are shown at the bottom of each boring log. Upon completion of drilling, the borings were backfilled with bentonite to satisfy WDNR regulations, and the soil samples were delivered to our laboratory for visual classification and laboratory testing. The soil samples were visually classified by a geotechnical engineer using the Unified Soil Classification System. The final logs prepared by the engineer, including laboratory test results, a boring location map, and a description of the Unified Soil Classification System are presented in Appendix B.

APPENDIX B

SOIL BORING LOCATION EXHIBIT
LOGS OF RECENT TEST BORINGS (5)
LOGS OF PREVIOUS TEST BORINGS (6)
PARTICLE SIZE DISTRIBUTION TEST REPORTS (2)
LOG OF TEST BORING – GENERAL NOTES
UNIFIED SOIL CLASSIFICATION SYSTEM



Legend

- Denotes Recent Boring Location and Number
- Denotes Previous Boring Location and Number

Notes

1. Recent soil borings performed by Badger State Drilling on June 27 and 28, 2017.
2. Boring locations are approximate.
3. Base map was provided by OPN Architects.

Job No.: C17051-15	CGC, Inc.	SOIL BORING LOCATION EXHIBIT
Date: 7/2017		Proposed Fire Station No. 14 3201 Dairy Drive City of Madison, Dane Co., WI

CGC Inc.

LOG OF TEST BORING

Project: Proposed Fire Station No. 14, 3201 Dairy Drive
Location: City of Madison, Dane Co., WI

Boring No. 1A
Surface Elevation (ft) ± 863.0
Job No. C17051-15
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
					± 8 in. TOPSOIL (OL)					
1	12	M	5		Soft to Medium Stiff, Gray/Brown (Lightly Mottled) Lean CLAY, Little to Some Sand, Trace Gravel, Scattered Dark Gray Organic Pockets (CL - Possible Fill)	(0.75-1.0)	23.3			2.6
2	18	M	4	5	Sand and Gravel Contents Slightly Decreasing With Depth	(0.25)	28.5			
3	16	W	4		Loose, Tan Fine to Coarse SAND, Little Gravel, Trace to Little Silt, Scattered Cobbles/Boulders (SP)					
4	18	W	9	10	Silt Content Slightly Increasing with Depth					
5	8	W	16		Medium Dense, Gray Fine to Medium SAND, Little Silt, Trace Gravel, Scattered Cobbles/Boulders (SP-SM)					
6	10	W	20	15						
7	10	W	21		Medium Dense, Gray Fine to Medium SAND, Some Silt, Trace Gravel, Scattered Cobbles/Boulders (SM)					
8	12	W	19	20						
9	8	W	29	25	Scattered Silt Seams near 23.5 ft					
10	10	W	24	30						
					End of Boring at 30 ft					
				35	Borehole Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 6.0'   Upon Completion of Drilling ____
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/28/17 End 6/28/17
Driller BSD Chief MC Rig D-50
Logger MG/CD Editor TFG
Drill Method 4.25" HSA (0-10') / MR (10-30'); Autohammer

LOG OF TEST BORING

CGC Inc.

Project	Proposed Fire Station No. 14
	3201 Dairy Drive
Location	City of Madison, Dane Co., WI
Boring No.	2A
Surface Elevation (ft)	± 863.0
Job No.	C17051-15
Sheet	1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						± 8 in. TOPSOIL (OL)					
1		14	M	8		Stiff, Gray/Brown (Lightly Mottled) Lean CLAY, Little Sand, Trace Gravel, Scattered Dark Gray Organic Pockets and Roots (CL - Possible Fill)	(1.75-2.0)	25.0			
2		18	M	6							
					5	Soft to Medium Stiff, Gray Lean to Silty CLAY, Some Sand (CL/CL-ML)	(0.25-0.75)	14.9	20	13	
3		14	W	4		Very Loose, Tan Fine to Coarse SAND, Little Gravel, Trace Silt, Scattered Cobbles/Boulders (SP)					
4		6	W	2		Scattered Clay Seams near 8.5 ft					
					10						
5		16	W	15		Medium Dense, Gray Fine to Medium SAND, Some Silt, Trace Gravel, Scattered Cobbles/Boulders (SM)					
6		8	W	11		P200 (Sample 6): 15.0%		24.2			
					15						
7		12	W	20							
8		10	W	11							
					20						
9		8	W	12		Medium Dense, Gray Fine to Coarse SAND, Some Gravel, Little Silt, Scattered Cobbles/Boulders (SP-SM)					
					25						
10		10	W	17		Medium Dense, Grayish Brown Fine to Medium SAND, Some Silt, Trace Gravel, Scattered Cobbles/Boulders (SM)					
					30	End of Boring at 30 ft					
						Borehole Backfilled with Bentonite Chips					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0'   Upon Completion of Drilling ______

Time After Drilling

Depth to Water

Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/28/17 End 6/28/17

Driller BSD Chief MC Rig D-50

Logger MG/CD Editor TFG

Drill Method 4.25" HSA (0-10') / MR (10-30'); Autohammer

CGC Inc.

LOG OF TEST BORING

Project: Proposed Fire Station No. 14
3201 Dairy Drive
Location: City of Madison, Dane Co., WI

Boring No. 3A
Surface Elevation (ft) ± 862.0
Job No. C17051-15
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						± 4 in. GRAVEL SURFACE					
1		14	M	8		Very Stiff, Gray/Brown (Lightly Mottled) Lean CLAY, Little Sand, Trace Gravel, Scattered Dark Gray Organic Pockets and Roots (CL - Possible Fill)	(2.0-2.25)	25.5			
2		12	M	7			(0.25-0.75)	17.7			
					5	Soft to Medium Stiff, Gray/Brown (Lightly Mottled) Sandy Lean CLAY, Trace Gravel (CL)					
3		18	W	2		Very Loose, Gray Silty Fine SAND, Layered with Tan Fine to Medium SAND, Little to Some Silt, Trace to Little Gravel (SM)					
4		16	W	2							
					10	Very Loose to Loose, Gray Fine to Medium SAND, Little Silt and Gravel, Scattered Cobbles/Boulders (SP-SM)					
5		16	W	7							
6		10	W	6							
					15						
7		18	W	22		Medium Dense, Gray Silty Fine SAND, Trace Gravel, Scattered Less Silty Fine to Medium Sand Seams (SM)					
8		12	W	9		Loose to Medium Dense, Gray Fine to Medium SAND, Little Silt, Trace Gravel, Scattered Cobbles/Boulders (SP-SM)					
					20						
9		14	W	23							
					25						
10		12	W	30							
					30	End of Boring at 30 ft					
						Borehole Backfilled with Bentonite Chips					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0'   Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/27/17 End 6/28/17
Driller BSD Chief MC Rig D-50
Logger MG/CD Editor TFG
Drill Method 4.25" HSA (0-10') / MR (10-30'); Autohammer

CGC Inc.

LOG OF TEST BORING

Project: Proposed Fire Station No. 14, 3201 Dairy Drive
Location: City of Madison, Dane Co., WI

Boring No. 4A
Surface Elevation (ft) ± 864.0
Job No. C17051-15
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
1	12	M	10	0–3	FILL: Dark Gray Silty Clay, Some Sand, Little Gravel, Trace Organics, Scattered Roots (Possible Tospoil Fill)	(-)	16.8			3.4
2	8	M	7	3–6	FILL: Medium Stiff to Stiff, Gray/Tan/Reddish Brown Lean to Silty Clay, Some Sand, Trace Gravel, Numerous Roots	(0.5-1.25)	17.5			
3	10	M	4	6–8.5	Very Loose to Loose, Gray Clayey Fine to Medium SAND, Scattered Lean Clay Seams (SC)		16.7			
4	12	W	6	8.5–10.5	Loose, Tan Fine to Coarse SAND, Little Gravel, Trace Silt, Scattered Cobbles/Boulders (SP)					
5	8	W	3	10.5–22	Very Loose, Tan Fine to Medium SAND, Trace to Little Silt and Gravel, Scattered Cobbles/Boulders (SP/SP-SM)					
6	10	W	2		P200 (Sample 6): 2.5%		22.3			
7	14	W	4		Grading Gray/Gravel Content Slightly Increasing with Depth					
8	10	W	2							
9	12	W	13	22–30	Medium Dense, Tan Fine to Medium SAND, Some Silt, Trace Gravel, Scattered Cobbles/Boulders (SM)					
10	12	W	18							
				30	End of Boring at 30 ft					
					Borehole Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.5'
Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/27/17 End 6/27/17
Driller BSD Chief MC Rig D-50
Logger MG/CD Editor TFG
Drill Method 4.25" HSA (0-10') / MR (10-30'); Autohammer

CGC Inc.

LOG OF TEST BORING

Project: Proposed Fire Station No. 14
3201 Dairy Drive
Location: City of Madison, Dane Co., WI

Boring No. 5A
Surface Elevation (ft) ± 863.5
Job No. C17051-15
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
1		10	M	6		FILL: Stiff, Gray/Dark Gray/Brown Lean Clay, Some Sand, Scattered Roots	(1.25-1.75)	22.0			
2		12	M	9	5	Stiff, Gray/Brown (Lightly Mottled) Sandy Lean CLAY, Trace Gravel (CL)	(1.5-1.75)	16.4			
3		12	W	5		Loose, Tan Fine to Medium SAND, Trace Silt and Gravel, Scattered Cobbles/Boulders (SP)					
4		10	W	2	10	Very Loose, Tan Fine to Medium SAND, Little Silt and Gravel, Scattered Cobbles/Boulders (SP-SM)					
5		12	W	3		Very Loose, Gray Fine to Medium SAND, Some Silt, Trace Gravel and Organics, Scattered Tan Less Silty Seams and Cobbles/Boulders (SM)					
6		10	W	2	15						
7		10	W	5		Very Loose to Loose, Gray Fine to Medium SAND, Little Silt and Gravel, Scattered Cobbles/Boulders (SP-SM)					
8		8	W	2	20						
9		12	W	19	25	Medium Dense, Gray Fine to Medium SAND, Some Gravel, Little Silt, Scattered Silt Seams and Cobbles/Boulders (SP-SM)					
10		12	W	21	30	Medium Dense, Gray Fine to Medium SAND, Some Silt, Little Gravel, Scattered Cobbles/Boulders (SM)					
					35	End of Boring at 30 ft Borehole Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 8.5' Upon Completion of Drilling ______
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/27/17 End 6/27/17
Driller BSD Chief MC Rig D-50
Logger MG/CD Editor TFG
Drill Method 4.25" HSA (0-10') / MR (10-30'); Autohammer

CGC Inc.

LOG OF TEST BORING

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 8
Surface Elevation (ft) 863.8
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
1		18	M	15		FILL: Medium Dense, Tan Fine to Medium Sand, Some Silt and Gravel USDA: FILL - 2.5Y 5/3 Sandy Loam					
2		10	M	5	5	FILL: Soft to Medium Stiff, Dark Gray/Gray Lean Clay, Little to Some Sand, Trace Organics USDA: FILL - 10YR 3/1, 5/2 Silty Clay Loam	(0.5)	15.4			
3		8	M	5		Medium Stiff, Dark Gray/Black Organic CLAY (OL - Probable Buried Topsoil) USDA: 10YR 2/1 Silty Clay Loam	(1.0)	26.6			9.1
4		18	W	10	10	Very Loose to Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
5		5	W	2	15						
6		3	W	4	20						
7		12	W	14	25	Medium Dense, Brown Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/3 Fine Sand					
8		8	W	21	30	Medium Dense, Gray-Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/2 Sand					
					35	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.0' Upon Completion of Drilling ____
Time After Drilling ____
Depth to Water ____ ▼
Depth to Cave in ____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/22/13 End 7/22/13
Driller BSD Chief DC Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM; Autohammer

CGC Inc.

LOG OF TEST BORING

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 9
Surface Elevation (ft) 863.5
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Type	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
1		18	M	17		FILL: Medium Dense, Tan Fine to Medium Sand, Some Silt and Gravel USDA: FILL - 2.5Y 5/3 Sandy Loam					
2		15	M	5	5	Loose, Dark Gray/Black Organic Clayey SILT (OL - Probable Buried Topsoil) USDA: 10YR 2/1 Silt Loam		19.3			6.5
3		10	W	10		Very Loose to Medium Dense, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
4		12	W	8	10						
5		18	W	3	15	Grades to Fine Sand near 15 ft					
6		3	W	10	20						
7		4	W	27	25						
8		12	W	9	30	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ∇ 6.0' Upon Completion of Drilling ______
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/23/13 End 7/23/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-15'; 3-7/8" RB/DM 15'-30'; Autohammer

CGC Inc.

LOG OF TEST BORING

Project **Proposed Fire Station #14 & Fire Training Site**
Femrite Drive and Dairy Drive
Location **Madison, Wisconsin**

Boring No. **10**
Surface Elevation (ft) **860.4**
Job No. **C13064-7**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						14 in.± Clayey TOPSOIL (OL)					
1		6	M	7		Loose, Gray Fine to Medium SAND, Some Silt, Trace Clay and Gravel (SM - Possible Fill) USDA: 10YR 5/1 Sandy Loam					
2		6	W	5	5	Very Loose to Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
3		12	W	3							
4		8	W	4	10	Color Change to Dark Brown (10YR 3/3) with Scattered Silt Seams near 7.5 ft					
5		10	W	4	15	Very Loose to Loose, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
6		9	W	9	20	Loose, Gray Fine SAND, Some Silt, Trace Gravel (SM) USDA: 10YR 5/2 Sandy Loam					
7		14	W	10	25	Loose, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
8		12	W	8	30	Scattered Silt Seams near 30 ft					
						End of Boring at 30 ft					
					35	Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 6.0' Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/24/13 End 7/24/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM; Autohammer

CGC Inc.

LOG OF TEST BORING

Project **Proposed Fire Station #14 & Fire Training Site**
Femrite Drive and Dairy Drive
Location **Madison, Wisconsin**

Boring No. **12**
Surface Elevation (ft) **863.2**
Job No. **C13064-7**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						12 in.± Clayey TOPSOIL (OL)					
1		10	M	9		Very Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL) USDA: 10YR 5/1 Silty Clay Loam (Redox: C2F 10YR 6/6)	(3.0)				
2		16	M	5	5	Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
3		12	W	5							
4		14	W	8	10						
5		12	W	5	15	3 in. Stiff, Gray/Brown Lean Clay Seam near 15 ft	(1.0-1.5)				
6		12	W	15	20	Medium Dense, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
7		16	W	15	25						
8		14	W	23	30	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0' Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/24/13 End 7/24/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

CGC Inc.

LOG OF TEST BORING

Project: Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location: Madison, Wisconsin

Boring No. 13
Surface Elevation (ft) 862.2
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
					12 in.± Sand and Gravel FILL					
1	5	M	8		Stiff to Very Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL - Possible Fill in Upper Few Feet of Layer) USDA: 10YR 5/1 Silty Clay Loam (Redox: C2D 10YR 6/6)	(3.5)				
2	18	M	8	5		(1.0-1.5)	29.5			
3	18	W	4		Very Loose to Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
4	18	W	4	10						
5	3	W	4	15						
6	12	W	17	20	Medium Dense, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
7	12	W	27	25	Medium Dense, Brown Fine to Coarse SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
8	4	W	14	30						
					End of Boring at 30 ft					
				35	Borehole backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 6.0'
Upon Completion of Drilling ____
Time After Drilling ____
Depth to Water ____
Depth to Cave in ____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/22/13 End 7/22/13
Driller BSD Chief DC Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

LOG OF TEST BORING

CGC Inc.

Project **Proposed Fire Station #14 & Fire Training Site**
Femrite Drive and Dairy Drive
Location **Madison, Wisconsin**

Boring No. **14**
Surface Elevation (ft) **865.0**
Job No. **C13064-7**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Type	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						8 in.± Sandy TOPSOIL FILL (OL)					
1		12	M	12		FILL: Very Stiff, Brown/Gray Lean Clay, Trace to Little Sand USDA: FILL-10YR 4/3 Silty Clay Loam	(3.75-4.0)				
2		12	M	8	5	Stiff to Very Stiff, Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL) USDA: 10YR 5/2 Silty Clay Loam (Redox: C2D 10YR 6/6)	(2.0-2.5)				
3		18	M	8			(1.0-1.5)	24.7			
4		6	W	4	10	Very Loose to Medium Dense, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
5		18	W	4	15	Grades to Fine Sand near 15 ft					
6		6	W	2	20						
7		8	W	12	25						
8		18	W	20	30						
						End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					
					35						

WATER LEVEL OBSERVATIONS

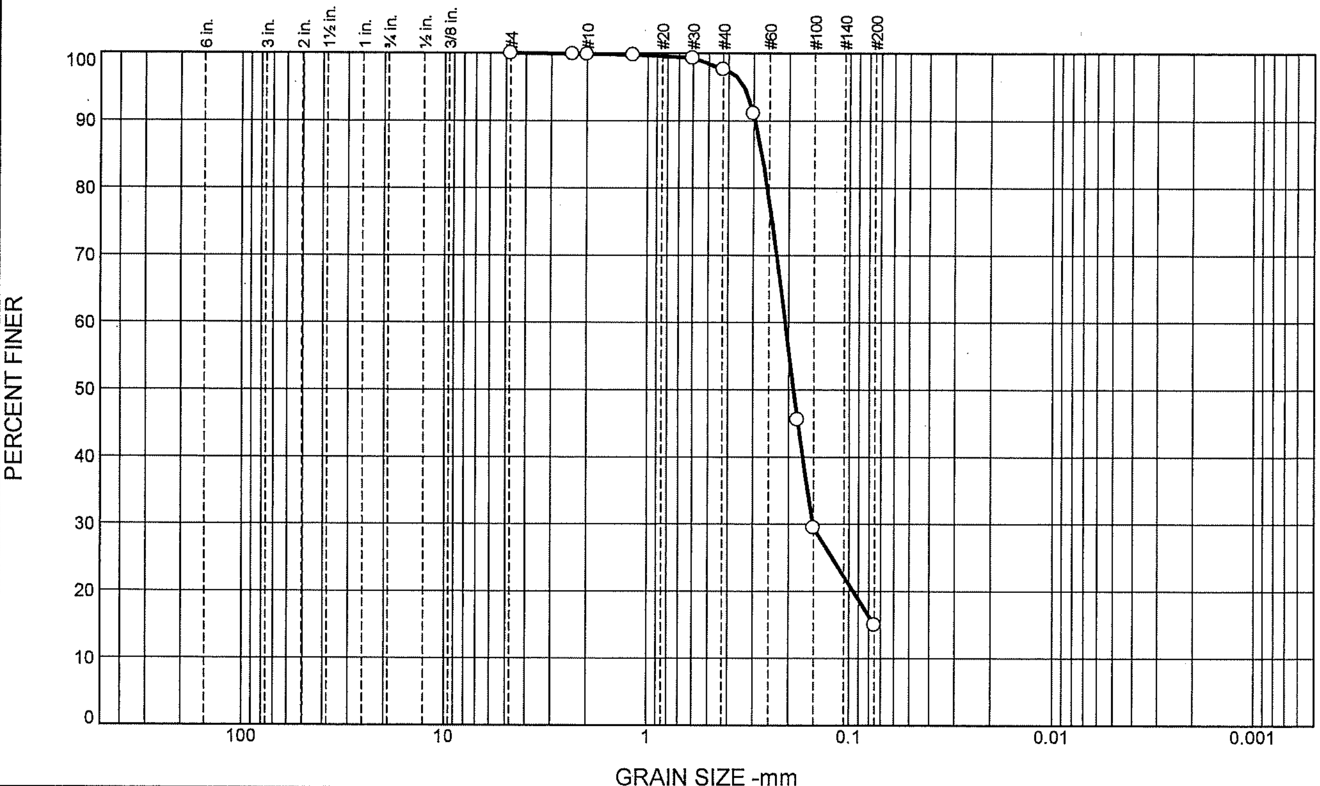
While Drilling ▽ 8.5' Upon Completion of Drilling ______
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **7/22/13** End **7/22/13**
Driller **BSD** Chief **DC** Rig **CME-750**
Logger **JM** Editor **DAS**
Drill Method **2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	2.2	82.6	15.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#10	99.8		
#16	99.8		
#30	99.3		
#40	97.6		
#50	91.1		
#80	45.5		
#100	29.5		
#200	15.0		

* (no specification provided)

Material Description

Brown Fine Sand, Some Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2938 D_{85}= 0.2718 D_{60}= 0.2073
D_{50}= 0.1881 D_{30}= 0.1511 D_{15}= 0.0751
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Sample Number: B-2A, S-6

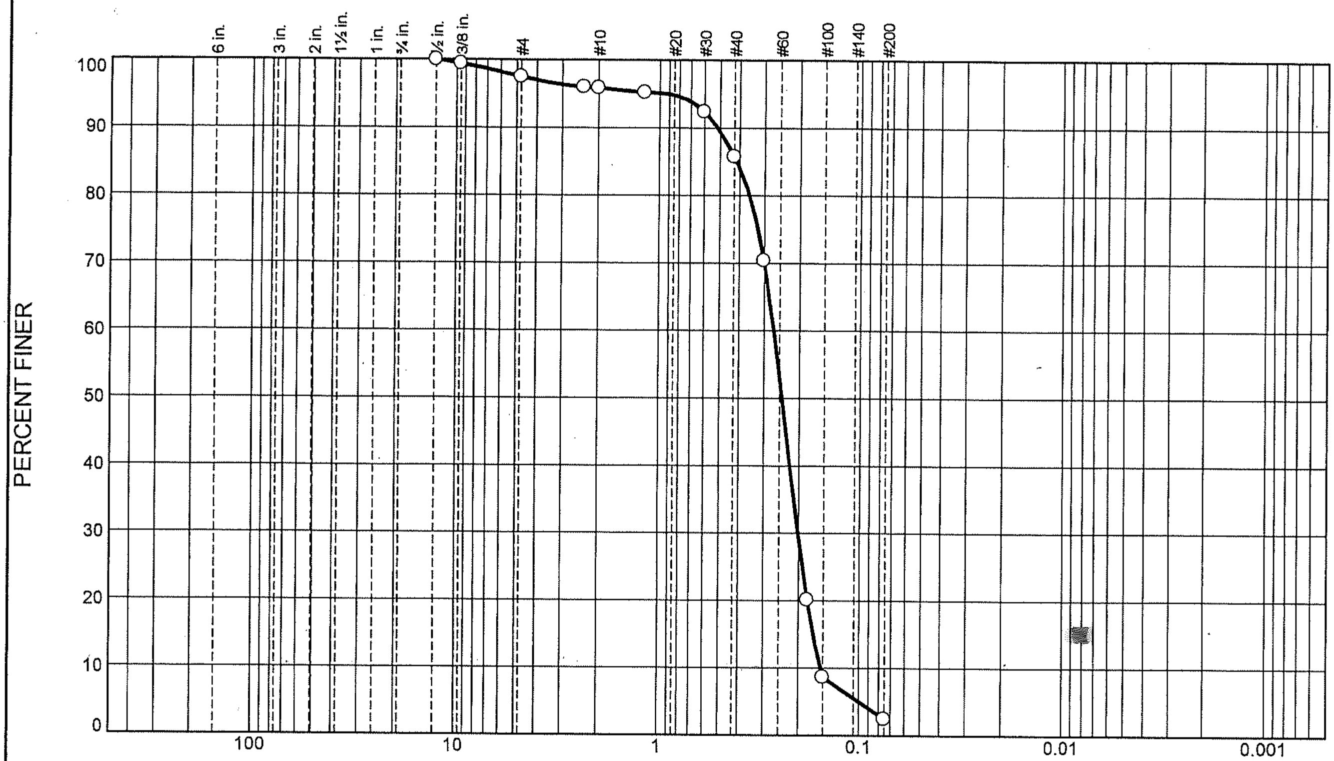
Date: 7/5/17

CGC,Inc.

Client: City of Madison - Public Works
Project: Fire Station No. 14
Dairy Drive, Madison
Project No: C17051-15 **Figure**

Tested By: DRW **Checked By:** TFG

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.5	1.6	10.1	83.3	2.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2	100.0		
3/8	99.4		
#4	97.5		
#8	96.0		
#10	95.9		
#16	95.2		
#30	92.4		
#40	85.8		
#50	70.4		
#80	20.1		
#100	8.7		
#200	2.5		

* (no specification provided)

Material Description

Brown Fine to Medium Sand, Trace Silt and Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5150 D_{85}= 0.4128 D_{60}= 0.2665
D_{50}= 0.2420 D_{30}= 0.2005 D_{15}= 0.1680
D_{10}= 0.1542 C_u= 1.73 C_c= 0.98

Classification

USCS= SP AASHTO=

Remarks

Sample Number: B-4A, S-6

Date: 7/5/17

CGC, Inc.

Client: City of Madison - Public Works
Project: Fire Station No. 14
Dairy Drive, Madison
Project No: C17051-15 **Figure**

Tested By: DRW **Checked By:** TFG

CGC, Inc.

LOG OF TEST BORING

General Notes

DESCRIPTIVE SOIL CLASSIFICATION

Grain Size Terminology

Soil Fraction	Particle Size	U.S. Standard Sieve Size
Boulders	Larger than 12"	Larger than 12"
Cobbles	3" to 12"	3" to 12"
Gravel: Coarse	¾" to 3"	¾" to 3"
Fine	4.76 mm to ¾"	#4 to ¾"
Sand: Coarse	2.00 mm to 4.76 mm	#10 to #4
Medium	0.42 to mm to 2.00 mm	#40 to #10
Fine	0.074 mm to 0.42 mm	#200 to #40
Silt	0.005 mm to 0.074 mm	Smaller than #200
Clay	Smaller than 0.005 mm	Smaller than #200

Plasticity characteristics differentiate between silt and clay.

General Terminology

Physical Characteristics
Color, moisture, grain shape, fineness, etc.
Major Constituents
Clay, silt, sand, gravel
Structure
Laminated, varved, fibrous, stratified, cemented, fissured, etc.
Geologic Origin
Glacial, alluvial, eolian, residual, etc.

Relative Density

Term	"N" Value
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Over 50

Relative Proportions Of Cohesionless Soils

Proportional Term	Defining Range by Percentage of Weight
Trace	0% - 5%
Little	5% - 12%
Some	12% - 35%
And	35% - 50%

Consistency

Term	q_u-tons/sq. ft
Very Soft	0.0 to 0.25
Soft	0.25 to 0.50
Medium	0.50 to 1.0
Stiff	1.0 to 2.0
Very Stiff	2.0 to 4.0
Hard	Over 4.0

Organic Content by Combustion Method

Soil Description	Loss on Ignition
Non Organic	Less than 4%
Organic Silt/Clay	4 – 12%
Sedimentary Peat	12% - 50%
Fibrous and Woody Peat	More than 50%

Plasticity

Term	Plastic Index
None to Slight	0 - 4
Slight	5 - 7
Medium	8 - 22
High to Very High	Over 22

The penetration resistance, N, is the summation of the number of blows required to effect two successive 6" penetrations of the 2" split-barrel sampler. The sampler is driven with a 140 lb. weight falling 30" and is seated to a depth of 6" before commencing the standard penetration test.

SYMBOLS

Drilling and Sampling

CS – Continuous Sampling
RC – Rock Coring: Size AW, BW, NW, 2"W
RQD – Rock Quality Designation
RB – Rock Bit/Roller Bit
FT – Fish Tail
DC – Drove Casing
C – Casing: Size 2 ½", NW, 4", HW
CW – Clear Water
DM – Drilling Mud
HSA – Hollow Stem Auger
FA – Flight Auger
HA – Hand Auger
COA – Clean-Out Auger
SS - 2" Dia. Split-Barrel Sample
2ST – 2" Dia. Thin-Walled Tube Sample
3ST – 3" Dia. Thin-Walled Tube Sample
PT – 3" Dia. Piston Tube Sample
AS – Auger Sample
WS – Wash Sample
PTS – Peat Sample
PS – Pitcher Sample
NR – No Recovery
S – Sounding
PMT – Borehole Pressuremeter Test
VS – Vane Shear Test
WPT – Water Pressure Test

Laboratory Tests

q_a – Penetrometer Reading, tons/sq ft
q_a – Unconfined Strength, tons/sq ft
W – Moisture Content, %
LL – Liquid Limit, %
PL – Plastic Limit, %
SL – Shrinkage Limit, %
LI – Loss on Ignition
D – Dry Unit Weight, lbs/cu ft
pH – Measure of Soil Alkalinity or Acidity
FS – Free Swell, %

Water Level Measurement

▽ - Water Level at Time Shown
NW – No Water Encountered
WD – While Drilling
BCR – Before Casing Removal
ACR – After Casing Removal
CW – Cave and Wet
CM – Caved and Moist

Note: Water level measurements shown on the boring logs represent conditions at the time indicated and may not reflect static levels, especially in cohesive soils.

CGC, Inc.

Madison - Milwaukee

Unified Soil Classification System

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size)		
	Clean Gravels (Less than 5% fines)	
GRAVELS lore than 50% of coarse fraction arger than No. 4 sieve size	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
	GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	
	GM	Silty gravels, gravel-sand-silt mixtures
	GC	Clayey gravels, gravel-sand-clay mixtures
	Clean Sands (Less than 5% fines)	
SANDS 50% or more of coarse fraction maller than No. 4 sieve size	SW	Well-graded sands, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	
	SM	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)		
SILTS AND CLAYS Liquid limit less than 50%	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS iquid limit 50% or greater	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY)RGANIC SOILS	PT	Peat and other highly organic soils

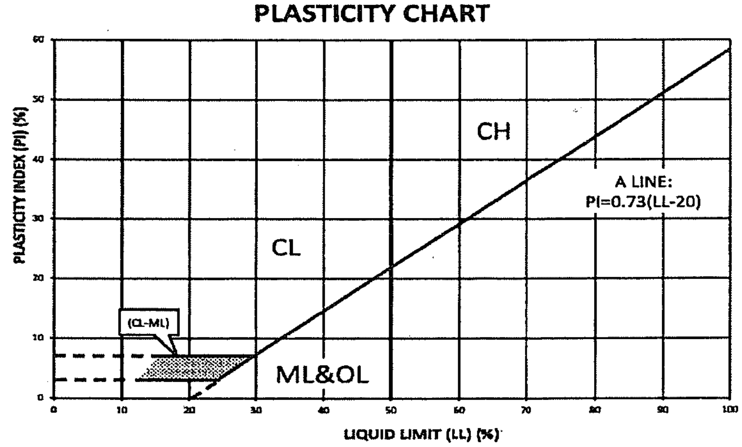
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line or P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent .... GW, GP, SW, SP
More than 12 percent .... GM, GC, SM, SC
5 to 12 percent .... Borderline cases requiring dual symbols

PLASTICITY CHART



APPENDIX C

DOCUMENT QUALIFICATIONS

APPENDIX C
DOCUMENT QUALIFICATIONS

I. GENERAL RECOMMENDATIONS/LIMITATIONS

CGC, Inc. should be provided the opportunity for a general review of the final design and specifications to confirm that earthwork and foundation requirements have been properly interpreted in the design and specifications. CGC should be retained to provide soil engineering services during excavation and subgrade preparation. This will allow us to observe that construction proceeds in compliance with the design concepts, specifications and recommendations, and also will allow design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction. CGC does not assume responsibility for compliance with the recommendations in this report unless we are retained to provide construction testing and observation services.

This report has been prepared in accordance with generally accepted soil and foundation engineering practices and no other warranties are expressed or implied. The opinions and recommendations submitted in this report are based on interpretation of the subsurface information revealed by the test borings indicated on the location plan. The report does not reflect potential variations in subsurface conditions between or beyond these borings. Therefore, variations in soil conditions can be expected between the boring locations and fluctuations of groundwater levels may occur with time. The nature and extent of the variations may not become evident until construction.

II. IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes. While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one - not even you* - should apply the report for any purpose or project except the one originally contemplated.

READ THE FULL REPORT

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes - even minor ones - and request an assessment of their impact. *CGC cannot accept responsibility or liability for problems that occur because our reports do not consider developments of which we were not informed.*

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL OPINION

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgement to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ - sometimes significantly - from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A REPORT'S RECOMMENDATIONS ARE NOT FINAL

Do not over-rely on the confirmation-dependent recommendations included in your report. *Those confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgement and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *CGC cannot assume responsibility or liability for the report's confirmation-dependent recommendations if we do not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical engineering report. Confront that risk by having CGC participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

DO NOT REDRAW THE ENGINEER'S LOGS

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

GIVE CONSTRUCTORS A COMPLETE REPORT AND GUIDANCE

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

READ RESPONSIBILITY PROVISIONS CLOSELY

Some clients, design professionals, and constructors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineer's responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

ENVIRONMENTAL CONCERNS ARE NOT COVERED

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

OBTAIN PROFESSIONAL ASSISTANCE TO DEAL WITH MOLD

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

RELY ON YOUR GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE

Membership in the Geotechnical Business Council (GBC) of Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with CGC, a member of GBC, for more information.

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Geotechnical Business Council
of the Geoprofessional Business Association
8811 Colesville Road, Suite G 106
Silver Spring, MD 20910

APPENDIX D

RECOMMENDED COMPACTED FILL SPECIFICATIONS

APPENDIX D

CGC, INC.

RECOMMENDED COMPACTED FILL SPECIFICATIONS

General Fill Materials

Proposed fill shall contain no vegetation, roots, topsoil, peat, ash, wood or any other non-soil material which by decomposition might cause settlement. Also, fill shall never be placed while frozen or on frozen surfaces. Rock, stone or broken concrete greater than 6 in. in the largest dimension shall not be placed within 10 ft of the building area. Fill used greater than 10 ft beyond the building limits shall not contain rock, boulders or concrete pieces greater than a 2 sq ft area and shall not be placed within the final 2 ft of finish subgrade or in designated utility construction areas. Fill containing rock, boulders or concrete pieces should include sufficient finer material to fill voids among the larger fragments.

Special Fill Materials

In certain cases, special fill materials may be required for specific purposes, such as stabilizing subgrades, backfilling undercut excavations or filling behind retaining walls. For reference, WisDOT gradation specifications for various types of granular fill are attached in Table 1.

Placement Method

The approved fill shall be placed, spread and leveled in layers generally not exceeding 10 in. in thickness before compaction. The fill shall be placed at moisture content capable of achieving the desired compaction level. For clay soils or granular soils containing an appreciable amount of cohesive fines, moisture conditioning will likely be required.

It is the Contractor's responsibility to provide all necessary compaction equipment and other grading equipment that may be required to attain the specified compaction. Hand-guided vibratory or tamping compactors will be required whenever fill is placed adjacent to walls, footings, columns or in confined areas.

Compaction Specifications

Maximum dry density and optimum moisture content of the fill soil shall be determined in accordance with modified Proctor methods (ASTM D1557). The recommended field compaction as a percentage of the maximum dry density is shown in Table 2. Note that these compaction guidelines would generally not apply to coarse gravel/stone fill. Instead, a method specification would apply (e.g., compact in thin lifts with a vibratory compactor until no further consolidation is evident).

Testing Procedures

Representative samples of proposed fill shall be submitted to CGC, Inc. for optimum moisture-maximum density determination (ASTM D1557) prior to the start of fill placement. The sample size should be approximately 50 lb.

CGC, Inc. shall be retained to perform field density tests to determine the level of compaction being achieved in the fill. The tests shall generally be conducted on each lift at the beginning of fill placement and at a frequency mutually agreed upon by the project team for the remainder of the project.

Table 1
Gradation of Special Fill Materials

Material	WisDOT Section 311	WisDOT Section 312	WisDOT Section 305			WisDOT Section 209		WisDOT Section 210
	Breaker Run	Select Crushed Material	3-in. Dense Graded Base	1 1/4-in. Dense Graded Base	3/4-in. Dense Graded Base	Grade 1 Granular Backfill	Grade 2 Granular Backfill	Structure Backfill
Sieve Size	Percent Passing by Weight							
6 in.	100							
5 in.		90-100						
3 in.			90-100					100
1 1/2 in.		20-50	60-85					
1 1/4 in.				95-100				
1 in.					100			
3/4 in.			40-65	70-93	95-100			
3/8 in.				42-80	50-90			
No. 4			15-40	25-63	35-70	100 (2)	100 (2)	25-100
No. 10		0-10	10-30	16-48	15-55			
No. 40			5-20	8-28	10-35	75 (2)		
No. 100						15 (2)	30 (2)	
No. 200			2-12	2-12	5-15	8 (2)	15 (2)	15 (2)

Notes:
1. Reference: Wisconsin Department of Transportation *Standard Specifications for Highway and Structure Construction.*
2. Percentage applies to the material passing the No. 4 sieve, not the entire sample.
3. Per WisDOT specifications, both breaker run and select crushed material can include concrete that is 'substantially free of steel, building materials and other deleterious material'.

Table 2
Compaction Guidelines

Area	Percent Compaction (1) Clay/Silt	Percent Compaction (1) Sand/Gravel
Within 10 ft of building lines		
Footing bearing soils	93 - 95	95
Under floors, steps and walks		
- Lightly loaded floor slab	90	90
- Heavily loaded floor slab and thicker fill zones	92	95
Beyond 10 ft of building lines		
Under walks and pavements		
- Less than 2 ft below subgrade	92	95
- Greater than 2 ft below subgrade	90	90
Landscaping	85	90

Notes:
1. Based on Modified Proctor Dry Density (ASTM D 1557)

APPENDIX E

SETTLEMENT PLATFORM

Settlement Platform Instructions

Settlement platforms will be placed as close to the bottom of the fill as is practical. The surface upon which the settlement platform should rest must be cleaned off to a flat compacted surface. The settlement platform should then be placed in this surface and backfill should be placed over the top of the settlement platform to a depth of at least two feet.

Initial elevations should be taken on the top of the first section of the pipe riser. These should be referenced to the elevation at the platform so that all future additional lengths of riser pipe can be referenced to the elevation of the platform.

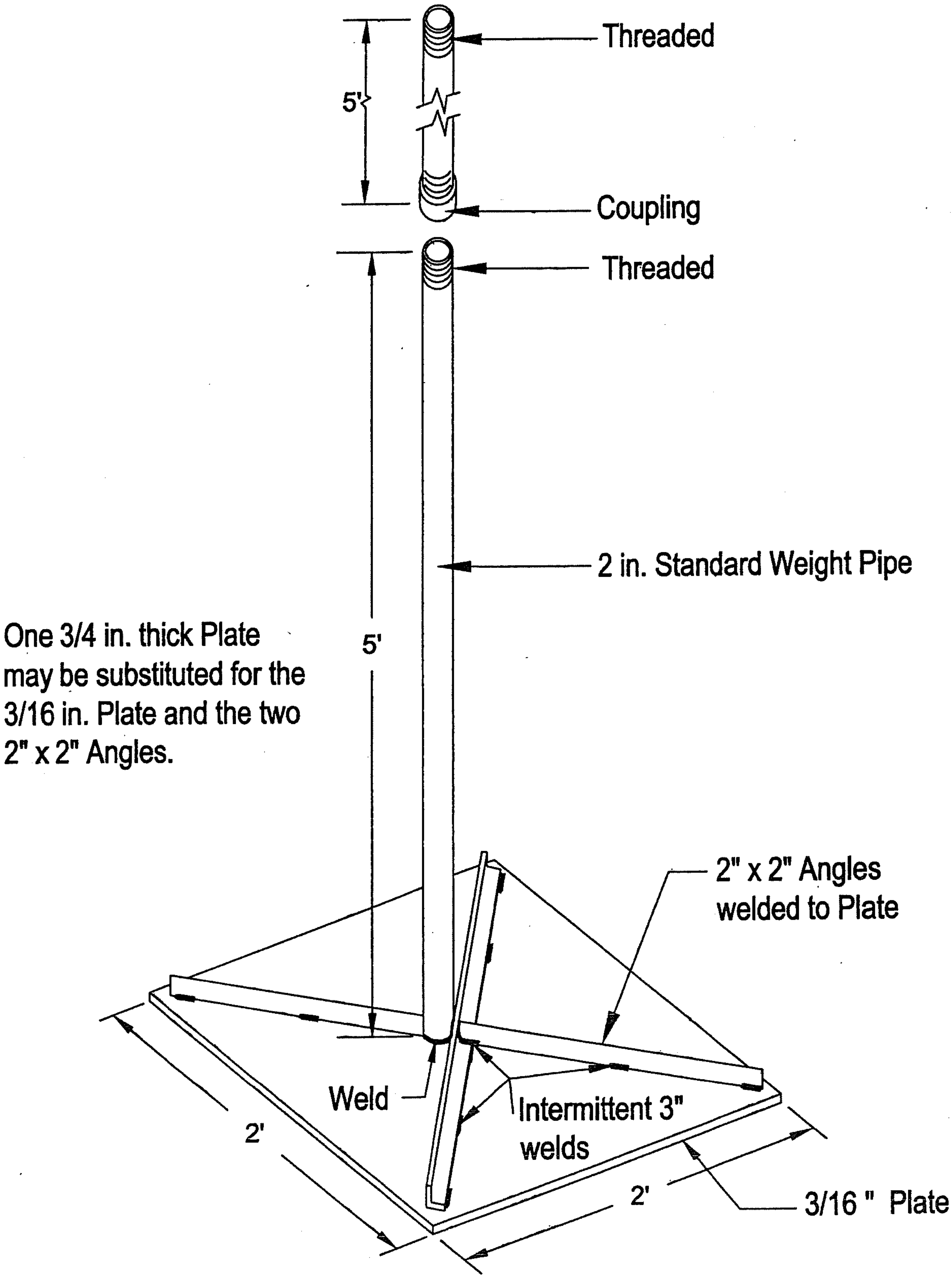
The settlement platform locations should be guarded with tall stakes driven into the fill marked with red flags. No equipment should be permitted to operate closer than three feet from the riser pipes. As each layer of fill is being added to the area, fill should be carefully placed around the riser pipe to an elevation slightly above the surrounding area. The vibrating compactor then should be moved to within a foot or so of the riser pipe with care being taken so as to avoid disturbance of the riser pipe. If necessary, hand compacting equipment should be used to avoid damage to the riser pipe.

When settlement platform readings are taken, the elevation of nearby fill should also be taken.

The elevation at the settlement platform and the nearby fill should be observed at least once each week, and during the period that fill is being placed in the vicinity of the platform, these elevations should be obtained daily. All elevation data should be plotted according to time, with one graph prepared per settlement platform. The plotting should contain the time scale along the abscissa and the vertical scale should be height of fill shown going upward from the middle of the paper, and the settlement of the settlement platforms should be plotted downward from the middle of the paper. The time sale should include both the actual calendar date and also the number of days since the platform was installed.

The benchmark to be used in reading the various settlement platforms should be well away from the proposed excavation or filling areas.

If damage occurs to any settlement platform riser pipe, it is suggested that the pipe be repaired as quickly as possible and the readings continued. The adjustment of these readings can be made, considering that settlement rate during the period of damage was uniform.



CGC, Inc.

Typical Detail
Settlement Platform

CGC, Inc.

Construction • Geotechnical
Consulting Engineering/Testing

August 7, 2017
C17051-18

Mr. Jon Evans, P.E., LEED AP-BD&C
Building Design Project Manager
Department of Public Works
Engineering Division
City-County Building, Room 115
210 Martin Luther King Jr. Blvd
Madison, WI 53703

Re: Addendum to Geotechnical Exploration Report
Proposed Fire Station No. 14
3201 Dairy Drive
City of Madison, Dane County, Wisconsin

Dear Mr. Evans:

As requested, Construction • Geotechnical Consultants, Inc. (CGC) arranged for geophysical testing to further evaluate the subsurface conditions as it relates to seismic site class. The recommendations in other sections of our report (Report C17051-15, dated July 14, 2017) completed for this project are still current. We are sending you an electronic copy of this report and can provide a paper copy upon request.

GEI Consultants, Inc. (GEI) (under subcontract to CGC) completed a Refraction Micro-Tremor (ReMi) survey on July 28, 2017 in order to estimate the shear wave velocity profile within the upper 100 ft of the site. The findings of their geophysical survey indicated that the shear wave velocity profile was fairly low in the upper approximately 20 ft of the site, which is consistent with the findings of the previously-completed soil borings on this site that encountered loose sands to approximately 20 ft below existing grade. The ReMi survey indicates that the density of the soil increases with depth (based on increased shear wave velocity), with a noticeable increase in shear wave velocity near 85 ft, which is generally consistent with very dense soil. Based on the ReMi survey, the average shear wave velocity in the upper 100 ft of the site was determined to be 1,076 feet per second. GEI's report is attached for additional information on the test methods, results and conclusions.

In our opinion, based on the average shear wave velocity of 1,076 feet per second in the upper 100 ft of the site, the average soil properties in the upper 100 ft of the site can be characterized as a stiff soil profile. This characterization would classify the site as **Site Class D** for seismic design according to International Building Code (see Table 1613.5.2).

2921 Perry Street, Madison WI 53713
Telephone: 608/288-4100
FAX: 608/288-7887

* * * * *

We trust that this report satisfies the current needs of this project. If you have any questions or need additional consultation, please contact us.

Sincerely,

CGC, Inc.

David A. Staab, P.E., LEED AP
Senior Consulting Professional

Encl: Appendix A - GEI Report, Date August 3, 2017

APPENDIX A

GEI REPORT (Project No. 1703284), DATED AUGUST 3, 2017

GEI Consultants

Consulting Engineers and Scientists

August 3, 2017
GEI Project No. 1703284

VIA EMAIL: *dstaab@cgcinc.net*

David A. Staab, P.E., LEED AP
CGC, Inc.
2921 Perry Street
Madison, WI 53713

RE: Seismic Site Classification at the Proposed Madison Fire Station, Madison, Wisconsin

Dear Mr. Staab:

We are pleased to present the following report on the seismic testing that we performed in accordance with our agreement.

Introduction

GEI Consultants, Inc. (GEI) was instructed by CGC, Inc. to perform a Refraction Micro-tremor (ReMi) survey for seismic site classification at the site for the proposed Madison Fire Station at 3201 Dairy Drive in Madison, Wisconsin. GEI performed the ReMi measurements at the above-referenced site on Friday, July 28, 2017.

Test Results

To characterize the shear wave velocity characteristics of the subsurface profile, GEI conducted a ReMi survey within the development area in the locations shown on Figure No. 1. The ReMi method is described in Louie, 2001 ((Louie, J, N., 2001, Faster, Better: Shear-wave Velocity to 100 Meters Depth from Refraction Microtremor Arrays: Bulletin of the Seismological Society of America, v. 91, p. 347-364). The method uses standard seismic P-wave recording equipment and ambient noise to produce average one-dimensional shear-wave profiles.

The survey line laid out for this work employed a total of 24 geophones spaced at 10 foot centers. Data was recorded in 20 second samples, with a 2-millisecond sampling rate per channel, utilizing a Geometrics 24 channel "Geode" seismograph and 4.5 Hz. geophones.

GEI Consultants, Inc.
400 N. Lakeview Parkway, Suite 140, Vernon Hills, IL 60061
847.984.3401 fax: 847.984.3532

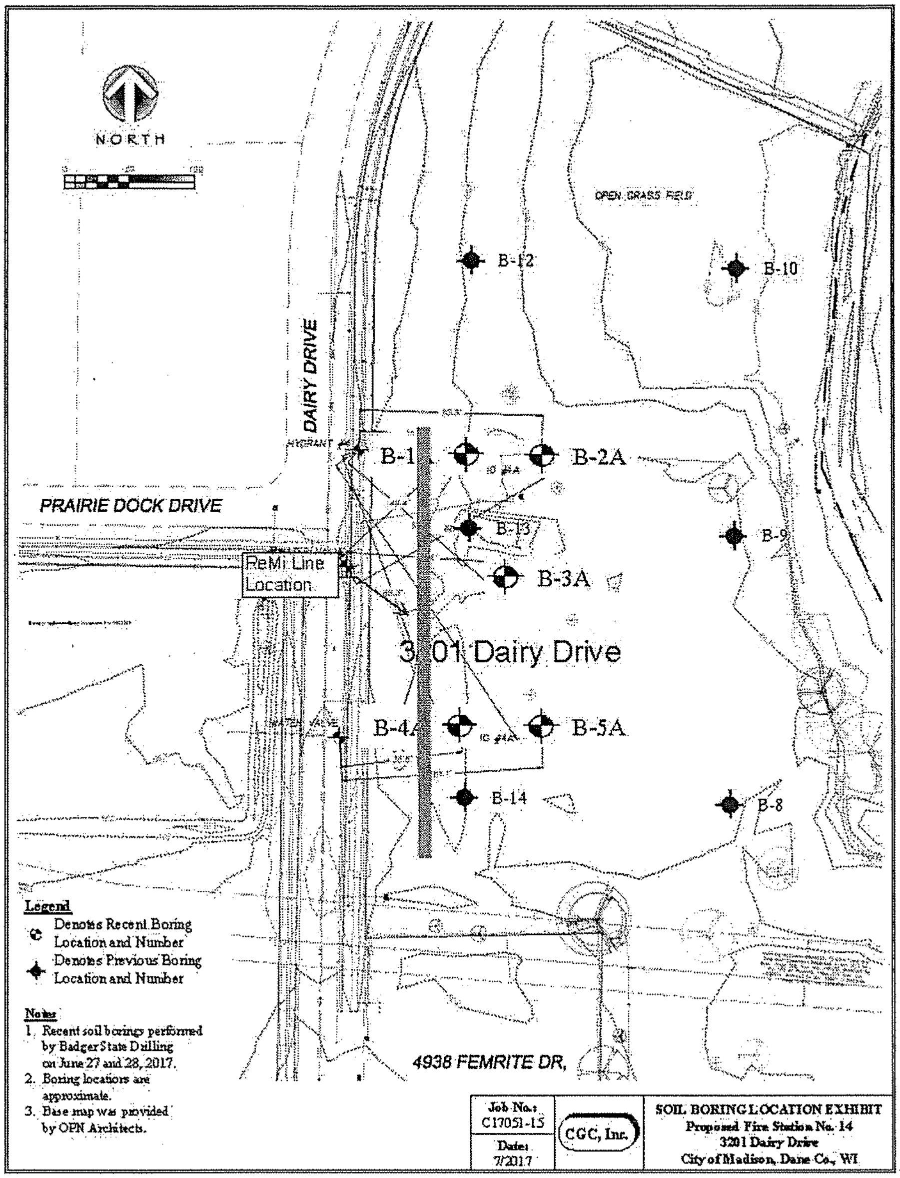


Figure No. 1

Background vibrations from vehicle traffic on the adjacent road were measured and employed in a wave-field transformation data processing technique to permit interpretation of the shear wave velocity profile using the ReMi "V-Spect" Computer program, developed by Optim Software. The resulting profile, presented in Figure No. 2, represents the average shear wave velocity profile over the length of the array. However, it should be noted that the actual profile varies from point to point over the extent of the array.

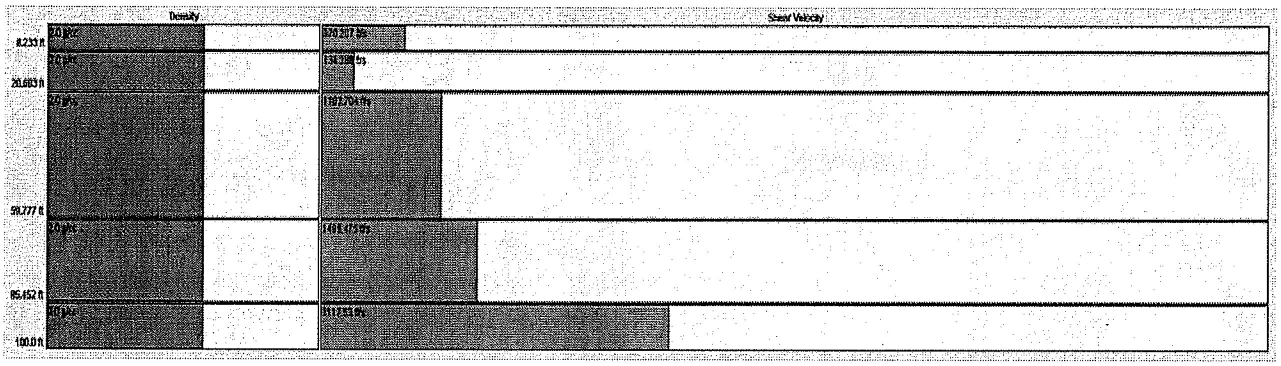


Figure No. 2

In general, the shear wave velocity was found to be relatively low within the upper 20 feet of the subsurface profile, with a gradual increase to a depth of about 85 feet. Below 85 feet a relatively high shear wave velocity, consistent with very dense soil, was interpreted from the results. This is consistent with the results of soil test borings drilled on the site, which were provided for our review.

Conclusion

The average shear wave velocity to a depth of 100 feet determined from this test was 1076 feet per second. This value is consistent with the characteristics of Seismic Site Class D as defined by the International Building Code.

We thank you for this opportunity to provide our services to CGC, Inc. If you have any questions regarding the contents of this report, please do not hesitate to contact us at 847-984-3401.

Respectfully,

GEI CONSULTANTS, INC.

Sean B. Brady
Senior Instrumentation Specialist

Bernard H. Hertlein, FACI, M. ASCE, M.GI
Senior Consultant

SBB:nls

CGC, Inc.
Construction • Geotechnical
Consulting Engineering/Testing

September 26, 2017
C17051-15

Mr. Jon Evans, P.E., LEED AP-BD&C
Building Design Project Manager
Department of Public Works
Engineering Division
City-County Building, Room 115
210 Martin Luther King Jr. Blvd
Madison, WI 53703

Re: Supplemental Geotechnical Exploration Report
Proposed Fire Station No. 14 – Helical Pier Alternative
3201 Dairy Drive
City of Madison, Dane County, Wisconsin

Dear Mr. Evans:

Construction • Geotechnical Consultants, Inc. (CGC) has completed the supplemental geotechnical exploration program for the proposed Fire Station No. 14 on Dairy Drive. The purpose of this exploration program was to evaluate the deeper subsurface conditions within the planned construction area and to provide geotechnical recommendations regarding helical pier design/construction. We are sending you an electronic copy of this report and we can provide a paper copy upon request.

PROJECT DESCRIPTION AND SITE CONDITIONS

We understand that Fire Station No. 14 is proposed for a vacant parcel on the east side of Dairy Drive, across from the intersection with Prairie Dock Drive. A geotechnical report including recommendations regarding site preparation, foundation, floor slab and pavement design/construction along with our assessment of the site class for seismic design was issued by us on July 13, 2017. A geophysical investigation of the site was conducted thereafter to more accurately determine (and improve) the site class for seismic design of the planned building, which was included in a report dated August 7, 2017.

Since our initial foundation recommendations included intermediate to deep foundations due to very loose sands extending fairly deep below the ground surface on this site, but previous borings were only performed to depths of 30 ft below current site grades, one additional boring (Boring 6A) was performed within the planned building footprint to gather more information for helical pier design.

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Telephone: 608/288-4100
FAX: 608/288-7887

SUBSURFACE CONDITIONS

Subsurface conditions were explored for this study by drilling one Standard Penetration Test (SPT) soil boring (labeled B-6A) to a planned depth of 90 ft below the ground surface. However, the boring was stopped at 70 ft after encountering about 13 ft of very dense soil. The boring location was selected and field-staked by CGC. The boring was drilled on September 21, 2017 by Badger State Drilling (under subcontract to CGC) using an ATV-mounted D-50 rotary drill rig equipped with hollow-stem augers, mud rotary equipment and an automatic SPT hammer. The ground surface elevations at the boring location was interpolated by CGC using a topographic site plan (showing 1-ft contour lines), which was provided to us by OPN Architect, and should therefore be considered approximate.

In addition to the deep boring recently performed within the building footprint, we have also included five SPT soil borings that were performed earlier this summer within the building footprint (labeled B-1A through B-5A) and six previous soil borings located in the vicinity of the proposed building in our evaluation of the site. Specific procedures used for drilling and sampling are described in Appendix A, and the recent and previous boring locations are shown in plan on the Soil Boring Location Exhibit attached in Appendix B.

The subsurface profiles at the boring locations varied somewhat at shallow depths due to previous site development and grading, but the profiles were fairly similar with depth. The following strata were typically encountered (in descending order):

- About 8 to 14 in. of ***topsoil/topsoil fill*** in about half of the borings; over
- About 2.3 to 6 ft of ***fill*** or ***possible fill*** in most borings, consisting primarily of soft to very stiff clay with variable sand and gravel contents as well as occasional organic inclusions (roots and other organic matter), and secondarily of medium dense sand with considerable silt and gravel contents; followed by
- About 1.5 to 3.5 ft of natural, soft to very stiff ***lean to silty clay*** with varying sand content and very loose to loose ***clayey sand*** in most borings; and/or
- Very loose to medium dense (with isolated dense zones) ***sand*** with variable silt and gravel contents to the maximum depths explored in most borings/to about 37 ft below the ground surface in B-6A; underlain by
- About 15 ft of cohesive/fine-grained strata, consisting of loose to medium dense ***sandy silt*** and stiff to very stiff ***lean to fat clay*** that extended to a depth of approximately 52 ft in Boring 6A; over

- Medium dense to very dense ***sand*** with typically considerable silt and gravel contents and scattered cobbles/boulders to the termination depth of 70 ft in Boring 6A. Note that the sand became very dense about 57 ft below existing grade.

Exceptions to the above profile include the following: Instead of *topsoil*, about 4 and 12 in. of ***sand/gravel surface*** was encountered in Borings 3A and 13, respectively, while borings 4A, 5A, 8 and 9 did not contain either. The *fill/possible fill* layer was not present in Boring 12, which featured a profile of topsoil over apparent natural clay that was underlain by natural sand strata. Conversely, *natural clays* were apparently missing in Borings 1A and 8 through 10. However, approximately 3.5-ft thick ***probable buried topsoil layers*** were encountered below the fill in Borings 8 and 9. The organic content (as measured by loss-on-ignition) of the buried topsoil layer ranged from 6.5% to 9.1%, with soils with loss on ignition exceeding 4% being considered organic. The shallow clays (fill and natural) were soft to very stiff, with moisture contents ranging from 14.9% to 29.5% in representative samples. Some of the on-site cohesive soils should therefore be considered slightly to moderately compressible. Possible clay fill samples obtained from Borings 1A and 4A containing apparent organic pockets had overall organic contents between 2.6% and 3.4%.

Groundwater was encountered in the borings during drilling at about 6 to 8.5 ft below site grades (corresponding to approximately EL 854.4 to 857.5 ft). Groundwater levels can be expected to fluctuate with seasonal variations in precipitation, infiltration, evapotranspiration, the level of nearby streams and lakes, the pumping rate of nearby wells and other factors. A more detailed description of the site soil and groundwater conditions is presented on the Soil Boring Logs attached in Appendix B, which also contain the laboratory test results.

DISCUSSION AND RECOMMENDATIONS

Subject to the limitations discussed below and based on the subsurface exploration, it is our opinion that the site is generally suitable for construction. *However, based on the presence of fairly deep, very loose sands within large portions of the proposed building footprint, a conventional spread footing foundation system at a typical design bearing pressure is likely not feasible for most of the planned building, as adequate undercutting/replacement of marginal soils will likely be impractical due to shallow groundwater.* In our opinion, suitable foundation support will require ground improvement with rammed aggregate piers (RAPs), which was discussed in detail in or previous report. Alternatively, the building could be supported on deep foundations such as helical piers, which was only briefly discussed previously because subsurface information was not sufficient for helical pier design recommendations at that point. More detailed recommendations for helical pier design/construction are included in the following paragraphs. Additional information regarding the conclusions and recommendations presented in this report is discussed in Appendix C.

Helical Piers

In our opinion, the proposed building can be supported on helical piers that extend through the existing fill, marginal shallow clay/clayey sand, very loose sand and underlying silt/clay strata, and bear within the medium dense to very dense sand layers that were encountered below a depth of approximately 52 ft in Boring 6A. The soil parameters included in Table 1 should be used for helical pier design.

Helical pier capacity will vary depending on the number and size of helices, depth of installation and bearing stratum. Utilizing the parameters summarized in Table 1, we used the commercially available software HeliCap®, produced by Hubbell Power Systems, to develop *preliminary* helical pier capacity estimates for a three-helix configuration (10 in., 12 in. and 14 in.) on a larger diameter circular shaft. In general, we estimate that *ultimate* helical pier capacities (in compression) ranging from about 100 to 180 kips can be developed for 50 to 60-ft long helical piers (below the bottom of foundation grade). Note that the helical pier capacity at these higher loads appears to be limited by the structural capacity of the helices and not from the geotechnical capacity of the soils. We anticipate that helical piers will encounter refusal shortly after reaching the very dense sand strata (below about 57 ft in Boring 6A). *The helical pier depths and capacities should be considered approximate and, since helical piers are proprietary, the helical pier installer should determine the helix configuration and depth necessary to satisfy project requirements.*

The installation torque is correlated with capacity, although static load tests can also be completed to confirm the ultimate and allowable capacities. A minimum factor of safety of 2.0 to 3.0 is generally used for helical pier design. If a factor of safety of 2.0 is used to determine the allowable helical pier capacity, we recommend that at least one static load test be performed to confirm the helical pier design satisfies the project requirements. Static load tests should be performed on piers installed to similar installation depths and torques as production piers. Additionally, the torque of each pier should be monitored during installation to document that each pier is torqued to the minimum torque established by the static load tests or empirical correlations to ultimate capacity. If static load tests are not performed, we recommend using a minimum factor of safety of 2.5 to 3.0 in determining the allowable capacity, and the installation torque of each pier should be monitored, which is empirically correlated to the ultimate capacity. *Since there are multiple proprietary helical pier systems, it is the responsibility of the contractor to determine that their selected helical pier configuration, installation procedures and termination criteria satisfy the project requirements.*

TABLE 1

Recommended Soil Parameters for Helical Pier Foundations

Proposed Fire Station No. 14, 3201 Dairy Drive, Madison, WI

Soil Layer	Cohesive FILL / Possible Fill and Natural CLAY to Clayey SAND		Very Loose to Medium Dense SAND		Medium Dense SAND with variable Silt and Gravel Contents		Medium Dense Sandy SILT		Stiff to Very Stiff Lean to Fat CLAY		Loose Sandy SILT		Medium Dense SAND		Very Dense SAND, Some Silt and Gravel	
Approximate Depth	**Top**	**Bottom**	**Top**	**Bottom**	**Top**	**Bottom**	**Top**	**Bottom**	**Top**	**Bottom**	**Top**	**Bottom**	**Top**	**Bottom**	**Top**	**Bottom**
Boring 1A	0 ft	6 ft	6 ft	11 ft	11 ft	30 ft (1)										
Boring 2A	0 ft	6 ft	6 ft	11 ft	11 ft	30 ft (1)										
Boring 3A	0 ft	6 ft	6 ft	16 ft	16 ft	30 ft (1)										
Boring 4A	0 ft	8.5 ft	8.5 ft	22 ft	22 ft	30 ft (1)										
Boring 5A	0 ft	6 ft	6 ft	22 ft	22 ft	30 ft (1)										
Boring 6A	0 ft	5.5 ft	5.5 ft	17 ft	17 ft	37 ft	37 ft	42 ft	42 ft	47 ft	47 ft	52 ft	52 ft	57 ft	57 ft	70 ft (1)
Boring 13	0 ft	5.5 ft	5.5 ft	18 ft	18 ft	30 ft (1)										
Boring 14	0 ft	7 ft	7 ft	22 ft	22 ft	30 ft (1)										
Estimated Soil Parameters (2)																
Short-term Loading Conditions																
Angle of internal friction, ϕ	**0** degrees		**26** degrees		**32** degrees		**30** degrees		**0** degrees		**28** degrees		**32** degrees		**38** degrees	
Cohesion	**750** lb/sq ft		**0** lb/sq ft		**0** lb/sq ft		**0** lb/sq ft		**1500** lb/sq ft		**0** lb/sq ft		**0** lb/sq ft		**0** lb/sq ft	
Long-term Loading Conditions																
Angle of internal friction, ϕ	**25** degrees		**26** degrees		**32** degrees		**30** degrees		**25** degrees		**28** degrees		**32** degrees		**36** degrees	
Cohesion	**30** lb/sq ft		**0** lb/sq ft		**0** lb/sq ft		**0** lb/sq ft		**30** lb/sq ft		**0** lb/sq ft		**0** lb/sq ft		**0** lb/sq ft	
Moist unit weight	**120** lb/cu ft		**110** lb/cu ft		**120** lb/cu ft		**120** lb/cu ft		**120** lb/cu ft		**115** lb/cu ft		**120** lb/cu ft		**125** lb/cu ft	
Submerged unit weight	**125** lb/cu ft		**120** lb/cu ft		**130** lb/cu ft		**130** lb/cu ft		**125** lb/cu ft		**125** lb/cu ft		**130** lb/cu ft		**135** lb/cu ft	
Buoyant unit weight	**63** lb/cu ft		**58** lb/cu ft		**68** lb/cu ft		**68** lb/cu ft		**63** lb/cu ft		**63** lb/cu ft		**68** lb/cu ft		**73** lb/cu ft	
Earth pressure coefficients																
Active, Ka	**1.00**		**0.39**		**0.31**		**0.33**		**1.00**		**0.36**		**0.31**		**0.24**	
Passive, Kp	**1.00**		**2.56**		**3.25**		**3.00**		**1.00**		**2.77**		**3.25**		**4.20**	

Notes:

(1) End of boring.

(2) Does not include factor of safety.

Other helical pier considerations include the following:

- *Prospective helical pier contractors should be aware of the presence of possible buried concrete within the surficial fill soils (or other remnants of the former development) and very dense zones or possible cobbles and boulders within the predominantly very loose to medium dense natural sand strata, that may impact helical pier installation.* The helical pier installer should have provisions to deal with the presence of potential obstructions. If obstructions are encountered, removing obstructions with an excavator would be one method to deal with the obstructions. Using smaller diameter helix configuration may also assist in the installation process but may require deeper piers to develop capacity.

- The existing fill, marginal shallow clay/clayey sand and very loose sand layers have relatively low lateral capacity. As such, round helical pier shafts, which have higher resistance to buckling, are recommended over square shafts. A buckling analysis should be completed to check that the pier shaft has adequate buckling resistance.

- Portions of the existing fill soils could potentially contain contaminants that may represent an increase in corrosion potential for the steel helical pier shafts. We therefore recommend that measures be taken to protect the helical pier shafts from corrosion, such as with a corrosion-resistant coating, or by increasing the thickness of the steel shafts to account for section loss due to corrosive soils. The final helical pier design should take into account the potentially corrosive nature of some of the soils at this site.

- Pile caps along the perimeter of the building should be located a minimum of 4 ft below finish grade for frost protection.

- We recommend helical pier installation, pile cap subgrade preparation and concrete placement be monitored by CGC.

As discussed in the initial geotechnical report, since floor slab loads are expected to be fairly light, we anticipate that the floor slab will be a conventional concrete slab-on-grade. Note, however, that undercutting/replacement of some of the shallow fill and natural soils will likely be required to develop a suitable subgrade for slab support. Although structural slab support on helical piers could be considered, we anticipate a conventional slab-on-grade with undercutting/replacement will be economically favorable to a structural slab. We can provide additional information, if needed.

* * * * *

It has been a pleasure to serve you on this project. If you have any questions or need additional consultation, please contact us.

Sincerely,

CGC, Inc.

Tim F. Gassenheimer, E.I.T.
Staff Engineer

David A. Staab, P.E., LEED AP
Senior Consulting Professional

Encl: Appendix A - Field Exploration
Appendix B - Soil Boring Location Exhibit
Log of Recent Test Boring (1)
Logs of Previous Test Borings – June 2017 (5)
Logs of Previous Test Borings – July 2013 (6)
Log of Test Boring-General Notes
Unified Soil Classification System
Appendix C - Document Qualifications

APPENDIX A

FIELD EXPLORATION REPORT

APPENDIX A

FIELD EXPLORATION

Subsurface conditions were explored for this study by drilling one Standard Penetration Test (SPT) soil boring (labeled B-6A) to a planned depth of 90 ft below the ground surface. However, the boring was stopped at 70 ft after encountering about 13 ft of very dense soil. The boring location was selected and field-staked by CGC. The boring was drilled on September 21, 2017 by Badger State Drilling (under subcontract to CGC) using an ATV-mounted D-50 rotary drill rig equipped with hollow-stem augers, mud rotary equipment and an automatic SPT hammer. The ground surface elevations at the boring location was interpolated by CGC using a topographic site plan (showing 1-ft contour lines), which was provided to us by OPN Architect, and should therefore be considered approximate.

In addition to the deep boring recently performed within the building footprint, we have also included five SPT soil borings that were performed earlier this summer within the building footprint (labeled B-1A through B-5A) and six previous soil borings located in the vicinity of the proposed building in our evaluation of the site.

In the previous borings, soil samples were obtained at 2.5-foot intervals to a depth of 10 ft and at 5 ft intervals thereafter. To better explore the extent of very loose sands, most of the the recent borings were samples at 2.5-foot intervals to a depth of 20 ft and at 5 ft intervals thereafter. The soil samples were obtained in general accordance with specifications for standard penetration testing, ASTM D 1586. The specific procedures used for drilling and sampling are described below.

1. Boring Procedures between Samples

   The boring is extended downward, between samples, by a hollow-stem auger.

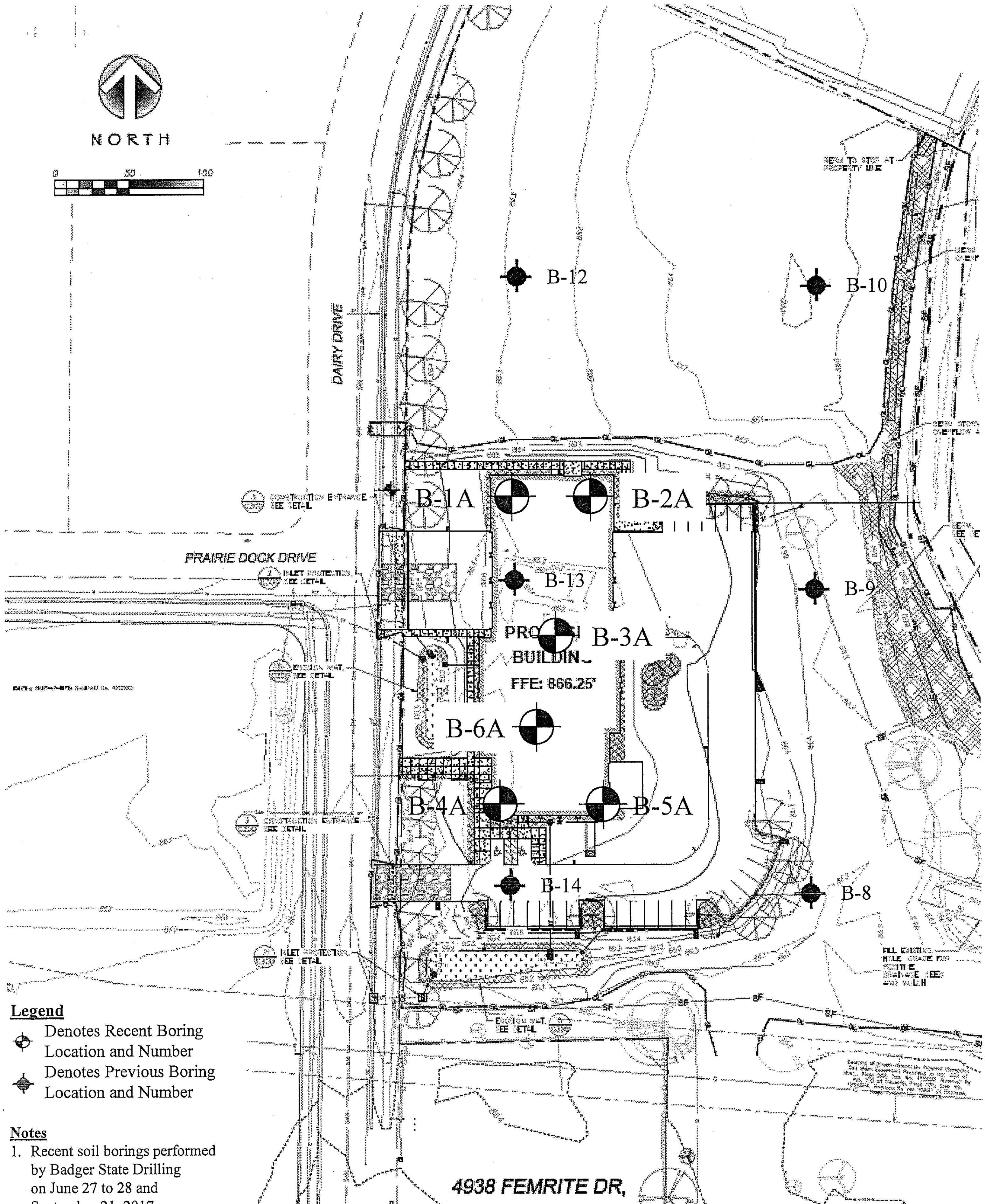
2. Standard Penetration Test and Split-Barrel Sampling of Soils
   (ASTM Designation: D 1586)

   This method consists of driving a 2-inch outside diameter split-barrel sampler using a 140-pound weight falling freely through a distance of 30 inches. The sampler is first seated 6 inches into the material to be sampled and then driven 12 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the log of borings and is known as the Standard Penetration Resistance.

During the field exploration, the driller visually classified the soil and prepared a field log. *Field screening of the soil samples for possible environmental contaminants was not conducted by the drillers as environmental site assessment activities were not part of CGC's work scope.* Water level observations were made in each boring during and after drilling and are shown at the bottom of each boring log. Upon completion of drilling, the borings were backfilled with bentonite to satisfy WDNR regulations, and the soil samples were delivered to our laboratory for visual classification and laboratory testing. The soil samples were visually classified by a geotechnical engineer using the Unified Soil Classification System. The final logs prepared by the engineer, including laboratory test results, a boring location map, and a description of the Unified Soil Classification System are presented in Appendix B.

APPENDIX B

SOIL BORING LOCATION EXHIBIT
LOGS OF TEST BORINGS (1)
LOG OF PREVIOUS TEST BORINGS – JUNE 2017 (5)
LOG OF PREVIOS TEST BORINGS – JULY 2013 (6)
LOG OF TEST BORING – GENERAL NOTES
UNIFIED SOIL CLASSIFICATION SYSTEM



Legend

- Denotes Recent Boring Location and Number
- Denotes Previous Boring Location and Number

Notes

1. Recent soil borings performed by Badger State Drilling on June 27 to 28 and September 21, 2017.
2. Boring locations are approximate.
3. Base map was provided by OPN Architects.

Job No.:	CGC, Inc.	SOIL BORING LOCATION EXHIBIT
C17051-15		Proposed Fire Station No. 14
Date:		3201 Dairy Drive
09/2017		City of Madison, Dane Co., WI

CGC Inc.

LOG OF TEST BORING

Project: Proposed Fire Station No. 14
3201 Dairy Drive
Location: City of Madison, Dane Co., WI

Boring No. 6A
Surface Elevation (ft) ± 864.0
Job No. C17051-15
Sheet 1 of 2

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
				0–0.5	± 6 in. TOPSOIL FILL with Gravel (OL - Fill)					
1	18	M	8		Very Stiff, Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL)	(3.0-3.5)				
2	18	M	8		Loose, Gray Clayey Fine to Medium SAND, Scattered Less Clayey Seams (SC)					
3	12	M/W	7	5	Very Loose to Loose, Tan Fine to Medium SAND, Trace Silt and Gravel (SP)					
4	12	W	2	∇						
5	10	W	6	10–15	*Grading Gray near 13.5 ft*					
6	12	W	32		Medium Dense to Dense, Gray Fine SAND, Some Silt, Trace Gravel (SM)					
7	12	W	16	20–25						
8	10	W	6		Loose, Grayish Brown Fine to Medium SAND, Little Silt, Trace Gravel (SP-SM)					
9	12	W	16	30–35	Medium Dense, Gray Fine to Medium SAND, Some Silt, Trace Gravel (SM)					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 8.5' Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 9/21/17 End 9/21/17
Driller BSD Chief KD Rig D-50
Logger DB Editor TFG
Drill Method 2.25" HSA (0-10') / MR (10-70'); Autohammer

LOG OF TEST BORING

CGC Inc.

Project: Proposed Fire Station No. 14, 3201 Dairy Drive
Location: City of Madison, Dane Co., WI

Boring No. 6A
Surface Elevation ± 864.0
Job No. C17051-15
Sheet 2 of 2

2921 PERRY STREET, MADISON, WIS. 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						Medium Dense, Gray Sandy SILT, Scattered Lean to Fat Clay Seams (ML)					
10		12	W	17	40						
						Stiff to Very Stiff, Gray Lean to Fat CLAY, Trace Sand (CL/CH)					
11		18	W	17	45		(1.5-3.5)				
						Loose, Gray Sandy SILT, Scattered Lean to Fat Clay Seams (ML)					
12		18	W	6	50						
						Medium Dense, Grayish Brown Fine to Medium SAND, Little Silt, Trace Gravel (SP-SM)					
13		18	W	24	55						
						Very Dense, Gray Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM)					
14		12	W	54	60						
15		12	W	92	65						
16		10	W	50/2"	70	*Drove Stone, Possible Top of Bedrock near 68.5 ft* *Split-Spoon Refusal at 69.2 ft*					
						End of Boring at 70 ft					
						Borehole Backfilled with Bentonite Chips					

LOG OF TEST BORING

CGC Inc.

Project	Proposed Fire Station No. 14
	3201 Dairy Drive
Location	City of Madison, Dane Co., WI

Boring No.	1A
Surface Elevation (ft)	± 863.0
Job No.	C17051-15
Sheet	1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE / VISUAL CLASSIFICATION and Remarks / SOIL PROPERTIES

No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	Visual Classification and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						± 8 in. TOPSOIL (OL)					
1		12	M	5		Soft to Medium Stiff, Gray/Brown (Lightly Mottled) Lean CLAY, Little to Some Sand, Trace Gravel, Scattered Dark Gray Organic Pockets (CL - Possible Fill)	(0.75-1.0)	23.3			2.6
2		18	M	4	5	Sand and Gravel Contents Slightly Decreasing With Depth	(0.25)	28.5			
3		16	W	4		Loose, Tan Fine to Coarse SAND, Little Gravel, Trace to Little Silt, Scattered Cobbles/Boulders (SP)					
4		18	W	9	10	Silt Content Slightly Increasing with Depth					
5		8	W	16		Medium Dense, Gray Fine to Medium SAND, Little Silt, Trace Gravel, Scattered Cobbles/Boulders (SP-SM)					
6		10	W	20	15						
7		10	W	21		Medium Dense, Gray Fine to Medium SAND, Some Silt, Trace Gravel, Scattered Cobbles/Boulders (SM)					
8		12	W	19	20						
9		8	W	29	25	Scattered Silt Seams near 23.5 ft					
10		10	W	24	30						
					35	End of Boring at 30 ft Borehole Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 6.0' Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/28/17 End 6/28/17
Driller BSD Chief MC Rig D-50
Logger MG/CD Editor TFG
Drill Method 4.25" HSA (0-10') / MR (10-30'); Autohammer

CGC Inc.

LOG OF TEST BORING

Project: Proposed Fire Station No. 14
3201 Dairy Drive
Location: City of Madison, Dane Co., WI

Boring No.: 2A
Surface Elevation (ft): ± 863.0
Job No.: C17051-15
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE / SOIL PROPERTIES

No.	Rec (in.)	Moist	N	qu (qa) (tsf)	W	LL	PL	LI
1	14	M	8	(1.75-2.0)	25.0			
2	18	M	6	~~(0.25-0.75)~~	~~14.9~~	~~20~~	~~13~~	
3	14	W	4					
4	6	W	2					
5	16	W	15					
6	8	W	11		24.2			
7	12	W	20					
8	10	W	11					
9	8	W	12					
10	10	W	17					

VISUAL CLASSIFICATION and Remarks

± 8 in. TOPSOIL (OL)

Stiff, Gray/Brown (Lightly Mottled) Lean CLAY, Little Sand, Trace Gravel, Scattered Dark Gray Organic Pockets and Roots (CL - Possible Fill)

Soft to Medium Stiff, Gray Lean to Silty CLAY, Some Sand (CL/CL-ML)

Very Loose, Tan Fine to Coarse SAND, Little Gravel, Trace Silt, Scattered Cobbles/Boulders (SP)

Scattered Clay Seams near 8.5 ft

Medium Dense, Gray Fine to Medium SAND, Some Silt, Trace Gravel, Scattered Cobbles/Boulders (SM)
P200 (Sample 6): 15.0%

Medium Dense, Gray Fine to Coarse SAND, Some Gravel, Little Silt, Scattered Cobbles/Boulders (SP-SM)

Medium Dense, Grayish Brown Fine to Medium SAND, Some Silt, Trace Gravel, Scattered Cobbles/Boulders (SM)

End of Boring at 30 ft

Borehole Backfilled with Bentonite Chips

Depth (ft): 5, 10, 15, 20, 25, 30, 35

WATER LEVEL OBSERVATIONS

While Drilling ∇ 6.0'
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/28/17 End 6/28/17
Driller BSD Chief MC Rig D-50
Logger MG/CD Editor TFG
Drill Method 4.25" HSA (0-10') / MR (10-30'); Autohammer

CGC Inc.

LOG OF TEST BORING

Project: Proposed Fire Station No. 14
3201 Dairy Drive
Location: City of Madison, Dane Co., WI

Boring No. 3A
Surface Elevation (ft) ± 862.0
Job No. C17051-15
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
					± 4 in. GRAVEL SURFACE					
1	14	M	8		Very Stiff, Gray/Brown (Lightly Mottled) Lean CLAY, Little Sand, Trace Gravel, Scattered Dark Gray Organic Pockets and Roots (CL - Possible Fill)	(2.0-2.25)	25.5			
2	12	M	7	5	Soft to Medium Stiff, Gray/Brown (Lightly Mottled) Sandy Lean CLAY, Trace Gravel (CL)	(0.25-0.75)	17.7			
3	18	W	2		Very Loose, Gray Silty Fine SAND, Layered with Tan Fine to Medium SAND, Little to Some Silt, Trace to Little Gravel (SM)					
4	16	W	2	10						
5	16	W	7		Very Loose to Loose, Gray Fine to Medium SAND, Little Silt and Gravel, Scattered Cobbles/Boulders (SP-SM)					
6	10	W	6	15						
7	18	W	22		Medium Dense, Gray Silty Fine SAND, Trace Gravel, Scattered Less Silty Fine to Medium Sand Seams (SM)					
8	12	W	9	20	Loose to Medium Dense, Gray Fine to Medium SAND, Little Silt, Trace Gravel, Scattered Cobbles/Boulders (SP-SM)					
9	14	W	23	25						
10	12	W	30	30						
				35	End of Boring at 30 ft Borehole Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0'   Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/27/17 End 6/28/17
Driller BSD Chief MC Rig D-50
Logger MG/CD Editor TFG
Drill Method 4.25" HSA (0-10') / MR (10-30'); Autohammer

LOG OF TEST BORING

CGC Inc.

Project: Proposed Fire Station No. 14
3201 Dairy Drive
Location: City of Madison, Dane Co., WI

Boring No. 4A
Surface Elevation (ft) ± 864.0
Job No. C17051-15
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Type	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
1		12	M	10		FILL: Dark Gray Silty Clay, Some Sand, Little Gravel, Trace Organics, Scattered Roots (Possible Tospoil Fill)	(-)	16.8			3.4
2		8	M	7	5	FILL: Medium Stiff to Stiff, Gray/Tan/Reddish Brown Lean to Silty Clay, Some Sand, Trace Gravel, Numerous Roots	(0.5-1.25)	17.5			
3		10	M	4		Very Loose to Loose, Gray Clayey Fine to Medium SAND, Scattered Lean Clay Seams (SC)		16.7			
4		12	W	6	▽ 10	Loose, Tan Fine to Coarse SAND, Little Gravel, Trace Silt, Scattered Cobbles/Boulders (SP)					
5		8	W	3		Very Loose, Tan Fine to Medium SAND, Trace to Little Silt and Gravel, Scattered Cobbles/Boulders (SP/SP-SM)					
6		10	W	2	15	P200 (Sample 6): 2.5%		22.3			
7		14	W	4		Grading Gray/Gravel Content Slightly Increasing with Depth					
8		10	W	2	20						
9		12	W	13	25	Medium Dense, Tan Fine to Medium SAND, Some Silt, Trace Gravel, Scattered Cobbles/Boulders (SM)					
10		12	W	18	30						
					35	End of Boring at 30 ft Borehole Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.5' Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______ ▼
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/27/17 End 6/27/17
Driller BSD Chief MC Rig D-50
Logger MG/CD Editor TFG
Drill Method 4.25" HSA (0-10') / MR (10-30'); Autohammer

CGC Inc.

LOG OF TEST BORING

Project: Proposed Fire Station No. 14
3201 Dairy Drive
Location: City of Madison, Dane Co., WI

Boring No. 5A
Surface Elevation (ft) ± 863.5
Job No. C17051-15
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
1		10	M	6		FILL: Stiff, Gray/Dark Gray/Brown Lean Clay, Some Sand, Scattered Roots	(1.25-1.75)	22.0			
2		12	M	9	5	Stiff, Gray/Brown (Lightly Mottled) Sandy Lean CLAY, Trace Gravel (CL)	(1.5-1.75)	16.4			
3		12	W	5		Loose, Tan Fine to Medium SAND, Trace Silt and Gravel, Scattered Cobbles/Boulders (SP)					
4		10	W	2	10	Very Loose, Tan Fine to Medium SAND, Little Silt and Gravel, Scattered Cobbles/Boulders (SP-SM)					
5		12	W	3		Very Loose, Gray Fine to Medium SAND, Some Silt, Trace Gravel and Organics, Scattered Tan Less Silty Seams and Cobbles/Boulders (SM)					
6		10	W	2	15						
7		10	W	5		Very Loose to Loose, Gray Fine to Medium SAND, Little Silt and Gravel, Scattered Cobbles/Boulders (SP-SM)					
8		8	W	2	20						
9		12	W	19	25	Medium Dense, Gray Fine to Medium SAND, Some Gravel, Little Silt, Scattered Silt Seams and Cobbles/Boulders (SP-SM)					
10		12	W	21	30	Medium Dense, Gray Fine to Medium SAND, Some Silt, Little Gravel, Scattered Cobbles/Boulders (SM)					
					35	End of Boring at 30 ft Borehole Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.5' Upon Completion of Drilling ____
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 6/27/17 End 6/27/17
Driller BSD Chief MC Rig D-50
Logger MG/CD Editor TFG
Drill Method 4.25" HSA (0-10') / MR (10-30'); Autohammer

LOG OF TEST BORING

CGC Inc.

Project **Proposed Fire Station #14 & Fire Training Site**
Femrite Drive and Dairy Drive
Location **Madison, Wisconsin**

Boring No. **8**
Surface Elevation (ft) **863.8**
Job No. **C13064-7**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
1		18	M	15		FILL: Medium Dense, Tan Fine to Medium Sand, Some Silt and Gravel USDA: FILL - 2.5Y 5/3 Sandy Loam					
2		10	M	5	5	FILL: Soft to Medium Stiff, Dark Gray/Gray Lean Clay, Little to Some Sand, Trace Organics USDA: FILL - 10YR 3/1, 5/2 Silty Clay Loam	(0.5)	15.4			
3		8	M	5	∇	Medium Stiff, Dark Gray/Black Organic CLAY (OL - Probable Buried Topsoil) USDA: 10YR 2/1 Silty Clay Loam	(1.0)	26.6			9.1
4		18	W	10	10	Very Loose to Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
5		5	W	2	15						
6		3	W	4	20						
7		12	W	14	25	Medium Dense, Brown Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/3 Fine Sand					
8		8	W	21	30	Medium Dense, Gray-Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/2 Sand					
					35	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ∇ **8.0'** Upon Completion of Drilling ______
Time After Drilling ______
Depth to Water ______
Depth to Cave in ______

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **7/22/13** End **7/22/13**
Driller **BSD** Chief **DC** Rig **CME-750**
Logger **JM** Editor **DAS**
Drill Method **2.25" HSA; 0-10'; 3-7/8" RB/DM; Autohammer**

LOG OF TEST BORING

CGC Inc.

Project **Proposed Fire Station #14 & Fire Training Site**
Femrite Drive and Dairy Drive
Location **Madison, Wisconsin**

Boring No. **9**
Surface Elevation (ft) **863.5**
Job No. **C13064-7**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
1		18	M	17		FILL: Medium Dense, Tan Fine to Medium Sand, Some Silt and Gravel USDA: FILL - 2.5Y 5/3 Sandy Loam					
2		15	M	5	5	Loose, Dark Gray/Black Organic Clayey SILT (OL - Probable Buried Topsoil) USDA: 10YR 2/1 Silt Loam		19.3			6.5
3		10	W	10		Very Loose to Medium Dense, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
4		12	W	8	10						
5		18	W	3	15	Grades to Fine Sand near 15 ft					
6		3	W	10	20						
7		4	W	27	25						
8		12	W	9	30	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					
					35						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0' Upon Completion of Drilling ____
Time After Drilling ____
Depth to Water ____
Depth to Cave in ____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start **7/23/13** End **7/23/13**
Driller **BSD** Chief **KD** Rig **CME-750**
Logger **JM** Editor **DAS**
Drill Method **2.25" HSA; 0-15'; 3-7/8" RB/DM 15'-30'; Autohammer**

LOG OF TEST BORING

CGC Inc.

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 10
Surface Elevation (ft) 860.4
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

No.	Type	Rec (in.)	Moist	N	Depth (ft)	Visual Classification and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						14 in.± Clayey TOPSOIL (OL)					
1		6	M	7		Loose, Gray Fine to Medium SAND, Some Silt, Trace Clay and Gravel (SM - Possible Fill) USDA: 10YR 5/1 Sandy Loam					
2		6	W	5	5	Very Loose to Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
3		12	W	3							
4		8	W	4	10	Color Change to Dark Brown (10YR 3/3) with Scattered Silt Seams near 7.5 ft					
5		10	W	4	15	Very Loose to Loose, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
6		9	W	9	20	Loose, Gray Fine SAND, Some Silt, Trace Gravel (SM) USDA: 10YR 5/2 Sandy Loam					
7		14	W	10	25	Loose, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
8		12	W	8	30	Scattered Silt Seams near 30 ft					
					35	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 6.0' Upon Completion of Drilling ____
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/24/13 End 7/24/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM; Autohammer

CGC Inc.

LOG OF TEST BORING

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 12
Surface Elevation (ft) 863.2
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	LI
						12 in.± Clayey TOPSOIL (OL)					
1		10	M	9		Very Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL) USDA: 10YR 5/1 Silty Clay Loam (Redox: C2F 10YR 6/6)	(3.0)				
2		16	M	5	5	Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
3		12	W	5							
4		14	W	8	10						
5		12	W	5	15	3 in. Stiff, Gray/Brown Lean Clay Seam near 15 ft	(1.0-1.5)				
6		12	W	15	20	Medium Dense, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
7		16	W	15	25						
8		14	W	23	30						
						End of Boring at 30 ft					
					35	Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 6.0' Upon Completion of Drilling ______
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/24/13 End 7/24/13
Driller BSD Chief KD Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

LOG OF TEST BORING

CGC Inc.

Project **Proposed Fire Station #14 & Fire Training Site**
Femrite Drive and Dairy Drive
Location **Madison, Wisconsin**

Boring No. **13**
Surface Elevation (ft) **862.2**
Job No. **C13064-7**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						12 in.± Sand and Gravel FILL					
1		5	M	8		Stiff to Very Stiff, Light Green-Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL - Possible Fill in Upper Few Feet of Layer) USDA: 10YR 5/1 Silty Clay Loam (Redox: C2D 10YR 6/6)	(3.5)				
2		18	M	8	5		(1.0-1.5)	29.5			
3		18	W	4		Very Loose to Loose, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
4		18	W	4	10						
5		3	W	4	15						
6		12	W	17	20	Medium Dense, Gray Fine SAND, Trace to Little Silt (SP/SP-SM) USDA: 10YR 5/2 Fine Sand					
7		12	W	27	25	Medium Dense, Brown Fine to Coarse SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
8		4	W	14	30						
					35	End of Boring at 30 ft Borehole backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 6.0'   Upon Completion of Drilling ____
Time After Drilling ____
Depth to Water ____
Depth to Cave in ____

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/22/13 End 7/22/13
Driller BSD Chief DC Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

CGC Inc.

LOG OF TEST BORING

Project Proposed Fire Station #14 & Fire Training Site
Femrite Drive and Dairy Drive
Location Madison, Wisconsin

Boring No. 14
Surface Elevation (ft) 865.0
Job No. C13064-7
Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE No.	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
					8 in.± Sandy TOPSOIL FILL (OL)					
1	12	M	12		FILL: Very Stiff, Brown/Gray Lean Clay, Trace to Little Sand USDA: FILL-10YR 4/3 Silty Clay Loam	(3.75-4.0)				
2	12	M	8	5	Stiff to Very Stiff, Gray/Brown (Mottled) Lean CLAY, Trace Sand (CL) USDA: 10YR 5/2 Silty Clay Loam (Redox: C2D 10YR 6/6)	(2.0-2.5)				
3	18	M	8			(1.0-1.5)	24.7			
4	6	W	4	10	Very Loose to Medium Dense, Brown Fine to Medium SAND, Trace to Little Silt, Trace Gravel (SP/SP-SM) USDA: 10YR 5/3 Sand					
5	18	W	4	15	Grades to Fine Sand near 15 ft					
6	6	W	2	20						
7	8	W	12	25						
8	18	W	20	30						
				35	End of Boring at 30 ft Borehole Backfilled with bentonite chips and slurry					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 8.5' Upon Completion of Drilling ____
Time After Drilling
Depth to Water
Depth to Cave in

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GENERAL NOTES

Start 7/22/13 End 7/22/13
Driller BSD Chief DC Rig CME-750
Logger JM Editor DAS
Drill Method 2.25" HSA; 0-10'; 3-7/8" RB/DM 10'-30'; Autohammer

CGC, Inc.

LOG OF TEST BORING

General Notes

DESCRIPTIVE SOIL CLASSIFICATION

Grain Size Terminology

Soil Fraction	Particle Size	U.S. Standard Sieve Size
Boulders	Larger than 12"	Larger than 12"
Cobbles	3" to 12"	3" to 12"
Gravel: Coarse	¾" to 3"	¾" to 3"
Fine	4.76 mm to ¾"	#4 to ¾"
Sand: Coarse	2.00 mm to 4.76 mm	#10 to #4
Medium	0.42 to mm to 2.00 mm	#40 to #10
Fine	0.074 mm to 0.42 mm	#200 to #40
Silt	0.005 mm to 0.074 mm	Smaller than #200
Clay	Smaller than 0.005 mm	Smaller than #200

Plasticity characteristics differentiate between silt and clay.

General Terminology

Physical Characteristics
 Color, moisture, grain shape, fineness, etc.
Major Constituents
 Clay, silt, sand, gravel
Structure
 Laminated, varved, fibrous, stratified, cemented, fissured, etc.
Geologic Origin
 Glacial, alluvial, eolian, residual, etc.

Relative Density

Term	"N" Value
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Over 50

Relative Proportions Of Cohesionless Soils

Proportional Term	Defining Range by Percentage of Weight
Trace	0% - 5%
Little	5% - 12%
Some	12% - 35%
And	35% - 50%

Consistency

Term	q_u-tons/sq. ft
Very Soft	0.0 to 0.25
Soft	0.25 to 0.50
Medium	0.50 to 1.0
Stiff	1.0 to 2.0
Very Stiff	2.0 to 4.0
Hard	Over 4.0

Organic Content by Combustion Method

Soil Description	Loss on Ignition
Non Organic	Less than 4%
Organic Silt/Clay	4 – 12%
Sedimentary Peat	12% - 50%
Fibrous and Woody Peat	More than 50%

Plasticity

Term	Plastic Index
None to Slight	0 - 4
Slight	5 - 7
Medium	8 - 22
High to Very High	Over 22

The penetration resistance, N, is the summation of the number of blows required to effect two successive 6" penetrations of the 2" split-barrel sampler. The sampler is driven with a 140 lb. weight falling 30" and is seated to a depth of 6" before commencing the standard penetration test.

SYMBOLS

Drilling and Sampling

CS – Continuous Sampling
RC – Rock Coring: Size AW, BW, NW, 2"W
RQD – Rock Quality Designation
RB – Rock Bit/Roller Bit
FT – Fish Tail
DC – Drove Casing
C – Casing: Size 2 ½", NW, 4", HW
CW – Clear Water
DM – Drilling Mud
HSA – Hollow Stem Auger
FA – Flight Auger
HA – Hand Auger
COA – Clean-Out Auger
SS - 2" Dia. Split-Barrel Sample
2ST – 2" Dia. Thin-Walled Tube Sample
3ST – 3" Dia. Thin-Walled Tube Sample
PT – 3" Dia. Piston Tube Sample
AS – Auger Sample
WS – Wash Sample
PTS – Peat Sample
PS – Pitcher Sample
NR – No Recovery
S – Sounding
PMT – Borehole Pressuremeter Test
VS – Vane Shear Test
WPT – Water Pressure Test

Laboratory Tests

q_a – Penetrometer Reading, tons/sq ft
q_a – Unconfined Strength, tons/sq ft
W – Moisture Content, %
LL – Liquid Limit, %
PL – Plastic Limit, %
SL – Shrinkage Limit, %
LI – Loss on Ignition
D – Dry Unit Weight, lbs/cu ft
pH – Measure of Soil Alkalinity or Acidity
FS – Free Swell, %

Water Level Measurement

▽ - Water Level at Time Shown
NW – No Water Encountered
WD – While Drilling
BCR – Before Casing Removal
ACR – After Casing Removal
CW – Cave and Wet
CM – Caved and Moist

Note: Water level measurements shown on the boring logs represent conditions at the time indicated and may not reflect static levels, especially in cohesive soils.

CGC, Inc.

Madison - Milwaukee

Unified Soil Classification System

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size)		
		Clean Gravels (Less than 5% fines)
GRAVELS lore than 50% of coarse fraction arger than No. 4 sieve size	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
	GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
		Gravels with fines (More than 12% fines)
	GM	Silty gravels, gravel-sand-silt mixtures
	GC	Clayey gravels, gravel-sand-clay mixtures
		Clean Sands (Less than 5% fines)
SANDS 50% or more of coarse fraction maller than No. 4 sieve size	SW	Well-graded sands, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines
		Sands with fines (More than 12% fines)
	SM	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)		
SILTS AND CLAYS Liquid limit less than 50%	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS iquid limit 50% or greater	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY RGANIC SOILS	PT	Peat and other highly organic soils

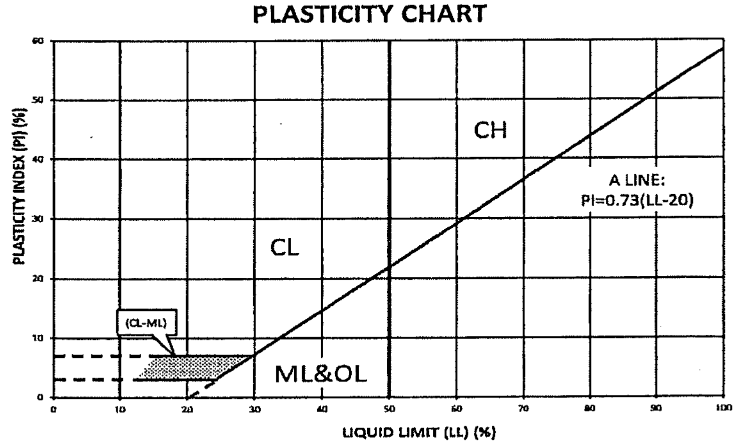
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limts below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limts above "A" line or P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent .... GW, GP, SW, SP
More than 12 percent .... GM, GC, SM, SC
5 to 12 percent .... Borderline cases requiring dual symbols

PLASTICITY CHART



APPENDIX C

DOCUMENT QUALIFICATIONS

APPENDIX C
DOCUMENT QUALIFICATIONS

I. GENERAL RECOMMENDATIONS/LIMITATIONS

CGC, Inc. should be provided the opportunity for a general review of the final design and specifications to confirm that earthwork and foundation requirements have been properly interpreted in the design and specifications. CGC should be retained to provide soil engineering services during excavation and subgrade preparation. This will allow us to observe that construction proceeds in compliance with the design concepts, specifications and recommendations, and also will allow design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction. CGC does not assume responsibility for compliance with the recommendations in this report unless we are retained to provide construction testing and observation services.

This report has been prepared in accordance with generally accepted soil and foundation engineering practices and no other warranties are expressed or implied. The opinions and recommendations submitted in this report are based on interpretation of the subsurface information revealed by the test borings indicated on the location plan. The report does not reflect potential variations in subsurface conditions between or beyond these borings. Therefore, variations in soil conditions can be expected between the boring locations and fluctuations of groundwater levels may occur with time. The nature and extent of the variations may not become evident until construction.

II. IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes. While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one - not even you* - should apply the report for any purpose or project except the one originally contemplated.

READ THE FULL REPORT

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes - even minor ones - and request an assessment of their impact. *CGC cannot accept responsibility or liability for problems that occur because our reports do not consider developments of which we were not informed.*

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL OPINION

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgement to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ - sometimes significantly - from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A REPORT'S RECOMMENDATIONS ARE NOT FINAL

Do not over-rely on the confirmation-dependent recommendations included in your report. *Those confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgement and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *CGC cannot assume responsibility or liability for the report's confirmation-dependent recommendations if we do not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical engineering report. Confront that risk by having CGC participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

DO NOT REDRAW THE ENGINEER'S LOGS

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

GIVE CONSTRUCTORS A COMPLETE REPORT AND GUIDANCE

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

READ RESPONSIBILITY PROVISIONS CLOSELY

Some clients, design professionals, and constructors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineer's responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

ENVIRONMENTAL CONCERNS ARE NOT COVERED

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

OBTAIN PROFESSIONAL ASSISTANCE TO DEAL WITH MOLD

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

RELY ON YOUR GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE

Membership in the Geotechnical Business Council (GBC) of Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with CGC, a member of GBC, for more information.

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Geotechnical Business Council
of the Geoprofessional Business Association
8811 Colesville Road, Suite G 106
Silver Spring, MD 20910

SECTION 00 31 46
PERMITS

PART 1 – GENERAL

1.1. SUMMARY

A. Each project has varying requirements for permits, inspections, and fees based on the scope, size, and location of the project.

B. The City of Madison (Owner) is subject to all permits, inspections and associated fees for construction, demolition, utility connection, storm water management, and other similar requirements that may be required to complete the scope of work associated with these contract documents.

C. The General Contractor (GC) shall be responsible for obtaining all permits, inspections and paying for all associated fees unless specifically identified within this specification.

1.2. REFERENCES

A. The following references are not intended to be all inclusive. It shall be the GC's responsibility to determine all requirements based on the scope of work in the contract documents.

B. City of Madison Ordinances: Review all ordinances that may require a permit or fee that may be connected with a required permit. Contact the following City Agencies to determine the exact requirements during bidding
   1. Building Inspection
   2. Zoning
   3. Engineering
   4. Water Utility
   5. Traffic Engineering
   6. Others as may be specified by the contract documents.

B. State Statutes

C. Other Regulatory Regulations

D. Other Agencies or companies that may have related requirements
   1. Madison Metropolitan Sewerage District
   2. Local gas and electric utility companies
   3. Other utility companies

1.3. GENERAL CONTRACTORS REQUIREMENTS

A. The GC shall be responsible for all of the following:
   1. Execute application for all required permits as may be required by the scope of work described within the contract documents.
   2. Paying all fees associated with the application of any required permits.
   3. Scheduling all required inspections that may be conditions of any required permits.

B. The GC shall provide high quality scanned images of all required permits and inspections and upload them to the Contract Documents-Regulatory Documents Library on the Project Management Web Site.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

END OF SECTION

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SECTION 00 43 43
WAGE RATES FORM

PART 1 – GENERAL

1.1. SUMMARY

A. The Reimbursable Hourly Worksheet is a contractor provided document that indicates the basic rate of pay, fringe benefits, and each companies cost of required insurance for all Trades and Classifications that will be performing productive labor during the execution of this contract.
   1. Rates shall be similar to recognized rates published by the Bureau of Labor Statistics, Associated General Contractors (AGC), Associated Builders and Contractors (ABC), appropriate union contracts, and other similar organizations or documents.

B. The Reimbursable Labor Rate Worksheet shall provide the basis for labor rates being used on Change Order Request forms..

1.2. RELATED SPECIFICATIONS

A. Section 01 26 57 Change Order Request
B. Section 01 29 76 Progress Payment Procedures
C. Section 01 31 23 Project Management Web Site (SharePoint)
D. Section 01 32 19 Submittals Schedule

PART 2 – PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1. GENERAL REQUIREMENTS

A. Prior to the Pre-Construction Meeting the City Project Manager (CPM) or the City Construction Manager (CCM) shall provide the GC a copy of the *Reimbursable Labor Rate Worksheet.xls.*
   1. See the last page of this specification for an example of the worksheet.

B. The GC shall provide all subcontractors that will be performing productive labor during the execution of this contract with additional copies of the worksheet as needed.

C. All contractors shall be required to fill out and submit completed worksheets for all Trades and Classifications of labor that will be performing productive labor during the execution of this contract.

3.2. GENERAL CONTRACTORS RESPONSIBILITIES

A. The GC shall consolidate all Trades and Classifications into one master Excel Workbook of all trades.

B. The GC shall provide the combined workbook as required by Section 1.6 of Specification 01 32 19 Submittals Schedule for review and approval by the Owners Representatives.
   1. Submittal shall be an Exported PDF of the completed Excel Workbook.
      a. As an Exported PDF the individual worksheets will be bookmarked and the document will be word searchable for easy reference.

C. The GC shall only use the rates posted in the approved submittal throughout the execution of this contract.

Reimbursable Hourly Rate Worksheet

(see bottm of page for instructions)

Project Name:
Project Location:
Project Number:
Contractor:
Rates are based on the following documentaton:

Enter TRADE Here:
Carpenter

Classification:		Foreman	Journeyman	Laborer	Apprt 1	Other	Other	Other
Base Rate (BR)		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Vacation		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Health Insurance		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Pension		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Apprenticeship		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Sub-total		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
BR Sub-total		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Work. Comp	% of BR	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Gen Liability	% of BR	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
WI Unemploy	% of BR	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Fed Unemploy	% of BR	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
FICA	% of BR	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Sub-total		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
TOTAL COST		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00

Enter YOUR percentage of base rate in the column below.

% of BR	
0	- Work. Comp
0	- Gen Liability
0	- WI Unemploy
0.6	- Fed Unemploy
7.65	- FICA

Form Instructions:

1. Provide a work sheet for ALL Trade Classifications that will be performing on site productive labor during the execution of this project.

2. Responsible contractor to complete only boxes that are shaded, all non-shaded boxes are formula driven.

3. Contractor shall provide the name of the source used for these rates. (union contract, Bureau of Labor and Statistices, AGC, ABC, etc.) and be prepared to provide copies if so requested.

END OF SECTION

SECTION 00 62 76.13
SALES TAX FORM

PART 1 – GENERAL

1.1. SUMMARY

A. The City of Madison is a qualifying tax exempt entity in the State of Wisconsin.

B. The Contractor shall refer to *Section 102.9 – Bidders Understanding* of the *City of Madison Standard Specifications for Public Works Construction* for more information on Tax Exempt Status.

C. This project constructs or remodels facilities owned by the City of Madison in Madison, Wisconsin.

1.2. RELATED SPECIFICATION SECTIONS

A. Parts of this specification will reference articles within "The City of Madison Standard Specifications for Public Works Construction".

1. Use the following link to access the Standard Specifications web page: http://www.cityofmadison.com/business/pw/specs.cfm
   a. Click on the "Part" chapter identified in the specification text. For example if the specification says "Refer to City of Madison Standard Specification **2**10.2" click the link for Part II, the Part II PDF will open.
   b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you to the referenced text.

1.3. TAX EXEMPT FORM

A. The Contractor can access Wisconsin Sales and Use Tax Exemption Certificates (form S-211, Wisconsin Department of Revenue) from the City of Madison Finance website.

1. City of Madison tax exempt information and signature by Purchasing Supervisor is already completed.
2. Website: http://www.cityofmadison.com/employeenet/finance/purchasing
   a. Under the title *Purchasing Forms*, scroll down to the form link titled *Sales Tax Exempt Form S-211*.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

END OF SECTION

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SECTION 01 26 13
REQUEST FOR INFORMATION (RFI)

PART 1 – GENERAL

1.1. SUMMARY

A. Contractors shall use the RFI form/process to request additional information or clarification regarding the construction documents.

B. Form will be provided by CPM.

1.2. RELATED SPECIFICATIONS

A. Section 01 26 46 Construction Bulletin (CB)

B. Section 01 26 57 Change Order Request (COR)

C. Section 01 26 63 Change Order (CO)

1.3. PERFORMANCE REQUIREMENTS

A. RFI issues initiated by any contractor shall be done through the General Contractor (GC).
   1. RFIs submitted by any Sub-contractor under the GCs control shall be returned with no response.

B. Submit a new RFI for each issue. Only multiple questions that are of a similar nature may be combined into one RFI shall be allowed and responded to.

1.4. QUALITY ASSURANCE

A. The GC shall be responsible for all of the following:
   1. Ensure that any request for additional information is valid and the information being requested is not addressed in the construction documents.
   2. Ensure that all requests are clearly stated and the RFI form is completely filled out.
   3. Ensure that all Work associated an RFI response is carried out as intended.

B. The Project Engineer (PE) shall be responsible for the following:
   1. Ensure that all responses to contractor initiated RFIs are properly responded to in a timely fashion.
      a. The CPM, Owner, consulting staff, and other City staff shall be responsible for the initial review of the RFI. The PE shall be responsible for codifying all consultant and Owner/City staff comments into a unified RFI response.

PART 2 – PRODUCTS

2.1. REQUEST FOR INFORMATION FORM

A. Will be provided by CPM.

PART 3 - EXECUTION

3.1. CONTRACTOR INITIATED RFI

A. Immediately on discovery of the need for additional information or interpretation of the Contract Documents any contractor may initiate an RFI for additional information or clarification through the GC.

3.2. RFI RESPONSES

A. Responses to simple RFI issues shall use the response section of the RFI form and shall be completed within five (5) working days of the RFI form being submitted.

B. Responses to more complex issues may require additional time or may require a Construction Bulletin to be published. The initial RFI shall be responded to within five (5) working days stating that the RFI is being reviewed and provide an estimated date for the response.

C. The following GC generated RFIs will be returned without action:

1. Requests for approval of submittals
2. Requests for approval of substitutions
3. Requests for approval of Contractor's means and methods.
4. Requests for coordination information already indicated in the Contract Documents.
5. Requests for adjustments in the Contract Time or the Contract Sum.
6. Requests for interpretation of A/E's actions on submittals.
7. Incomplete RFI or inaccurately prepared RFI.

3.3. COMMENCEMENT OF WORK RELATED TO AN RFI

A. The GC shall only proceed with the Work of an RFI where, additional information is not required.

B. The GC shall not proceed with any Work associated with an RFI while it is under review.

C. The GC shall not proceed with any Work associated with an RFI that clearly states a CB will be issued in response to the RFI.

D. The GC will be required to immediately remove and replace unauthorized Work and all costs required to conform to the Contract Documents shall be borne by the GC.

END OF SECTION

SECTION 01 26 46
CONSTRUCTION BULLETIN (CB)

PART 1 – GENERAL

1.1. SUMMARY

A. Construction Bulletins (CB) are formal published construction documents that modify the original contract bid documents after construction has commenced. CBs may be published for many reasons, including but not limited to the following:
   1. Clarification of existing construction documents including specifications, plans, and details
   2. Change in product or equipment
   3. A response to a Request for Information
   4. Change in scope of the contract as either an add or a deduct of work

B. CBs provide a higher degree of detail in response to a Request for Information (RFI) through directives, revised plans/details, and specifications as necessary.

C. The CB may change the original contract documents through additions or deletions to the Work.

D. Where the directives of a CB are significant enough to warrant a Change Order Request (COR) the GC shall use all information provided in the CB to assemble all required back-up documentation for additions and deletions of materials, labor and other related contract costs for the COR.

1.2. RELATED SPECIFICATIONS

A. Section 01 26 13 Request for Information (RFI)
B. Section 01 26 57 Change Order Request (COR)
C. Section 01 26 63 Change Order (CO)

1.3. PERFORMANCE REQUIREMENTS

A. Project Engineer (PE): The PE shall be the only person authorized to publish a CB as needed for any reason indicated in section 1.1.A above. The PE shall consult as necessary with any of the following while drafting the CB and shall confirm final direction with the CPM prior to issuing a CB:
   1. City Project manager (CPM)
   2. Owner
   3. Members of the consulting staff
   4. Members of city staff
   5. The General Contractor
   6. Sub-contractors

B. General Contractor: The GC shall be responsible for the following as needed:
   1. Executing the directives of the CB when he/she believes that no changes in labor, materials, equipment, or contract duration will be required for additions or deletions.
   2. Submit a COR when he/she believes that a change in labor, materials, equipment or contract duration will be required for additions or deletions.

1.4. QUALITY ASSURANCE

A. The PE shall be responsible for ensuring the final CB sufficiently provides direction, details, specifications and other information as necessary for the GC to perform the intended Work.

B. The PE shall be responsible for ensuring the final CB is published as expeditiously as practical based on the complexity of the CB being written. CBs that may affect the GC critical path shall be given priority.

PART 2 – PRODUCTS

2.1. CONSTRUCTION BULLETIN FORM

A. Will be provided by CPM.

PART 3 - EXECUTION

3.1. WRITING THE CONSTRUCTION BULLETIN

A. The PE shall draft a CB as needed using the form provided by CPM.
   1. The PE and/or consulting staff as necessary shall provide specifications, model numbers and performance data, details and other such information necessary to clearly state the intentions of the CB.
   2. The consulting staff, CPM, Owner, and other City Staff shall review the draft and recommend changes as needed.
   3. The PE shall amend the draft as necessary into a final CB for review

B. Once the final CB has been approved the PE shall submit it to the GC.

3.2. EXECUTING THE CONSTRUCTION BULLETIN

A. The GC shall acknowledge receipt of the CB.

B. The GC shall notify all Sub-contractors of the CB and publish the CB to all field sets of drawings and specifications as appropriate.

C. The GC shall execute the directives of the CB or submit COR documentation as necessary during the execution and implementation of the CB.
   1. See Specification 01 26 57 Change Order Request (COR)

END OF SECTION

SECTION 01 26 57
CHANGE ORDER REQUESTS (COR)

PART 1 – GENERAL

1.1. SUMMARY

A. Except in cases of emergency no changes in the Work required by the Contract Documents may be made by the General Contractor (GC) without having prior approval of the City Engineer or his representative.

B. The City may at any time, without invalidating the Contract and without Notice to Sureties, order changes in the Work by written Change Order (CO). Such changes may include additions and/or deletions.

C. Where the City desires to make changes in the Work through use of written Change Order Request (COR), the following procedures apply:

1. If requested by the City, the GC shall prepare and submit a detailed proposal, including all cost and time adjustments to which the GC believes it will be entitled if the change proposed is incorporated into the Contract. The City shall be under no legal obligation to issue a Change Order for such proposal.
2. The parties shall attempt in good faith to reach agreement on the adjustments needed to the Contract to properly incorporate the proposed change(s) into the Work. In the event that the parties agree on such adjustments, the City may issue a Change Order and incorporate such changes and agreed to adjustments, if any.
3. In some instances, it may be necessary for the City to authorize Work or direct changes in Work for which no final and binding agreement has been reached and for which unit prices are not applicable. In such cases the following shall apply.
    a. Upon written request by the City, the GC shall perform proposed Work
    b. The cost of such change may be determined in accordance with this specification.
    c. In the event agreement cannot be accomplished as contemplated herein, the City may authorize the Work to be performed by City forces or to hire others to complete the Work. Such action on the part of the City shall not be the basis of a claim by the GC for failure to allow it to perform the changed Work.

D. Where changes in the Work are made by the City through use of a force account basis, the GC shall as soon as practicable, and in no case later than ten (10) working days from the receipt of such order, unless another time period has been agreed to by both parties, give the City written Notice, stating:

1. The date, circumstances and source of the extra work; and,
2. The cost of performing extra work described by such Order, if any; and,
3. Effect of the order on the required completion date of the Project, if any.

E. The giving of each Notice by the GC as prescribed by this specification, shall be a requirement to liability of the City for payment of any additional costs incurred by the GC in implementing changes in the Work. Under this specification, no order or statement of the City shall be treated as a Change Order, or shall entitle the GC to an equitable adjustment of the terms of this Contract or damages for costs incurred by the GC on any activity for which the Notice was not given.

F. In the event Work is required due to an emergency as described in this specification the GC must request an equitable adjustment as soon as practicable, and in no case later than ten (10) working days of the commencement of such emergency.

G. All GC requests for equitable adjustment shall be submitted to the CPM per the specifications below. Such requests shall set forth with specificity the amount of and reason(s) for the proposed adjustment and shall be accompanied by supporting information and documents.

H. No adjustment of any kind shall be made to this Contract, if asserted by the GC for the first time, after the date of final payment.

I. This specification shall be used by the GC when preparing documentation for any COR to ensure each has been properly and completely filled out as required by the City of Madison.

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 26 13 Request for Information (RFI)

B. Section 01 26 46 Construction Bulletins (CB)

C. Section 01 26 63 Change Order (CO)

D. Parts of this specification will reference articles within "The City of Madison Standard Specifications for Public Works Construction".

1. Use the following link to access the Standard Specifications web page: http://www.cityofmadison.com/business/pw/specs.cfm

a. Click on the "Part" chapter identified in the specification text. For example if the specification says "Refer to City of Madison Standard Specification **2**10.2" click the link for Part II, the Part II PDF will open.

b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you to the referenced text.

1.3. DEFINITIONS AND STANDARDS

A. LABOR: The amount of time and cost associated with the performance of human effort for a defined scope of Work. Labor is further defined as follows:

1. Labor rate is the total hourly rate which includes the base rate of pay, fringe benefits plus each company's cost of required insurance, also referred to as a reimbursable labor rate.
2. Unit labor is the labor hours anticipated to install the corresponding unit of material.
3. Labor cost is the labor hours multiplied by the hourly labor rates.

B. MATERIAL: Actual material cost is the amount paid, or to be paid, by the GC for materials, supplies and equipment entering permanently into the Work, including cost of transportation and applicable taxes. The cost shall not exceed the usual and customary cost for such items available in the geographical area of the project.

C. LARGE TOOLS AND MAJOR EQUIPMENT: Large tools and major equipment are those with an initial cost greater than $1,500, whether from the GC or other sources.

1. Tool and equipment use and time allowed is only for extra work associated with change orders.

a. Rental Rate is the machine cost associated with operating a piece of equipment for a defined length of time (hour, day, week, or month) and shall not exceed the usual and customary amount for such items available in the geographical area of the project.

b. Rental cost is the rental rate multiplied by the anticipated duration the equipment shall be required.

2. The GC shall provide a breakdown of all rental rates to indicate what items and costs are associated with the rate. Examples of items to include in the breakdown would be fuel consumption, lubrication, maintenance and other similar expenses but not including profit and overhead.

3. When large tools and equipment needed for Change Order work are not already at the job site, the actual cost to get the item there is also reimbursable.

D. BOND COST: The cost shall be calculated at 1% of the total proposed change order.

E. SUB-CONTRACTOR COSTS: Sub-contractor costs are for those labor, material, and equipment costs required by subcontracted specialties to complete the Change Order work.

F. OVERHEAD AND PROFIT Markup: The allowable markup percentage to a COR by the GC and Sub-contractors for overhead and profit. All of the following are expenses associated with overhead and profit and shall not be reimbursable as individual items on any COR:

1. CHANGE ORDER PREPARATION: All costs associated with the preparing and processing of the change order.
2. DESIGN, ESTIMATING, AND SUPERVISION: All such efforts, unless specifically requested by Owner as additional Work to be documented as a COR or portion thereof.
3. INSTALLATION LAYOUT: The layout required for the installation of material and equipment, and the installation design, is the responsibility of the GC.

4. SMALL TOOLS AND SUPPLIES: The cost of small hand tools with an initial cost of $1,500 or less, along with consumable supplies and expendable items such as drill bits, saw blades, gasoline, lubricating or cutting oil, and similar items.
5. GENERAL EXPENSE: The general expense, which is those items that are a specific job cost not associated with direct labor and material such as job trailers, foreman truck, and similar items.
6. RECORD DRAWINGS: The preparation of record or as-built drawings.
7. OTHER COSTS: Any miscellaneous cost not directly assessable to the execution of the Change Order including but not limited to the following:
    a. All association dues, assessments, and similar items.
    b. All education, training, and similar items.
    c. All drafting and/or engineering, unless specifically requested by Owner as additional Work to be documented as a Change Order proposal or portion thereof.
    d. All other items including but not limited to review, coordination, estimating and expediting, field and office supervision, administrative work, etc.

G. Contract Extension: The necessary amount of time to be added to the contract deadlines for the completion of a change order.

1.4. CONTRACT EXTENSION

A. The GC shall not assume that every COR will require a Contract Extension. If the GC feels a contract extension is warranted he/she shall provide sufficient scheduling information that shows how the COR being requested impacts the critical path of the project.

B. The City of Madison strongly encourages the GC to explore alternative methods and practices prior to submitting a COR with a request for contract extension.

1.5. OVERHEAD AND PROFIT MARKUP

A. Pursuant to the City of Madison Standard Specifications for Public Works Construction, Section 104.7, Extra Work, the following maximum allowable markups shall be strictly enforced on all change orders associated with the execution of this contract.
1. The total maximum overhead and profit shall not exceed fifteen percent (15%) of the total costs.
2. The total maximum overhead and profit shall be distributed as follows:
    a. For work performed and materials provided solely by the General Contractor, fifteen percent (15%) of the total costs.
    b. For work performed and materials provided solely by Sub-contractors and supervised by the General Contractor:
        i. Supervision of the GC, five percent (5%) of the total Sub-contractor cost.
        ii. Sub-contractors work and materials ten percent (10%) of the total Sub-contractor cost.

1.6. PERFORMANCE REQUIREMENTS

A. The GC shall become thoroughly familiar with this specification as it will identify procedures and expenses that are or are not allowed under the Change Order and Change Order Request process.

B. The GC shall be responsible for all of the following:
1. Carefully reviewing the CB that is associated with the COR.
2. Collecting required supporting documentation from all contractors that quantify the need for a COR.
    a. Labor hours and wage rates
    b. Material costs
    c. Equipment costs

C. The following shall apply to establishing prices for labor, materials, and equipment costs:
1. Where Work to be completed has previously been established by individual bid items in the contract bid proposal the GC shall use the unit bid prices previously established.
2. Where Work to be completed was bid as a Lump Sum without individual bid items the GC shall provide a breakdown of all labor, materials, equipment including unit rates and quantities required.

D. The completion date is determined by Owner. The schedule, however, is the responsibility of the GC. Time extensions for extra Work will be considered when a schedule analysis of the critical path shows that the Change Order Request places the Work beyond the completion date stated in the Contract.

1.7. QUALITY ASSURANCE

A. The GC shall be responsible for ensuring that all COR supporting documentation meets the following requirements prior to completing the COR form:

1. Sufficiently indicates labor, material, and other expenses related to completing the intent of the CB.
2. No costs exceed the usual and customary amount for such items available in the geographical area of the project, and no costs exceed those established under the contract.

B. The Project Engineer (PE), City Project Manager (CPM), other members of the consulting staff, and city staff shall review all COR requests to ensure that the intent of the CB will be met under the proposal of the COR or request additional information as necessary.

PART 2 – PRODUCTS

2.1. CHANGE ORDER REQUEST FORM

A. Will be provided by CPM.

PART 3 - EXECUTION

3.1. ESTABLISHING A CHANGE ORDER REQUEST

A. Upon receipt of a Construction Bulletin (CB) where the GC believes a significant change in contract scope warrants the submittal of a COR the GC shall do all of the following within ten (10) working days after receipt of the CB:

1. Review the CB with all necessary trades and sub-contractors required by the change in scope.
    a. Additions or deletions to the contract scope shall be as directed within the CB.
    b. Additions or deletions of labor and materials shall be determined by the GC based on the directives of the CB.
2. Assemble all required back-up documentation for additions and deletions ~~of~~ including material~~s~~ breakdown, labor breakdown and other related contract costs as previously outlined in this specification.
3. Submit a COR request form.

B. Submitting a COR does not obligate the GC to complete the work associated with the COR nor does it obligate the Owner to approve the COR as a change to the contract.

3.2. CHANGE ORDER REQUEST REVIEW, APPROVAL, AND PROCESSING

A. The PE and CPM shall review all CORs submitted by the GC.

1. Additional consulting staff and city staff having knowledge of the components of the COR shall review and advise the PE and CPM as to the accuracy of the items, quantities, and associated costs of the COR as directed by the CB.
2. The CPM shall review the COR with the Owner.

B. If required the PE and CPM, shall in good faith, further negotiate the COR with the GC as necessary. All amendments to any COR shall be documented.

C. After final review of the COR the CPM and Owner may accept the COR.

D. The CPM shall prepare the COR in the form of an official Board of Public Works Change Order for final review and approval as outlined in Section 01 26 63 Change Order (CO).

E. The GC shall not act upon any accepted COR until it has received final approval through the Public Works process as an official CO to the Work unless instructed to do so by the CPM. Proceeding without the final approval of a fully authorized Change Order is at the GC's own risk.

3.3. EMERGENCY CHANGE ORDER REQUEST

A. In the event Work is required due to an emergency as described in the Contract Documents, the GC must request an equitable adjustment as soon as practicable, and in no case later than ten (10) working days of the commencement of such emergency.

B. The GC shall provide full documentation of all labor, materials and equipment used during the period of emergency as part of the COR submittal.

END OF SECTION

SECTION 01 26 63
CHANGE ORDER (CO)

PART 1 – GENERAL

1.1. SUMMARY

A. Except in cases of emergency, no changes in the Work required by the Contract Documents may be made by the General Contractor (GC) without having prior approval of the City Project Manager (CPM).

B. The City may at any time, without invalidating the Contract and without Notice to Sureties, order changes in the Work by written Change Order. Such changes may include additions and/or deletions.

C. The Change Order (CO) is a Board of Public Works (BPW) form that is reviewed and approved by a specific process.

D. The CO form is typically made up of multiple Change Order Requests (CORs) and/or Bid Items as appropriate depending on the type of project and how the contract was bid.

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 26 13 Request for Information (RFI)
B. Section 01 26 46 Construction Bulletin (CB)
C. Section 01 26 63 Change Order Request (COR)

1.3. BOARD OF PUBLIC WORKS PROCEDURE

A. The Board of Public Works has a very explicit procedure for the review and approval of all change orders associated with any Public Works Contract as follows:
   1. The Supervisory Chain of the CPM shall review and approve any CO under $10,000 provided it does not include either of the following:
      a. The CO does not request a time extension to the contract.
      b. The CO does not cause the contract contingency sum to be exceeded.
   2. The Board of Public Works shall review and approve any CO that requires any of the following:
      a. Any CO over $10,000.
      b. Any CO requesting a time extension to the contract regardless of the monetary value of the CO.
      c. Any CO that that causes the contract contingency sum to be exceeded.

B. The Board of Public Works generally meets every other week and only once in August and December. The GC is cautioned that, under normal scheduling, a CO requiring a BPW review will take a minimum of two (2) weeks to achieve final approval.
   1. The City shall not be responsible for additional delays to the Work caused by the scheduling constraints of the Board of Public Works.

C. *SPECIAL NOTE:* The GC is cautioned to never proceed unless told to do so by the CPM. Only in rare instances may the CPM give a written notice to proceed on a COR without an approved CO. Proceeding without the written notice of the CPM or an approved CO is at the GC's own risk.

PART 2 – PRODUCTS

2.1. CHANGE ORDER FORM

A. Provided by CPM.

PART 3 - EXECUTION

3.1. PREPARATION OF THE CHANGE ORDER

A. The CPM shall prepare the required CO as follows:
1. Provide information for all contract information.
2. Provide a general description of the items described within the change order.
3. Provide detailed information for each Item on the CO form. At the option of the CPM he/she may include multiple Change Order Requests each as their own item.
4. Provide required pricing breakdown and accounting information as needed for the item.
5. Insert attachments of contractor/architect provided information that clarifies and quantifies the CO. Attachments may include but not be limited to material lists, estimated labor breakdown, revised details or specifications, and other documents that may be related to the requested change.
6. Save the final version of the completed CO.

3.2. EXECUTION OF THE CHANGE ORDER

A. The GC shall do the following:
1. Review all items on the CO form.
2. The GC shall notify the CPM immediately of any errors or discrepancies on the form and shall not sign or save it.
   a. The CPM shall make any corrections as needed, re-save the form, and notify the GC.
3. If/when the GC concurs with the CO form as drafted the GC shall digitally sign the form.

B. The CPM shall do the following:
1. Monitor the review process
2. Ensure that proper BPW procedures are executed as needed by the CO approval process.
   a. Schedule the CO on the next available BPW agenda if required.
      i. Attend the BPW meeting to speak on the CO to board members and answer questions.
      ii. The GC and/or PE may be required to attend the BPW meeting to address specific information as it relates to the Work and/or materials associated with the CO.
3. Monitor final approval and distribution of the CO.
4. Notify the GC that the CO has been completed.
5. Ensure that the CO is posted to the next Public Works payment schedule.
6. Verify that the GC's next Progress Payment-Schedule of Values show the CO as part of the contract sum.

C. Upon final approval of the CO the GC may proceed with executing the Work associated with the CO.

END OF SECTION

SECTION 01 33 23
SUBMITTALS

PART 1 – GENERAL

1.1. SUMMARY

A. The General Contractor (GC) shall be responsible for providing submittals for review of all contractors and sub-contractors as designated in the construction documents. Submittals shall include but not be limited to all of the following:
   1. Equipment specified and pre-approved in the specification; to ensure quality, construction, and performance specifications have not changed since final design.
   2. Equipment specified by performance in the specification; to ensure that the intended quality, construction, and performance specified is met by the selected material or product.
   3. Shop, piece, erection, and other such drawings as indicated in the specifications to ensure all structural, dimensional, and assembly requirements are being met.
   4. Submittals indicating installation sequencing
   5. Submittals indicating control sequencing
   6. Contractor licensing, certification, and other such regulatory documentation when required by a specification.
   7. Other submittals as may be required by individual specifications.

B. The submittal process shall not be used to determine alternates to specified products or equipment. All considerations shall be reviewed during the bidding process and acceptable alternates shall be acknowledged by addendum prior to the closing of bidding. See bidding instructions for the information on submitting alternates for consideration.

D. In the event that a manufacturer has significantly changed a product (discontinued a model, changed dimension or performance data changed available colors, etc.) since bid opening the GC shall submit a Request for Information (RFI) to the Project Engineer requesting other approved alternates prior to uploading a digital submittal.

E. Contractors and sub-contractors shall be responsible for knowing the submittal requirements of ALL sections within their scope of work under the contract. The Owner reserves the right to request documentation on any materials, equipment, or product being installed where a submittal is not on file. If the material, equipment, or product installed is determined not to meet the intent of the specification the contractor/sub-contractor shall be required to remove and replace the items involved. The GC shall be solely responsible for all costs associated with the removal and replacement.

1.2. RELATED REFERENCES

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 32 19 Submittals Schedule
C. Section 01 32 26 Construction Progress Reporting
D. All Technical Specifications, contract documents, construction drawings, and any published addendums during the bidding process.
E. All contract documents generated during the execution of the contract including but not limited to Requests for Information (RFI) and Construction Bulletins (CB).

1.3. SUBMITTAL REQUIREMENTS

A. A completed submittal shall meet the following requirements:
   1. Digital submittal shall be original PDF of manufacturer's data sheets or high quality color scan of the same.

a. Submittals shall not include sales fliers or other similar documents that typically do not provide complete manufacturers data.

2. Documents within the PDF submittal shall be printable to a sized sheet no less than 8-1/2 by 11 inches and no larger than 24 by 36 inches.
3. At the beginning of each submittal the contractor shall identify the plan reference (WC-1, EF-3, etc.) in RED block letters that the submittal is for.
4. Where multiple model numbers appear in a table the contractor shall identify the specific model being submitted by using a RED square, box, or other designation to distinguish the correct model from others on the page.

B. A complete submittal will include all information associated with the product or equipment as presented in plans, equipment tables, and specifications. Information shall include but not be limited to the following:
1. Dimensional data
2. Performance data
3. Resource requirements, power, water, waste, etc
4. Clearance and maintenance requirements
5. Finish information, colors, textures, etc.
6. Warranty information

C. Where a submittal includes material samples (carpet, tile, paint draw downs, etc.) the contractor shall do the following:
1. The Contractor shall submit the sample(s) as indicated in the specification.
2. The Contractor shall include a quality photograph(s) of the product with the digital submittal. Photographs shall meet the following requirements:
   a. Formatted to be between 500Kb and 1.0 Mb in file size
   b. Have no glare or flash reflection on the sample
   c. Sample fills the frame of the photo and shows detail as needed. Include multiple photos from other angles as needed.
   d. Scanned copies of products or photos are not acceptable.

D. Uploaded submittals should be relative and related to a specific written specification.
1. Do not upload submittals under a broad category or division (I.E. HVAC 23 00 00). Always upload by the specific specification that identifies a required product or performance to be met.
2. Group related items together if the specification is written that way. (I.E. all of the plumbing fixtures and trim relative to one specific specification should be submitted together).
3. Submittals shall be grouped and adhere to the divisions in the submittal schedule. Submittals that do not conform to the submittal schedule and/or specification divisions will be rejected for re-submittal.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. GENERAL CONTRACTORS PROCEDURES

A. All required submittals will be submitted electronically by the GC.

B. Uploading the submittal indicates that the GC has reviewed and approved the submittal against the contract document requirements.

C. The GC shall discuss submittal status at all progress meetings and shall monitor submittal review/approval/re-submittal so as to not incur delays in the project schedule.

D. The GC and sub-contractors shall provide re-submittals as required.

3.2. SUBMITTAL REVIEW

A. The submittal shall be reviewed internally by the required Architect/Engineer and Owner Representative in a timely fashion and provide commentary on missing items, incorrect information, or incomplete shop drawings, etc as needed.

B. When the internal review is completed the CPM will notify the Project Engineer the submittal is ready for final review.

C. Information will be transmitted electronically.

3.3. PROJECT ENGINEERS REVIEW

A. Upon completion of the internal review the Project Engineer shall review all internal review comments, confer with the CPM as needed and determine the appropriate disposition status for the submittal (approved or resubmit).

B. The Project Engineer shall summarize final internal review comments onto the submittal cover sheet, provide a final disposition of the submittal and update the review status of the submittal to "Complete..." (with or w/o comments) or "Rejected".

C. A completed Final Review status initiates the CPM to notify the GC and appropriate sub-contractor(s) that the review of the submittal has been completed.

D. Information will be transmitted electronically.

END OF SECTION

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SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.1. SUMMARY

A. This Section includes general procedural requirements for temporary facilities and controls including, but not limited to the following:
1. Temporary Utilities
2. Barriers
3. Fencing
4. Exterior Enclosures
5. Security
6. Vehicular Access and Parking
7. Waste Removal
8. Project Identification

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 31 19 Progress Meetings
B. Section 01 74 19 Construction Waste Management and Disposal

1.3. QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:
1. Building Code requirements
2. Health and safety regulations
3. Utility company regulations
4. Police, Fire Department and Rescue Squad rules
5. Environmental protection regulations
6. Joint Commission - Hospital Accreditation Standards

B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities".

C. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code".

1.4. TEMPORARY UTILITIES

A. Owner will provide the following:

B. Water Service: water is available from existing building services.
   1. Use trigger-operated nozzles for water hoses, to avoid waste of water.

C. Temporary Electric Power Service: General Contractor shall extend temporary power from existing building services.

D. **Contractor to provide temporary rest room/Porta-toilet.**

1.5. BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

1.6. FENCING

A. Construction: Contractors option.

1.7. EXTERIOR ENCLOSURES

A. Provide temporary closure of exterior openings to accommodate acceptable working conditions and protection for Products, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.8. SECURITY

A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.9. VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Owner.

C. Provide and maintain access to fire hydrants, free of obstructions.

1.10. WASTE REMOVAL

A. See Section 01 74 19 - Waste Management, for additional requirements.

B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

C. Provide containers with lids. Remove trash from site periodically.

D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.11. PROJECT IDENTIFICATION

A. N/A

PART 2 - PRODUCTS

2.1. TEMPORARY PARTITIONS

A. Provide dustproof partitions to limit dust and dirt migration and to separate occupied areas from fumes and noise.
   1. N/A

2.2. EQUIPMENT

A. Temporary Lifts and Hoists: Contractors requiring temporary lifts and hoists shall provide facilities for hoisting materials and employees.

B. Electrical Outlets: Electrical Contractor shall provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.

C. Electrical Power Cords: Contractors requiring power cords shall provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

D. Lamps and Light Fixtures: Electrical Contractor shall provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.
E. Heating Units: General Contractor shall provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.
F. First Aid Supplies: General Contractor shall provide first aid supplies complying with governing regulations.
G. Fire Extinguishers: General Contractor shall provide hand-carried, portable UL-rated, fire extinguishers of NFPA recommended classes for the exposures, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1. TEMPORARY FIRE PROTECTION

A. Until fire protection needs are supplied by permanent facilities, General Contractor shall install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses.
B. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations".
C. Locate fire extinguishers where convenient and effective for their intended purpose.
D. Store combustible materials in containers in fire-safe locations.
E. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires.
F. Prohibit smoking on the premises.
G. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
H. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site
I. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.2. COLLECTION AND DISPOSAL OF WASTE

A. Collect waste from construction areas and elsewhere daily
B. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly.
C. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F.
D. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

3.3. ENVIRONMENTAL PROTECTION

A. Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result.
B. Avoid use of tools and equipment which produce harmful noise.
C. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

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SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 – GENERAL

1.1. SUMMARY

A. This specification includes administrative and procedural requirements for the recycling, re-use, salvaging, and disposal of non-hazardous construction and demolition waste.

B. The General Contractor (GC) shall be fully responsible for complying with all applicable ordinances and other such regulatory requirements during the execution of this contract.

1.2. RELATED SPECIFICAITONS

A. 01 29 76 Progress Payment Procedures

B. 01 33 23 Submittals

C. 01 77 00 Closeout Procedures

D. Other Divisions and Specifications that may address the proper disposal of construction or demolition waste as it pertains to work being conducted under that particular specification.

1.3. CITY ORDINANCES

A. There are two (2) Madison General Ordinances (MGO) that the City of Madison has regarding construction and demolition waste.

1. MGO 10.185, Recycling and Reuse of Construction and Demolition Debris, describes the requirements associated with this ordinance including definitions, documentation requirements, and penalties.
2. MGO 28.185, Approval of Demolition (Razing, Wrecking) and Removal, describes the requirements associated with applying for and receiving a demolition permit.

B. All City of Madison, Board of Public Works, contracts being conducted by City Engineering, Facility Management, for construction, remodeling, or demolition shall comply with the above ordinances regardless of project type or size.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. GENERAL GUIDELINES FOR ALL WASTES

A. Recycle all paper and beverage containers used by workers, sub-contractors, suppliers and visitors to the project site.

B. All revenues, savings, rebates, tax credits, and other such incentives received from recycling, reusing, or salvaging waste materials shall accrue to the GC unless specified otherwise in the contract documents.

C. Separate recyclable, reusable, and salvageable waste from other waste materials, trash, and debris except where Waste Management Disposal Company allows comingled waste materials, see section 1.8.D above.

1. Separate by type in appropriate containers or designated areas according to the approved waste management plan away from the construction area. Do not store within the drip lines of existing trees.
2. Inspect containers and bins frequently for contamination and inappropriately sorted materials. Remove contaminated materials and resort as necessary.

3. Stockpile bulk materials such as sand, topsoil, stone, etc., on site away from the construction area and without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water, and cover to prevent windblown dust. Do not store within the drip lines of existing trees.
4. Whenever possible store items off the ground and/or protect them from the weather.

3.2. GUIDELINES FOR RECYCLABLE, RE-USABLE, AND SALVAGEABLE WASTE

A. The following guidelines is not a complete or all inclusive list and shall be adjusted as needed by the methods and procedures identified in the Waste Management Plan.
B. Asphalt Paving: Break-up into transportable pieces or grind, transport to an authorized recycling facility.
C. Carpet and Pad: Separate carpet and pad scraps, containerize and transport to an authorized recycling facility.
D. Ceiling System Components: Suspended ceiling system components shall be sorted by material type as follows:
   1. Broken, cut, or damaged tiles shall be containerized, transport to an authorized recycling facility.
   2. Damaged, or cut tracks, trim and other metal grid system components shall be sorted with other metals of similar types, palletize, transport to an authorized recycling facility.
E. Clean Fill: When allowed by Division 31 Specifications; concrete, masonry, stone, asphalt pavement, sand and other such materials may be used as clean fill on this project site. The GC shall verify with the Project Engineer, Structural Engineer, or Civil Engineer as necessary prior to using any materials as clean fill. Materials shall be processed, placed, and compacted as specified. If not being re-used on site, transport to an authorized recycling facility.
F. Clean Wood Materials: Including but not limited framing cutoffs, wood sheathing or paneling materials, structural or engineered wood products, and pallets or crates. Clean Wood shall be free of paints, stains, oils, preservatives and other such contaminates.
   1. Useable pieces shall be sorted by type and dimension, bundled and transported off site by the GC or returned to the supplier.
   2. Non-useable pieces shall be palletized or containerized, transport to an authorized recycling facility.
   3. Clean, uncontaminated sawdust and wood shavings shall be bagged, transport to an authorized recycling facility.
G. Concrete: Break-up into transportable pieces, remove all reinforcing and other metals, transport to an authorized recycling facility.
H. Glass Products: Shall be sorted by types, do not include light fixture lamps and bulbs. Products broken in shipment shall be returned to the supplier. Broken or cracked items still in frames shall be taped to prevent further breakage and injury to workers. Transport to an authorized recycling facility.
I. Gypsum Board: Stack large clean pieces on wooden pallets or container, store in a dry location, transport to an authorized recycling facility.
J. Light Fixture Lamps and Bulbs: Fluorescent tubes shall be containerized, transport to an authorized recycling facility.
K. Masonry and CMU: Remove all metal reinforcing, anchors, and ties, clean undamaged pieces and neatly stack on pallets, transport damaged pieces to an authorized recycling facility.
L. Metals: Sort metals by type as follows, this does not include piping:
   1. Architectural metals including but not limited to siding, soffit, and roofing panels shall be sorted by material, palletize or bundle as needed and transport to an authorized recycling facility.
   2. Structural steel, sort by size and type; palletize and transport to an authorized recycling facility.
   3. Miscellaneous metals such as aluminum, brass, bronze, etc shall be sorted by type, containerized or palletized as necessary, transport to an authorized recycling facility.
M. Packaging and shipping materials
   1. Cardboard boxes and containers: Breakdown all cardboard boxes and containers into flat sheets. Bundle and store in a dry location until transported for recycling.
   2. Pallets:
      a. Whenever possible require deliveries using pallets to remove them from the project site.
      b. Neatly stack pallets in preparation for reusing them or providing them to other companies for salvage or re-use.
      c. Break down pallets into component wood pieces that comply with the requirements for recycling clean wood materials. Neatly stack or palletize pieces in preparation for transportation.
   3. Crates: Break down crates into component wood pieces that comply with the requirements for recycling clean wood materials. Neatly stack or palletize pieces in preparation for transportation.
   4. Polystyrene Packaging: Separate and bag materials.

N. Piping and conduit: Reduce all piping and conduit to straight lengths, sort and store by size, material and type. Remove supports, hangers, valves, boxes, sprinkler heads, and other such components, sort and store by size, material and type. Transport to authorized recycling facilities according to material types.

O. Roofing: Roofing materials shall be sorted and containerized by type, transport to authorized recycling facilities according to material types.

P. Site-Clearing Waste: Sort all site waste by type.
   1. Only stockpile soils types and quantities required for re-use on the project site. All remaining quantities shall be transported off site to an authorized facility that receives such materials.
   2. Brush, branches, and trees with no marketable re-use shall be transported to facilities for chipping into mulch.
   3. Trees with a marketable re-use shall be salvaged and transported to facilities that specialize in processing trees for future use as wood products.

3.3. GUIDELINES FOR DISPOSAL OF WASTES

A. The following guidelines shall be adjusted as needed by the methods and procedures identified in the Waste Management Plan.

B. Any waste that is contaminated, organic, or cannot be recycled, re-used, or salvaged shall be legally disposed of in an authorized landfill or incinerator. Disposal methods shall follow all applicable regulatory requirements.

C. No waste material of any kind, except those types designated as clean fill in section 3.4 above, shall be allowed to be buried on the project site at any time.

D. No burning of any kind of waste material shall be permitted on this project site at any time.

E. Paint and Stain: Paints, stains, and their containers shall be disposed of as follows:
   1. Whenever possible containers should be thoroughly cleaned immediately after emptying and sorted with as appropriate (metal or plastic) for recycling
   2. Empty containers, regardless of type or base material, may be disposed of with lids off with general garbage.
   3. Latex paint may be placed with general garbage if properly solidified as follows:
      a. Small amounts (an inch or less in can): Remove lids and allow paint to dry out in the can and harden. Protect cans from rain and freezing.
      b. Large amounts (more than one inch): Mix paint with equal amounts of cat litter, stir and allow to completely dry. Alternate method: mix with commercial paint hardener.
   4. Oil-based or combustible paints and stains, regardless of liquid or solid, shall be transported to an approved facility that takes such items such as Dane County Clean Sweep Sites.

F. Treated Wood Materials: Treated wood materials including but not limited to wood that has been painted, stained, or chemically treated shall not be recycled or incinerated.

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SECTION 01 78 36
WARRANTIES

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to provide clear responsibilities and guide lines related to providing all Warranties and Guarantees related to the Work, workmanship, materials, equipment, and other such items required by the Construction Documents.

B. Manufacturers' disclaimers and limitations on product warranties do not relieve any contractor of the warranty on the Work that includes the product.

C. Manufacturers' disclaimers and limitations on product warranties do not relieve suppliers, manufacturers and any contractor required to provide special warranties under the contract documents.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures

B. Section 01 77 00 Closeout Procedures

C. Section 01 78 23 Operation and Maintenance Data

D. Other Divisions and Specifications that may address more specifically the requirements for Warranties related to the installation of all items and equipment installed under the execution of the Work.

1.3. DEFINITIONS

A. See specification 01 77 00 for the definitions of the following terms that may also be used in this specification:
   1. Substantial Compliance
   2. Certificate of Occupancy
   3. Certificate of Substantial Completion
   4. Construction Closeout
   5. Contract Closeout

B. Emergency Repair: The Owner or Owner Representative reserves the right to make emergency repairs as required to keep equipment or materials in operation or to prevent damage to property and injury to persons without voiding the contractors warranty or bond or relieving the contractor of his/her responsibilities during the warranty period.

C. Installer: The company or contractor hired to install a finished product that was manufactured and supplied specifically for the Work within this contract. The Installer may or may not be the same company that supplied the product. See the definition for supplier.

D. Supplier: Any company that makes a specific finished product for the Work from information within the Contract Documents. Examples of suppliers would include custom cabinets, steel stairs and railings, etc. A supplier would not be a company that distributes items manufactured by others such as an electrical or plumbing supplier.

E. Warranty: A written guarantee from the manufacturer to the owner on the integrity of a product and its installation, and the manufacturers' responsibility to repair or replace the defective product or components within a specified time from the date of ownership. Warranty may also be used interchangeably with Guarantee. The following warranty types may be part of any specification within the Work associated with the Construction Documents:
   1. Expressed Warranty: A warranty that provides specific repair or replacement for covered components of a product over a specified length of time.

2. Implied Warranty: A warranty that is not stated explicitly by a seller or manufacturer that the product is merchantable and fit for the intended purpose.
3. Standard Product Warranty: Preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner. Standard warranties may be for any amount of time but shall not be for anything less than one (1) year from the warranty date.
4. Special Warranty: A written warranty required by the Contract Documents either to extend the time limit provided under a standard warranty or to provide greater rights to the Owner.

F. Warranty Date: The effective date that begins all warranty periods required for products, installations, and work-manship associated with the execution of the Work for this contract. The Warranty Date shall be set by the CPM.

G. Related Damages and Losses: When correcting failed or damaged Warranted Work, remove and reinstall (or replace if necessary) the construction that has been damaged as a result of the failure or the construction that must be removed and replaced to obtain access for the correction of Warranted Work.

H. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected reinstate the warranty by a new written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation unless specifically noted otherwise in a specification.

I. Replacement Cost: All costs that may be associated with Work being replaced under warranty including but not limited to the following:
1. Related damages and losses
2. Labor, material and equipment
3. Permits and inspection fees
4. This shall be regardless of any benefit the Owner may have had from the Work through any portion of its anticipated useful service life.

J. Replacement Work: All materials, products, required labor, and equipment necessary to replace failed or damaged warranted to an acceptable condition that complies with the requirements of the original Construction Documents.

K. Owners Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, and remedies.
1. Rejection of Warranties: The Owner reserves the right to reject any warranty and to limit the selection of products with warranties not in conflict with the requirements of the contract documents.
2. Where the Contract Documents require a Special Warranty or similar commitment on the Work or product, the Owner reserves the right to refuse acceptance of the Work until the Contractor presents evidence the entities required to countersign such required commitments have done so.

1.4. GENERAL CONTRACTORS RESPONSIBILITIES

A. The General Contractor (GC) shall be responsible to remedy, at his/her expense, any defect in the Work and any damage to City owned or controlled real or personal property when the damage is a result of:
1. The GC's failure to conform to Contract Document requirements.
    a. Any substitutions not properly approved and authorized may be considered defective.
2. Any defect in workmanship, materials, equipment, or design furnished by the GC or Sub-contractors.

B. All warranties as described in this specification and these Contract Documents shall take effect on the date established by the CPM, as noted in Section 1.3F above.
1. All warranties shall remain in effect for one (1) year thereafter unless specifically stated otherwise in the Contract Documents or where standard manufacturer warranties are greater.

C. The GC's warranty with respect to Work repaired or replaced, including restored or replaced Work due to damage, will run for one (1) year from the date of Owner Acceptance of said repair or replacement.
1. This shall be regardless of any benefit the Owner may have had from the Work through any portion of its anticipated useful service life.

D. Warranty Response
1. See Section 3.5 of this specification.

PART 2 – PRODUCTS - THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. WARRANTY CHECKLIST

A. All contractors shall be responsible for reviewing the drawings and specifications within their Divisions of Work to provide a complete and comprehensive list of all Warranty Requirements to the GC.

B. Each list shall indicate the title (and plan identifier when applicable) of the warranted item, the associated specification of the warranted item, the terms of the warranty (years), and a column to verify the item has been turned in and completed.

C. The GC shall be responsible for all of the following:

1. Consolidating all the warranty lists into one master Warranty Checklist and submitting electronically.
   a. The checklist shall be in a tabular data format similar to the sample below.
2. Resubmit the schedule as needed after initial reviews have been completed.

D. The GC shall work with all contractors to amend the Warranty Checklist throughout the execution of the project based on changes and modifications as necessary.

Title	Specification	Terms	Completed
Overhead Door Operator	08 36 00	MFR 2yr	
Exterior Bench and Trash Receptacles	12 93 00	MFR 3 year warranty on finish	
Kitchen Sink (SK-1)	22 42 00	MFR 5 year	
Disposal (D-1)	22 42 00	MFR 7 year parts and in-home service	
Toilet (WC-1)	22 42 00	MFR 1 year limited	

3.2. LETTERS OF WARRANTY

A. All letters of warranty shall be in a typed letter format and provide the following information:

1. The letter shall be on official company stationary including company name, address, and phone number.
2. Indicate project name, contract number, and contract address the warranty is for on the reference line.
3. Provide a description of the warranty(ies) being provided.
   a. Include Division, Trade, or Specification information as necessary.
   b. Only combine warranties of related Divisional Work together. Create new letters for additional Divisions as necessary.
4. Indicate the effective Warranty Date. As noted in Section1.3.F above, the Warranty Date shall be the date the Certificate of Substantial Completion was signed by the City Engineer.
5. Contractor Letters of Warranty shall only be signed by a principal officer of the company.
6. After signing the letter provide the GC with a high quality color scanned image in PDF format and the original signed letter.

B. The GC shall be responsible for the Final Warranty submittal as identified in Section 3.4 below.

C. The GC shall obtain letters of warranty from all of the following:

1. The General Contractor shall provide warranty letters for all Work that was self performed under the contract documents, identify all trades or Divisions of Work.
2. All Sub-contractors shall provide warranty letters for Work performed under the contract documents; identify all trades or Divisions of Work.
3. Suppliers, as required by other specifications within the Construction Documents where the manufacture of a specific product unique to the Work of this contract was required.
   a. The terms and conditions of the Supplier Letter of Warranty shall be as defined by the specifications associated with the Work but shall not be less than the industry standard of repair, or replace defective materials and workmanship within one (1) year of the warranty date.
   b. When the supplier is also the installer a single written letter may be submitted identifying both the warranty for the manufacture of the product and the warranty for the installation of the product.
4. Installers as required by other specifications within the Construction Documents where the installation of a specific product unique to the Work of this contract was required.
   1. The terms and conditions of the Installer Letter of Warranty shall be as defined by the specifications associated with the Work but shall not be less than the industry standard of repair, or replace defective materials and workmanship associated with the installation of the product within one (1) year of the warranty date.
5. Special Letters of Warranty shall be required from any contractor, supplier, installer or manufacturer who agrees to provide warranty services required by any Division Specification in excess of their Standard Product Warranty.

3.3. STANDARD PRODUCT WARRANTY

A. All contractors shall be responsible for collecting and providing copies of all standard product warranties for commercially available products purchased and installed under this contract.

B. Only one copy of the manufacturers' standard warranty needs to be submitted as representative for all quantities of the same model number used throughout the Work.

C. Provide the manufacturers certificate, letter, or other standard documentation for each Standard Product Warranty submitted as follows:

1. Whenever possible a PDF version of the document shall be used.
   a. If a PDF version is used all additional information shall be completed using simple PDF editing tools such as text boxes, highlight, etc.
   b. If a PDF version is not available and an original document is furnished the additional information shall be neatly hand written and highlighted on the document in such a fashion so that it does not obscure any part of the written warranty.
2. Provide the following additional information on each warranty document:
   a. Contract warranty date.
   b. Provide the manufacturer name and model number of the product if not specified within the warranty.
      i. Where the manufacturer name and model number is specified within the warranty it shall be highlighted for visibility.
   c. Provide the plan identifier (LAV-1, WC-2, etc) when applicable.

D. Each completed warranty shall be saved as a digital PDF. The file shall be named using the specification number and item description. I.E. 22 42 00 Toilet (WC-1).pdf

   a. Where an original certificate was furnished provide a high quality colored scan of the completed document with the additional information. Save the scanned image in PDF format and use the same naming convention as indicated above.

E. Provide all PDF files and any original documents to the GC for final consolidation to be provided to the Owner.

3.4. FINAL WARRANTY SUBMITTAL

A. The GC shall receive all required warranties (digital PDF and any original documents) from all contractors, suppliers, installers and manufacturers.

B. The GC shall inventory all received warranties with the Warranty Submittal List to ensure all required warranties have been received and all warranty periods are correct according to the specifications.

C. Provide with each Operation and Maintenance Manual a complete copy of any associated warranty.

D. Scan all warranties into a single organized electronic PDF file as follows:

1. Organize the PDF file into an orderly sequence based on the table of contents of the Specifications.
2. Provide a typed Table of Contents for the entire file at the front of the document.
3. Provide bookmarks and links to each individual PDF to enable quick navigation through the PDF document.

E. Submit electronically, the warranty submittal for review by the PE and CPM.

F. Correct any deficiencies or omissions and resubmit as necessary.

3.5. WARRANTY NOTIFICATION, RESPONSE, EXECUTION AND FOLLOW-UP

A. Warranty Notification:

1. The City of Madison uses an email notification system for all warranty related issues. The GC will be required to provide, and keep current during the warranty period, a minimum of two (2) email addresses and phone numbers of current employees to receive email notifications and provide response regarding Work associated with these construction documents.
   a. In the event a Warranty Issue is deemed by the City of Madison to be an emergency, the GC shall first receive a phone call with a follow-up email from the CPM.

B. Warranty Response:

1. The GC shall upon notification by the City of Madison provide warranty response as follows:
   a. Critical Systems or equipment: Where damage to equipment and other building components, or injury to personnel is probable provide immediate emergency shut-down information and an on-site response team as soon as possible but in no case shall on-site response exceed 24 hours.
   b. For non-critical responses where damage or injury is unlikely provide on-site response no later than the next business day.

c. Where Technical Assistance support is part of the written warranty provide all assistance necessary via phone, text, or internet systems as indicated by the warranty. If issues cannot be resolved provide on-site response no later than the next business day.

d. If the request cannot be supported in sufficient time as outlined above the Owner (or Owner Representative) reserves the right to contact other contractors or service companies having similar capability to expedite the repair or replacement and shall invoice all associated costs to the Owner back to the GC.

C. Warranty Execution:

1. The GC shall provide all repairs or replacements as necessary to restore broken or damaged Work to the original level of acceptance as intended by the Contract Documents.
   a. Provide all materials, equipment, products, and labor necessary to complete the repair or replacement associated with the Warranty Issue.
   b. Provide all cleaning services as may be required before, during, and after the repair or replacement as per Specification 01 74 13 Progress Cleaning.
   c. Provide any protection necessary for existing construction as per Specification 01 76 00 Protecting Installed Construction
   d. Provide new letters of warranty when required.

D. Warranty Follow-up:

1. Logged Warranty Issues:
   a. The GC shall provide complete documented responses of all logged Warranty Issues. Responses shall provide a description of work completed, by who, inclusive dates, and photos of completed or repaired work.
      i. Provide call back response if work is not acceptable.
   b. The City Project Manager shall review the submitted response documentation and do a field inspection if necessary.
      i. If work is not acceptable, contact GC to review details and expectations of the repair as needed.
      ii. If work is acceptable close the Warranty Issue.
2. Warranty Reviews:
   a. The GC shall be responsible for scheduling on-site review with all of the following:
      i. City Project Manager, and other City staff as needed
      ii. Owner and Owner Tenant Representative
      iii. Plumbing, Heating, Electrical Sub-contractors
      iv. Other Sub-contractors that may be responsible for open Warranty issues
   b. Reviews shall be scheduled at 6 months, and 11 months after the effective date of the warranty. The review meetings shall:
      i. Review the status of all open Warranty Issues, determine course of action and estimated date of completion.
      ii. As appropriate, provide shut-down, start-up, testing, and training of off-season equipment as required by the contract documents.
      iii. The 11th month review shall review all open Warranty Issues, final plan for resolution, and all Warranty Issues where a new letter of warranty may have been issued.

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SECTION 01 78 39
AS-BUILT DRAWINGS

PART 1 – GENERAL

1.1. SUMMARY

A. This specification is intended to provide clear guidelines and identify the responsibilities of all contractors as they pertain to City of Madison contract procedures regarding the accurate recording of the Work associated with the execution of this contract. This shall include but not be limited to work that will be hidden, concealed, or buried.

B. Each contractor shall be responsible for maintaining an accurate record of all installations, locations, and changes to the contract documents during the execution of this contract as it may relate to their specific division or trade.

C. The General Contractor (GC) shall be responsible for ensuring all contractors provide as-built record information to the Master As-Built Document Set as described in this specification.

1.2. RELATED SPECIFICAITONS

A. 01 26 13 Request for Information
B. 01 31 23 Construction Bulletin
C. 01 26 63 Change Orders
D. 01 29 76 Progress Payment Procedures
E. 01 33 23 Submittals
F. 01 77 00 Closeout Procedures
G. Other Divisions and Specifications that may address more specifically the requirements for field recording the installation of all items associated with the execution of this contract by Division or Trade.

1.3. RELATED DOCUMENTS

A. Other related documents shall include but not be limited to the following:
1. Bidding documents including drawings, specifications, and addenda.
2. Required regulatory documents of conditional approval.
3. Field orders, verbal or written by inspectors having regulatory jurisdiction.
4. Shop drawings and installation drawings.

1.4. PERFORMANCE REQUIREMENTS

A. The GC shall be responsible for maintaining the "Master As-Built Document Set" at all times during the execution of this contract. This document set shall include all of the following:
1. Master As-Built Plan Set
2. Master As-Built Specification Set
3. Other Document Sets

B. The GC shall designate one person of the GC staff to be responsible for maintaining the Master As-Built Document Set. This shall include, posting updates, revisions, deletions and the monitoring of all contractors posting as-built information as described in this specification.

C. All contractors shall use this specification as a general guideline regarding the requirements for documenting their completed Work. Contractors shall explicitly follow additional specification requirements within their own Division of Trade as it may apply to this specification.

1.5. QUALITY ASSURANCE

A. The GC shall be responsible for all of the following:
   - a. Spot checking all sub-contractors field documents to insure daily information is being recorded as work progresses.
   - b. Discuss as-built recording to the plan set at weekly job meetings with all sub-contractors on site.
   - c. Schedule time with sub-contractors in the job trailer for recording as-built information to the plan set.
   - d. Insure that all sub-contractors are providing clear and accurate information to the plan set in a neat and organized manner.
   - e. Insure sub-contractors who have completed work have finalized recording all as-built information to the plan set before releasing them from the project site.

B. The Project Engineer, the City Project Manager, and other design team staff will perform random checks of the Master As-Built Document Set during the execution of this contract to ensure as-built information is being recorded in a timely fashion as the Work progresses. An updated and current Master As-Built Document Set is a stipulation for approval of the progress payment.

<u>PART 2 – PRODUCTS</u>

2.1. OFFICE SUPPLIES

A. The GC shall provide a sufficient supply of office products at all times for all contractors to use in recording as-built information into the plan set. This shall include but not be limited to the following:
   - a. Red ink pens, medium point. Pens that bleed through paper, markers, and felt tips will not be accepted.
   - b. The use of highlighters is acceptable. Assign colors to various trades for consistency in recording information.
   - c. Straight edges of various lengths for drawing dimension, extension and other lines.
   - d. Civil and Architectural scales
   - e. Clear transparent, non-yellowing, single sided tape.
   - f. Correction tape or correction fluid for correcting small errors.

<u>PART 3 - EXECUTION</u>

3.1. FIELD DOCUMENT AS-BUILTS

A. The GC and all Sub-contractors shall be responsible for keeping their own field set of as-built documents including plans, specifications and published changes.

B. Field sets shall be kept dry and in good condition at all times.

C. <u>No Work shall be buried, covered, or hidden, by any additional Work, regardless of Contractor or Trade, until locations of all materials and equipment has been properly documented as described below</u>.

D. All contractors shall be required to record the following as-built information:
   - a. Notes on the daily installation of materials and equipment.
   - b. Sketches, corrections, and markups indicating final location, positioning, and arrangement of materials and equipment such as pipes, conduits, valves, cleanouts, pull boxes and other such items. Note all final locations on plan sheets, indicate dimension off identifiable building features. Riser diagrams need only be corrected for significant changes in locations, routing or configuration.
     - i. The use of photographs in lieu of hand drawn sketches is acceptable.
     - ii. Photos shall be taken according to Specification 01 32 33 Photographic Documentation
     - iii. Print photo and markup with dimensions or notes as necessary.
   - c. Identify by the use of existing plan symbology and notes the size, type, quantity, and use as applicable of materials such as pipes, valves, conduits, etc.
   - d. Note whether horizontal runs are below slab or above ceiling, include dimensions above or below finished floor elevation.

E. All contractors shall be responsible for transferring the information from their field set of documents to the Master As-Built Plan Set kept in the GC job trailer. See Section 3.3.D. below for the proper procedure.

F. All contractors shall update the GC Master Plan Set as often as necessary, but not less than once per work week.

3.2. SITE SURVEY AS-BUILT

A. The Land Surveyor Sub-Contractor shall provide digital as-built information including but not be limited to the following:

a. For underground buried utility laterals and services of all types locate all of the following that may apply:
   i. Connection points at all mains
   ii. Storm discharge points to open air
   iii. All corners and bends regardless of angle, large radius sweeps shall have multiple point locations sufficient to define the sweep.
   iv. All vertical drops
   v. All wells
   vi. Private buried utilities such as buried electrical cables, irrigation systems, etc.
   v. Other information that may need to be located in the future by the owner prior to digging

b. Record all surface features including but not limited to the following:
   i. Building corners, pavement edges, and other permanent structural features.
   ii. All surface covers for inlets, catch basins, cleanouts, access structures, curb stops and other such devices.
   iii. Other permanent surface features such as hydrants, lamp posts, and other permanent site amenities.

c. The following data shall be recorded while locating items in sub-sections 3.2.a and 3.2.b above:
   i. Flow lines at both ends of pipes
   ii. Pipe sizes and material types
   iii. Rim elevations for all covers
   iv. Sump elevations and invert elevations of all structures
   v. Spot elevations for all pads, driveways, walks, stoops, and floors

B. The Surveyor shall provide the final digital as-built on a media and in a format specified in Specification 00 31 21 Survey Information to the GC for turn in to the Project Engineer and the Civil Engineer.

C. The Surveyor shall provide two printed as-built site plans to the GC for inclusion in the Master As-Built Plan Set as follows:

1. One sheet to show all features (but not contour information) with text neatly organized for each item identified.
2. One sheet showing contours, contour labels, and features from item 1 above, but with no additional text.

3.3. MASTER AS-BUILT DOCUMENT SET

A. The GC shall be responsible for maintaining the Master As-Built Document Set in the job trailer at all times.

1. The Master As-Built Plan Set (Plan Set) shall begin with one complete bid set of drawings and any additional sheets that were supplied by published addenda during the bidding process. The cover sheet shall be titled as the "Master As-Built Plan Set" in large bold red letters approximately 2" in height and shall not be used for any other purpose.
   a. The Plan Set shall be kept dry, legible, and in good condition at all times.
   b. The Plan Set shall be kept up to date with new revisions within two (2) working days of supplemental drawings being issued. Revisions shall be posted as follows:
      i. Insert new, revised sheets into the plan set. Void old sheets but do not remove them from the plan set. Indicate date received and what document (RFI, CB, CO, etc) caused the change.
      ii. Insert new, revised individual details into the plan set. Void old details, tape new details over the old details with a "tape hinge" to allow them to be viewed. Indicate date received and what document (RFI, CB, CO, etc) caused the change.
      iii. Add new details in appropriate white space on relevant sheets. If no space is available use the back side of the previous sheet or insert a new sheet. Indicate date received and what document (RFI, CB, CO, etc) caused the change.
   c. The Plan Set shall be available at anytime for easy reference during progress meetings and for emergency location information of new work already completed.
2. The Master As-Built Specification Set (Spec Set) shall begin with one complete bid set of specifications and any additional specifications that were supplied by published addenda during the bidding process. The Spec Set shall be provided in three "D" ring type binders of sufficient thickness to accommodate the specification set. Multiple binders are allowed as necessary. Label the front cover and binding edge with

"Master As-Built Specifications" in bold red letters. Provide other information as necessary to distinguish the contents of multi-volume sets.

a. The Spec Set shall be kept dry, legible, and in good condition at all times.
b. The Spec Set shall be kept up to date with new revisions within two (2) working days of supplemental drawings being issued.
c. The Spec Set shall be available at anytime for easy reference during progress meetings.

3. Other Document Sets may be kept at the GCs option in three "D" ring type binders of sufficient thickness to accommodate the documentation. Other documentation sets may include but not be limited to RFIs, CBs, COs, etc.

C. The Land Surveyor Sub-Contractor shall be required to use digital surveying for all exterior site surveying, and provide deliverable digital as-builts as specified in Specification 00 31 21 Survey Information. As soon as practical the surveyor shall provide the GC with a preliminary copy of installed buried utilities for inclusion with the plan set in the job trailer. The surveyor shall provide final digital as builts as per section 3.2 above.

D. All contractors shall be responsible for updating the Plan Set from their field sets at least once per work week. Updates shall include but not be limited to the following procedures:

a. All updates shall be done only in red ink. Place a "cloud" around small areas of correction to call attention to the change.
b. Whenever possible place general work notes, field sketches, supplemental details, photos, and other such information on the reverse side of the preceding sheet. Installation notes including dates shall be kept neatly organized in chronological order as necessary.
c. Accurately locate items on the plan set as follows:
   i. For items that are located as dimensioned provide a check mark or circle indicating the dimension was verified.
   ii. For items that are within 5 feet of the location indicated on the plans leave as shown and:
      - Provide correct dimensions to existing dimension strings or,
      - Accurately locate with new dimension strings
   iii. For items that are more than 5 feet from the location indicated on the plans
      - Accurately draw the items in the new location as installed and,
      - Accurately locate with new dimension strings and,
      - Note that the existing location is void.
d. Include dimensioned locations for items that will be buried, concealed, or hidden in the ground, under floors, in walls or above ceilings.
   i. Dimensions shall be pulled from identifiable building features, not from centers of columns or other buried features.
   ii. When necessary pull more dimensions as needed from opposing directions to properly locate single items.

3.4. AS-BUILT REVIEW AND ACCEPTANCE

A. The GC shall provide the Master As-Built Plan Set to the Project Engineer (PE), the City Project Manager (CPM), and other design team staff for content review prior to the Progress Payment Milestone indicated in Specification 01 29 76 Progress Payment Procedures. The submitted plan set shall include the digital survey information produced under Section 3.2 above.

1. If the plan set is not approved:
   a. The PE and CPM shall only be required to generalize deficiencies by trade there shall be no requirement or expectation to generate a "punch list" of required corrections.
   b. The GC and Sub-contractors as necessary shall be responsible for inspecting the installation and correcting the drawings as needed.
   c. The GC shall re-submit the plan set for review.
2. If the plan set is approved the PE shall take possession of the plan set to be used in providing the owner with digital CAD record drawings. Upon completion of transferring the information to CAD the PE shall provide the Owner with CAD record drawings, record PDFs, and the Master As-Built Plan Set.

3.5. CHANGES AFTER ACCEPTANCE

A. No Contractor shall be responsible for making changes to the As-Built record documents after acceptance by the PE and CPM except when necessitated by changes resulting from any Work made by the Contractor as part of his/her guarantee.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 REFERENCE STANDARDS

A. American Concrete Institute (ACI):
1. ACI 211.1 Proportioning Concrete Mixtures
2. ACI 301 Specifications for Structural Concrete
3. ACI 303.1 Specification for Cast-in-Place Architectural Concrete
4. ACI 305 Hot Weather Concreting
5. ACI 306 Specifications for Cold Weather Concreting
6. ACI 308 Specifications for Curing Concrete
7. ACI 309 Consolidation of Concrete
8. ACI 318 Building Code Requirements for Structural Concrete

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.

3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Curing compounds.
7. Floor and slab treatments.
8. Bonding agents.
9. Semirigid joint filler.
10. Joint-filler strips.
11. Repair materials.

B. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 117.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
   a. For standard finish, use Structural 1, B-B or better; mill oiled and edge sealed.
      OR
   b. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I/II.
2. Fly Ash: ASTM C 618, Class F or C.

3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
4. Blended Hydraulic Cement: ASTM C 595/C 595M cement.
5. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 4S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal, but not more than 1/3 the slab thickness
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C 260/C 260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

F. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.

G. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

H. Color Pigment: ASTM C 979/C 979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
1. Color: As selected by Architect from manufacturer's full range.

I. Water: ASTM C 94/C 94M and potable.

2.6 FIBER REINFORCEMENT

A. Synthetic Macro-Fiber: Polyolefin or polypropylene macro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 2-1/4 inches long.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Corp. - Construction Chemicals.
b. Euclid Chemical Company (The); an RPM company.
c. FORTA Corporation.
d. GCP Applied Technologies Inc. (formerly Grace Construction Products).
e. Nycon, Inc.
f. Propex Operating Company, LLC.

2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class C, maximum water vapor permeance 0.04 perms. Include manufacturer's recommended adhesive or pressure-sensitive joint tape. Provide in lengths and widths required for least number of seams.

2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, non-dissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.10 REPAIR MATERIALS

A. Repair Underlayment for slabs beneath floor coverings : Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment for slabs with no floor covering: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: For concrete not exposed to deicing salts, use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 35 percent.

For concrete exposed to deicing salts, limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Slag Cement: 50 percent.
4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
5. Silica Fume: 10 percent.
6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to
0.06 percent by weight of cement for prestressed concrete.
0.15 percent by weight of cement for reinforced concrete exposed to chlorides.
0.30 percent by weight of cement for reinforced concrete not protected from moisture.
1.00 percent by weight of cement for reinforced concrete protected from moisture.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings and Piers: Normal-weight concrete.

1. Minimum Compressive Strength: As indicated at 28 days.
2. Maximum W/C Ratio: 0.50.
3. Slump Limit: 6 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for ¾ inch to 1-inch nominal maximum aggregate size.

B. Exterior Slabs-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: As indicated at 28 days.
2. Maximum W/C Ratio: 0.43.
3. Maximum Water Content 27 gal/cu yd.
4. As an alternate to limit of 27 gal/cu yd, water content, provide documentation of the shrinkage tests the proposed concrete mix conducted in accordance with ASTM C157 for specimens cured for 7 days in water and placed in drying environment for 21 days confirming length change to be less than 0.04% at 28 days.
5. Slump Limit: 6 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
6. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size; 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch to 1-inch nominal maximum aggregate size. Exterior slabs shall not be trowel-finished.
7. Synthetic Macro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of 4.0 lb/cu. yd.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 07 92 00 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings, to receive mortar setting beds, and for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated, exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
   a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated, and where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.9 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

3.10 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall

within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

1. Steel reinforcement placement.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C 567/C 567M, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C 31/C 31M.

    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
    b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 03 30 00

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SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated stainless steel rods, hangers and training tie-offs.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 – Cast-In-Place Concrete

B. Section 06 10 63 – Exterior Rough Carpentry.

B. Section 06 15 33 – Wood Patio Decking.

1.03 REFERENCE STANDARDS

A. ASTM F593-17 - Standard Specification for Stainless Steel Bolts, Hex Cap, Screws and Studs; 2017.

1.04 SUBMITTALS

A. Refer to Section 01 33 23 - Submittals, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.

1.05 WARRANTIES

A. Refer to Section 01 78 36 – Warranties for additional warranty information.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Stainless Steel threaded rods, bolts and washers; ASTM F593-17.

2.02 FABRICATION

A. Fabricate training tie-offs and related components as indicated on the drawings of same material and finish as fabrication, except where specifically noted otherwise.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Obtain approval prior to site cutting or making adjustments not scheduled.

END OF SECTION

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SECTION 05 51 00
METAL STAIRS

PART 1 - GENERAL

1.01 SECTION INCLUDES
A. Prefabricated stair treads with nosings attached to wood stringers and wood structure.

1.02 RELATED REQUIREMENTS
A. Section 06 10 63 – Exterior Rough Carpentry.
B. Section 06 15 33 – Wood Patio Decking

1.03 REFERENCE STANDARDS
A. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2017.
B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
D. NAAMM AMP 510 - Metal Stairs Manual; 1992.

1.04 SUBMITTALS
A. Refer to Section 01 33 23 - Submittals, for submittal procedures.
B. Product Data: Provide product cut sheets indicating product, model number, sizes, structural capacities, and finishes.

1.05 QUALITY ASSURANCE
A. Fabricator Qualifications: A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.

1.06 WARRANTIES
A. Refer to Section 01 78 36 – Warranties for additional warranty information.

PART 2 - PRODUCTS

2.01 MANUFACTURERS
A. Metal Stair Fabricators Basis of Design: McNichols Co., Inc., www.mcnichols.com; Bar Grating Stair Treads, Series GW-100 (Welded), Product Spacing 19-W-4.
   1. Jointing and Finish Quality Level: Industrial.
   2. Risers: Open.
   3. Treads: Steel bar grating.
   4. Grating Type: Welded.
   5. Bearing Bar Depth: 1 inch, minimum.
   6. Top Surface: Serrated.
   7. Nosing: Checkered plate.
   8. Nosing Width: 1-1/4 inch, minimum.
   9. Tread Size: 10 15/16" wide x 36" long – refer to drawings.
   10. Anchorage to Stringers: End plates welded to grating, bolted to wood stringers.
   11. Finish: Hot Dipped Galvanized.

2.04 MATERIALS
A. Steel Sections: ASTM A36/A36M.
B. Steel Plates: ASTM A6/A6M or ASTM A283/A283M.
C. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230 with G40/Z120 coating.
D. Checkered Plate: ASTM A786/A786M, rolled steel floor plate; manufacturer's standard pattern.
E. Gratings: Bar gratings complying with NAAMM MBG 531 or NAAMM MBG 532, whichever applies based on bar sizes.

2.05 SHOP FINISHING
A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Galvanizing: Hot-dip galvanize to minimum requirements of ASTM A123/A123M.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.
B. Provide anchors, plates, angles, hangers, and struts required for connecting stair treads to structure.
C. Obtain approval prior to site cutting or creating adjustments not scheduled.

END OF SECTION

SECTION 06 10 63
EXTERIOR ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood framing.

B. Related Requirements:

1. Section 06 15 33 "Wood Patio Decking."

1.2 DEFINITIONS

A. Boards: Lumber of less than 2 inches nominal in thickness and 2 inches nominal or greater in width.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Timber: Lumber of 5 inches nominal or greater in least dimension.

D. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. SPIB: The Southern Pine Inspection Bureau.
4. WCLIB: West Coast Lumber Inspection Bureau.
5. WWPA: Western Wood Products Association.

1.3 ACTION SUBMITTALS

A. Product Data: For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. Certificates of Inspection: Issued by lumber grading agency for exposed wood products not marked with grade stamp.

C. Evaluation Reports: For preservative-treated wood products, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by ALSC's Board of Review.

1. Factory mark each item with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:
1. Dimension Lumber: 19 percent.
2. Timber. 19 percent.

2.2 LUMBER

A. Hand select wood for railings and handrails for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

B. Dimension Lumber: No. 1 grade and any of the following species:
1. Douglas fir-larch, Douglas fir-larch (North), or Douglas-fir-south; NLGA, WCLIB, or WWPA.
2. Mixed southern pine; SPIB.

2.3 TIMBER POSTS

A. Timber Posts: Southern pine No. 1 SPIB.

2.4 PRESERVATIVE TREATMENT

A. Pressure treat boards and dimension lumber with waterborne preservative according to AWPA U1; Use Category UC3b for exterior construction not in contact with the ground, and use Category UC4a for items in contact with the ground.

B. Preservative Chemicals: Acceptable to authorities having jurisdiction.

1. Do not use chemicals containing arsenic or chromium.

C. Use process that includes water-repellent treatment.

D. After treatment, re-dry to 19 percent maximum moisture content.

E. Mark treated wood with treatment quality mark of an inspection agency approved by ALSC's Board of Review.

F. Application: Treat all wood as indicated on drawings.

2.5 FASTENERS

A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

1. Use stainless steel fasteners and connectors to UC4 treated wood. Fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or ASTM F 2329 may be used only at UC3 treated wood

B. Nails: ASTM F 1667.

C. Power-Driven Fasteners: ICC-ES AC70.

D. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.

E. Carbon-Steel Bolts: ASTM A 307 with ASTM A 563 hex nuts and, where indicated, flat washers all hot-dip zinc coated.

F. Stainless-Steel Bolts: Type 316 stainless bolts, hex nuts and, where indicated, flat washers.

G. Post-installed Anchors: Stainless-steel, chemical or torque-controlled expansion anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing according to ASTM E 488, conducted by a qualified independent testing and inspecting agency.

1. Stainless-steel bolts and nuts Type 316.

2.6 METAL ACCESSORIES

A. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G90 coating designation.

B. Stainless-Steel Sheet: Type 316.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.

B. Framing Standard: Comply with AF&PA WCD1 unless otherwise indicated.

C. Install metal framing anchors to comply with manufacturer's written instructions.

D. Do not splice structural members between supports unless otherwise indicated.

E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

F. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of members or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

G. Apply copper naphthenate field treatment to comply with AWPA M4, to cut surfaces of preservative-treated lumber according to manufacturers recommendations.

H. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

As indicated or "Fastening Schedule" in ICC's International Building Code.

I. Use hot dip galvanized common wire nails unless otherwise indicated. Select fasteners of size that do not fully penetrate members where opposite side is exposed to view. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads unless otherwise indicated.

END OF SECTION

SECTION 06 15 33
WOOD PATIO DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood decking.
2. Stairs for elevated decks.
3. Railings for elevated decks.
4. Support framing for elevated decks.

1.2 DEFINITIONS

A. Boards: Lumber of less than 2 inches nominal in thickness and 2 inches nominal or greater in width.

B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

C. Timber: Lumber of 5 inches nominal or greater in least dimension.

D. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. SPIB: The Southern Pine Inspection Bureau.
4. WCLIB: West Coast Lumber Inspection Bureau.
5. WWPA: Western Wood Products Association.

1.3 ACTION SUBMITTALS

A. Product Data: For preservative-treated wood products and metal framing anchors.

1. For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by ALSC's Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. Certificates of Inspection: Issued by lumber grading agency for exposed wood products not marked with grade stamp.

C. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood products.
2. Metal framing anchors.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by ALSC's Board of Review.

1. Factory mark each item with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
3. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Boards: 19 percent.
2. Dimension Lumber: 19 percent
3. Timber. 19 percent

2.2 WOOD DECKING AND STAIR TREADS

A. Hand select wood for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

B. Dimension Lumber Decking and Stair Treads: No. 1 grade and any of the following species:
1. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWPA.
2. Mixed southern pine; SPIB.

2.3 WOOD RAILINGS

A. Hand select wood for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

B. Dimension Lumber Railing Members: No. 1 grade and any of the following species:
1. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWPA.
2. Mixed southern pine; SPIB.

2.4 DIMENSION LUMBER FRAMING

A. Deck and Stair Framing: No. 1 grade and any of the following species:
1. Douglas fir; WCLIB or WWPA.

2. Mixed southern pine; SPIB.

2.5 POSTS

A. Dimension Lumber and timber Posts: No. 1 grade and any of the following species:
   1. Douglas fir-; NLGA, WCLIB, or WWPA.
   2. Mixed southern pine; SPIB.

2.6 PRESERVATIVE TREATMENT

A. Pressure treat boards and dimension lumber with waterborne preservative according to AWPA U1; Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

B. Pressure treat timber (12x12) with waterborne preservative according to AWPA U1; Use Category UC4a.

C. Preservative Chemicals: Acceptable to authorities having jurisdiction.

   1. Do not use chemicals containing arsenic or chromium.

D. Use process that includes water-repellent treatment.

E. After treatment, redry to 19 percent maximum moisture content.

F. Mark treated wood with treatment quality mark of an inspection agency approved by ALSC's Board of Review.

G. Application: Treat all wood unless otherwise indicated.

   1. Framing members].
   2. Sills and ledgers.
   3. Members in contact with masonry or concrete.
   4. Posts.
   5. Decking.
   6. Stair treads.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

   1. Use stainless steel fasteners when attaching to UC4 treated timbers, and use fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or ASTM F 2329 to UC3 treated members unless otherwise indicated.

B. Nails: ASTM F 1667.

C. Power-Driven Fasteners: ICC-ES AC70.

D. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.

E. Carbon-Steel Bolts: ASTM A 307 with ASTM A 563 hex nuts and, where indicated, flat washers all hot-dip zinc coated.

F. Stainless-Steel Bolts: ASTM F 593, Alloy Group 1 or 2; with ASTM F 594, Alloy Group 1 or 2 hex nuts and, where indicated, flat washers.

G. Post-installed Anchors: Stainless-steel, chemical or torque-controlled expansion anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing according to ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Stainless-steel bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.8 METAL FRAMING ANCHORS

A. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated on Drawings. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G90 coating designation.

C. Stainless-Steel Sheet: ASTM A 666, Type 316.

D. Joist Hangers: U-shaped, with 2-inch- long seat and 1-1/4-inch- wide nailing flanges at least 85 percent of joist depth.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Prime wood indicated to be painted, including both faces and edges. Cut to required lengths and prime ends. Comply with requirements in Section 099113 "Exterior Painting."

C. Stain wood indicated to be stained, including both faces and edges. Cut to required lengths and stain ends. Comply with requirements in Section 099300 "Staining and Transparent Finishing."

3.3 INSTALLATION, GENERAL

A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.

B. Framing Standard: Comply with AF&PA WCD1 unless otherwise indicated.

C. Install wood decking and stair treads with crown up (bark side down).

D. Install plastic lumber to comply with manufacturer's written instructions.

E. Secure decking to framing with screws.

F. Install metal framing anchors to comply with manufacturer's written instructions.

G. Do not splice structural members between supports unless otherwise indicated.

H. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of members or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

J. Apply copper naphthenate field treatment to comply with AWPA M4, to cut surfaces of preservative-treated lumber.

K. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. ICC-ES AC70 for power-driven fasteners.
2. "Fastening Schedule" in ICC's International Building Code.
3. "Fastener Schedule for Structural Members" and "Alternate Attachments" in ICC's International Residential Code for One- and Two-Family Dwellings.

L. Use common wire nails unless otherwise indicated. Select fasteners of size that do not fully penetrate members where opposite side is exposed to view. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads unless otherwise indicated.

M. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced and with adjacent rows staggered.

3.4 ELEVATED DECK JOIST FRAMING INSTALLATION

A. General: Install joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists where framed into wood supporting members by using wood ledgers as indicated or, if not indicated, by using metal joist hangers. Do not notch joists.

B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.

3.5 STAIR INSTALLATION

A. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:

1. Stringer Size: As indicated on drawings.
2. Notching: Do not notch.
3. Stringer Spacing: As Indicated.

B. Provide stair framing with no more than 3/16-inch variation between adjacent treads and risers and no more than 3/8-inch variation between largest and smallest treads and risers within each flight.

END OF SECTION

SECTION 07 31 13
ASPHALT SHINGLES

PART 1 - GENERAL

1.01 SECTION INCLUDES
A. Asphalt Shingle roofing.
B. Flexible sheet membranes underlayment covering complete roof area.
C. Associated metal flashings and accessories.

1.02 RELATED REQUIREMENTS
A. Section 06 10 63 – Exterior Rough Carpentry: Roof sheathing.

1.03 REFERENCE STANDARDS
A. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017.
B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2017.
C. ASTM D3161/D3161M - Standard Test Method for Wind-Resistance of Steep Slope Roofing Products (Fan-Induced Method); 2016a.
D. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules; 2016.
E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
F. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2017.
G. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples; 2018.
H. NRCA (RM) - The NRCA Roofing Manual; 2018.
I. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 SUBMITTALS
A. Refer to Section 01 33 23 - Submittals for submittal procedures.
B. Product Data: Provide data indicating material characteristics.
C. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 FIELD CONDITIONS
A. Do not install shingles or eave protection membrane when surface temperatures are below 45 degrees F.

1.06 WARRANTY
A. Refer to Section 01 78 36 - Warranties for additional warranty requirements.
B. Manufacture's standard warranty on shingles, underlayment and sheet metal finishing.
C. Correct defective Work within a one year period after Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 ASPHALT SHINGLES
A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, conforming to ASTM D3018 Type I Self-Sealing. UL Certification of ASTM D 3462, ASTM D 3161/UL997 60-mph Wind resistance and UL Class A Fire Resistance, glass fiber mat base, ceramically colored/UV resistant mineral surface granules across entire face of shingle, square three-tab type
B. Manufacturers:
   1. CertainTeed CT 20:: https://www.certainteed.com/residential-roofing/
      a. Color: Weathered Wood.
   2. GAF; Timberline Royal Sovereign: www.gaf.com/#sle.
      a. Color: Weathered Gray.
   3. Owens Corning Corp; Supreme www.owenscorning.com/#sle.
      a. Color: Driftwood.

2.02 SHEET MATERIALS

A. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 22 mil (0.55 mm) total thickness; with strippable release film and woven polypropylene sheet top surface.
   1. Manufacturers Basis-of-Design:
      a. Grace Ice and Water Shield Roofing Underlayment, www.graceconstruction.com.

2.03 ACCESSORIES

A. Roofing Nails: Standard round wire shingle type, galvanized steel, stainless steel, aluminum roofing nails, or copper roofing nails, minimum 3/8 inch (9.5 mm) head diameter, 12 gage, 0.109 inch (2.77 mm) nail shank diameter, 1-1/2 inch (38 mm) long and complying with ASTM F1667.

B. Staples: Standard wire shingle type, of hot dipped zinc coated steel, 16 wire gage, 0.0508 inch (1.29 mm) diameter, 15/16 inch (23.8 mm) crown width, of sufficient length to penetrate through roof sheathing or 3/4 inch (19 mm) into roof sheathing or decking.

2.04 METAL FLASHINGS

A. Metal Flashings: Provide sheet metal eave edge, gable edge, ridge, ridge vents, open valley flashing, chimney flashing, dormer flashing, and other flashing indicated.
   1. Form flashings to profiles indicated on drawings.
   2. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
   3. Hem exposed edges of flashings minimum 1/4 inch (6 mm) on underside.

B. Steel Sheet Metal: Prefinished and galvanized steel sheet, 26 gage, 0.0179 inch (0.45 mm) minimum thickness, G90/Z275 hot-dipped galvanized; PVC coated, Charcoal Gray color.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions prior to beginning work.

B. Verify deck surfaces are dry, free of ridges, warps, or voids.

3.02 PREPARATION

A. Install eave edge flashings tight with fascia boards, weather lap joints 2 inches (50 mm) and seal with plastic cement, and secure flange with nails spaced 12 inches on center.

3.03 INSTALLATION - UNDERLAYMENT

A. Install underlayment perpendicular to slope of roof, with ends and edges weather lapped minimum 4 inches, stagger end laps of each consecutive layer, nail in place, and weather lap minimum 4 inches over eave protection.

B. Weather lap and seal watertight per manufacturer's recommendations.

3.04 INSTALLATION - METAL FLASHING AND ACCESSORIES

A. Weather lap joints minimum 2 inches (50 mm) and seal weather tight with plastic cement.

B. Secure in place with nails at 12 inches on center, and conceal fastenings.

C. Items Projecting Through or Mounted on Roofing: Flash and seal weather tight with plastic cement.

3.05 INSTALLATION - SHINGLES

A. Install shingles in accordance with manufacturer's instructions manufacturer's instructions and NRCA (RM) applicable requirements.
   1. Fasten individual shingles using two nails per shingle, or as required by manufacturer and local building code, whichever is greater.
   2. Fasten strip shingles using four nails per strip, or as required by manufacturer and local building code, whichever is greater.

B. Place shingles in straight coursing pattern with 5 inch weather exposure to produce double thickness over full roof area, and provide double course of shingles at eaves.

C. Project first course of shingles 3/4 inch beyond fascia boards.

D. Extend shingles 1/2 inch beyond face of gable edge fascia boards.

E. Complete installation to provide weather tight service.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for wood security gate, wood trapdoors and removeable wood mullions.

1.02 REFERENCE STANDARDS

A. BHMA A156.1 - American National Standard for Butts and Hinges; 2016.
B. BHMA A156.6 - American National Standard for Architectural Door Trim; 2015.
C. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.

1.03 SUBMITTALS

A. Refer to Section 01 33 23 - Submittals, for submittal procedures.
B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.

1.04 WARRANTY

A. Refer to Section 01 78 36 - Warranties for additional warranty requirements.
B. Warranty against defects in material and workmanship for period of one year, from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

A. Provide specified door hardware outlined under Schedule below.
B. Provide individual items of single type, of same model, and by same manufacturer.
C. Provide door hardware products that comply with the following requirements:
    1. Applicable provisions of federal, state, and local codes.
D. Hardware Fasteners:
    1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
        a. Aluminum fasteners are not permitted.
        b. Provide philips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.

2.02 SCHEDULE

A. Basis-of-Design:
Provide Basis-of-Design product or comparable product approved during bidding process. Characteristics that comparable products must match include, but are not limited to, color, form, aesthetics, and performance.
    1. Gate Hardware:
        a. Padlock Hasp: National Hardware N342-550 Hasp, 7 ½", Stainless Steel; 2 per gate.
        b. Hook and Eye Gate Hook: National Hardware HHI N122-283 Gate Hook, 5", Zinc; 1 per gate.
        c. Hinges: SS iSKCON , 5"x 5" Wide Throw Door Hinge, Stainless Steel; 3 per gate.
    2. Trapdoor Hardware:
        a. Pull: Stanley Hardware 76-2865 Pull Flush Trap Door, Zinc-plated, one each trap door; 2 per trapdoor.
        b. Hinges: National Hardware N255-938 V514 Door Hinge, Stainless Steel; 3 per trapdoor.
    3. Bolt Latch at Removeable Mullions: National Hardware N151-654 V834 Barrel Bolt, Zinc Plated.
    4. Padlocks - shall be owner provided.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions and applicable codes.
B. Use templates provided by hardware item manufacturer.

C. Door Hardware Mounting Heights: As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.

3.03 PROTECTION

A. Protect finished Work.

B. Do not permit adjacent work to damage hardware or finish.

END OF SECTION

SECTION 31 25 00
Erosion Control

PART 1 - GENERAL

1.01 SCOPE

A. The work under this section consists of providing all work, materials, labor, equipment, and supervision necessary to provide and construct erosion control measures necessary to protect property and the environment.

1.02 RELATED WORK

A. Applicable provisions of Division 01 govern work under this Section.
B. Section 32 05 00 Common Work Results For Exterior Improvements
C. Provide erosion control in accordance with the following references:
   1. Wisconsin Department of Natural Resources Technical Standards For Construction Site Erosion and Sediment Control. http://dnr.wi.gov/org/water/wm/nps/stormwater/techstds.htm
   2. Erosion Control Product Acceptability List ("PAL"), current version as published by the WisDOT. http://wisconsindot.gov/Documents/doing-bus/eng-consultants/cnslt-rsrces/tools/pal/pal-8-11-2017.pdf
D. Method of measurement and basis of payment sections in any referenced erosion control documents shall not apply to this contract.
E. These documents are available from: State of Wisconsin Document Sales and Distribution 202 South Thornton Avenue; P.O. Box 7840; Madison, WI 53707; 608-266-3358

1.03 PERMITS

A. ASTM F593-17 - Standard Specification for Stainless Steel Bolts, Hex Cap, Screws and Studs; 2017.

1.04 SUBMITTALS

A. The Lead Contractor will submit the following to the A/E:
   1. Contractor shall mark-up of the Erosion Control Plan that is included in these documents showing additional or alternate erosion control measures as needed due to the Contractors means and methods throughout all phases of construction. The Contractor may also be required to submit calculations and backup information showing the proposed measures meet applicable regulations.
   2. Submittals for materials used to implement the erosion control plan.
B. Submit shop drawings for the following erosion control features:
   1. Silt Sock

1.05 EROSION CONTROL PLAN

A. The A/E has prepared an erosion control plan for the project and will apply for the required erosion control permit from the City of Madison (if required). The Contractor will provide the A/E with submittals for materials used to implement the erosion control plan, as well as any modifications to the erosion control plan that are necessary due to the Contractor's means and methods of construction.
B. Contractor shall comply with all the requirements of the erosion control plan, and any stipulations as put forth by the City of Madison erosion control permit.
C. Erosion control and storm water management practices shall be installed and maintained in accordance with City of Madison and WDNR approved Technical Standards (or equivalent).
D. Contractor shall provide all erosion control practices necessary to protect property and the environment. Erosion control and storm water management practices shall be installed and maintained in accordance with the WDNR approved Technical Standards (or equivalent).

PART 2 - PRODUCTS

2.01 GENERAL

A. Erosion mats, silt sock, soil stabilizers, and tackifiers shall be listed on the Product Acceptability List for Multi-Modal
B. Applications ("PAL") as published by the Wisconsin Department of Transportation.
C. When the design or contract includes permanent erosion control or stormwater control features, the contractor may employ these items in his control of erosion and stormwater during his construction activities. However, these items shall be fully cleaned, restored, and in every way fully functioning for its intended permanent use prior to acceptance of the work.

2.02 STRAW BALE BARRIERS

A. Rectangular bales of hay or straw, tightly bound with twine, not wire.

B. Anchor stakes shall be "T" or "U" steel posts, or hardwood, 2.0 by 2.0 inches nominal. Rebar shall not be used to anchor bales.

2.03 SILT FENCE

A. Fence fabric shall comply with the requirements of Standard Specifications for Highway Construction 628.2.6, in 3 foot tall rolls, with 4' tall 2" x 2" nominal cross section hardwood posts spaced a maximum of 10' o.c. Silt fence shall be Mirafi, Trevira, Amoco, CFM, or approved equal.

2.04 EROSION MAT

A. A straw/coconut fiber mat encased in an accelerated photodegradable polypropylene top net. Erosion mat shall comply with the requirements of Class I, Type A erosion mat as defined by Standard Specifications for Highway Construction and the PAL. Erosion mat shall be American Excelsior, SI Geosolutions, Erosion Control Systems, North American Green, or approved equal.

B. Concentrated Areas/Channels (as indicated on plans): This mat shall be North American Green SC150, or approved equal.

C. Erosion Mat at Storm Outlets: This mat shall be ProPex LandLok 300, or approved equal.

D. Erosion Mat in bio-filtration and raingarden areas shall be North American Green SC-150BN or approved equal.

2.05 STAPLES

A. Use biodegradable staples in accordance with manufacturer's recommendations for materials being anchored. Wood and metal staples are not allowed.

2.06 RIP-RAP

A. Rip rap shall be the class specified and shall conform to Standard Specifications for Highway Construction Section 606.2.

2.7 TRACKING PAD STONE

A. The aggregate for tracking pads shall be 3 to 6 inch clear or washed stone. All materials shall be retained on a 3-inch sieve.

2.8 SOIL STABILIZERS

A. Soil stabilizers shall be non-asphalt-based products of the type specified, and meeting the requirements of the PAL.

2.9 SOIL TACKIFIERS

A. Soil tackifiers shall be non-asphalt-based products of the type specified, and meeting the requirements of PAL.

2.10 POLYMERS

A. Polymers used to settle suspended sediment shall meet the requirements of the WDNR Technical Standards.

PART 3 - EXECUTION

3.01 GENERAL

A. Install erosion control measures as required by the erosion control plan and contract documents. Provide additional erosion control measures as dictated by Contractor's means and methods, or by differing site conditions. Notify Construction Representative of additional erosion control features that are provided, but not shown on the plan.

B. Contractor shall provide all erosion control measures necessary to protect property and the environment. Include all erosion control measures as required by the most stringent of applicable sections of DNR Technical Standards or the Standard Specifications for Highway Construction.

C. Perform all work in accordance with manufacturer's instruction where these specifications do not specify a higher requirement.

D. Contractor shall comply with all the requirements of the erosion control plan, and if applicable, the WPDES Stormwater Discharge Permit for Erosion Control, including required monitoring and documentation.

3.02 GRADING AND EARTHWORK

A. Install all temporary or permanent erosion control measures prior to any onsite grading or land disturbances.

B. Clear only those areas designated for the placement of improvements or earthwork before placement of the final cover. Perform stripping of vegetation, grading, excavation, or other land disturbing activities in a logical sequence and manner which will minimize erosion. If possible, schedule construction for times of the year when erosion hazards are minimal.

C. Do not clear the site of topsoil, trees, and other natural ground covers before the commencement of construction. Retain natural vegetation and protect until the final ground cover is placed.

D. Temporary stockpiles are to be located greater than 25 feet from any roadway, parking lot, paved area, drainage structure, or channel.

E. Provide temporary stabilization and control measures (seeding, mulching, covering, erosion matting, barrier fencing, etc.) for the protection of disturbed areas and soil piles which will remain uncovered for a period of more than 7 consecutive calendar days.

F. Remove surplus excavation materials from the site immediately after rough grading. The disposal site for the surplus excavation materials shall also be subject to these erosion control requirements.

3.03 DRAINAGE

A. Minimize water runoff and retain or detain on-site whenever possible so as to promote settling of solids and groundwater recharge.

B. Convey drainage to the nearest adequate stormwater facility. Do not discharge water in a manner that will cause erosion or sedimentation of the site or receiving facility.

C. Protect storm sewer inlets and catch basins in accordance with the erosion control plan, if provided, a log with the WDNR Technical Standards and PAL. If not specified, protect inlets with straw bale barriers, silt fencing, filter basket, or other equivalent methods approved by the Engineer which provide the necessary erosion protection.

D. Divert roof drainage and runoff from all areas upslope of the site around areas to be disturbed or channel them through the site in a manner that will not cause erosion.

E. Ditch checks are to be provided in swales or ditches to reduce the velocity of water in the channel. Construct in accordance to DNR Technical Standards and PAL.

F. Minimize the pumping of sediments when dewatering. Discharge to a sedimentation basin/trap or sedimentation vessel to reduce the discharge of sediments. Do not discharge water in a manner that will cause erosion or sedimentation of the site or receiving facility. Refer to section 31 23 19 Dewatering for specifications.

3.04 TRACKING CONTROL

A. Construct and maintain tracking pads in accordance with the Technical Standards. Provide each entrance to the site with a stone tracking pad at least 50 feet in length with a minimum thickness of 12 inches. The tracking pad shall be the full width of the egress point. Inspect tracking pads on a daily basis and replace aggregate when no longer effective.

B. If necessary, provide a crushed aggregate paved parking area.

C. If applicable, wash water shall be discharged to sedimentation basins, sedimentation vessels, or other such control areas.

3.05 MAINTENANCE

A. Inspect all erosion control measures within 24 hours of the end of each rainfall event that exceeds 0.25", or daily during period of prolonged rainfall, or weekly during periods without rainfall. Immediately repair and/or replace any and all damaged, failed, or inadequate erosion control measures.

B. Re-apply soil stabilizers, tackifiers, polymers and anionic polycrylamides as needed to prevent erosion of exposed soil.

C. Maintain records of all inspections and any remedial actions taken.

D. Maintain stockpile stabilization measures as necessary after rainfall events and heavy winds. Replace tarps, re-seed, and reapply mulch, tackifiers and stabilizers as necessary.

E. Remove sediment from stormwater and erosion control structures, basins and vessels as necessary.

F. Repair or replace damaged inlet protection.

G. Replace or supplement stone tracking pads with additional stone when they become ineffective.

H. Remove any sediment reaching a public or private roadway, parking lot, sidewalk, or other paved. Do not remove tracked sediments by flushing. Completely remove any accumulations not requiring immediate attention at least once daily at the end of the workday.

I. Frequently dispose of all waste and unused construction materials in licensed solid waste or wastewater facilities. Do not bury, dump, or discharge, any garbage, debris, cleaning wastes, toxic materials, or hazardous materials on the site, on the land surface or in detention basins, or otherwise allow materials to be carried off the site by runoff onto adjacent lands or into receiving waters or storm sewer systems.

END OF SECTION

SECTION 32 05 00
COMMON WORK RESULTS FOR EXTERIOR IMPROVEMENTS

PART 1 - GENERAL

1.01 SCOPE

A. This section includes information common to all site work and applies to the entire contract.

B. Unless otherwise noted in the Contract Documents, Contractor shall be responsible for obtaining and paying for all permits necessary to complete the work.

C. Construction Limits are indicated on the drawings. In the absence of such a designation on the drawings, confine work to the minimum area reasonably necessary to undertake the work as determined by the Construction Representative. In no case shall construction activities extend beyond property lines or construction easements.

D. The Contractor shall restore all disturbed areas in accordance with the drawings and specifications. If plans and specifications do not address restoration of specific areas, these areas will be restored to pre-construction conditions as approved by the Construction Representative.

1.02 REFERENCE STANDARDS

A. Work under this section depends on applicable provisions from other sections and the plan set in this contract. Examples of related sections include, but are not limited to:
   1. Division 31 — Earthwork
   2. Specification 01 76 00 Protecting Installed Construction

B. AASHTO - American Association of State Highway and Transportation Officials

C. ACPA - American Concrete Pipe Association

D. ANSI - American National Standards Institute

E. ASCE - American Society of Civil Engineers

F. ASME - American Society of Mechanical Engineers

G. ASTM - American Society for Testing and Materials

H. AWWA - American Water Works Association

I. AWS - American Welding Society

J. FHA - Federal Highway Administration

K. EPA - Environmental Protection Agency

L. NEC - National Electric Code

M. NEMA - National Electrical Manufacturers Association

N. NFPA - National Fire Protection Association

O. NSF - National Sanitation Foundation

P. OSHA - Occupational Safety and Health Administration

Q. STI - Steel Tank Institute

R. UL - Underwriters Laboratories Inc.

S. WDNR - State of Wisconsin Department of Natural Resources

T. WisDOT - State of Wisconsin Department of Transportation

U. Where reference is made to the "SSHSC", it shall mean the pertinent sections of the State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications. Where reference is made to the "STANDARD SPECIFICATIONS", it shall mean pertinent sections of the City of Madison Standard Specifications for Public Works Construction, current edition. Where reference is made to the "BMPH", it shall mean the Wisconsin Construction Site Best Management Practice Handbook, current edition as published by the WDNR. Method of measurement and basis of payment sections in referenced documents shall not apply.

PART 2 – PRODUCTS

2.01 BARRICADES, SIGNS, AND WARNING DEVICES

A. Traffic barricades, traffic signs, and warning devices shall meet the requirements of applicable OSHA standards and the FHA Manual of Uniform Traffic Control Devices (MUTCD).

B. Traffic signing materials shall meet the requirements of Sections 634, 636, and 637 of Standard Specifications for Highway Construction except that signs shall be from aluminum blanks.

C. Galvanized 2" round posts shall be provided for all signs.

2.02 TEMPORARY PLASTIC BARRIER FENCING

A. UV stabilized high-density polyethylene barrier fence free of holes tears and other defects. Provide 4' tall fence in diamond or rectangular pattern. Fencing shall be "safety orange" color, unless otherwise noted.

B. Posts for temporary plastic barrier fencing shall be 5' tall, minimum 12 gauge, painted metal posts.

PART 3 - EXECUTION

3.01 MAINTENANCE OF SITE AND BUILIDNG ACCESS/EGRESS

A. Unless otherwise shown or directed, maintain existing access and egress to the facility throughout construction. Maintain ANSI A117 compliant access for disabled persons, delivery access, emergency vehicle access, and emergency egress. Do not interrupt access and egress without prior written approval from the Construction Representative.

3.02 CONTINUITY OF EXISTING TRAFFIC/PARKING AND TRAFFIC CONTROL

A. Do not interrupt or change existing traffic, delivery, or parking without prior written approval from the Construction Representative. When interruption is required, coordinate schedule with the Owner agency to minimize disruptions. When working in public right-of-way, obtain all necessary approvals and permits from the City of Madison.

B. When Contractor's activities impede or obstruct traffic flow, Contractor shall provide traffic control devices, signs and flaggers in accordance with other Contract Documents and the current version of the MUTCD, or as shown on the Drawings.

3.03 PROTECTION AND CONTINUITY OF EXISTING UTILITIES

A. Verify the locations of any water, drainage, gas, sewer, electric, drainage, gas, sewer, electric, telephone/communication, fuel, steam lines or other utilities and site features which may be encountered in any excavations or other sitework. All lines shall be properly underpinned and supported to avoid disruption of service.

B. Do not interrupt or change existing utilities without prior written approval from the Construction Representative, affected utilities and users. Notify all users impacted by outages a minimum of 48 hours in advance of outage. Notification shall be provided in writing and describe the nature and duration of outages and provide the name and number of Contractor's foreperson or other contact.

C. Any service connections encountered that are to be removed shall be cut off at the limits of the excavation and capped in accordance with the requirements of applicable codes and any specifications governing such removals.

3.04 PROTECTION OF EXISTING WORK AND FACILITIES

A. Verify the locations of, and protect, any signs, paved surfaces, buildings, structures, landscaping, streetlights, utilities, and all other such facilities that may be encountered or interfered with during the progress of the work. Take measures necessary to safeguard all existing work and facilities that are outside the limits of the work or items that are within the construction limits but are intended to remain. Report any damage to existing facilities to the Construction Representative immediately. Correct and pay for all damages.

3.05 CONSTRUCTION LAYOUT

A. Contractor shall establish all heights and grades to properly execute work from bench mark established by a surveyor (from original survey work). It is strongly recommended that the design engineering firm be contacted and used for all construction layout as well as as-built surveys in an effort to avoid conflict between datums and horizontal control points used. Prior to construction layout, existing and proposed finished floor elevations shall be checked with respect to current site benchmarks to ensure elevations correspond with layout elevations.

B. Contractor shall provide all construction layout surveys to accurately locate the construction on the site.

3.06 STORMWATER/EXCAVATION WATER MANAGEMENT

A. Control grading around structures, pitch ground to prevent water running into excavated areas.

B. Pits, trenches within building lines and other excavations shall be maintained free of water.

C. Provide trenching, pumping, other facilities required.

D. Notify Architect/Engineer if springs or running water are encountered in excavation; provide discharge by trenches, drains, pumping to point outside of excavation. Provide information to Architect/Engineer of points and areas that water will be discharged. At the Engineer's option, the Contractor shall drain the spring to the storm sewer system by the use of field tile.

E. Be responsible for control measures to prevent damage from flooding, erosion, and sedimentation to on-site and off-site areas.

END OF SECTION

SECTION 32 11 23 33
DENSE GRADED BASE

PART 1 - GENERAL

1.01 SCOPE

A. This section includes information common to dense graded base using crushed stone or crushed gravel and applies to all sections in this Division.

1.02 REFERENCE STANDARDS

A. Work under this section depends on applicable provisions from other sections and the plan set in this contract. Examples of related sections include, but are not limited to:
   1. Division 31 — Earthwork

B. Wherever WisDOT or SSHSC appears in this specification it shall be construed to mean the pertinent sections of the State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction (SSHSC), current edition, and all supplemental and interim supplemental specifications, as they may pertain, except this contract shall be a lump sum contract and measurement and basis of payment methods shall not apply.

C. Dense Graded Base shall conform to City of Madison standard specification Article 401 – Crushed Aggregate Base Course.

1.03 SUBMITTALS

A. Provide copies of record drawings.

B. Provide copies of material testing reports.

C. Provide the following prior to construction:
   1. Manufacturers product information (cut sheets)
   2. Mix designs and specifications
   3. Aggregate Gradations

D. Materials conforming to the WisDOT Standard Specifications for Highway and Structure Construction (Latest Edition, hereafter called "Standard Specifications for Highway Construction" and supplied from a WisDOT approved source need not be tested. The contractor shall furnish evidence of such WisDOT approval to the A/E and/or Construction Representative.

E. Maintain record drawings showing actual locations of utilities and other features encountered, modifications to proposed grades and site features, and other deviations from the original design.

PART 2 - PRODUCTS

2.01 GENERAL

A. Use dense graded base. Materials shall conform to Section 301.2 of the WisDOT Standard Specifications for Highway and Structure Construction. Material gradations shall conform to Section 305.2.2 of the WisDOT Standard Specifications for Highway and Structure Construction unless specified elsewhere in the contract documents.

B. Base Course Gradation: 1-1/4" Crushed Aggregate

C. Materials shall conform to Gradation No. 2 per the City of Madison specification 401.1(b).

2.02 BREAKER RUN AGGREGATE

A. Crushed stone, rock or gravel meeting the requirements of either Breaker Run or Select Crushed material as defined in Section 311.2 or Section 312.2 of Standard Specifications for Highway Construction, respectively.

PART 3 - EXECUTION

3.01 CONSTRUCTION

A. Preparing The Pavement Foundation (Sub-Grade):
   1. Prepare the foundation, or resurface the previously placed base layer, as specified in WisDOT Section 211 before placing base. Do not place base foundations that are soft, spongy, or covered by ice or snow. Water and rework or re-compact dry foundations as necessary to ensure proper compaction, or as the representative designates.
      a. In proposed pavement areas, all organic solid shall be removed.
      b. Excavation shall be reasonably free of water prior to beginning filling. Do not place material on frozen surfaces or use frozen material.

c. In areas of existing pavement to be modified or adjusted in grade, the existing pavement section shall be removed by an acceptable method. The new pavement section shall match the construction details.

d. Place and compact material to minimize settlement and avoid damage to structures, pipes, utility lines and other features. Hand place and compact material as necessary.

e. Moisture condition backfill material as necessary to achieve density required for given use.

f. Compact fill material as required for the given use.

g. It is the responsibility of the Contractor to provide all necessary compaction equipment and other grading equipment that may be required to obtain the specified density. Vibratory plate or tamping type walk behind compactors will be required whenever backfill is placed adjacent to structures, pipes, utility lines and other features.

h. Where additional filling or excavation is necessary, or placement of base course will be delayed, roll surface of proposed roadway or parking lot with a smooth drum roller to provide relatively impervious surface and promote drainage.

2. Proof-roll all subgrade areas that are to receive aggregate base or pavement. Proof-roll with a loaded dump truck prior to the placement of base courses to locate soft spots that yield under loading. Overexcavate (undercut) areas of soft subgrade that will not compact readily when proof-rolled or tamped. Backfill with breaker run or select crushed material as approved by the project representative.

   a. Prior to undercutting or excavating below subgrade (EBS) or placing any base course, contact the Construction Representative to schedule inspection of subgrade and proof-rolling. Provide minimum of 24 hrs confirmed notice. All proof-rolling shall be completed in the presence of the Construction Representative and Geotechnical Consultant.

   b. To complete proof-rolling, entire roadway subgrade shall be provided with a relatively smooth surface, suitable for observing soil reaction during proof-rolling.

   c. Contractor shall schedule and provide a fully loaded tri-axle dump truck for proof-rolling. Loaded truck shall have a minimum gross operating weight of 30 tons. Test shall be conducted with "tag" or "pusher" axles retracted from the ground.

   d. Test-rolling shall be accomplished in a series of traverses parallel to the centerline of the street or parking area. The truck shall traverse the length of the street or parking area once for each 12' of width. Additional passes along the traverse shall be completed as directed by the Geotechnical Consultant, to further define unsatisfactory subgrade.

   e. Soft areas, yielding areas, cracked areas or areas where rolling or wave action is observed shall be considered indicative of an unsatisfactory subgrade. Such areas shall be undercut as outlined in Section 31 05 00.

   f. Once the subgrade has been proof-rolled and approved, protect the soils from becoming saturated, frozen, or adversely altered.

   g. Contractor shall assume 15% of proposed paved areas may require undercutting. This work shall be included in base bid. Undercut as outlined in Section 31 05 00.

B. Stockpiling:

1. If continuous compliance with material specifications is questionable, the project representative may require the contractor to supply material from a stockpile of previously tested material. Maintain a sufficiently large stockpile to preclude the use of material not previously approved.

2. Build and maintain stockpiles using methods that minimize segregation and prevent contamination. If the contract specifies location, place stockpiles where specified. Clear and prepare stockpile areas to facilitate the recovery of the maximum amount of stockpiled material.

C. Constructing Base:

1. Place aggregate in a manner that minimizes hauling on the subgrade. Do not use vehicles or operations that damage the subgrade or in-place base. Deposit material in a manner that minimizes segregation.

2. onstruct the base to the width and section the plans show. Shape and compact the base surface to within 0.04 feet (12 mm) of the plan elevation.

3. Ensure there is adequate moisture in the aggregate during placing, shaping, and compacting to prevent segregation and achieve adequate compaction.

4. Maintain the base until paving over it, or until the project representative accepts the work, if paving is not part of the contract. The contractor is not responsible for maintaining material placed on detours.

D. Standard Compaction: Compact the base until there is no appreciable displacement, either laterally or longitudinally, under the compaction equipment. Route hauling equipment uniformly over previously placed base. Compact each layer before placing a subsequent layer. If the material is too dry to readily attain the required compaction, add water as necessary to achieve compaction.

E. Special Compaction: If the contract requires special compaction, compact each layer to 95 percent of maximum density, or more, before placing the subsequent layer. The geotechnical engineer will determine the maximum density according to AASHTO T 99 method C or D and in-place density according to AASHTO T 191.

F. Controlling Dust: Apply water or other engineer-approved dust control materials to control dust during construction and maintenance of the base and shoulders.

3.02 COMPACTION

A. Compact each base layer, including shoulder foreslopes, with equipment specified in WisDOT Section 301.3.1. Use standard compaction conforming to WisDOT Section 301.3.4.2. Final shaping of shoulder foreslopes does not require compaction.

B. Compacting 1 1/4-Inch Base and 3/4-Inch Base. If using a pneumatic roller, do not exceed a compacted thickness of 6 inches (150 mm) per layer. For the first layer placed over a loose sandy subgrade, the contractor may, with the geotechnical engineer's approval, increase the compacted layer thickness to 8 inches (200 mm). If using a vibratory roller, do not exceed a compacted thickness of 8 inches (200 mm) per layer.

C. Compacting 3-Inch Base: Compact with a vibratory or pneumatic roller. Do not exceed a compacted thickness of 9 inches (225 mm) per layer.

3.3 UNDERCUTTING/EXCAVATION BELOW SUBGRADE (EBS)

A. Undercutting/EBS shall be completed only when directed by the Geotechnical Consultant. The Contractor shall not be compensated for any unauthorized undercutting/EBS. Measure and document undercut areas and depths in consultation with Geotechnical Consultant. Work shall comply with Section 31 05 00. Contractor shall assume 50% of proposed driveway paved areas may require undercutting. This work shall be included in unit prices with bid item 90002.

3.4 CLEANUP

A. After the project is completed, thoroughly clean up all debris that may have accumulated during the placement of dense graded base. Replace or repair as required, all surfaces and/or landscape features damaged or disturbed under this item of work.

END OF SECTION

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SECTION 32 92 19
SEEDING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Preparation of subsoil.
B. Placing topsoil and compost.
C. Final Seeding and applying stabilizers, mulching material, and fertilizer.
D. Maintenance.

1.02 RELATED REQUIREMENTS

A. Section 31 25 00 - Erosion Control: Temporary seeding
B. Section 32 05 00 – Common Work Results for Exterior Improvements.

1.03 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.04 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.
B. All seed shall conform to the requirements of the Wisconsin Statutes regarding noxious weed seed content. No seed shall be used on the work later than one year after the germination test date which appears on the label.
C. Seed shall be tested when required in accordance with the methods and procedures used in making purity analyses and germination tests as adopted by the US Department of Agriculture in the Administration of the Federal Seed Act.

1.05 SUBMITTALS

A. Refer to Section 01 33 23 - Submittals, for submittal procedures.
B. Product Data: Provide complete product data for seeding mix and fertilizers.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.
B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.07 WARRANTIES

A. Refer to Section 01 78 36 – Warranties for additional warranty information.
B. Refer to Article 3.7 below.

PART - 2 PRODUCTS

2.1 APPROVED SEED MIXTURES

A. No Mow Turf
   1. Contractor shall supply No Mow seed mixture with annual rye variety. The following formulation is as manufactured by Prairie Nursery of Westfield, WI. Any substitution must have prior approval of the Owner.

NO MOW WITH ANNUAL RYE	ORIGIN/GERM
SR5130 Chewings Fescue - Festuca communtata - 23.75%	OR-85%
Sheep Fescue - Festuca ovina - 23.44%	Canada - 85%
Chariot Hard Fescue - Festuca longifolia - 11.94%	OR-85%
Heron Hard Fescue - Festuca rubra - 11.85%	OR-85%
Sea Link Creeping Red Fescue - Festuca rubra - 11.82%	OR-85%
SR5250 Creeping Red Fescue - Festuca rubra - 11.68%	OR-85%
Annual Ryegrass - Lolium multiflorum - 3.95%	OR – 90%

2. 1.53% Inert matter
3. .02% other crop seed
4. .02% weed seed
5. Noxious weed seed – none

2.2 SOIL MATERIALS

A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0. or below:

B. Compost: Well decomposed, stable, weed free; derived from food, agricultural or industrial residuals, biosolids, yard trimmings, or source-separated or mixed solid waste; with no objectionable odors and not resembling the raw material from which it was made; no substances toxic to plants.
   1. Gradation: 100 percent passing 3/8 inch screen.
   2. Moisture Content: 35 to 55 percent by weight. 3. pH: 5.5 to 8.9.
   4. Not more than 1 percent man-made matter and without plastic items more than 2 inches in length.

2.3 ACCESSORIES

A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Chopped cornstalks are not acceptable.

B. Fertilizers, intended for use in connection with seeding, sodding, or other planting, shall be standard commercial products conforming to the requirements of the Wisconsin Statues. Native plant seedings or temporary seeding to be followed by native seedings should not be fertilized. Each package of fertilizer shall be plainly marked with the analysis of the phosphoric acid and soluble potash. Fertilizers shall meet the following minimum requirements:
   1. Nitrogen, not less than..10%
   2. Phosphoric Acid, not less than...............................10%
   3. Potash, not less than...10%

C. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.

D. Erosion Control: Reference Civil drawings and specifications for erosion control products.

PART - 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared soil base is ready to receive the work of this Section.

3.2 PREPARATION

A. Grading, topsoiling, and fertilizing shall be completed before seeding, except when equipment designed for the purpose is used, the fertilizer and seed mixture may be placed in one operation. The areas to be seeded shall be worked with discs, harrows, or other appropriate equipment until it becomes a reasonably even and loose seed bed immediately in advance of the seeding.

3.3 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

3.4 SEEDING

A. The seed mixes shall be applied at the following rates:

SEED MIX	RATE
No Mow Turf	5lbs per 1,000 SF / 220 lbs per Acre

B. Final seeding shall be limited to the following period: Late August - Mid October

C. Any seeding outside the dates listed above shall be at the risk of the Contractor and reseeding after October 15th or in the spring shall be completed at no additional cost to the City of Madison with the same seed mix that was specified in the contract.

D. Unless otherwise specified, seed mixture shall be sown uniformly over the areas to be seeded, and lightly raked or dragged to cover the seeding with approximately one-forth inch of soil. After seeding, the areas shall be lightly rolled or compacted by means of suitable equipment, preferably of the cultipacker type when such equipment can be operated, or by means of light hand tampers.

3.5 WATERING

A. All seeded areas shall be watered as necessary to meet germination and seed growth as defined in ACCEPTANCE AND GUARANTEE below.

3.6 ACCEPTANCE

A. Upon completion of seeding, the Contractor shall request approval from the Architect and Engineer for acceptance of seeded areas for the purposes of issuing the certificate of completion and removal of erosion control devices (including, but not limited to inlet protection, silt sock and/or fence, turbidity barrier and/or silt curtain). If the certificate of completion is authorized by the Architect and Engineer with pending or without acceptance of seeded areas, the Contractor is responsible for maintaining erosion control devices until authorized by the Architect.

B. Acceptance shall be defined as healthy and flourishing germination of 95% of perennial grass seed to a minimum height of 1 inch, with no or few bare patches.

C. All seeded areas which are dead or found not to be in a normal, healthy condition or do not conform to the specifications, in the judgement of the Architect will not be accepted. All rejected work shall be replaced by the Contractor, including removal and repair of all work affected by the replacement, at no cost to the City.

3.7 GUARANTEE

A. All areas that have been seeded with turf shall be guaranteed to be in a healthy and flourishing condition as defined in section 3.8 ACCEPTANCE for a period of 1 year from the date on the certificate of completion.

B. At any time within the period of the guarantee, the Contractor shall replace any seeded areas which, for any reason, have died or are in a dying condition, or which have failed to flourish in such a manner or to such a degree that their usefulness or appearance has been impaired. Replacement shall include removal and repair of all affected work. Seeded areas that have perished for any reason shall be reseeded or overseeded with the exact variety of turf seed that was originally specified.

C. Following the completion of the repair, a re-inspection will be made prior to final acceptance.

END OF SECTION

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SECTION E: BIDDERS ACKNOWLEDGEMENT

FIRE STATION NO. 14 TRAINING TOWER
CONTRACT NO. 8427

Bidder must state a Unit Price and Total Bid for each item. The Total Bid for each item must be the product of quantity, by Unit Price. The Grand Total must be the sum of the Total Bids for the various items. In case of multiplication errors or addition errors, the Grand Total with corrected multiplication and/or addition shall determine the Grand Total bid for each contract. The Unit Price and Total Bid must be entered numerically in the spaces provided. All words and numbers shall be written in ink.

1. The undersigned having familiarized himself/herself with the Contract documents, including Advertisement for Bids, Instructions to Bidders, Form of Proposal, City of Madison Standard Specifications for Public Works Construction - 2019 Edition thereto, Form of Agreement, Form of Bond, and Addenda issued and attached to the plans and specifications on file in the office of the City Engineer, hereby proposes to provide and furnish all the labor, materials, tools, and expendable equipment necessary to perform and complete in a workmanlike manner the specified construction on this project for the City of Madison; all in accordance with the plans and specifications as prepared by the City Engineer, including Addenda Nos. _______ through _______ to the Contract, at the prices for said work as contained in this proposal. (Electronic bids submittals shall acknowledge addendum under Section E and shall not acknowledge here)
2. If awarded the Contract, we will initiate action within seven (7) days after notification or in accordance with the date specified in the contract to begin work and will proceed with diligence to bring the project to full completion within the number of work days allowed in the Contract or by the calendar date stated in the Contract.
3. The undersigned Bidder or Contractor certifies that he/she is not a party to any contract, combination in form of trust or otherwise, or conspiracy in restraint of trade or commerce or any other violation of the anti-trust laws of the State of Wisconsin or of the United States, with respect to this bid or contract or otherwise.
4. I hereby certify that I have met the Bid Bond Requirements as specified in Section 102.5. *(IF BID BOND IS USED, IT SHALL BE SUBMITTED ON THE FORMS PROVIDED BY THE CITY. FAILURE TO DO SO MAY RESULT IN REJECTION OF THE BID).*
5. I hereby certify that all statements herein are made on behalf of Joe Daniels Construction Co., Inc. (name of corporation, partnership, or person submitting bid) a corporation organized and existing under the laws of the State of Wisconsin a partnership consisting of _______________; an individual trading as _______________; of the City of Madison State of Wisconsin; that I have examined and carefully prepared this Proposal, from the plans and specifications and have checked the same in detail before submitting this Proposal; that I have fully authority to make such statements and submit this Proposal in (its, their) behalf; and that the said statements are true and correct.

Joseph A. Daniels

SIGNATURE Joseph A. Daniels

President

TITLE, IF ANY

Sworn and subscribed to before me this
6th day of June, 20 19.

Kara D. Sainsbury

(Notary Public or other officer authorized to administer oaths)
My Commission Expires 07/17/2020
Bidders shall not add any conditions or qualifying statements to this Proposal.

Contract 8427, Joe Daniels Construction Co., Inc.

Section F: Best Value Contracting (BVC)

This section is a required document for the bid to be considered complete. There are two methods for completing the Best Value Contracting (BVC) form. Method one: The form can be filled out online and submitted to this site to be included with your electronic bid. Method two: The form can be downloaded from the site and submitted by hand to the City of Madison.

Method of Submittal for BVC (click in box below to choose) *

I will submit Bid Express fillable online form (BVC).

Best Value Contracting
1. The Contractor shall indicate the non-apprenticeable trades used on this contract.
Trucking and Landscaping

2. Madison General Ordinance (M.G.O.), 33.07(7), does provide for some exemptions from the active apprentice requirement. Apprenticeable trades are those trades considered apprenticeable by the State of Wisconsin. Please check applicable box if you are seeking an exemption.

☐ Contractor has a total skilled workforce of four or less individuals in all apprenticeable trades combined.

☐ No available trade training program; The Contractor has been rejected by the only available trade training program, or there is no trade training program within 90 miles.

☐ Contractor is not using an apprentice due to having a journey worker on layoff status, provided the journey worker was employed by the contractor in the past six months.

☐ First time contractor on City of Madison Public Works contract requests a onetime exemption but intends to comply on all future contracts and is taking steps typical of a "good faith" effort.

☐ Contractor has been in business less than one year.

☐ Contractor doesn't have enough journeyman trade workers to qualify for a trade training program in that respective trade.

☐ An exemption is granted in accordance with a time period of a "Documented Depression" as defined by the State of Wisconsin.

3. The Contractor shall indicate on the following section which apprenticeable trades are to be used on this contract. Compliance with active apprenticeship, to the extent required by M.G.O. 33.07(7), shall be satisfied by documentation from an applicable trade training body; an apprenticeship contract with the Wisconsin Department of Workforce Development or a similar agency in another state; or the U.S Department of Labor. This documentation is required prior to the Contractor beginning work on the project site.

☐ The Contractor has reviewed the list and shall not use any apprenticeable trades on this project.

LIST APPRENTICABLE TRADES (check all that apply to your work to be performed on this contract)

- ☐ BRICKLAYER
- ☑ CARPENTER
- ☑ CEMENT MASON / CONCRETE FINISHER
- ☐ CEMENT MASON (HEAVY HIGHWAY)
- ☐ CONSTRUCTION CRAFT LABORER
- ☐ DATA COMMUNICATION INSTALLER
- ☐ ELECTRICIAN
- ☐ ENVIRONMENTAL SYSTEMS TECHNICIAN / HVAC SERVICE TECH/HVAC INSTALL / SERVICE
- ☐ GLAZIER
- ☑ HEAVY EQUIPMENT OPERATOR / OPERATING ENGINEER
- ☐ INSULATION WORKER (HEAT and FROST)
- ☐ IRON WORKER
- ☐ IRON WORKER (ASSEMBLER, METAL BLDGS)
- ☐ PAINTER and DECORATOR
- ☐ PLASTERER
- ☐ PLUMBER
- ☐ RESIDENTIAL ELECTRICIAN
- ☐ ROOFER and WATER PROOFER
- ☐ SHEET METAL WORKER
- ☐ SPRINKLER FITTER
- ☐ STEAMFITTER
- ☐ STEAMFITTER (REFRIGERATION)
- ☐ STEAMFITTER (SERVICE)
- ☐ TAPER and FINISHER
- ☐ TELECOMMUNICATIONS (VOICE, DATA and VIDEO) INSTALLER-TECHNICIAN
- ☐ TILE SETTER

FIRE STATION NO. 14 TRAINING TOWER
CONTRACT NO. 8427

Small Business Enterprise Compliance Report

This information may be submitted electronically through Bid Express or submitted with bid in sealed envelope.

Cover Sheet

Prime Bidder Information

Company: Joe Daniels Construction Co., Inc.

Address: 919 Applegate Road, Madison, WI 53713

Telephone Number: 608/271-4800 Fax Number: 608/271-4570

Contact Person/Title: Joseph A. Daniels - President

Prime Bidder Certification

I, Joseph A. Daniels (Name), President (Title) of Joe Daniels Construction Co., Inc. (Company) certify that the information contained in this SBE Compliance Report is true and correct to the best of my knowledge and belief.

Witness' Signature

Bidder's Signature

June 6, 2019
Date

FIRE STATION NO. 14 TRAINING TOWER
CONTRACT NO. 8427

Small Business Enterprise Compliance Report

Summary Sheet

SBE Subcontractors Who Are NOT Suppliers

Name(s) of SBEs Utilized	Type of Work	% of Total Bid Amount	
JR's Construction & Landscaping	Landscaping	1.76%	%
Steve Brumm Trucking	Trucking	1.51%	%
Urban Construction	Singles	0.50%	%
			%
			%
			%
			%
			%
			%
			%
			%
			%
			%

Subtotal SBE who are NOT suppliers: 3.77% %

SBE Subcontractors Who Are Suppliers

Name(s) of SBEs Utilized	Type of Work	% of Total Bid Amount
		%
		%
		%
		%
		%
		%

Subtotal Contractors who are suppliers: -0- % x 0.6 = -0- % (discounted to 60%)

Total Percentage of SBE Utilization: 3.77 %.

FIRE STATION NO. 14 TRAINING TOWER
CONTRACT NO. 8427
DATE: 6/6/19

Item	Quantity	Price	Extension
		Joe Daniels Construction Co., Inc.	
Section B: Proposal Page			
90001 - BASE BID - LUMP SUM	1.00	$193,300.00	$193,300.00
1 Items	Totals		$193,300.00

Department of Public Works
Engineering Division
Robert F. Phillips, P.E., City Engineer

City-County Building, Room 115
210 Martin Luther King, Jr. Boulevard
Madison, Wisconsin 53703
Phone: (608) 266-4751
Fax: (608) 264-9275
engineering@cityofmadison.com
www.cityofmadison.com/engineering

Assistant City Engineer
Michael R. Dailey, P.E.

Principal Engineer 2
Gregory T. Fries, P.E.
Christopher J. Petykowski, P.E.

Principal Engineer 1
Christina M. Bachmann, P.E.
Eric L. Dundee, P.E.
John S. Fahmey, P.E.

Facilities & Sustainability
Jeanne E. Hoffman, Manager

Operations Manager
Kathleen M. Cryan

Mapping Section Manager
Eric T. Pederson, P.S.

Financial Manager
Steven B. Danner-Rivers

BIENNIAL BID BOND

Joe Daniels Construction Co., Inc.
(a corporation of the State of Wisconsin)
(individual), (partnership), (hereinafter referred to as the "Principal") and
The Cincinnati Insurance Company
a corporation of the State of Ohio (hereinafter referred to as the "Surety") and licensed to do business in the State of Wisconsin, are held and firmly bound unto the City of Madison, Wisconsin (hereinafter referred to as the "City"), in the sum equal to the individual proposal guaranty amounts of the total bid or bids of the Principal herein accepted by the City, for the payment of which the Principal and the Surety hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of this obligation is that the Principal has submitted to the City certain bids for projects from the time period of February 1, 2018 through January 31, 2020.

If the Principal is awarded the contract(s) by the City and, within the time and manner required by law after the prescribed forms are presented for its signature, the Principal enters into (a) written contract(s) in accordance with the bid(s), and files with the City its bond(s) guaranteeing faithful performance and payment for all labor and materials, as required by law, or if the City rejects all bids for the work described, then this obligation shall be null and void; otherwise , it shall remain in full force and effect.

In the event the Principal shall fail to execute and deliver the contract(s) or the performance and payment bond(s), all within the time specified or any extension thereof, the Principal and Surety agree jointly and severally to pay to the City within ten (10) calendar days of written demand a total equal to the sum of the individual proposal guaranty amounts of the total bid(s) as liquidated damages.

The Surety, for value received, hereby agrees that the obligations of it and its bond shall be in no way impaired or affected by any extension of time within which the City may accept a bid, and the Surety does hereby waive notice of any such extension.

This bond may be terminated by the Surety upon giving thirty (30) days written notice to the City of its intent to terminate this bond and to be released and discharged therefrom, but such termination shall not operate to relieve or discharge the Surety from any liability already accrued or which shall accrue before the expiration of such thirty (30) day period.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, on the day and year set forth below.

PRINCIPAL

Joe Daniels Construction Co., Inc.
COMPANY NAME AFFIX SEAL (no seal)

11-16-2017
DATE

By: _______________
SIGNATURE AND TITLE
Joseph A. Daniels - President

SURETY

The Cincinnati Insurance Company
COMPANY NAME AFFIX SEAL

11-16-2017
DATE

By: _______________
SIGNATURE AND TITLE
Elizabeth Mosca, Attorney-in-Fact

This certifies that I have been duly licensed as an agent for the Surety in Wisconsin under National Provider No. 12305256 for the year 2018 and appointed as attorney in fact with authority to execute this bid bond, which power of attorney has not been revoked.

11-16-2017
DATE

____
AGENT SIGNATURE

PO Box 259408
ADDRESS

Madison, WI 53725-9408
CITY, STATE AND ZIP CODE

608-252-9674
TELEPHONE NUMBER

Note to Surety and Principal: Any bid submitted which this bond guarantees may be rejected if the Power of Attorney form showing that the Agent of Surety is currently authorized to execute bonds on behalf of Surety is not attached to this bond.

THE CINCINNATI INSURANCE COMPANY

Fairfield, Ohio

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That THE CINCINNATI INSURANCE COMPANY, a corporation organized under the laws of the State of Ohio, and having its principal office in the City of Fairfield, Ohio, does hereby constitute and appoint

Tim Hausmann; Judith A. Walker; Patrick A. McKenna;
Brooke L. Parker and/or Elizabeth Mosca

of Madison, Wisconsin its true and lawful Attorney(s)-in-Fact to sign, execute, seal and deliver on its behalf as Surety, and as its act and deed, any and all bonds, policies, undertakings, or other like instruments, as follows:

Any such obligations in the United States, up to
Thirty Million and No/100 Dollars ($30,000,000.00).

This appointment is made under and by authority of the following resolution passed by the Board of Directors of said Company at a meeting held in the principal office of the Company, a quorum being present and voting, on the 6th day of December, 1958, which resolution is still in effect:

"RESOLVED, that the President or any Vice President be hereby authorized, and empowered to appoint Attorneys-in-Fact of the Company to execute any and all bonds, policies, undertakings, or other like instruments on behalf of the Corporation, and may authorize any officer or any such Attorney-in-Fact to affix the corporate seal; and may with or without cause modify or revoke any such appointment or authority. Any such writings so executed by such Attorneys-in-Fact shall be binding upon the Company as if they had been duly executed and acknowledged by the regularly elected officers of the Company."

This Power of Attorney is signed and sealed by facsimile under and by the authority of the following Resolution adopted by the Board of Directors of the Company at a meeting duly called and held on the 7th day of December, 1973.

"RESOLVED, that the signature of the President or a Vice President and the seal of the Company may be affixed by facsimile on any power of attorney granted, and the signature of the Secretary or Assistant Secretary and the seal of the Company may be affixed by facsimile to any certificate of any such power and any such power of certificate bearing such facsimile signature and seal shall be valid and binding on the Company. Any such power so executed and sealed and certified by certificate so executed and sealed shall, with respect to any bond or undertaking to which it is attached, continue to be valid and binding on the Company."

IN WITNESS WHEREOF, THE CINCINNATI INSURANCE COMPANY has caused these presents to be sealed with its corporate seal, duly attested by its Vice President this 1st day of October, 2015.

The Cincinnati Insurance Company CORPORATE SEAL OHIO

THE CINCINNATI INSURANCE COMPANY

Stephen A. Van Tuyl

Vice President

STATE OF OHIO) ss:
COUNTY OF BUTLER)

On this 1st day of October, 2015, before me came the above-named Vice President of THE CINCINNATI INSURANCE COMPANY, to me personally known to be the officer described herein, and acknowledged that the seal affixed to the preceding instrument is the corporate seal of said Company and the corporate seal and the signature of the officer were duly affixed and subscribed to said instrument by the authority and direction of said corporation.

NOTARIAL SEAL STATE OF OHIO

Mark J. Huller

MARK J. HULLER, Attorney at Law
NOTARY PUBLIC - STATE OF OHIO
My commission has no expiration date. Section 147.03 O.R.C.

I, the undersigned Secretary or Assistant Secretary of THE CINCINNATI INSURANCE COMPANY, hereby certify that the above is a true and correct copy of the Original Power of Attorney issued by said Company, and do hereby further certify that the said Power of Attorney is still in full force and effect.

GIVEN under my hand and seal of said Company at Fairfield, Ohio.

this 16 day of November, 2017.

The Cincinnati Insurance Company CORPORATE SEAL OHIO

Scott R. Bolen

Secretary

BN-1005 (10/15)

CERTIFICATE OF BIENNIAL BID BOND

TIME PERIOD- VALID (FROM/TO)	February 1, 2018 to January 31, 2020
NAME OF SURETY	The Cincinnati Insurance Company
NAME OF CONTRACTOR	Joe Daniels Construction Co., Inc.
CERTIFICATE HOLDER	City of Madison, Wisconsin

This is to certify that a biennial bid bond issued by the above-named Surety is currently on file with the City of Madison.

This certificate is issued as a matter of information and conveys no rights upon the certificate holder and does not amend, extend or alter the coverage of the biennial bid bond.

Cancellation: Should the above policy be cancelled before the expiration date, the issuing Surety will give thirty (30) days written notice to the certificate holder indicated above.

SIGNATURE OF AUTHORIZED CONTRACTOR REPRESENTATIVE
Joseph A. Daniels - President

November 16, 2017
DATE

SECTION H: AGREEMENT

THIS AGREEMENT made this 3rd day of JULY in the year Two Thousand and Nineteen between **JOE DANIELS CONSTRUCTION CO., INC.** hereinafter called the Contractor, and the City of Madison, Wisconsin, hereinafter called the City.

WHEREAS, the Common Council of the said City of Madison under the provisions of a resolution adopted **JULY 2, 2019**, and by virtue of authority vested in the said Council, has awarded to the Contractor the work of performing certain construction.

NOW, THEREFORE, the Contractor and the City, for the consideration hereinafter named, agree as follows:

1. **Scope of Work.** The Contractor shall, perform the construction, execution and completion of the following listed complete work or improvement in full compliance with the Plans, Specifications, Standard Specifications, Supplemental Specifications, Special Provisions and contract; perform all items of work covered or stipulated in the proposal; perform all altered or extra work; and shall furnish, unless otherwise provided in the contract, all materials, implements, machinery, equipment, tools, supplies, transportation, and labor necessary to the prosecution and completion of the work or improvements:

FIRE STATION NO. 14 TRAINING TOWER
CONTRACT NO. 8427

2. **Completion Date/Contract Time.** Construction work must begin within seven (7) calendar days after the date appearing on mailed written notice to do so shall have been sent to the Contractor and shall be carried on at a rate so as to secure full completion SEE SPECIAL PROVISIONS, the rate of progress and the time of completion being essential conditions of this Agreement.

3. **Contract Price.** The City shall pay to the Contractor at the times, in the manner and on the conditions set forth in said specifications, the sum of **ONE HUNDRED NINETY-THREE THOUSAND THREE HUNDRED AND NO/100** ($**193,300.00**) Dollars being the amount bid by such Contractor and which was awarded to him/her as provided by law.

4. **Affirmative Action.** In the performance of the services under this Agreement the Contractor agrees not to discriminate against any employee or applicant because of race, religion, marital status, age, color, sex, disability, national origin or ancestry, income level or source of income, arrest record or conviction record, less than honorable discharge, physical appearance, sexual orientation, gender identity, political beliefs, or student status. The Contractor further agrees not to discriminate against any subcontractor or person who offers to subcontract on this contract because of race, religion, color, age, disability, sex, sexual orientation, gender identity or national origin.

   The Contractor agrees that within thirty (30) days after the effective date of this agreement, the Contractor will provide to the City Affirmative Action Division certain workforce utilization statistics, using a form to be furnished by the City.

   If the contract is still in effect, or if the City enters into a new agreement with the Contractor, within one year after the date on which the form was required to be provided, the Contractor will provide updated workforce information using a second form, also to be furnished by the City. The second form will be submitted to the City Affirmative Action Division no later than one year after the date on which the first form was required to be provided.

   The Contractor further agrees that, for at least twelve (12) months after the effective date of this contract, it will notify the City Affirmative Action Division of each of its job openings at facilities in Dane County for which applicants not already employees of the Contractor are to be considered. The notice will include a job description, classification, qualifications and application procedures and deadlines. The Contractor agrees to interview and consider candidates referred by the Affirmative Action Division if the candidate meets the minimum qualification standards established by the Contractor, and if the referral is timely. A referral is timely if it is received by the Contractor on or before the date started in the notice.

Articles of Agreement
Article I

The Contractor shall take affirmative action in accordance with the provisions of this contract to insure that applicants are employed, and that employees are treated during employment without regard to race, religion, color, age, marital status, disability, sex, sexual orientation, gender identity or national original and that the employer shall provide harassment free work environment for the realization of the potential of each employee. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation and selection for training including apprenticeship insofar as it is within the control of the Contractor. The Contractor agrees to post in conspicuous places available to employees and applicants notices to be provided by the City setting out the provisions of the nondiscrimination clauses in this contract.

Article II

The Contractor shall in all solicitations or advertisements for employees placed by or on behalf of the Contractors state that all qualified or qualifiable applicants will be employed without regard to race, religion, color, age, marital status, disability, sex, sexual orientation, gender identity or national origin.

Article III

The Contractor shall send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding a notice to be provided by the City advising the labor union or worker's representative of the Contractor's equal employment opportunity and affirmative action commitments. Such notices shall be posted in conspicuous places available to employees and applicants for employment.

Article V

The Contractor agrees that it will comply with all provisions of the Affirmative Action Ordinance of the City of Madison, including the contract compliance requirements. The Contractor agrees to submit the model affirmative action plan for public works contractors in a form approved by the Affirmative Action Division Manager.

Article VI

The Contractor will maintain records as required by Section 39.02(9)(f) of the Madison General Ordinances and will provide the City Affirmative Action Division with access to such records and to persons who have relevant and necessary information, as provided in Section 39.02(9)(f). The City agrees to keep all such records confidential, except to the extent that public inspection is required by law.

Article VII

In the event of the Contractor's or subcontractor's failure to comply with the Equal Employment Opportunity and Affirmative Action Provisions of this contract or Section 39.03 and 39.02 of the Madison General Ordinances, it is agreed that the City at its option may do any or all of the following:

1. Cancel, terminate or suspend this Contract in whole or in part.

2. Declare the Contractor ineligible for further City contracts until the Affirmative Action requirements are met.

3. Recover on behalf of the City from the prime Contractor 0.5 percent of the contract award price for each week that such party fails or refuses to comply, in the nature of liquidated damages, but not to exceed a total of five percent (5%) of the contract price, or ten thousand dollars ($10,000), whichever is less. Under public works contracts, if a subcontractor is in noncompliance, the City may recover liquidated damages from the prime Contractor in the manner described above. The preceding sentence shall not be construed to prohibit a prime Contractor from recovering the amount of such damage from the non-complying subcontractor.

Article VIII

The Contractor shall include the above provisions of this contract in every subcontract so that such provisions will be binding upon each subcontractor. The Contractor shall take such action with respect to any subcontractor as necessary to enforce such provisions, including sanctions provided for noncompliance.

Article IX

The Contractor shall allow the maximum feasible opportunity to small business enterprises to compete for any subcontracts entered into pursuant to this contract. (In federally funded contracts the terms "DBE, MBE and WBE" shall be substituted for the term "small business" in this Article.)

5. Substance Abuse Prevention Program Required. Prior to commencing work on the Contract, the Contractor, and any Subcontractor, shall have in place a written program for the prevention of substance abuse among its employees as required under Wis. Stat. Sec. 103.503.

6. **Contractor Hiring Practices.**

Ban the Box - Arrest and Criminal Background Checks. (Sec. 39.08, MGO)

This provision applies to all prime contractors on contracts entered into on or after January 1, 2016, and all subcontractors who are required to meet prequalification requirements under MGO 33.07(7)(l), MGO as of the first time they seek or renew pre-qualification status on or after January 1, 2016. The City will monitor compliance of subcontractors through the pre-qualification process.

a. **Definitions.** For purposes of this section, "Arrest and Conviction Record" includes, but is not limited to, information indicating that a person has been questioned, apprehended, taken into custody or detention, held for investigation, arrested, charged with, indicted or tried for any felony, misdemeanor or other offense pursuant to any law enforcement or military authority.

"Conviction record" includes, but is not limited to, information indicating that a person has been convicted of a felony, misdemeanor or other offense, placed on probation, fined, imprisoned or paroled pursuant to any law enforcement or military authority.

"Background Check" means the process of checking an applicant's arrest and conviction record, through any means.

b. **Requirements.** For the duration of this Contract, the Contractor shall:

1. Remove from all job application forms any questions, check boxes, or other inquiries regarding an applicant's arrest and conviction record, as defined herein.

2. Refrain from asking an applicant in any manner about their arrest or conviction record until after conditional offer of employment is made to the applicant in question.

3. Refrain from conducting a formal or informal background check or making any other inquiry using any privately or publicly available means of obtaining the arrest or conviction record of an applicant until after a conditional offer of employment is made to the applicant in question.

4. Make information about this ordinance available to applicants and existing employees, and post notices in prominent locations at the workplace with information about the ordinance and complaint procedure using language provided by the City.

5. Comply with all other provisions of Sec. 39.08, MGO.

c. **Exemptions:** This section shall not apply when:

1. Hiring for a position where certain convictions or violations are a bar to employment in that position under applicable law, or

2. Hiring a position for which information about criminal or arrest record, or a background check is required by law to be performed at a time or in a manner that would otherwise be prohibited by this ordinance, including a licensed trade or profession where the licensing authority explicitly authorizes or requires the inquiry in question.

To be exempt, Contractor has the burden of demonstrating that there is an applicable law or regulation that requires the hiring practice in question, if so, the contractor is exempt from all of the requirements of this ordinance for the position(s) in question.

FIRE STATION NO. 14 TRAINING TOWER
CONTRACT NO. 8427

IN WITNESS WHEREOF, the Contractor has hereunto set his/her hand and seal and the City has caused this contract to be sealed with its corporate seal and to be executed by its Mayor and City Clerk on the dates written below.

Countersigned:

Keea I. Sainsbury 7/3/19
Witness Keea I. Sainsbury Date

Keea I. Sainsbury 7/3/19
Witness Keea I. Sainsbury Date

JOE DANIELS CONSTRUCTION CO., INC.
Company Name

Joseph A Daniels 7/3/19
President Joseph A. Daniels Date

7/3/19
Secretary Samuel J. Daniels Date

CITY OF MADISON, WISCONSIN

Provisions have been made to pay the liability that will accrue under this contract.

7/17/19
Finance Director Date

7.19.19
Witness Date

7/9/19
Witness Date

Approved as to form:

City Attorney Date

7/19/19
Mayor

for 7-
City Clerk Date

FIRE STATION NO. 14 TRAINING TOWER
CONTRACT NO. 8427

IN WITNESS WHEREOF, the Contractor has hereunto set his/her hand and seal and the City has caused this contract to be sealed with its corporate seal and to be executed by its Mayor and City Clerk on the dates written below.

Countersigned:		JOE DANIELS CONSTRUCTION CO., INC. Company Name	
Keea I. Sainsbury	7/3/19	Joseph A. Daniels	7/3/19
Witness Keea I. Sainsbury	Date	President Joseph A. Daniels	Date
Keea I. Sainsbury	7/3/19	Samuel J. Daniels	7/3/19
Witness Keea I. Sainsbury	Date	Secretary Samuel J. Daniels	Date

CITY OF MADISON, WISCONSIN

Provisions have been made to pay the liability that will accrue under this contract.		Approved as to form:	
	7/17/19		
Finance Director	Date	City Attorney	Date
	7.19.19		7/19/19
Witness	Date	Mayor	
	7/9/19	for	7-1
Witness	Date	City Clerk	Date

BOND NO. B1242720

SECTION I: PAYMENT AND PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we **JOE DANIELS CONSTRUCTION CO., INC.** as principal, and The Cincinnati Insurance Company Company of Cincinnati, Ohio as surety, are held and firmly bound unto the City of Madison, Wisconsin, in the sum of **ONE HUNDRED NINETY-THREE THOUSAND THREE HUNDRED AND NO/100** ($**193,300.00**) Dollars, lawful money of the United States, for the payment of which sum to the City of Madison, we hereby bind ourselves and our respective executors and administrators firmly by these presents.

The condition of this Bond is such that if the above bounden shall on his/her part fully and faithfully perform all of the terms of the Contract entered into between him/herself and the City of Madison for the construction of:

FIRE STATION NO. 14 TRAINING TOWER
CONTRACT NO. 8427

in Madison, Wisconsin, and shall pay all claims for labor performed and material furnished in the prosecution of said work, and save the City harmless from all claims for damages because of negligence in the prosecution of said work, and shall save harmless the said City from all claims for compensation (under Chapter 102, Wisconsin Statutes) of employees and employees of subcontractor, then this Bond is to be void, otherwise of full force, virtue and effect.

Signed and sealed this 3rd day of July 2019

Countersigned:

Witness Keea I. Sainsbury

Secretary Samuel J. Daniels

JOE DANIELS CONSTRUCTION CO., INC.
Company Name (Principal)

President Joseph A. Daniels Seal no seal

Approved as to form:

City Attorney

THE CINCINNATI INSURANCE COMPANY
Surety Seal

☐ Salary Employee ☒ Commission

By
Attorney-in-Fact Patrick A. McKenna

This certifies that I have been duly licensed as an agent for the above company in Wisconsin under National Producer Number 650765 for the year 2019, and appointed as attorney-in-fact with authority to execute this payment and performance bond which power of attorney has not been revoked.

July 3, 2019
Date

Agent Signature Patrick A. McKenna

THE CINCINNATI INSURANCE COMPANY

Fairfield, Ohio

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS: That THE CINCINNATI INSURANCE COMPANY, a corporation organized under the laws of the State of Ohio, and having its principal office in the City of Fairfield, Ohio, does hereby constitute and appoint

Patrick A. McKenna; Judith A. Walker; Brooke L. Parker; Elizabeth Mosca and/or David Zenobi

of Madison, Wisconsin its true and lawful Attorney(s)-in-Fact to sign, execute, seal and deliver on its behalf as Surety, and as its act and deed, any and all bonds, policies, undertakings, or other like instruments, as follows:

Any such obligations in the United States, up to
Thirty Million and No/100 Dollars ($30,000,000.00).

This appointment is made under and by authority of the following resolution passed by the Board of Directors of said Company at a meeting held in the principal office of the Company, a quorum being present and voting, on the 6th day of December, 1958, which resolution is still in effect:

"RESOLVED, that the President or any Vice President be hereby authorized, and empowered to appoint Attorneys-in-Fact of the Company to execute any and all bonds, policies, undertakings, or other like instruments on behalf of the Corporation, and may authorize any officer or any such Attorney-in-Fact to affix the corporate seal; and may with or without cause modify or revoke any such appointment or authority. Any such writings so executed by such Attorneys-in-Fact shall be binding upon the Company as if they had been duly executed and acknowledged by the regularly elected officers of the Company."

This Power of Attorney is signed and sealed by facsimile under and by the authority of the following Resolution adopted by the Board of Directors of the Company at a meeting duly called and held on the 7th day of December, 1973.

"RESOLVED, that the signature of the President or a Vice President and the seal of the Company may be affixed by facsimile on any power of attorney granted, and the signature of the Secretary or Assistant Secretary and the seal of the Company may be affixed by facsimile to any certificate of any such power and any such power of certificate bearing such facsimile signature and seal shall be valid and binding on the Company. Any such power so executed and sealed and certified by certificate so executed and sealed shall, with respect to any bond or undertaking to which it is attached, continue to be valid and binding on the Company."

IN WITNESS WHEREOF, THE CINCINNATI INSURANCE COMPANY has caused these presents to be sealed with its corporate seal, duly attested by its Vice President this 8th day of March, 2017.

The Cincinnati Insurance Company CORPORATE SEAL OHIO

THE CINCINNATI INSURANCE COMPANY

Stephen A. [signature]

Vice President

STATE OF OHIO) ss:
COUNTY OF BUTLER)

On this 8th day of March, 2017, before me came the above-named Vice President of THE CINCINNATI INSURANCE COMPANY, to me personally known to be the officer described herein, and acknowledged that the seal affixed to the preceding instrument is the corporate seal of said Company and the corporate seal and the signature of the officer were duly affixed and subscribed to said instrument by the authority and direction of said corporation.

NOTARIAL SEAL STATE OF OHIO

Mark J. Huller [signature]

MARK J. HULLER, Attorney at Law
NOTARY PUBLIC - STATE OF OHIO
My commission has no expiration date. Section 147.03 O.R.C.

I, the undersigned Secretary or Assistant Secretary of THE CINCINNATI INSURANCE COMPANY, hereby certify that the above is a true and correct copy of the Original Power of Attorney issued by said Company, and do hereby further certify that the said Power of Attorney is still in full force and effect.

GIVEN under my hand and seal of said Company at Fairfield, Ohio.

this 3rd day of July, 2019

The Cincinnati Insurance Company CORPORATE SEAL OHIO

[signature]

Secretary

BN-1005 (3/17)

CITY ENGINEERING

Application for the Approval of Subcontractors on Public Works Contracts

Contract No.: 8427

Contract Name: Fire Station No. 14 Training Tower

Contractor: Joe Daniels Construction Co., Inc.

Contract Value: $193,300.00

In accordance with Section 109 of the Specifications, I request the approval of the following subcontractors to be engaged by our company for this contract:

Mailing addresses of the subcontractors are attached.

I agree that I am fully responsible for the acts and omissions of the subcontractors and I understand that the City's approval does not create any contractual relationship between any of the subcontractors and the City. I further agree that, if during the term of the contract, it is necessary to amend this list of subcontractors, I shall request and obtain approval of the City Engineer, in writing and prior to allowing any work by the subcontractor(s). In those instances where the amended list involves MBE, WBE, or SBE subcontractors, I shall also obtain the approval of the Department of Civil Rights.

Company	Type of Work	% Value	$ Value of Contract	Check as Applies: WBE	MBE	SBE	CITY USE ONLY: BVC Compliant	PreQ	Total Approved
JR's Construction	Landscaping	1.81	$3,500.	☐	☐	☒	☒ Y ☐ N ☐ NA	☐	☒
Steve Brumm Trucking	Trucking	1.55	$3,000.	☐	☐	☒	☒ Y ☐ N ☐ NA	☐	☒
Urban Construction	Roofing	0.52	$1,000.	☐	☐	☐	☒ Y ☐ N ☐ NA	☐	☒
				☐	☐	☐	☐ Y ☐ N ☐ NA	☐	☐
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				☐	☐	☐	☐ Y ☐ N ☐ NA	☐	☐
				☐	☐	☐	☐ Y ☐ N ☐ NA	☐	☐
		Total	$7,500.00						

Date Submitted: July 9, 2019

Signed: Joseph A Daniel

FOR CITY USE ONLY

☑ Approved ☐ Disapproved ☐ Approved in Part

3.88 % of contract is subcontracted

Date: 7/10/19

Signed: [signature]

Robert F. Phillips, P.E., City Engineer

Distribution: Contractor
Project Engineer/Manager
Construction Engineer
Construction Office File

Must comply with BVC requirement

Joe Daniels Construction -
WATT carpenter, cement mason, operator;
truck driver & landscaper
not-apprenticeable