



**Milwaukee
Water Works**

Safe, Abundant Drinking Water.

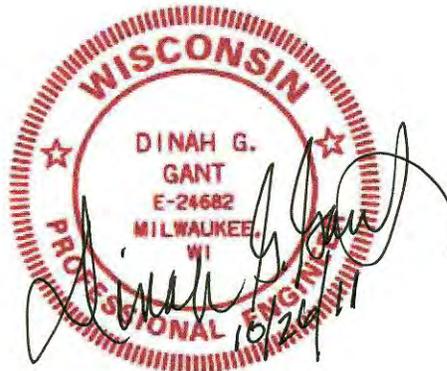
**City of Milwaukee
Department of Public Works
Milwaukee Water Works**

Specifications for

Official Notice No. 165-2011

Howard Purification Plant

HP-180: Ozone Building Wall Stabilization and Repair



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GENERAL REQUIREMENTS

PART 1 DEPARTMENT OF PUBLIC WORKS – GENERAL SPECIFICATIONS

The Department of Public Works General Specifications applies to all contracts. These specifications are in a separate booklet.

PART 2 SPECIFIC OFFICIAL NOTICE & GENERAL OFFICIAL NOTICE

The Specific Official Notice as it appears in The Daily Reporter and General Official Notice is part of these Contract Documents.

PART 3 SPECIFICATIONS

HP-180: Ozone Building Wall Stabilization and Repair

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JOB REQUIREMENTS

HP-180: OZONE BUILDING WALL STABILIZATION AND REPAIR

- JR-1 FORM OF BID** Contractor shall submit a lump sum bid for furnishing the complete job in accordance with plans and specifications.
- JR-2 JOB LOCATION** Howard Purification Plant, 3929 South 6th Street, Milwaukee, WI 53221.
- JR-3 GENERAL DESCRIPTION OF WORK** The work to be performed under the provisions of this contract and as set forth in these documents consists of the supply and installation of all materials, labor, supervision, inspection, and rentals for all work involved and described below:

OZONE BUILDING WALL STABILIZATION AND REPAIR

The project will consist of underpinning the foundation of a portion of the westerly wall of the Howard Ozone Building with helical piers and related repairs.

- JR-4 CONTRACT DRAWINGS** The contract drawings upon which the proposal is to be based are listed hereunder:
- | | |
|-----------|-------------------------------|
| HP-180-01 | Title Sheet and Drawing Index |
| HP-180-02 | Site Work |
| HP-180-03 | Foundation Plan and Details |
| HP-180-04 | Wall Layout Plan and Details |
| HP-180-05 | Wall Layout Plan - Details |

The above drawings are general in nature and are intended to indicate the relative locations of the repairs and equipment specified. It shall be the responsibility of the successful bidder to ascertain the suitability of the specific equipment to be furnished in regard to the space allotted.

- JR-5 PRE-BID MEETING** A **MANDATORY** pre-bid meeting for all prospective bidders will be held on November 17, 2011 at 10:00 AM in the Howard Purification Plant Conference Room, located at the address stated above. The City of Milwaukee will **ONLY** receive bids from prospective bidders who are in attendance at the **MANDATORY** Pre-Bid Meeting. The official envelope for submitting a bid will be available at the **MANDATORY** Pre-Bid Meeting. Bidder participation is encouraged to become familiar with all aspects of the project and bidding requirements.

- JR-6 SITE VISIT** A site visit will be available at the conclusion of the **MANDATORY** Pre-Bid Meeting.
- JR-7 PRE-CONSTRUCTION MEETING** After the Notice to Proceed is issued, a date shall be set for the pre-construction meeting to be held at the job site. Construction details of the project will be discussed in the meeting.
- JR-8 JOB SCHEDULE** Within ten (10) days after Notice to Proceed is issued; the contractor shall submit a construction schedule for approval. The schedule shall be made in sufficient detail to indicate dates of each significant operation. The schedule shall be such that the entire job will be completed within the specified completion time. Schedule shall be in Microsoft Project 2010 or in .pdf format. Submit an electronic file and hardcopy of the schedule.
- The contractor shall place all orders for materials promptly after award of the contract. With submittal of the construction schedule, he shall include a schedule of delivery of all major material and equipment required for the job.
- The contractor shall immediately notify the City, in writing, of any problems with meeting this schedule. If the construction schedule cannot be met because of materials or equipment deliveries, the contractor shall be required to submit purchase orders and confirmations of delivery, showing the date the order was placed and the promised date of delivery.
- JR-9 WORK DAYS AND TIMES** Work shall take place between the hours of 7:00 AM to 3:30 PM, Monday through Friday. Work will not be allowed on City of Milwaukee holidays nor on weekends.
- JR-10 START & COMPLETION DATE** The Contractor shall not start work on the project site prior to April 30, 2012. Work on this project shall be complete by June 1, 2012.
- JR-11 CHARGE FOR INSPECTION** The Contractor will be charged \$350.00 per day per inspector for each and every day inspection is required on this Contract after the date allowed for completion or after such extension of time as may have been granted. This charge is further defined in Section 2.5.11 of the Department of Public Works (DPW) General Specifications.
- JR-12 PROGRESS PAYMENTS** Within ten (10) days after the Notice to Proceed is issued, the contractor shall submit to the City for approval a schedule showing the breakdown of the contract with quantities and prices as a basis for checking and computing progress estimates. The values shown in the approved breakdown shall be used for pay purposes only and shall not be used as a basis for additions to or deductions from contract work.

When the contractor proceeds properly and with diligence to perform and complete the work on this contract, the Commissioner of Public Works may, from time to time as the work progresses, grant to the contractor an estimate of the amount already earned. In making such progress estimates, there shall be retained 5% of each progress estimate

until final completion and acceptance of the work; except that after 50% of the work has been completed and the Commissioner finds that satisfactory progress is being made and all conditions complied with, he may authorize any of the remaining progress payments to be paid in full to the contractor. Progress Payments are further defined in Section 2.9.14 of the Department of Public Works (DPW) General Specifications.

In accordance with Charter Ordinance 7.26 as amended 6-1-72, payment for materials delivered to the work or storage site may be authorized by the Commissioner of Public Works providing the following terms and conditions are met:

- A. The work is progressing properly and such materials as specified are properly stored and suitable for permanent incorporation in the work.
- B. Materials designated for pay in the next progress estimate after delivery shall be limited to fabricated or manufactured components which are assembled in final form ready for placement in the work
- C. The following forms shall be submitted with requests for payment.

- 1. Progress Estimate and Request for Payment for Fabricated Materials or Components Properly Stored.
- 2. Certification of the Contractor or his duly authorized representative.

Field Engineer shall verify that material is as specified and properly stored.

- D. The contractor shall be responsible for the safeguarding of any such materials against loss or damage whatsoever, and in the case of any loss or damage, the contractor shall replace such lost or damaged materials at no cost to the City. The Commissioner shall reserve the right to deduct from ensuing progress estimates the value of any lost or damaged materials until such loss or damage is restored by the contractor.
- E. The Commissioner may limit processing progress estimates to those cases where the amount earned in any pay period for work and materials is \$5,000 or more.
- F. Any materials for which payment has been made shall not be removed from the work or storage site without the specific written approval of the Commissioner of Public Works.

JR-13 FORMAL CORRESPONDENCE Formal correspondence shall be addressed to: Ms. Carrie M. Lewis, Superintendent of Milwaukee Water Works, 841 North Broadway, Room 409, Zeidler Municipal Building, Milwaukee, WI 53202. Formal correspondence includes the following:

- 1. Request for Change Order.
- 2. Request for extension of Completion Date

3. Disputes concerning Payment or Field Issues.
4. Payment Requests.
5. Submittals.

END OF SECTION

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Contract description.
2. Specifications and standards.
3. Shop Drawings.
4. Warranty and guarantee.

1.02 CONTRACT DESCRIPTION

- A.** The work covered in this specification includes the furnishing of all equipment, labor, supervision, materials & appurtenances for and in connection with the foundation underpinning and installation of helical piers plus related repairs to stabilize the Howard Ozone Building westerly wall.
- B.** The Work to be performed shall include but not be limited to the following:
1. Excavate to a depth necessary to perform work.
 2. Remove and reuse segmental retaining wall.
 3. Underpin foundation and install helical piers.
 4. Repoint cracked joints.
 5. Reset loose brick veneer, and install wall flashing.
 6. Replace portion of glass block window.
 7. Replace stoop, walk and any curbing if necessary. Restore site to existing condition.

NOTE: See Exhibit "A", Exhibit "B", and Contract Drawings for additional details.

1.03 SPECIFICATIONS AND STANDARDS

- A. Materials, general design, design loads, allowable stresses, joint design, shop fabrication and field construction shall conform to the requirements of the following latest standard specifications of any technical society, organization, or association, or to codes of local or state authorities, including:
1. AWWA, American Water Works Association.
 2. MSJC, Building Code for Masonry Structures.
 3. BIA, Brick Industry Association.
 4. TMS, The Masonry Society.
 5. AWS, American Welding Society.
 6. ANSI, American National Standards Institute.
 7. SSPC, The Society for Protective Coatings.
 8. ASTM, American Society for Testing and Material.
 9. The Wisconsin Administrative Code.
 10. OSHA, U.S. Department of Labor Occupational Safety and Health Act.
 11. ASME, American Society of Mechanical Engineers.
 12. ASCE, American Society of Civil Engineers.
 13. EPA, United States Environmental Protection Agency.
 14. NFPA 70 N.
- B. The contractor shall be familiar with the requirements of the above agencies. Any conflict in the contract drawings, these specifications, the contractor's design or construction methods shall result in this contractor performing in a manner which conforms to the applicable requirements. Agencies and/or associations not specified above are referenced in individual specification sections as required.

PART 2 SHOP DRAWINGS

- A. Within 15 business days after the Notice to Proceed, the Contractor shall submit to the CITY for approval a minimum of four (4) copies of all shop, fabrication, assembly, and other drawings required by the specifications; all drawings of equipment and devices offered by the Contractor; all drawings showing essential details of any change in design or construction proposed by the Contractor; and all necessary layouts. Drawings of equipment and devices shall show sufficient detail to adequately depict the construction and operation of each item. Each shop drawing

shall bear City of Milwaukee, the name and location of the structure, job number, the name of the Contractor, the date of the drawing, the date of each correction or revision, and the specification numbers & plan sheet numbers applicable thereto. The Contractor shall allow a minimum of 10 working days for the City to review submittals, each time a drawing is submitted.

- B. Three revised copies of each drawing shall be submitted each time a drawing is returned to the Contractor for revision. Upon final review of a drawing, six (6) copies shall be submitted to the CITY for record and distribution to authorized persons.
- C. After review by the CITY, all such drawings shall become a part of the contract documents, and the work or equipment shown thereby shall be furnished and installed as shown unless otherwise required by the CITY. No work shall be performed or equipment manufactured until drawings have been reviewed. The review of drawings submitted by the Contractor will be for, and will cover only general conformity to the plans and specifications and will not constitute a blanket approval of all dimensions, quantities, or details of the material or equipment shown by such drawings, nor shall such approval relieve the Contractor of responsibility for errors contained therein.
- D. At the completion of work and prior to final payment, the Contractor shall provide the CITY with six (6) sets of as-built drawings for the completed job showing all new equipment and installations. The Contractor will be responsible for the accuracy of these drawings. Two (2) copies of the above "as-built" drawings shall be submitted in an electronic format compatible with the latest edition of Bentley, MICROSTATION.

PART 3 WARRANTY AND GUARANTEE

- A. The Contractor shall furnish a written two (2) year warranty from the date of official acceptance against defective materials or workmanship before the final payment is made.
- B. During the period of two (2) years from and after the date of the final acceptance by the City of the work embraced by this contract, the Contractor shall make all needed repairs arising out of defective workmanship or materials, or both, which in the judgment of the Commissioner of Public Works, shall become necessary during such period. The City will perform an inspection during the spring of the final year of the warranty. The Contractor is not required to attend this inspection. A written report summarizing the inspection and detailing any needed repairs will be provided to the Contractor. The Contractor shall make all repairs within 6 months of receiving the report.

- C. Whenever defective equipment or materials are replaced, the warranty period for the replacement equipment or materials shall be the remaining warranty period for the original, replaced equipment or materials.
- D. If within ten days after mailing of a notice in writing to the Contractor, or his agent, the said Contractor shall neglect to make, or undertake with due diligence to make, the aforesaid repairs, the City is hereby authorized to make such repair at the Contractor's expense; providing, however, that in case of an emergency where, in the judgment of the Commissioner, delay would cause serious loss or damage, repairs may be made without notice being sent to the Contractor, and the Contractor shall pay the cost thereof.
- E. The Contractor shall also furnish written guarantees as required by each Section. Length of time and requirements of guarantees are specified in each Section. Each guarantee shall commence on the date of official acceptance. Final payment will not be paid until the City receives all guarantees.

PART 3 EROSION CONTROL IMPLEMENTATION PLAN (ECIP)

- A. Within fifteen (15) days after Notice to Proceed is issued, and at least twenty (20) working days prior to the start of any construction activity, the Contractor shall submit to the City for review & approval a minimum of three copies of an Erosion Control Implementation Plan (ECIP). The Contractor shall allow two (2) weeks for the City to review the ECIP for meeting technical standards and for the City to notify the Contractor if the plan meets the standards.
- B. Work shall not start until the ECIP meets technical standards. No construction activity may begin without an ECIP approved by the City.
- C. The Contractor shall be required to have a copy of the ECIP on the job site for the entire duration of the Contract.
- D. The ECIP shall include, but not be limited to:
 1. A completed "Erosion Control Implementation Plan" application (See ATTACHMENT "C").
 2. A plan showing all locations of erosion control devices and other Best Management Practices (BMP's).
 3. A written description of all erosion control devices and BMP's to be used.
 4. A written schedule of installing erosion control devices.
 5. A written schedule of construction operations related to implementing erosion control devices and BMP's.
 6. A written maintenance schedule for all erosion control devices and BMP's.
- E. All costs associated with implementing the erosion control plan, such as furnishing, installing, maintaining, and removal of erosion control devices shall be included in the lump sum bid (Base Bid) for the project, and shall be listed as one item under "Erosion Control" in the bid documents. There shall be no additional compensation for revising the ECIP or utilizing additional BMP's in order to comply with Chapter

290 of the City of Milwaukee Code of Ordinances. If the Contractor is found not in compliance with the ECIP, the Contractor will be subject to the penalties included in Chapter 290.

F. EROSION CONTROL PLAN SITE CHARACTERISTICS

The Contractor may utilize the Contract Drawing for this project or provide a site diagram. The following information shall be included on the ECIP:

1. The scale of the drawing (not less than 1" = 100')
2. A north arrow (towards the top or to the right of the plan)
3. The name of all project streets and streets abutting the project
4. Approximate location of all existing and proposed drainage structures
5. The direction of water runoff (flow arrows)
6. The limits of construction
7. The approximate location of all erosion control devices
8. Areas where vegetation will be disturbed and re-established
9. For non right-of-way projects, locate watershed areas of overland and concentrated flow. Include area sizes in acres and representative soil type of disturbed areas.

G. STORM WATER INLET PROTECTION

1. Any structure that is connected to the drainage system shall be protected from sediment entering the system.
2. All storm water inlets adjacent to and on the project site shall have type M inlet protection.
3. If the frame of any storm water inlet is removed or openings are in the masonry and storm water may enter, the protection device should be changed to a type R.
4. Any manholes that the frame is removed or openings are in the masonry and storm water may enter shall have a type R erosion control.

H. TEMPORARY STORAGE PILES.

1. Storage of erodible materials (i.e. gravel) should not be closer than 25 feet of a roadway or drainage way.
2. If placed in the right-of-way, the stockpiles shall not be placed closer than 100 feet of an unprotected storm drain.
3. Covering or surrounding with straw bales, silt fence or other measures, shall control erosion from stockpiles existing less than ten (10) days.
4. Stockpiles existing longer than ten (10) days shall be seeded and mulched.

I. TRACKING

1. The project and surrounding roadways shall be kept free from materials that may enter the drainage system.
2. Tracked roadways shall be cleaned immediately by means other than flushing with water.

3. Tracking pads at ingress and egress points may be used to help control tracking of sediment onto roadway surfaces. The pads shall be constructed with a minimum 2-inch size stone, 8-feet wide and a minimum of 50-feet long.
 4. The project roadways shall be cleaned on a daily basis. Cleaning shall be done by means other than flushing with water.
- J. **LOCATING SEDIMENT CONTROLS**
1. The “*Wisconsin Construction Site Best Management Practices Handbook*” should be consulted to determine the location of sediment controls (i.e. silt fence, straw bales, waddles, and other planned practices) that minimize the amount of sediment from leaving the site.
- K. **DEWATERING**
1. Water containing particles of 100 microns or greater shall be treated by use of temporary sediment basins or other devices designed to remove particles of 100 microns or greater.
- L. **VEGETATION**
1. The construction activity shall be staged as to limit the amount of time vegetation is stripped and re-established.
- M. **MAINTENANCE**
1. A schedule for maintaining all erosion control devices is necessary to maximize the effort of limiting sediment from entering the drainage system.
 2. All devices shall be checked and maintained after a rainfall event that totals 0.50 inches.
 3. All devices shall be checked and maintained at least once a week.

END OF SECTION

ATTACHMENT "C"
CITY OF MILWAUKEE

DEPARTMENT OF PUBLIC WORKS

Erosion Control Implementation Plan

The Erosion Control Implementation Plan (ECIP) is an effort to conform to Chapter 290 of the Code of Ordinances. The ECIP shall be submitted to the City Engineer at least ten (10) working days prior to the start of any construction activity. **NO** construction activity may begin without an ECIP approved by the Department of Public Works.

<i>FOR OFFICE USE ONLY</i>				Application No. _____	
Meets Technical Standards <input type="checkbox"/>		Does Not Meet Technical Standards <input type="checkbox"/>			
Date Application Received: _____		Date all Information Received: _____		Reviewed By: _____	
Fee Paid <input type="checkbox"/>		Check No. : _____			
		APPLICANT (Contractor)		Erosion Control Consultant/Engineer	
Name					
Address					
City/State/Zip					
Phone		()		()	
Relationship to Project					
Principal Contact Responsible for Installation, Maintenance and removal of erosion control measures :					
Name					
Phone		()		Fax ()	
Type of Construction					
Proposed Construction Start Date					
Any public waterway within 1,000 feet of any location.		Yes <input type="checkbox"/>		No <input type="checkbox"/>	

ECIP REQUIREMENTS:

- Attach a description of erosion control devices and other best management practices to be utilized on the project(s). The description should include, but not be limited to: type of products; i.e., *Geotex Fabric*, Manufacturer's Names and Types of Equipment (i.e.; self-contained power broom)
- Attach the intended timetable and sequence of construction activities.
- Attach the intended timetable and sequence of best management practices and devices to be implemented for erosion control.
- Attach a site plan showing approximate locations(s) of erosion control devices. The site plan shall be at a scale of no less than 1" = 100'. The plan shall also indicate the direction of runoff flow, the construction limits, temporary stockpiles and any other significant information.

Upon receipt of all required information, the ECIP will be reviewed within ten (10) working days and all involved parties will be notified whether or not the plan meets technical standards.

Applicant's Signature: _____ **Date:** _____

SECTION 01039**COORDINATION AND MEETINGS****PART 1 GENERAL****1.01 SECTION INCLUDES:**

- A. Coordination
- B. Alterations
- C. Cutting and Patching
- D. Pre-construction Meeting
- E. Pre-installation Meetings
- F. Progress Meetings

1.02 COORDINATION

- A. Coordinate scheduling, submittals, and Work on the various Sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify that the City requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements and installation of appurtenance, mechanical and electrical work. Follow routing shown for pipes, and conduit, as closely as practicable; place runs parallel with line of structure. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion.
- E. Coordinate correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of the City of Milwaukee's activities.

1.03 ALTERATIONS

- A. Materials: As specified in product Sections; match existing products and work for patching and extending work.

- B. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- C. Remove, cut and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to original condition.
- D. Refinish visible existing surfaces to original condition.
- E. Where new work abuts or align with existing, perform a smooth and even transition. Patched work must match existing adjacent work in texture and appearance.
- F. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to the City.
- G. Patch or replace portions of existing surfaces that are damaged, lifted or discolored, or showing other imperfections.
- H. Finish surfaces as specified in individual product Sections.

1.04 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements which affects:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture resistant element.
 - 3. Efficiency, maintenance or safety of element.
 - 4. Visual qualities of sight-exposed elements.
 - 5. Work of City of Milwaukee or separate contractor.
- C. Execute cutting, fitting and patching to complete Work, and to:
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover Work to install or correct ill-timed work.
 - 3. Remove and replace defective and non-conforming Work.
 - 4. Remove samples of installed Work for testing.
 - 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

6. Execute work by methods which will avoid damage to other Work, and provide proper surfaces to receive patching and finishing.
7. Cut rigid materials using masonry saw or core drill.
8. Restore Work with new products in accordance with requirements of Contract Documents.
9. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
10. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
11. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
12. Identify and hazardous substance or condition exposed during the Work to the City.

1.05 PRECONSTRUCTION MEETING

- A. The City will schedule a pre-construction conference after Notice of Award.
- B. Attendance Required: City and Contractor.
- C. Agenda
 1. Submission of executed bonds and insurance certificates (unless previously submitted to DPW).
 2. Submission of list of Subcontractor, list of products, Schedule of Values, and progress schedule.
 3. Designation of personnel representing the parties in Contract.
 4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract closeout procedures.
 5. Scheduling and reports.
 6. Use of premises by City and Contractor.
 7. Construction facilities and controls provided by City.
 8. Temporary utilities and controls provided by City, if any.
 9. Security and housekeeping procedures.

10. Procedures for testing.
11. Procedures for start-up of equipment.
12. Requirements for maintaining record documents.
13. Inspection and acceptance of equipment put into service during construction period.
14. Conflicts.
15. A review of Contract Documents shall be made and deviations or differences shall be resolved.
16. Establish which areas on-site will be available for use as storage areas and working area.

1.06 PRE-INSTALLATION MEETING

- A. When determined by the City, convene a pre-installation meeting at work site prior to commencing work.
- B. Require attendance of parties directly affecting, or affected by, work of the specific Section.
- C. Notify all parties four days in advance of meeting date.
- D. Prepare agenda, preside at meetings, record minutes, and distribute copies within three days after the meeting to participants, with one copy to the City.
- E. Review conditions of installation, preparation and installation procedures, and coordination with related work.

1.07 PROGRESS MEETING

- A. The City will schedule and administer meetings throughout progress of the Work as required.
- B. The City will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record meeting minutes, and distribute copies within three days to the City, participants, and those affected by decisions made.
- C. Attendance Required: Contractor's general superintendent, major Subcontractors and suppliers, City, as appropriate to agenda topics for each meeting.
- D. Agenda
 1. Review minutes of previous meeting.

2. Review of Work.
3. Field observations, problems and decisions.
4. Field observations of problems that impede planned progress.
5. Review submittal schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding Work period.
10. Coordination of projected progress.
11. Maintenance of quality and Work standards of proposed changes on progress schedule and coordination.
12. Other business relating to work.

END OF SECTION

SECTION 01500**JOB SITE SECURITY, UTILITIES AND FACILITIES****PART 1 SCOPE****1.01 INDEX**

- A. Scope
- B. Security and Safety
- C. Occupancy During Construction
- D. Electric Power
- E. Water
- F. Toilet Facilities

1.02 GENERAL CONDITIONS

- A. All operations shall be carried on with a minimum of damage and disturbance. All damages shall be repaired to the original condition to the satisfaction of the Engineering Representative.
- B. All removals become the property of the contractor and shall be disposed of off the site unless otherwise specified.
- C. Disposal of all waste and debris generated during the removal and installation operations shall be conducted in accordance with the latest edition of all local, state and federal rules and regulations governing the waste product. Copies of any required certificates, forms, manifests, etc. required for proper disposal shall be submitted to the City in accordance with Section 01010, Submittals.

1.03 TEMPORARY VENTILATION

Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.04 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

- B. Protect non-owned vehicular traffic stored materials, site and structures from damage.

1.05 PROGRESS CLEANING

- A. Waste materials, debris, and rubbish shall be removed daily after work. Maintain site in a clean and orderly condition.
- B. Clean and repair damage caused by removals or installations.
- C. Restore existing facilities used during construction to original condition.

PART 2 SECURITY AND SAFETY

2.01 GENERAL

The Milwaukee Water Works consists of a number of facilities that treat and deliver drinking water to the City and surrounding suburban communities. To insure the safety and security of drinking water, the Milwaukee Water Works has instituted protocols for visitors and contractors to control entry to these facilities. It is essential that contractors strictly comply with the security policy outlined in the specification section.

For this project, the contractor shall continuously coordinate building and site security measures, including accessing the site, with the designated Water Engineering representative or the Water Security Manager, Telephone # (414) 286-3465, facsimile # (414)-286-2672.

2.02 SCOPE

Any and all City agencies and contractors engaged for work at Milwaukee Water Works facilities shall be required to attend a "Pre-Construction Security Briefing" before any contracted work can be initiated. At this meeting, the contractor and sub-contractors shall have a detailed briefing with discussions regarding the following items:

- A. Milwaukee Water Works site security policies and procedures
- B. Contractor and sub-contractor obligations
- C. Permit System

2.03 POLICIES

During the "Security Briefing" portion of the "Pre-Construction Meeting," Milwaukee Water Works Security staff shall provide the prime contractor with site polices to be reviewed by the rime and sub-contractors. These documents may include:

- A. Lock-out/Tag-out Policy
- B. Confined Space Entry Procedures
- C. Evacuation Procedure for Propane, Lox and Ammonia Releases
- D. Personal Protective Equipment Guidelines
- E. No Smoking Policy
- F. Prohibited Materials

Additionally, the contractor will be provided:

- A. Contact Phone Numbers for MWW Staff
- B. On-Site Parking Location and designated construction entrance
- C. Site Security Policy and Procedures

The Prime Contractor shall be required to review these documents and is responsible for conveying the contents of these submittals to their employees, sub-contractors, and any other parties working directly or indirectly for them. These policies apply equally to all contractors. Failure to comply with established policies and procedures may result in access privileges being withdrawn.

MWW Staff shall provide a "walk-through" session with the contractor to review area layout and site plans as part of this orientation process and to establish the specific work areas necessary for the contractors to perform their scope of work. Topics covered in this session include: site overview with hazards, Material Safety Data Sheets (MSDS), fire extinguisher placement, and the storm water protection policy.

2.04 CONTRACTOR RESPONSIBILITIES

Contractors shall provide the following documents no less than 7 business days prior to the start of contracted work:

- A. Scope of work to be performed;

- B. Name of primary contractor's onsite representative;
- C. Names of all companies sub-contracted to do work on the project;
- D. Completed "Contract Firm Registration Form" (see attachment 'A') for prime contract firm and every sub-contract firm;
- E. A "Contractor Employee Registration Form" completed for the contractors and every employee who needs to be granted site access (see attachment 'B');
- F. List of items to be stored on-site;
- G. Material Safety Data Sheets for all chemicals to be used/stored on-site.

Note: It is the responsibility of the Prime Contractor to facilitate gathering and submittal of the "Contractor Employee Registration Form" for all sub-contractors working on the project. A sub-contractor is defined as an individual or firm hired by the primary contractor to perform a specific task as part of the overall project. This would not include an organization making deliveries of supplies or equipment to the job site; procedures for these firms are covered under Part 8, "DELIVERIES."

In the event it is necessary for the Prime Contractor to add additional employees to the list of approved personnel, a minimum of 72 hours, or 3 business days, must be allowed for processing of the request. Site access will be denied to the additional personnel until processing is complete.

Additionally, Contract Firms are obligated to notify MWW in a timely manner of any site-authorized staff that leaves the employ of the Contractor.

At no time should anyone but the Prime Contractor be contacting Milwaukee Water Works employees with issues or access requests. If a request for site access does not come from the Prime Contractor, the request will not be processed.

During the time period that the Contractor is on-site, they must agree to:

- A. Notify the Plant Manager immediately of any significant chemical spills or leaks.
- B. Maintain normal non-toxic breathable air quality, through adequate ventilation, at their work site.
- C. Perform no equipment isolations or tie-ins without the signed approval of site management.

- D. Restrict movement to the specific work areas within the site to perform contractor's scope of work.

During the project, the contractor advised that the area surrounding the work site is to be kept as free as possible of dust contamination during removal operations. Contractor is also advised that the area is to be ventilated so that the presence of fumes from the installation operations is kept as low as possible. Additionally, the contractor is advised that all rules and regulations governing confined space are to be strictly adhered to.

2.05 CONTRACTOR SPECIAL WORK PERMITS

Contractors must notify Engineering/Site Management staff of any welding, torching, or potentially hazardous or operational impact request, prior to commencing such operations. Special permits shall be issued to the contractor, and these must also be displayed at the work site.

Failure to comply with the terms of the special work permits, or provisions that provide for MWW employee safety, shall be cause for revocation of such permits, and the contractor may be forced to discontinue activities at the Site.

2.06 CONTRACTOR IDENTIFICATION AND DAILY REGISTRATION

Every day, all contractors shall be required to show a valid picture ID card, to sign-in at the start of work, and sign out at the end of work. A MWW employee or designated security representative shall be on site to ensure compliance. Any identification tags or lanyards issued by MWW are to be worn while on site and returned to site management upon completion of contracted work.

2.07 CONTRACTOR GATE ACCESS & PARKING

Contractors must comply with the terms of entry for the site and park only in the areas designated for parking by the MWW site representative.

NOTE: Parking privileges may be rescinded at any time as site operational requirements dictate.

PART 3 CITY OF MILWAUKEE PERMITS

The contractor shall obtain the necessary permits for this project.

PART 4 OCCUPANCY DURING CONSTRUCTION

The Water Works facility shall be in continuous operation during this contract. Contractor and sub-contractors are to take any and all necessary precautions to insure there is no interference with daily operations or security. MWW personnel shall be continuously occupying the facility. All hours of contractor's operations shall be coordinated with the MWW site or engineering representative.

PART 5 ELECTRICAL POWER AND TELEPHONE SERVICE

On-site electrical service is available for contractor use during project duration. Contractor shall provide and maintain all necessary power cords, electrical lighting, heat, ventilation and telephone service and shall make all necessary connections in accordance with OSHA regulations. Contractor shall provide and pay for his own wireless telephone service.

PART 6 WATER

Water is available for the contractor at the site and may be obtained from the fixture(s) so designated by MWW staff or engineering representative. Contractor and sub-contractors must provide their own hoses, back flow preventer and any other connection appurtenances required for the contract.

PART 7 TOILET FACILITIES

On-site toilet facilities **ARE NOT** available for Contractor use during project duration. Contractor shall furnish portable facilities. Contractor shall maintain these toilet facilities in a sanitary condition throughout the duration of the project and shall remove them from site at the end of the project. The placement and location of the temporary portable toilets shall be coordinated with the Plant Manager and Water Engineering Representative.

PART 8 DELIVERIES

Contractor shall coordinate the delivery of all equipment, material, dumpsters, portable toilets (and their maintenance) and other required items required for the contract work with the MWW staff. A minimum of 24 hours prior notice in advance of the desired

delivery date shall be transmitted to the designated Water Engineering Representative. Contractor shall provide the following information in the notification:

1. Trucking/Delivery Company
2. Driver Name
3. Truck License Plate Number

The driver of the delivery vehicle is required to display picture identification as a prerequisite for entry to the MWW facility for the delivery. Failure to comply with the above will result in denial of project site access, requiring the contractor to re-schedule delivery.

END OF SECTION

Milwaukee Water Works

Safe, Abundant Drinking Water.

FORM A

CONTRACT FIRM REGISTRATION FORM

CONTRACTOR: _____

PLANT/SITE: _____

CONTRACT/SERVICE ORDER No. _____

WATER ENGINEERING PROJECT No. _____

PRIMARY CONTACT PERSON: _____

OFFICE PHONE NUMBER: _____

CELL PHONE NUMBER: _____

REQUESTED WORK HOURS (00am – 00pm): _____

NUMBER OF EMPLOYEES TO BE WORKING ON-SITE: _____

**Signature certifies receipt of the materials outlined in
Contract Section 01500, Part 2 – Security and Safety, Section C, Policies.**

SIGNATURE: _____

PRIMARY CONTACT PERSON

DATE: _____

***Accompanying this form should be a complete listing of all
equipment to be stored on site for the duration of the project.***

Milwaukee Water Works

Safe, Abundant Drinking Water.

FORM B

CONTRACTOR EMPLOYEE REGISTRATION FORM

Contract Firm: _____

Plant/Site/Project: _____

Employee Name (Printed): _____

This certifies that I have received the building site security and safety policies.

EMPLOYEE
SIGNATURE: _____

Required

DATE: _____

ONSITE PARKING

- I will always be driving a Company vehicle.
- I will always be a passenger in a vehicle.
- I will be driving my personal vehicle. If checked here complete and sign the next section.

Contractor Personal Vehicle Liability Waiver

EMPLOYEE VEHICLE

MAKE & MODEL: _____ LICENSE PLATE: _____

I, hereby agree to hold harmless the City of Milwaukee for any and all damage, loss or injury, which may occur as a result of utilizing the contractor onsite parking area.

EMPLOYEE
SIGNATURE: _____

Required

DATE: _____

SECTION 01600**MATERIAL AND EQUIPMENT****PART 1 GENERAL****1.01 SUMMARY****A. Section Includes:**

1. Products.
2. Transportation and handling.
3. Storage and protection.
4. Product options.
5. Substitutions.

1.02 PRODUCTS

- A. Material, machinery, components, equipment, fixtures and system shall be new. Assure standardization and uniformity by using products from one manufacturer.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- C. Provide interchangeable components of the same manufacturer for components being replaced.

1.03 TRANSPORTATION AND HANDLING

- A. Transport and handle Products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct and Products are undamaged.
- C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement or damage.

1.04 STORAGE AND PROTECTION

- A. Store and protect Products in accordance with manufacturer's instructions.
- B. Store with seals and labels intact and legible.

- C. Store sensitive Products in weather tight, climate controlled, enclosures in an environment favorable to Product.
- D. For exterior storage of fabricated Products, place on sloped supports above ground.
- E. Provide off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement or damage.
- I. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.05 PRODUCT OPTIONS

- A. Products specified by reference standards or by description only: Any Product meeting those standards or description.
- B. Products specified by naming one or more manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products specified by naming one or more manufacturers with a provision for substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following article.

1.06 SUBSTITUTIONS

- A. City will consider requests for Substitutions only within 15 days after date established in Notice to Proceed.
- B. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that the Contractor:
 - 1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.

2. Will provide the same warranty for the Substitution as for the specified Product.
 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to City.
 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 5. Will reimburse City for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
1. Submit two copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 2. Submit shop drawings, product data and certified test results attesting to the proposed Product equivalence. Burden of proof is on proposer.
 3. The City will notify Contractor in writing of decision to accept or reject request.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Closeout Procedures.
2. Final Cleaning.
3. Adjusting.
4. Project Record Documents.
5. Operation and Maintenance Data.
6. Spare Parts and Maintenance Products.
7. Guarantee.

B. Related Sections

1. Section 01500 – Job Site Security, Utilities and Facilities: Progress cleaning.

1.02 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for City's review.
- B. Provide submittals to City that is required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments and sum remaining due.

1.03 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean surfaces exposed to view; remove temporary labels, stains and foreign substances.

- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- D. Remove waste and surplus materials, rubbish and construction facilities from the site.

1.04 ADJUSTING

- A. Adjust operating appurtenances and equipment to ensure smooth and unhindered operation.

1.05 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. Manufacturer's instructions for assembly, installation and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by City.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Field changes of dimension and detail.
 - 2. Details not on original Drawings.
- F. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.

3. Changes made by Addenda or Change Orders.
- G. Submit documents to City in the following manner:
1. Submit prior to final Application for Payment.
 2. Documents shall be accompanied with a transmittal letter that includes the following:
 - a) Date.
 - b) City's project title and number.
 - c) Contractor's name and address.
 - d) Title and number of each record document.
 - e) Certification that each document as submitted is complete and accurate.
 - f) Contractor's signature or authorized representative.
 3. Delete Consultant and City's title block from documents. Delete Engineer's seals from documents.
 4. Submit two sets of documents.
 5. Submit one set of reproducible "mylar" Contract Drawings.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8-1/2 x 11 inch text pages, three D-side ring binders with durable plastic covers. Drawings and diagrams shall be reduced to 8-1/2 x 11 inches or 11 x 17 inches. Where reduction is not practicable, large drawings shall be folded separately and placed in an envelope that is bound into the manuals. Envelope shall bear suitable outside identification.
- B. Prepare binder cover and spine with printed title "OPERATION & MAINTENANCE INSTRUCTION," title of project, project number and subject matter of binder when multiple binders are required.
- C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, typed on 24 pound white paper, in three parts as follows:

1. Part 1: Directory, listing names, addresses, telephone numbers and e-mails of Architect/Engineer, Contractor, Subcontractors and major equipment suppliers.
 2. Part 2: Operation and maintenance instructions arranged by system and subdivided by specification section. For each category, identify names, addresses, telephone numbers and e-mails of Subcontractors and suppliers. Identify the following:
 - a) Significant design criteria.
 - b) List of Equipment.
 - c) Parts list and assembly drawings for each component.
 - d) Operating instructions for start-up, normal operation, shutdown and emergency conditions.
 - e) Maintenance instructions for equipment and systems.
 - f) Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - g) Troubleshooting Guide.
 3. Part 3: Project documents and certificates, including the following:
 - a) Shop drawings and product data.
 - b) Air and water balance reports.
 - c) Certificates.
 - d) Photocopies of warranties.
- E. Submit one draft copy of volumes 15 days prior to final inspection. This copy will be reviewed and returned with City comments. Revise content of all document sets as required prior to final submission.
- F. Submit four sets of revised final volumes within 10 days after receipt of City's comments.

1.07 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance and extra Products in quantities specified in individual specification sections.

- B. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

1.08 WARRANTY AND GUARANTEE

- A. Provide duplicate notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, suppliers and manufacturers.
- C. Provide Table of Contents and assemble in binder with durable plastic cover.
- D. Submit prior to final Application for Payment.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

EXHIBIT “A”

TECHNICAL SPECIFICATIONS

**TECHNICAL PROJECT
SPECIFICATIONS FOR HP-180:
HOWARD AVENUE WALL
STABILIZATION**

**HOWARD AVENUE
PURIFICATION PLANT**

MILWAUKEE WATER WORKS

PREPARED BY:

**BLOOM COMPANIES, LLC
10501 W. RESEARCH DRIVE, SUITE 100
MILWAUKEE, WI 53226**

August 23, 2011



**BLOOM
COMPANIES, LLC**
Infrastructure Innovation and Ingenuity

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**SECTION 04 05 03
MASONRY MORTARING AND GROUTING**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Part 1 General
 - 1. Summary
 - 2. Related Sections
 - 3. References
 - 4. Submittals
 - 5. Quality Assurance
 - 6. Environmental Requirements

- B. Part 2 Products
 - 1. Components
 - 2. Admixtures
 - 3. Mixes

- C. Part 3 Execution
 - 1. Preparation
 - 2. Installation
 - 3. Field Quality Control

1.2 SUMMARY

- A. The work under this section shall consist of providing all work, material, labor, equipment, and supervision necessary to provide for masonry mortaring.

1.3 RELATED SECTIONS

- A. Section 04 20 00 – Masonry and Masonry Restoration

- B. Applicable provisions of Division 1 shall govern all work under this section.

1.4 REFERENCES

- A. ASTM International:
 - 1. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
 - 2. ASTM C150 - Standard Specification for Portland Cement.
 - 3. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
 - 4. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
 - 5. ASTM C387 - Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
 - 6. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
 - 7. ASTM C476 - Standard Specification for Grout for Masonry.

CITY OF MILWAUKEE WATER WORKS
HOWARD AVENUE OZONE BUILDING WALL STABILIZATION AND REPAIR

- 1 8. ASTM C780 – Method for Pre-construction and Construction
- 2 Evaluation of Mortars for Plain and Reinforced Unit Masonry
- 3 9. ASTM C1019 - Standard Test Method for Sampling and Testing
- 4 Grout.
- 5 10. ASTM C1314 - Standard Test Method for Constructing and
- 6 Testing Masonry Prisms Used to Determine Compliance with
- 7 Specified Compressive Strength of Masonry.
- 8 11. ASTM C1324 – Test Method for Examination and Analysis of
- 9 Hardened Masonry Mortar
- 10 12. ASTM C1329 - Standard Specification for Mortar Cement.

- 11 C. The Brick Industry Association
- 12 1. BIA TN-8 – Mortars for Brickwork
- 13 2. BIA TN-8B – Mortars for Brickwork – Selection and Quality
- 14 Assurance
- 15 3. BIA TN-46 – Maintenance of Brick Masonry

- 16 D. The Masonry Society:
- 17 1. TMS MSJC - Building Code for Masonry Structures (ACI
- 18 530/ASCE 5/TMS 402), Specification for Masonry Structures (ACI
- 19 530.1/ASCE 6/TMS 602) and Commentaries.

20 **1.5 SUBMITTALS**

- 21 A. Submit 6 copies of all submittals for review.

- 22 B. Samples: Submit two samples of mortar, illustrating mortar color and
- 23 color range, aggregate & texture.

- 24 C. Test Reports:
- 25 1. Submit reports on mortar indicating conformance of mortar to
- 26 property requirements of ASTM C270, mortar to requirements of
- 27 ASTM C1142 component mortar materials to requirements of
- 28 ASTM C270 and test and evaluation reports to ASTM C780 for
- 29 aggregate ratio and water content, air content, consistency and
- 30 compressive strength.

- 31 D. Manufacturer's Installation Instructions: Submit premix mortar
- 32 manufacturer's installation instructions.

- 33 E. Manufacturer's Certificate: Certify products meet or exceed
- 34 specified requirements.

35 **1.6 QUALITY ASSURANCE**

- 36 A. Perform Work in accordance with TMS MSJC Code and TMS MSJC
- 37 Specification.
- 38 B. Maintain one copy of each document on site.

39 **1.7 ENVIRONMENTAL REQUIREMENTS**

- 40 A. Hot and Cold Weather Requirements: TMS MSJC Specification.

1 **PART 2 PRODUCTS**

2 **2.1 COMPONENTS**

- 3 A. Portland Cement: ASTM C150, Type I, gray color.
- 4 B. Mortar Aggregate: ASTM C144, standard masonry type.
- 5 C. Hydrated Lime: ASTM C207, Type N.
- 6 D. Fine Aggregate: Natural Sand, medium grain - quartz, feldspar and lithic
7 sand.
- 8 E. Water: Clean and potable.

9 **2.2 ADMIXTURES**

- 10 A. No admixtures shall be used except upon written permission of Architect /
11 Engineer.
- 12
- 13 B. Calcium chloride is not permitted.

14 **2.3 MIXES**

- 15 A. Mortar Mixes:
- 16 1. Mortar For Structural Masonry: ASTM C270, Type N, Portland
17 cement & hydrated lime using Proportion specification.
- 18 2. Mortar for Repointing (tuckpointing) mortar ASTM C270, Type N,
19 Portland cement & hydrated lime using Proportion specification.
- 20
- 21 B. Mortar Mixing:
- 22 1. Pre-hydrate repointing mortar.
- 23 2. Thoroughly mix mortar ingredients in accordance with ASTM
24 C270 in quantities needed for immediate use.
- 25 3. Achieve uniformly damp sand immediately before mixing process.
- 26 4. Use only minimum quantity of water to achieve a workable low
27 moisture content mortar.
- 28 5. Add mortar color to achieve uniformity of mix and coloration.
- 29 6. Do not re-temper repointing and masonry restoration mortar after
30 initial mixing.
- 31 7. Use mortar within two hours of initial mixing.

32 **PART 3 EXECUTION**

33

34 **3.1 PREPARATION**

- 35 A. Ensure adjacent surfaces to receive mortar are clean and free of
36 deleterious materials. Moisten joints prior to repointing.
- 37

38 **3.2 INSTALLATION**

- 39
- 40 A. Install mortar in accordance with TMS MSJC Specification.

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3.2 FIELD QUALITY CONTROL

- A. Establishing Mortar Mix: In accordance with ASTM C270.
- B. Testing of Mortar Mix: In accordance with ASTM C780 for aggregate ratio and water content, air content, consistency, and compressive strength.
- C. Test flexural bond strength of mortar and masonry units to ASTM C1357; test in conjunction with masonry unit sections specified.
- D. Test compressive strength of mortar and masonry to ASTM C1314; test in accordance with masonry unit sections specified.

END OF SECTION

SECTION 04 20 00
MASONRY and MASONRY RESTORATION

PART 1 –GENERAL

1.1 SECTION INCLUDES

- A. Part 1 General
 - 1. Summary
 - 2. Related Sections
 - 3. References
 - 4. Unit Prices
 - 5. Submittals
 - 6. Qualifications
 - 7. Environmental Requirements

- B. Part 2 Products
 - 1. Brick
 - 2. Accessories
 - 3. Weeps/Vents

- C. Part 3 Execution
 - 1. Examination
 - 2. Preparation
 - 3. Masonry Restoration
 - 4. Installation
 - 5. Erection Tolerances
 - 6. Field Quality Control
 - 7. Cleaning

1.2 SUMMARY

- A. This Section includes all labor, material, equipment and related services necessary to install new brick and concrete masonry units, and restoration of existing brick and concrete masonry walls as shown on the plans and includes
 - 1. Provide reconstruction of face brick were noted on plan
 - 2. Provide cutting and pointing of brick and concrete masonry wall joints were noted on plan
 - 3. Provide furnishing and installation of all related anchorage and accessories

1.3 RELATED SECTIONS

- A. Section 04 05 03 – Masonry Mortaring and Grouting: Mortar for use in this section.

- B. Section 07 90 00 - Joint Sealants: Rod and sealant at control and expansion joints.

- C. Applicable provisions of Division 1 shall govern all work under this section

1 **1.4 REFERENCES**

- 2 A. American Society for Testing and Materials (ASTM International):
3 1. ASTM A153 -Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4 2. ASTM A615 -Standard Specification for Deformed and Plain Billet-Steel
5 Bars for Concrete Reinforcement.
6 ASTM A641 -Standard Specification for Zinc-Coated (Galvanized) Carbon
7 Steel Wire.
8 3. ASTM A653 -Standard Specification for Steel Sheet, Zinc-Coated
9 (Galvanized) or Zinc-Iron
10 4. Alloy-Coated (Galvannealed) by the Hot-Dip Process.
11 5. ASTM A709 – Low Alloy Steel Deformed and Plain Bars for Concrete
12 Reinforcement.
13 6. ASTM A951 -Standard Specification for Masonry Joint Reinforcement.
14 7. ASTM C33 - Standard Specification for Concrete Aggregates.
15 8. ASTM C39/C39M - Standard Test Method for Compressive Strength of
16 Cylindrical Concrete Specimens.
17 9. ASTM C55 -Standard Specification for Concrete Brick.
18 10. ASTM C62 -Standard Specification for Building Brick (Solid Masonry
19 Units Made From Clay or Shale).
20 ASTM C67 -Standard Test Methods for Sampling and Testing Brick and
21 Structural Clay Tile.
22 11. ASTM C90 -Standard Specification for Loadbearing Concrete Masonry
23 Units.
24 12. ASTM C126 -Standard Specification for Ceramic Glazed Structural Clay
25 Facing Tile, Facing Brick, and Solid Masonry Units.
26 13. ASTM C140 -Standard Test Methods of Sampling and Testing Concrete
27 Masonry Units.
28 ASTM C150 - Standard Specification for Portland Cement.
29 14. ASTM C216 -Standard Specification for Facing Brick (Solid Masonry
30 Units Made from Clay or
31 Shale).
32 15. Shale).
33 16. ASTM C494/C494M - Standard Specification for Chemical Admixtures for
34 Concrete.
35 17. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or
36 Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
37 18. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in
38 Hardened Concrete.
39 19. ASTM C652 -Standard Specification for Hollow Brick (Hollow Masonry
40 Units Made From Clay or Shale).
41 20. ASTM C666 - Standard Test Method for Resistance of Concrete to Rapid
42 Freezing and Thawing.
43 21. ASTM C979 - Standard Specification for Pigments for Integrally Colored
44 Concrete.
45 22. ASTM D1729 - Standard Practice for Visual Appraisal of Colors and Color
46 Differences of Diffusely-Illuminated Opaque Materials.
47 23. ASTM D2244 - Standard Test Method for Calculation of Color Differences
From Instrumentally Measured Color Coordinates.
- 48 B. The Brick Industry Association
49 1. BIA TN-8B – Mortars for Brickwork – Selection and Quality Assurance

CITY OF MILWAUKEE WATER WORKS
HOWARD AVENUE OZONE BUILDING WALL STABILIZATION AND REPAIR

- 1 2. BIA TN-46 – Maintenance of Brick Masonry
- 2 C. Masonry Joint Standards Committee (MSJC):
- 3 1. MSJC -Building Code for Masonry Structures (ACI 530/ASCE 5/TMS
- 4 402), Specification for
- 5 2. Masonry Structures (ACI 530.1/ASCE 6/TMS 602) and Commentaries.

6 **1.5 UNIT PRICES**

- 7 A. Provide unit prices as described below:
- 8 1. Unit Price No. 1 Face Brick Pointing
- 9 Pointing of face brick joints
- 10 Unit of measurement: Per linear foot of joint
- 11 2. Unit Price No. 2 Concrete Masonry Unit Pointing
- 12 Pointing of CMU joints
- 13 Unit of measurement: Per linear foot of joint
- 14 B. The quantities for units of measurement for unit prices stated shall be
- 15 calculated as follows:
- 16 1. Per lin. ft: Quantities shall be rounded to the nearest one-half foot.

17 **1.6 SUBMITTALS**

- 18 A. Submit six copies of each submittal, unless noted otherwise.
- 19 B. Product Data: Submit data for fabricated wire reinforcement, reinforcement
- 20 bars, wall ties, anchors and other accessories.
- 21 C. Reinforcement shop drawings
- 22 D. Manufacturer's Certificate: Certify products meet or exceed specified
- 23 requirements.
- 24 E. Contractor qualifications: Documentation of experience: comparable work in
- 25 past ten years; three projects, with references completed in last five years
- 26 employing workers skilled in the restoration process and operation indicated
- 27 for this project; installers certifications.

28 **1.7 QUALIFICATIONS**

- 29 A. Masonry Restoration Contractor: Company specializing in performing work of
- 30 this section with minimum ten years experience in comparable work . Submit
- 31 a list, with references, of three buildings on which masonry restoration was
- 32 completed in the last five years employing workers skilled in the restoration
- 33 processes and operation indicated.
- 34 B. Installers of masonry repointing shall be certified by the International Masonry
- 35 Institute with minimum 3 years experience.

1 **1.8 ENVIRONMENTAL REQUIREMENTS**

- 2 A. Hot and Cold Weather Requirements: MSJC Specification.

3 **PART 2 PRODUCTS**

4 **2.1 BRICK**

- 5 A. Salvaged / Recovered Brick: Sound existing face brick may be recovered from
6 the removal of the existing brick for use in reconstruction of noted areas .
7 Salvaged brick shall be free from cracks, laminations and other defects or
8 deficiencies.

- 9 B. New Brick: The Owner has a small supply of approximately 220 existing bricks
10 on site for use in reconstructing noted areas. If brick is required beyond the
11 owner supplies it will need to be purchased by General Contractor. General
12 contractor to submit a sample of proposed brick to engineer for approval prior
13 to use.

- 14 C. Approved Appearance: To match existing brick.

- 15 D. Delivery, Unloading and Storage: General contractor shall receive, unload and
16 store Owner supplied brick at the project site. All units used in the work shall
17 conform to requirements specified herein. Any improper brick shall be culled
18 out. Brick shall be resorted or culled as necessary, especially when plant
19 palletted, to avoid spotty or irregular ranges of color or texture in the finished
20 wall. Brick shall be carefully unloaded and neatly stacked on or near the
21 project site, undamaged, and adequately protected at all times.

22 **2.2 ACCESSORIES**

- 23 A. Corrugated Formed Sheet Metal Wall Ties: 7/8 inch wide, 16 gage thick steel
24 with galvanized finish (ASTM A 153 Class B-2: (1.50 oz/ft²). Imbed 3 inch in
25 each wythe.

- 26 B. Mortar and Grout: As specified in Section 04 05 00.

27 **2.3 Weeps/ Vents**

- 28 A. Mortar Free open head joints at 24 inch o/c with non-woven plastic mesh

- 29 B. Cavity Drainage Mat – non-woven plastic type, sized as required for cavity.

30 Manufacturers:

- 31 1. Mortar-Net
32 2. Cav-Clear
33 3. Substitutions: with prior approval.

34 **2.4 Masonry Cleaner**

- 35 A. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

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1 **2.5**

2 **2.6**

- 3 A. Mortar Free open head joints at 24 inch o/c with non-woven plastic mesh
- 4 B. Cavity Drainage Mat – non-woven plastic type, sized as required for cavity.
- 5 Manufacturers:
- 6 1. Mortar-Net
- 7 2. Cav-Clear
- 8 3. Substitutions: with prior approval.

9 **PART 3 EXECUTION**

10 **3.1 EXAMINATION**

- 11 A. Verify field conditions are acceptable and are ready to receive work.
- 12 B. Verify items provided by other sections of work are properly sized and located.
- 13 C. Verify built-in items are in proper location, and ready for roughing into
- 14 masonry work.

15 **3.2 PREPARATION**

- 16 A. Direct and coordinate placement of metal anchors supplied to other sections.
- 17 B. Furnish temporary bracing during installation of masonry work. Maintain in
- 18 place until building structure provides permanent support.

19 **3.3 MASONRY RESTORATION**

- 20 A. Rebuilding:
- 21 1. Cut out damaged and deteriorated masonry with care in manner to
- 22 prevent damage to adjacent remaining materials.
- 23 2. Remove existing brick with care to salvage and recover sound existing
- 24 brick for reuse.
- 25 3. Support structure in advance of cutting out units to maintain stability of
- 26 remaining materials.
- 27 4. Cut away loose or unsound adjoining masonry, mortar, and concrete to
- 28 provide firm and solid bearing for new work.
- 29 5. Build in new masonry following procedures for new work.
- 30 6. Mortar Mix: As specified in Section 04 05 03: Colored and proportioned to
- 31 match existing work.
- 32 7. Ensure anchors, ties, reinforcing, are correctly located and built in.
- 33 8. Install built-in masonry to match and align with existing, with joints and
- 34 coursing true and level, faces plumb and in line. Build in openings,
- 35 accessories and fittings.
- 36 B. Repointing:

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- 1 1. Cut out loose or disintegrated mortar in joints to minimum 3/4 inch depth
- 2 or until sound mortar is reached.
- 3 2. Utilize hand tools; or power tools only after test cuts determine no
- 4 damage to masonry units results.
- 5 3. Do not damage masonry units.
- 6 4. When cutting is complete, remove dust and loose material by brushing.
- 7 5. Pre-moisten joint and apply mortar.
- 8 6. Pack tightly in maximum 1/4 inch layers. Form smooth, compact concave
- 9 joint to match existing.

- 10 C. Restoration Cleaning:
- 11 1. Clean surfaces and remove large particles with wood scrapers or non-
- 12 ferrous wire brush.
- 13 2. Rinse from bottom up with potable water applied at 400 psi and at rate of
- 14 4 gal/min.

15 **3.4 INSTALLATION**

- 16 A. Construction of Masonry: MSJC specification.
- 17 B. Establish lines, levels, and coursing indicated. Protect from displacement.
- 18 C. Maintain masonry courses to uniform dimension. Form bed and head joints of
- 19 uniform thickness.
- 20 D. Coursing of Brick Units:
- 21 1. Bond: To Match existing.
- 22 2. Coursing: Match existing.
- 23 E. Placing and Bonding:
- 24 1. Lay solid masonry units in full bed of mortar, with full head joints.
- 25 2. Lay hollow masonry units with face shell bedding on head and bed joints.
- 26 F. Buttering corners of joints or excessive furrowing of mortar joints is not
- 27 permitted.
- 28 G. Tooth masonry into existing construction as required. Maintain mortar joint
- 29 thickness and masonry size so that repair is not obvious.
- 30 H. Remove excess mortar as work progresses.
- 31 I. Do not shift or tap masonry units after mortar has achieved initial set. Where
- 32 adjustment is required, remove mortar and replace.
- 33 J. Perform job site cutting of masonry units with proper tools to assure straight,
- 34 clean, unchipped edges. Prevent broken masonry unit corners or edges.
- 35 K. Isolate masonry from vertical structural framing members with movement joint.
- 36 L. Isolate top of non-structural masonry from horizontal structural framing
- 37 members and slabs or decks with compressible joint filler.

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1 M. Weeps and Vents: Furnish weeps and vents in outer wythe at 24 inches oc
2 horizontally immediately above open head joints in mortar joints on the
3 exterior facing wythe on 24 inch centers at the base of all cavities,
4 immediately above shelf/ relief angles, ledges, bond beams and lintels.

5 N. Provide wall ties within 8 inches of openings and corners. Space at 16 inches
6 o.c. horizontally and vertically.

7 **3.5 ERECTION TOLERANCES**

8 A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

9 B. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20
10 feet or more

11 C. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in
12 two stories or more.

13 D. Maximum Variation from Level Coursing: 1/8 inch in 3 feet and 1/4 inch in 10
14 feet; 1/2 inch in 30 feet.

15 E. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet.

16 F. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

17 **3.6 FIELD QUALITY CONTROL**

18 A. Clean cavities in walls: Back beveling of the mortar bed and minimum
19 furrowing shall be provided.

20 B. Flushing out the cavity with water will not be accepted.

21 C. The use of mesh, matting, pea gravel or other devices or material in the
22 bottom of a cavity is not an acceptable alternate for a clean cavity.

23 D. The base of the wall being worked on should be cleaned out at the end of
24 each day's work, before the mortar droppings fully harden.

25 E. Brick left out for inspection/clean-cut holes should be installed just as soon as
26 mortar is removed and the cavity is closed off by construction above, so that a
27 reasonable mortar color match can be achieved.

28 F. Movement joints in clay products masonry free of mortar:

29 G. Movement joints in clay products masonry should be kept free of mortar from
30 the initial construction.

31 H. Caulking of movement joints will not be allowed to proceed until all movement
32 joints are cleaned out and final inspected.

33 I. Caulking of movement joints in clay products masonry during warm weather:

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1 J. The Sealant should be installed in the movement joints when the masonry is
2 thermally expanded (summertime) and the joints are at a small dimension.

3 K. Delaying the sealing of movement joints in a rain screen wall should not
4 create any concern or problems relative to water penetration.

5 **3.7 CLEANING**

6 A. All masonry shall be in final acceptance condition within 24 hours after laying
7 and shall be maintained in that condition, by meeting or exceeding the degree
8 of cleanliness required, demonstrated on the approved sample panel.

9 B. Lay masonry utilizing all necessary care to achieve cleanliness. Remove
10 excess mortar from exposed exterior and interior masonry surfaces as the
11 work progresses and before it tenaciously adheres to the faces of the
12 masonry. Remove mortar protrusions and smears as masonry units are laid
13 and tooled, as scaffolds are raised, and at the start of the next day's work,
14 leaving the surface of the masonry clean and finished. Contractor may use
15 calcimine brushes, stiff fiber brushes, other similar masonry units, burlap,
16 rags, carpet remnants, rubber floats or other approved means. USE OF
17 CHEMICAL CLEANING OR HARSH PHYSICAL CLEANING WILL NOT BE
18 PERMITTED. Included as chemical cleaners and prohibited are most
19 manufactured masonry cleaning solutions or compounds. Equipment or
20 methods and techniques utilized, reduced productivity, as well as weather
21 conditions experienced will not relieve Contractor of required compliance.

22 C. Protection shall be provided to prevent mortar spattering and maintain
23 masonry in a clean condition so that the masonry is satisfactory for
24 acceptance when masonry work is completed. This may require covering
25 portions of finished masonry which is below new work in progress with
26 polyethylene, canvas or other approved means. Cover tops of unfinished walls
27 and new work during inclement weather and at the end of each day's work to
28 prevent moisture entry. Extend covering a minimum of 24 inches down both
29 sides of wall and hold covering securely in place. Hair-pin type devices
30 frequently spaced have been successfully used in the past.

31 D. No final wash-down is required unless removal of earthy construction dirt or
32 dust is necessitated by extremely unusual site conditions.

33 E. If any masonry is not cleaned as required by these specifications, or if walls
34 have an unsatisfactory appearance upon completion of work, such violations
35 will require additional work by the Contractor for producing acceptable
36 masonry at no extra cost to the Owner. This is not to be construed as a
37 Contractor's option. Procedures must be submitted by the Contractor and
38 samples approved by all other parties to the contract, prior to proceeding with
39 such work.

40 F. Should the Contractor use or attempt to use chemical cleaning utilizing acid or
41 strong alkali based materials, or should the Contractor use or attempt to use
42 harsh physical cleaning such as sand blasting or pressure water jetting; such
43 actions will be construed as nonperformance causing the Owner damages

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1 which shall be liquidated by reducing payment to the Contractor in the amount
2 of \$2.50 per square foot of masonry involved.
3
4

5

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

1
2

3 **PART 1 GENERAL**

4 **1.1 SECTION INCLUDES**

- 5 A. Part 1 General
6 1. Summary
7 2. Related Work
8 3. Referenced Documents
9 4. Submittals
10 5. Delivery, Storage, and Handling
11 6. Field Measurements
- 12 B. Part 2 Materials
13 1. Materials
14 2. Structural Supports
15 3. Fabrication
16 4. Finishes
- 17 C. Part 3 Execution
18 1. Examination
19 2. Preparation
20 3. Installation
21 4. Field Quality Control

22 **1.2 SUMMARY**

- 23 A. The work under this section consists of providing all work, materials, labor equipment
24 and supervision necessary to provide metal fabrications as required in these specifications
25 and the drawings. Included are the following topics:

26 **1.3 RELATED WORK**

- 27 A. Applicable provisions of Division 1 shall govern all work under this section.

28 **1.4 REFERENCES**

- 29 A. ASTM International:
30 1. ASTM A240/A240M - Standard Specification for Chromium and
31 Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure
32 Vessels and for General Applications.
33 2. ASTM A276 - Standard Specification for Stainless Steel Bars and
34 Shapes.
35 3. ASTM A354 - Standard Specification for Quenched and Tempered Alloy
36 Steel Bolts, Studs, and Other Externally Threaded Fasteners.

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- 1 4. ASTM A501 - Standard Specification for Hot-Formed Welded and
- 2 Seamless Carbon Steel Structural Tubing.
- 3 5. ASTM A554 - Standard Specification for Welded Stainless Steel
- 4 Mechanical Tubing.
- 5 6. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
- 6 7. ASTM F436 - Standard Specification for Hardened Steel Washers.

- 7 B. American Welding Society:
- 8 1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive
- 9 Examination.
- 10 2. AWS D1.6 - Structural Welding Code - Stainless Steel.

- 11 C. SSPC: The Society for Protective Coatings:
- 12 1. SSPC - Steel Structures Painting Manual.

13 **1.5 SUBMITTALS**

- 14 A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing,
- 15 anchorage, size and type of fasteners, and accessories. Include erection
- 16 drawings, elevations, and details where applicable.

17 **1.6 DELIVERY, STORAGE, AND HANDLING**

- 18 A. Accept metal fabrications on site in labeled shipments. Inspect for damage.
- 19 B. Protect metal fabrications from damage by exposure to weather.

20 **1.7 FIELD MEASUREMENTS**

- 21 A. Verify field measurements are as indicated on drawings.

22 **PART 2 PRODUCTS**

23 **2.1 MATERIALS - STAINLESS STEEL**

- 24 A. Angles: ASTM A276 Type 316
- 25 B. Plate: ASTM A240/A240M; Type 316.
- 26 C. Bolts, Nuts, and Washers: ASTM A354.

27 **2.2 FABRICATION**

- 28 A. Fit and shop assemble items in largest practical sections, for delivery to site.
- 29 B. Fabricate items with joints tightly fitted and secured

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- 1 C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts;
2 unobtrusively located; consistent with design of component, except where
3 specifically noted otherwise.
- 4 D. Supply components required for anchorage of fabrications. Fabricate anchors
5 and related components of same material and finish as fabrication, except where
6 specifically noted otherwise.

7 **PART 3 EXECUTION**

8 **3.1 EXAMINATION**

- 9 A. Verify field conditions are acceptable and are ready to receive Work.

10 **3.2 INSTALLATION**

- 11 A. Install items plumb and level, accurately fitted, free from distortion or defects.
- 12 B. Make provisions for erection stresses. Install temporary bracing to maintain
13 alignment, until permanent bracing and attachments are installed.
- 14 C. Obtain approval of Architect/Engineer prior to site cutting or making adjustments
15 not scheduled.

16 **END OF SECTION**

1

2

3

4

SECTION 07 90 00
JOINT SEALANTS

5

6

7

PART 1 GENERAL

8

1.1 SECTION INCLUDES

9

A. Part 1 General

10

1. Summary

11

2. Related Sections

12

3. Unit Prices

13

4. Submittals

14

5. Quality Control

15

6. Environmental Requirements

16

7. Transportation and Handling

17

8. Warranty

18

9. Warranty Duration

19

B. Part 2 Products

20

1. Joint Sealant System – Polyurethane

21

2. Backer Rod

22

3. Prefomed Expanding Rod Foam Sealant

23

C. Part 3 Execution

24

1. Inspection

25

2. General

26

3. Preparation

27

4. Installation/Application

28

5. Cleanup

29

1.2 SUMMARY

30

A. The Work of this Section shall include furnishing all labor, materials, equipment, and supervision to install joint sealants, including surface preparation, in accordance with the Drawings and Specifications for cracks, construction and control joints, and masonry joints.

31

32

33

34

1.3 RELATED SECTIONS

35

A. 04 20 00 – Masonry and Masonry Restoration

36

B. Applicable provisions of Division 1 shall govern all work under this section

37

1.4 UNIT PRICES

38

A. Provide unit prices as described below:

39

1. Unit Price No. 1 Concrete Masonry Unit Sealant

40

Installation of Sealant at CMU joints

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1 Unit of measurement: Per linear foot

2 B. The quantities for units of measurement for unit prices stated shall be
3 calculated as follows:

4 1. Per linear foot: Quantities shall be rounded to the nearest one-half foot.

5 **1.5 SUBMITTALS**

6 A. Submit for record certification that the joint sealant system is compatible with
7 all of the products in which it will come in contact.

8 B. Submit for review and approval Manufacturer's Spec Data Sheets of each
9 product to be used.

10 C. Submit for record Material Safety Data Sheets of each product, solvent, or
11 related chemicals to be used and certification that the materials conform to
12 local, state and federal environmental and worker's safety laws and
13 regulations.

14 D. Upon request submit for review and approval qualifications of Manufacturer's
15 representative.

16 E. Upon request, submit for record qualification statement of the installer stating
17 projects, size and location.

18 F. Submit for review and approval a complete description of the joint sealant
19 system including primer, sealant material, and backer rods or bond breakers.
20 Also indicate placement and installation procedures along with material
21 working requirements, shelf life and performance data.

22 G. Submit for review and approval complete description of fire-rated joint system
23 including sealant material, backup filler, details and certification that system
24 meets fire-rating requirements on drawings per ASTM E 119, Standard Test
25 Methods for Fire Tests of Building Construction and Materials and UL263, Fire
26 Tests of Building Construction and Materials.

27 H. Submit sample Warranty prior to application.

28 I. Submit six (6) copies of all required submittals.

29 J. Samples: Submit for review and approval, samples of joint sealants, including
30 color(s) . Samples may also be requested for chemical analysis.

31 **1.6 QUALITY CONTROL**

32 A. The joint sealant Installer shall be approved by the joint sealant Manufacturer.

33 B. The Manufacturer shall make available a qualified Representative to assist the
34 Installer and DSF as specified herein. The Representative shall be
35 experienced in the placement of the sealant material.

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- 1 C. Testing Requirements: Installer to perform adhesion test in presence of
2 Owners representative or engineer at the rate of one test per 1,000 lineal feet
3 of joint. Adhesion test to be performed a minimum of 7 days after installation.
4 Procedure per Manufacturer's standard or as follows:
5
6 1. Make a knife cut from one side of the joint to the other.
7 2. Make two cuts approximately two inches long at the sides of the joint,
8 meeting the first cut at
9 the top of the two-inch cuts.
10 4. Grasp the two-inch piece of joint sealant and try to pull the uncut sealant
11 out of the joint.
- 12 D. If adhesion is adequate, the joint sealant should tear cohesively in itself or be
13 very difficult to adhesively remove from the surface.
- 14 E. Joint sealant shall be replaced by applying more sealant in the same manner
15 it was originally installed.
- 16 F. If test results are unsatisfactory, more frequent testing will be required until
17 satisfactory results are consistently obtained.
- 18 G. Replace all joint sealant which proves defective per above test at no additional
19 cost to Owner.

20 **1.7 ENVIRONMENTAL REQUIREMENTS**

- 21 A. Manufacturer and Installer are required to confirm that all materials used in
22 accordance with this Section conform to local, state, and federal
23 environmental and workers' safety laws and regulations.
- 24 B. VOC content of materials shall not exceed the limits per Environmental
25 Protection Agency National Volatile Organic Compound Emission Standards
26 for Architectural Coatings (40CFR59).

27 **1.8 TRANSPORTATION AND HANDLING**

- 28 A. Deliver all materials to site in original, unopened containers, bearing the
29 following information:
30 1. Name of product
31 2. Name of Manufacturer
32 3. Date of manufacture
33 4. Lot or batch number
34 5. UL labels
- 35 B. Store materials under cover and protected from the weather, within the
36 Manufacturer's recommended temperature ranges.
- 37 C. Replace packages or materials showing any signs of damage with new
38 material at no additional cost to the Owner.

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- 1 D. At not time shall the weight of the stored material placed on a slab area
2 exceed 30 PSF or 2,000 lbs. over 20 square inches.

3 **1.9 WARRANTY**

- 4 A. Provide to the Owner a "Joint and Several" Warranty by the Installer and
5 Manufacturer that the joint sealant system will be free of defects, water
6 penetration, and chemical damage related to design, workmanship, or
7 material deficiency, consisting of, but not limited to:
8 1. Surface crazing or other weathering deficiency.
9 2. Tear failure resulting from anticipated movement.
10 3. Debonding from the substrate or delaminating between layers.
11 4. Defective installation.
- 12 B. The Warranty shall be "Joint and Several" in which the Installer and
13 Manufacturer will jointly and severally warrant and provide at no charge to the
14 Owner materials and labor needed to properly repair or replace the product
15 and replace parking stripes within the duration of the Warranty. In the event
16 of either party's non-performance, the full burden and responsibility for any
17 Warranty repair shall fall upon the remaining party.
- 18 C. Vandalism, abrasive maintenance equipment, and construction traffic are not
19 normal traffic use and are exempt from the Warranty.

20 **1.10 Warranty Duration**

- 21 A. The bid price shall include a five (5) year Warranty commencing with the date
22 of project acceptance in accordance with Division 1.
- 23 B. A single Warranty commencement date will apply to all waterproofing.

24 **PART 2 PRODUCTS**

25 **2.1 JOINT SEALANT SYSTEM - POLYURETHANE**

- 26 A. Vertical Joint Sealants: Multi-component, non-sag unmodified polyurethane
27 sealant, match color of adjacent materials, containing no coal tar, asphalt, or
28 other adulterants and conforming to ASTM C 920, Type M, Grade NS, Class
29 25, use NT and Federal Specification TT-S-00227E , Type II, Class A.
30 1. Approved Vertical Joint Sealants are:
31 a. ISO-FLEX 881, LymTal International, Inc., Orion, MI.
32 b. Dynatrol II, Pecora Corp., Harleysville, PA.
33 c. Sikaflex - 2c NS, Sika Corp., Lyndhurst, NJ.
34 d. Sonolastic NP2, Sonneborn Building Products, BASF, Shakopee,
35 MN.
36 e. Dymeric 240 or Dymeric 511, Tremco Inc., Cleveland, OH.
37 f. Vulkem 922, Tremco, Inc., Cleveland, OH.
38 g. High Durometer Joint Sealant

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- 1 B. General Purpose Exterior Sealant: Polyurethane; ASTM C 920 Grade NS,
2 Class 25, Uses M, F, and A; single component.
3 1. Color: color as selected.
4 2. Manufacturers:
5 a. Bostik; Product Chem-Calk 900; (800) 523-2678; www.bostik.com.
6 b. Pecora Corporation; Product Dynatrol I: (800) 523-6688;
7 www.pecora.com.
8 c. Sonneborn Building Products, ChemRex, Inc.; Product Sonolac:
9 (800) 433-9517; www.chemrex.com
10 d. Tremco, Inc; Product Dymonic: (800) 321-7906;
11 www.tremcosealants.com.
12 e. Adeka
13 3. Applications: Use for:
14 a. Control, expansion, and soft joints in masonry.
15 b. Joints between concrete and other materials.
16 c. Joints between metal frames and other materials.
17 d. Joints at window and door perimeter meeting dissimilar material.
18 e. Other exterior joints for which no other sealant is indicated.

19 **2.2 BACKER ROD**

- 20 A. Backer rod diameter shall be closed cell type of size recommended by
21 Manufacturer for joint sizes indicated on Drawings.
- 22 B. Backer rod shall be extruded round, closed cell, low-density polyethylene or
23 polyolefin foam material with a skin-like outer texture.
- 24 C. Approved closed cell backer rods are:
25 1. Mile High Foam Backer Rod, Backer Rod Manufacturing, Inc., Denver,
26 CO.
27 2. ITP Standard Backer Rod Insulation, Industrial Thermo Polymers Limited,
28 Buffalo, NY.
29 3. HBR, Nomaco, Inc., Zebulon, NC.
30 4. Sonolastic Closed-Cell Backer-Rod, Sonneborn Building Products, BASF,
31 Shakopee, MN.

32 **2.3 PREFORMED EXPANDING FOAM SEALANT**

- 33 A. Expanding Foam Sealant shall be as recommended by Manufacturer for joint
34 sizes as indicated on Drawings.
- 35 B. Expanding Foam Sealant to consist of laminations of acrylic impregnated
36 expanding foam sealant and closed cell foam with one sided mounting
37 adhesive.
- 38 C. Expanding Foam Sealants are to provide water tight secondary seal behind
39 conventionally installed sealant and backer rod or with sealant applied directly
40 to the foam sealant as a backer.
- 41 D. Approved Preferred Expanding Foam Sealants are:
42 1. Backerseal (Greyflex), Emseal Joint Systems, Ltd., Westborough, MA.

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1 2. Or Approved Equivalent.

2 **PART 3 EXECUTION**

3

4 **3.1 INSPECTION**

5 A. Inspect surfaces to receive the work and report in any deficiencies in the
6 surface which render it unsuitable for proper execution of this work. Do not
7 proceed with work until unsatisfactory conditions have been corrected in an
8 acceptable manner. Commencement of work implies acceptance of related
9 work.

10 **3.2 GENERAL**

11 A. Coordinate and verify that related work meets the following requirements.

12 B. Systems selected for use are compatible with each other.

13 C. Installer shall take necessary precautions against injury to personnel or
14 adjacent building occupants during installation of joint sealants. Installer
15 personnel shall use protective equipment and area shall be well vented to the
16 outside.

17 **3.3 PREPARATION**

18 A. Grind joint edges smooth and straight prior to installation.

19 B. All surfaces that are to receive joint sealant shall be dry and thoroughly
20 cleaned by mechanical means of all loose particles, existing joint sealant,
21 laitance, dirt, dust, oil, grease or other foreign matter.

22 C. Mechanical methods, such as grinding or sandblasting, shall be used to clean
23 joint surfaces to sound, virgin concrete.

24 D. Check preparation of substrate to ensure adhesion of joint sealant.

25 E. Correct unsatisfactory conditions in a manner acceptable to the Manufacturer
26 and DSF Construction Representative before installation of joint sealant
27 system.

28 F. Rout cracks with a grinding tool to produce the profile indicated on the
29 drawings. The crack must be centered in the routed notch.

30 **3.4 INSTALLATION/APPLICATION**

31 A. Do all work in strict accordance with Manufacturer's written instructions and
32 specifications and as indicated on the Drawings.

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- 1 B. Do not apply joint sealant system until the concrete and masonry has been air
2 dried at temperatures at or above 40 degrees F. for at least 28 days after the
3 curing period specified for the material.
- 4 C. Install bond breaker or backer rod according to Drawings.
- 5 D. Prime all joints.
- 6 E. Completely fill the joint without sagging or smearing onto adjacent surfaces.
- 7 F. In areas not receiving deck coating, fill horizontal joints until slightly recessed
8 to avoid direct contact with wheel traffic.
- 9 G. Cease installation of sealants under adverse weather conditions, or when
10 temperatures are below 40 degrees F or below or above Manufacturer's
11 recommended limitations.
- 12 H. Protect joint sealant as required until sealant is fully cured.

13 **3.5 CLEANUP**

- 14 A. Remove all excess primer, sealant, and masking materials from the structure.

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END OF SECTION

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SECTION 31 20 00
EARTHMOVING

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. PART 1 - General
 - 1. Summary
 - 2. Related Work
 - 3. Reference Standards
 - 4. Submittals
 - 5. Quality Assurance
 - 6. Quantities
 - 7. Record Drawings

- B. PART 2 - Materials
 - 1. Earth Fill
 - 2. Granular Fill

- C. PART 3 - Execution
 - 1. Topsoil Removal
 - 2. Excavation
 - 3. Placing and Compacting Materials
 - 4. Cleanup

1.2 SUMMARY

- A. The work under this section shall consist of providing all work, materials, labor, equipment, and supervision necessary to complete earthwork required in these specifications and on the drawings.

1.3 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this Section.

1.4 REFERENCE STANDARDS

- A. Applicable provisions of Division 1 shall govern all work under this section.

- B. American Society for Testing and Materials (ASTM):
 - 1. D422-63(1998) Standard Test Method for Particle Size Analysis of Soils
 - 2. D4318-00 Liquid Limit, Plastic Limit and Plasticity Index of Soils
 - 3. D4253 – 00 Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
 - 4. D698-00a Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort

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- 1 C. Contractor shall be solely responsible for balancing site materials. If
2 onsite excavation and borrow operations do not provide enough suitable
3 material for fill areas, Contractor shall coordinate and pay for excavation,
4 transport and placement of imported material meeting the specifications
5 of the contract documents. If excavation results in excess materials,
6 Contractor shall coordinate and pay for loading, transport and offsite
7 disposal of excess materials.
- 8 D. If contractor finds the geotechnical information or existing or proposed
9 elevations shown on the plans to be erroneous, he shall notify the
10 Engineer immediately.

11 **1.8 RECORD DRAWINGS**

- 12 A. Maintain as-built drawings showing actual locations of utilities and other
13 features encountered, modifications to proposed grades and site features,
14 and other deviations from the original design.

15 **PART 2 PRODUCTS**

16 **2.1 EARTH FILL**

- 17 A. Clean material consisting of inorganic soil or a mixture of inorganic soil
18 and rock, stone or gravel. The material shall be free of topsoil, sod,
19 stumps, wood, asphalt, concrete, debris, and other deleterious material.
20 The maximum dimension of any material shall not exceed 2" in any
21 direction.

22 **2.2 GRANULAR FILL**

- 23 A. Clean material meeting the requirements of "Grade 1 or Grade 2 Granular
24 Backfill" as defined in Section 209.2.1 of the Standard Specifications for
25 Highway Construction.

26 **PART 3 EXECUTION**

27 **3.1 TOPSOIL REMOVAL**

- 28 A. Coordinate topsoil stockpile locations with Owner working onsite.
- 29 B. Remove all topsoil from proposed locations of buildings, structures,
30 roads, walks and other paved areas. Also, remove topsoil from proposed
31 lawn or turf areas where the proposed elevation exceeds the existing
32 elevation by 1' or greater, or where fill will be placed.
- 33 C. Do not excavate, grade or work topsoil in frozen or muddy condition.
- 34 D. Minimize compaction of topsoil to the extent possible.

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1 **3.2 EXCAVATION**

- 2 A. Excavate to the elevations shown on the plans; allow for placement of fill,
3 base course, pavements, and topsoil as required by the plans and other
4 Contract Documents.
- 5 B. Excavate areas to provide positive drainage whenever possible.
- 6 C. Remove excess and spoil material from the site in a timely fashion.
- 7 D. Do not excavate below design grades without prior authorization by the
8 Engineer.

9 **3.3 PLACING AND COMPACTING MATERIAL**

- 10 A. Place material in fill areas only after all topsoil has been removed.
- 11 B. Place fill to the elevations shown on plans; allow for placement of base
12 course, pavements and topsoil as required by the plans and other
13 Contract Documents.
- 14 C. Fill type shall be as indicated on Table 31 20 00 -2, or as shown on the
15 plans.
- 16 D. Do not place fill on areas consisting of organic soil, debris or other soft
17 and yielding material.
- 18 E. Do not place fill on frozen or muddy areas.
- 19 F. Moisture condition subgrade as necessary to provide a firm surface prior
20 to placing fill.
- 21 G. Place fill in horizontal lifts having thickness as shown on Table 31 20 00 -
22 2.
- 23 H. Compact fill material as required by Table 31 20 00 -2 for given use.
- 24 I. Moisture condition fill material as necessary to achieve density required
25 for given use.
- 26 J. Place and compact backfill so as to minimize settlement and avoid
27 damage to walls, utility lines and other work in place.
- 28 K. It is the responsibility of the Contractor to provide all necessary
29 compaction equipment and other grading equipment that may be required
30 to obtain the specified compaction. Compaction of controlled backfill by
31 travel of grading equipment will not be considered adequate for uniform
32 compaction. Hand guided vibratory or tamping compactors will be
33 required whenever controlled backfill may be placed adjacent to walls,
34 footings, columns or in confined areas.

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- L. Accommodate and assist geotechnical consulting engineer in collecting and testing soil samples.

Location	Required Material	Maximum Compacted Lift Thickness	Minimum Proctor Compaction	Minimum Relative Density ^(a)
Footing, Foundation and Structure Backfill	Structural Fill	8"	95% Modified	70%
Areas within 10' of Existing or Proposed Building or Structure Footing or Slab	Granular Fill	12"	90% Modified	60%
Areas Beneath Existing or Proposed Pavement (Roads, Drives, Walks)	Granular Fill	8"	90% Modified	60%
Turf Areas	Earth Fill	10"	85 % Modified	50%

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(a) Minimum relative density as determined by ASTM D-4253-00 for coarse-grained soils with less than 15% by mass passing the No. 200 sieve. Applicable only when minimum proctor compaction cannot be achieved.

Table 31 20 00 -2

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3.4 CLEAN UP

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- A. Level off all waste disposal areas and clean up all areas used for the storage of materials or the temporary deposit of excavated earth. Remove all surplus material, tools and equipment.
- B. Thoroughly clean all drainage ways, roads, parking lots, sidewalks, and paved surfaces and remove and dispose of all debris and mud.

END OF SECTION

**SECTION 31 66 15
HELICAL PIERS**

PART 1 –GENERAL

1.1 SECTION INCLUDES

- A. Part 1 General
 - 1. Summary
 - 2. Related Sections
 - 3. Referenced Codes and Standards
 - 4. Definitions
 - 5. Submittals
 - 6. Qualifications
 - 7. Shipping, Storage, and Handling
- B. Part 2 Products
 - 1. Helical Pier and Bracket Assemblies
- C. Part 3 Execution
 - 1. Examination
 - 2. Installation Equipment
 - 3. Installation Procedures
 - 4. Termination Criteria
 - 5. Allowable Tolerances
 - 6. Quality Assurance

1.2 SUMMARY

- A. The work covered by this section includes the furnishing and installing of all Helical Piers and Bracket Assemblies shown on the Contract Drawings and this specification. The work shall include all labor, materials, equipment, and incidentals necessary to complete the work. Helical Piers shall be load tested if required on the Drawings.

1.3 RELATED SECTIONS

- A. Section 31 23 33 Trenching, Backfilling and Compacting
- B. Applicable provisions of Division 1 shall govern all work under this section

1.4 REFERENCED CODES AND STANDARDS

- A. This specification is based on nationally recognized codes and standards including the references listed below. In case of a conflict between the reference and this specification, this specification shall govern.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM A36/A36M Structural Steel

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2. ASTM A123-02 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 3. ASTM A153-05 Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware
 4. ASTM A500 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 5. ASTM D1143 Standard Test Method for Piles Under Static Axial Compressive Load
 6. ASTM D3689 Standard Test Method for Individual Piles Under Static Axial Tensile Load
 7. ASTM D3966-90(1995) Standard Test Method for Piles Under Lateral Loads
- C. American Welding Society (AWS):
1. AWS D1.1 Structural Welding Code – Steel
 2. AWS D1.2 Structural Welding Code – Reinforcing Steel
- D. American Society of Mechanical Engineers (ASME):
1. ANSI/ASME Standard B18.2.1-1996, Square and Hex Bolts and Screws, Inch Series
- E. American Society of Civil Engineers (ASCE):
1. ASCE 20-96 Standard Guidelines for the Design and Installation of Pile Foundations
- F. Occupational Safety and Health Administration (OSHA):
1. Excavation Safety Guidelines

1.5 DEFINITIONS

- A. Helical Pier: Manufactured galvanized steel foundation with one or more helical bearing plates that is rotated into the ground to support structures.
- B. Engineer: Individual or firm retained by Owner to produce, the Drawings and this specification.
- C. Maximum Plausible Bearing Capacity: Ultimate bearing capacity of the strongest layer within a bearing stratum divided by a factor of safety of 2.0. When using field standard penetration resistance test (SPT), ultimate bearing capacity of the strongest layer shall be determined from the average SPT blow count plus one standard deviation for the population of test data within the bearing stratum.
- D. Lead Section: The first section of a Helical Pier to enter the ground. Lead Sections consist of a central shaft with a tapered end and one or more helical bearing plates affixed to the shaft.
- E. Extension Section: Helical Pier sections that follow the Lead Section into the ground and extend the Helical Lead to the appropriate depth. Extension Sections consist of a central shaft and may have helical bearing plates affixed to the shaft.

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- F. Augering: Rotation of the shaft with little or no advancement. It can occur when the helical bearing plates pass from a relatively soft material into a comparatively hard material. Augering can also result from insufficient crowd or downward pressure during installation. In some cases, augering may be (temporarily) necessary in order to grind through an obstruction.
- G. Safety Factor: The ratio of the ultimate compression resistance to the nominal load used for the design of any helical pile component or interface (Allowable Stress Design).
- H. Bearing Stratum: Any soil layer which provides a significant portion of the axial load capacity of an installed helical pile by providing resistance to one or more of the pile's helical plates.
- I. Helical (Helix) Plate: Generally round steel plate formed into a helical spiral and welded to the central steel shaft. When rotated in the ground, the helix shape provides thrust along the pile's longitudinal axis thus aiding in pile installation. The plate transfers axial load to the soil through bearing.
- J. Geotechnical Capacity (Ultimate Soil Capacity): The maximum load that can be resisted through bearing of helix plates in the soil which they are embedded

1.6 SUBMITTALS

- A. In accordance with Division 1 Submittal procedures, the Contractor shall prepare and submit to the Engineer for review and approval, Shop Drawings sealed by a registered professional engineer in the State of Wisconsin for the Helical Piers intended for use on the project. The Shop Drawings shall include the following:
 - 1. Plan showing the number, location, required capacity, and provided capacity of all helical piers to be provided.
 - 2. Product designations and data for all helix, extension sections, and ancillary products to be supplied at each helical pier location.
 - 3. Planned installation depth and the number of lead and extension sections
 - 4. Preliminary helical configuration (number and diameter of helical bearing plates)
 - 5. Manufacturer's recommended capacity to installation torque ratio
 - 6. Minimum final installation torque(s)
 - 7. Product identification numbers and designations for all Bracket Assemblies and number and size of connection bolts or concrete reinforcing steel detail
 - 8. Corrosion protection coating on Helical Piers and Bracket Assemblies
- B. The Contractor shall submit to the Engineer design calculations showing Helical Pier design allowable capacities and calculated final installation torque. Calculations shall include considerations for downdrag (if any), corrosion, expansive soils (if any), minimum installation depth, buckling, soil bearing and pullout capacity.

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- C. The Contractor shall submit to the Engineer calibration information certified by an independent testing agency for the torque measurement device to be used on the project. Calibration information shall have been obtained within the year of the date submitted. Calibration information shall include, but is not limited to, the name of the testing agency, identification number or serial number of the device calibrated and the date of calibration.
- D. Work shall not begin until all the submittals have been received and approved by the Engineer. All costs associated with incomplete or unacceptable submittals shall be the responsibility of the Contractor.

1.7 QUALIFICATIONS

- A. Helical Pier Manufacturer Qualifications
 - 1. In possession of current ICC-ES/BOCA/ICBO product evaluation report or complete description of product testing and manufacturing quality assurance programs used to assess and maintain product quality
 - 2. Minimum of least five (5) years experience in the design and manufacture of Helical Piers and Helical Anchors
- B. Helical Pier Installer Qualifications
 - 1. Installation shall be completed by a contractor who is certificated by the manufacturer to install the manufacturer's material.
OR
 - 2. Installer shall provide proof of installations of similar nature, complexity or dollar cost for a minimum of 5 projects completed in the last 5 years. Installer shall provided names and phone numbers of those project owner's representatives who can verify the installing contractor's participation in those projects. Installer shall be approved by the helical pier manufacturer.
- C. Helical Pier Designer Qualifications
 - 1. Registration as a Professional Engineer licensed to practice in the State of Wisconsin.

1.8 SHIPPING, STORAGE, AND HANDLING

- A. All Helical Pier and Bracket Assemblies shall be free of structural defects and protected from damage. Helical Piers and Bracket Assemblies should be stored on wood pallets or supports to keep them from contacting the ground. Damage to materials shall be cause for rejection.

PART 2 PRODUCTS

2.1 HELICAL PIERS AND BRACKET ASSEMBLES

- A. Helical pierd shall be designed by the Contractor to support the nominal compressive load(s) as shown on the project plans. The overall length, helix configuration and minimum torsional resistance of a helical pier shall be such that the required geotechnical capacity is developed by the helix plate(s) in an

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appropriate bearing stratum. The pier design shall take into account such pier spacing, soil stratification, corrosion, and strain compatibility issues as are present for the project.

- B. All steel structure pier components shall be designed within the limits provided by the American Institute of Steel Construction (AISC). Either Allowable Stress Design (ASD) or Load & Resistance Factor Design (LRFD) are acceptable methods of analysis. Product testing in accordance with ICC-ES Acceptance Criteria 358 may also be considered as an acceptable means of establishing allowable system capacities.
- C. Except where noted otherwise on the project plans, all piers shall be installed to provide a minimum factor of safety against ultimate bearing resistance of at least 2.00. Piers must satisfy the deflection criteria stated on the plans or drawings.
- D. A geotechnical report and soil boring logs taken in the vicinity of the Helical Pier installation is provided as part of the Contract Documents. The clearance requirements of the drilling rig necessitated that the borings were located several feet away from the existing building. There is likely granular backfill from the ozone contactor building to the North below the existing footings to be supported by Helical piers. The granular backfill is assumed to extend to a depth of 11'-0" below the current grade elevation at the helical pier installation locations and it's consolidation is the likely cause of the foundation settlement that has been occurring. This granular fill material does not appear in the soil borings logs because the actual boring locations outside of the granular backfill area. The helical piers shall be designed for all helices to be developed in the undistributed soils below the granular fill. Helical Pier Contractor may conduct additional geotechnical investigation and testing at its discretion at no additional cost to contract.
- E. All Helical Piers components shall be protected from corrosion by hot-dip galvanizing per ASTM A123 or A153, as applicable.
- F. Helical Piers shall be fitted with a repair Bracket Assembly rated for the design allowable loads shown on the Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Contractor shall take effort to locate all utilities and structures above and underground in the area of the Work. Contractor is responsible for protection of utilities and structures shown on the Drawings. Additionally, Contractor shall hire a private utility locator to verify all utilities within five (5) feet of a Helical Pier installation.
- B. Contractor shall review drawings, geotechnical report, and soil borings to determine subsurface conditions for sizing and installation of Helical Piers.

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- C. Contractor shall notify Engineer of any condition that would affect proper installation of Helical Piers immediately after the condition is revealed. Contractor shall halt Work until the matter can be resolved upon mutual satisfaction of Contractor, Owner and Engineer.

3.2 INSTALLATION EQUIPMENT

- A. Torque Motor: Helical Piers should be installed with high torque, low speed torque motors, which allow the helical plates to advance with minimal soil disturbance. The torque motor shall be hydraulic power driven with clockwise and counter-clockwise rotation capability. The torque motor shall be adjustable with respect to revolutions per minute during installation. Percussion drilling equipment shall not be permitted. The torque motor shall have torque capacity equal to or greater than the minimum final installation torque required for the project. .
- B. Installation Equipment: The installation equipment shall be capable of applying adequate crowd and torque simultaneously to ensure normal advancement of the Helical Piers. The equipment shall be capable of maintaining proper alignment and position.
- C. Torque Indicator: A torque indicator shall be used to measure installation torque during installation. The torque indicator can be an integral part of the installation equipment or externally mounted in-line with the installation tooling. The torque indicator shall meet requirements set forth by helical pier manufacturer. Torque indicators shall be calibrated prior to start of Work. Torque indicators shall be calibrated either on-site or at an appropriately equipped test facility. Indicators that measure torque as a function of hydraulic pressure shall be calibrated at normal operating temperatures. Torque indicators shall be re-calibrated if, in the opinion of the Engineer, reasonable doubt exists as to the accuracy of the torque measurements.

3.3 INSTALLATION PROCEDURES

- A. The number and size of helical bearing plates shall be determined by the Contractor in order to achieve the required torque and tensile/bearing capacity for the soil conditions at the site. However, the ratio of design allowable capacity to the total area of the helical bearing plates shall not exceed the Maximum Plausible Bearing Capacity of the bearing stratum.
- B. Constant axial force (crowd) shall be applied while rotating Helical Piers into the ground. The crowd applied shall be sufficient to uniformly advance the Helical Pier section. The rate of rotation and magnitude of down pressure shall be adjusted for different soil conditions and depths but shall not be in excess of any maximum limits recommended by the Helical Pier manufacturer.
- C. The torsional strength rating of the Helical Pier shall not be exceeded during installation.

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- D. When the Termination Criteria of a Helical Pier is obtained, the Contractor shall adjust the elevation of the top end of the shaft to the elevation shown on the Drawings or as required. This adjustment may consist of cutting off the top of the shaft and drilling new holes to facilitate installation of Bracket Assemblies to the orientation shown on the Drawings. Or, installation may need to continue until the final elevation and orientation of the pre-drilled bolt hole is in alignment. The Contractor shall not reverse the direction of torque and back out the Helical Pier to achieve final elevation or orientation.
- E. The Contractor shall install Bracket Assemblies as shown on the Drawings.
- F. All Helical Pier components including the shaft and Bracket Assembly shall be isolated from making a direct electrical contact with any concrete reinforcing bars or other non-galvanized metal objects because these contacts may alter corrosion rates.

3.4 TERMINATION CRITERIA

- A. Helical Piers shall be advanced until all of the following criteria are satisfied:
 - 1. Axial capacity is verified by achieving the final installation torque. The final installation torque shall be calculated by the Helical Pier designer using the manufacturer's recommended capacity to torque ratio and a minimum factor of safety of 2.0.
 - 2. Minimum depth is obtained. The minimum depth shall be as shown in the provided calculations, that which corresponds to the planned bearing stratum, or the depth at which the final installation torque is measured, whichever is greater.
- B. If the torsional strength rating of the Helical Pier has been reached, or if the maximum torque of the installation equipment has been reached, or if Augering occurs prior to achieving the minimum depth required, the Contractor shall have the following options:
 - 1. Terminate the installation at the depth obtained subject to the review and acceptance of the Engineer and Owner.
 - 2. Remove the Helical Pier and install a new one with fewer and/or smaller diameter helical bearing plates or with dual cutting edge helical bearing plates. The new helical configuration shall be subject to review and acceptance of the Engineer and Owner. If reinstalling in the same location, the top-most helix of the new Helical Pier shall be terminated at least (3) feet beyond the terminating depth of the original Helical Pier.
- C. If the final installation torque is not achieved within the Planned Length, the Contractor shall have the following options:
 - 1. Until the Maximum Length is achieved (if any), install the Helical Pier or Helical Anchor deeper using additional Extension Sections.
 - 2. Remove the Helical Pier and install a new one with additional and/or larger diameter helical bearing plates.
 - 3. Decrease the rated load capacity of the Helical Pier and install additional Helical Piers. The rated capacity and additional unit location shall be subject to the review and acceptance of the Engineer and Owner.

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- D. If the Helical Pier is refused or deflected by a subsurface obstruction, the contractor shall have the following options:
1. If the obstruction is shallow, remove the Helical Pier and remove the obstruction by surface excavation. Backfill and compact the resulting excavation, and reinstall the Helical Pier.
 2. Remove the Helical Pier and relocate 1 foot to either side of the installation location subject to the review and acceptance of Engineer and Owner.

3.5 ALLOWABLE TOLERANCES

- A. Helical Piers shall be installed as close to the specified installation and orientation angles as possible. Tolerance for departure from installation and orientation angles shall be +/- 5 degrees.
- B. Helical Piers and Bracket Assemblies shall be installed at the locations and to the elevations shown on the Drawings. Tolerances for Bracket Assembly placement shall be +/- 1 inch in both directions perpendicular to the shaft and +1 to -1/2 inch in a direction parallel with the shaft unless otherwise specified.

3.6 QUALITY ASSURANCE

- A. The Contractor shall provide the Engineer and Owner copies of installation records within 48 hours after each installation is completed. These installation records shall include, but are not limited to, the following information:
1. Name of Contractor's supervisor during installation
 2. Date and time of installation
 3. Location of Helical Pier by grid location, diagram, or assigned identification number
 4. Type and configuration of Lead and Extension Section with length of shaft and number and size of helical bearing plates
 5. Total length installed
 6. Final elevation of top of shaft and cut-off length, if any
 7. Final plumbness or inclination of shaft
 8. Final installation torque
 9. Comments pertaining to interruptions, obstructions, or other relevant information
 10. Design allowable capacity

END OF SECTION

EXHIBIT “B”

GEOTECHNICAL EXPLORATION
REPORT



midwest engineering services, inc.

geotechnical environmental materials engineers

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June 24, 2011

Ms. Rachel Domann, P.E., S.E.
Bloom Companies, LLC
10501 W. Research Drive, Suite 100
Milwaukee, Wisconsin 53226

**SUBJECT: Subsurface Exploration and Foundation Evaluation
Proposed Building Foundation Underpinning
Howard Avenue Purification Plant - Ozone Building
Milwaukee, Wisconsin
MES Project No. 7-113082**

Dear Ms. Domann,

The subsurface exploration and foundation evaluation for the referenced project has been completed. Two (2) copies of the report are included herein.

After you have had the opportunity of reading the report, please call at any time with any questions or comments you may have. Midwest Engineering Services, Inc. appreciates the opportunity to be of service on this project, and looks forward to continuing as your geotechnical consultant during the design and construction phases, as well as on your upcoming projects.

Very truly yours,

MIDWEST ENGINEERING SERVICES, INC.

A handwritten signature in black ink that reads "Ted A. Cera".

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

A handwritten signature in black ink that reads "James M. Becco".

James M. Becco, P.E.
Region Manager

SUBSURFACE EXPLORATION AND FOUNDATION EVALUATION

Proposed Building Foundation Underpinning
Howard Avenue Purification Plant - Ozone Building
Milwaukee, Wisconsin

Prepared for
Bloom Companies, LLC
10501 W. Research Drive, Suite 100
Milwaukee, Wisconsin 53226

June 24, 2011

MES Project No. 7-113082

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INTRODUCTION

General

This report presents the results of the subsurface exploration and foundation evaluation for the proposed Building Foundation Underpinning Project at the Howard Avenue Purification Plant, in Milwaukee, Wisconsin. The work was performed for Bloom Companies, LLC, at the request of Ms. Rachel Domann.

Purpose

The purpose of this study was to evaluate the subsurface conditions at specific boring locations on the site, and to establish parameters for use by the design engineers in preparing the foundation repair design for the proposed project.

Scope

The scope of services included a site reconnaissance, the subsurface exploration, a determination of soil characteristics by field and laboratory testing, and an evaluation and analysis of the data obtained. The scope of the field work, including the number, depth, and locations of the borings was determined by the client.

Authorization

The description of services and authorization to perform this subsurface exploration and analysis were in the form of a signed agreement between Bloom Companies, LLC (Engineer) and Midwest Engineering Services, Inc. (Consultant) dated May 24, 2011. This agreement included a copy of MES Proposal No. 7-11013, dated January 21, 2011, as Attachments A and C. This report has been prepared on behalf of, and exclusively for the use of Bloom Companies, LLC. The information contained in this report may not be relied upon by any other parties without the express written consent of MES, and acceptance by such parties of MES' General Conditions.

SITE AND PROJECT DESCRIPTION

Site Features

The project site is located at the Howard Avenue Purification Plant, which is on the south side of Howard Avenue and on the west side of 6th Street, in Milwaukee, Wisconsin. The specific project area is along the central portion of the west wall line of the Ozone Building. The Ozone Building consists of a single story brick faced structure.

Driveways, sidewalks, and grass covered landscape areas are adjacent to the building within the project area.

The topography of the general area is flat, and the project site is also relatively flat. No elevation difference was present between the boring locations within the limits of the project area. At the time of the exploration, the surface of the site was firm and the drill rig experienced no difficulty in moving around.

Project Description

From the information provided by client, it is understood that the central portion of the west wall of the Ozone Building, which is founded on a frost depth strip footing, has experienced some distress in the form of settlement. Based on previously collected subsurface information provided to MES by the client, fill soils, which may not have been compacted during placement, and may not have been placed under engineering controlled conditions, are present in the general area of the project. It is possible that the foundations (or portions of) bear upon the fill soils.

The proposed project will consist of underpinning the foundation of the Ozone structure with helical piers and related repairs. Structural loads were not provided, but are estimated to be moderate in magnitude.

EXPLORATION AND LABORATORY PROCEDURES

Scope Summary

The field and laboratory data utilized in the evaluation and analysis of the subsurface materials was obtained by drilling exploratory test borings, securing soil samples by the split-spoon sampling method, and subjecting the samples to laboratory testing.

Field Exploration

Two (2) soil test borings were drilled for this project to a depth of 26.5 feet below the existing ground surface. The number, depths, and locations of the borings were provided by the client. The borings were located in the field by the drill crew utilizing conventional taping procedures referenced to existing site features and apparent property lines. They are considered accurate to within a few feet.

The surface elevations shown on the logs were determined by the drill crew utilizing conventional leveling techniques. The floor of the building at the overhead door south of boring B-2, was utilized as a benchmark, with a temporary reference elevation of EL. 100.0. The elevations are considered accurate to within about 1 foot.

The soil test borings were performed with a All Terrain Vehicle (ATV) mounted rotary drilling rig utilizing continuous flight hollow stem augers to advance the holes. Representative samples were obtained by the Standard Penetration Test (SPT) method in general accordance with ASTM D-1586 procedures at 2.5 foot intervals to 15 feet, and then at 5 foot intervals thereafter to the end of the borings. The SPT provides a means of determining the relative density of granular soils and comparative consistency of cohesive soils, thereby providing a method of evaluating the relative strength and compressibility characteristics of the subsoils.

The SPT soil samples were transferred into clean glass jars immediately after retrieval, and returned to the laboratory upon completion of the field operations. Samples will be discarded unless other instructions are received. All soil samples were visually classified by a soils engineer in general accordance with the Unified Soil Classification System (ASTM D-2488-75). After completion of the borings, the auger holes were backfilled to the ground surface with bentonite chips.

A copy of the Soil Boring Logs and Boring Location Diagram (Figure 1) are enclosed in the Appendix. The soil stratification shown on the logs represents the approximate soil conditions in the actual boring locations at the time of the exploration. The terms and symbols used on the logs are described in the General Notes found in the Appendix.

Laboratory Physical Testing

Soil samples obtained from the exploration were visually classified in the laboratory, and subjected to testing, which included moisture content determination.

Selected cohesive soil samples were tested in unconfined compression with a controlled strain loading rate and/or with a calibrated hand penetrometer to aid in evaluating the soil strength characteristics. The values of strength tests performed on soil samples obtained by the Standard Penetration Test Method (SPT) are considered approximate, recognizing that the SPT method provides a representative but somewhat disturbed soil sample.

The laboratory testing was performed in general accordance with the respective ASTM methods, as applicable, and the results are shown on the boring logs in the Appendix.

DESCRIPTION OF SUBSURFACE CONDITIONS

General

A description of the subsurface conditions encountered at the test boring locations is shown on the Soil Boring Logs. The lines of demarcation shown on the logs represent approximate boundaries between the various soil classifications. It must be recognized that the soil descriptions are considered representative for the specific test hole location, but that variations may occur between and beyond the sampling intervals and boring locations. Soil depths, topsoil and layer thicknesses, and demarcation lines utilized for preconstruction planning should not be expected to yield exact and final quantities. A summary of the major soil profile components is described in the following paragraphs.

Soil Conditions

The surface materials present at the boring locations consisted of about 6 inches of dark brown sandy and clayey silt topsoil fill. The topsoil fill was generally underlain by fill soils comprised of clayey sand and gravel, silty clay, and sandy gravelly clay to depths of about 7.5 to 10.5 feet (EL. 92.4 to EL. 89.4±). The fill soils were somewhat variable in strength and composition, and exhibited standard penetration resistances (N-values) of 6 to 47 blows per foot, and estimated unconfined compressive strengths of 1.48 to 4.5+ tons per square foot (tsf).

The underlying natural soils were predominantly cohesive, consisting of silty clay with trace sand and gravel extending to the boring termination depths. These cohesive soils were stiff to hard in consistency. Unconfined compressive strengths ranged from 1.0 to 7.83 tsf.

The foregoing discussion of soil conditions on this site represents a generalized soil profile as determined at the test boring locations. A more detailed description and supporting data for each test location can be found on the individual Soil Boring Logs.

Groundwater Observations

Groundwater observations were made during the drilling operations, and in the open boreholes at completion. Groundwater was not encountered in the boreholes at the time of drilling or upon completion.

On the basis of the field observations and the soils relative moisture contents, the groundwater level is judged to be below the depth of the borings at the time of the exploration.

The groundwater observations reported herein are considered approximate. It must be recognized that groundwater levels fluctuate with time due to variations in seasonal precipitation, lateral drainage conditions, and soil permeability characteristics. Longer term monitoring would be required to better evaluate groundwater levels on this site.

EVALUATION AND RECOMMENDATIONS

General Development Considerations

Existing fill soils, which were variable in strength and composition, were encountered to depths ranging from about 7.5 to 10.5 feet (EL. 92.4 to EL. 89.4±) below existing site grades within the borings. It is recommended that the planned helical piers used for underpinning the existing foundation be extended through these materials to bear within the underlying natural silty clay soils. Some difficulty with excavation stability may be experienced.

Site Preparation

The underpinning must be performed in a manner that will prevent the undermining of existing footings where excavations extend near the existing building. The existing foundations must be properly protected to prevent instability and damage to the existing structure.

When the foundation underpinning and repairs are completed, the excavations adjacent to the foundation must be backfilled with properly compacted structural fill. Any new fill should be a clean granular soil, such as those materials meeting the gradations outlined in Section 209 or 305 of the State of Wisconsin Standard Specification for Highway and Structure Construction. Fine-grained soils, such as those with high silt or clay content are difficult to compact in narrow applications, and are not recommended for use. Backfill must be placed in layers of not more than nine (9) inches in thickness, at moisture contents at or near optimum, and be compacted to a minimum density of 95 percent of the maximum dry density as determined by ASTM designation D-698. Silt, clay, topsoil, and wet granular soils are not suitable for reuse as compacted fill in the excavations.

Proper moisture control is essential to reduce the amount of compactive effort necessary to achieve the desired densities. This is especially true of clayey soils, where scarification and aeration may be required to achieve near - optimum moisture levels prior to compaction. A sheepfoot roller is generally required for compaction of clayey soils, whereas a vibratory smooth drum roller is preferred for granular material.

Small hand-operated compactors should be used in confined areas; granular fills are generally more readily compacted to the required densities in such applications.

It is recommended that well-graded granular soils be utilized as backfill along side below grade walls to reduce the potential for consolidation and settlement of the fill. All fill soils must be placed and compacted under engineering controlled conditions, to provide suitable support for overlaying structures and roadways. Additional guidance can be provided at the time of construction in the selection process for trench backfill.

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

Foundation Analysis

It is understood that helical piers will be utilized for the repair of the distressed foundation. Based upon the belief that the existing footing bears at the typical frost depth, the top of a helical pier will be at about 4 feet (EL. 96±) below the ground surface. A three (3) helix pier, with a 12 inch - 10 inch - 8 inch diameter helix array extending from the bottom of the frost depth foundation, to bear within the stiff silty clay soils at depths of about 20 to 25 feet (EL. 79.9 to EL. 74.9±) below existing grade can be designed for allowable capacity of about 7 tons. Larger diameter helices can be utilized to develop a higher capacity, if required. Variable strength and composition fill soils were encountered to depths of about 7.5 to 10.5 feet (EL. 92.4 to EL. 89.4±) below existing grade. Piers must not be terminated within these fill soils. The bearing depth of the top helix should be at least one helix diameter below the fill soils to limit the stress imposed on the soils by the foundation system. The actual depth and capacity must be determined by the contractor during installation. It is recommended that MES personnel monitor the pier installation to verify that adequate penetration and support strength is being achieved.

Since the soils encountered are considered to be moderately corrosive, there is a potential for corrosion of buried metallic structures to occur on this site, and corrosion mitigation measures, may be necessary. As part of preliminary design planning, it is recommended that the test results and subsurface conditions be provided to the manufacturers and/or contractors associated with the helical piers proposed for use on this site with regard to corrosion potential and the necessity of protective measures.

CONSTRUCTION CONSIDERATIONS

Groundwater Control

Because no groundwater was encountered in the upper levels of the boreholes during the exploration, no major difficulties during excavation for the proposed underpinning is anticipated. A gravity drainage system and filtered sump pumps or other conventional dewatering procedures, should be adequate to control perched water if encountered.

Since the foundation materials are subject to softening when exposed to free moisture, every effort should be made to keep excavations dry. Discharge water from roof drains should be directed away from the building, and the site grading direct runoff to catch basins, so that the potential for the softening of the foundation and pavement subgrade soils is reduced.

While little or no groundwater was encountered at the time the borings were drilled, seasonal variations in precipitation and site drainage conditions can cause groundwater to be present in the upper soils.

Excavations and Site Drainage

Sloping, shoring or bracing of the excavation sidewalls will be necessary. Trenching in granular soils may be difficult due to the instability of vertical slopes, and will therefore require a flattening of trench sides, or some other means of protection, to facilitate construction and to protect life and property. The degree of excavation instability problems is dependent upon the depth and length of time that excavations remain open, excavation bank slopes, water levels and the effectiveness of any dewatering systems. All excavation work must be performed in accordance with OSHA and local building code requirements.

Where excavations encroach upon or extend below the groundwater or perched zones and into fine sand, silt, or soft clay, they may become substantially unstable when the confining effect of the overburden is removed. Significant sloughing or caving of sidewalls may also occur. Some overexcavation of softened or loosened soils, in conjunction with the use of a crushed stone working mat, may be necessary to establish a stable bearing subgrade. Additionally, significantly widened excavations may result, or be required to maintain or achieve sidewall stability.

Excavations in close proximity of the existing structure must be performed with caution and utilize methods which will prevent undermining of existing foundations and destabilizing the existing structure. New building foundations should be stepped to match the bearing elevation of the existing building foundations and bear on suitable natural soil or structural fill. The use of a properly designed shoring and bracing or

sheet piling, or underpinning will be necessary if excavation is performed within close proximity of existing foundations. This must be performed by an experienced specialty contractor. If driving or vibratory methods are utilized for the installation of any bracing systems, this must be performed with caution in order to prevent damage to existing buildings, utilities, or other structures. Consideration should be given to the performance of video and/or photographic documentation of the condition of nearby buildings, utilities, and other structures prior to installation.

Since the subgrade soils are generally sensitive to moisture, every effort should be made to provide adequate drainage across the site during construction, and to prevent ponding of runoff on the subgrade. These soils are also subject to erosion caused by runoff, and erosion control measures should be implemented where needed or required by local ordinances.

Seismic Design Considerations

On-site natural soils generally consist of stiff to very stiff cohesive soils and loose to medium dense granular soils. The on-site natural soils are considered to meet the criteria for Site Class D in accordance with Table 1613.5.2 of the International Building Code-2006.

GENERAL COMMENTS

This geotechnical exploration and foundation analysis has been prepared to aid in the evaluation of the foundation conditions on this site. The recommendations presented herein are based on the available soil information and the design information provided. Any changes in the design information or building locations should be brought to the attention of the soils engineer to determine if modifications in the recommendations are required. The final design plans and specifications should also be reviewed by the soils engineer to determine that the recommendations presented herein have been interpreted and implemented as intended.

This geotechnical study has been conducted in a manner consistent with that level of care ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. The findings, recommendations and opinions contained herein have been promulgated in accordance with generally accepted practice in the fields of foundation engineering, soils mechanics, and engineering geology. No other representations, expressed or implied, and no warranty or guarantee is included or intended in this report.

It is recommended that the earthwork and foundation operations be monitored by the soils engineer, to test and evaluate the bearing capacities, and the selection, placement and compaction of controlled fills.

APPENDIX



midwest engineering services, inc.

SOIL BORING LOG: B-1

Project: Proposed Building Foundation Underpinning

Project No.: 7-113082

Location: Howard Avenue Purification Plant - Ozone Building
Milwaukee, WI

Drill Date: June 1, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION		Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
	Ground Surface Elevation: 99.9								
1	98.9	6" Dark brown Clayey SILT, moist (Topsoil Fill)	1-AU	-	-	-	28	-	
2	97.9	Brown Clayey SAND and GRAVEL, moist (Fill)							
3	96.9								
4	95.9	Tan and gray Silty CLAY, trace sand and gravel, moist (Fill)	2-SS	9	1.5	1.48	14	-	
5	94.9								
6	93.9	Tan and gray Silty CLAY with silty sand pockets, trace gravel, very moist (Fill)	3-SS	6	2.25	2.23	15	-	
7	92.9								
8	91.9	Tan and gray mottled Silty CLAY, trace gravel, moist	4-SS	18	-	-	18	-	
9	90.9								
10	89.9	Gray Silty CLAY, trace sand and gravel, very moist	5-SS	10	2.0	-	13	-	
11	88.9								
12	87.9		6-SS	20	3.0	1.73	18	-	
13	86.9								
14	85.9		7-SS	13	3.0	3.71	17	-	
15	84.9								
16	83.9		9-SS	8	3.0	2.72	15	-	
17	82.9								
18	81.9		11-SS	12	1.0	1.15	18	-	
19	80.9								
20	79.9								
21	78.9								
22	77.9								
23	76.9								
24	75.9								
25	74.9								
26	73.9								

End of Boring: 26½'

Notes:

Water Level / Caving Observations:

Water Level During Drilling: None
 Water Level Upon Completion: None
 Caved at Upon Completion: 23 ± ft (El. 76.9±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

 Boring Location Offset:
 Reason for Offset:

Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.



midwest engineering services, inc.

SOIL BORING LOG: B-2

Project: Proposed Building Foundation Underpinning

Project No.: 7-113082

Location: Howard Avenue Purification Plant - Ozone Building
Milwaukee, WI

Drill Date: June 1, 2011

Depth Below Surface/Elev. (ft)	VISUAL SOIL CLASSIFICATION		Sample No.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	PID (ppm)	Remarks
	Ground Surface Elevation: 99.9								
1	98.9	6" Dark brown Sandy SILT, moist (Topsoil Fill)	1-AU	-	-	-	15	-	
2	97.9								
3	96.9	Light brown and gray Sandy, Gravelly CLAY, moist (Fill)	2-SS	12	4.5+	3.13	14	-	
4	95.9								
5	94.9								
6	93.9	Tan and gray mottled Silty CLAY, trace sand and gravel, moist	3-SS	47	-	-	6	-	
7	92.9								
8	91.9	Brown Silty CLAY, trace sand and gravel, moist	4-SS	13	4.5+	4.12	15	-	
9	90.9								
10	89.9								
11	88.9								
12	87.9								
13	86.9	Gray Silty CLAY, trace sand and gravel, moist to very moist	5-SS	20	4.5+	4.95	14	-	
14	85.9								
15	84.9								
16	83.9		6-SS	27	4.5+	7.83	14	-	
17	82.9								
18	81.9		7-SS	26	4.5+	5.15	14	-	
19	80.9								
20	79.9		8-SS	10	1.5	1.32	18	-	
21	78.9								
22	77.9		9-SS	10	1.5	1.48	20	-	
23	76.9								
24	75.9								
25	74.9								
26	73.9		11-SS	8	2.0	1.81	19	-	

End of Boring: 26½'

Notes:

Water Level / Caving Observations:

Water Level During Drilling: None
 Water Level Upon Completion: None
 Caved at Upon Completion: 23 ± ft (El. 76.9±)

Additional Comments:

*N value may be elevated due to cobbles and boulders

 Boring Location Offset:
 Reason for Offset:

Lines of demarcation represent **approximate** boundaries between soil types. Variations may occur between sampling intervals and between boring locations, and the transition may be gradual.

GENERAL NOTES

SAMPLE IDENTIFICATION

Visual soil classifications are made in general accordance with the Unified Soil Classification System on the basis of textural and particle size categorization, and various soil behavior characteristics. Visual classifications should be substantiated by appropriate laboratory testing when a more exact soil identification is required to satisfy specific project applications criteria.

PARTICLE SIZE±

Boulders: 8 inches	Coarse Sand: 2 to 4 mm	Silt: 0.005 to 0.074 mm
Cobbles: 3 to 8 inches	Medium Sand: 0.42 to 2 mm	Clay: -0.005 mm
Gravel: 5 mm to 3 inches	Fine Sand: 0.074 to 0.42 mm	

DRILLING & SAMPLING SYMBOLS

SS: Split-spoon, 2" O.D. by 1 3/8" I.D.	RB: Roller Bit
ST: Shelby Tube, 2" O.D. or 3" O.D., as noted in text	WS: Wash Sample
AU: Auger Sample	BS: Bag Sample
DB: Diamond Bit	HA: Hand Auger
CB: Carbide Bit	

SOIL PROPERTY SYMBOLS

N: Standard penetration count, indicating number of blows of a 140 lb. hammer with a 30 inch drop, required to advance a split-spoon sampler one foot.		
Qu: Unconfined compressive strength, tons per square foot (tsf)		
Qp: Calibrated hand penetrometer resistance, tsf		
MC: Moisture content, %		
LL: Liquid Limit	PL: Plastic Limit	PI: Plasticity Index
Dd: Dry Density, pounds per cubic foot (pcf)		
PID: Photoionization Detector (Hnu meter) volatile vapor level, ppm		

SOIL RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

NON-COHESIVE SOILS		COHESIVE SOILS		
Classifier	N-Value Range	Classifier	Qu Range (tsf)	N-Value Range
very loose	0-3	very soft	0-0.25	0-2
loose	3-7	soft	0.25-0.5	2-5
medium dense	7-15	medium stiff	0.5-1.0	5-10
dense	15-38	stiff	1.0-2.0	10-14
very dense	38+	very stiff	2.0-4.0	14-32
		hard	4.0+	32+

GROUNDWATER



: Approximate Groundwater level at time noted on soil boring log, measured in open borehole unless otherwise noted. Groundwater levels often vary with time, and are affected by soil permeability characteristics, weather conditions, & lateral drainage conditions.