City of Milwaukee

Milwaukee Water Works

Safe, Abundant Drinking Water.

City of Milwaukee
Department of Public Works
Milwaukee Water Works

Specifications for

Linnwood Purification Plant

WP-318: South Filtered Water Reservoir Roof

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GENERAL REQUIREMENTS

PART 1 DEPARTMENT OF PUBLIC WORKS - GENERAL SPECIFICATIONS
(NOTE: The Department of Public Works General Specifications applies to all contracts. These specifications are in a separate booklet.)

PART 2 SPECIFIC OFFICIAL NOTICE AND GENERAL OFFICIAL NOTICE
The Specific Official Notice as it appears in The Daily Reporter and General Official Notice are a part of these contract documents.

PART 3 SPECIFICATIONS

WP-318: SOUTH FILTERED WATER RESERVOIR ROOF

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JOB REQUIREMENTS

WP-318 SOUTH FILTERED WATER RESERVOIR ROOF

JR-1 FORM OF BID: Contractor shall submit a lump sum bid for furnishing the complete job in accordance with plans and specifications.

The Contractor shall submit the unit prices and the estimated quantities that were used in arriving at the Base Bid for all of the items listed in the bid documents. The unit prices and estimated quantities will be used as a basis for additions to or deductions from work required under the contract.

JR-2 JOB LOCATION: Linnwood Purification Plant, 3000 N. Lincoln Memorial Drive, Milwaukee, WI 53211.

JR-3 GENERAL DESCRIPTION OF WORK: The work to be performed under this contract consists of the furnishing of all equipment, labor, supervision, materials and appurtenances for and in connection with the following project as shown on the Contract Drawings and further specified herein. The Contractor shall ensure that all equipment installed under this contract is complete and operational before being put into service.

SOUTH FILTERED WATER RESERVOIR ROOF

- Interior "dry" inspection of the Linnwood South Clearwell, South Filtered Water Reservoir, the clear water tunnel between them, and the South Reservoir Effluent tunnel downstream from the filtered water reservoir to the South Metering Manhole. Make repairs as necessary.

- Replacement of the Linnwood South Filtered Water Reservoir roofing system with a sloped waterproofing membrane roofing system that will satisfy the requirements of the Wisconsin Department of Natural Resources (WIDNR).

JR-4 CONTRACT DRAWINGS: The contract drawings upon which the proposal is to be based are listed hereunder:

Contract Drawing No.	Title
WP-318-01	South Filtered Water Reservoir Roof Location Map – Drawing Index
WP-318-02	South Filtered Water Reservoir Roof Site Plan

WP-318-03	South Filtered Water Reservoir Roof Sections and Details
WP-318-04	South Filtered Water Reservoir Roof Details and Sewer Lateral Profiles

JR-5 REFERENCE DRAWINGS: The following reference drawings are the original construction drawings. These are included here for general information only. The drawings are assumed to be accurate; however, the CONTRACTOR is responsible for field verification of any and all dimensions essential to the work, prior to the placement of equipment orders. Note: Reference Drawings may refer to Drawing No. WP-15-4 - a drawing which is not available for viewing.

Reference Drawing No.	Title
WP-9-13	Water Purification Plant S. Filtered Water Reservoir Top & Bottom Slab Plan
WP-9-14	Water Purification Plant Filtered Water Reservoirs Top Slab Details
WP-9-15	Water Purification Plant Filtered Water Reservoirs Bottom Slab Details
WP-9-16	Water Purification Plant Filtered Water Reservoirs Bar Details & Joints
WP-9-17	Water Purification Plant Filtered Water Reservoirs Gate, Manholes & Ladders
WP-14-1	Water Purification Plant Manhole Frames & Covers Location Plan & Types B & D
WP-14-2	Water Purification Plant Manhole Frames & Covers Details of Type A
WP-15-5	Water Purification Plant Clear Wells and Filters Typical Sections

WP-15-6	Water Purification Plant Clear Wells and Filters Special Sections
WP-15-14	Water Purification Plant Clear Wells and Filters Clear Well Floor Slab – Typical Details
WP-15-15	Water Purification Plant Clear Wells and Filters Clear Well Floor Slab – Special Details
WP-15-16	Water Purification Plant Clear Wells and Filters Clear Water Tunnels and Floor Slab Details
WP-15-17	Water Purification Plant Clear Wells and Filters Columns and Column Footings
WP-37-3	Water Purification Plant Development of Grounds Profiles
WP-44-4	Water Purification Plant Underground Lines 60” Wash Water Pipe – Plan and Profiles
WP-44-9	Water Purification Plant Underground Lines Sprinkling System - Plan
WP-44-12	Water Purification Plant Underground Lines Sub-soil Drainage – Plan and Details
WP-45-1	Water Purification Plant Filling for Reservoirs & Basins General Plan
WP-45-2	Water Purification Plant Filling for Reservoirs & Basins Sections

WP-72-1	Water Purification Plant Improvement of Grounds Sewer Extension – Southwest Quarter
WP-79-1	Water Purification Plant Improvement of Grounds Concrete Curb – Southwest Quarter
WP-127-1	Linnwood Purification Plant Site Plan
WP-235-7	Linnwood Purification Plant Ozonation Facilities Project Sitework – General Layout
WP-235-14	Linnwood Purification Plant Ozonation Facilities Project Sitework – Effluent Meter Manholes
WP-235-54	Linnwood Purification Plant Ozonation Facilities Project Existing Facilities Improvements South Reservoir Plan, Sections & Details
WPSEWERS1	Linnwood Purification Plant General Layout – Sewer Plan

JR-6 PRE-BID MEETING: A **MANDATORY** Pre-Bid Meeting is scheduled for **TUESDAY, MARCH 25, 2014 at 10:00 AM** in the Linnwood Purification Plant Conference Room; 3000 North Lincoln Memorial Drive, Milwaukee, WI 53211. 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. **All attendees are required to e-mail anthony.supinski@milwaukee.gov and philip.greuel@milwaukee.gov at least 24 hours in advance of the Pre-Bid Meeting to be placed on the visitor list for access to the Linnwood Purification Plant.**

Site Visit: A site visit will take place at the conclusion of the **MANDATORY** Pre-Bid Meeting.

JR-7 PRE CONSTRUCTION MEETING: Within **ten (10) business days** after Notice to Proceed is issued, a pre-construction (pre-submittal) meeting will be held at the job site. The meeting will include discussion of design and equipment function and system operation details of the project.

JR-8 PRE-INSTALLATION MEETING: No less than **twenty (20) business days** prior to the start of construction, a meeting will be held at the job site to discuss security requirements, scheduling of work, equipment delivery and storage, and other construction details of the project.

JR-9 JOB SCHEDULE: Within **ten (10) business days** after Notice to Proceed is issued, the contractor shall submit a construction/submittal 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. **Contractor shall submit the schedule in hard copy and electronic format using Microsoft Project 2010. However, if an electronic copy cannot be provided in this format, a copy shall be transmitted electronically in a pdf format and a hard copy of any updated schedules must be provided at all progress meetings.**

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-10 COMPLETION DATE: All work on this project shall be completed according to the following schedule:

No Construction Work Before:	**September 2, 2014**
Substantial Completion:	**December 12, 2014**
Final Completion:	**May 31, 2015**

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) business 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.

The Contractor shall take note of the two (2) wage scales included with this bid - the Prevailing Wage Rate issued by the State of Wisconsin and the Davis-Bacon Wage documents as issued by the U.S. Department of Labor Wage and Hour Division. The Contractor is required to pay the **HIGHER** of the two (2) wage scales.

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 5.0% 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 with no amount retained. Payment requests should be sent by U.S. mail to Ms. Carrie Lewis, Superintendent, Milwaukee Water Works, Room 409, Frank P. Zeidler Municipal Building, 841 N. Broadway, Milwaukee, WI 53202.

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

   2. Certification of the Contractor or his duly authorized representative.

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 the contractor restores such loss or damage.

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:

1. Progress Payments
2. Request for Change Order
3. Request for extension of Completion Date
4. Disputes concerning Payment or Field Issues
5. Submittals

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

This contract shall include the furnishing of all equipment, labor, supervision, materials, and appurtenances for and in connection with the following project as shown on the Contract Drawings and further specified herein.

1.01 SOUTH FILTERED WATER RESERVOIR ROOF

The work shall consist of all labor, equipment, supervision, materials, and the performance of all operations for and in connection with repairing and waterproofing the roof of the South Filtered Water Reservoir roof at the Linnwood Water Purification Plant. The work to be performed shall include but not be limited to the following:

A. Perform a "pre" and "post" interior "dry" inspection of both the South Clearwell and the South Filtered Water Reservoir, the clear water tunnel between them, and the South Reservoir Effluent downstream from the filtered water reservoir to the South Metering Manhole (Contractor may need to pump out water from effluent tunnel). Inspect the condition of all structures (and baffling if applicable) for signs of leakage, cracking and other structural deficiencies, and document. Inspection shall be evaluated by a structural engineer. Submit a preliminary report to MWW prior to the start of excavation work on the South Filtered Water Reservoir. A final and more detailed report, including photos and/or video, shall be submitted to MWW prior to the product completion date. The final report will include a summary of the inspection, all repairs performed, and maintenance recommendations for increasing useful life expectancy.

B. Make necessary internal concrete repairs (including joint repair in the effluent tunnel using internal pipe seals), as specified in Sections 03701 and 90212, to the inside of the storage units and tunnels as recommended in the preliminary "dry" inspection report. Additional repairs to be performed per unit price.

C. Remove the existing layer of soil covering the concrete roof deck in a manner that will not impact the structural integrity of the Reservoir.

D. Prepare the exposed roof deck prior to installing the lightweight engineered fill. This includes stripping the existing pitch/felt waterproof membrane if present, cleaning the surface of the roof, and repairing the roof joints and all cracks as specified in Section 03700. Additional repairs to be performed per unit price.

E. Furnish and install lightweight engineered fill over the entire Filtered Water Reservoir roof. The engineered fill shall be sloped so as to divert water away from manholes and ventilators.

F. Furnish and install a fully adhered EPDM sheet-applied waterproofing membrane system over the sloped lightweight engineered fill. The membrane must conform to Wisconsin Department of Natural Resources requirements of having a minimum thickness of 60mils (0.060 inches).

G. Furnish and install a prefabricated sheet and dual-section drainage system on the waterproofing membrane, and connect the dual-section drains to a new 8" PVC sewer lateral (and 3'-6" diameter manhole). Connect to existing nearby storm sewer system.

H. Replace and grade the soil cover (including topsoil) on top of sheet drainage system. Note: The 24" to 30" vertical clearance between top of manhole hatches/ventilation vents and the finished surface grade must be maintained, per WIDNR requirements.

I. Apply grass seed to the graded soil cover on top of reservoir roof and at all construction areas.

J. Remove and replace any disturbed pavement or curb, if applicable.

K. Site cleanup and remediation to pre-construction conditions.

1.02 EXISTING AND GENERAL CONDITIONS

The South Clearwell is a structure that holds filtered water before it enters the South Filtered Water Reservoir. The South Clearwell is located in the Filter Building, one level below the Filter Floor. The inside dimensions of the South Clearwell are 297 ft. x 182 ft., and the height is approximately 17.5 ft. The South Clearwell has two effluent channels that divert the water to the clear water tunnel that takes it to the South Filtered Water Reservoir.

The South Filtered Water Reservoir is a buried structure that holds approximately 7MG of treated water ready for distribution. The outside dimensions of the reservoir are 312 ft. x 192 ft., and the top of the roof slab is approximately 3.0 ft. below grade. The South Filtered Water Reservoir interior has a height of 17 ft. and is baffled.

The South Filtered Water Reservoir roof slab is essentially flat, is 10 inches thick, and is reinforced. The roof may or may not be covered with any waterproofing membrane. The South Filtered Water Reservoir has four access manholes (one at each corner) and has five roofing vents. Split tiles (6" wide) rest on the roof slab for drainage purposes, and an abandoned sprinkler system may still be present.

The South Reservoir Effluent is 72 inches in diameter, is concrete, and is approximately 15 years of age. Effluent line slopes away from reservoir.

1.03 CONTRACTOR'S QUALIFICATIONS

Contractor shall be certified, authorized, and trained by the roofing system (membrane) manufacturer.

Contractor shall be thoroughly experienced and upon request be able to provide evidence of having at least five (5) years successful experience installing EPDM sheet-applied roofing membranes.

1.04 SPECIFICATIONS AND STANDARDS

All 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:

A. City of Milwaukee "Street Construction Specifications", dated July 1, 1992.

B. The latest edition of "Standard Specifications for Sewer and Water Construction in Wisconsin" with all addenda.

C. City of Milwaukee "Recreational Facilities Construction Specifications", dated January 1, 1992.

D. WIDNR, Wisconsin Department of Natural Resources.

E. ANSI, American National Standards Institute.

F. EPA, United States Environmental Protection Agency.

G. ASTM, American Society for Testing and Material.

H. SPC, Society for Protective Coatings.

I. The Wisconsin Administrative Code.

J. OSHA, U.S. Department of Labor Occupational Safety and Health Act.

K. AWWA, American Water Works Association.

The contractor shall be familiar with the requirements of the above agencies. If any conflict exists in the contract drawings, these specifications, or the contractor's design or construction methods, the contractor shall request clarification from the City of Milwaukee (City) before proceeding and shall perform in a manner that conforms to the Commissioner of Public Works' (Commissioner) final decision.

PART 2 SHOP DRAWINGS

A. The contractor shall submit to the City for review a minimum of three (3) copies of all grading plans, Erosion Control Implementation Plans, shop, fabrication, assembly, foundation, and other drawings required by the specifications. The submittals shall include all drawings of equipment and devices offered by the contractor and all drawings showing essential details of any change in design or construction proposed by the contractor.

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 and plan sheet numbers applicable thereto.

All shop drawing submittals should be sent to Ms. Carrie Lewis, Superintendent, Milwaukee Water Works, Frank P. Zeidler Municipal Building,
841 N. Broadway, Room 409, Milwaukee, WI 53202.

Three (3) 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, eight (8) copies shall be submitted to the City for record and distribution to authorized persons.

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 by the City and returned to the contractor stamped "no exceptions". 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 acceptance of all dimensions, quantities, or details of the material or equipment shown by such drawings, nor shall such review relieve the contractor of responsibility for errors contained therein.

B. 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 final grading and all new & existing installations. Such items shall be located by dimensions and elevations. 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 Microstation®.

PART 3 GUARANTEE

The contractor shall furnish written contractor and product warranties from the date of official acceptance against defective materials or workmanship before the final payment is made. The specific items and non-prorated warranties to be provided are as follows:

A. EPDM Sheet Membrane – 20 years

B. Drainage Mat and Dual-Section Drains – 15 years

C. Lightweight Concrete Engineered Fill – 15 years

D. Internal pipe seals – 2 years

E. Contractor Installation Workmanship and Materials – 2 years

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, shall become necessary during such period.

Whenever defective equipment or materials are replaced, the equipment or materials shall be guaranteed for two (2) years from the date that the replacement is performing satisfactorily.

If within ten (10) 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.

END OF SECTION

SECTION 01039

COORDINATION AND MEETINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Coordination

B. Alterations

C. Cutting and patching

D. Pre-construction conference

E. Progress meetings

F. Pre-installation conferences

1.02 COORDINATION

A. Coordinate scheduling, submittals, and work on the various sections of the specifications to assure efficient and orderly installation of interdependent construction elements.

B. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate work with other construction projects that may be concurrently active.

D. Coordinate space requirements and installation of 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, maintenance, and repairs.

E. Coordinate completion and clean up of work of separate sections in preparation for substantial completion.

F. Coordinate correction of defective work and work not in accordance with Contract Documents in order to minimize disruption of the City’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 work from weather and the extremes in 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 aligns 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 installers to perform cutting and patching.

B. Submit a written request in advance of cutting or altering elements that affect:

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 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 any hazardous substance or condition exposed during the work to the City.

1.05 PRE-CONSTRUCTION CONFERENCE

A. City will schedule a pre-construction conference after Notice to Proceed.

B. Attendance Required: City and Contractor.

C. Agenda:

1. Submission of executed bonds and insurance certificates.

2. Submission of list of all subcontractors, 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, if any.

8. Temporary utilities and controls provided by City, if any.

9. Security procedures.

10. Procedures for testing.

11. Procedures for start-up of equipment.

12. Requirements for maintaining record documents.

13. Inspection and acceptance of equipment placed into service during construction period.

14. Conflicts.

1.06 PROGRESS MEETINGS

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 minutes and distribute copies within three (3) 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 meetings.

2. Review of work.

3. Field observations, problems, and decisions.

4. Field observations of problems that impede planned progress.

5. Review of 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.

12. Other business relating to work.

1.07 PRE-INSTALLATION CONFERENCE

A. When determined by the City, convene a pre-installation conference 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 (4) days in advance of meeting date.

D. Prepare agenda, preside at conferences, record minutes, and distributed copies within two (2) days after conference to participants, with one (1) copy to the City.

E. Review conditions of installation, preparation and installation procedures and coordination with related work.

END OF SECTION

SECTION 01500

JOB SITE SECURITY, UTILITIES AND FACILITIES

PART 1 - SCOPE

1.01 INDEX

A. PART 1 - Scope

B. PART 2 - Security and Safety

C. PART 3 – City of Milwaukee Permits

D. PART 4 - Occupancy during Construction

E. PART 5 - Electrical Power and Telephone Service

F. PART 6 – Heat and Ventilation

G. PART 7 - Water

H. PART 8 - Toilet Facilities

I. PART 9 - Deliveries

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 Water Engineering representative.

B. All removals become the property of the contractor and shall be disposed of off-site, unless otherwise specified.

1.03 TEMPORARY VENTILATION

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

1.04 BARRIERS

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

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

C. Utilize road plates to protect underground utilities and structures, and to minimize disturbances caused by construction traffic.

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

A. The Milwaukee Water Works (MWW) consists of a number of facilities to treat and deliver drinking water to the City and surrounding suburban communities. To ensure the safety and security of drinking water, the MWW 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.

B. For this project, the contractor shall continuously coordinate building and site security measures, including accessing the site, with the designated Water Engineering representative or Michael Schaefer, Water Security Manager, who can be reached by Telephone: (414) 286-3465, or Facsimile: (414) 286-2672.

2.02 SCOPE

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

1. MWW site security policies and procedures
2. Contractor and subcontractor obligations
3. Permit system

2.03 POLICIES

A. During the "Security Briefing" portion of the "Pre-Construction Meeting", MWW Security staff shall provide the contractor with site polices to be reviewed by the contractor and subcontractors. These documents may include:

1. Lock-out/Tag-out Policy
2. Confined Space Entry Procedures
3. Evacuation Procedure for Propane, Lox, and Ammonia Releases
4. Personal Protective Equipment Guidelines
5. No Smoking Policy
6. Prohibited Materials

B. Additionally, the contractor will be provided:

1. Contact phone numbers for MWW staff
2. On-Site parking location and designated construction entrance.
3. Site security policy and procedures.

C. The contractor shall be required to review these documents and is responsible for conveying the contents of these submittals to their employees, subcontractors 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.

D. 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

A. Contractors shall provide the following documents **no less than seven (7) business days prior** to the start of contracted work:

1. Scope of work to be performed
2. Name of primary contractor's onsite representative
3. Names of all companies sub-contracted to do work on the project
4. Completed "Contract Firm Registration Form" (see Attachment 'A') for prime contract firm and every subcontract firm
5. A "Contractor Employee Registration Form" completed for the contractors and every employee who needs to be granted site access (see Attachment 'B')
6. List of items to be stored on-site
7. MSDS for all chemicals to be used/stored on-site

B. Note: It is the responsibility of the contractor to facilitate gathering and submittal of the "Contractor Employee Registration Form" for all subcontractors working on the project. A subcontractor 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".

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

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

E. At no time should anyone but the contractor be contacting MWW employees with issues or access requests. If a request for site access does not come from the contractor, the request will not be processed.

F. During the time period that the contractor is on-site, they must agree to:

1. Notify the Plant Manager immediately of any significant chemical spills or leaks.

2. Maintain normal non-toxic breathable air quality, through adequate ventilation at their work site.

3. Perform no equipment isolations or tie-ins without the signed approval of site management.

4. Restrict movement to the specific work areas within the site to perform contractors scope of work.

2.05 CONTRACTOR SPECIAL WORK PERMITS

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

B. 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

A. 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. A fee of $50.00 will be charged for any identification tags or lanyards issued by MWW that are not returned.

2.07 CONTRACTOR GATE ACCESS AND PARKING

A. 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.

B. Parking Note:

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

PART 3 - CITY OF MILWAUKEE PERMITS

3.01 GENERAL

A. The contractor shall obtain the necessary permits for this project.

PART 4 - OCCUPANCY DURING CONSTRUCTION

4.01 GENERAL

A. The MWW facility shall be in continuous operation during this contract. Contractor and subcontractors are to take any and all necessary precautions to ensure 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 Water Engineering representative.

PART 5 - ELECTRICAL POWER AND TELEPHONE SERVICE

5.01 GENERAL

A. On-site electrical service is NOT available for contractor use at the Linnwood Purification Plant site. The contractor is required to request a dedicated service for job trailers from the electric utility.

B. Contractor shall provide and maintain all necessary power cords and electrical lighting, and shall make all necessary connections in accordance with OSHA regulations.

C. Contractor shall provide, maintain and pay for his own wireless telephone and internet service.

PART 6 – HEAT AND VENTILATION

6.01 GENERAL

A. Contractor shall provide and maintain all necessary heat and ventilation equipment required for the contract. Contractor shall perform all air treatment procedures and make all necessary connections in accordance with OSHA regulations.

PART 7 - WATER

7.01 GENERAL

A. Water is available for the contractor at the site and may be obtained from the fixture(s) so designated by MWW staff or Water Engineering representative.

B. Contractor and subcontractors must provide their own hoses, back flow preventer and any other connection appurtenances required for the contract.

PART 8 - TOILET FACILITIES

8.01 GENERAL

A. On-site toilet facilities are NOT available for contractor use during project duration. Contractor shall furnish their own 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 9 - DELIVERIES

9.01 GENERAL

A. 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.

B. Contractor shall provide the following information in the notification:

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

C. The driver of the delivery vehicle is required to display picture identification as a pre-requisite 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 reschedule 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:_____ DATE:_____

PRIMARY CONTACT PERSON

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

Updated August, 2007

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: _____ DATE: _____
Required

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: _____ DATE: _____
Required

Updated August, 2007

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 PRODUCTS

A. Products: Defined as new material, machinery, components, equipment, fixtures and systems forming the work; does not include machinery and equipment used for preparation, fabrication, conveying and erection of the work.

B. All materials that will be in direct contact with potable drinking water shall be in compliance with NSF Standard 61 Drinking Water System Components – Health Effects.

C. Do not use materials and equipment removed from existing premises, except as specifically permitted.

D. Assure standardization and uniformity in all parts of the work by providing like items of equipment or certain materials as products of one manufacturer.

E. Uniformity in equipment items is required in order to provide the City with interchangeability capabilities, simplified spare parts inventories and standardized maintenance programs and manufacturers services.

1.02 TRANSPORTATION AND HANDLING

A. Transport and handle products in accordance with manufacturer's instructions.

B. Promptly inspect shipments to assure 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.

1.03 STORAGE AND PROTECTION

A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.

B. Provide off-site storage and protection when site does not permit on-site storage or protection.

C. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

D. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

E. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

F. Spare parts and special tools shall be properly marked to identify the associated equipment by name, equipment and part number. Delivery of spare parts and special tools shall be made prior to the initial test run of the associated equipment.

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. Guarantee
7. Spare Parts and Maintenance Materials

B. Related Sections

1. Section 01010 – Summary of Work

1.02 CLOSEOUT PROCEDURES

A. Submit written certification that contract has been reviewed, work has been inspected, and work is complete in accordance with the contract and is ready for City inspection.

B. Provide submittals to City that is required by governing or other authorities.

C. Submit Final Application for Payment identifying total adjusted contract price, previous payments, and sum remaining due.

1.03 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. Clean equipment and fixtures to a sanitary condition.

C. Clean site, sweep paved areas, rake clean landscaped surfaces.

D. Remove waste and surplus materials, rubbish, and construction facilities from the work site.

1.04 ADJUSTING

A. Adjusting operating products and equipment to ensure smooth and unhindered operation.

1.05 PROJECT RECORD DOCUMENTS

A. Maintain onsite, 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.

B. Store record documents separate from documents used for construction.

C. Record information concurrent with construction progress. Electrical boxes and conduit location determined in the field and not specifically shown on the drawings shall be recorded and documented.

D. 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 alternate utilized.
3. Changes made by Addenda or Change Orders.

E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
2. Field changes of dimensions and details.
3. Details not on original Contract Drawings.

F. Delete Consultant, City of Milwaukee title block and Engineer's seal from all documents.

G. Submit **five (5)** sets of documents with **one (1)** electronic version to City prior to final Application for Payment.

1. Accompany submittal with transmittal letter containing the following:
   a) Date
   b) 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) Signature of contractor, or his/her authorized representative.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit **six (6)** sets prior to final inspection, bound in 8 ½ x 11 -inch text pages, three D-side ring binder capacity expansion binders with durable plastic covers.

B. Prepare binder covers with printed title "OPERATION MAINTENANCE INSTRUCTIONS", title of project, and subject of binder when multiple binders are required.

C. Internally subdivide the binder contents with permanent 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 30-pound white paper.

1. Part 1: Directory, listing names, addresses, telephone numbers and emails of City, 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 name, addresses, telephone numbers and emails of subcontractors and suppliers.

   Identify the following:

   a) Significant design criteria.

   b) List of equipment.

   c) Parts list for each component.

   d) Operating instructions.

   e) Maintenance instructions for equipment and systems.

   f) Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.

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 or warranties and bonds, if required.

E. Special Requirements for Operation and Maintenance Data and Manuals. Adequate operation and maintenance information shall be supplied for all equipment requiring maintenance or other attention. The contractor shall provide operation and maintenance manuals for each type of equipment supplied.

1. Operation and Maintenance Manuals shall include the following:
   a) All sets of manuals shall be originals. Copies will not be acceptable.
   b) Equipment function, normal operating characteristics, and limiting conditions.
   c) Assembly, installation, alignment, adjustment, and checking instructions.
   d) Operation instructions for start up, routine and normal operation, regulation and control, shutdown, and emergency conditions.
   e) Lubrication and maintenance instructions, including lubrication cross references to a minimum of three locally available suppliers.
   f) Guide to "troubleshooting".
   g) Parts list and predicted life of parts subject to wear.
   h) Outline, cross-section, and detailed assembly drawings; engineering data; wiring diagrams.
   i) Test data and performance curves, where applicable.
2. The operation and maintenance manuals shall be in addition to any instructions or parts packed with or attached to the equipment when delivered, or instructions that may be required by the contractor.
3. Manuals and other data shall be printed on heavy, first quality paper, in an 8 ½ x 11-inch size with standard 3-hole punching. Drawings and diagrams shall be reduced to 8½ x 11-inches, or 11 x 17 inches. Where reduction is not practicable, larger drawings shall be folded separately and placed in an envelope that is bound into the manuals. Each envelope shall bear suitable identification on the outside.
4. Material shall be assembled and bound in the same order as it appears in the Specifications, and each volume shall have a table of contents and suitable index tabs.
5. All submittals shall be marked with contract identification, and inapplicable information shall be erased or deleted.
6. Shipment of equipment will not be considered complete until required data and manuals have been received.

F. Copies will be returned after final inspection, with City's comments. Revise content of documents as required prior to final submittal.

G. Submit final volumes within **ten (10)** days after receipt of City's comments.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts and equipment, maintenance and extra materials in quantities as noted in applicable Specification sections.

B. Deliver to project site and place in location as directed, obtain receipt prior to final payment.

1.08 GUARANTEE

A. Provide duplicate notarized copies.

B. Execute and assemble documents and subcontractors, suppliers, and manufacturers.

C. Provide Table of Contents and assemble in three D-side ring binder with durable plastic cover.

D. Submit prior to final application for payment.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.01 SCOPE

A. This section covers earthwork and shall include the necessary clearing, grubbing, and preparation of the site; removal and disposal of all debris; excavation; handling, storage, transportation, and disposal of all excavated material; all necessary sheeting, shoring, and protection work; preparation of sub-grades; pumping and dewatering as necessary; protection of adjacent property; backfilling; construction of fills and embankments; surfacing and grading; and other appurtenant work.

1.02 GENERAL

A. With reference to the terms and conditions of the construction standards for excavations set forth in OSHA "Safety and Health Regulations for Construction", Chapter XVII of Title 29, CFR, Part 1926, contractor shall employ a competent person and, when necessary based on the regulations, a registered professional engineer, to act upon all pertinent matters of the work of this section.

B. The City of Milwaukee “Street Construction Specifications”, dated July 1, 1992 shall govern all earthwork products and execution methods under this contract. The “Street Construction Specifications” shall also govern the materials and methods for excavation, trenching, soil removal, soil transportation and stockpiling, backfilling, and grading.

1.03 SUBMITTALS

A. Drawings, specifications, and data covering the proposed materials shall be submitted in accordance with the requirements of Section 01010 and this section.

B. Sheeting, shoring, and excavation support systems’ submittals shall bear the seal and signature of a Professional Engineer licensed or registered in the State of Wisconsin.

C. The contractor shall submit an Erosion Control Implementation Plan (ECIP) for review and approval by the City before starting any construction activity.

D. The contractor shall submit to the City for review a proposed design of the finished grading plan in addition to a detailed list of construction materials, methods, and equipment to be used. The submittal list shall include the weights and wheel loadings of all proposed vehicles that may need to have access to the reservoir roof slab.

E. Three (3) weeks prior to grading and topsoil preparation, the contractor shall submit to the City for review three hard copies, and one electronic copy of the latest version of MicroStation® drawings, showing the contractors final design of the finished grading and landscaping elevations, the storm drain locations, and proposed surface preparation methods.

1.04 INSURANCE

A. Professional Liability insurance shall be provided.

1. Professional liability insurance shall be required for sheeting, shoring, and excavation support systems design services, as specified herein, to be performed by a professional engineer with appropriate expertise in accordance with applicable laws and regulations, licensed or registered in the State of Wisconsin, where the shop drawings or other evidence of design bear the seal and signature of that professional engineer.

   This insurance shall provide protection against claims arising out of performance of professional design services and caused by a negligent error, omission, or act for which the insured party is legally liable; such professional liability insurance shall provide coverage in the amount of $3,000,000 which shall be maintained throughout the duration of the Project and for one year after Final Acceptance.

2. In the event that the professional design services are performed by an independent consultant or Subcontractor engaged by Contractor, this insurance shall be furnished and maintained by the independent consultant or Subcontractor. In the event that the professional design services are performed by a member of contractor's organization, this insurance shall be furnished and maintained by Contractor.

3. A certificate of insurance for such professional liability insurance coverage, including the amount, duration, and name of the insured party, shall be delivered to City.

1.05 EROSION CONTROL IMPLEMENTATION PLAN (ECIP)

A. General

1. At least thirty (30) working days prior to the start of any construction activity, the contractor shall submit to the City for review and 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.

2. Work shall not start until the ECIP meets technical standards. No construction activity may begin without an ECIP approved by the City.

3. The contractor shall be required to have a copy of the ECIP on the job site for the entire duration of the contract.

4. The ECIP shall include, but not be limited to:
    a) A completed "Erosion Control Implementation Plan" application (See Attachment "H").
    b) A plan showing all locations of erosion control devices and other Best Management Practices (BMP's).
    c) A written description of all erosion control devices and BMP's to be used.
    d) A written schedule of installing erosion control devices.
    e) A written schedule of construction operations related to implementing erosion control devices and BMP's.
    f) A written maintenance schedule for all erosion control devices and BMP's.
5. 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. 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.

B. Erosion Control Site Plan Characteristics

1. The contractor may utilize the Contract Drawings for this project or provide a separate site diagram. The following information shall be included on the ECIP:
    a) The scale of the drawing (not less than 1" = 100')
    b) A north arrow (towards the top or to the right of the plan)
    c) The name of all project streets and streets abutting the project
    d) Approximate location of all existing and proposed drainage structures
    e) The direction of water runoff (flow arrows)
    f) The proposed limits of construction
    g) The approximate location of all erosion control devices
    h) Areas where vegetation will be disturbed and re-established
    i) 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.

C. 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 or manhole is removed, or openings are in the masonry where storm water may enter, the protection device should be changed to a type R.

D. Temporary storage piles.

1. If possible, storage of erodible materials (e.g. gravel, soil, etc.) 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. Use coverings if necessary and surround them with straw bales, silt fence or other measures.

E. Tracking

1. The project and surrounding roadways shall be kept free from materials that may enter the drainage system.
2. 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 3-inch size stone, a minimum of 8-feet wide and a minimum of 50-feet long.
3. Tracked roadways shall be cleaned immediately by means other than flushing with water.
4. The project roadways shall be cleaned on a daily basis. Cleaning shall be done by means other than flushing with water.

F. Locating Sediment Controls

1. Current WIDNR publications shall be consulted to determine the location of sediment controls (e.g. silt fence, straw bales, stone tracking pads, etc.) that minimize the amount of sediment from leaving the site.
    a) Storm Water Management Technical Standards
    b) The "*Wisconsin Construction Site Best Management Practices Handbook*"

G. 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.

H. Vegetation

1. The construction activity shall be staged as to limit the amount of time vegetation is stripped and re-established.

2. Contractor shall utilize road plates to protect areas of greenspace and vegetation from ruts or depressions caused by construction traffic.

3. Refer to Section 02200 Earthwork and Section 02950 Seeding, as well as any applicable construction plan sheets, for further instruction on vegetation disturbance, protection, and restoration.

I. 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 inspected and maintained after a rainfall event that totals 0.50 inches.

3. All devices shall be inspected and maintained at least once a week.

1.06 ROOF LOADING LIMITS

A. It is the responsibility of the contractor to space equipment and limit soil piles to avoid overloading the structure.

B. The contractor shall determine the safe roof loading, and adequately develop and submit to the City for review a list of equipment to be used for this contract. Review from the City does not relieve the contractor of the responsibility to protect the structural integrity of the reservoir.

C. According to the original contract specifications for the reservoir, the total allowable maximum live load for the roof slab is 350psf, including soil, stockpiles, equipment, and other materials such as engineered fill.

D. The largest roof suspended bay is 20 ft. long and 20 ft. wide.

E. While pushing the soil on or off the roof, the contractor shall limit the depth of the pushed soil piles so as not to exceed the maximum loading limits. In general, soil loads are approximately 100pcf (one square foot of soil that is one foot deep weighs approximately 100 pounds).

F. For all work on top of the reservoir roof, the contractor shall ensure that the distributed load of all workers, equipment, soil, and other materials present on the same suspended roof bay (within 20 ft. x 20 ft. area) shall be below the total allowable maximum load of 350psf.

G. The contractor shall use planking on all exposed roof slab areas that will be traveled over with vehicles and/or equipment the uses tracks. Vehicles and equipment with tires and no tracks do not require planking, but the contractor shall limit wheel loads in order to avoid the risk of punching the roof slab.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Filter Fabric

1. Filter Fabric shall be provided in rolls wrapped with covering for protection from mud, dirt, dust and debris.

a) Filter Fabric Type FF shall be provided for installation at locations indicated on the drawings. Filter fabric Type FF shall be a woven polypropylene fabric and shall have the indicated properties:

Grab Tensile Strength, lb.	ASTM D-4632	200 min.
Puncture Strength, lb.	ASTM D- 4833	105 min.
Apparent Breaking Elongation, Machine Direction, %	ASTM D-4632	24 min.
Apparent Breaking Elongation, Cross Direction, %	ASTM D-4632	10 min.
Apparent Opening Size, μm	ASTM D-4754	600 max.
Permittivity, s-1	ASTM D-4491	1.9 min.

B. Polyethylene film

1. Polyethylene film beneath concrete slabs or slab base course material shall be Product Standard PS17, 6 mil minimum thickness.

C. General Fill and Embankment Materials

1. To the maximum extent available, excess suitable material obtained from structure and trench excavation shall be used for the construction of general fills and embankments. Additional material shall be provided from contractor's offsite source. No borrow pits shall be opened on site unless such pits are specifically indicated on the drawings.

2. All material placed in fills and embankments shall be free from rocks or stones larger than the required size in their greatest dimension, brush, stumps, logs, roots, debris, and other organic or deleterious materials. The maximum size of stone in fills and embankment shall be 4 inches. No rocks or stones shall be placed in the upper 18 inches of any fill or embankment. Rocks or stones within the allowable size limit may be incorporated in the remainder of fills and embankments, provided they are distributed so that they do not interfere with proper compaction.

D. Select Granular Fill

1. Granular fill material shall be crushed rock or gravel suitable for use as a free draining sub-base beneath slabs and foundations. Granular fill shall be free from dust, clay, and trash; hard, durable, non-friable; and shall be graded 3/4 inch to No. 4 as defined in ASTM C33 for No. 67 coarse aggregate and indicated below. Granular fill shall meet the quality requirements for ASTM C33 coarse aggregate. Only crushed rock with angular particles shall be used when the perimeter of the granular fill is not confined or otherwise subject to raveling, such as on a slope.

Size	Percent Passing
1 inch	100
3/4 inch	90 - 100
3/8 inch	20 – 55
No. 4	0 - 10
No. 8	0 – 5

E. Dense Graded Base

1. Dense graded base (3/4-inch) shall be placed as a sub-base for asphaltic concrete pavement and beneath concrete curb and gutter. Dense graded base (3/4-inch) shall meet the following Wisconsin Department of Transportation Gradation requirements:

Size	Percent Passing
1 inch	100
3/4 inch	95 - 100
3/8 inch	50 - 90
No. 4	35 - 70
No. 10	15 - 55
No. 40	10 – 35
No. 200	5.0 – 15.0

F. Topsoil

1. All furnished topsoil shall comply with the requirements of the City of Milwaukee “Street Construction Specifications”, dated July 1, 1992.

2. Topsoil furnished shall be a natural, fertile, friable soil possessing characteristics of representative productive soils in the vicinity. It shall not be excessively acidic or alkaline or contain toxic substances.

3. Topsoil shall be screened and processed and shall be free from clay lumps, weeds, roots, stones, and other debris. Topsoil depth shall be placed to a minimum at a minimum depth of 4 inches after compaction.

4. Organic material shall be a natural part of the loam; any indication (smell inclusive) suggesting recent addition of manure shall be cause for rejection.

5. Topsoil shall be stockpiled in sufficient quantity to supply the contract. The stockpile shall be subject to inspection and testing prior to approval and use.

2.02 MATERIAL TESTING

A. Preliminary Review of Materials

1. As stipulated in the Quality Control section, all tests required for preliminary review of materials shall be made by an acceptable independent testing laboratory at the expense of contractor. Two (2) initial gradation tests shall be made for each type of general fill, designated fill, backfill, or other material, and one (1) additional gradation test shall be made for each additional 500 tons of each material delivered to the jobsite. In addition, one (1) set of initial Atterberg Limits tests shall be made for each fill material containing more than 20 percent by weight passing the No. 200 sieve and for materials specified by Atterberg Limits. One (1) additional Atterberg Limits test shall be made for each additional 500 tons of each material delivered to the job site.

B. Field Testing Expense

1. All moisture-density (Proctor) tests and relative density tests on the materials, and all in-place field density tests, shall be made by an independent testing laboratory approved by the City at the expense of Contractor. Contractor shall provide access to the materials and work area and shall assist the laboratory as needed in obtaining representative samples.

C. Required Field Tests

1. For planning purposes the following guidelines shall be used for frequency of field tests. Additional tests shall be performed as necessary for job conditions and number of failed tests. Test results shall be submitted as indicated in the Submittals section.

a) Two (2) moisture-density (standard Proctor) tests in accordance with ASTM D698 or two (2) relative density tests in accordance with ASTM D4253 and D4254 for each type of general fill, designated fill, backfill, or other material proposed.

b) For area fills and embankments, an in-place field density and moisture test for each 1,000 cubic yards of material placed.

c) One (1) in-place field density and moisture test for every 100 to 200 cubic yards of structure backfill or select fill.

d) One (1) in-place density and moisture test whenever there is a suspicion of a change in the quality of moisture control or effectiveness of compaction.

e) At least one (1) test for every full shift of compaction operations on mass earthwork.

f) Additional gradation, proctor, and relative density tests whenever the source or quality of materials changes.

PART 3 - EXECUTION

3.01 SCOPE

A. The Contractor shall protect above and below grade utilities by following the guidelines of Wisconsin Statute 182.0715. The contractor shall call Diggers Hotline at 1-800-242-8511 at least three (3) working days before excavation.

B. The contractor shall implement the ECIP as submitted by the contractor and approved by the City. Excavation may not begin until ECIP is approved and proposed grading plan is reviewed by the City.

C. The contractor shall remove and dispose of any sprinkler system equipment that is encountered during excavation.

D. The contractor shall remove the soil and materials covering the roof and transfer the soil to designated stockpiling areas as shown on Contract Drawing WP-318-02. The exact location of the stockpiles will be determined at the Pre-construction Meeting. No soil stockpiling will be allowed on the reservoir nor on the adjacent coagulation basin. Backfill and topsoil/sod are to be stockpiled separately.

E. The contractor shall remove and properly dispose of the existing split tiles and granular backfill that presently rests on the roof. Roof may or may not have any layers of waterproofing.

F. The contractor shall cover all exposed roof areas with tarp sheets and secure them in place to minimize the possibility of leakage of rainwater into the reservoir. The tarp sheets shall remain in place until engineered fill and sheet-applied waterproofing membrane has been applied on the exposed roof slab. No roof areas shall be left exposed over night without tarp covering.

G. The contractor shall secure and protect all sloped soil surfaces, including the stockpiles of soil by tarp and other erosion control measures.

H. The contractor shall remove from site all excavated materials and soil that is not used in restoration and rehabilitation of the site.

I. The contractor shall excavate and trench along the perimeter walls of the reservoir to enable the proper installation of insulation and dual-section soil drains, and to allow for connecting the dual-section drains to the existing sewers.

J. The contractor shall backfill, grade and restore the soil cover on top of the roof after installation of the new roof waterproofing system.

K. The contractor shall landscape the area to the grades shown on the finished grade and landscaping drawings submitted by the contractor and reviewed by the City. The finished grades shall ensure a minimum of 3.0 ft. soil cover, including 4-inch topsoil, on top of the new roof waterproofing system and drainage system. The soil cover shall be sloped away from the center of the reservoir to ensure positive surface runoff according to City, County, State and Federal standards. Final grades shall match up to the existing grades in the surrounding areas. Ensure that vents and access manholes are at least 24-inches above grade at completion of work.

L. After removing stockpiles, the contractor shall leave the area clean and neat, restoring the site to pre-construction conditions. When necessary, the contractor shall grade the site surface to prevent freestanding surface water.

M. The contractor shall replace any concrete/asphalt pavement, including curbing, damaged by work in this contract.

N. Contractor shall submit as-built drawings of grading plans, including new and existing above ground/underground utilities, structures, etc.

3.02 EXCAVATION

A. General

1. Excavations shall provide adequate working space and clearances for the work to be performed therein and for installation and removal of concrete forms. In no case shall excavation faces be undercut for extended footings.

2. Sub-grade surfaces shall be clean and free of loose material of any kind when concrete is placed thereon. Do not place base on foundations that are soft, spongy, or covered by ice or snow. Water and rework or re-compact dry foundations as necessary to ensure proper compaction, or as the City directs.

3. Except where exterior surfaces are specified to be damp-proofed, monolithic concrete manholes and other concrete structures or parts thereof that do not have footings that extend beyond the outside face of exterior walls may be placed directly against excavation faces without the use of outer forms, provided that such faces are stable and also provided that a layer of polyethylene film is placed between the earth and the concrete.

4. Excavations for manholes and similar structures constructed of masonry units shall have such horizontal dimensions that not less than 6 inches clearance is provided for outside plastering.

B. Classification of Excavated Materials

1. No classification of excavated materials will be made for payment purposes. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition, or condition thereof.

C. Preservation of Trees

1. No trees shall be removed, unless their removal is authorized by the City. Trees left standing shall be adequately protected from permanent damage by construction operations.

D. Unauthorized Excavation

1. Except where otherwise authorized, indicated, or specified, all materials excavated below the bottom of concrete walls, footings, slabs on grade, and foundations shall be replaced with concrete at the expense of contractor. It shall be placed at the same time and monolithic with the concrete foundation.

E. Blasting

1. Blasting or other use of explosives for excavation will not be permitted.

F. Dewatering

1. Dewatering equipment shall be provided to remove and dispose of all surface water and groundwater entering excavations, trenches, or other parts of the work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.

2. All excavations for concrete structures or trenches which extend down to or below groundwater shall be dewatered by lowering and keeping the groundwater level to the minimum depth of 24 inches beneath such excavations. The specified dewatering depth shall be maintained below the prevailing bottom of excavation at all times.

3. Surface water shall be diverted or otherwise prevented from entering excavations or trenches to the greatest extent possible without causing damage to adjacent property.

4. Contractor shall be responsible for the condition of any pipe or conduit used for drainage purposes, and all such pipe or conduit shall be left clean and free of sediment.

G. Sheeting and Shoring

1. Except where banks are cut back on a stable slope, excavations for structures and trenches shall be supported as necessary to prevent caving or sliding.

2. Steel sheet piling or other excavation support systems shall be furnished and installed as necessary to limit the extent of excavations for the deeper structures and necessary backfill under adjacent shallower structures, and to protect adjacent structures and facilities from damage due to excavation and subsequent construction. Contractor shall assume complete responsibility for, and install adequate protection systems for prevention of damage to existing facilities.

3. Excavation support systems and sheeting and shoring shall be all removed after completion of work.

4. The design of the excavation support system shall be such as to permit complete removal while maintaining safety and stability in the excavation at all times.

5. Sheeting, shoring and excavation support systems shall be designed by a professional engineer retained by the contractor and registered in the state where the project is located.

H. Stabilization

1. Sub-grades for concrete structures shall be firm, dense, and thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact under the feet of the workers.

2. Sub-grades for concrete structures which are otherwise solid, but which become mucky on top due to construction operations, shall be reinforced with crushed rock or gravel as specified for granular fills. The stabilizing material shall be placed in such a manner that no voids remain in the granular fill. All excess granular fill with unfilled void space shall be removed. The finished elevation of stabilized sub-grades shall not be above sub-grade elevations indicated on the drawings.

I. Roadway Excavation

1. Excavation for the roadways, drives, and parking areas shall conform to the lines, grades, cross sections, and dimensions indicated on the drawings and shall include the excavation of all unsuitable material from the subgrade. After shaping to line, grade, and cross section, the subgrade shall be compacted to a depth of at least 6 inches and shall meet the following:

Test method to determine maximum density and moisture:	ASTM D698
Relative compaction and moisture content relative to the optimum:	95%
Moisture content relative to the optimum:	-2% to +2%

2. This operation shall include any reshaping and wetting or drying required to obtain proper compaction. All soft, yielding, or otherwise unsuitable material shall be removed and replaced with suitable material.

3.03 GENERAL FILLS AND EMBANKMENTS

A. General

1. Fills and embankments not required or indicated to be designated fills shall be constructed as general fills and embankments. All fills and embankments shall be constructed to the lines and grades indicated on the drawings. Backfill materials shall be deposited in layers not to exceed 8 inches in non-compacted thickness. Unless otherwise specified herein, the following governing standards apply:

Test method to determine maximum density and moisture:	ASTM D698
Relative compaction and moisture content relative to the optimum:	95%
Moisture content relative to the optimum:	-2% to +2%

2. Backfilling and construction of fills and embankments during freezing weather shall not be done except by permission of City. No backfill, fill, or embankment materials shall be installed on frozen surfaces, nor shall frozen materials, snow, or ice be placed in any backfill, fill, or embankment.

B. Sub-grade Preparation

1. After preparation of the fill or embankment site, the sub-grade shall be scarified and moisture conditioned to a minimum depth of 8 inches, leveled and rolled so that surface materials of the sub-grade will be at a moisture content and as compact and well bonded with the first layer of the fill or embankment as specified for subsequent layers.

2. Unless otherwise directed by City, the sub-grade shall be proof-rolled by a rubber-tired roller, a loaded dump truck, or other suitable rubber-tired equipment acceptable to City. A minimum of four passes of the proof-rolling equipment shall be provided such that the last two passes are made perpendicular to the first two passes.

3. All soft, yielding, or otherwise unsuitable material shall be removed and replaced with compacted fill.

C. Placement and Compaction

1. All fill and embankment materials shall be placed in approximately horizontal layers not to exceed 8 inches in non-compacted thickness. Material deposited in piles or windrows by excavating and hauling equipment shall be spread and leveled before compaction.

2. Each layer of material shall have the best practicable moisture content for satisfactory compaction. The material in each layer shall be wetted or dried to achieve the moisture content relative to optimum as specified above, and shall be thoroughly mixed to ensure uniform moisture content and adequate compaction. Each layer shall be thoroughly compacted to the required degree of compaction at the required moisture content. If the material fails to meet the density specified, compaction methods shall be altered. The changes in compaction methods shall include, but not be limited to, changes in compaction equipment, reduction in non-compacted lift thickness, increase in number of passes, and better moisture control.

3. Wherever a trench is to pass through a fill or embankment, the fill or embankment material shall be placed and compacted to an elevation not less than 12 inches above the top of pipe elevation before the trench is excavated.

D. Borrow Pits

1. Borrow pits are not permitted

3.04 DESIGNATED FILLS

A. General

1. Fills required or indicated to be designated fills shall be constructed using the specific materials and placement requirements as specified. In addition to the specific requirements specified herein, all requirements for general fills and embankments shall apply. These requirements include, but are not limited to organic or deleterious materials, subgrade preparation, lift thickness, and moisture conditioning requirements. All designated fills shall be constructed to the lines and grades indicated on the drawings. Backfilling and construction of fills during freezing weather shall not be done except by permission of City. No backfill, fill, or embankment materials shall be installed on frozen surfaces, nor shall frozen materials, snow, or ice be placed in any backfill, fill, or embankment.

B. Select Granular Fill

1. Granular fills shall be provided where indicated on the drawings. Granular fills shall be placed on suitably prepared sub-grades in uncompacted lift thickness of 6 inches or less and shall meet the following requirements:

Test method to determine maximum density and moisture:	ASTM D698
Relative compaction and moisture content relative to the optimum:	95%
Moisture content relative to the optimum:	-2% to +2%

2. Where granular fills are to be covered with concrete, the top surface shall be graded to the required sub-grade elevation. The completed fill shall be covered by a vapor barrier.

C. Dense Graded Base

1. The dense graded base beneath the asphaltic concrete pavement shall be placed in lift thicknesses not to exceed a compacted thickness of 6 inches per layer if using a pneumatic roller, or 8 inches if using a vibratory roller.

3.05 FINAL GRADING AND PLACEMENT OF TOPSOIL

A. After other outside work has been finished, and backfilling and embankments completed and settled, all areas that are to be graded shall be brought to grade at the indicated elevations, slopes, and contours. All cuts, fills, embankments, and other areas that have been disturbed or damaged by construction operations shall be surfaced with topsoil to a depth of 4 inches. Topsoil shall be of a quality at least equal to the existing topsoil in adjacent areas, free from trash, stones, and debris, and well suited to support plant growth.

B. Topsoil shall be applied to a thickness of 4 inches in all areas affected by excavation and grading work. Reuse of existing topsoil rolled back in preparation for grading will be subject to the City's approval.

C. Topsoil shall be spread evenly thereon and lightly compacted. No topsoil shall be spread in a frozen or muddy condition. Contractor shall allow for compaction of approximately 20 percent when spreading topsoil.

D. Use of graders or other power equipment will be permitted for final grading and dressing of slopes, provided the result is uniform and equivalent to manual methods. All surfaces shall be graded to secure effective drainage. Unless otherwise indicated, a slope of at least 1 percent shall be provided.

E. Final grades and surfaces shall be smooth, even, and free from clods and stones, weeds, brush, and other debris.

3.06 DISPOSAL OF EXCAVATED MATERIALS

A. Suitable excavated materials may be used in fills and embankments as needed. All excess excavated material shall be disposed of offsite at the expense of contractor.

B. All debris, stones, logs, stumps, roots, and other unsuitable materials shall be removed from the site and disposed of by, and at the expense of, contractor.

3.07 RESTORATION

A. All established lawn or greenspace areas cut by the line of trench, by excavation, or damaged during the work shall be restored and seeded, after completion of construction, to the complete satisfaction of the City. Refer to section 02950 for seeding.

3.08 SETTLEMENT

A. Soil shall be uniformly compacted in layers to avoid settlement. Contractor shall be responsible for all settlement of backfill, fills, and embankments which may occur within the correction period stipulated in the General Conditions.

B. Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within thirty (30) days after notice from City.

END OF SECTION

ATTACHMENT "H"

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.

FOR OFFICE USE ONLY			**Application No.** _____
Meets Technical Standards ☐	**Does Not Meet Technical Standards** ☐		
Date Application Received: _____	**Date all Information Received:** _____		**Reviewed By:** _____
Fee Paid ☐	**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** ☐ **No** ☐		

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 02223

ENGINEERED FILL

PART 1 - GENERAL

A. The contractor shall furnish and install *Elastizell® Engineered Fill* (lightweight concrete) on the existing concrete surface of the South Filtered Water Reservoir roof so as to provide a 0.015 ft/ft minimum slope. The reservoir roof surface shall be cleaned and repaired as specified in Section 03700, and the installation shall be performed in accordance with the procedures provided by the manufacturer. The summit of the Engineered Fill shall run along the north-south centerline of the reservoir and shall be sloped in four (4) directions where it shall be tapered to a minimum of 2-inch thickness at the reservoir edge.

The Engineered Fill shall be installed in the vicinity of access manholes in a way that ensures positive drainage away from the manholes.

B. The Engineered Fill shall be manufactured by Elastizell Corporation of America, P.O. Box 1462, Ann Arbor, MI 48106, Ph # (734) 761-6900, Fax # (734) 761-8016**. No substitutions will be allowed for material or for execution of this WIDNR stipulated item.**

C. Prior to bidding, the contractor shall contact the manufacturer to obtain certification for the Elastizell® EF Applicator. Following is a partial list of applicators that have been pre-certified by the manufacturer:

1. Elastizell of Wisconsin, Inc., 20070 West Lincoln Avenue, New Berlin, WI 53146, Phone # (262) 547-5565; Fax # (262) 547-5589.
2. Western Fireproofing Co. of Kansas, Inc., 501 Westport Road Kansas City, MO 64111, Phone # (816) 561-7667; Fax # (816) 561-1911.
3. Elastizell Systems, Inc., 2475 Arbor Blvd., Dayton, OH 45439, Phone # (937) 298-1313; Fax # (937) 298-7949.
4. Lightcrete Systems, Inc., P.O. Box 601, Whitmore Lake, MI 48189, Phone # (734) 995-9203; Fax # (734) 995-9210.
5. Elastizell of St. Louis, Inc., 410 North Tenth Street, Valley Park, MO 63088, Phone # (866) 235-2662; Fax # (636) 225-0017.

D. The applicator and manufacturer must have been regularly engaged in the placement of Engineered Fill including completion of mass fills having a minimum of 10,000 cubic yards in the past five (5) years. The applicator shall be experienced and familiar with the requirements and the methods for proper performance of this work, and shall have worked on ten prior projects, involving Engineered Fill, that have performed satisfactorily for at least ten (10) years.

E. The specialized batching, mixing, and placing equipment shall have bulk handling equipment approved by the manufacturer. Bulk cement shall be weighed on a scale that operates within a tolerance of 1-1/2 percent per batch. Transit mixers and volumetric batching mixers are not acceptable for this low-density application.

F. The contractor shall submit to the City for review and approval the name and address of the certified applicator, a project list complying with the requirements of this section, manufacturer approval, and reports documenting the physical properties of the Engineered Fill to be used for this project. The contractor shall not proceed with this job until the manufacturer has certified the chosen applicator and the City has approved the applicator and all the other required submittals.

G. Work not included, but related to this section: Removing existing topsoil; stripping and disposing of any existing coal tar pitch membrane; cleaning the existing concrete surface; repairing cracks and joints before the Elastizell EF is cast; applying the waterproofing membrane; applying the prefabricated sheet drainage system and connecting it to the existing storm sewer; replacing the sloped topsoil over the drainage system; and planting grass seed.

PART 2 - PRODUCTS

A. The expansion material shall be Elastizell EF/JLE as manufactured by Elastizell Corporation of America, and shall meet the following properties:

	Class II
Maximum Cast Density	30 pcf
Minimum Compressive Strength @ 28 days	40 psi
Coefficient of Permeability (cm/sec) @ 13.8 kPa (2.0 psi)	1×10^{-5}
Frost Heave per BRRL LR90 (250 hour exposure) 11.43 cm (4.5") high x 10.16 cm (4") diameter	< 1.25 cm (0.5")

B. Portland cement shall comply with ASTM C150. Pozzolans and other cementitious materials may be used. The Elastizell Corporation of America shall design the mix. The contractor shall use potable water.

C. Admixtures may be used when specifically approved by the manufacturer of the Engineered Fill.

PART 3 - EXECUTION

A. The contractor shall evaluate the site conditions and the areas under which work of this section will be performed, and shall correct conditions detrimental to timely and proper completion of the work.

B. The contractor shall prepare the concrete surface of the existing roof according to Section 03700 of the specifications, and shall install the Engineered Fill in accordance with the procedures provided by Elastizell Corporation of America. The contractor shall clear the exposed roof surface of standing water, dirt, debris, ice, etc., prior to installing the Engineered Fill. The roof grades and items that will be encased in the fill shall be set and stable prior to installing the Engineered Fill.

C. The temperature must be above 32ºF and rising when placing the Engineering Fill. If temperatures below 32ºF are anticipated, follow manufacturers' procedures for the proper installation of Elastizell EF/JLE under these conditions.

D. The contractor shall follow the manufacturer instructions for applying and casting the Elastizell EF/JLE, and shall use approved job site batching, mixing, and placing equipment certified by the Elastizell Corporation of America. The contractor shall mix the materials and convey promptly to the point of placement, and shall cast the Engineered Fill in lifts.

E. The Engineered Fill finished surface shall be within ±0.16 foot of proposed plan elevation and shall be sloped at a minimum of 0.015 ft/ft. The summit of the engineered fill shall be along the north-south center line of the reservoir and shall be sloped in four directions to the structure's edge. The Engineered Fill shall be cast a minimum 2-inch thick at the edges, and therefore, shall not be feathered to zero.

F. Engineered Fill shall be installed in the vicinity of the access manholes in a way that ensures positive drainage away from manholes.

G. The finished surface shall be free of ridges and sharp projections to allow the roofing membrane to properly adhere to it. The City shall field inspect the finished surface to verify that it meets the smoothness requirements for proper installation of the roofing membrane. The contractor shall remedy any problems with the smoothness of the final surface finish to the satisfaction of the City.

H. During placement of the initial batches, the contractor shall sample and check the density and adjust the mix as required to obtain the specified cast density at the point of placement.

I. The contractor shall take four (4) test specimens for each 300 cubic yards of Engineered Fill placed or every four (4) hours of placing. The specimens shall be tested in accordance with ASTM C796 except they shall not be oven dried. The specimens shall be 3” diameter x 6" high cylinders covered after casting to prevent damage and loss of moisture. The specimens shall be moist cured at least seven (7) days prior to a 28-day compressive strength test. Specimens may be tested at any age to monitor the compressive strength. The contractor shall send the specimens to the manufacturer for testing, and shall submit the test results in written reports to the City.

J. Before installing the fully adhered waterproofing membrane, the contractor shall ensure proper curing of the Engineered Fill according to the manufacturer’s recommendations. Within 24 hours after a section of Engineered Fill has properly cured, the contractor shall install the waterproofing membrane or shall cover the newly cured sections with tarp sheets as specified in Section 02200. No properly and completely cured Engineered Fill sections may be left exposed for more than 24 hours.

END OF SECTION

SECTION 02950

SEEDING

PART 1 - GENERAL

1.01 SCOPE

A. This section covers seeding to be performed after backfilling and final grading are complete. All areas disturbed by construction operations shall be treated as specified herein.

B. All lawn, ditch, and shoulder areas that are damaged during the work shall be restored, after completion of construction, to the complete satisfaction of City. All areas disturbed by contractor outside the work area shall be restored, at contractor's expense, to the satisfaction of the City. Occupying areas outside City property, street right-of-way, and utility easements for any purpose shall be done only with the written approval of the property owner and City.

C. The contractor may use dry seeding or hydroseeding methods as outlined in this section to establish the required lawn construction and restoration. **No fertilizers or any other chemicals shall be used for seeding or site restoration.**

1.02 GENERAL

A. Governing Standard

1. The governing standard for the seeding Work shall be Wisconsin State Statutes, Chapter 94 (Seed Law) and Wisconsin Administrative Code, Chapter ATCP 20.

B. Experience

1. All work shall be performed by a licensed seeding contractor who is experienced in the type of Work required.

C. Completion

1. Seeding work shall be completed at any time the City allows. Seeding requirements are as follows:

a) Locations to be seeded: Disturbed sitework areas.

b) Area to be seeded: As required by the work on the drawings

1.03 SUBMITTALS

A. All submittals of drawings and data shall be in accordance with the requirements of Section 01010 and this Section.

1. Three weeks prior to grading, the contractor shall submit to the City for review seed samples and data showing seed mix composition and analysis. The contractor shall also submit the procedure on how it will be applied to the graded topsoil.

B. Invoices and Analysis Labels

1. A copy of supplier's invoices for all seed and mulch, which shows the quantity by weight purchased for the project and representative labels bearing the manufacturer's or vendor's guaranteed statement of analysis shall be submitted to City for review and approval to assure compliance with specified requirements for quality and application rates.

1.04 GUARANTEE

A. Contractor shall guarantee a uniform stand of seeding, free of weeds to the extent practical, and acceptable to City.

1.05 DELIVERY, STORAGE AND HANDLING

A. Seed shall be delivered to the site in its original, unopened container, labeled as to weight, analysis, and manufacturer. Store any seed delivered prior to use in a manner safe from damage from heat, moisture rodents, or other causes. Any seed damaged after acceptance shall be replaced by the contractor.

B. Prior to use, all products shall be kept dry and in a weatherproof location so that their effectiveness will not be impaired.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General

1. All materials shall conform to the requirements of the governing standard, except where otherwise specified. The source of materials shall be submitted to the City for review.

B. Grass Seed

1. Grass seed shall be mixed and guaranteed by the dealer to be as follows:

SEED MIXTURE

Ingredients	Minimum	Weight	Purity	Germination
Kentucky Bluegrass	38.25%	45%	85%	80%
Creeping Red Fescue	24.25%	25%	97%	90%
Kentucky 31 Fescue	9.80%	10%	98%	85%
Perennial Rye Grass	19.80%	20%	99%	90%
Inert Matter, Weed & Crop Seed	7.90% (Maximum)			

2. All grass seed shall conform to the requirements of Wisconsin State Statutes, Chapter 94 (Seed Law), and the Wisconsin Administrative Code Chapter ATCP 20, regarding noxious weed seed content and labeling. Seed shall not be used than one (1) year following the test date labeled.

3. Quality testing of seed shall be performed by a testing agency licensed in the State of Wisconsin. The agency shall receive representative materials proposed for use, test topsoil pH and analyze organic content, and provide recommendations for: a) soil additives to achieve desired pH factor; and b) nutrients to achieve the desired composition of the seeding bed.

4. Seed shall be delivered to the site in unopened containers, giving the manufacturer's guaranteed analysis. Each bag of seed shall have a label securely attached showing at least ingredient, minimum crop seed and germination.

5. Seed measurement shall be based on net masses of seed shipments, or by weight, using approved scales supplied by the contractor.

C. Fertilizer

1. No fertilizers or any other chemical shall be used in the topsoil mix, or for seeding, germination or any other site restoration work.

D. Water

1. Contractor shall use only City water for irrigation and other restoration work.

E. Mulch

1. Sedge marsh hay (not from reed canary grass) shall be clean, small-grained and air-dry, well seasoned, and free of rot, mildew and the seeds of noxious weeds.

2. Cellulose fiber mulch shall have prepared cellulose processed into a uniform fibrous state, containing nothing to inhibit the growth of grass seedlings.

F. Erosion Mat

On sloped areas greater than 3:1, and as determined by the City, the contractor shall furnish and install erosion mats as follows:

1. Erosion mats shall consist of a uniform web of interlocking wood excelsior fibers with a net backing on one side. The blanket shall be of a uniform thickness with the wood fibers evenly distributed over the entire area of the blanket. The blanket shall be furnished in rolled strips. The net backing shall have a mesh size not exceeding 1-1/2 by 3 inches and may be woven from twisted paper, cotton cord, a biodegradable plastic, or other approved material. The blanket shall be NSF approved.

2. Staples for anchoring the erosion mats in place shall be U-shaped, made of No. 11 gage or larger diameter steel wire, or other approved material, have a width of one or two inches, and a length of not less than six (6) inches.

PART 3 - EXECUTION

3.01 GENERAL

A. Execution of seeding work shall conform to the governing standard, or shall be as specified herein, whichever is the most stringent.

3.02 SEEDING

A. Clearing

1. Prior to finish grading, areas to be seeded shall be cleared to remove any stumps, stones larger than 3 inches, roots, cable, wire, or other materials that might hinder subsequent seeding or maintenance

B. Finish Grading

1. Finish grading shall result in a surface conforming to the contours indicated on the drawings. Depressions shall be filled with topsoil.

C. Seed Application – Dry Seeding

1. Seed shall be installed at the finished grade elevations on a surface prepared and finished to an even, loose and uniform surface. The areas to be seeded shall be dragged and raked to form a level and loose seedbed. A light rolling before final raking to locate soft spots and mounds shall be accomplished if necessary.

2. The seed shall be sown by means of equipment adapted to the purpose. The seed shall be sown at the rate of one (1) pound per three hundred (300) square feet of area. The seed shall be sown in two (2) applications using one-half (1/2) of the specified rate per application. The applications shall be at ninety (90°) degrees to each other. After seeding, the seed shall be covered with approximately one-quarter (1/4) inch of soil, and the area lightly rolled or compacted.

3. On hills and slopes, seed shall be broadcast. Broadcast seeding shall be uniformly distributed on designated areas. No seeding shall be done during windy weather.

4. Mulch shall be placed on the seeded area the same day as the seeding operation. Mulching operations shall not be performed during periods of excessively high winds. The placed mulch shall be loose enough to allow some sunlight to penetrate and air to slowly circulate, but thick enough to shade the ground, conserve soil moisture, and prevent or reduce erosion.

5. Straw mulch shall be placed uniformly over the area to a loose depth of one (1) to two (2) inches using one and one-half (1-1/2) to two (2) tons of straw per acre.

6. Cellulose fiber mulch shall be applied at a rate of 1,500lbs/acre. Cellulose fiber binding used to anchor straw mulch shall be applied at a net dry weight of 750lbs/acre. If mixed with water, the mixture shall be of a 1:2 cellulose fiber/water ratio.

7. The machine for placing the mulch shall be of an approved type that will blow or eject by constant air stream a controlled amount of straw. No chemicals shall be added to the spray. Mulch should be stabilized either by anchoring tools, plastic netting, or cellulose fiber. Liquid binders other than City water shall not be allowed. Lightweight plastic netting shall be laid as per manufacturer's recommendations. Anchoring stakes are to be either driven into the ground or removed after establishment of seed.

8. No seeding shall occur on frozen ground or at temperatures lower than 32° F (0° C).

D. Seed Application - Hydroseeding

1. Seed shall be installed at the finished grade elevations on a surface prepared and finished to an even, loose and uniform surface. The areas to be seeded shall be dragged and raked to form a level and loose seedbed. A light rolling before final raking to locate soft spots and mounds shall be accomplished if necessary.

2. The seed/water mix shall be spread on a properly prepared surface at the rate specified by the Manufacturer. The mix shall be continually agitated from time of mixing until time of application. No fertilizer shall be used in the mix.

3. Cellulose fiber included into a seed/water mix shall be diluted at a 1:2 fiber/water weight ratio. Cellulose fiber binding used to anchor straw mulch shall be applied at a net dry weight of 750 lbs./acre. If mixed with water, the mixture shall be of a 1:2 cellulose fiber/water weight ratio.

4. Apply seed such that adjacent surfaces remain clean and free of the mix.

5. Straw shall be applied by hand or by blower at a maximum thickness of ½ inches and stabilized. Straw should be stabilized either by anchoring tools, plastic netting, or cellulose fiber. Liquid binders other than City water shall not be allowed. Lightweight plastic netting shall be laid as per manufacturer's recommendations. Anchoring stakes are to be either driven into the ground or removed after establishment of seed.

6. No seeding shall occur on frozen ground or at temperatures lower than 32° F (0° C).

E. Erosion Mat

1. Erosion mats are to be placed in areas with a slope greater than 3:1, or as determined by the City.

2. The contractor shall place the erosion mats immediately after seeding operations have been completed. The mats shall bear continuously on the soil and shall have their lateral edges impressed in the soil to permit runoff water to flow over it.

3. Any seeded areas damaged during erosion mat placement shall be re-seeded as specified at the contractor's expense.

4. Following the placement of the mats, water shall be uniformly applied to the areas sufficiently to moisten the seedbed to a depth of 2 inches and in a manner to preclude washing or erosion.

5. The contractor shall maintain the erosion mats and make satisfactory repairs of any areas damaged by erosion, traffic, or other causes until acceptance of the work.

3.03 MAINTENANCE

A. Waste and excess material from the seeding operation shall be promptly removed. Adjacent paved areas are to be cleaned, and any damage to existing adjacent turf areas shall be repaired.

B. Seeded areas are to be watered daily to maintain adequate surface soil moisture for proper seed germination. Watering equipment shall be installed the same day or the day following seeding. Watering equipment shall include sprinklers that completely and effectively cover the entire seeded area with a uniform spray of water. The sprinklers shall be attached by hose to a manifold, which in turn shall be connected to a water supply at the water plant.

C. The entire sprinkling system shall be on automatic timer set to water the area daily. The duration of daily watering shall be set to produce optimum germination and growth results, and shall last for at least four (4) weeks. After initial setting of the timer, the contractor shall revisit the site at adjust sprinkler duration.

D. Thirty (30) days after seeding, the contractor shall repair all erosion damage caused by rain and re-seed areas where grass population is sparse as directed by the City.

END OF SECTION

SECTION 03700

CONCRETE ROOF CLEANING AND REPAIRS

PART 1- GENERAL

A. The contractor shall furnish all labor, equipment, tools, supervision, materials and incidentals required to complete the necessary surface preparation of the existing concrete roof prior to the installation of Engineered Fill as specified in Section 02223.

B. The contractor shall obtain all permits required to remove and dispose of roofing materials containing asbestos.

C. Prior to installing the Engineered Fill, the contractor shall strip the entire exposed roof surface of any existing coal tar pitch/felt waterproofing membrane and dispose of it properly, and sweep the surface, removing any deteriorated or spalled concrete, standing water, dirt, debris, ice, etc. The contractor shall seal all construction/structural joints and roof cracks that are wider than 1/16" with an approved polyurethane elastomeric sealant such as *Sikaflex®-1a* or an approved equal. The applied sealant must be NSF-approved for potable water contact and must be compatible with the Engineered Fill.

D. If any cracks wider or deeper than 1/2-inch are found during the course of this project, the contractor shall not apply a sealant to the crack or joint. Instead, the contractor shall install an 8-inch wide strip of the *Sure-Seal Kleen* ® EPDM waterproofing membrane specified in Section 07100. The 8-inch wide membrane strips shall be installed along the full length of the joint or crack and shall be adhered to the roof surface with *Sure-Seal Solvent-Free EPDM Bonding Adhesive*.

E. As specified in Section 02200, the contractor shall keep in place the secured tarp cover on all exposed roof areas that are not being worked on to minimize the possibility of leakage of rain water into the reservoir. Once surface preparation is completed on an area, it shall be re-covered with secured tarp until the Elastizell Engineered Fill is applied. No roof areas shall be left exposed over night without tarp cover.

F. The City and the *Elastizell® Engineered Fill* applicator shall inspect and approve roof areas where surface preparation has been completed. No fill shall be applied until this approval has been issued.

G. As stated in the Job Requirements Section of the specifications, the contractor shall provide a unit price, per lineal feet, for repairing and sealing all roof joints and cracks. According to the reference drawings, there are ten (10) construction joints running in the north-south direction and four running in the east-west direction at an approximate total length of 4,680 lin. ft.

PART 2 - PRODUCTS

A. All products used for cleaning, repairing, and sealing roof joints and cracks including primers, sealants, adhesives, and membrane material shall be certified as NSF-61, approved for potable water contact, and shall be compatible with the *Elastizell® Engineered Fill*. Sealant used for roof joints shall be suitable for the expansion and contraction of the existing structural and construction joints.

B. Crack and joint sealant shall be *Sikaflex®-1a* one part polyurethane elastomeric sealant as manufactured by Sika Corporation, 201 Polito Avenue, Lyndhurst, NJ 07071, Ph# (800) 933-7452, Fax# (201) 933-6225, www.sikausa.com, or an approved equal.

C. The 8-inch wide waterproofing membrane strips shall be 0.060-inch thick, non-reinforced *Sure-Seal®* Ethylene Propylene Diene Monomer/Trepolymer (EPDM) as manufactured by Carlisle SynTec Incorporated, P.O. Box 7000, Carlisle, PA 17013-0925, Ph # (800) 479-6832, www.carlislesyntec.com. The strips shall be directly adhered to the roof's concrete surface using *Sure-Seal Solvent-Free EPDM Bonding Adhesive*. The surface and ambient temperature must be at least 40°F and rising when applying the adhesive.

PART 3 - EXECUTION

A. The contractor shall strip the entire exposed roof of any existing waterproofing membrane and dispose of it properly, as required per regulations, and sweep clean the exposed roof surface to remove all soil and clear it of standing water, dirt, debris, ice, etc. The existing concrete roof may or may not be waterproofed with any tar pitch\organic felt membrane. The contractor shall remove all deteriorated or spalled concrete so as to ensure proper bonding of the Engineered Fill to the existing concrete roof. No water, chemicals, or any other liquids shall be used in the roof cleaning process.

B. The contractor shall take all necessary measures to ensure that no sealant material shall permeate or seep into the treated water in the reservoir.

C. The contractor shall follow the sealant's manufacturer recommendations for applying sealant material, and shall allow all sealant to cure per manufacturer's recommendations before applying the Engineered Fill.

D. All cracks over 1/16-inch in width and all moving cracks under 1/16-inch in width shall be routed out to ¼-inch minimum in width and depth and filled flush with *Sikaflex®-1a* one part polyurethane elastomeric sealant or an approved equal.

E. All expansion, construction, and structural joints equal to or less than ½-inch wide shall be cleaned, primed, fitted with a closed cell backer rod and sealed with *Sikaflex®-1a* one-part polyurethane elastomeric sealant or an approved equal.

F. If any cracks and/or joints wider or deeper than 1/2-inch were found, the contractor shall not apply a sealant and shall instead install an 8-inch wide strip of *Sure-Seal Kleen®* EPDM waterproofing membrane along the full length of the joint or crack. The membrane strip shall be centered over the joint or crack, and shall be adhered to the roof surface with *Sure-Seal Solvent-Free EPDM Bonding Adhesive*.

END OF SECTION

SECTION 03701

INTERNAL CONCRETE CRACK REPAIR

PART 1- GENERAL

A. The contractor shall furnish all labor, equipment, tools, supervision, materials and incidentals required to complete the necessary surface preparation and repairs to internal concrete cracks.

B. As stated in the Job Requirements Section of the specifications, the contractor shall provide a unit price, per lineal feet, for repairing internal cracks.

C. The quantity of crack repair (lin. ft.) will be determined from the preliminary "dry" interior clearwell, reservoir, and tunnel inspection reports.

D. The contractor shall obtain all permits required to make the necessary repairs.

PART 2 - PRODUCTS

A. All products used for cleaning, repairing, and sealing roof joints and cracks including primers, sealants and adhesives shall be certified as NSF-61, approved for potable water contact.

B. Crack and joint compound shall be cementitious-type slurry that produces a non-soluble crystalline formation to seal cracks. A fast-setting, non-shrink, high-bond-strength hydraulic cement compound will also be needed for concrete patching and repair. Products to use: *XYPEX Concentrate* and *XYPEX Patch'n Plug* as manufactured by Xypex Chemical Corporation, www.xypex.com, or an approved equal.

PART 3 - EXECUTION

A. The contractor shall provide materials and erect any required scaffolding to do the crack repair.

B. The contractor shall remove all deteriorated or spalled concrete so as to ensure proper bonding of the cementitious slurry to the existing concrete surface

C. The contractor shall chip away at the crack to provide a U-shape trench with a width of 1-inch and a depth of 1.5-inch.

D. The contractor shall follow the crystalline waterproofing system manufacturer recommendations for applying cementitious slurry and hydraulic cement patching compound, and shall allow all materials to cure per manufacturer's recommendations.

E. The contractor shall supply any heat required for the proper application and curing of materials.

END OF SECTION

SECTION 06100

ROUGH CARPENTRY

PART 1 GENERAL

1.01 DESCRIPTION

A. Section includes requirements for the installation of miscellaneous carpentry as indicated in specification sections and on the Construction Drawings, including, but not limited to, rough carpentry in conjunction with other work, blocking, scaffolding, nailers, and sheathing panels.

1.02 SUBMITTALS

A. Submit under provisions of Section 01010 Summary of Work.

B. Product Data:

1. Submit manufacturer’s descriptive literature and product specifications for each product.

2. Include data to indicate use.

1.03 DELIVERY, STORAGE AND HANDLING

A. Comply with requirements of Section 01600 Material and Equipment.

PART 2 PRODUCTS

2.01 DIMENSIONAL LUMBER

A. Wood blocking in nominal thickness:

1. Blocking shall be Grade #2 or better, complying with lumber producer's inspection agency grading rules certified as conforming to the "National Grading Rule for Dimension Lumber", by the Board of Review of the American Lumber Standards Committee (ALSQ, established under Section 10 of PS-20.

2. Dimensional lumber shall be smooth four sides (S4S), unless otherwise shown or indicated.

3. Dimensional lumber shall be seasoned, with nineteen percent (19%) maximum moisture content at time of dressing, complying with the dry size requirements of PS-20. Lumber shall be marked "S-Dry."

4. Dimensional lumber shall be:

   a) Nailers: nominal size as indicated on the Construction Drawings.

   b) Blocking: nominal size as indicated on the Construction Drawings.

   c) Cant Strips: diagonal saw-cut from 2x2 or 4x4 dimensional lumber, as indicated on the Construction Drawings.

   d) Plywood: thickness as indicated on the Contract Drawings for use as shim material beneath nailers.

2.02 PRESERVATIVE TREATED WOOD

A. "Treated wood" shall be dimensional lumber pressure-treated with water-borne preservatives for exterior use, complying with AWPB LP-22, 0.40 retention, and marked "Wolmanized" or certified as an equal.

B. Treated wood shall be kiln-dried to maximum moisture content of fifteen percent (15%) following treatment with water-borne preservatives.

2.03 PLYWOOD

A. Minimum thickness: ½-inch, 4-ply.

B. Interior grade C-D or better, with exterior glue (CDX), conforming to the rating of the American Plywood Association (APA), PS 1-83.

C. Thickness to match existing decking.

2.04 FASTENERS

A. Carpentry to wood substrate:

1. Common wire nails with galvanized coating.

2. Length as necessary to penetrate the substrate by a minimum of 1-1/2 inches.

3. Nail sizes:

    a) One (1) inch nominal thickness decking - 12d.

    b) Two (2) inch nominal thickness decking - l6d.

    c) Three (3) inch nominal thickness decking - 20d.

    d) Four (4) inch nominal thickness decking - 30d.

B. Carpentry to concrete or solid masonry substrate

1. Tapper, 1/4-inch diameter, Phillips-head screw, by Powers Fastening, Inc., New Rochelle, NY. Length as necessary to provide a minimum of 1-inch embedment.

2. Tapcon 1/4-inch diameter, Phillips-head screw by Buildex Division of ITW, Inc., Itasca, IL, or approved equal. Length as necessary to provide a minimum of 1-inch embedment.

C. Carpentry to hollow masonry substrate:

1. Sleeve anchor by Hilti Fastening Systems, Tulsa, OK, or approved equal. Length as necessary to penetrate a minimum of 1-inch into the interior of the hollow masonry units.

2. Tapper, 1/4-inch diameter, Phillips-head screw, by Powers Fastening, Inc., New Rochelle, NY, or approved equal. Length as necessary to provide a minimum of 1-inch embedment.

3. Tapcon, 1/4-inch diameter, Phillips-head screw by Buildex Division of ITW, Inc., Itasca, IL, or approved equal. Length as necessary to provide a minimum of 1-inch embedment.

D. Carpentry to sheet metal substrate:

1. Self-drilling sheet metal screws, cadmium plated.

2. Length shall penetrate the substrate by a minimum of 1-inch.

3. 10-24 wafer-head Plymetal TEKS/3 with wings by the Buildex Division of ITW, Inc. Itasca, IL, or approved equal.

E. Carpentry to structural steel:

1. Self-drilling sheet metal screws, cadmium plated.

2. Length shall penetrate the substrate by a minimum of 1-inch.

3. 12-24 flat-head TEKS/4 by Buildex Division of ITW, Inc. Itasca, IL, or approved equal.

F. Carpentry to gypsum or cementitious wood fiber roof decking:

1. NTB- I H screw with 1-inch head and locking wire barbs by Olympic Manufacturing Group, Inc., Agawam, MA, or approved equal. Length as necessary to achieve required pull-out resistance (225 lbs.) without penetrating the underside of the roof deck.

2. Toggle Bolt assembly, 1/4-inch diameter with flat head, Powers Fastening, Inc., New Rochelle, NY, or approved equal. Length as necessary for toggle wings to properly engage the bottom side of the roof deck. Note: The contractor shall request Written Approval, from the City, prior to using this fastener in an area where the deck is exposed.

PART 3 EXECUTION

3.01 CARPENTRY INSTALLATION

A. General Requirements

1. Do not use lumber or materials that are unsound, warped, bowed, twisted, inadequately seasoned, or too small to fabricate the work with a minimum of joints.

2. Fit carpentry work to other work. Produce joints of which are tight, true and well fastened.

3. Set carpentry accurately to required levels and lines with members plumb and true.

4. Attach carpentry to substrates in accordance with recognized standards.

a) Countersink the new fastener heads flush with top of wood members. Hollow out bottom of new wood members, if necessary, to fit over existing exposed bolt heads that are not countersunk.

b) Countersink the nail heads on exposed carpentry and fill holes.

5. Select fastener size that will not penetrate members where opposite side will be exposed to view or will receive finish materials.

6. Threaded fasteners shall be turned into place, not driven.

7. Fasteners shall be tightened at installation and re-tightened as required prior to closing in or at completion of work.

B. Examine existing nailers and blocking which conforms to the Construction Details at walls, edges, expansion joints, hatches, pipes or curbs.

1. Replace deteriorated sections with new dimensional lumber of the same size.

2. Enhance existing fastening to secure as required.

C. Install new wood nailers and blocking to achieve thickness and elevations required by the Construction Details.

1. Secure to substrate as shown on the Construction Details.

2. Install additional fasteners, as required to counteract minor warpage or variances in substrate, and to hold tight and true to lines.

3. When using multiple nailer courses, weave comers and stagger end joints a minimum of 3-feet from underlying course.

4. Provide blocking to achieve a minimum of 8-inch height above finished roof surface.

3.02 CLEANING

A. General: Comply with requirements of Section 01500.

B. Wood chips, shavings, sawdust and other debris shall be swept up and removed from the work area daily prior to installation of subsequent roofing components.

END OF SECTION

SECTION 07100

WATERPROOFING MEMBRANE

PART 1 - GENERAL

A. The contractor shall provide all labor, material, tools, equipment, and supervision necessary to supply and install a fully adhered Ethylene Propylene Diene Monomer/Terploymer (EPDM) sheet-applied waterproofing membrane, with minimum thickness of 60 mil (0.060in.). The membrane shall be adhered directly to the finished surface of the *Elastizell® Engineered Fill.*

B. The membrane shall be *Sure-Seal® Adhered Roofing System* as manufactured by Carlisle SynTec Systems Incorporated, P.O. Box 7000, Carlisle, PA 17013-0925, Phone # (800) 479-6832, www.carlislesyntec.com. The roofing system shall consist of 0.060-inch thick non-reinforced *Sure-Seal Kleen®* EPDM membrane sheets adhered directly to the Engineered Fill with *Sure-Seal Solvent-Free EPDM Bonding Adhesive.* Adjoining sheets of membrane shall be spliced together a minimum of 5½" using *Sure-Seal Pressure Sensitive SecurTAPE ®* and *Low-VOC EPDM Primer*. **No substitutions will be allowed for material or for execution of this WIDNR stipulated item.**

C. The contractor shall acquire the services of a Carlisle Authorized Roofing Applicator that shall install this roofing system in compliance with the shop drawings as approved by Carlisle and by the City. A list of Authorized Applicators can be obtained from Wisconsin's Carlisle representative: Weather-Tek Building Products, 21605 Gateway Court, Brookfield, WI 53045, Phone # (262) 373-4277, Fax # (262) 373-4279.

D. Upon completion of the installation, the contractor shall contact the manufacturer for an inspection to be conducted by a technical representative of Carlisle to ascertain that the roofing system has been installed according to Carlisle's specifications and details.

E. The contractor shall schedule and execute work in a manner that would prevent leaks and excessive foot traffic on completed roof sections. No vehicles, heavy machinery or equipment shall be allowed on top of roof sections with installed membrane. Care should be exercised to ensure water does not flow beneath any completed sections of the membrane system.

F. SUBMITTALS

After Notice to Proceed is issued, and in accordance with Section 01010, the contractor shall submit to the City for review and approval the following items:

1. Shop drawings that are pre-approved by Carlisle, showing layout of waterproofing areas; type of penetrations, terminations, perimeter, and special details of construction; and identification of materials and MSDS.
2. Manufacturer's product literature and installation instructions.
3. Sample of the manufacturer's membrane system warranty.
4. Letter from the manufacturer certifying the Applicator as authorized by Carlisle to install this roofing system, and listing foremen who have received training from the manufacturer along with the dates training was received.
5. Certification of the manufacturer's warranty fund reserve.
6. Upon completion of the installed work and prior to the issuance of the manufacturer's warranty, the contractor shall submit to the City copies of the manufacturer's final inspection.

G. MATERIAL DELIVERY, HANDLING, AND STORAGE

1. The contractor shall deliver materials to the project site in original, factory-sealed, unopened containers bearing manufacturer's name and label intact and legible showing the name of the material, the manufacturer's stock number and date of manufacture, along with the MSDS.
2. The contractor shall deliver material in sufficient quantity to permit work to continue without interruption.
3. The contractor shall comply with the manufacturer's written instructions for proper material storage by storing materials, except membrane, between 60°F and 80°F in dry areas protected from water and direct sunlight. If exposed to lower temperature, materials shall be restored to 60°F minimum temperature before installation.
4. The contractor shall use materials containing solvents before expiration of their shelf life, and shall store them in dry, well-ventilated spaces with proper fire and safety precautions keeping the container lids on tight.
5. The contractor shall remove and replace any materials that are damaged due to storage, transportation, and/or handling at the contractors' expense.

PART 2 - PRODUCTS

A. GENERAL

1. Products specified in this section, including membrane, adhesives and sealants, fasteners, fastening plates and edgings must be manufactured and supplied by Carlisle SynTec Incorporated, and covered by the warranty, unless otherwise approved by the City and accepted by Carlisle.
2. The waterproofing membrane and adhesives shall be compatible and acceptable for use over the *Elastizell® Engineered Fill*.

B. MEMBRANE

The waterproofing membrane shall be 0.060-inch thick, non-reinforced *Sure-Seal Kleen®* Ethylene Propylene Diene Monomer/Terpolymer (EPDM) sheets adhered directly to the Engineered Fill. The membrane shall conform to the physical properties of ASTM D4637.

C. ADHESIVES AND SEALANTS

1. The membrane shall be fully adhered to the finished surface of the Engineered Fill using *Sure-Seal Solvent-Free EPDM Bonding Adhesive*. The ambient and surface temperature must be at least 40°F and rising when applying the adhesive.
2. Adjoining sheets of membrane shall be spliced together a minimum of 5½-inch using a 6-inch wide *Sure-Seal Pressure Sensitive SecurTAPE ®* and *Low-VOC EPDM Primer*.
3. The membrane shall be terminated and sealed at the edges using *Sure-Seal Termination Bar* and *Sure-Seal Water Cut-off Mastic*.

D. FASTENERS AND PLATES

Subject to the approval of the City and in compliance with Carlisle's installation guidelines, the following Carlisle manufactured fasteners and other materials may be used to further secure the membrane at edges and around roof penetrations:

1. HP Fasteners: A threaded, black epoxy electro-deposition coated fastener used with steel and wood roof decks.
2. HP Term Bar Nail-Ins: A 1-1/4 inch long expansion anchor with a zinc plated steel drive pin used for fastening the *Sure-Seal Termination Bar* or *Seam Fastening Plates* to concrete, brick, or block walls.
3. Seam Fastening Plates: A 2-inch diameter FM approved metal plate used in conjunction with RUSS or with EPDM membrane to secure the membrane.

4. RUSS (*Reinforced Universal Securing Strip*): A 6 or 9-inch wide, 100 foot-long strip of *Sure-Seal* reinforced EPDM membrane. The 6-inch wide RUSS is utilized horizontally or vertically (in conjunction with *Seam Fastening Plates*) below the EPDM membrane to further secure the membrane. The 9-inch wide RUSS is used in conjunction with metal edgings to allow the continuation of the EPDM deck membrane as flashing in accordance with Carlisle details.

E. OTHER PRODUCTS

Subject to the approval of the City and in compliance with Carlisle's installation guidelines, the following Carlisle manufactured products may be used if the need arises:

1. Sure-Seal Pressure-Sensitive Pre-Molded Pipe Flashing and Pourable Sealer Pockets.
2. Sure-Seal Pressure-Sensitive T-Joint Covers.
3. Cured and uncured EPDM / Elastoform Flashing, and Pressure-Sensitive Flashing.
4. Pressure-Sensitive Inside/Outside Corners.

PART 3 - EXECUTION

A. GENERAL

1. The contractor shall comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, jobsite considerations and weather restrictions.
2. When feasible, begin the application at the highest point of the highest roof level and work to the lowest point to prevent moisture infiltration and to minimize construction traffic on completed sections. This shall include completion of all flashings and terminations.
3. Position membrane sheets to accommodate contours of the roof deck and shingle splices to avoid bucking water.
4. No heavy machinery or equipment shall be allowed on top of completed roof sections. Contractor shall follow Carlisle published instructions to prevent leaks and excessive traffic on completed roof sections.

B. SUBSTRATE PREPARATION

1. Before any waterproofing work is started, the waterproofing applicator shall thoroughly inspect finished surface of the *Elastizell® Engineered Fill* for any deficiencies. The contractor shall submit to the City a written report of the inspection findings and final condition of the substrate-finished surface, indicating that it is even without noticeable high spots or depressions and that it meets Carlisle's requirements for adequate application of the waterproofing system.

2. Should any deficiencies exist with the Engineered Fill, the contractor shall coordinate between the Engineered Fill Applicator and the waterproofing applicator to make all necessary corrections. All expenses associated with these necessary corrections shall be the responsibility of the contractor and the subcontractors, and the City shall not incur any of the associated costs.
3. Upon correction of substrate deficiencies and before any waterproofing work is started, the contractor shall submit to the City a written report of all the corrections and final condition of the substrate finished surface.
4. The waterproofing applicator shall follow the criteria outlined in the "Design Criteria" section of Carlisle's technical manual to prepare the roof deck or the substrate prior to the application of the new roofing system.
5. The waterproofing applicator shall clear the substrate of debris and foreign material, and shall ensure that the substrate is free of accumulated water, ice or snow.

C. MEMBRANE PLACEMENT

1. Unroll and position membrane without stretching. Allow the membrane to relax for approximately 1/2 hour prior to splicing.
2. Fully adhere the EPDM membrane to the sloped finished surface of the *Elastizell® Engineered Fill* with *Sure-Seal Solvent-Free EPDM Bonding Adhesive* at the rate specified on the container label. The ambient and surface temperature must be at least 40°F and rising when applying the adhesive.
3. Install adjoining membrane sheets in the same manner; overlapping edges a minimum of 5½ inches.

D. MEMBRANE SPLICING WITH SECURE TAPE

1. Overlap adjacent sheets a minimum of 5½ inches and mark a line, on the bottom sheet, 1/2 inch out from the edge of the top sheet.
2. Fold the top sheet back and apply *Low-VOC EPDM Primer* to the dry splice area of the top and bottom membrane sheets.
3. Position and apply a 6-inch wide *Sure-Seal Pressure Sensitive SecurTAPE ®* onto the bottom sheet with the edge of the tape's release film along the marked line.
4. Press the tape onto the bottom sheet using hand pressure. Remove the release film and press the top sheet onto the tape using hand pressure.
5. Roll the splice with a 2-inch wide steel roller.
6. Install a 6-inch wide section of Pressure-Sensitive Flashing over all field splice intersections and seal edges of flashing with Lap Sealant.

E. MEMBRANE FLASHING AND TERMINATION

1. The membrane shall be terminated and sealed at the edges of the reservoir roof, expansion joints, and around hatches, vents, and other penetrations using *Sure-Seal Termination Bar* and *Sure-Seal Water Cut-off Mastic*, as shown on Carlisle's standard detail drawing U-9D.
2. The *Sure-Seal Termination Bar* is a 1-inch wide, and 0.098-inch thick extruded aluminum bar, pre-punched 6 inches on center. It incorporates a sealant ledge to support *Cut-off Mastic* sealant and provide increased stability for membrane terminations.
3. Follow Carlisle's typical flashing procedures for all wall, and penetration flashing including metal edging and roof drain applications, and terminate the flashing in accordance with the appropriate Carlisle U-9 Termination.
4. Raise all curbs, vent pipes and roof penetrations as required to flash per Carlisle's specifications.

F. MEMBRANE PROTECTION AT RESERVOIR EDGE

1. One-inch thick extruded polystyrene (XEPS) insulation shall be installed vertically, as shown on Contract Drawing WP-318-03, along the reservoir perimeter to protect the waterproofing membrane flashing from the reservoir edge down to past the termination bar.
2. The extruded polystyrene insulation shall be installed by hand and held in place by soil during construction.

G. DAILY SEAL

1. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
2. Use Sure-Seal Pourable Sealer or other acceptable membrane seal in accordance with the manufacturer's requirements.

H. CLEAN UP

1. Perform daily clean up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in accordance with the ECIP, all other provisions stated in these specifications, and all local, state and federal regulations.
2. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

END OF SECTION

SECTION 07150

SOIL DRAINAGE SYSTEM

PART 1 - GENERAL

A. The contractor shall provide all labor, material, tools, equipment, and supervision necessary to supply and install a *Prefabricated Soil Sheet Drainage System* that shall act as the subsoil hydrostatic water relief system for the reservoir roof and the waterproofing membrane.

B. The contractor shall provide all labor, material, tools, equipment, and supervision necessary to connect the prefabricated soil sheet drainage system to the existing sewer, including outlet connectors, adapters, prefabricated piping, 8-inch Polyvinyl Chloride (PVC) piping, and manholes. The contractor shall obtain a plumbing permit and all required permits to connect to the existing storm sewer system.

C. The soil drainage system shall consist of *AMERDRAIN® 500/520* and *TOTALDRAIN™ Prefabricated Soil Sheet Drains*, along with outlet connectors, adapters and prefabricated piping, as manufactured by American Wick Drain Corporation, 1209 Airport Road, Monroe, NC 28110, Phone # (800) 242-9425, Fax# (704) 238-0220, www.americanwick.com. **No substitutions will be allowed for material or for execution of this WIDNR stipulated item.**

D. Prior to installing the prefabricated sheet drainage system, the contractor shall attend a meeting to be held by the City at the jobsite to clarify and coordinate installation procedures. Representatives of the prefabricated drainage system and the waterproofing membrane system manufacturers, along with representatives from subcontractors with work related to the drainage system, shall also attend the meeting.

E. The soil drainage system shall be laid out in a manner such that the resulting lateral water flow and drainage shall be in the directions as shown on Contract Drawing HC-09-03, away from the reservoir through the collector piping and into the existing sewer system.

F. The contractor shall schedule and execute work in a manner that would prevent leaks and excessive foot traffic on completed roof sections. No vehicles, heavy machinery, or equipment shall be allowed on top of roof sections with installed membrane or sheet drains.

G. Upon completion of the installation and before backfilling, the contractor shall contact the manufacturer of the soil drainage system "American Wick Drain Corp." and the waterproofing membrane manufacturer "Carlisle Inc." for an inspection to be conducted by their technical representatives. The inspection shall ascertain that the soil drainage system has been installed according to the manufacturer's specifications and details.

H. SUBMITTALS

In accordance with Section 01010, the contractor shall submit to the City for review and approval the following items:

1. Manufacturer's product data and installation instructions and MSDS of all products.
2. Shop drawings and manufacturer's details showing layout of the sheet drain system on the roof and around the edges of the reservoir. Shop drawings shall show slope of the sheet and dual-section drains, direction of water flow, and details of connecting the dual-section sheet drains to the existing sewers.
3. Shop drawings showing project specific details for all conditions that are not covered by manufacturers' standard details.
4. Manufacturer's letter of certification stating that system flow rate meets or exceeds the specified rate.
5. Samples of each component of sheet drainage system.
6. Test reports from a qualified testing agency certifying materials meet or exceed specified physical properties.
7. Sample of the manufacturer's prefabricated drainage system warranty.
8. Letter from waterproofing membrane manufacturer "Carlisle Inc." indicating approval of proposed prefabricated drainage system as a protection course for the waterproofing membrane.

I. MATERIAL DELIVERY, HANDLING, AND STORAGE

1. The contractor shall deliver materials to the project site in original, factory-sealed, unopened containers bearing manufacturer's name and label intact and legible showing the name of the material, the manufacturer's stock number and date of manufacture, along with the MSDS.
2. The contractor shall deliver material in sufficient quantity to permit work to continue without interruption.
3. The contractor shall comply with the manufacturer's written instructions for proper material storage by storing materials in dry areas protected from water and direct sunlight. Material shall remain in original packing containers until time of installation.
4. The contractor shall comply with the manufacturers' written instructions for proper material handling and installation and shall protect the sheet drains and fabric from direct sunlight during installation.

5. The contractor shall remove and replace any materials that are damaged due to storage, transportation, and/or handling at the contractors' expense.

PART 2 - PRODUCTS

A. GENERAL

1. All products specified in this section, including prefabricated sheet and dual-section drains, filter fabric, film, adhesives, end connecters and adapters, and prefabricated collecting outlet pipes must be manufactured and supplied by American Wick Drain Corporation, and covered by the warranty, unless otherwise approved by the City and accepted by American Wick Drain Corporation.
2. The sheet drainage system materials shall be compatible and acceptable for use over the *Sure-Seal*® waterproofing membrane system.

B. HORIZONTAL SHEET DRAIN - *AMERDRAIN*® *500/520*

1. The horizontal prefabricated soil sheet drain system shall be suitable for installation on sloped surface over a waterproofing membrane. It shall be suitable for use as subsoil drainage system where it will be directly covered with topsoil, and where high compressive strength and high flow capacity are required.
2. The horizontal sheet drain system shall be *AMERDRAIN*® *500/520* as manufactured by American Wick Drain Corporation. The sheet drains shall be three-part composite system consisting of a formed polystyrene (plastic) core covered with a non-woven, needle-punched polypropylene (geotextile) filter fabric on the dimple side of the core, with a polymeric film on the backside of the core.
3. The horizontal sheet drains shall have the following properties:
    a) Flow capacity per unit width: 16gpm/ln. ft. of surface per ASTM D4716
    b) Roll length: 104 ft.
    c) Roll width: 4 ft.
    d) Roll weight: 83 lbs.
4. The geotextile filter fabric shall prevent soil debris from infiltrating while allowing water to pass into the drain core, and shall have the following properties:
    a) Material: Polypropylene
    b) Grab tensile: 110 lbs. per ASTM D4632
    c) Puncture: 65 lbs. per ASTM D3786
    d) Mullen burst: 215 psi per ASTM D3786
    e) Elongation: 60% per ASTM D4632
    f) AOS Std.: 100 sieve per ASTM D4751
    g) Flow rate: 150 gpm/sq ft per ASTM D4491

5. The formed plastic core shall allow the water to flow to designated drainage exits promoting positive drainage, and shall have the following properties:
    a) Material: Polystyrene with polymeric sheet on flat side of core
    b) Thickness: 7/16 inch per ASTM D1777
    c) Compressive Strength: 15,000 lbs./sq. ft per ASTM D1621-mod.
6. The polymeric film shall provide extra protection for and compatibility with the waterproofing membrane and shall prevent the membrane from folding into the backside of the sheet drain.

C. DUAL-SECTION SHEET DRAIN - *TOTALDRAIN™*

1. The dual-section sheet drain system shall be *TOTALDRAIN™* sheets as manufactured by American Wick Drain Corporation. The sheets shall be a combination of *AMERDRAIN® 500/520* section with a manufactured transition to a high-profile *TOTALDRAIN™* section.
2. *TOTALDRAIN™* sheets shall collect drainage water from the horizontal sheet drains and surrounding soil, and provide a high-capacity water flow to the designated drainage outlets and sewer connections.
3. *TOTALDRAIN™* sheets shall be two-part composite system consisting of a formed polystyrene (plastic) core covered with a non-woven, needle-punched polypropylene (geotextile) filter fabric on the dimple side of the core.
4. The sheets shall have the following properties:
    a) Flow Capacity:
        Sheet Section: 16 gal./min./ft.
        High Profile Section: 100 gal./min./ft.
    b) Core Thickness:
        Sheet Section: 7/16 inch
        High Profile Section: 1 inch
    c) Roll Length: 50 ft.
    d) Roll Width: 2 ft.
    e) Roll Weight: 30 lbs.
5. The geotextile filter fabric and the plastic core of the *TOTALDRAIN™* sheets shall have properties that match the fabric and core properties of the *AMERDRAIN® 500/520* as previously outlined in this section.

D. OUTLET CONNECTERS, ADAPTORS, AND PIPING

Subject to the approval of the City and in compliance with American Wick Drain Corporation installation guidelines, the contractor shall supply and install the following products as needed:

1. Outlet fittings including end and tee connectors as manufactured by American Wick Drain Corporation. Connectors shall be compatible with *AMERDRAIN® 500/520* and *TOTALDRAIN™ Prefabricated Soil Sheet Drains.*

2. Adapters and prefabricated outlet piping as manufactured or approved by American Wick Drain Corporation. Adapters and prefabricated outlet piping shall be compatible with all outlet fittings and *AMERDRAIN® 500/520* and *TOTALDRAIN™ Prefabricated Soil Sheet Drains.*
3. Fernco® adaptors to connect the prefabricated outlet piping to the proposed 8" sewer lateral, as manufactured by Fernco Inc., 300 South Dayton Street, Davison, MI 48423, Phone #(800) 521-1283, Fax #(810) 653-8714.
4. Outlet fittings, adapters, and prefabricated piping may be schedule 40 PVC pipe or corrugated polyethylene pipe.
5. Sewer lateral piping shall be 8-inch PVC pipe as set forth in ASTM D3034. Sewer manholes shall be standard 3-inch to 6-inch diameter, precast reinforced concrete, Class 3300.
6. The sizes and material of the outlet connectors, adapters and prefabricated outlet piping, shall be compatible with the proposed 8-inch sewer lateral piping.

PART 3 - EXECUTION

A. GENERAL

1. The contractor shall comply with all coordination and installation procedures established in the meeting that shall be held by the City at the jobsite as outlined in PART 1, paragraph D of this section.
2. The contractor shall follow the manufacturer's instructions for installing the soil drainage system including proper preparation of the installed waterproofing membrane, jobsite considerations and weather restrictions.
3. Verify that site conditions are acceptable for installation of prefabricated sheet drain material.
4. Do not proceed with installation of prefabricated sheet drain material until unacceptable conditions have been corrected.
5. Clear all debris including topsoil, water, ice, snow, and other foreign materials that may have accumulated on the waterproofing membrane before installing the prefabricated soil sheet drains.
6. Proceed with installation in a manner that would prevent moisture infiltration and minimizes construction traffic on completed sections.
7. No heavy machinery or equipment shall be allowed on top of completed roof sections.

B. INSTALLATION OF HORIZONTAL SHEET DRAIN (*AMERDRAIN® 500/520*)

1. When feasible, begin the application at the highest point of the highest roof level and work to the lowest point to prevent moisture infiltration and to minimize construction traffic on completed sections.

2. Position and lay rolls of prefabricated sheet drain directly over the waterproofing membrane with the polymeric film side towards the membrane and the geotextile fabric side towards the topsoil cover.
3. Within the same row, attach adjacent rolls of sheet drain by butting the beginning of the second roll against the end of the first roll and connecting the rolls with standard straight connector. Tape the fabric overlap joints of adjacent rolls, using 4-inch wide single-sided underground tape, to prevent soil intrusion and to secure fabric in place prior to backfilling.
4. For the first row of sheet drain rolls, place the edge of the core with the flange at the upstream side.
5. Install additional rows of sheet drain rolls by folding back the fabric of the rolls in the lower row and placing drain cones of upper rolls over flange of lower rolls creating a shingle effect along the sloped roof. Prior to backfilling, tape fabric joints between each row, using 4-inch wide single-sided underground tape, to prevent soil intrusion and to secure fabric in place.
6. The sheet drain rolls at the perimeter edges of the reservoir shall extend at least one foot away from the outside edge of the reservoir walls as shown on the Contract Drawings.
7. Fabric overlap at edges that are not connected to another sheet or dual-section drain shall be tucked behind the core to seal off the edges and prevent soil from entering the core.
8. Install sheet drain rolls around inside corners of walls and hatches by bending sheet drain material and cutting fabric on wall side of drain.
9. Install sheet drain rolls around outside corners of walls and hatches by cutting sheet drain core flush with the corner while providing 3-inch of extra fabric to wrap around the exposed edges of drain core rolls.
10. Rolls of sheet drain shall be secured in place by their own weight. **No metal stickpins, nails, or adhesives shall be used for attaching the sheet drain rolls to the waterproofing membrane.**
11. Under heavy uplift wind conditions, and subject to the approval of the City and the manufacturers of the sheet drains and waterproofing membrane, the contractor may place on the installed sheet drain rolls the minimum amount of topsoil necessary to secure them in place. The contractor shall follow recommendations of sheet drain and waterproofing membrane manufacturers when placing topsoil directly on sheet drain, and shall take all necessary measures to prevent any soil or dirt from getting onto the membrane or inside the core of the sheet drains.
12. Subject to the approval of the City and the manufacturers of the sheet drains and waterproofing membrane, the contractor may use double-sided tape to secure the sheet drain rolls in place if deemed necessary by the City.

C. INSTALLATION OF DUAL-SECTION SHEET DRAIN (*TOTALDRAIN™*)

1. Install prefabricated *TOTALDRAIN™* rolls oriented with the high-profile section downstream of the low-profile section.
2. Lay *TOTALDRAIN™* rolls directly on soil surrounding the perimeter of the reservoir. Attach the edge of the low-profile section of the *TOTALDRAIN™* sheets to the outside edge of the *AMERDRAIN® 500/520* sheets. The perimeter edge of the high-profile section of the *TOTALDRAIN™* shall be at least three feet away from the outside edge of the perimeter walls of the reservoir as shown on the Contract Drawings.
3. Attach *TOTALDRAIN™* to *AMERDRAIN® 500/520* sheets by folding back the filter fabric of *TOTALDRAIN™* and placing the cones of *AMERDRAIN®* 500/*520* over the flange of *TOTALDRAIN™* creating a shingle effect. Tape fabric joints using 4-inch wide single-sided underground tape, to prevent soil intrusion and to secure fabric in place prior to backfilling.
4. Bend the *TOTALDRAIN™* sheets to slope downward at 0.5 ft./ft. as shown on the Contract Drawings.
5. At the perimeter edges of the high-profile section, fold the fabric overlap behind the core then close the edges with 4-inch single-sided underground tape.
6. Attach adjacent rolls of *TOTALDRAIN™* by peeling back the fabric from the two ends of the drain and cutting one row of low-profile cones and dimples from each end of the two sections to be joined without cutting the fabric. Insert one row of high-profile cones of the second roll into the high-profile dimples of the first roll seating cones with a rubber hammer and interlocking the two adjacent rolls. Tape the fabric overlap joints, using 4-inch single-sided underground tape, to prevent soil intrusion and to secure fabric in place prior to backfilling.
7. Slope the rows of *TOTALDRAIN™* that are parallel to the reservoir walls at 0.004ft/ft as shown on the Contract Drawings.
8. Bend the *TOTALDRAIN™* material to make inside corners.
9. For outside corners: cut low-profile core flush with corner and tape edges; slit fabric on high-profile section and bend around corner; place corner guard with fabric over slit of high-profile drain and secure with tape.
10. Rolls of dual-section drain shall be secured in place by their own weight. **No metal stickpins, nails, or adhesives shall be used for attaching the dual-section drain rolls to the waterproofing membrane.**

11. Under heavy uplift wind conditions, and subject to the approval of the City and the manufacturers of the sheet drains and waterproofing membrane, the Contractor may place on the installed dual-section drain rolls the minimum amount of topsoil necessary to secure them in place. The contractor shall follow recommendations of dual-section drain and waterproofing membrane manufacturers when placing topsoil directly on drain, and shall take all necessary measures to prevent any soil or dirt from getting onto the membrane or inside the core of the sheet drains.

D. INSTALLATION OF OUTLET CONNECTERS, ADAPTORS, AND PIPING

1. The contractor shall follow the manufacturer's instructions for installing the outlet fittings and piping including end and tee connectors, adapters, and prefabricated outlet piping.
2. All outlet fittings shall be installed and connected in a manner that ensures positive drainage from the prefabricated soil sheet drainage system to the prefabricated outlet piping.
3. End and tee connectors shall be attached to the edges of the dual-section sheet drains and taped with 4-inch single-sided underground tape, to prevent water leakage, soil intrusion, and to secure connectors in place prior to backfilling.
4. The prefabricated outlet piping shall be attached to the outlet connectors and adapters in watertight connections, and shall be laid in a manner that ensures positive drainage to the existing sewer system.

E. CONNECTING TO EXISTING SEWERS

1. The contractor shall obtain a plumbing permit and all required permits to connect to the existing storm sewers.
2. The latest edition of the "Standard Specifications for Sewer and Water Construction in Wisconsin" with all its addenda shall govern all materials and execution methods for connecting the prefabricated outlet piping to the existing sewers.
3. The contractor shall install an 8-inch sewer lateral, including one 3’-6” diameter sewer manhole, from the outlet connector to the existing sewer manhole as shown on Contract Drawings WP-318-03 and WP-318-04. The City shall inspect the existing and proposed manholes and shall determine whether the contractor may connect the proposed 8-inch piping to the existing manhole.
4. The contractor shall follow the latest edition of the "Standard Specifications for Sewer and Water Construction in Wisconsin" with all its addenda, when repairing damaged catch basins and storm sewers.
5. All material, labor and cost of installation of necessary and/or damaged catch basins and storm sewers shall be included in the lump sum bid for this project and no additional unit charges shall be applicable.

F. BACKFILLING

1. After inspection by the manufacturer’s representatives of the waterproofing system and the drainage system, and upon approval by the City, the contractor may proceed with backfilling the drainage system.
2. The contractor shall follow the manufacturers' recommendations while placing and compacting the roof’s soil cover directly against the installed drainage system. Backfill shall be added in 6-inch to 12-inch lifts and compacted to a minimum 80% Modified Proctor Density so as to prevent the soil cover from eroding until the grass is established. The contractor shall only use compacting equipment and methods that have been pre-approved by the City and that do not exceed the roof’s maximum allowable loading limits.
3. The contractor shall direct compactor exhaust away from drains and shall use care during backfill operations to avoid damage to the drainage system. No heavy backfilling machinery or equipment shall be allowed on top of completed roof sections that are exposed.

END OF SECTION

SECTION 90212

INTERNAL PIPE SEALS

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope
   1. This section specifies internal pipe repair seals, including safe and acceptable installation technique and practice.

B. Internal Seal Description
   1. Internal seal supplier shall furnish internal pipe seals conforming to all applicable standards and procedures, and meeting all applicable testing and material properties as described by those standards or within this specification.

1.02 QUALITY ASSURANCE (ALSO REFER TO SECTION 01010, SUMMARY OF WORK)

A. References
   1. American Society for Testing and Materials (ASTM):
      a. A240, Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
      b. C150, Standard Specification for Cement Mortar.
      c. D395, Standard Test Method of Rubber Compression Set.
      d. D412, Standard Test Method for Rubber Properties in Tension.
      e. D573, Standard Test Method for Rubber Deterioration in Air Oven.
      f. D1171, Standard Test Method for Rubber Deterioration Surface Ozone Cracking Outdoors or Chamber.
      g. D2000, Standard Classification System for Rubber Products in Automotive Application.
      h. D2240, Standard Test Method for Rubber Property Durometer Hardness.
      i. D3568, Standard Test Method for Rubber Evaluation for EPDM (Ethylene Propylene Diene Terpolymers) Including Mixtures with Oils.
      j. D3900-5a, Standard Test Methods for Rubber Determination of Ethylene Units in Ethylene Propylene Copolymers (EPM) and in Ethylene Propylene Diene Terpolymers (EPDM) by Infrared Spectrometry.

2. Food and Drug Administration, Title 21 Code of Federal Regulations:
   a. Section 177.2600, Rubber Articles Intended for Repeated Use.
3. ANSI/NSF Standard 61 Drinking Water Components – Health Effects.

B. Qualifications
1. Installer shall have a minimum of ten (10) years' experience with a minimum of 10,000 seals installed safely and correctly with a minimum of ten (10) references that can attest to the quality and service.
2. The seal technology supplied shall have a minimum installed history of ten (10) years.
3. Only seal technologies having an approved testing mechanism will be accepted.
4. The seal supply and installation shall be provided by one (1) company with the manufacturer being the installer.

C. Manufacturer Requirements
1. Internal seals shall be examined for dimensional tolerance and material properties at the supplier's rubber bonding facility.
2. Approved products are the WEKO-SEAL by Miller Pipeline Corporation, or approved equal.

D. Installation Technician Requirements
1. Internal seal technicians shall be fully qualified by the seal supplier to safely install internal seals of the type(s) and size(s) being used. Qualifications shall be current as of the actual date of installation of the project.
2. Certificates of Installation of each technician shall be provided upon request.

E. Submittals
1. Installation data to be submitted for review prior to installation.
   a. List of equipment to be used.
   b. Technical data for proposed internal joint seal, including material safety data sheets, application instructions, and product data.
   c. Acknowledgement that products submitted meet requirements of standards referenced.
2. Proof of Qualifications to be submitted.
   a. List of at least ten (10) references within the past ten (10) years.
   b. Manufacturer shall have, in place, a minimum of 10,000 seals in service for a minimum of ten (10) years.
3. Safety training documentation shall be submitted. Installer's certification of product safety training for all personnel participating in pipeline rehabilitation operations, including the names of all personnel (including the trainer, the date, time and duration of the training, and a statement that all necessary protective gear and equipment) is available for use by personnel on the site.
4. Copies of joint repair record as-builts.

F. Delivery, Storage, and Handling
1. Deliver material as per manufacturer's recommendations.
a. Rubber membranes shall be packaged in a manner that will not damage or deform them.
b. Rubber membranes shall be kept in a cool, dry environment.

G. Warranty
1. A two (2)-year warranty for the supply and installation of the internal seal shall be included, and shall cover the cost of replacement seals and freight to project site, should the internal seal have any defects in material or workmanship.
2. Warranty period shall commence on the date of installation and after applicable internal seal testing.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. The following manufacturers and installers are acceptable:
1. Miller Pipeline Corporation (WEKO-SEAL).
Terry Bell: (317) 293-0278, Ext. 132
2. An approved equal.

2.02 MATERIALS

A. Joint Liner
1. EPDM Rubber Derivative Membrane (Extra-Wide) manufactured in accordance with ASTM-D2000.
a. Material shall be made from a non-toxic EPDM (ethylene propylene diene M-class rubber) synthetic rubber compound and all ingredients used to produce it shall be listed in FDA Title 21 Code of Federal Regulations Section 177.2600. Final material shall not support microbiological growth when used in the potable or sea water or in humid aerobic conditions.
b. The volume change of the rubber shall not exceed +8 percent (+8%) after immersion in water at 70°C for seven (7) days.
c. The compression set shall not exceed 15 percent (15%) when tested at 23°C for seventy (70) hours.

2. Joint liner splicing.
a. The seal splice shall be made using a butt-splicing bonding method employing heat, pressure, adhesive and time to product a quality splice.
b. Vulcanization shall occur at 330°F with 2000 pounds per square inch (psi) pressure.

c. As a test, the seal shall be gripped at a point six (6) inches on each side of the splice and shall be bent in both directions as sharply as possible. The splice shall be capable of passing this bend test without visible separation. No voids or cracks are allowed.

B. Bands, Shims, and Set Screws

1. Bands, spacers, shims, clips, and set screws for securing rubber membrane across piping joints shall be stainless steel and suited for the particular application (Type 304/304L).
2. Typical mechanical properties shall include:
   a. Yield strength greater than or equal to 25,000 psi.
   b. Tensile strength greater than or equal to 70,000 psi.
   c. Elongation in 2 IN equal to 40 percent (40%).
   d. Hardness Rockwell B value of 92.
   e. Finish/condition is annealed.
3. Stainless steel bands manufacturing:
   a. Bands shall be rolled to the radius of the pipe being renewed.
   b. Bands shall have minimum dimensions of 3/16” thick x 2” wide for 72 inch pipe size.
   c. Each band shall be checked on fixed radius gauge.
4. Cleated end:
   a. To be manufactured from the same manufacturer lot number as the band.
   b. All shop and field welds to be made by certified welders with a minimum of two (2) years’ experience on this alloy. The welds are to be made with stick or wire of alloy. All shop welds to be accomplished in an A-1025 Helium/CO2 gas atmosphere when using wire.
   c. Welding wire to be AWS Class A5.9 (ASME SFA 5.9).
   d. Field welding to be made with coated electrode, AWS class A5.4, AC-DC-16, with tensile strength of 86,000 psi and yield strength of 65,000 psi.
   e. All material specifications must be certified.
5. Radiused shims:
   a. Material specifications 16 to 22 gauge 2” x 6”.
   b. Manufactured by rolling to the radius of the pipe.
   c. all edges to be deburred.

C. Cement Mortar

1. Cement mortar for pipe joint sealing and preparation shall be the fast setting type suitable for wet/dry conditions. Cement mortar shall be Type 5 or approved other in accordance with ASTM-C150.

D. Liquid Joint Lubrication
   1. Liquid joint lubricant to assist in installation of the rubber membrane and bands shall be non-toxic vegetable based lubricating gel.
   2. Required properties:
      a. Does not deteriorate or decompose while in storage for a minimum of two (2) years.
      b. A soft, pasty consistence suitable for use intended from 0°F to 120°F.
      c. Does not have any deteriorating effect on natural or synthetic rubber gaskets.
      d. Will not impart taste or odor to water.
      e. Has no objectionable odor.
      f. Is non-toxic and does not support the growth of bacteria.
      g. pH – 9.6 minimum – 11 maximum (pH Meter).
      h. Does not contain any petroleum based oils or grease.

NOTE: All bands and associated components shall be manufactured from the same type of steel selected.

E. Thread Sealing Compound
   1. Thread sealing compound shall be a non-toxic paste-type with “Teflon”.
   2. Teflon components required properties:
      a. Flash point: 410°F closed cup.
      b. Density: 1.4-1.42.
      c. Viscosity: 200,000 - 275,000 centipoises.
      d. Temperature range: -50°F to 500°F.
      e. Pressure application: Maximum 10,000 psi.

F. Hydraulic expander for installation of steel and stainless steel expansion bands shall be capable of hydraulic expansion pressures of 6,000 psi.

PART 3 – EXECUTION

3.01 GENERAL

A. All work and testing shall comply with the applicable federal, state, and local codes and standards, including:
   1. Federal Occupational Safety Health Act of 1970.
   2. Construction Safety Act of 1969 (As Amended).

B. Prior to fitting, seals should be given a thorough visual examination by a qualified installation technician, paying particular attention to the ribbed (lip seals) sections of the seal. If quality of material construction or condition is in doubt, the seals shall not be used.

3.02 CLEANING

A. Thoroughly clean the areas in which the joints are to be repaired and sealed of grease, dust, debris, roots and solid or semi-solid matter prior to start of sealing procedures.
   1. Take care that all materials loosened or removed by the cleaning operations are intercepted and removed.

B. Damage to Pipeline
   1. Protect pipeline from damage during cleaning operations.
   2. Repair damage, which may occur, at no additional cost to the City using methods approved by the City.

3.03 JOINT PREPARATION

A. The area of pipe on either side of the joint, where the actual “lip seals” make contact with the pipe, must be prepared to a finish that will allow the “lip seals” to interface consistently, and so to provide a permanent seal.

   All high/low surface imperfections running axially through or part way through the sealing surface must be removed before installation of seals. Any joint gaps, deep imperfections, or low areas must be properly filled with approved non-toxic joint filler and rendered smooth to suit the prepared surface of the joint area.

B. Joints are to be filled to the full depth of the gap and rendered flush with the internal surface of the pipe.
   1. The filling materials shall be a quick-setting plaster/cement mortar, which is mixed as required in the pipe.
   2. All surplus material spillage should be removed from the joint area prior to the surface preparation of the seal area.

C. The extent of the prepared area on either side of the joint is to be compatible with the “lip seals” and at least 1 inch of additional cleaning is recommended on either side of the ribbed section of the seal.

D. The pipe should be pre-marked with a grease chalk to allow the preparation areas and seal position to be clearly defined.

E. It may be necessary to apply a thin layer of quick-setting cement mortar to the preparation area which the seal will be placed. This cement will control pipe porosity and irregularities and provide for an effective bubble test on the completed seal.

3.04 SURFACE PREPARATION

A. Immediately prior to fitting the seal, the area must be cleaned with a dry brush and coated with lubricant.
   1. Lubricant shall be a non-toxic vegetable soap compatible with the composition of the seal.
   2. The lubricant shall be hand applied (using a brush) over the prepared area.
   3. Care must be taken not to acquire debris from the surrounding unprepared surface into the lubricant and thereby reintroducing debris to the prepared surface.

3.05 POSITIONING THE SEAL

A. The seal shall be checked that it is undamaged and that the test unit is tight before fitting the seal in place.

B. Place seal in position to bridge the joint gap, guided by the chalk marks indicating seal position.
   1. Position seal accurately on the prepared areas.
   2. Locate the test unit in the seal at either the 9 o'clock or 3 o'clock position.
   3. The seal must be positioned parallel to the joint gap.

3.06 POSITIONING RETAINING BANDS

A. Before the stainless steel bands are placed in the grooves, provided in the seal, place two stainless steel radiused shims, 6 inches long by 18-22 gauge, underneath the wedge area in the grooves to provide a bridge that will transmit the radial load evenly to the seal as the bands are expanded.

B. Since retaining bands can be of one-piece, two-piece or three-piece construction depending on the pipe diameter, a retainer clip is to be used to restrain band movement during expansion. In certain design applications, (two-piece and three-piece band construction in larger diameters) a special mechanical locking device shall be used to temporarily restrain the bands before expansion.

3.07 EXPANDING THE SEAL INTO POSITION

A. Use hydraulic expander to apply a set pressure to the retaining bands of the seal.
   1. When positioning the expander in line with the retaining band, care must be taken to ensure that the band remains in the groove of the seal, and does not become moved or dislodged.
   2. Care should also be taken to ensure the expander is positioned correctly on the band.
   3. The set pressure is to be held for a minimum of two (2) minutes.

B. Fit a radiused-locking piece called a “wedge” between the exposed gap of the expanded band ends.
   1. Select a size of wedge having a slight interference fit between the band ends.
   2. The radius of the wedge is equal to the radius of the pipe.

C. Tap the wedge (leading edge first) into position, locking in the compression of the seal.

D. Release the pressure from the expander.

E. Repeat procedure (steps A-D) on the second retaining band of the seal.

F. Repeat this entire operation (steps A-E) not before 30 minutes have elapsed after the first expansion. This allows for any seal relaxation that may take place and usually a slightly larger wedge may be fitted.

G. Once the expanding procedure is completed, the mechanical locking device, if required, for the wedge shall be tightened down to a torque of 15 inch – lbs.

3.08 PRESSURE TESTING

A. Internally sealed areas are to be individually pressure-tested, by Test 1 and Test 2, prior to completion of work.
   1. Test 1:
      a. To be applied after each section has been completed and not before 30 minutes have elapsed after the final fitting of the seal.
      b. A pressure of 10 psig is applied to the seal through the test valve and maintained with a regulated air supply, while a soap and water solution is applied to the outer edge and entire body of the seal to detect leakage.
      c. A restraining device is to be locked in its expanding position during testing to prevent excessive ballooning to the center membrane of the seal (that may occur at this pressure).
   2. Test 2:
      a. A pressure of 5 psig is applied to the seal through the test valve and maintained with a regulated air supply, while a soap and water solution is applied to the outer edge and entire body of the seal to detect any leak.

B. Test Valve Assembly
   1. Following Test 2, the test valve of the seal is sealed with a counter sunk hex head completion plug using a non-toxic thread sealing compound on the threads.

C. The pass/fail criteria may be adjusted by the City as conditions warrant.

END OF SECTION