

CITY OF KALAMAZOO DEPARTMENT OF PUBLIC SERVICES



PHASE 1: CENTRAL PUMP STATION 1 FILTER MEDIA REPLACEMENT (AS NEEDED) AND MISC. FILTER IMPROVEMENTS

Contract No. 200-19743-24010

Project Manual
and
Drawings

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PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. The Work to be done consists of the furnishing of all labor, materials, and equipment, and the performance of all Work included in this Contract. The summary of the Work is presented in Section 01110: Summary of Work.
2. Work Included:
 - a. The Contractor shall furnish all labor, superintendence, materials, power, light, heat, fuel, water, tools, appliances, equipment, supplies, and means of construction necessary for proper performance and completion of the Work. The Contractor shall obtain and pay for all necessary construction permits. The Contractor shall perform and complete the Work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the Work and maintain it during and after construction, until accepted, and shall do all Work and pay all costs incidental thereto. Contractor shall repair or restore all structures and property that may be damaged or disturbed during performance of the Work.
 - b. The cost of incidental work described in these Project Requirements, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the Work and shall be included in the prices for the various Contract Items. No additional payment will be made therefore.
 - c. The Contractor shall provide and maintain tools and equipment as may be necessary, in the opinion of the Engineer, to perform in a satisfactory and acceptable manner all the Work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his workmanship, materials, and equipment, prior approval of the Engineer notwithstanding.
3. Public Utility Installations and Structures:
 - a. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, vaults, manholes, and all other appurtenances and facilities pertaining thereto whether owned or controlled by the Owner, other governmental bodies, or privately owned by individuals, firms, or corporations, used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage, water, or other public or private property which may be affected by the Work shall be deemed included hereunder.
 - b. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make his own investigations to inform himself fully of the character, condition, and extent of all such installations and structures as may be encountered and as may affect the construction operations.
 - c. The Contractor shall protect all public utility installations and structures from damage during the Work. Access across any buried public utility installation or structure shall be made to avoid any damage to these facilities. All required protective devices and

construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor shall be repaired by the Contractor, at his expense. No separate payment shall be made for such protection or repairs to public utility installations or structures.

- d. Public utility installations or structures owned or controlled by the Owner or other governmental body which are shown on the Drawings to be removed, relocated, replaced, or rebuilt by the Contractor shall be considered as a part of the general cost of doing the Work and shall be included in the prices bid for the various Contract Items. No separate payment shall be made therefore.
- e. Where public utility installations or structures owned or controlled by the Owner or other governmental body are encountered during the course of the Work, and are not indicated on the Drawings or in the Specifications, and when, in the opinion of the Engineer, removal, relocation, replacement, or rebuilding is necessary to complete the Work under this Contract, such Work shall be accomplished by the utility having jurisdiction, or such Work may be ordered, in writing by the Engineer, for the Contractor to accomplish. If such work is accomplished by the utility having jurisdiction it will be carried out expeditiously, and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement, or rebuilding as required. If such work is accomplished by the Contractor, it will be paid for as extra work as provided in the Agreement.
- f. The Contractor shall, at all times in performance of the Work, employ acceptable methods and exercise reasonable care and skill so as to avoid unnecessary delay, injury, damage, or destruction of public utility installations and structures; and shall, at all times in the performance of the Work, avoid unnecessary interference with, or interruption of, public utility services, and shall cooperate fully with the owners thereof to that end.
- g. The maintenance, repair, removal, relocation, or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the owners of such utilities.

1.02 DRAWINGS AND PROJECT MANUAL

- A. Drawings: When obtaining data and information from the Drawings, figures shall be used in preference to scaled dimensions, and large-scale drawings in preference to small-scale drawings.
- B. Supplementary Drawings:
 - 1. When, in the opinion of the Engineer, it becomes necessary to explain more fully the Work to be done or to illustrate the Work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications pertaining thereto, will be prepared by the Engineer, and the Contractor will be furnished one (1) complete set of reproducible drawings (24 inches by 36 inches) and one (1) reproducible copy of the specifications.
 - 2. The Supplementary Drawings shall be binding upon the Contractor with the same force as the Contract Drawings. Where such Supplementary Drawings require either less or more than the estimated quantities of Work, credit to the Owner or compensation therefore to the Contractor shall be subject to the terms of the Agreement.
- C. Contractor to Check Drawings and Data:
 - 1. The Contractor shall verify all dimensions, quantities, and details shown on the Drawings, Supplementary Drawings, Schedules, Specifications, or other data received from the Engineer, and shall notify him of all errors, omissions, conflicts, and discrepancies found therein. Failure

to discover or correct errors, conflicts, or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction, or improper operation resulting therefrom, nor from rectifying such conditions at his own expense. He will not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the Engineer, should such errors or omissions be discovered.

2. All schedules are given for the convenience of the Engineer and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.

D. Specifications: The Technical Specifications consist of three (3) parts: General, Products, and Execution. The General part of a Specification contains General Requirements which govern the Work. The Products and Execution parts modify and supplement the General Requirements by detailed requirements for the Work and shall always govern whenever there appears to be a conflict.

E. Intent:

1. All Work called for in the Specifications applicable to this Contract, but not shown on the Drawings in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Drawings or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the Work, is required and shall be performed by the Contractor as though it were specifically delineated or described.
2. The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, the interpretation of these Specifications shall be made upon that basis.

1.03 MATERIALS AND EQUIPMENT

A. Manufacturer:

1. All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request and at the Engineer's option, that the manufacturer or subcontractor deal directly with the Engineer. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.
2. Any two (2) or more pieces of material or equipment of the same kind, type, or classification, and being used for identical types of service, shall be made by the same manufacturer.

B. Delivery:

1. The Contractor shall deliver materials in ample quantities to ensure the most speedy and uninterrupted progress of the Work so as to complete the Work within the allotted time.
2. The Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the work of any related Contractor.

C. Tools and Accessories:

1. The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind, or size of equipment, one (1) complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.

2. Spare parts shall be furnished as specified herein and as recommended by the manufacturer necessary for the operation of the equipment, not including materials required for routine maintenance.
3. Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight, and principal rate data.

D. Service of Manufacturer's Engineer:

1. The Contract Prices for equipment shall include the cost of furnishing a competent and experienced engineer or superintendent who shall represent the manufacturer and shall assist the Contractor, when required, to install, adjust, test, and place in operation, the equipment in conformity with the Contract Documents.
2. After the equipment is placed in permanent operation by the Owner, such engineer or superintendent shall make all adjustments and tests required by the Engineer to prove that such equipment is in proper and satisfactory operating condition, and shall instruct such personnel as may be designated by the Owner in the proper operation and maintenance of such equipment.

1.04 INSPECTION AND TESTING

A. General:

1. For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests, and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Five (5) copies of the reports shall be submitted, and authoritative certification thereof must be furnished to the Engineer as a prerequisite for the acceptance of any material or equipment.
2. If, in the making of any test of any material or equipment, it is ascertained by the Engineer that the material or equipment does not comply with the Contract Documents, the Contractor will be notified thereof, and he will be directed to refrain from delivering said material or equipment, or to remove it promptly from the site or from the Work and replace it with acceptable material, without cost to the Owner.
3. Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with the recognized test codes of the ANSI, ASME, or the IEEE, except as may otherwise be stated herein.
4. The Contractor shall be fully responsible for the proper operation of equipment during testing and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the Owner formally takes over the operation thereof.

B. Costs:

1. All costs for inspections required under the Building Permit shall be provided by the Contractor, unless otherwise expressly specified.
2. The cost of shop and field tests of equipment and of certain other tests specifically called for in the Contract Documents shall be borne by the Contractor, and such costs shall be deemed to be included in the Contract Price.
3. Materials and equipment submitted by the Contractor as the equivalent to those specifically named in the Contract may be tested by the Owner for compliance. The Contractor shall reimburse the Owner for the expenditures incurred in making such tests of materials and equipment which are rejected for non-compliance.

C. Certificate of Manufacture:

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1. Contractor shall furnish to Engineer authoritative evidence in the form of a certificate of manufacture that the materials to be used in the Work have been manufactured and tested in conformity with the Contract Documents.
2. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.
3. All materials shall be in compliance with "build America buy America" requirements. Certifications shall be provided for all materials.

D. Shop Tests:

1. Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function, or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. Shop tests where specified shall be witnessed by the Engineer.
2. Five (5) copies of the manufacturer's actual test data and interpreted results thereof, accompanied by a certificate of authenticity sworn to by a responsible official of the manufacturing company and/or independent laboratory, shall be submitted to the Engineer for approval.
3. The cost of shop tests, travel expenses of the Engineer, and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.

E. Start-up Tests:

1. As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make start-up tests of equipment.
2. If the start-up tests disclose any equipment furnished under this Contract which does not comply with the requirements of the Contract Documents, the Contractor shall, prior to demonstration tests, make all changes, adjustments, and replacements required. The furnishing Contractor shall assist in the start-up tests as applicable.

F. Demonstration Tests:

1. Prior to Contractor's request for a Substantial Completion inspection, all equipment and piping installed under this Contract shall be subjected to demonstration tests as specified or required to prove compliance with the Contract Documents.
2. The Contractor shall furnish labor, fuel, energy, water, and all other materials, equipment, and instruments necessary for all demonstration tests, at no additional cost to the Owner. Contractor shall assist in the demonstration tests as applicable.

1.05 LINES AND GRADES

A. Grade:

1. All work under this Contract shall be constructed in accordance with the lines and grades shown on the Drawings, or as given by the Engineer. The full responsibility for keeping alignment and grade shall rest upon the Contractor.
2. The Engineer will establish benchmarks and baseline controlling points. Reference marks for lines and grades as the Work progresses will be located by the Contractor to cause as little inconvenience to the prosecution of the Work as possible. The Contractor shall so place excavation and other materials as to cause no inconvenience in the use of the reference marks provided. He shall remove any obstructions placed by him contrary to this provision.

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B. Surveys:

1. The Contractor shall furnish and maintain, at his own expense, stakes and other such materials.
2. The Contractor shall check such reference marks by such means as he may deem necessary and, before using them, shall call the Engineer's attention to any inaccuracies.
3. The Contractor shall, at his own expense, establish all working or construction lines and grades as required from the reference marks set by the Engineer, and shall be solely responsible for the accuracy thereof. He shall, however, be subject to the check and review by the Engineer.

C. Safeguarding Marks:

1. The Contractor shall safeguard all points, stakes, grade marks, monuments, and bench marks made or established on the Work, bear the cost of re-establishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or to removing without authorization such established points, stakes, and marks.
2. The Contractor shall safeguard all existing and known property corners, monuments, and marks adjacent to but not related to the Work and shall bear the cost of re-establishing them if disturbed or destroyed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

0SECTION 01110 - SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY

- A. The Work to be performed shall consist of furnishing tools, equipment, materials, supplies, and manufactured articles, and furnishing all labor, transportation, and services, including but not limited to fuel, power, water, essential communications, and performing all Work or other operations required in strict accordance with the Drawings and these specifications. The Work shall be complete, and all Work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the Work in good faith shall be provided by the Contractor as though originally so indicated, at no increase in cost to the City.
- B. The Project location for Pump Station No.1 (PS1), also referred to as Central Water Station is 215 West Stockbridge, Kalamazoo, MI 49001.
 - 1. The work consists of media replacement in 2 gravity filters each with 4 filter cells, filter inlet pipe, valve and actuator replacement. The work also includes cleaning and repairs to the underdrain system and nozzles. All of the filter media, inlet pipes, valves, and actuators will be included in the price for the work. However, the City may decide to only do the work for some filters cells, inlet pipes, valves, and actuators. For the work not completed will be credited back to the City. See Drawings for additional information and requirements.

1.02 CONTRACT DOCUMENTS

- A. The intent of the Contract Documents is to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to OWNER.
- B. CONTRACTOR shall examine the existing conditions and takes these into account for Bid price. No extras will be permitted as a failure of CONTRACTOR to not do so.
- C. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.

1.03 WORK SEQUENCE

- A. CONTRACTOR shall arrange its Work so that at no time shall it cause unnecessary interruption to the operation of existing facilities. In order to meet the overall objective of the Project, certain elements of the Work must be completed in a particular sequence. It may also be necessary to do certain parts of the Work outside of normal working hours. The CONTRACTOR shall do this Work at such times and at no additional cost to the OWNER. When construction operations must be done with any portion of the existing facilities out of service, such work shall be done at such times and in

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the sequence as recommended by ENGINEER and with the prior approval of the Michigan Department of Environment, Great Lakes and Energy, if required. During such period of curtailment of facility operation, the Work shall be done with all haste possible under the circumstances, even to the extent of working continuously 24 hours a day for this period. CONTRACTOR shall be completely responsible for fines and other enforcement imposed upon the facility resulting from inadvertent or unplanned interruptions caused by CONTRACTOR that result in EGLE permit violations.

B. General Constraints:

1. Before mobilization Contractor shall obtain, pay for, and provide copies of all permits required for the project.
2. Access to existing pump stations and wells shall be maintained at all times.
3. Access drives and doors to be accessible and operation to Owner. Coordinate with Owner.
4. Contractor shall be responsible for developing a sequence for implementation of Work and approved by Owner and Engineer.
5. Sequence shall be consistent with sequencing specified in all parts of the contract documents.
6. See Drawings for additional information and constraints.

1.04 CONTRACTOR USE OF PREMISES

- A. Limit use of the premises to construction activities in areas indicated; allow for OWNER occupancy and use by the public. Confine operations to areas within Contract limits indicated. Portions of the Site beyond areas in which construction operations are indicated are not to be disturbed. Contractor shall follow Water Supply Entry Policy.
- B. Keep driveways and entrances serving the premises clear and available to OWNER, OWNER's employees, and private property owners at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on Site. Areas for CONTRACTOR's trailers, equipment, and material storage, and CONTRACTOR's employee parking shall be as indicated on Drawings or agreed by OWNER prior to the start of construction.
- C. Use of the Existing Building/Structures: Maintain the existing building/structures in a weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

1.05 OWNER OCCUPANCY

- A. Full OWNER Occupancy: OWNER will occupy the Site and existing buildings/structures during the entire construction period. Cooperate with OWNER during construction operations to minimize conflicts and facilitate OWNER usage. Perform the Work so as not to interfere with OWNER's operations.
- B. Obtain a Certificate of Occupancy from local building officials prior to OWNER occupancy.

1.06 MISCELLANEOUS PROVISIONS

- A. CONTRACTOR shall be responsible for verifying the location of all underground utilities by magnetic or other type instruments before beginning excavation Work.
- B. Time and Sequence of Work: In general, it is the intention and understanding that CONTRACTOR shall have control over the sequence or order of execution of the several parts of the Work to be done under the Contract and over the method of accomplishing the required results, except as some particular sequence or method may be distinctly demanded by the Drawings and Project Manual or by the expressed provisions of the Contract. ENGINEER may, however, make such reasonable requirements as may, in ENGINEER's judgment, be necessary for the proper and effective protection of Work partially or wholly completed, and to these requirements CONTRACTOR shall conform.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01210 - ALLOWANCES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for processing Allowances. Selected materials and equipment, and in some cases their installation, are shown and specified in the Contract Documents by Allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. Additional requirements, if necessary, will be issued by Change Order.

1.02 DEFINITIONS

- A. Lump Sum Allowance: A monetary sum that includes, as part of the Contract Price, the associated costs, and requirements to complete the specified Allowance.
- B. Unit-cost Allowance: A specified quantity of a product or assembly, as part of the Contract Price, that is to be included in the Work even though the location of the product or assembly is not indicated on Drawings or shown in the specifications.
- C. Contingency Allowance: A monetary sum that, as part of the Contract Price, is to be utilized as directed by OWNER, through a Change Order, to cover minor changes in the Work.
- D. Provisionary Allowance: A monetary sum that, as part of the Contract Price, is to be utilized as directed by OWNER, through a Change Order, to cover minor changes in the Work.

1.03 SUBMITTALS

- A. Submit invoices or delivery slips to indicate actual quantities of materials delivered to the Site for use in fulfillment of each Allowance.

1.04 OWNER'S INSTRUCTIONS

- A. At the earliest feasible date after Contract Award, advise ENGINEER of the date when the final selection and purchase of each product or system described by an Allowance must be completed in order to avoid delay in performance of the Work.
- B. When requested by ENGINEER, obtain Bids for each Allowance for use in making final selections; include recommendations that are relevant to performance of the Work.
- C. Purchase products and systems as selected by ENGINEER from the designated supplier.
- D. Use Allowances only as directed for OWNER's purposes, and only by Change Orders which designate amounts to be charged to the Allowance.

- E. If the actual price for the specified Allowance is more or less than the stated Allowance, the Contract Price shall be adjusted accordingly by Change Order. The adjustment in Contract Price shall be made in accordance with Paragraph 11.02 of the General Conditions.
- F. Change Orders authorizing use of funds from the Contingency or Provisionary Allowances will include CONTRACTOR's related costs and reasonable overhead and profit margins.
- G. At Project closeout, any amounts remaining in Allowances will be credited to OWNER by Change Order.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 INSPECTION

- A. Inspect products covered by an Allowance promptly upon delivery for damage or defects.

3.02 PREPARATION

- A. Coordinate materials and their installation for each Allowance with related materials and installations to ensure that each Allowance item is completely integrated and interfaced with related construction activities.

SCHEDULE OF ALLOWANCES

1. Filter Cell Underdrain Cleaning, Nozzle Cleaning, Nozzle Replacement, and Underdrain Repair Allowance: Include in bid an allowance in the amount of \$150,000 for underdrain cleaning, nozzle cleaning, and nozzle replacement. Underdrain cleaning and nozzle cleaning shall be per the manufacturer's direction, notes on Contract Drawings, and information in the Appendix. Contractor to propose method, for review and approval, route for removing filter media from the filters to disposal. In general most nozzles will need to be cleaned. There may be a few cracked, broken, or in operable nozzles shall be replaced. Contractor shall purchase 550 nozzles that are to be replaced as part of this allowance. Work will be paid based on Owner authorized work for Contractor's time and materials. Any unauthorized work will not be paid. Any monies remaining will be deleted for a credit. No markups are permitted on allowance for materials but is allowed for Contractor time.
2. Contingency Allowance: An allowance of \$75,000 to be used by OWNER to cover unforeseen conditions that may arise during progression of Work. This allowance shall only be as authorized by Owner. Any monies remaining will be deleted for a credit.

END OF SECTION

SECTION 01220 - UNIT PRICES – MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes descriptions of the method of measurement and the basis of payment for Unit Price work under this Contract.
- B. Basis of Contract Payments:
 - 1. Final Contract Price shall be determined by actual quantities installed at unit prices stated in Contractor's Bid.
 - 2. Engineer shall determine actual as-built quantities.
 - 3. All work identified on the Drawings, but not included as a Bid item shall be considered incidental to construction and not paid for directly, except Work that would be considered additional Work due to unforeseen conditions.
 - 4. Unit price payments for individual items shall include everything necessary for such item to function as intended in the system.
 - 5. Owner reserves the right to increase, decrease or eliminate any quantities for items listed in Contractor's Bid or which become a part of the Contract Documents.
 - 6. All work shall be completed in accordance with the MDOT 2020 Standard Specifications for Construction, unless otherwise stated or directed.

1.03 GENERAL CONDITIONS

- A. Item No. 1 – Mobilization, (Maximum of 5% of Total Bid):
 - 1. Includes:
 - a. Preparatory work and expenses incurred prior to beginning work onsite.
 - b. Transport materials, personnel, and equipment to the job site.
 - c. Establish temporary onsite construction facilities, including but not limited to, port-a-johns.
 - d. Provide insurance, bonds, and other costs associated with the project in general and not included in other pay items.
 - e. All required submittals.
 - 2. Unit of Measure:
 - a. Lump sum.
 - b. 50% payment will be made after 5% of the original contract amount is earned.
 - c. Final 50% payment will be made after 25% of the contract amount is earned.
- B. Item No. 2 – Filter Media Removal:
 - 1. Includes the following:

- a. Remove filter media and replace with new media. Note existing filter media in some place is hardened and fused together. Contractor to review status of material prior to bidding.
 - a. Work prices shall be provided based on per filter cell work. All 8 filter cells shall be assumed for the work. However, Owner may choose to exclude filter work as they see fit.
 - 2. Unit of Measure:
 - a. Lump sum per filter cell.
- C. Item No. 3 – Filter Media Replacement (Alternate 1):
 - 1. Includes the following:
 - a. Media shall be replaced with Alternate 1 media as indicated on the Drawings.
 - b. Work prices shall be provided based on per filter cell work. All 8 filter cells shall be assumed for the work. However, Owner may choose to exclude filter work as they see fit.
 - 2. Unit of Measure: Lump sum per filter cell.
- D. Item No. 4 – Filter Media Replacement (Alternate 2):
 - 3. Includes the following:
 - b. Media shall be replaced with Alternate 2 media as indicated on the Drawings.
 - c. Work prices shall be provided based on per filter cell work. All 8 filter cells shall be assumed for the work. However, Owner may choose to exclude filter work as they see fit.
 - 4. Unit of Measure: Lump sum per filter cell.
- B. Item No. 5 Filter Inlet Pipes, Valves, and Actuator Replacement:
 - 1. Includes the following:
 - a. Removal and replacement of the filter cell inlet pipe, valve, and actuator.
 - b. Existing air and control wires shall be reconnected to new actuator.
 - c. Work prices shall be provided based on per filter cell inlet pipe, valve, and actuator work. All 8 filter cells shall be assumed in the work. However, Owner may choose to exclude filter work as they see fit.
 - 2. Unit of Measure:
 - a. Lump Sum per filter cell.

1.02 ADDITIONAL ALLOWANCES

- A. Item No. 6 Filter Cell Underdrain Cleaning, Nozzle Cleaning, Nozzle Replacement, and Underdrain Repair Allowance
 - 1. Includes the following:
 - a. cleaning of filter underdrains, cleaning of nozzles, and nozzle replacement. Nozzles in general will only need to be cleaned and only a few nozzles replaced. See section 01210 - Allowances and Drawings for additional information.
 - 2. Unit of Measure:
 - a. Cash Allowance: Refer to specification section 01210 Allowances for more details.
- B. Item No. 7 Contingency Allowance
 - 1. Includes the following:
 - a. To cover unforeseen conditions that may arise during progression of Work.
 - 2. Unit of Measure:

- a. Cash Allowance: Refer to specification section 01210 Allowances for more details.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01290 - APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements governing CONTRACTOR's Applications for Payment.
- B. Related Sections:
 - 1. CONTRACTOR's Application for Payment form is included in Section 00620.
 - 2. CONTRACTOR's Construction Schedule and Submittal Schedule are included in Section 01330.

1.02 OWNER'S INSTRUCTIONS

- A. Schedule of Values:
 - 1. Coordinate preparation of Schedule of Values with preparation of CONTRACTOR's Construction Schedule.
 - 2. Correlate line items on Schedule of Values with other required administrative schedules and forms, including:
 - a. CONTRACTOR's Construction Schedule.
 - b. Application for Payment form.
 - c. List of subcontractors.
 - d. Schedule of Allowances.
 - e. Schedule of Alternates.
 - f. List of products.
 - g. List of principal suppliers and fabricators.
 - h. Schedule of Submittals.
 - 3. Submit Schedule of Values to ENGINEER at the earliest feasible date, but in no case later than 7 days before the date scheduled for submittal of the initial Application for Payment.
 - 4. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for Schedule of Values.
 - 5. Identification: Include the following Project identification on Schedule of Values:
 - a. Project name and location.
 - b. Name of ENGINEER.
 - c. Project number.
 - d. CONTRACTOR's name and address.
 - e. Date of submittal.
 - 6. Arrange Schedule of Values in a tabular form with separate rows for each Specification Section and separate columns for each major structure or area of Work.
 - 7. Provide a breakdown of the Contract Price in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
 - 8. Round off amounts to the nearest whole dollar; the total shall equal the Contract Price.
 - 9. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items

- on Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
10. Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually on Applications for Payment. Each item on Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.
 11. At CONTRACTOR's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items on Schedule of Values or distributed as general overhead expense.
 12. Update and resubmit Schedule of Values when Change Orders or Work Change Directives result in a change in the Contract Price.
- B. Initial Application for Payment: Administrative actions and submittals that must precede submittal of the first Application for Payment include the following:
1. List of subcontractors.
 2. List of principal suppliers and fabricators.
 3. Schedule of Values.
 4. CONTRACTOR's Construction Schedule (preliminary if not final).
 5. Submittal Schedule (preliminary if not final).
- C. Applications For Payment:
1. Each Application for Payment shall be consistent with previous applications and payments as certified by ENGINEER and paid for by OWNER.
 2. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
 3. The date for each progress payment will be determined at the Pre-Construction Conference. The period of construction Work covered by each Application for Payment is 1 month. Actual start/end dates will be determined at the Pre-Construction Conference.
 4. Use the pay application form included in Section 00620 for Applications for Payment.
 5. Complete every entry on the form, including execution by person authorized to sign legal documents on behalf of CONTRACTOR. Incomplete applications will be returned without action.
 6. Entries shall match data on Schedule of Values and CONTRACTOR's Construction Schedule. Use updated Schedules if revisions have been made.
 7. Include amounts of Change Orders and Work Change Directives issued prior to the last day of the construction period covered by the application.
 8. Submit 3 executed copies of each Application for Payment to ENGINEER; 1 copy shall be complete, including waivers of lien and similar attachments, when required.
 9. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to ENGINEER.
- D. Application for Payment at Substantial Completion:
1. Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for OWNER occupancy of designated portions of the Work.
 2. Administrative actions and submittals that shall proceed or coincide with this application include:
 - a. Warranties (guarantees) and maintenance agreements.
 - b. Maintenance instructions.

- c. Meter readings.
 - d. Final cleaning.
 - e. Final progress photographs.
 - f. List of incomplete Work, recognized as exceptions to ENGINEER'S Certificate of Substantial Completion.
- E. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
- 1. Completion of Project closeout requirements.
 - 2. Completion of items specified for completion after Substantial Completion.
 - 3. Assurance that unsettled claims will be settled.
 - 4. Assurance that Work not complete and accepted will be completed without undue delay.
 - 5. Transmittal of required Project construction records to OWNER.
 - 6. Proof that taxes, fees, and similar obligations have been paid.
 - 7. Removal of surplus materials, rubbish, and similar elements.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01310 - PROJECT COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
 - 1. Coordination of Work under this Contract.
 - 2. Coordination with other Contractors.
 - 3. Administrative and supervisory personnel.
 - 4. Pre-Construction Conference.
 - 5. Progress meetings.
 - 6. General installation provisions.
 - 7. Cleaning and protection.
- B. Related Sections Specified Elsewhere:
 - 1. Requirements for CONTRACTOR's Construction Schedule are included in Section 01330.

1.02 SUBMITTALS

- A. Within 15 days of Notice to Proceed, submit a list of CONTRACTOR's principal staff assignments, including the Superintendent and other personnel in attendance at Site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.

1.03 SCHEDULING

- A. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair. Make adequate provisions to accommodate items scheduled for later installation.
- B. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at Site in accordance with Laws or Regulations. CONTRACTOR shall train CONTRACTOR's employees on use of these sheets and shall keep a master copy on hand at Site.

- C. Coordination with Other Contractors:
 - 1. CONTRACTOR shall so conduct CONTRACTOR's operations as not to interfere with or injure the Work of other Contractors or workmen employed on adjoining or related Work, and CONTRACTOR shall promptly make good any injury or damage which may be done to such Work by CONTRACTOR or CONTRACTOR's employees or agents.
 - 2. Should a contract for adjoining Work be awarded to another CONTRACTOR, and should the Work on one of these contracts interfere with that of the other, ENGINEER shall decide which contract shall cease Work for the time being and which shall continue, or whether Work on both contracts shall continue at the same time and in what manner.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of schedules.
 - 2. Installation and removal of temporary facilities.
 - 3. Delivery and processing of submittals.
 - 4. Progress meetings.
 - 5. Project closeout activities.

1.04 PRE-CONSTRUCTION CONFERENCE

- A. ENGINEER will schedule a Pre-Construction Conference and organizational meeting at the Site or other convenient location prior to commencement of construction activities to review responsibilities and personnel assignments.
- B. Attendees: OWNER, ENGINEER and ENGINEER's consultants, CONTRACTOR and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.
- C. Agenda: Discuss items of significance that could affect progress including such topics as:
 - 1. Tentative Construction Schedule.
 - 2. Critical Work sequencing.
 - 3. Designation of responsible personnel.
 - 4. Procedures for processing field decisions and Change Orders.
 - 5. Procedures for processing Applications for Payment.
 - 6. Distribution of Contract Documents.
 - 7. Submittal of Shop Drawings, product data, and samples.
 - 8. Preparation of Record Documents.
 - 9. Use of the premises.
 - 10. Office, Work, and storage areas.
 - 11. Equipment deliveries and priorities.
 - 12. Safety procedures.
 - 13. First aid.
 - 14. Security.
 - 15. Housekeeping.
 - 16. Working hours.

1.05 PROGRESS MEETINGS

- A. Attendees: In addition to representatives of OWNER and ENGINEER, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.
- B. Agenda: CONTRACTOR to review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.
- C. CONTRACTOR's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to CONTRACTOR's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
- D. Reporting: CONTRACTOR will prepare and distribute copies of minutes of the meeting to each party present and to other parties who should have been present. The minutes will include a brief summary, in narrative form, of progress since the previous meeting and report.
- E. Schedule Updating: CONTRACTOR shall revise Construction Schedule after each progress meeting where revisions to Schedule have been made or recognized. Issue revised Schedule no later than 3 days after the progress meeting date to ENGINEER for distribution concurrently with the progress meeting minutes.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

END OF SECTION

SECTION 01330 - SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for submittals, including, but not necessarily limited to, the following:
 - 1. CONTRACTOR's Construction Schedule.
 - 2. Submittal Schedule.
 - 3. Shop Drawings.
 - 4. Product data.
 - 5. Samples.
 - 6. Progress photographs.
 - 7. Record photographs.
- B. Topics covered elsewhere include, but are not limited to:
 - 1. Permits.
 - 2. Applications for payment.
 - 3. Performance and payment bonds.
 - 4. Insurance certificates.
 - 5. List of subcontractors.

1.02 SUBMITTALS

- A. Bonds and Insurance Certificates shall be submitted to and approved by OWNER and ENGINEER prior to the initiation of any construction on Site.
- B. Permits, Licenses, and Certificates: For OWNER's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents; correspondence and records established in conjunction with compliance with standards; and regulations bearing upon performance of the Work.

1.03 SUBMITTAL PROCEDURES

- A. Coordination:
 - 1. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 2. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 3. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - 4. ENGINEER reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing:

1. Allow sufficient review time so that installation shall not be delayed as a result of the time required to process submittals, including time for resubmittals.
2. ENGINEER will review and return submittals with reasonable promptness, or advise CONTRACTOR when a submittal being processed must be delayed for coordination or receipt of additional information by putting the submittal "On Hold" and returning a transmittal identifying the reasons for the delay.
3. No extension of Contract Time will be authorized because of failure to transmit submittals to ENGINEER sufficiently in advance of the Work to permit processing.

C. Submittal Preparation:

1. Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
2. Provide a space approximately 4 inches by 5 inches on the label or beside the title block on submittals not originating from CONTRACTOR to record CONTRACTOR's review and approval markings and the action taken.
3. Include the following information on the label for processing and recording action taken.
 - a. Project name.
 - b. Date.
 - c. Name and address of ENGINEER.
 - d. Name and address of CONTRACTOR.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Number and title of appropriate Specification Section.
 - i. Drawing number and detail references, as appropriate.
4. Any markings done by CONTRACTOR shall be done in a color other than red. Red is reserved for ENGINEER's marking.
5. The number of copies to be submitted will be determined at the pre-construction conference. Reproducibles may be submitted and will be marked and returned to CONTRACTOR. Blue or black line prints shall be submitted in sufficient quantity for distribution to ENGINEER and OWNER recipients.

D. Submittal Transmittal:

1. Package each submittal appropriately for shipping and handling. This shall include an index either on the transmittal or within the submittal itself. Transmit each submittal from CONTRACTOR to ENGINEER using a transmittal form. Submittals received from sources other than CONTRACTOR will be returned without action. Use separate transmittals for items from different specification sections. Number each submittal consecutively. Resubmittals should have the same number as the original, plus a letter designation for each resubmittal (i.e., 7-A, 7-B, etc.).
2. Indicate on the transmittal relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include CONTRACTOR's certification that information complies with Contract Document requirements. On resubmittal, all changes shall be clearly identified for ease of review. Resubmittals shall be reviewed for the clearly identified changes only. Any changes not clearly identified will not be reviewed and original submittal shall govern.

1.04 CONSTRUCTION SCHEDULE

A. Bar Chart Schedule:

1. Prepare a fully developed, horizontal bar chart type Construction Schedule. Submit within 30 days of the date established for "Commencement of the Work."
2. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated on Schedule of Values.
3. Prepare Schedule on a sheet, or series of sheets, of stable transparency or other reproducible media, of sufficient width to show data for the entire construction period.
4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on Schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the Work.
5. Coordinate Construction Schedule with Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other schedules.
6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on Schedule to allow time for ENGINEER's procedures necessary for certification of Substantial Completion.

B. Schedule Updating: Revise Schedule after each meeting or activity where revisions have been recognized or made within 2 weeks following the meeting or activity.

1.05 SUBMITTAL SCHEDULE

- A. After development and acceptance of Construction Schedule, prepare a complete Schedule of Submittals. Submit Schedule within 10 days of the date required for establishment of Construction Schedule.
- B. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products, as well as Construction Schedule.
- C. Prepare Schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information:
 1. Scheduled date for the first submittal.
 2. Related Section number.
 3. Submittal category.
 4. Name of subcontractor.
 5. Description of the part of the Work covered.
 6. Scheduled date for resubmittal.
 7. Scheduled date ENGINEER's final release or approval.
- D. Following response to initial submittal, print and distribute copies to ENGINEER, OWNER, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.
- E. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

City of Kalamazoo

Phase 1: Central Pump Stations 1 Filter Media

Replacement (As Needed) and Misc.

Filter Improvements

Tetra Tech Project No. 200-19743-24010

01330-3

5/8/2026

- F. Schedule Updating: Revise Schedule after each meeting or activity where revisions have been recognized or made within 2 weeks following the meeting or activity.

1.06 SHOP DRAWINGS

- A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
- B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:
 - 1. Dimensions.
 - 2. Identification of products and materials included.
 - 3. Compliance with specified standards.
 - 4. Notation of coordination requirements.
 - 5. Notation of dimensions established by field measurement.
- C. Nameplate data for equipment including electric motors shall be included on Shop Drawings. Electric motor data shall state the manufacturer, horsepower, service factor, voltage, enclosure type, oversize wiring box, etc.
- D. Shop Drawings shall indicate shop painting requirements to include type of paint and manufacturer.
- E. Manufacturer's catalog sheets, brochures, diagrams, illustrations, and other standard descriptive data shall be clearly marked to identify pertinent materials, products, or models. Delete information which is not applicable to the Work by striking or cross-hatching.
- F. Measurements given on Shop Drawings or standard catalog sheets, as established from Contract Drawings and as approved by ENGINEER, shall be followed. When it is necessary to verify field measurements, they shall be checked and established by CONTRACTOR. The field measurements so established shall be followed by CONTRACTOR and by all affected trades.
- G. Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 inches by 11 inches but no larger than 36 inches by 48 inches.
- H. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

1.07 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as Shop Drawings.

- B. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
 - 1. Manufacturer's printed recommendations.
 - 2. Compliance with recognized trade association standards.
 - 3. Compliance with recognized testing agency standards.
 - 4. Application of testing agency labels and seals.
 - 5. Notation of dimensions verified by field measurement.
 - 6. Notation of coordination requirements.
- C. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

1.08 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
- B. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match ENGINEER's Sample. Include the following:
 - 1. Generic description of the Sample.
 - 2. Sample source.
 - 3. Product name or name of manufacturer.
 - 4. Compliance with recognized standards.
 - 5. Availability and delivery time.
- C. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
- D. Where variation in color, pattern, texture, or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3) that show approximate limits of the variations.
- E. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
- F. Preliminary Submittals: Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
 - 1. Preliminary submittals will be reviewed and returned with ENGINEER's mark indicating selection and other action.
- G. Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; 1 will be returned marked with the action taken.

- H. Maintain sets of Samples, as returned, at the Site, for quality comparisons throughout the course of construction.
- I. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
- J. Sample sets may be used to obtain final acceptance of the construction associated with each set.

1.09 ENGINEER'S ACTION

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, ENGINEER will review each submittal, mark to indicate action taken, and return promptly.
 - 1. Compliance with specified characteristics is CONTRACTOR's responsibility.
- B. Action Stamp: ENGINEER will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
 - 1. Final Unrestricted Release: Where submittals are marked "No Exceptions Taken," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
 - 2. Final-But-Restricted Release: When submittals are marked "Furnish as Corrected," that part of the Work covered by the submittal may proceed, provided it complies with notation or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
 - 3. Returned for Resubmittal: When submittal is marked "Rejected" or "Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
 - a. Do not permit submittals marked "Rejected" or "Revise and Resubmit" to be used at Site, or elsewhere where Work is in progress.
 - 4. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Acknowledge Receipt."
 - 5. The approval of ENGINEER shall not relieve CONTRACTOR of responsibility for errors on Drawings or submittals as ENGINEER's checking is intended to cover compliance with Drawings and Specifications and not enter into every detail of the shop work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01420 - DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.01 DEFINITIONS

- A. Basic Contract definitions are included in the General Conditions.
- B. Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, either at the Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.02 INDUSTRY STANDARDS

- A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents. Such standards are made a part of the Contract Documents by reference. Individual Sections indicate which codes and standards CONTRACTOR must keep available at Site for reference.
- B. Updated Standards: At the request of ENGINEER, CONTRACTOR, or authority having jurisdiction, submit a Change Order proposal where an applicable code or standard has been revised and reissued after the date of the Contract Documents and before performance of Work affected. ENGINEER will decide whether to issue a Change Order to proceed with the updated standard.
- C. Minimum Quantity or Quality Levels: In every instance the quantity or quality level shown or specified shall be the minimum to be provided or performed. The actual installation may comply exactly, within specified tolerances, with the minimum quantity or quality specified, or it may exceed that minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum values, as noted, or appropriate for the context of the requirements. Refer instances of uncertainty to ENGINEER for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed for performance of a required construction activity, CONTRACTOR shall obtain copies directly from the publication source.
- E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations as referenced in Contract Documents are defined to mean the associated names. Names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up to date as of date of Contract Documents.

AA Aluminum Association
 900 19th St., NW; Washington, D.C. 20006

AABC Associated Air Balance Council
 1518 K St. NW, Suite 503; Washington, D.C. 20005

AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol St., NW, Suite 249; Washington, D.C. 20001
ACI	American Concrete Institute P.O. Box 9094; Farmington Hills, MI 48333-9094
ACPA	American Concrete Pipe Association 222 West Las Colinas Blvd., Suite 641; Irving, TX 75039-5423
AFBMA	Anti-Friction Bearing Manufacturing Association
AFPA	American Forest & Paper Association 1111 19 th St., NW, Suite 800; Washington, D.C. 20036
AGA	American Gas Association 400 N Capitol St., NW; Washington, D.C. 20001
AGMA	American Gear Manufacturers Association
AI	Asphalt Institute Research Park Dr., P.O. Box 14052; Lexington, KY 40512-4052
A.I.A.	American Insurance Association 1130 Connecticut Ave., NW, Suite 1000; Washington, D.C. 20036
AISC	American Institute of Steel Construction One East Wacker Dr., Suite 3100; Chicago, IL 60601-2001
AISI	American Iron and Steel Institute 1101 Seventeenth St., NW; Washington, D.C. 20036
AITC	American Institute of Timber Construction 7012 S. Revere Parkway, Suite 140; Englewood, CO 80112
ALI	Associated Laboratories, Inc. P.O. Box 152837; Dallas, TX 75315
ALSC	American Lumber Standard Committee P.O. Box 210; Germantown, MD 20875-0210
AMCA	Air Movement and Control Association 30 W. University Dr.; Arlington Heights, IL 60004-1893
ANSI	American National Standards Institute 25 West 43 rd St.; New York, NY 10036
API	American Petroleum Institute

1220 L St., NW; Washington, D.C. 20005-4070

AREA	American Railway Engineering Association 50 F Street, NW, Suite 7702, Washington, D.C. 20001
ASCE	American Society of Civil Engineers 1801 Alexander Bell Dr.; Reston, VA 20191-4400
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, NE; Atlanta, GA 30329
ASME	American Society of Mechanical Engineers 345 East 47th St.; New York, NY 10017
ASSE	American Society of Safety Engineers 1800 East Oakton Street, Des Plaines, IL 60018
ASTM	American Society for Testing and Materials 100 Barr Harbor Dr.; West Conshohocken, PA 19428-2959
AWPA	American Wood-Preservers' Association P.O. Box 5690; Granbury, TX 76049
AWS	American Welding Society 550 NW Le Jeune Rd.; Miami, FL 33126
AWWA	American Water Works Association 6666 W. Quincy Ave.; Denver, CO 80235
CISPI	Cast Iron Soil Pipe Institute 1499 Chain Bridge Rd.; Suite 203; McLean, VA 22101
CRSI	Concrete Reinforcing Steel Institute 933 North Plum Grove Rd.; Schaumburg, IL 60173
CSA	Canadian Standards Association
FM	Factory Mutual Engineering and Research 1151 Boston-Providence Turnpike; Norwood, MA 02062-9102
H.I.	Hydraulic Institute 9 Sylvan Way; Parsippany, NJ 07054
IEEE	Institute of Electrical and Electronic Engineers 3 Park Ave., 17 th Floor; New York, NY 10016-5997
IPCEA	Insulated Power Cable Engineers Association

ISA	Instrument Society of America 67 Alexander Dr.; Research Triangle Park, NC 27709
MBMA	Metal Building Manufacturers Association 1300 Summer Ave.; Cleveland, OH 44115-2851
NAPA	National Asphalt Pavement Association 5100 Forbes Blvd.; Lanham, MD 20706-4413
NCPI	National Clay Pipe Institute P.O. Box 759; Lake Geneva, WI 53147
NEC	National Electrical Code (by NFPA)
NESC	National Electrical Safety Code
NEMA	National Electrical Manufacturers Association 1300 North 17 th St., Suite 1847; Rosslyn, VA 22209
NFPA	National Fire Protection Association 1 Batterymarch Park; Quincy, MA 02269-9101
NPCA	National Precast Concrete Association 10333 North Meridian St., Suite 272; Indianapolis, IN 46290
PCA	Portland Cement Association 5420 Old Orchard Rd.; Skokie, IL 60077-1083
PCI	Precast/Prestressed Concrete Institute 209 W. Jackson Blvd.; Chicago, IL 60606-6938
PDI	Plumbing and Drainage Institute 800 Turnpike Street, Suite 300, North Andover, MA 01845
PTI	Post-Tensioning Institute 1717 W. Northern Ave., Suite 114; Phoenix, AZ 85021
RIS	Redwood Inspection Service 405 Enfente Dr., Suite 200; Novato, CA 94949
SAE	Society of Automotive Engineers 400 Commonwealth Dr.; Warrendale, PA 15096-0001
SDI	Steel Deck Institute P.O. Box 25; Fox River Grove, IL 60021-0025
SJI	Steel Joist Institute 3127 10 th Ave. North Ext.; Myrtle Beach, SC 29577-6760

SMACNA	Sheet Metal & Air Conditioning Contractors' National Association 4201 Lafayette Center Dr.; Chantilly, VA 20151-1209
SPIB	Southern Pine Inspection Bureau 4709 Scenic Highway; Pensacola, FL 32504-9094
SSPC	The Society for Protective Coatings 40 24 th St., 6 th Floor; Pittsburgh, PA 15222-4565
TPI	Truss Plate Institute 583 Donofrio Dr., Suite 200; Madison, WI 53719
UL	Underwriters Laboratories 333 Pfingsten Rd.; Northbrook, IL 60062-2096
WCLIB	West Coast Lumber Inspection Bureau P.O. Box 23145; Portland, OR 97281
WWPA	Western Wood Products Association 522 SW Fifth Ave., Suite 500; Portland, OR 97204-2122

- F. Government Agencies. Names and titles of state and Federal Government standard or Specification producing agencies are frequently abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard or Specification producing agencies of the Federal government. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up to date as of the date of the Contract Documents.

CE	Corps of Engineers (U.S. Department of the Army) Chief of Engineers - Referral Washington, D.C. 20314
CFR	Code of Federal Regulations (Available from the Government Printing Office) N. Capitol Street between G and H St. NW Washington, D.C. 20402 (Material is usually first published in the Federal Register)
DOT	Department of Transportation 400 Seventh Street, SW Washington, D.C. 20590
EDA	Economic Development Administration U.S. Department of Commerce 121 N. Canal Street, Suite 855 Chicago, IL 60606
EPA	Environmental Protection Agency

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401 M Street, SW
Washington, D.C. 20460

DEQ	Department of Environmental Quality
DOT	Department of Transportation
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor) Government Printing Office Washington, D.C. 20402

1.03 GOVERNING REGULATIONS/AUTHORITIES

- A. ENGINEER has contacted authorities having jurisdiction where necessary to obtain information necessary for the preparation of Contract Documents; that information may or may not be of significance to CONTRACTOR. Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.

1.04 SUBMITTALS

- A. Permits, Licenses, and Certificates: For OWNER's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01450 - QUALITY CONTROL SERVICES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for quality control services.
- B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and CONTRACTOR. They do not include Contract enforcement activities performed by ENGINEER.
- C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve CONTRACTOR of responsibility for compliance with Contract Document requirements.
- D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
- E. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
- F. Inspections, tests, and related actions specified are not intended to limit CONTRACTOR's quality control procedures that facilitate compliance with Contract Document requirements.
- G. Requirements for CONTRACTOR to provide quality control services required by ENGINEER, OWNER, or authorities having jurisdiction are not limited by provisions of this Section.

1.02 CONTRACTOR RESPONSIBILITIES

- A. Provide inspections, tests, and similar quality control services, specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be OWNER's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by CONTRACTOR. Costs for these services shall be included in the Contract Price.
- B. Employ and pay an independent agency to perform specified quality control services.
- C. CONTRACTOR and each agency engaged to perform inspections, tests, and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition, CONTRACTOR and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
- D. Schedule times for inspections, tests, taking samples, and similar activities.

- E. Retesting: CONTRACTOR is responsible for retesting where results of required inspections, tests, or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was CONTRACTOR's responsibility.
 - 1. Cost of retesting construction revised or replaced by CONTRACTOR is CONTRACTOR's responsibility, where required tests were performed on original construction.
- F. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
 - 1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
 - 2. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
 - 3. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
 - 4. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
 - 5. Security and protection of samples and test equipment at the Project site.
- G. Contractor shall furnish concrete and geotechnical testing services.

1.03 OWNER RESPONSIBILITIES

- A. Provide inspections, tests, and similar quality control services specified to be performed by independent agencies and not by CONTRACTOR, except where they are specifically indicated as CONTRACTOR's responsibility or are provided by another identified entity. Costs for these services are not included in the Contract Price.
- B. Engage and pay for the services of an independent agency to perform inspections and tests specified as OWNER's responsibility.
- C. OWNER will employ and pay for the services of an independent agency, testing laboratory, or other qualified firm to perform services which are OWNER's responsibility.
- D. OWNER shall perform bacteriological sampling and testing of water mains and ancillary equipment.

1.04 TESTING AGENCY RESPONSIBILITIES

- A. Where OWNER has engaged a testing agency or other entity for testing and inspection of a part of the Work, and CONTRACTOR is also required to engage an entity for the same or related element, CONTRACTOR shall not employ the entity engaged by OWNER, unless otherwise agreed in writing with OWNER.
- B. The independent testing agency engaged to perform inspections, sampling, and testing of materials and construction specified in individual Specification Sections shall cooperate with ENGINEER and CONTRACTOR in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.

- C. The agency shall notify ENGINEER and CONTRACTOR promptly of irregularities or deficiencies observed in the Work during performance of its services.
- D. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
- E. The agency shall not perform any duties of CONTRACTOR.

1.05 SUBMITTALS

- A. The independent testing agency shall submit a certified written report of each inspection, test, or similar service to ENGINEER in triplicate, unless CONTRACTOR is responsible for the service. If CONTRACTOR is responsible for the service, submit a certified written report of each inspection, test, or similar service through CONTRACTOR in triplicate.
- B. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
- C. Written reports of each inspection, test, or similar service shall include, but not be limited to:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making the inspection or test.
 - 6. Designation of the Work and test method.
 - 7. Identification of product and Specification Section.
 - 8. Complete inspection or test data.
 - 9. Test results and an interpretation of test results.
 - 10. Ambient conditions at the time of sample taking and testing.
 - 11. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 REPAIR AND PROTECTION

- A. Upon completion of inspection, testing, sample taking, and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes.

- B. Protect construction exposed by or for quality control service activities and protect repaired construction.
- C. Repair and protection are CONTRACTOR's responsibility regardless of the assignment of responsibility for inspection, testing, or similar services.

END OF SECTION

SECTION 01500 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: This Section specifies procedural and administrative requirements for temporary services and facilities.
- B. Temporary Construction and Support Facilities include, but are not limited to:
 - 1. CONTRACTOR's field offices and storage sheds.
- C. Construction Buildings and Facilities include, but are not limited to.
 - 1. Temporary enclosures.
 - 2. Temporary Project identification signs.
 - 3. Temporary Site identification signs.
 - 4. Temporary Project bulletin boards.
 - 5. Stairs.
 - 6. Hoists.
 - 7. Ongoing construction cleanup.
 - 8. Rodent and pest control.
 - 9. Storage of equipment and material.
- D. Security and Protection Facilities required include, but are not limited to:
 - 1. Barricades, warning signs, lights.
 - 2. Enclosure fence for the Site.
 - 3. Security enclosure and lockup.
 - 4. Environmental protection.

1.02 REFERENCES

- A. Natural Resources and Environmental Protection Act, P.A. 451 (Act 451) of 1994.
- B. Guidebook of Best Management Practices for Michigan Watersheds.
- C. Local Soil Erosion Control Ordinance or requirements.
- D. Codes and Standards:
 - 1. Comply with NFPA Code 241, "Building Construction and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library, "Temporary Electrical Facilities."
 - 2. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services," prepared jointly by AGC and ASC, for industry recommendations.
 - 3. Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

1.03 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section.

QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to:
 - 1. Building Code requirements.
 - 2. Health and Safety regulations.
 - 3. Utility Company regulations.
 - 4. Police, Fire Department, and Rescue Squad rules.
 - 5. Environmental Protection regulations.
 - 6. State and Local Soil Erosion and Sedimentation Control regulations.
- B. Inspection: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide new materials; if acceptable to ENGINEER, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

2.02 EQUIPMENT

- A. Provide new equipment; if acceptable to ENGINEER, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.
- B. First Aid Supplies: Comply with governing regulations.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they shall serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

- A. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
 - 1. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to OWNER.
 - 2. Provide incombustible construction for offices, shops, and sheds located within the construction area, or within 30 feet of building lines. Comply with requirements of NFPA 241.
- B. Temporary Heating Facilities: Provide temporary heat required by construction activities for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
 - 1. Except where use of the permanent system is authorized, provide vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.
 - 2. Use of gasoline-burning space heaters, open flame, or salamander-type heating units is prohibited.
- C. CONTRACTOR's Field Offices: Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at Site.

3.03 CONSTRUCTION BUILDINGS AND FACILITIES INSTALLATION

- A. Temporary Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated. Verify with ENGINEER final wording of graphics to be placed on sign and final location of sign. Obtain sign permit from local authority.
- B. Temporary Site Identification and Signs: Prepare Site identification and other signs of the size indicated; install signs where indicated or as directed by ENGINEER to inform construction personnel, public and visitors seeking entrance to Site. Do not permit installation of unauthorized signs.
- C. Temporary Project Bulletin Board: As a minimum, the following items must be posted:
 - 1. Wage Rates (when applicable).
 - 2. Safety Poster (OSHA or State OSHA).
 - 3. Nondiscrimination Poster.
 - 4. Equal Employment Opportunity Statement signed by a Company official.
 - 5. Grading Permit (Soil Erosion and Sedimentation Control Act 451).
- D. Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.
- E. Ongoing Construction Cleanup: Project cleanup shall be an ongoing operation. CONTRACTOR shall maintain an order of neatness and good housekeeping comparable to that maintained by OWNER. Project cleanup applies to the Site and all areas affected by construction operations. CONTRACTOR shall:
 - 1. Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not

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- hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 degrees F (27 degrees C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.
2. Maintain dirt and debris resulting from CONTRACTOR's operations in designated spoil piles as approved by ENGINEER or remove from the Site daily. Dirt and debris shall not collect or interfere with OWNER's facility operations. Excess dirt and debris shall be removed from the Site as needed to confine spoil piles in designated areas.
 3. Perform general cleanup inside of OWNER's buildings weekly. Cleanup shall include consolidation of stored materials, removal of waste material and debris, and sweeping of flooring surfaces.
 4. Maintain clear access to all properties affected by construction activities. Maintain unobstructed access to existing buildings, equipment, safety equipment, and other items requiring OWNER access for facility operation.
 5. Keep tools, equipment, and materials in a neat and orderly arrangement.
 6. Repair all holes and ruts resulting from construction operations that affect OWNER's use of property with approved material; compact, level, and restore.
- F. Rodent and Pest Control: CONTRACTOR shall employ a licensed pest control service during the Contract Times of this Contract.
1. Pest control service shall maintain Site free from:
 - a. Mice, rats, and similar rodents.
 - b. Termites, carpenter ants, and similar pests.
 - c. Birds perching or nesting inside buildings.
 2. Pest control services shall be performed at the start of the Project. Inspections and maintenance of pest control products shall be performed on a monthly basis.
- G. Storage of Equipment and Material: Valves, actuators, piping, and other equipment shall be stored in weathertight structures provided by CONTRACTOR.
1. Motors, electrical equipment, gauges, and other equipment of a delicate nature, as determined by ENGINEER, shall be stored in weathertight warehouses which are maintained at a temperature of at least 60 degrees F.
 2. Structural steel, miscellaneous and cast iron items may be placed in open yard storage, but any such items having attached motors or other machinery units shall have such units well wrapped with waterproof paper or cloth for protection from the weather.
 3. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of ENGINEER.
 4. Materials and equipment distributed, stored, and placed upon or near the Site of the Work shall at all times be so disposed as not to interfere with work prosecuted by OWNER or other Contractors in the employment of OWNER or with drainage. Materials and equipment shall not be stored on public streets.

3.04 FIELD QUALITY CONTROL

- A. Should the local Regulatory Agency determine at any time during construction that the construction operation is in violation of the Natural Resources and Environmental Protection Act, P.A. 451 (Act 451) of 1994 and cite OWNER, CONTRACTOR or Subcontractor shall take immediate action, as directed by OWNER, to ensure compliance with the Act.

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3.05 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour-day basis where required to achieve indicated results and to avoid possibility of damage.
- C. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- D. Termination and Removal: Unless ENGINEER requires that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of CONTRACTOR. OWNER reserves the right to take possession of Project identification signs.
 - 2. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period including, but not limited to:
 - a. Replace air filters and clean inside of ductwork and housings.
 - b. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
 - c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION

SECTION 01530 - PROTECTION OF EXISTING FACILITIES

PART 1 – GENERAL

1.01 GENERAL

- A. The Contractor shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than the original condition prior to such damage or temporary relocation, all in accordance with the Drawings and Specifications.

1.02 EXISTING FACILITIES/PRIVATE PROPERTY

- A. The Contractor shall not perform work that would affect any oil, gas, sewer, or water pipeline; any telephone, telegraph, or electric transmission line; any fence; or any other structure, nor shall the Contractor enter any private property until authorization has been obtained from the appropriate party by the Contractor and approved by the OWNER.
- B. After authority has been obtained, the Contractor shall give said party due notice of its intention to begin work, if required by said party, and shall remove, shore, support, or otherwise protect or replace such pipeline, transmission line, ditch, fence, or any other structure, etc.

1.03 RESTORATION OF PAVEMENT

- A. General: All paved areas cut or damaged during construction shall be restored to match original construction. Pavements that are subject to partial removal shall be neatly saw cut in straight lines and shall be swept clean as needed.

1.04 EXISTING UTILITIES AND IMPROVEMENTS

- A. Maintaining in Service: Unless indicated otherwise, oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and telecommunication wires and cables, etc., encountered in the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements are made with the OWNER. The Contractor shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section..

PART 2 – PRODUCTS

NOT USED

PART 3 -- EXECUTION

NOT USED

END OF SECTION

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SECTION 01600 - GENERAL EQUIPMENT STIPULATIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. These General Equipment Stipulations apply, in general, to all equipment provided under other Specification Sections. They shall supplement the detailed equipment specifications, but in cases of conflict the equipment specifications shall govern.

1.02 OPERATION AND MAINTENANCE

- A. All equipment suppliers shall submit to ENGINEER, through CONTRACTOR, 4 bound copies and 1 electronic/digital format copy of a manual containing specifications, Drawings, and descriptions of equipment; installation instructions; operation, maintenance, and lubrication manuals; parts lists; emergency instructions; and where applicable, test data with curves, wiring diagrams, PLC programs, VFD configuration, Valve actuator configuration on CD and schematics. This information shall be submitted for each item of equipment furnished under this Contract and shall be specific to the exact equipment models complete with all appurtenances provided. It shall also include detailed, comprehensive directions for all required maintenance activities and for the repair or replacement of all wearing parts. Special attention shall be paid to necessary safety precautions that OWNER's staff should take when operating, maintaining, or repairing the equipment.
1. Bound copies of O&M Manuals shall be in addition to any instructions shipped with the equipment and shall be submitted only after ENGINEER has given final approval of Shop Drawings. All manuals shall be submitted to ENGINEER following final Shop Drawing approval and prior to the date of shipment of the equipment to the Site. Organize operation and maintenance manuals into suitable sets of manageable size, organized by section or process, as directed by ENGINEER. Bind properly indexed data in heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Appropriate identification shall be noted on the front and spine of each binder.
 2. Electronic Copy of O&M Manuals: Each equipment O&M manual shall be provided in electronic format, matching the content of the final approved printed O&M Manual. The information shall be saved in a single ".pdf" file, with bookmarks for each chapter, section, appendices, etc., as well as each piece of equipment. Where numerous pieces of equipment may be addressed within a section, a second tier of bookmarks shall be provided to allow quick access to each piece of equipment or key piece of information.
 3. "Sample" Table of Contents:

Bookmarks

Table of Contents

Section 1 - Approved Shop Drawings

Section 2 - Installation Instructions and Parts Identification

Section 3 - Operations and Maintenance Information

Section 4 - Troubleshooting (If not included in Section 3.)

Section 5 - Parts List (If not included in Section 3.)

Section 6 - Lubrication Instructions (If not included in Section 3.)

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4. These manuals shall be in addition to any instructions shipped with the equipment and shall be submitted only after ENGINEER has given final approval of Shop Drawings. All manuals shall be submitted to ENGINEER following final Shop Drawing approval and prior to the date of shipment of the equipment to the Site. Organize operation and maintenance manuals into suitable sets of manageable size, organized by section or process, as directed by ENGINEER. Bind properly indexed data in heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Appropriate identification shall be noted on the front and spine of each binder.

1.03 QUALITY ASSURANCE

- A. Compliance with OSHA: All equipment provided under this Contract shall meet all the requirements of the Federal and/or State Occupational Safety and Health Acts. Each equipment supplier shall submit to ENGINEER certification that the equipment furnished is in compliance with OSHA.
- B. Electrical Codes, Ordinances, and Industrial Standards: The design, testing, assembly, and methods of installation of the wiring materials, electrical equipment and accessories proposed under this Contract shall conform to the National Electrical Code and to applicable State and local requirements. UL listing and labeling shall be adhered to under this Contract. Any equipment that does not have a UL, FM, CSA, or other listed testing laboratory label shall be furnished with a notarized letter signed by the supplier stating that the equipment furnished has been manufactured in accordance with the National Electrical Code and OSHA requirements. Any additional cost resulting from any deviation from codes or local requirements shall be borne by CONTRACTOR.

1.04 SHIPPING AND HANDLING EQUIPMENT

- A. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment and handling.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Anchor Bolts: Anchor bolts, nuts, and washers shall be hot-dipped galvanized in conformity with ASTM A 385 and be supplied with sleeves.
- B. Shop Painting:
 1. Non-submerged Applications: Tnemec Series 37H, Chem-Prime.
 2. Submerged, Non-potable Applications: Tnemec Series 66, Hi-Build Epoxoline.
 3. Submerged, Potable Applications: Tnemec Series 139, Pota-Pox II.
 4. Rust preventive compound shall be:
 - a. Dearborn Chemical, No-Ox-ID2W.
 - b. Houghton, Rust Veto 344.
 - c. Rust-Oleum R-9.

PART 3 - EXECUTION

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3.01 OPERATION AND MAINTENANCE TRAINING

- A. Provide services of manufacturer's service representative to instruct OWNER's personnel in operation and maintenance of equipment. Training shall include start-up and shutdown, servicing and preventative maintenance schedule and procedures, and troubleshooting procedures plus procedures for obtaining repair parts and technical assistance.
 - 1. Manufacturer's representative shall provide a minimum of 2 on-Site training sessions.
 - a. Two sessions for Maintenance personnel
 - 2. Review operating and maintenance data contained in the final approved operating and maintenance manuals.
 - 3. Schedule training with OWNER, provide at least 10-day prior written notice to ENGINEER and OWNER.

END OF SECTION

SECTION 01730 - CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for cutting and patching.

1.02 SUBMITTALS

- A. Cutting and Patching Proposed Method: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval from ENGINEER to proceed.

1.03 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
- B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance or decreased operational life or safety.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in ENGINEER's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance shall equal or surpass that of existing materials.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

3.02 PREPARATION

- A. Provide temporary support of Work to be cut.
- B. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Take all precautions necessary to avoid cutting existing pipe, conduit, or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.03 PERFORMANCE

- A. Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
- B. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.
- C. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
 - 1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
- D. Comply with requirements of applicable Sections of Division 2 where cutting and patching requires excavating and backfilling.
- E. Cap, valve or plug, and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after bypassing and cutting.
- F. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
 - 1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
 - 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - 3. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.04 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty, and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION

SECTION 01770 - CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for Contract closeout including, but not limited to:
 - 1. Warranties and Bonds.
 - 2. Requirements for Substantial Completion.
 - 3. Project record document submittal.
 - 4. Equipment acceptance.
 - 5. Operating and maintenance manual submittal.
 - 6. Final cleaning.
- B. Refer to the General Conditions for terms of CONTRACTOR's special warranty of workmanship and materials.
- C. Specific requirements for warranties for the Work and products and installation that are specified to be warranted, are included in the individual Sections of Divisions 2 through 16.
- D. Certifications and other commitments and agreements for continuing services to OWNER are specified elsewhere in the Contract Documents.

1.02 WARRANTY REQUIREMENTS

- A. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve CONTRACTOR of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with CONTRACTOR.
- B. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- C. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- D. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. CONTRACTOR is responsible for the cost of replacing or rebuilding defective Work regardless of whether OWNER has benefited from use of the Work through a portion of its anticipated useful service life.
- E. OWNER's Recourse: Written warranties made to OWNER are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law,

nor shall warranty periods be interpreted as limitations on time in which OWNER can enforce such other duties, obligations, rights, or remedies.

- F. Rejection of Warranties: OWNER reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- G. OWNER reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.03 SUBSTANTIAL COMPLETION

- A. Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
 - 1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documents for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Price.
 - 2. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - 3. Advise OWNER of pending insurance changeover requirements.
 - 4. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents.
 - 5. Obtain and submit releases enabling OWNER unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates, and similar releases.
 - 6. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
- B. Inspection Procedures: On receipt of a request for inspection, ENGINEER will either proceed with inspection or advise CONTRACTOR of unfilled requirements.
 - 1. ENGINEER will prepare the Certificate of Substantial Completion following inspection, or advise CONTRACTOR of construction that must be completed or corrected before the certificate will be issued.
 - 2. ENGINEER will repeat inspection when requested and assured that the Work has been substantially completed.
 - 3. Results of the completed inspection will form the basis of requirements for final acceptance.
- C. The warranty period for specific portions of the Work will begin on the date established on Component Acceptance Form or at such other date as agreed by OWNER, ENGINEER, and CONTRACTOR.

1.04 FINAL ACCEPTANCE

- A. Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
 - 1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 - 2. Submit an updated final statement, accounting for final additional changes to the Contract Price.

3. Submit a copy of ENGINEER's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by ENGINEER.
 4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when OWNER took possession of and responsibility for corresponding elements of the Work.
 5. Submit consent of surety to final payment.
 6. Submit a final liquidated damages settlement statement.
 7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 8. Submit record drawings, maintenance manuals, final Project photographs, damage or settlement survey, property survey, and similar final record information.
 9. Deliver tools, spare parts, extra stock, and similar items.
 10. Make final changeover of permanent locks and transmit keys to OWNER. Advise OWNER's personnel of changeover in security provisions.
 11. Complete start-up testing of systems, and instruction of OWNER's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
- B. Reinspection Procedure: ENGINEER will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to ENGINEER.
1. Upon completion of reinspection, ENGINEER will prepare a certificate of final acceptance, or advise CONTRACTOR of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 2. If necessary, reinspection will be repeated.

1.05 REINSPECTION FEES

- A. Should the Engineer perform reinspections due to failure of the Work to comply with the claims of status of completion made by the Contractor:
1. Contractor will compensate the Owner for such additional services.
 2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.06 SUBMITTALS

- A. Submit written warranties to ENGINEER prior to the date certified for Substantial Completion. If ENGINEER's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of ENGINEER.
- B. When a designated portion of the Work is completed and occupied or used by OWNER, by separate agreement with CONTRACTOR during the construction period, submit properly executed warranties to ENGINEER within 15 days of completion of that designated portion of the Work.
- C. When a special warranty is required to be executed by CONTRACTOR, or CONTRACTOR and a subcontractor, supplier, or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to OWNER through ENGINEER for approval prior to final execution.

- D. Refer to individual Sections of Divisions 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.

1.07 RECORD DOCUMENT SUBMITTALS

- A. Record Drawings:
1. Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown.
 2. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Drawings. The Record Drawings shall be supplemented by any detailed sketches as necessary or directed to indicate, fully, the Work as actually constructed. These master Record Drawings are the Contractor's representation of as-built conditions, including all revisions made necessary by addenda, change orders, RFIs, or other changes, and shall be maintained up-to-date during the progress of the Work.
 3. Mark whichever Drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
 4. In the case of those drawings which depict the detail requirement for equipment to be assembled and wired in the factory, such as motor control centers and the like, the Record Drawings shall be updated indicating any portions which are superseded by change order drawings or final shop drawings including appropriate reference information describing the change orders by number and the shop drawings by manufacturer, drawing, and revision numbers.
 5. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
 6. Mark new information that is important to OWNER, but was not shown on Contract Drawings or Shop Drawings.
 7. Note related Change Order numbers where applicable.
 8. Organize Record Drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on the cover of each set.
- B. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work.
1. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to ENGINEER for OWNER's records.
- C. Operation and Maintenance Manuals: Submit in accordance with requirements of Section 01600, operation and maintenance manuals for items included under this Section.

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 COMPONENT ACCEPTANCE

- A. Component Acceptance Certificate: For each item of equipment incorporated into the Project, ENGINEER will issue a Component Acceptance Certificate as shown in Section 00625.
- B. The certificate will certify that the equipment installation is complete, that manufacturer-provided inspection and start-up services and training have taken place, and that OWNER has beneficial use of the equipment.
- C. The data on the Component Acceptance Certificate may be used to establish the time of beginning for the warranty period for that piece of equipment, if OWNER begins to use it at that time.

3.02 FINAL CLEANING

- A. General cleaning during construction is required by the General Conditions.
- B. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
- C. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
 - 1. Remove labels that are not permanent labels.
 - 2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - 3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
 - 4. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - 5. Clean Site, including landscape development areas, of rubbish, litter, and foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth even-textured surface.
- D. Comply with regulations of authorities having jurisdiction and safety standards for cleaning.
 - 1. Do not burn waste materials. Do not bury debris or excess materials on OWNER's property.
 - 2. Do not discharge volatile, harmful, or dangerous materials into drainage systems.
 - 3. Remove waste materials from Site and dispose of in a lawful manner.
- E. Where extra materials of value remaining after completion of associated Work have become OWNER's property, arrange for disposition of these materials as directed.

END OF SECTION

SECTION 13225 - FILTER MATERIALS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Labor, materials, and equipment necessary for production, testing, furnishing, and placement of the filter materials, and preparation of the filters for service as specified in this Section, as shown on Drawings, or listed on Schedule. Filter materials provided shall be placed in proper operating condition in full conformity with Contract Documents, engineering data, instructions, and recommendations of the filter materials producer. The materials in this section shall be used as directed by Owner based on selection of Alternate 1 and/or 2. Note Owner may select different Alternates for different filter cells.

1.02 REFERENCES

- A. Reference Standards:
1. AWWA B100 Filtering Material.
 2. AWWA C653 Disinfection of Water Treatment Plants.
 3. ASTM C 25 Chemical Analysis of Limestone, Quicklime, and Hydrated Lime.
 4. ASTM C 40 Organic Impurities in Fine Aggregates for Concrete.
 5. ASTM C 117 Materials Finer than 75-[mu]m (No. 200) Sieve in Mineral Aggregates by Washing.
 6. ASTM C 123 Lightweight Pieces in Aggregate.
 7. ASTM C 702 Reducing Samples of Aggregate to Testing Size.
 8. ASTM D 75 Sampling Aggregates.
 9. ASTM E 11 Wire Cloth Sieves for Testing Purposes.
 10. NSF 61 Drinking Water System Components

1.03 DEFINITIONS

- A. Effective Size: For example, the size opening that will pass 10 percent (by weight) of a representative sample of the filter material. That is, if the size distribution of the particles is such that 10 percent (by weight) of a sample is finer than 0.45 mm, the filter material has an effective size of 0.45 mm.
- B. Uniformity Coefficient: For example, a ratio calculated as the size opening that will just pass 60 percent (by weight) of a representative sample of the filter material divided by the size opening that will just pass 10 percent (by weight) of the same sample.

1.04 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
1. Submit a representative sample of each size of filter material for Alternate 1 and/or 2 for approval before shipment. Samples shall be submitted in clean, dust-tight containers clearly marked with name and address of supplier and the size or grade of contents. After approval of

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the samples, shipments shall be of a quality equal to the sample. Approval samples shall meet the requirements of Paragraph 2.03.

- a. Supplier's Name
 - b. Quality Control Manual
 - c. Gradation of Each Media Type
 - d. Date of Sampling/Lot Number
 - e. Samples of Each Media Type
 - f. Representative Sample Analysis, (i.e. effective size, uniformity coefficient, specific gravity)
 - g. Material Quantities
 - h. Diagram with Type of Material and Depth of Each
 - i. Estimated Shipping Schedule
 - j. Media Loading Procedure
 - k. All testing shall conform to the requirements of the latest edition of AWWA B100.
- B. Test and Inspection Report: A written report shall be submitted to ENGINEER documenting testing and/or inspection results. The report shall be prepared as noted under Section 01600.
- C. Submit an affidavit of compliance stating that the filter materials furnished comply with the applicable provisions of AWWA B100.
- D. Supplier shall a minimum of five (5) years' experience in producing materials similar to that which is specified herein and shall have evidence of at least ten (10) installations in satisfactory operation.

1.05 QUALITY ASSURANCE

- A. Filtering materials, including greensand, silica sand, anthracite, and granular activated carbon shall be obtained from sources regularly used in producing and furnishing these materials for water treatment plants.
- B. Evidence shall be submitted that there are ample facilities at the source to supply filter materials in the quantities required for the Work, and that the screening facilities are capable of producing filter materials of uniform quality.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Shipment shall be made in semi-bulk containers generally containing approximately 1 ton or more of filter material or by bags generally containing approximately 1 cubic foot or less. Bulk shipment is prohibited.
 1. Bags and semi-bulk containers shall be of plastic, paper, or woven container suitable for shipment and marked to clearly identify the contents of bag or container.
 2. When a shipment of material is being loaded, CONTRACTOR shall notify ENGINEER of the truck number and date to be shipped. The shipping notice shall contain a certification of the particle size distribution of the material in the shipment.

- B. Storage of material at the Project Site shall be as follows:
1. Filter materials shall be kept clean. Bags and semi-bulk containers shall be stored on pallets or dunnage, and stored separately according to size and type of filter material. Bags and semi-bulk containers shall be covered by a durable opaque material to block sunlight and to provide protection from weather.
 2. Under no circumstances shall material be removed from the bags or semi-bulk containers prior to placement in the filter cells, except for sampling.

PART 2 - PRODUCTS

2.01 FILTER MEDIA

- A. Alternate 1: Manganese Sand Media . See Drawings for media depth.
1. Filter sand shall be composed of hard, durable, clean siliceous particles, free of all mica with an average specific gravity of at least 2.4 -2.9 g/cm³ and shall be in accordance with AWWA Specification B100. Sand media shall be an effective size of 0.30-0.35 mm, and a uniformity coefficient of not more than 1.60. Acid solubility shall be less than 5 percent. Sand shall meet all requirements of 10 State Standards.
- B. Alternate 2: Granular Activated Carbon Media. See Drawings for media depth.
1. Media shall be provided by Calgon.
 2. The GAC to be supplied and installed shall virgin, granular, and manufactured bituminous coal. Peat, wood, or coconut-based GAC will not be accepted.
 3. The GAC shall be suitable for use as a filter media in a potable water treatment plant and be effective in the removal of the target compounds described herein to the prescribed acceptable levels. The GAC shall be visually free of clay, dirt, and deleterious material.
 4. The GAC shall be durable granular activated carbon capable of withstanding the abrasion associated with repeated backwashing.
 5. GAC for use as an adsorption media in the treatment of potable water supplies shall conform to the requirements of the most current edition of AWWA B-604. The GAC shall conform to food chemical codes when assessed as outlined in the Food Chemicals Codex, Third Edition.
 6. The GAC shall meet the minimum standards and performance criteria regarding material specifications and physical properties. These performance criteria shall be evaluated based on samples of the proposed material which are submitted to the system Owner (or representative), lab reports and the Owner's on-site tests of the delivered material. Failure of samples to meet the performance criteria shall result in rejection of the GAC and, in the case of job-site samples, in the removal and replacement of any installed materials at no cost to the system Owner.
 7. Detailed specifications and material quality and testing results shall be submitted to the Owner for review and approval prior to delivery, and installation of the GAC. Manufacturer's test reports shall include the following information:
 - a. Manufacturer's name.
 - b. Material source and manufacturer plant location.
 - c. Date of sampling.

- d. Lot or stockpile number identification.
 - e. Demonstration of compliance with physical properties and specifications.
8. Media shall meet the following requirements:

Type	Bituminous Coal
Iodine Number	1,000 mg/g (min)
Effective Size	0.55 - 0.75 mm
Abrasion Number	75 (min)
Mean Particle Diameter, mm	1.1-1.4
Screen Size by Weight, US Sieve Series	On 12 mesh: 5% max Through 40 mesh: 4% max
Uniformity Coefficient	1.9 (max)
Moisture as Packed	2% (max)
Apparent Density	.54 g/cc

2.02 SOURCE QUALITY CONTROL

A. Sampling:

1. Sampling of filter materials shall be performed in accordance with ASTM D 75 as modified by AWWA B100 and this Section. The size of the composite samples shall be in accordance with AWWA B100.
2. Composite samples for analysis of filter materials shall be obtained at the point of loading by an independent laboratory, acceptable to ENGINEER. At least one composite sample shall be generated for each size and type of material per truckload to be shipped to the Site.
3. Each composite sample shall be reduced to representative samples for testing in accordance with ASTM C 702. All samples shall be quartered, and a portion shall be submitted to ENGINEER for analysis. Chain of custody shall be observed for all samples.
4. The remaining two sample portions shall be maintained at the production facility for possible independent analysis for verification of testing performed by manufacturer and ENGINEER. Sample portions shall be maintained until ENGINEER has accepted manufacturer's testing results.

B. Testing:

1. The following tests shall be performed at the production site by an independent laboratory, acceptable to ENGINEER, in accordance with AWWA B100:
 - a. Acid Solubility:
 - 1) The acid solubility test is performed by immersing a known weight of material in one-to-one hydrochloric acid (made by combining equal volumes of 1.18 specific gravity HCl and H₂O) until the acid-soluble materials are dissolved, then determining the weight loss of the material. Minimum sample size and minimum quantity of concentrated hydrochloric acid diluted one-to-one with distilled water are indicated in Table 4 of AWWA B100.
 - 2) The acid solubility test procedure shall be as shown in Paragraph 3.3.1.1 of AWWA B100.
 - b. Gravel Shape Tests:

- 1) Gravel shape tests shall be performed for identification of fractured, flat, or elongated particles by visual inspection.
 - 2) Gravel shape definitions shall be as shown in Paragraphs 3.3.2.2 and 3.3.2.3 of AWWA B100.
 - c. Specific Gravity:
 - 1) The specific gravity of filter gravel shall be determined in accordance with ASTM C 127 and shall be reported as saturated-surface-dry specific gravity. The specific gravity of silica sand and filter anthracite shall be determined in accordance with ASTM C 188 and shall be reported as apparent specific gravity.
 - d. Sieve Analyses:
 - 1) Sieving procedures shall be in accordance with AWWA B100 and ASTM C 136. Sieves shall be calibrated under provisions of ASTM E 11.
 2. All testing apparatus and measuring devices shall be properly calibrated and proof of calibration shall be furnished to ENGINEER's satisfaction.
 3. In addition to the above tests, the following tests shall be performed at the production site by an independent laboratory acceptable to ENGINEER:
 - a. Moh Hardness:
 - 1) Moh hardness of the material shall be performed using the Moh hardness scale.
 - b. Caustic Solubility:
 - 1) Caustic solubility is performed by immersing a known weight of material in a 1 percent sodium hydroxide solution and heated to 190 degrees F until the caustic-soluble materials are dissolved, then determining the weight loss of the material.
- C. Verification of Performance:
1. Additional Testing:
 - a. At the option of ENGINEER, two additional tests shall be conducted using the two remaining representative samples and a mutually acceptable independent laboratory.
 - b. All testing shall be in accordance with AWWA B100 and this Specification. The results of all tests shall be averaged arithmetically.
 - c. If the independent laboratory reports that the material complies with the applicable requirements of the Specifications, OWNER will accept the material and pay the associated testing costs. If the material does not meet the requirements of the Specifications, CONTRACTOR shall pay the associated testing costs.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prior to placement of the filter materials, each filter cell shall be cleaned thoroughly and the underdrain shall be checked for integrity by careful examination of underdrains for plugging. Each filter cell shall be kept clean throughout placement operations. See Section 01210 - Allowances and Drawings for additional information and requirements.
- B. CONTRACTOR shall report unsatisfactory conditions to ENGINEER before placing the filter materials. Any unsatisfactory conditions shall be repaired in a method as directed by ENGINEER and OWNER. These repairs are to be paid from Section 01210 – Allowances. These repairs do not include any damage Contractor has done to the underdrain system.

- C. Upon start of placement of the filter materials, CONTRACTOR shall have accepted the filter cell and underdrain and shall be responsible for any subsequent crack or leak in the filter cell or underdrain. Any cracks or leaks in the filter cell or underdrain, or damage shall be repaired under provisions of the General Conditions in a method approved by ENGINEER and OWNER at no change in Contract price.

3.02 FIELD QUALITY CONTROL

A. Production Site Verification Tests:

1. OWNER may perform sampling at the Site for the purpose of verification of production Site testing.
2. If the filter materials do not meet this Specification, they shall be removed from the Site at CONTRACTOR's expense. An independent laboratory, acceptable to OWNER, may be employed by CONTRACTOR to sample and test the disputed material before removal.
3. All Site sampling and testing shall be in accordance with AWWA B100.
4. At the option of OWNER or CONTRACTOR, 2 additional tests shall be conducted using 2 additional representative samples and a mutually acceptable independent laboratory. The results of all tests shall be averaged arithmetically.
5. If the independent laboratory reports that the material complies with the Specifications, OWNER will accept the material and pay the laboratory fee. If the material does not meet the requirements of the Specification, CONTRACTOR shall promptly remove the material from the Site and pay the laboratory fee.

B. Field Control Tests:

1. Field control tests shall be made by an independent laboratory acceptable to OWNER at the expense of CONTRACTOR.
2. A sample for determination of the portion of material passing a No. 50 sieve shall be taken from each 50 cubic feet of media placed into a filter.
3. A composite sample shall be prepared in accordance with ASTM D 75, as modified by AWWA B100, for each filter and at least 3 sieve analyses shall be made on the composite sample.
4. The average of the sieve analyses shall be used to determine the amount of fine material to be removed from the filter by scraping.

3.03 INSTALLATION

A. General:

1. The top elevation of each layer of filter material shall be marked by a level line on the sidewall of the filter cell underdrains shall be in their proper position prior to placement of any filter material.
2. Filter materials may be placed dry by using a chute or conveyor to discharge the materials onto a platform from which they may be distributed with a hand shovel, or they may be placed hydraulically by pump or ejector. Materials placed using the wet method shall be added through the water and then backwashed for leveling. Pneumatic handling of filter materials is prohibited.
3. To provide for initial expansion of the bed due to segregation of particle sizes, the elevation of the top surface, before the initial washing, shall be approximately 10 percent of the bed thickness below the finished elevation.

4. The bottom layer of gravel shall be carefully placed by bucket to not damage underdrains.
5. For materials smaller than 1/2 inch, workers shall stand or walk on plywood or boards that will sustain their weight without displacing the filter material instead of directly on the filter material.
6. All water used for installation and backwashing of the filter material shall be provided by OWNER. All valves and backwash water pumps will be operated by plant staff under supervision of CONTRACTOR.
7. All water in the filter cells, effluent tunnels, and ducts shall be dewatered prior to disinfection of the filter cells, tunnels, and ducts. The procedure for draining the water used for installation of the filter materials shall be as follows:

B. Material Placement:

1. The following recommended procedure shall be used for placement of filter materials. If CONTRACTOR intends to use a different method for placement of the material, the method shall be submitted to ENGINEER for approval.
 - a. Water shall be introduced into the filter cell to the level of the mark and a chalk line shall be struck on all sides of the filter cell as shown by the water line.
 - b. Drain the filter cell down to a level to permit hand placement of the first gravel layer.
 - c. When the proper amount of material is in place, check the surface of the layer by admitting water to the filter to the chalk line level. If low or high spots exist, carefully rake the surface flat and level.
 - d. The top of each layer shall be leveled against the water surface held at the appropriate mark. None of the particles shall be less than half submerged, and there shall be no places where additional material can be placed without the particles extending more than 1/2 of their volume above the water surface.
 - e. Each layer shall be completed before the layer above it started. Each layer of filter material shall be deposited in a uniform thickness, with the top surface screeded and brought to a true level plane.
2. Each successive layer shall be placed by repeating the above procedure until all layers have been installed. Care shall be exercised in placing each layer to avoid disturbing the surface of previously placed layers.
3. After the last gravel layer is placed and before any silica sand or anthracite is placed, the filter shall be backwashed for a minimum of 5 minutes at the highest available rate not to exceed 25 gpm per square foot of filter area until the water is clear. Any gravel that becomes intermixed after placement with another material or size shall be removed and replaced with clean material of the proper type and size. The wash rate shall be increased gradually to remove any air and avoid overturning the gravel with bubbles.
4. The silica sand and anthracite layers shall be placed under provisions described above. Each material shall be washed and scraped or skimmed to remove excess fine materials before the next material is installed.

C. Initial Washing:

1. After each layer of filter material has been placed, washwater shall be admitted slowly upward through the underdrain system until the entire bed is flooded. The bed shall be allowed to stand for as long a period as necessary to saturate the media before initial wash, provided that this period shall not be less than 12 hours if the bed has been allowed to stand dry. The wash rate shall be increased gradually during the initial wash to remove air from the bed.

2. During each backwash, the filter cell shall be backwashed at an initial rate of not more than 2 gpm per square foot of filter area. The backwash rate shall then be gradually increased over a period of 3 minutes to the maximum rate indicated below:

Water Temperature (degrees Fahrenheit)	Maximum Backwash Rate (gpm per square foot)
50 or Less	15
51-55	16
56-60	17
61-65	18.5
66-70	20
71-75	21
Above 75	22.5

3. Continue to backwash the filter until the water is clear, but not less than 5 minutes at maximum rate.
4. The initial washing of each layer shall consist of a minimum of 5 backwash cycles.

D. Scraping:

1. After the initial wash for each layer, partially drain the filter and remove the layer of fine material (approximately 3/16 inch) from the surface of the filter by scraping.
2. The scraping operation shall be repeated as many times as necessary, as approved by ENGINEER, to remove virtually all material passing a No. 50 sieve and, in the case of anthracite, to remove all flat particles.
3. Add additional material if required to bring the top surface of each filter layer to the specified finished elevation prior to the final scraping operation.
4. The filter shall be washed at least three times between scrapings.

3.04 DISINFECTION

- A. Contractor to chlorinate and flush all filter cells, ducts, and tunnels following final placement of the filter materials and before the filters are placed into service. Coordinate with Owner.

END OF SECTION

SECTION 15100 - PRESSURE PROCESS PIPING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes the following:

1. Provide all labor, materials, and equipment necessary for fabrication and production of the items specified in this Section and as shown on Drawings.
2. Unless otherwise noted on Drawings, or in this Section, pressure process piping 4 inches in diameter and larger shall be part of this Work.
3. Dismantling of existing piping and supports, where required or shown or noted on Drawings; piping connections to existing piping, structures, and valves including equipment erected under other Contracts, are included in Work of this Section. Piping shall contain necessary unions or companion flanges to allow ease of equipment removal.
4. Complete all the demolition work and repair thereof to existing walls and slabs as required for the installation of this Work including grouting of all sleeves and castings. Provide all necessary joint and coupling materials, including bolts, nuts and gaskets, wall castings or sleeves, and standard or special fittings. Furnish hangers, supports, anchors, blocking, harnesses, and other necessary closure pipe sections and special fittings. Provide and secure in proper alignment, all sleeve and casting openings in existing walls and slabs, including repair thereof.
5. Provide all shop-applied interior and exterior pipe linings and coatings. Provide plugs in open ends of pipe, temporary bulkheads, protection of surface and subsurface improvements, cleaning, painting, testing, and disinfection, as required to accomplish Work as specified and shown on Drawings.

B. Products Installed But Not Furnished Under This Section: Install process valves, and other appurtenances which are furnished under other Sections and incorporated in the piping systems as shown on Drawings and specified in this Section.

1. All pipe insulation shall be accomplished under Section 15080. Under this Section of Work, all shop-applied surface coating shall be furnished as herein specified and pipe testing accomplished prior to insulating.

C. Products Supplied But Not Installed Under This Section:

1. All piping, fittings, appurtenances, and shop-applied coatings shall be supplied as specified under this Section.

1.02 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:

1. Shop Drawings shall be fully dimensioned Drawings showing the piping in full detail with exact locations, dimensions, and schedules of all pipe, fittings, hangers, supports, and appurtenances. They shall be made in accordance with the general information shown on Drawing and special information furnished by the several manufacturers of equipment. Where special fittings are required, they shall be shown in large detail with all necessary dimensions.
2. Each pipe section, special fitting, casting, sleeve, and appurtenance shall be identified on Drawings by its respective erection mark.

3. Design details of joints and joint restraint shall be submitted to ENGINEER for ENGINEER's consideration and approval before ordering any pipe.
 4. Product Data: Submit product data covering the items included under this Section.
- B. Record Drawings: At Project closeout, submit record Drawings of installed products, in accordance with requirements of Section 01770.

1.03 QUALITY ASSURANCE

- A. All Work under this Section shall be done in accordance with standard practices as recommended by manufacturer and AWWA.
- B. Codes, Ordinances, and Standards: Manufacture, storage, and erection of equipment under this Contract shall be in accordance with current ASA (ANSI), AWWA, and ASTM Standards. Standards and Specifications referenced herein shall be the current published edition. The manufacturer of the pipe and fittings shall furnish ENGINEER a certified statement that all pipe and fittings furnished by manufacturer meet the material requirements and have been inspected and tested in accordance with the applicable Specification and Standard.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Disinfection compounds shall be stored in well-ventilated areas protected from moisture and fire.
- B. Liquid Chlorine shall not be stored on Site except when more than one working day is required for disinfection. Prior approval from ENGINEER and the local authorities is required for gas chlorine storage.
- C. Storage:
1. All pipe and related items installed under this Section shall be stored as recommended by manufacturer.
 2. CONTRACTOR shall take all actions necessary to protect all items installed under this Contract including furnishing all special storage areas required by equipment manufacturers.
 3. Pipe shall be stored on suitable timber skids free from contact with the ground. Gaskets shall be stored in as cool, clean, and shaded a place as practical.
- D. Handling:
1. All items installed under this Contract shall at all times be handled as recommended by manufacturer and in such a manner as to avoid any damage.
 2. All special handling equipment and temporary supports shall be provided by CONTRACTOR.
 3. Items will be subject to inspection and approval upon delivery to the Site and after storage. No cracked, broken, or damaged pipe shall be used.
 4. In the event coatings are damaged, the damaged area shall be recoated with an approved coating similar to that specified for that item.
 5. During handling, hauling, and storage of pipe, each piece shall be kept from contact with adjacent pieces by means of wooden blocks or timbers.

1.05 PROJECT CONDITIONS

- A. Existing Conditions: The Drawings are not intended to show every detail of construction or location of piping or equipment. Where existing conditions make it necessary or advisable to change location of piping or equipment, CONTRACTOR shall so inform ENGINEER for ENGINEER's approval.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
 - 1. Plastic Pipe (PVC):
 - a. Spears.
 - b. Harvel.
 - c. JM Eagle.
 - 2. Hangers and Supports:
 - a. Grinnell.
 - b. Elcen.

2.02 MATERIALS

- A. Liquid Chlorine: Liquid chlorination may be allowed subject to approval of ENGINEER, OWNER, and Fire Marshal. Liquid chlorine shall meet the requirements of AWWA B301.
- B. Sodium Hypochlorite shall meet the requirements of AWWA B300. Containers shall have an expiration date marked at time of shipment to ensure that excessive deterioration has not occurred.
- C. Calcium Hypochlorite shall meet the requirements of AWWA B300.
- D. Refer to City of Kalamazoo Standard Specifications for Water Main and Service Installation 2021.
- E. All materials that come into contact with the water being treated or the finished water shall be on either the EPA or NSF lists of products approved for use in contact with potable water. Manufacturers shall submit an affidavit with the shop drawings indicating approval by the EPA or NSF for the materials used in products that come into contact with the water.
- F. All equipment and components in contact with the water shall be lead free and shall be in compliance with NSF/ANSI 61 G and NSF ANSI 372 Drinking Water System Components – Lead Content.

2.03 PIPE JOINTS

- A. All joint material and lubricants shall be furnished with the pipe, including all joint material required for connection to equipment furnished under other Sections. All joint materials shall be assembled in accordance with standard practice and manufacturer's recommendations. All equipment connections shall be flanged, union, or grooved coupling so that equipment can be removed without disassembly of the connecting piping.

- B. Flanged Joints (FJ): Pipe flanges shall conform to American Standards: dimensions, ANSI B16.1 and threads, ANSI B2.1. Flange faces except stainless steel shall be coated with a rust inhibitor immediately after drilling.
 - 1. Flanges for ductile iron pipe and fittings shall be ductile iron and meet the requirements of AWWA C115 (ANSI 21.15).
 - 2. Flanges for stainless steel pipe shall be fabricated from stainless steel flat plate of the same composition as the pipe.
 - 3. Flanged joints shall be made up with full-face 1/8-inch rubber gaskets. Gaskets for gas lines shall be neoprene and asbestos.
 - 4. Flanges shall be firmly bolted with machine, stud or tap bolts of the proper size and number meeting the requirements of ASTM A 307, Grade B. Joints made with bolts or bolt studs shall have a nut on each side. Bolt projection through nuts shall be equal, and where studs are used, bolt projection on each side of the flange shall be equal.
 - 5. All nuts and bolts shall be 316L stainless steel.

2.04 PIPING

- A. Refer to City of Kalamazoo Standard Specifications for Water Main and Service Installation 2021.
- B. Plastic Pipe (CPVC): Plastic pipe shall be designed, fabricated, and installed in accordance with these Specifications and as shown or noted on Drawings and listed on Schedule.
 - 1. Plastic pipe shall meet the requirements of ASTM D 1785 (CPVC) Schedule 80, socket end ASTM D 2467.
 - 2. Pipe sizes indicated are I.D.
 - 3. Plastic pipe fittings shall meet the same requirements as the pipe and connections shall be flanged.
 - 4. Installation shall be in accordance with the paragraph on "Pipe Installation." In addition, the recommendations of ASTM Committee D 20 on Plastics relating to the installation of flexible thermoplastic sewer pipe shall be followed.

2.05 WALL AND SLAB SLEEVES AND CASTING

- A. At all points where pipes must pass through the walls, floors, or slabs of structures, CONTRACTOR shall furnish and install suitable sleeves or wall castings. Unless otherwise shown or permitted, the space between the pipe and the sleeve shall be sealed at the inside and outside wall faces on walls exposed to earth or water/sewage, at one face of other walls, and at the top surface of floors and slabs with a rubber link seal.
- B. In general, the wall sleeve or castings shall be of the same material as the pipe. Iron pipe wall castings, wall pipe, transition sleeves, and solid sleeves shall meet the requirements of AWWA Specifications C100 and shall be of the lightest class conforming to the pressure rating of the pipelines which they connect, but in no case shall be lighter than Class B.
- C. Rubber link seal shall be identical rubber links interconnected with bolts and elongated nuts and washers. The sealing element shall be made of synthetic rubber material especially compounded to resist aging, ozone, sunlight, and chemical action. Bolts and metal parts shall be made of galvanized or cadmium-plated steel to resist corrosion. Rubber link seal joints shall be submitted to ENGINEER for approval.

2.06 HANGERS AND SUPPORTS

- A. Hangers and supports shall include all hanging and supporting devices of metallic construction shown, specified, or required for piping, apparatus, and equipment installed under this Section. All supports and parts shall conform to the latest requirements of ANSI B31.1, except as supplemented or modified by the requirements of this Specification or as detailed on Drawings. Materials shall be stainless steel, galvanized steel, galvanized malleable iron, or galvanized wrought iron.
- B. Hangers and supports shall be adequate to maintain the pipelines, apparatus, and equipment in proper position and alignment under all operating conditions with due allowance for expansion and contraction, and shall have springs where necessary. Hangers and supports shall be of standard design where possible and be best suited for the service required, as approved by ENGINEER. Supporting devices shall be designed in accordance with the best practice and shall not be unnecessarily heavy. Sufficient hangers and supports shall be installed to provide a working safety factor of not less than 5 for each hanger. Hangers shall have a minimum spacing in accordance with ANSI B31.1. Point loading hangers are not acceptable. Hangers shall be sling or saddle type.
- C. Wherever possible, pipe attachments for horizontal piping shall be pipe clamp, and structural attachments shall be beam clamps. All rigid hangers shall provide a means of vertical adjustment after erection. Generally, hangers shall be sized for supporting the pipe, excluding insulation. Proper pipe protection saddles shall be installed on pipes that are covered with insulation where hangers and supports are outside the insulation. Overhead hangers shall be supported by threaded rods properly fastened in place by suitable screws, clamps, inserts or bolts, or by welding. Saddle stands shall be of the adjustable type. Each stand shall consist of a length of steel pipe fitted at the base with a standard threaded flange and at the top with an adjustable saddle or roll. The base flange shall be bolted to the floor, foundation, or concrete base.
- D. Anchors shall be furnished and installed where specified, shown, or required for holding the pipelines and equipment in position or alignment. Anchors shall be designed for rigid fastening to the structures, either directly or through brackets. The design of all anchors shall be subject to approval by ENGINEER. Materials shall be galvanized or stainless steel. Inserts for concrete shall be galvanized or stainless steel or galvanized malleable iron and shall be installed in the concrete structures where required for fastening supporting devices. They shall be designed to permit the rods to be adjusted horizontally in one place and to lock the rod nut or head automatically. Inserts shall be recessed near the upper flange to receive reinforcing rods. Inserts shall be so designed that they may be held in position during concrete pouring operations. Inserts shall be designed to carry safely the maximum load that can be imposed by the rod that they engage.

2.10 TAPS AND PLUGS

- A. Where indicated or required, pipe or fittings shall be tapped to receive small or special fittings under this or other headings of the Work. Required taps shall be provided as part of this Work.
- B. All taps shall be temporarily plugged at point of fabrication.

2.11 SOURCE QUALITY CONTROL

A. Tests, Inspections:

1. All pipe and fittings delivered to the Project shall be accompanied by certification papers showing that the pipe and fittings have been tested in accordance with the applicable Specifications and that pipe and fittings meet the Specifications for this Project. All pipe and fittings will be inspected upon delivery to the Site by ENGINEER or OWNER's Representative. No cracked, broken, or damaged pipe or fittings will be allowed in this Work.

PART 3 - EXECUTION

3.01 ERECTION

- #### A. Equipment provided under this Section shall be fabricated, assembled, erected, and placed in proper operation condition in full conformity with detail Drawings, specifications, engineering data, instructions, and recommendations of equipment manufacturer approved by ENGINEER.

3.02 INSTALLATION

A. Connections to Existing Facilities:

1. CONTRACTOR shall furnish all labor and materials required for the connection of piping under this Contract to existing structures as called for on Drawings.
2. Where breaking holes for connections to existing structures, care shall be taken to prevent debris from entering.
3. After installation of the pipe, the structure shall be pointed up around the pipe, both on the inside and outside so that it is restored to a watertight condition.

3.03 FIELD QUALITY CONTROL

A. Defective Pipe: No pipe or special casting known to be defective shall be laid in Work.

1. Any piece found to be defective after it has been laid shall be removed by CONTRACTOR and replaced by a sound and perfect piece.
2. If the major part of a defective pipe is sound, the good end may be cut off and used.
3. The cutting of pipes for this and any other purpose shall be done by skilled workers, and in such manner as will not injure the pipe. Every such cut shall be square and smooth. Cut surfaces shall be recoated as specified for the pipe.

B. Tests:

1. After completion, each run of pipe shall be tested by CONTRACTOR in the presence of ENGINEER. All appurtenances such as service connections, corporation stops, and curb stops shall be tested with the run of pipe.
 - a. Any leaks shall be made tight.
 - b. Under this Work, CONTRACTOR shall furnish all water or air, piping, bulkheads, pumps or compressors, gauge, and other equipment required for the test.
 - c. The section of pipe to be tested shall be cleaned and isolated by valves or plugs. Such valves or plugs shall be designed to hold against the test pressure. Sections of pipe shall have an opening through which air or water can be introduced. The supply line shall be fitted with suitable control valves and a pressure gauge for continually measuring the pressure. The pressure gauge shall have a minimum diameter of 3-1/2 inches and a range

compatible with the test pressure. Pipelines that cannot be closed for a direct pressure test shall be tested by filling the tanks to which they are connected to the highest operating level or installing temporary test bulkheads. After completion of tests, all pipes shall be drained. Buried pipelines shall be pressure tested with all pipe joints exposed for visual inspection unless otherwise directed by ENGINEER.

- d. If requested by ENGINEER, CONTRACTOR shall furnish proposed test procedures for approval including pipe identification, test pressure and a description of the method of testing.
 - e. In the event that the leakage exceeds the specified amount, the joints in the line shall be carefully inspected for leaks and repaired where necessary. Any pipes or special castings found to be cracked shall be removed and replaced with new pieces by CONTRACTOR. After this Work has been done, the test shall be repeated. Final acceptance of the lines will not be made until satisfactory tests have been passed.
2. Test Pressures: In general, pipelines shall be tested at 1.5 times their working pressure or at the test pressure indicated on Piping Schedule. Adjustments for hydrotest water temperature and water column elevation differences at point of test must be made.
 3. Hydrostatic Testing (except HDPE): The section of pipe to be tested shall be filled with water, the entrained air within the line shall be removed, and water shall be pressurized up to test pressure at the pipe low point within 5 to 10 minutes.
 - a. The test period shall start immediately after initial pressurization. The line shall be maintained under the test pressure for a continuous 2-hour period.
 - b. The section of pipe to be tested shall hold the test pressure with no more than a 5 percent loss in pressure over the test period or the leakage per hour under the conditions of test shall not exceed values determined by the following equation:

$$L = \frac{SD\sqrt{P}}{148,000}$$

where L = allowable leakage per hour (gallons)
 S = length of pipe in test (feet)
 D = nominal diameter of pipe (inches)
 P = average test pressure (psi, gauge)

- c. Piping with flanged, grooved coupling, screwed, socket type, and welded joints shall be completely tight at the designated test pressure.
 - d. The test pressure shall not vary by more than 5 psi throughout the entire test period.
4. Each valve assembly shall be tested by CONTRACTOR; the test shall consist of opening and closing the valve.
 5. Each hydrant assembly shall be tested by CONTRACTOR; the test shall consist of flushing the hydrant for a minimum of ten minutes. During the test period the 6-inch gate valve shall be closed and opened. CONTRACTOR shall furnish necessary hoses for the disposal of OWNER-furnished water.

3.04 DISINFECTION

- A. Potable water piping and water mains shall be flushed and disinfected in accordance with AWWA C 651, continuous feed or slug method. All potable water piping shall be flushed. Disinfection may precede or follow pressure testing; however, new Work shall not be connected to existing piping or water mains until two consecutive samples taken 24 hours apart have passed bacteriological tests.
- B. Provide all temporary piping, fitting, backflow preventers, disinfectant feeding equipment, sampling, and laboratory testing necessary to complete the flushing and disinfection procedure. ENGINEER shall be notified of flushing and disinfection schedules, and shall witness the sampling.
- C. CONTRACTOR shall dispose of the high residual chlorine water by a method approved by ENGINEER.
- D. Liquid Chlorination: As a minimum, CONTRACTOR shall have on hand the following equipment when using or storing chlorine cylinders:
 - 1. Chlorine cylinder repair kit, Chlorine Institute Type A or B as appropriate.
 - 2. Self-contained breathing apparatus with 30-minute air supply and a spare 30-minute tank.
 - 3. CONTRACTOR shall also have a spare injector available at all times.

END OF SECTION

SECTION 15110 - PROCESS VALVES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Labor, materials, and equipment necessary for fabrication, production, installation, and erection of the items specified in this Section and as shown on Drawings.
- B. Items furnished under this Section shall be erected under Division 15. Hanger rods, inserts and supports, flange bolts, and gaskets for valves shall be furnished and installed under Section 15100.

1.02 REFERENCES

- A. ANSI:
 - 1. B16.3, B2.1 Threaded Valve Joint Standards.
 - 2. B16-104 Reinforced Teflon Steel Standard.
- B. ANSI/AWWA:
 - 1. C110/A21.10 Ductile Iron and Gray Iron Fittings, 3-inch through 48-inch for Water and Other Liquids.
 - 2. C111/A21.11 Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings.
 - 3. C500 Metal Seated Gate Valves for Water Supply Service.
 - 4. C504 Rubber Seated Butterfly Valves, 3-Inch through 72-Inch.
 - 5. C542 Electric Motor Actuators for Valves
 - 6. C550 Protective Interior Coating for Valves
- C. ASTM:
 - 1. A 48 Specification for Gray Iron Castings.
 - 2. A 126 Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - 3. A 183 Specification for Carbon Steel Track Bolts and Nuts.
 - 4. A 194/194M Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service.
 - 5. A 276 Specification for Stainless and Heat Resisting Steel Bars and Shapes.
 - 6. A 436 Specification for Austenitic Gray Iron Castings.
 - 7. A 536 Specification for Ductile Iron Castings.
 - 8. B 148 Specification for Aluminum Bronze Castings.
 - 9. B 584 Specification for Copper Alloy Sand Castings for General Applications.
 - 10. B 61 Specification for Steam of Bronze Castings.

1.03 SUBMITTALS

- A. Shop Drawings: Submit in accordance with Section 01330, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
- B. Operation and Maintenance Manuals: Submit in accordance with requirements of Section 01600, operation and maintenance manuals for items included under this Section.

- C. Warranty: Submit in accordance with requirements of Section 01770, warranties covering the items included under this Section.

1.04 QUALITY ASSURANCE

- A. All Work under this Section shall be performed in accordance with standard practices as recommended by manufacturer and AWWA.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Refer to City of Kalamazoo Standard Specifications for Water Main and Service Installation 2021.
- B. All materials that come into contact with the water being treated or the finished water shall be on either the EPA or NSF lists of products approved for use in contact with potable water. Manufacturers shall submit an affidavit with the shop drawings indicating approval by the EPA or NSF for the materials used in products that come into contact with the water.
- C. All equipment and components in contact with the water shall be lead free and shall be in compliance with NSF/ANSI 61 G and NSF ANSI 372 Drinking Water System Components – Lead Content.
- D. Subject to compliance with specified requirements, manufacturers offering products which may be incorporated in Work include:
 - 1. Butterfly Valves (B):
 - a. Refer to City of Kalamazoo Standard Specifications for Water Main and Service Installation 2021.
 - 2. Electric motor open-shut service operators:
 - a. Beck
 - 3. Limit Switches, spring-centered:
 - a. Allen-Bradley.
 - b. Square D Co.

2.02 VALVE AND GATE IDENTIFICATION

- A. Each valve and gate shall be tagged with its distinguishing mark letter and number. Identification tag shall be 1-1/2-inch in diameter, 18-gauge polished brass or aluminum with 1/2-inch-high, embossed, black-filled mark letter and number placed thereon. Tags shall be securely fastened to the valve or gate operator with No. 16 brass jack chain or plastic seals.

2.03 COMPONENTS

- A. Butterfly Valves (Exposed):
 - 1. Refer to City of Kalamazoo Standard Specifications for Water Main and Service Installation 2021.
 - 2. Valve body shall be ductile iron ASTM A536. Disc shall be cast iron ASTM A 48, Class 40, ductile iron ASTM A 536, Class 65-45-12, ni-resist ASTM A 436, Type 1, aluminum bronze

City of Kalamazoo

Phase 1: Central Pump Stations 1 Filter Media

Replacement (As Needed) and Misc.

Filter Improvements

Tetra Tech Project No. 200-19743-24010

15110-2

5/8/2026

ASTM B 148, CL9A, stainless steel series 316. Corrosion-resistant edge material shall be furnished on ductile iron disks. Shaft shall be stainless steel series 316 and shaft seal shall be adjustable chevron packing or O-ring. Valve seat shall be Buna-N or EPDM for water service. Valve shall be capable of operating with an air actuator or electric actuator.

3. Valve shall be compatible for flange connection to CPVC Schedule 80 piping.

2.04 VALVE JOINTS

- A. Refer to City of Kalamazoo Standard Specifications for Water Main and Service Installation 2021.
- B. Flange Joint: Flanges shall meet the requirements of ANSI-B16.1 Standard Class 125, except that bolt holes at shaft hubs may be drilled and tapped on the flanges. Flange faces shall be coated with a rust inhibitor immediately after drilling.
- C. PVC Pipe Sizes, 1/2-inch and larger: flanged.

2.05 ACCESSORIES

- A. Motor:
 1. Electric Motor Open-Close Service: Electric motor actuators for open-shut service shall meet the requirements of ANSI/AWWA C542, except as herein specified.
 - a. Controls shall be "integrally mounted" as part of the actuator body. If designated on Valve Schedule a "wall-mounted enclosure" or "remote control station" shall be provided for mounting important actuator controls separate from the actuator body in an easily accessible location. Deviations from the Valve Schedule will not be accepted.
 - b. The valve manufacturer shall provide the required seating, unseating dynamic torque requirements and any other trust or static loading information necessary to properly size the electric motor actuator.
 - c. Electrical equipment shall be mounted in a NEMA 4 or 7 enclosure whether on the valve body or in the wall-mounted enclosure. The enclosure shall be NEMA 4 unless shown otherwise on Valve Schedule.
 - d. Actuator materials of construction shall be selected by the manufacturer to be compatible with the environmental conditions that will be present at the valves installed location. Actuators installed in water treatment plants or other potable water applications shall have materials that comply with the Safe Water Drinking Act requirements including food grade lubricants.
 - e. Motorized valve actuators shall include the motor, reversing starter with remote-off-local switch, associated gearing, limit switches, torque switches, auxiliary handwheel for manual operation, a valve mounted mechanical dial valve position indicator, Open-Close-Stop position switch or push-buttons, and accessories as listed on Valve Schedule.
 - f. Motorized valve actuators scheduled with "wall-mounted" controls shall include in addition to the above a wall-mounted control enclosure.
 - g. The remote control station shall be provided by the actuator manufacturer, have a NEMA 4 rated enclosure unless noted otherwise on Schedule and be powered by the actuator. Signal and power wires shall be integrally linked to the actuator with wires landed on appropriately marked terminal strips in the actuator. Unit shall be capable of being mounted 300 feet away from the actuator and with enclosure suitable for wall, rack or pole mounting. Locable Local-Off-Remote selector and Open-Close valve position switches,

- push buttons, and open-closed indicator lights or valve position indication shall be provided.
- h. The wall-mounted control enclosure shall include valve "open" (amber) and "closed" (green) indicating lights, a remote-off-local switch even if there is a remote-local switch at the valve body, Open-Stop-Close switch or push-buttons and a terminal strip to accept incoming and outgoing wires.
 - i. Wires shall be tagged at each end of the wire with individual wire markers. Each terminal of the terminal strips shall be numbered and identified with a marker. Schematics shall be provided with Shop Drawings showing wire numbers, terminals, field wiring, etc. Connections for remote equipment shall be wired to terminal blocks. Equipment shall be factory wired and tested before shipment.
 - j. The motor starters shall be the solid state reversing or mechanical contactor type complete with gang-operated switch, 2 solid state reversing or mechanical type contactors, 120 volt control power transformer when motor voltage is other than 120 volt, thermal overload protection for each phase, and associated wiring. Operating voltage shall be 460 Volts unless indicated otherwise on Valve Schedule.
 - k. Limit switches shall be provided at the extreme open and close position of the operator travel. At least 2 independent switches at each end of motor travel shall be provided as standard for the local indicator lights and interlocking. An additional 4 switches shall be provided for remote use.
 - l. Torque switches shall be provided in both the open and closed circuits of the operators. The torque switches shall be field adjustable and designed to stop the operator motor when the torque exceeds safe limits for either the operator or the valve. An electrical or mechanical interlock shall be provided to prevent the open torque switch from tripping when unseating a torque seated valve.
 - m. A local mechanical dial position indicator or LCD display shall be provided on the valve operator to indicate the position of the valve.
 - n. Motors shall be standard-duty rated, totally enclosed nonventilated, Class F insulated, 60 hertz and specially designed for valve service. If voltage and phase are not noted on Valve Schedule configure motors for 460 Volt three phase service. The design shall combine low inertia with a high starting and stalling torque.
 - o. Lost motion drive for increased unseating torque shall be provided.
 - p. Unless indicated otherwise on Valve Schedule the actuator shall be sized to stroke valves from full open to full closed and vice versa in one to three minutes under the full specified unbalance operating head stated in the Specifications and at a frequency not to exceed 60 cycles per hour. The motor winding temperature rise shall not exceed NEMA standard for Class B temperature rise.
 - q. Gear case shall be cast iron. Pedestals shall be fabricated steel or cast iron. Stem nut shall be high-tensile bronze.
 - r. A heater shall be provided if indicated in the Schedule to prevent condensation in the controls cavity and terminal chamber of the actuator body. Heaters shall be 120 V powered. Multiple heaters shall be provided if necessary depending on the actuator body configuration.
 - s. Mechanical manual operation shall be provided by a clutchable handwheel drive mechanism completely independent from the motor gearing. Hand operation shall be direct drive permitting fast manual valve operation. Failure of motor gearing due to power failure or gearing problem shall not prevent handwheel operation. Manual operation shall prevent (disconnect) electrical operation. Gear reducers shall be provided for manual handwheel if

required. Maximum rim force required for handwheel operation shall not exceed 40 pounds for dynamic loads. Manual operator shall engage the actuators lost motion device.

- B. Position Indicator: Position indicators shall be of bronze or cast iron construction.
 - 1. Limit Switch. Two limit switches shall be factory-mounted to the valve for indicating full open and full closed positions.
- C. Stem Cover: Stem covers shall be galvanized steel with position indicators and cap.
- D. Stem Guide: Stem guides shall be cast iron ASTM A 126, Class B, construction with bronze bushings adjustable in two directions and provided with mounting assembly and anchor bolts of stainless steel. The minimum thickness of any portion shall be 1/2 inch.
- E. Wall Bracket: Wall brackets shall be cast iron and provided with stainless steel assembly and anchor bolts.

PART 3 - EXECUTION

3.01 ERECTION

- A. Equipment provided under this Section shall be fabricated, assembled, erected, and placed in proper operation condition in full conformity with detail drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer approved by ENGINEER.
- B. Equipment furnished under this Section shall be installed under Section 15100.

3.02 FIELD QUALITY CONTROL

- A. Installation: Special attention shall be given by CONTRACTOR to ensure that items furnished under this Section are installed in accordance with manufacturer's recommendations.

END OF SECTION

OTHER SPECIFICATIONS

**CITY OF KALAMAZOO
DEPARTMENT OF
PUBLIC SERVICES**

WATER RESOURCES DIVISION



PUBLIC SERVICES DEPARTMENT

WATER RESOURCES DIVISION
415 STOCKBRIDGE AVE.
KALAMAZOO, MICHIGAN 49001-2898
PHONE 269-337-8601
FAX 269-337-8533

**Standard Specifications for
Water Main and Service Installation
2021**



WATER MAIN AND WATER SERVICES

PART 1 GENERAL

1.01 SCOPE

- A. This Section includes furnishing and installing water main systems.
- B. Reconnection of proposed water main and/or water service connections to existing water main and/or water service constructions shall be in conformance with requirements of this Section.
- C. This Section shall include furnishing, excavating, installing, testing, disinfecting, and backfilling all required water main pipe, water service pipes, water main appurtenances, water service, and other work incidental to the water main and/or water service installation unless specifically included under other Items.
- D. This work shall also consist of providing as-constructed plans of the completed work.

1.02 SUBMITTALS

- A. Submittals shall be the responsibility of the Contractor:
 - 1. Shop Drawings for Review:
 - a. Manufacturer's Shop Drawings indicating physical dimensions, and joint details for each size, type, and class of pipe, fittings and specials furnished for the project.
 - 2. Information for the Record:
 - a. Manufacturer's certification indicating that the pipe and joints meet specifications for each production run for each size, type, and class of pipe furnished. The Engineer may request test results to verify certification. Certification documents shall be according to the Source Quality Control of this Section.
 - b. Manufacturer's installation instructions.
 - c. The laboratory shall submit test certifications of pipe ordered tested under "Field Quality Control," of this Section.
 - 3. Engineer may request additional Shop Drawings or Information for the Record as required.
 - 4. **Requests for approved equals must be submitted to the Engineer for review a minimum of two (2) weeks prior to bid.**

1.03 AS CONSTRUCTED RECORD

- A. During construction the contractor shall be required to keep current a set of "as constructed" drawings. Before final payment shall be made, the contractor shall submit for approval to the City of Kalamazoo the complete set of as constructed drawings. Each set of "as constructed" drawings shall be labeled "As Constructed", dated, and contain at a minimum the following information (additional information may be required by the City of Kalamazoo):
 - 1. Note distance between all fittings (Center to Center of Fittings).
 - 2. Note Hydrant to valve, valve to main distances (Center to Center of Fittings).
 - 3. Note the type of bend used, (# of degrees), and the Direction of Bend: (Up or down), (N-S-E-W).

4. Note lengths and locations of restrained joints.
5. Details and profiles of special field situations that relate to the water distribution system shall be included.
6. Dimensional information locating each water distribution system component to real world features, such as property lines, right-of-way lines, and centerlines of roads.
7. On all cul-de-sacs with no center island, measure bends and hydrants to center of cul-de-sac. On all cul-de-sacs with a center island, measure bends and hydrants to center of the roadway.
8. When fittings/hydrants are installed as proposed, please circle the proposed listing.
9. All hydrants shall be noted as to whether or not drip valve plugs were installed.
10. When installing 12 inch or larger valves, (Butterfly Valves), indicate which side of the main the operating nut was placed, as well as gear box style with number of turns to close.
11. The contractor shall complete the service card information including a sketch of the water service installation with dimensions and location of the curb box.
12. Contractor shall GPS all valves, hydrants, fittings, as well a minimum every 3 lengths of pipe for straight runs. DWG files shall be provided to the Engineer upon completion of the project. GPS accuracy shall be subfoot.
13. **All as-built record drawings shall be completed and turned in to the Engineer within 2 weeks from completion of the installation.**

1.04 CONTRACT WORK

- A. Prior to the start of construction, the City of Kalamazoo shall be given the opportunity to provide construction services for any and all portions of the water main construction. The City of Kalamazoo shall submit an estimated cost to perform the work or will issue a bill based on time and material costs. A separate contract with the City of Kalamazoo will be needed for work to be performed by the City of Kalamazoo.
 1. City of Kalamazoo shall perform all water main taps in the water system, unless otherwise directed by the Engineer.
- B. The City of Kalamazoo Department of Public Services must approve the Contractor who will perform water main installation. A reference list of at least five (5) Type 1 supply water main projects completed by the Contractor shall be submitted in support of the Contractor's qualifications. The Department of Public Services maintains a list of Contractors approved for water main installation and can be contacted to receive a current copy of that list.
- C. The Contractor (when hired by the City) or Developer (when the Contractor is hired to perform work by the Developer), shall provide a written statement of warranty (Warranty Bond) for a period of 2 years from the date of **final acceptance** for water main work or **after meter is installed** for water service work. Warranty work shall cover any necessary cost to repair water main or appurtenance leaks and water main or appurtenance leak damage at no cost to the City of Kalamazoo. Final acceptance on all water main and appurtenance work shall not occur until all items have been inspected by the Engineer, passed all required testing, as well as receipt and approval of all as built documents. Additionally, final acceptance on a water service will only be given **once the water meter is installed**.
 1. Water service or water main warranty work shall be completed either a prequalified contractor under the inspection of the City of Kalamazoo, or by City of Kalamazoo field service crews. All warranty work shall be paid for by the Developer or the Contractor.
- D. The Contractor is responsible for field locating all work which has not yet received final acceptance by the City of Kalamazoo. All damage to work that has not received final acceptance is the responsibility of the Contractor.

PART 2 PRODUCTS

All Products shall be supplied new from the manufacturer and certified new from the supplier. No second hand or salvaged material shall be allowed. All products shall be **“Buy American”** unless otherwise specified in this section.

2.01 DUCTILE IRON

A. Ductile Iron (DI) Pipe Specifications:

1. Ductile Iron Pipe shall be manufactured in accordance with American National Standards Institute (ANSI) and American Water Works Association (AWWA) ANSI/AWWA C150/A21.50 and C151/A21.51. Pipe shall be minimum thickness Class 52 pipe. Flanged pipe shall be manufactured in accordance with ANSI/AWWA C 115/A21.15. Pipe through concrete floors or foundations shall be minimum thickness Class 53 pipe.
 - a. Water pipe must be lined with a standard thickness cement mortar lining sealed with a bituminous seal coat in accordance with ANSI/AWWA C104/A21.4, unless otherwise required. The outside of the pipe must be coated with the standard bituminous seal and each length of pipe must be marked with the following information
 - 1) Metal thickness class.
 - 2) Net weight of the pipe without lining.
 - 3) The nominal size.
 - 4) The manufacturer's identifying symbol.
 - b. Underground pipe shall be push on or mechanical joints and above ground pipe shall be flanged joints with gaskets meeting the requirements of ANSI/AWWA C111/A21.11. Nitrile or fluoroelastomer gaskets shall must be used as indicated on the plans and in locations of known or suspected soil or groundwater contamination as necessary. Gaskets provided will be specified based on the type of contamination that is encountered. Each joint shall contain serrated silicon bronze electrical continuity wedges as directed by the Engineer or authorized representative. 4 to 6 inch pipe shall use 2 wedges, 8 to 12 inch pipe shall use 3 wedges, and 16 inch and above shall use 4 wedges.
 - c. Pipe used in conjunction with Horizontal Directional Drilling operations shall be Flex-Ring or TR FLEX joints.

B. Restrained Joints

1. Restrained joints shall meet the requirements of ANSI/AWWA C111/A21.11, and AWWA/ANSI C110/A21.10 or ANSI/AWWA C153/A21.53.
2. Mechanical restrained joints shall be EBAA Iron Megalug series 1100, Romac Romagrip, Ford Series 1400, or approved equal.
 - a. Restraint devices for nominal pipe sizes 4 inch through 54 inch shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ANSI/AWWA C110/A21.10.
 - b. The devices shall have a working pressure rating of 350 psi for 4 to 16 inch, 250 psi for 18 to 48 inch and 200 psi for the 54 inch size. Ratings are for water pressure and must include a minimum safety factor of 2 to 1 in all sizes.

- c. Gland body, wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536.
- d. Ductile iron gripping wedges shall be heat treated within a range of 370 to 470 BHN.
- e. Three (3) test bars shall be incrementally poured per production shift as per Underwriter's Laboratory (U.L.) specifications and ASTM A536. Testing for tensile, yield and elongation shall be done in accordance with ASTM E8.
- f. Chemical and nodularity tests shall be performed as recommended by the Ductile Iron Society, on a per ladle basis.
- g. All components shall be manufacture and assembled in the United States.
- h. Coating for restraint devices shall consist of the following:
 - 1) All wedge assemblies and related parts shall be processed through a phosphate wash, rinse and drying operation prior to coating application. The coating shall consist of a minimum of two coats of liquid thermoset epoxy coating with heat cure to follow each coat.
 - 2) All casting bodies shall be surface pretreated with a phosphate wash, rinse and sealer before drying. The coating shall be electrostatically applied and heat cured. The coating shall be a polyester based powder to provide corrosion, impact and UV resistance.
 - 3) The coating system shall be MEGA-BOND by EBAA Iron, Inc. or approved equal.
- 3. Push on restrained joint shall be field locking gasket or Flex Ring style as manufactured by US Pipe, McWane, American USA, or approved equal. Field locking or Flex Ring gasket shall match appropriately to the manufacturer of the pipe used.
- 4. Use of threaded rods or thrust blocks as a restrained joint shall not be permitted, unless approved by the Engineer.
- 5. Restrained flange adapters shall be EBAA Iron Megaflange series 2100 or approved equal.
 - a. Restrained flange adapters shall be made of ductile iron conforming to ASTM A536 and have flange bolt circles that are compatible with ANSI/AWWA C110/A21.10 (125#/Class 150 Bolt Pattern).
 - b. Restraint for flange adapter shall consist of plurality of individual actuated gripping wedges to maximize restraint capability. Torque limiting actuating screws shall be used to insure proper initial set of gripping wedges.
 - c. The flange adapters shall be capable of deflection during assembly or permit lengths of pipe to be field cut to allow a minimum of 0.6 inch gap between the end of the pipe and the mating flange without affecting the integrity of the seal.
 - d. All internal surfaces of the gasket ring (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. The coating shall meet ANSI/NSF-61. Exterior surfaces of the gasket ring shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16.
 - e. Restraint Ring coated with MEGA-Bond Restraint Coating System.

C. Ductile Iron Pipe Fittings

1. Fittings, plugs, and gaskets must meet the requirements of ANSI/AWWA C111/A21.11, and AWWA/ANSI C110/A21.10 or ANSI/AWWA C153/A21.53. Cement mortar linings for fittings must meet the requirements of ANSI/AWWA C104/A21.4.
2. Mechanical joints shall be EBAA Iron Megalug series 1100, Romac Romagrip, or approved equal.
3. Restrained flange adapters shall be EBAA Iron Megaflange series 2100 or approved equal.

2.02 Ductile Iron Valves

- A. All underground valves in sizes from 4 inches to 10 inches shall be reduced wall, resilient-seated gate valves for water supply service meeting the requirements of AWWA C 515. Valves shall be American Flow Control Series 2500, Clow model 2638, or EJ Flowmaster Series resilient seated gate valve, Mechanical joint with rubber gaskets (per AWWA/ANSI C 111/A21.11), ductile iron body, stainless steel stem, mechanical joint restraint, and ¾ inch tee head bolts. Valves shall open right (clockwise) and be equipped with standard AWWA operating nut. Nut shall be color coded red. Valves shall have a working pressure rating of 250 psi or greater.
 1. In lieu of a mechanical joint restraint, American Flow Control Series 2500 valves may be equipped with ALPHA joints.
- B. All underground valves 12 inches and larger shall be rubber-seated butterfly valves meeting the requirements of AWWA C 504. Valves shall be Pratt Groundhog Butterfly Valves, by Henry Pratt Company, Clow, M&H, or Kennedy model 4500, mechanical joint with rubber gaskets (per AWWA/ANSI C 111/A21.11), ductile iron body, mechanical joint restraint, and ¾ inch tee head bolts. Valves shall open right (clockwise) and be equipped with standard AWWA operating nut. Nut shall be color coded red. Valves shall have a working pressure rating of 250 psi or greater.
- C. All above ground or in pits/vaults valves between 3 inches and 10 inches shall be rubber seated gate valves meeting the requirements of AWWA C515. Valves shall be American Flow Control Series 2500 Resilient Wedge Gate Valve, Clow model 2638, EJ Flowmaster Series, or approved equal with flanged joint with rubber gaskets (per AWWA/ANSI C 111/A21.11), ductile iron body, stainless steel bolts, nuts and washers, stainless steel stem, and be equipped with a hand wheel to operate. Valves shall have a working pressure rating of 150 psi or greater.
- D. All above ground or in pits/vaults valves 12 inches and larger shall be rubber seated butterfly valves meeting the requirements of AWWA C504. Valves shall be by Henry Pratt Company, Clow, M&H, or Kennedy, flanged joint with rubber gaskets (per AWWA/ANSI C 111/A21.11), ductile iron body, and ¾ inch stainless steel bolts, washers and nuts. Valves shall open right (clockwise) and be equipped with standard wheel to operate. Valves shall have a working pressure rating of 150 psi or greater.
- E. All underground valves in sizes from 4 inches to 16 inches used in combination with a tapping saddle shall be reduced wall, resilient-seated gate valves for water supply service meeting the requirements of AWWA C 515. Valves shall be American Flow Control Series 2500, Clow model 2638, EJ Flowmaster Series with one flanged and one mechanical joint ends with rubber gaskets (per AWWA/ANSI C 111/A21.11), ductile iron body, stainless steel stem, mechanical joint restraint, and ¾ inch tee head bolts or approved equal. Valves shall open right (clockwise) and be equipped with standard AWWA operating nut. Nut shall be color coded red. Valves shall have a working pressure rating of 250 psi or greater.

- F. All valves used in conjunction with a fire service line shall be Mueller R-2361-6 Outside Screw and Yoke (O.S.&Y.) with sample tap or approved equal. The stem shall be type 304 stainless steel. Sample tap shall have a 4 ½ inch brass nipple, brass ball valve, and brass plug meeting NSF/ANSI Standard 61 requirements. Sample tap shall be ½ inch for 4 inch and smaller valves and ¾ inch for valves larger than 4 inch.
- G. All valves installed using the insertion style method shall be an all stainless steel body Resilient Wedge Gate Valve designed for permanent use in potable water systems. The design will allow the valve to be installed into an existing pressurized pipeline while maintaining constant pressure and service without system shutdown. No restraining devices, restraining fasteners, or transition gaskets shall be required for the installation or operation of the valve. Valves in sizes 4 inches to 12 inches shall be Hydra-Stop Insta-Valve 250 or approved equal. 16 inch valves shall be Hydra-stop Insta-Valve Plus 250 or approved equal.

2.03 HYDRANTS

- A. All fire hydrants shall be American Flow Control or EJ and shall meet the requirements of AWWA C502. Hydrants shall be provided as complete units including hydrant, hydrant marker, pipe, pipe fittings and valve meeting section 2.01, 2.03 and 2.04 requirements. Hydrants shall be supplied for a bury depth of 5.5 feet. The hydrant barrel shall be painted safety yellow by the manufacturer. Hydrant caps and operating nut shall be painted John Deere green by the manufacturer.
 - 1. American Flow Control hydrants shall be 5 ¼ inch Waterous Pacer Traffic Model WB67-250. Hydrants shall be supplied with a 16 inch upper standpipe length. The Hydrant will come equipped with a bronze upper valve washer. In lieu of a mechanical joint restraint, hydrants may be equipped with ALPHA joints.
 - 2. EJ hydrants shall be WaterMaster Model 5BR250 with snow barrel.
- B. Hydrants shall come equipped with a Carrol Drain. Drain piping shall be made of type 304 stainless steel. External port shall have removable cap for flushing hydrant. Carrol Drain assembly shall be constructed so that it is removable when replacement of assembly is necessary.
- C. Hydrants shall have two 2 ½ inch national standard hose connections, 7.5 threads per inch, OD of threads 3 1/16 inch and one 5 inch integral "STORZ" type nozzle connection. Hose nozzle cap nut, weather shield hydrant operating nut, Storz nozzle cap nut, and Carrol Drain cap nut shall be square 15/16 inch at bottom of nut tapered to 13/16 inch at top (Waterous reference #19). The hydrant mechanism shall be on a non-rising stem opening clockwise. Chains shall not be supplied with the hydrant caps.
- D. Hydrants shall be equipped drip valve, tapped for plug. The drip valve system shall be bronze. Draining system shall be positively activated by the main operating rod, meaning the drip valve will open when the hydrant is closed. Hydrant shall be provided with plug removed.
- E. Hydrants shall have a 6 inch shoe with mechanical joint connections in conformance to ANSI/AWWA C115/21.11.

2.04 FIRE HYDRANT MARKER

- A. The fire hydrant sign shall be installed on a galvanized 2 pound sign post.
- B. The fire hydrant sign shall be aluminum 8 inch x 18 inch (MDOT type III-A) with hydrant symbol and down arrow of a reflective material.
- C. Fire hydrant mounted marker whips shall be 4 feet x 3/8 inch solid pultrusion fiberglass shaft, with seven (7) 6 inch bands of E.G. reflective sheeting of alternating lime green and red color.

Marker shall have a single solid stainless steel spring with aluminum threaded insert, and use Zinc coated bolt & mounting hardware.

2.05 TAPPING SLEEVES

- A. Tapping sleeves for size on size taps or 12 inch and larger sleeves:
 - 1. Model shall be American Flow Control series 2800-C, Tyler Union, Smith-Blair series 665, Romac style SST III, Ford style FTSS, Ford MJTS, or approved equal.
 - 2. Ductile Iron Tapping Sleeves.
 - a. Sleeves shall be of construction meeting ASTM A536. Side flange seals shall be O-ring type of round cross-sectional shape.
 - b. All sleeves to include the end joint accessories and split glands necessary to assemble sleeve to pipe.
 - c. Sleeve shall be coated with asphaltic varnish in compliance with NSF-61.
 - 3. Stainless Steel Tapping Sleeves.
 - a. Sleeves shall be 18-8 type 304 Stainless Steel in accordance with AWWA C223.
 - b. Bolts, nuts, and washers shall be 18-8 Type 304 Stainless Steel. Nuts shall be heavy hex, and coated to prevent galling.
- B. Tapping sleeves smaller than 12 inch which are not size on size:
 - 1. Model shall be Smith-Blair series 665, Romac style SST III, Ford style FTSS, or approved equal.
 - 2. Sleeves shall be 18-8 type 304 Stainless Steel in accordance with AWWA C223.
 - 3. Bolts, nuts, and washers shall be 18-8 Type 304 Stainless Steel. Nuts shall be heavy hex, and coated to prevent galling.
- C. Line Stop Tapping Sleeves and appurtenances:
 - 1. Model shall be Hydra-Stop HSF 250 Patriot or approved equal
 - 2. Body shall be type 304 Stainless Steel in accordance with AWWA C223.
 - 3. Blind Flange shall be Epoxy Coated Carbon Steel or type 304 Stainless Steel.
 - 4. Bolts, Nuts and Washers shall be type 304 Stainless Steel.
 - 5. Completion Plug shall be HSF 250 Push and Pin Style, made of reinforced composite polymer.
 - 6. Completion Plug O-ring shall be BUNA-N Rubber
 - 7. Completion Plug Pins shall be SAE Grade 8, Zinc coated to prevent corrosion
 - 8. Completion Pin Plug shall be type 304 Stainless Steel, coated to prevent galling.
 - 9. Flange O-Ring shall be BUNA-N Rubber.
- D. All gaskets shall be Nitrile in compliance with NSF-61.
- E. No special tools shall be required other than standard socket wrench.
- F. Flange end pilot dimensions to be in compliance with MSS-Sp-60.

2.06 AIR RELEASE VALVES

- A. Air Release Valves – All air release valves shall be manufactured per ANSI/AWWA C512-04. Cla-Val Series 36 Combination Air Valves, or approved equal. The valves shall be of the size listed in the plans.
1. The combination air valve shall combine the operating features of both an air and vacuum valve and an air release valve in one housing. The air and vacuum valve portion shall automatically exhaust large quantities of air during the filling of the pipeline and automatically allow air to reenter the pipeline when the internal pressure of the pipeline approaches a negative value due to column separation, draining of the pipeline, or other emergency. The air release valve portion shall automatically release small amounts of air from the pipeline while it is under pressure.
 2. The inlet and outlet of the valve shall have the same cross section area. The float shall be guided by a stainless steel guide shaft and seat drip tight against a synthetic rubber seal. 4 inch and larger valves shall have dual guided shafts of hexagonal cross section and a protective discharge hood.
 3. The float shall be of all stainless steel construction and capable of withstanding maximum system surge pressure without failure. The body and cover shall be concentrically located and of ductile iron and the valve internal parts shall be stainless steel or Buna-N rubber.
 4. All 1 inch and 2 inch valves shall be NPT. All valves 4 inch and larger shall be flanged.
- B. Vent piping shall be 2 inch diameter, with copper piping below grade and galvanized piping above grade.
- C. Air vent screens shall be black PVC, with NPT threaded to match the size of the connection pipe. Screen shall be one-piece 304 Stainless, mesh size 100. Silver reflective tape shall be placed on the vent pipe.
- D. An air release valve sign shall be installed on a galvanized 2 pound sign post.
- E. The valve sign shall be aluminum 8 inch x 18 inch (MDOT type III-A) with valve symbol and down arrow of a reflective material.

2.07 REPAIR SLEEVES

- A. All repair sleeves shall be certified NSF/ANSI 61-G and 372, and be in accordance with AWWA C230. Sleeves without service tap shall be Smith – Blair model 226, PowerSeal model 3121, or approved equal. Sleeves with service tap shall be Smith – Blair model 238, PowerSeal model 3131, or approved equal.
- B. Sleeves shall use Type 304 Stainless Steel hardware in accordance with ASTM A193/A194. Sleeves shall have conductivity feature.
- C. The repair sleeves shall be of the full circle type designed to repair a fully broken (completely separated) pipe and shall be rated for a working pressure of not less than 150 psi. Repair sleeves 12 inches or under in size will have a single joint.
- D. The length of the sleeves shall not be less than 7 ½ inches. Sleeves shall have no less than three (3) guide bolts of the minimum specified length. Sleeves of longer length shall have an additional guide bolt for every two (2) inches of additional band length.
- E. Each sleeve shall consist of a sealing gasket, a non-magnetic stainless steel band with contact buttons protruding through specially prepared gaskets, clamp lugs, bolts and nuts.
- F. No welding will be permitted in the manufacture of stainless steel repair sleeves except for the addition of the tap to repair sleeve.

- G. The lugs shall not be deformed in the process of attachments to the band during assembly or during removal in the field.
- H. The gasket shall be natural rubber, nitrile or approved equal and shall be of the tapered overlap design to give a pressure tight fit on the pipe surface to form a leak tight, permanent seal when the repair sleeve is installed. The gasket shall have a grid pattern to conform pipe surface irregularities.
- I. The gasket shall have a stainless steel bridge plate flush mounted and securely bonded into the gasket during the molding of the gasket.

2.08 POLYETHYLENE ENCASEMENT

- A. Polyethylene encasement must be manufactured using 8 mil thick virgin polyethylene in accordance with ANSI/AWWA C105/A21.10. Provide the tube size recommended by the manufacturer to protect the pipe and fitting sizes. Provide adhesive tape for the polyethylene tube as recommended by the manufacturer. Tape for repairing damage to the polyethylene must have a life expectancy equal to or greater than the life expectancy of the polyethylene.

2.09 STEEL BLOW-OFF PIPE

- A. Steel pipe shall be hot dipped galvanized meeting the requirements of ASTM A53.

2.10 WATER SERVICES AND APPURTENANCES

A. Copper Service Lines

- 1. Copper pipe shall be used for service lines which are $\frac{3}{4}$ inch, 1 $\frac{1}{4}$ inch and 2-inch. All copper services shall conform to AWWA C800. Water service pipe shall be copper meeting the requirements of ASTM B88, type K.
- 2. All appurtenances on copper service lines shall be flare copper connections. Other connections may be used in lieu of flare copper connections if approved by the Engineer prior to installation.

- B. All water service appurtenances shall meet the requirements of AWWA C800 and be from The Ford Meter Box Company, Inc., A.Y. McDonald Mfg. Co., or as approved by the Engineer. All water service appurtenances for 2 inch and smaller are as follows:

1. $\frac{3}{4}$ inch services:

- a. Corporation Stop $\frac{3}{4}$ inch – FB600-3-NL or AY McDonald 74701B NL (3/4 inch)
- b. Service Saddle – Smith-Blair 311(4 to 12 inch water main), Smith-Blair 313 (16 to 24 inch water main), Romac 101U(4 to 12 inch water main), Romac 202SSU (16 to 24 inch water main), Ford F101(4 to 12 inch water main), or Ford F202(16 to 24 inch water main).
- c. Curb Stop (for use when reducing a 1 $\frac{1}{4}$ inch street service to $\frac{3}{4}$ inch yard service) – Ford B21-555-NL, C18-35-NL, and C28-33-NL
- d. Curb Stop (when using $\frac{3}{4}$ inch street service) – Ford B22-333-NL or AY McDonald 76100 NL ($\frac{3}{4}$ inch)
- e. Brass Fittings – All brass fittings such as tees, elbows, caps, nipples and similar items shall be manufactured in the U.S.A.
- f. Couplings – Ford C22-33-NL or AY McDonald 74758 NL ($\frac{3}{4}$ inch)

2. 1 $\frac{1}{4}$ inch services:

- a. Corporation Stop – Ford FB600-45-NL or AY McDonald 74701B NL (1 x 1 $\frac{1}{4}$ inch)

- b. Service Saddle – Smith-Blair 311(4 to 12 inch water main), Smith-Blair 313 (16 to 24 inch water main), Romac 101U(4 to 12 inch water main), Romac 202SSU (16 to 24 inch water main), Ford F101(4 to 12 inch water main), or Ford F202(16 to 24 inch water main).
 - c. Curb Stop – Ford B22-555-NL or AY McDonald 76100 NL (1 ¼ inch)
 - d. Brass Fittings – All brass fittings such as tees, elbows, caps, nipples and similar items shall be manufactured in the U.S.A.
 - e. Couplings – Ford C22-55-NL or AY McDonald 74758 NL (1 ¼ inch)
- 3. 2 inch services:
 - a. Tapping Valve – Ford B11-777-NL
 - b. Service Saddle – Smith-Blair 313, Romac 202S, or Ford F202
 - c. Brass Fittings – All brass fittings such as tees, elbows, caps, nipples and similar items shall be manufactured in the U.S.A.
 - d. Couplings – Ford C44-77-NL
- 4. Water meters – All water meters shall be Neptune Water Meters. They shall be supplied and installed by the City of Kalamazoo.
- C. All water service appurtenances larger than 2 inch shall be in accordance with section 2.01.
- D. All multiple meter settings with more than two meters excluding the fire meter shall use a fabricated meter manifold. Fabricated manifold shall be manufactured as follows:
 - 1. Water manifold shall be made using 304 Schedule 40 Stainless Steel pipe.
 - 2. Inlet and outlets shall be threaded or welded flange. End cap shall be welded flange with a blind flange for future additions.
- E. Conduit used as sleeves shall be schedule 40 PVC or approved by Engineer.

2.11 METER SETTINGS

- A. Interior meter settings shall use components from the following manufactures.
 - 1. 1 inch meter – Ford KV23-454W-NL Angle Valve, Ford C38-44-2-625-NL, Brass Nipple, Apollo 94ALF-105-01A Ball Valve or approved equal
 - 2. 1½ inch and 2 inch meter – Ford FV13-777W-NL Angle Valve, Ford CF35-66NL (1 ½ inch), Ford CF 35-77-NL (2 inch), Brass Nipple, Watts LFFBV-3C Ball valve or approved equal.
 - 3. 3 inch and larger- rubber seated gate valves meeting the requirements of AWWA C515. Valves shall be American Series 2500 Resilient Wedge Gate Valve with hand wheel by American or equal flanged joint with rubber gaskets (per AWWA/ANSI C 111/A21.11), and be equipped with a hand wheel to operate, Hymax 874-56-03008812 (3 inch), 874-56-04010812 (4 inch), 874-56-06016312 (6 inch), or 874-56-08021712 (8 inch) Flange Adaptor, and flange to plain end ductile or type 304 stainless steel spool piece.
- B. Exterior meter settings shall use components from the following manufactures.
 - 1. 5/8 inch meter – Ford V81-22-33-NL
 - 2. ¾ inch meter – Ford V83-22-33-NL
 - 3. 1 inch meter – Ford V84-22-55-NL Copper setter

4. 1 ½ inch and 2 inch meter – Watts LFFBV-3C Ball Valve or approved equal. Ford CF-77-1-937-NL Meter Flange, Ford C28-77-NL Coupler, and Brass Nipple.
5. 3 inch and larger – All above ground or in pits/vaults valves 3 inches and larger shall be rubber seated gate valves meeting the requirements of AWWA C515. Valves shall be American Series 2500 Resilient Wedge Gate Valve with hand wheel by American or equal flanged joint with rubber gaskets (per AWWA/ANSI C111/A21.11), and be equipped with a hand wheel to operate, Hymax 874-56-03008812 (3 inch), 874-56-04010812 (4 inch), 874-56-06016312 (6 inch), or 874-56-08021712 (8 inch) Flange Adaptor, and flange to plain end ductile or type 304 stainless steel spool piece.

2.12 FIRE SERVICE APPURTENANCES

- A. All fire service appurtenances shall meet the requirements of AWWA/ANSI C110/A21.10, AWWA C115, and be from the following manufacturers.
 1. Double Check Valve Detector Assembly – Zurn Wilkins Model 350DA or 350ADA with meter setting, AMES Colt LFC300 with meter setting, or approved equal. The City of Kalamazoo will supply the 5/8 inch water meter.
 2. Reduced Pressure Zone Assembly – When using a RPZ in lieu of double check valve for a backflow device, a Zurn Wilkins Model 375DA or 375ADA with meter setting, AMES Colt LFC500 with meter setting, or approved equal shall be required. The City of Kalamazoo will supply the 5/8 inch water meter.

2.13 METER BOXES AND VAULTS

- A. All Meter Boxes, Meter Vaults and components shall be from the following manufactures.
 1. Box – Hancor MP NL1 24 0008 - 24 inch x 48 inch or ADS24X48MP 24 inchx48 inch white corrugated meter pit or Engineer approved equal.
 2. Vault – Precast concrete meter vault shall have a 3 inch minimum wall thickness and size shall be depended on number of meters and meter size. The wall shall have steps that are equally spaced 12 inches apart. Meter vault shop drawings shall be submitted to the Engineer and approved for each installation.
 3. Meter Pit Cover – Vestal 32-497, 32-055, 32-104, and 32-046 or approved equal.
 4. Meter Vault Cover – Ford MC-24HH-MB-T

2.14 VALVE BOXES AND VAULTS

- A. Curb Stop Boxes for 1 ¼ inch Service – Bingham & Taylor Fig. No. 4901-B, 94-F with 2 ½” New Style Flush Fit Cover or approved equal. Cover shall be inscribed with the word “water”.
 1. Curb Stop Box extensions shall be cast iron and manufactured by Bingham & Taylor, capable of being mounted directly to the curb stop box.
- B. Gate Valve Box or 2 inch Service Box – the valve box shall be of adjustable length screw type. The valve box shall be a malleable iron casting conforming to subsection 908.03 of the 2012 Michigan Department of Transportation *Standard Specifications for Construction*. This valve box shall either be a two or three piece screw type and the cover shall be inscribed with the word “water.” Valve box 8550 Series (two piece) or 8560 Series (three piece) manufactured by EJ, 4905 size no. 22 manufactured by Bingham & Taylor, or approved equal.
 1. Gate Valve Box extensions shall be cast iron and manufactured by EJ or Bingham & Taylor, capable of being mounted directly to the gate valve box.
- C. Valve Vaults for Insta-Valves – Valve vaults used in conjunction with Insta-Valves shall be constructed with materials as detailed in WA-8-A of the City of Kalamazoo Standard Plans.

They shall be of the diameter specified and in accordance with subsection 823.02 of the Michigan Department of Transportation *Standard Specifications for Construction* for Gate Wells.

- D. Valve Vaults for Air Release Valves – Valve vaults used in conjunction with Air Release Valves shall be constructed with materials as detailed in the latest WA-4-Series or WA-5-Series of the City of Kalamazoo Standard Plans. They shall be of the diameter specified and in accordance with subsection 823.02 of the Michigan Department of Transportation *Standard Specifications for Construction* for Gate Wells.

2.15 BACKFILL MATERIALS

- A. Use materials meeting the requirements of section 902 of the 2012 Michigan Department of Transportation *Standard Specifications for Construction*.

2.16 BELL JOINT LEAK CLAMP

- A. Bell Joint Leak Clamps shall be Smith-Blair Model 274, Ford Meter Box FBC or MJSC style, or approved equal.
 - 1. The bell spigot ring, section connector, and range spacer shall be ductile iron 80-55-06 in accordance with ASTM 536. Fusion bonded epoxy finish shall meet application methods per AWWA C213. Spigot ring design shall be interlocking to allow ease of installation without interrupting the flow of the pipe. The bolt head pocket shall be integral for one wrench installation.
 - 2. Gasket shall be Nitrile Buna-N per ASTM D2000, and certified to NSF/ANSI 61-G & 372.
 - 3. Restraint Rods and Nuts shall be Type 304 Stainless Steel. Restraint Rod shall have rolled threads, and Nut shall be fluoropolymer coated to prevent galling.
- B. Bell encapsulating couplings shall be Ford Meter Box MJBE style.
 - 1. The coupling shall be designed to fully encapsulate the pipe bell. The coupling shall be of split mechanical joint design with independent end seal and side seal gaskets.
 - 2. All welded components shall be constructed with ASTM A 36 carbon steel.
 - 3. The end seal and side seal gaskets shall be virgin NBR formulated for water service. The gaskets shall not require field trimming, cutting or modification.
 - 4. The end seal compression ring shall be manufactured with ductile iron per ASTM A 526 Grade 65-45-12 or ASTM A 36 carbon steel.
 - 5. The coupling shall be coated to an average of 12 mills thickness with a fusion-bonded epoxy that is NSF 61 listed and meeting application methods of AWWA C213.

2.17 COUPLINGS

- A. Wide range couplings shall be Romac Alpha or approved equal.
 - 1. All cast components shall be ductile iron, meeting or exceeding ASTM A 536, grade 65-45-12
 - 2. Grippers shall be ductile iron, meeting or exceeding ASTM A 536, grade 65-45-12.
 - 3. Gaskets shall be SBR compounded for water service per ASTM D2000 and meet NSF61 classification.
 - 4. Bolts and nuts shall be 304 stainless steel.
 - 5. Body shall be epoxy coated, and NSF61 Certified.

2.18 STRUCTURE CASTINGS

- A. All 24 inch structure covers shall be a malleable iron casting conforming to subsection 908.03 of the 2012 Michigan Department of Transportation *Standard Specifications for Construction*. The structure cover shall be series 1040 manufactured by EJ, inscribed with the word "Water".

2.19 STEEL CASING PIPE AND APPURTENANCES

- A. Steel casing pipe shall meet the requirements in accordance with subsection 909.05.D of the 2012 Michigan Department of Transportation *Standard Specifications for Construction* with the exceptions listed below:

1. For steel casing pipe jacked under a railroad, replace in its entirety the entry for 30 inch nominal size listed in Table 909-18 with the following:

Nominal OD and Wall Thickness in Inches Jacked in Place Steel Pipe

Nominal Size	Nominal Outside Diameter	Wall Thickness
30	30.000	0.406(a)
a. Coated or cathodically protected (0.469 inch minimum if uncoated and unprotected)		

2. Steel casing must have a minimum yield strength of 35,000 pounds per square inch (psi) and be in accordance with ASTM A53, Type E or S, Grade A or B and be designed for Cooper E80 loading requirements. In all cases, the allowable jacking strength capacity of the casing pipe shall be capable of withstanding the maximum jacking forces imposed by the operation.

- B. Stainless steel band spacer shall be Advance Products & Systems model SSIM or approved equal. The bands shall be constructed of circular stainless steel bands, which bolt together forming a shell around the carrier pipe. The spacers shall be designed with runners to support the carrier within the casing and maintain a minimum clearance of 1.00 inches between the casing inside diameter (ID) and the spacer outside diameter (OD). The spacers shall contain four modular runners – two on each half. Stainless steel bolts, nuts and washers shall be supplied with the casing spacers.

The band shall be manufacture of 8 inch wide 14-guage T-304 stainless steel. Abrasion resistant runners, having a minimum length of 7 inches and a minimum width of 1 inch, shall be attached to each band to minimize friction between the casing pipe and the carrier pipe as it is installed. Runner material shall be of glass filled polymer with compression strength of 33,000 psi, flexural strength of 40,000 psi, and tensile strength of 27,000 psi. The ends of thall runners shall be beveled to facilitate installation over rough weld beads or the welded ends of misaligned or deformed casing pipe.

Interior surfaces of the circular stainless steel band shall be lined with PVC, or EPDM alternate, having a minimum thickness of .090 inches with a harness of Durometer "A" 85-90.

Recommended position of the spacers is one placed not more than one foot from each end of the casing and pipe joint. Subsequent spacers shall be placed every 6-8 feet apart thereafter.

- C. Casing end seal shall be Advance Products & Systems model AC or approved equal. Pull-on casing end seals shall be manufactured of 1/8 inch thick neoprene rubber assuring excellent chemical resistance and resiliency. End seals must be effectively used in the temperature range of -20 degrees to 190 degrees Fahrenheit. End seals shall include ½ inch wide T304 stainless steel bandings with 100% nonmagnetic worm gear mechanism. End seals shall be seamless, have vulcanized edges, and can be pulled on at the time of construction.

PART 3 EXECUTION

3.01 CONSTRUCTION

- A. The plans show the locations of existing utilities in accordance with available data. If the work requires precise information on the location of existing utilities, the Contractor will expose utilities shown on the plans to determine the actual locations.

Do not disturb or cut into existing in-service water mains. If the operation of valves in existing water mains is required, notify the City of Kalamazoo a minimum of 3 working days in advance. Coordinate scheduling of water main connections with the City of Kalamazoo. Secure the Engineer's or authorized representative's approval of the schedule before beginning the work.

The City of Kalamazoo will open or close in service valves and provide on-site inspections for all water main and water service installations. The City of Kalamazoo will perform this work for an estimated time and material charge. The cost of opening and closing valves and on-site inspection will need a separate contract with the City of Kalamazoo prior to start of work. This does not apply to work being contracted by the City of Kalamazoo.

Minimize the out of service time for existing water mains. Make connections at night, on Sundays, or on holidays, as conditions require or as approved by the City of Kalamazoo. Minimize interference with the water supply if abandoning existing water mains and incorporating new water mains into the water system.

No trees or permanent structures shall be placed within 10 feet of the centerline of the water main or service line.

3.02 TRENCH EXCAVATION

- A. Excavate water main trenches to the lines and grades shown on the plans in accordance with modifications approved by the Engineer, or authorized representative, or to meet or bypass existing utility structures. Excavate trenches to the depths shown on the plans to provide 5 feet of cover from top of water main to the final grade. Excavate trenches to the widths shown on Michigan Department of Transportation Standard Plan R-83 Series.
- B. Excavate the bottom of the trench to the required grade to allow 6 inches of bedding for the pipe. Do not block under the pipe.
- C. Maintain trenches for water mains free of ground or surface water by pumping or as otherwise approved by the Engineer or authorized representative
- D. Install, and later remove, temporary timber bracing, as required to prevent movement or damage to new or existing water mains or adjacent utilities.
- E. During backfilling, carefully remove supports for sheeted and braced excavations to prevent earth banks or adjacent streets from collapsing.
- F. The Contractor may leave sheeting and bracing in place during backfilling and remove after completing backfilling operations. The Contractor may leave sheeting and bracing in place, if approved by the Engineer and the Contractor cuts it off 5 feet below the ground surface.

3.03 DISPOSAL

- A. Dispose of waste material as specified in section 205 of the 2012 Michigan Department of Transportation *Standard Specifications for Construction*.

3.04 LAYING OF THE PIPE

- A. Install the pipe joint restraint system in accordance with the manufacturer's recommendations, or as directed by the Engineer. Assemble the pipe in the trench. If deflections at joints are required by changes in grade, alignment, or to plumb valve stems, ensure deflections of bell and spigot joints and mechanical fitting joints do not exceed three-quarters of the maximum deflection recommended by the joint manufacturer or that allowed by AWWA C600, whichever is less. Do not store or leave tools or other objects in the pipe.
- B. Provide restrained joints as indicated on the plans. No tie rods or thrust blocks shall be allowed unless approved by the Engineer or authorized representative.
- C. Proper actuation of the gripping wedges of the mechanical joint restraint shall be ensured with torque limiting twist off nuts.
- D. The Contractor shall provide a written statement of warranty (Warranty Bond) for a period of 2 years from the date of **final acceptance (after meter is installed)**. Warranty work shall cover any necessary cost to repair water main or appurtenance leaks and water main or appurtenance leak damage at no cost to the City of Kalamazoo. Final acceptance will only be given **once the water service meter is installed**.
- E. Pipe shall be laid with bell ends facing the direction of laying, unless otherwise directed by the Engineer or authorized representative. When pipe is laid on a grade of 10 percent or greater, the laying shall start at the bottom and proceed upward with the bell ends of the pipe upgrade.
- F. Install silicon bronze wedges between all push-on joint pipes to allow for underground location and thawing of pipeline. 4 to 6 inch pipe shall use 2 wedges, 8 to 12 inch pipe shall use 3 wedges, and 16 inch and above shall use 4 wedges at each pipe joint.
- G. Pipe shall be restrained in accordance with Table 3.1.

Table 3.1 Pipe Thrust Restraint Table

NON-POLYWRAPPED PIPE								
Pipe Size (Inches)	90° Bend	45° Bend	22.5° Bend	11.25° Bend	Tee*	Reducer (One Size)	Reducer (Two Sizes)	Dead End
4	44	18	9	5	42	-	-	42
6	62	26	13	7	59	31	-	59
8	82	34	17	9	78	33	56	78
10	100	42	20	10	94	32	58	94
12	119	50	24	12	110	33	59	110
16	157	65	32	16	143	61	85	143
20	195	81	39	20	173	61	109	173
24	233	97	47	23	204	61	111	204
30	288	120	58	29	246	86	134	246
POLYWRAPPED PIPE								
Pipe Size (Inches)	90° Bend	45° Bend	22.5° Bend	11.25° Bend	Tee*	Reducer (One Size)	Reducer (Two Sizes)	Dead End
4	62	26	13	7	60	-	-	60
6	88	37	18	9	84	44	-	84
8	117	49	24	12	111	47	80	111
10	142	59	29	14	133	45	82	133
12	170	71	34	17	158	47	84	158
16	224	93	45	23	203	87	121	203
20	278	116	56	28	247	87	155	247
24	332	138	66	33	291	87	159	291
30	411	171	82	41	351	123	191	351
* Length of restraint for branch; use the size of the branch Consult Engineer for scenarios not included in table.								

3.05 INSTALLATION OF PIPE INVOLVING HORIZONTAL DIRECTIONAL DRILLING

- A. Horizontal direction drilling (HDD) is a method of trenchless construction using a surface launched steerable drill tool controlled from a mobile drilling frame, and includes a field power unit, drilling fluid mixing system, and mobile spoils extraction system. The work generally consists of three phases:
1. Drilling a pilot hole from the surface or pit at a starting point to an exit pit at the surface beyond the obstacle or area that is to be avoided.
 2. Reaming the pilot hole to make it large enough for the pipeline to be installed.
 3. Pipeline is pulled into place. During the pipe pulling operation, drilling fluid (a bentonite, water, and polymer solution) is injected to stabilize the hole, remove cuttings, and lubricate the pipe.
- B. Coordination

1. Drilling operations shall not interfere with, interrupt or endanger surface features or surface activities.
 2. When rock stratum, boulders, underground obstructions, or other soil conditions that impede the progress of drilling operation are encountered, the Contractor and Engineer shall review the situation and jointly determine the feasibility of continuing drilling operations, making adjustments or switching to an alternative construction method.
 3. The contractor shall familiarize themselves with the geologic characterization of the soil stratum at the proposed drilling path. The Contractor shall be responsible for informing the Engineer of any changes that are required in the directional drilling procedure due to geologic conditions.
 4. Launching and recovery pits shall be as small as practical. Dewatering of pits and excavations shall be done in accordance with the City of Kalamazoo Standard Specifications. When groundwater is encountered, the Contractor shall provide a dewatering system of sufficient capacity to keep any excavation free from water until the backfill operation is in progress. Dewatering shall be performed in a manner that removal of soil particles is held to a minimum. Water from the dewatering system shall be desilted before discharge. Methods of dewatering and desilting, including all costs shall be the Contractor's responsibility and are included in the Horizontal Directional Drilling Water Main pay item.
 5. Utilities shown on the plans are approximate. In areas where there is a potential conflict, the Contractor shall dig up and verify the locations and elevations of the utilities at no additional expense to the City. The Contractor shall assume full responsibility for the protection fall utilities, structures and their foundations which may be affected by the work.
 6. Before beginning the drilling process, the Engineer shall stake the proposed drill path.
- C. Drill Path Survey
1. The Drill path shall be walked in the presence of the Engineer and the Contractor with the guidance system that shall be used for each segment of drill path. The contractor shall locate and record any surface and subsurface magnetic variations or abnormalities and all points of interference, as well as verifying all utility locations and corresponding utility maps. Should any discrepancies arise between utility maps, field locations and guidance system findings, the Contractor shall clarify all discrepancies prior to beginning drilling operations. The drill path survey shall be performed no earlier than two days prior to commencing drilling operations. Provide the Engineer 48-hour notice of drill path survey.
- D. Equipment
1. The drilling equipment shall be capable of placing the pipe within the planned line and grade without inverted slopes.
 2. The drilling equipment shall be capable of pulling product pipe from either the downstream or upstream pit locations. The equipment must be adequately sized for the application.
 3. The guide system shall have the capability of measuring inclination, roll and azimuth. The guidance system shall have an independent means to ensure the accuracy of the installation. The Contractor shall demonstrate a viable method to eliminate accumulated error due to the inclinometer (pitch or accelerometer). The guidance

system shall be capable of generating a plot of borehole survey for the purpose of a record drawing. The guidance system shall meet the following specifications:

Inclination:	Accuracy	+0.05
	Range	+90
	Repeatability	+0.02
Roll:	Accuracy	+0.05
	Range	+90
Azimuth	Accuracy	+0.05
	Range	+90

4. Equipment setup requirements at the launch and recover locations shall be determined by the Contractor in accordance with the Plans and shall be submitted to the Engineer prior to commencement of drilling operations.

E. Pilot Hole Drilling

1. The entry angle of the pilot hole and the drilling process shall maintain a curvature that does not exceed the allowable bending radii of the carrier pipe per the manufacturer's recommendations.

F. The contractor shall follow the pipeline alignment as shown on the Plans, within the specification requirements. The location and depth of the drill head in relation to the profile and centerline of the alignment shall be determined at a maximum of ten-foot intervals. Acceptable tolerance shall be 0.5 feet variation from the centerline of the pipe in both vertical and horizontal directions (1-foot tolerance window).

G. In the event of difficulties at any time during drilling operation requiring the complete withdrawal from the tunnel, the Contractor shall either be allowed to withdraw and abandon the tunnel and begin a second attempt at a different location. The alternate locations shall be approved by the Engineer before the Contractor withdraws.

H. Access pits shall be at the beginning and end segments shown on the Plans. Intermittent pits shall be approved by the Engineer prior to proceeding with drilling operations. No intermittent access pits shall be allowed in Railroad Right of Ways.

I. Installing the Carrier Pipe:

1. After the pilot hole is completed, the Contractor shall install a swivel to the reamer and commence pullback operations.
2. Reaming diameter shall not exceed 1.5 times the diameter of the carrier pipe being installed.
3. The carrier pipe being pulled into the tunnel shall be protected and supported so that it moves freely and is not damaged by stones and debris on the ground during installation.
4. Pullback forces shall not exceed the allowable forces for the carrier pipe.

J. The Contractor shall allow sufficient lengths of carrier pipe to extend past the termination point to allow connections to adjacent pipe sections, tees, or fittings. Pulled pipe shall be allowed 24 hours of stabilization prior to making tie-ins. The length of extra carrier pipe shall be at the Contractor's discretion.

K. Field Inspection

1. All pipe sections, specials, and jointing materials shall be carefully examined for defects and no piece shall be laid that is known to be defective. Any defective piece discovered installed shall be removed and replaced with a sound one in a manner satisfactory to the Engineer at the Contractor's expense.
2. Defective material shall be marked with an "X" in pink paint and shall be removed from the job site.

L. Drilling Fluid Containment and Disposal Requirements

1. The contractor shall contain, handle, and dispose of drilling fluids in accordance with the following requirements:
 1. All drilling fluid and fluid additives shall be disclosed, and Material Safety Data Sheets (MSDS) shall be provided to the permit agency and the Engineer upon request.
 2. Excess drilling fluid shall be confined in a containment pit at the entry and exit location until recycled or removed from the site.
 3. Precautions shall be taken to ensure that drilling fluid does not enter the roadways, streams, municipal storm or sanitary sewer lines, and/or any other drainage system or body of water.
 4. When installing below railroads, vents shall be installed on either side of the railroad tracks to direct any excess drilling fluid to a containment area and to prevent unintended surfacing of drilling fluid within the Railroad Right of Way.
 5. Unintended surfacing of drilling fluid shall be contained at the point of discharge and recycled or removed from the site.
 6. Drilling fluids that are not recycled and reused shall be removed from the site and disposed at an approved disposal site.
 7. Drilling fluids shall be completely removed from the construction site prior to backfilling or restoring the site.

3.06 ABANDONING WATER MAINS

- A. Remove and dispose of abandoned pipe, gate boxes, or other appurtenances, as necessary for placement of a new water main at no additional cost to the City of Kalamazoo. Remove portions of gate boxes to at least 3 feet below the pavement surface under the road, and to at least 12 inches below the planned grade outside the road. If the Engineer determines abandoned mains may remain in place, cap the end of pipe with cap and megalug or as directed by the Engineer or authorized representative. If shown on the plans or directed by the Engineer or authorized representative, fill abandoned water mains with non-structural flowable fill.

3.07 VALVES

- A. Prior to installation, all valves shall be fully operated open and close to verify its functionality and number of turns. Set and join valves to the water mains as required for cleaning, laying, and jointing the required type of pipe, as shown on the plans. Install valves as required by the contract, or as approved by the Engineer. Place the valve stems plumb. Install valves to not bear on the pipe. Install anchor coupling with valves installed on tees or crosses, with swivel gland located on the valve side of the anchor coupling.
- B. When installing 12 inch and larger valves (Butterfly Valves), the operating nut shall be located on the side of the valve furthest from the centerline of the roadway, unless otherwise directed by the Engineer.

3.08 LIVE TAPS TO IN SERVICE WATER MAINS

- A. Prior to tapping of the main contractor shall disinfect all pipe, appurtenances, tapping machine with chlorinated water.
- B. Contractor shall install all necessary tapping appurtenances according to manufacturer's recommendation.
- C. Contractor shall use equipment which allows the tapping machine to rinse out metal shavings and tap water main per manufacturer's recommendations. No tap 4 inches or larger shall be allowed within 4 feet from any joint, fitting, or exiting tap regardless of location of tap. 1 ¼ inch taps located within 10 feet of previous tap shall be offset 15 degrees.
- D. Once tapping is complete Contractor shall disinfect all exposed water main and appurtenances with chlorinated water.

3.09 VALVE BOXES.

- A. Provide valve boxes that do not transmit shock or stress to the valve. Place valve boxes plumb over the operating nut of the valve, with the box cover flush with the pavement, or as approved by the Engineer or authorized representative. Provide firm support for valve boxes.
- B. Valve boxes shall be installed, centered and plumbed over the operating nut of the gate valve. The area around the valve box shall be back-filled with Granular Material Class II placed in layers not to exceed 12 inches, and thoroughly compacted to the required density. The Contractor shall take due care to prevent the box from shifting during backfilling operations. The tops of the valve boxes shall be flush with the established pavement or ground surface.

3.10 ADJUSTING OR RECONSTRUCTING WATER SHUT OFFS OR VALVE BOXES

- A. Adjust and reconstruct water shutoffs or valve boxes to the final grade or as approved by the Engineer or authorized representative. Replace shutoff or gate box materials damaged during adjustment or reconstruction, as determined by the Engineer, or authorized representative, at no additional cost to the City of Kalamazoo.

3.11 WATER SERVICES

- A. Water Services shall not be connected to the water main until approved by the Engineer or authorized representative.
 - 1. The standard size for all new services shall be 1 ¼ inch. The property owner/developer may request a larger size if needed.
 - 2. ¾ inch service materials may only be used when performing repairs or partial replacements of an existing ¾ inch service, or when replacing the yard service of a ¾ inch service. When replacing a complete street side service of a ¾ inch service, a new 1 ¼ inch tap will be completed, new 1 ¼ inch street service line installed, and reduced down at the curb shut off per section 2.10.
- B. Tap water main per section 3.08.
- C. When more than two meters excluding the fire meter are required to be set on a single service line, a fabricated meter manifold shall be installed.
- D. Water Services 2 inch and Smaller
 - 1. Construct services from the distribution main to the water meter. Lay services in a straight line perpendicular to the water main unless approved by the Engineer or authorized representative. Construct service with a continuous piece of copper from the corporation stop to the curb stop and curb stop to the water meter unless

approved by the Engineer or authorized representative. Services over 300 feet will require an exterior meter setting (meter pit).

2. All couplings shall be located as close to the water main as possible, but outside roadway unless approved by the Engineer.
3. The use of thread sealant shall not be allowed on flare fittings.
4. No splices shall be allowed for 1 ¼ inch or smaller yard services 90 feet and shorter in length.
5. Tap and curb shut off locations shall be no closer than 5 feet to edge of driveways. If a service is required to be abandoned due to improper location, service shall be fully abandoned at the water main tap location and new service installed at the developer's expense. Corporation stop shall be shut off, copper piping removed, and copper disc installed on the corporation stop.
6. If finish grade changes from plan grade after installation of service, curb shutoff shall be adjusted to 5 foot bury depth at the developer's expense.
7. When the street service is installed separately from the yard service a copper disk shall be installed on the yard side of the curb valve per the manufacturer's recommendations as approved by the Engineer or authorized representative.

E. Water Services Greater than 2 inch

1. For services entering a building with no basement, install the stand pipe flange 12 inch from the finished floor elevation and 6 to 12 inches away from any walls. Install the flange pipe so two bolt holes are parallel from each wall (two hole). For services entering a building with a basement or into a concrete vault, install the stand pipe flange 6 to 12 inches off the wall. Install the flange pipe so that two bolt holes are parallel to the floor, normal to the wall. For all services entering a building, the service line shall be located in room located on an outside wall of the building, with enough room to maintain the service.
2. Contractor shall complete installation of service prior to pressure testing and disinfection. The Contractor shall hydrostatic test the complete fire service from the nearest outside valve to first valve (OS&Y) before installing the fire check valve per section 3.22. Service shall be cleaned, flushed and tested per section 3.23. No connection shall be made to these services until after pressure test is complete and consecutive negative bacterial test results have been received in accordance with sections 3.22 and 3.23 of this specification, and the water main approved by the Engineer or authorized representative.
3. No adapter flange or grooved pipe joint shall be used on any portion of the service to be maintained by the City of Kalamazoo, with the exception of the meter side of an OS&Y fire service valve.
4. For service lines with multiple meter settings, a valve the same size as the incoming service line shall be installed prior to the tee or manifold. If one of the meter settings is for a fire service, the valve shall be an OS&Y valve in accordance with section 2.02.F.

F. Construct the service pipe with at least 5 feet of cover, unless Engineer or authorized representative requires additional depth.

G. Make all service connections, and transfers. Maintain and protect, at no additional cost, existing service connections requiring transfer, but not shown on the plans, until reconnection or disposal.

- H. If relocating a portion of water service, shut down the water service by method approved by the Engineer or authorized representative.
- I. Service lines entry points into the structure shall be sealed with hydraulic cement or mastic putty and oakum to prevent groundwater infiltration. For ductile iron pipe services, link seals should be used as the preferred method.
- J. FIRE SERVICES
 - 1. The Contractor shall notify the Engineer or authorized representative a minimum of 3 working days prior to flushing the fire service or testing the fire system capacity.
 - 2. All fire services shall have an OS&Y valve meeting the requirements of 2.02.F installed. The sample tap on the OS&Y Valve shall be installed on the downstream side of the valve.
- K. INTERIOR METER SETTINGS (PREFERED)
 - 1. Interior valve and meter inlet connection shall be installed by the Contractor in accordance with the Engineer, or authorized representative's recommendations and final approval.
 - 2. The meter setting shall be located in a heated portion of the building. The meter setting shall not be located in a crawl space, above electrical appliance, or near an electrical panel. A clear and unobstructed access to the meter of not less than 24 inches by 24 inches shall be provided.
 - a. 1 ¼ meter settings must be placed in basements. Meter setting shall be placed in the front of the building facing the street or within three feet of the front on the side unless otherwise approved by the Engineer or authorized representative. Water Services shall not be placed under footings. If service enters house under the porch and the porch footing extends below water service, a 2 inch PVC sleeve will be required.
 - b. A ½ inch schedule 40 PVC conduit, or larger, shall be installed from the meter setting to the remote reading point. There shall be no more than 75 feet of conduit between pull boxes. There shall be no more than four (4) 90-degree bends between pull boxes. All pull boxes must be installed no more than 96 inches above the floor. Pull boxes shall not be installed in attics or crawl spaces.
 - 3. The City of Kalamazoo will install the meter, readout, readout wire, copper ground wire, outlet meter connection and valve.
- L. EXTERIOR METER SETTINGS
 - 1. Exterior meter settings shall be installed by the Contractor according to the Engineer's or authorized representative's recommendations, and in accordance with City of Kalamazoo Standard Plans. Meter settings will be required for services greater than 300 feet, slab on grade, crawl spaces, where minimum 5 foot bury depth cannot be maintained, and other reasons. Contractor shall verify proper meter location with the Engineer prior to construction.
 - 2. Meter boxes or vaults shall not be installed in any street, alley, parking area, driveway, or sidewalk. Major landscaping (shrubs, boulders, etc.) and structures (retaining walls, fences, buildings, etc.) shall not be placed within seven and a half (7.5) feet or trees shall not be planted within ten (10) feet of any meter box or vault, unless otherwise directed by the Engineer.

3. The ground surrounding meter boxes, pits and vaults shall slope away from the lid at a minimum grade of 2%
4. No plumbing or electrical connections will be allowed inside the meter box or vault, unless otherwise directed by the Engineer.
5. All tees, connections, and couplings shall be a minimum of five (5) feet downstream from the meter box or vault wall on the outlet side. Tees and connections shall not be installed between the curb stop and the meter setter or copper horn.
6. Meters shall be installed by the City of Kalamazoo upon inspection and acceptance of the meter setting.
7. Meter boxes shall be used for all 1 inch exterior meter settings. The Contractor shall install meter boxes to horizontal location and to final grade as determined by grade stakes. Meter boxes shall be installed 5 feet outside the right of way in private property. All work shall be in accordance with the current WS-8 of the City of Kalamazoo Standard Plans.
8. For services 1 ¼ inch and smaller, curb shutoffs shall be located in the right of way, centered in the curb lawn area, or as directed by the Engineer.
9. The Contractor shall install meter vaults for 1 ½ inch and larger meter settings.
10. Meters shall be installed by the City of Kalamazoo upon inspection and acceptance of the meter setting.

3.12 WATER MAINS, CUT AND PLUG

- A. All work related to water main, cut and plug shall be in accordance with section 3.06.A. If the plans show cutting and plugging water mains, arrange for the City of Kalamazoo to shut down the main. Remove the section of pipe and plug the water main as shown on the plans or as approved by the Engineer or authorized representative. Construct the required restraint as directed by the Engineer or authorized representative.

3.13 FIRE HYDRANTS

- A. Set fire hydrants at the locations shown on the plans and in accordance with City of Kalamazoo standard plans and manufacturer's recommendations or as coordinated with the City of Kalamazoo. When installed, the hydrant shall be located on the side of the water main furthest from the centerline of the roadway, unless otherwise directed by the Engineer. Equip the hydrant with auxiliary valves, as shown on the plans. Stand hydrants plumb, with side nozzles parallel to the curb, and with the pumper nozzle normal to the curb, unless otherwise directed by the Engineer. Place the nozzles at the height specified by the City of Kalamazoo.
- B. For all gate valves connected adjacent to a tee or hydrant, the anchor between the fitting or hydrant and the valve shall be a 6 inch by 13 inch swivel by solid adapter with swivel gland. The swivel gland shall be located on the hydrant side of the solid adapter.
- C. Install a valve box over hydrant valve in accordance with section 3.09.
- D. Hydrants shall have a protective cover placed over hydrants prior to backfilling to ensure the hydrant is not damaged. If hydrant is damaged, the contractor shall repair or replace the hydrant at no cost to the City.
- E. If site conditions are such that it is not desirable for hydrant drain into the surrounding soil (i.e. when hydrant has less than 10 feet of separation from a sewer, high ground water, impervious or contaminated soils, etc.), hydrant drip valve plug(s) shall be installed by the Contractor onsite. Final determination on drip valve plug installation shall be made by the

Engineer or his representative. As constructed records shall be noted whether or not the drip valve plug was installed.

3.14 FIRE HYDRANT MARKER

- A. The sign shall be located between the hydrant and curb and offset from the pumper nozzle, or as directed by the Engineer. The sign shall be placed 3 feet away from the hydrant. The sign shall be single sided or double sided as directed by the Engineer or authorized representative. The sign shall have an installed height to the bottom of the sign of 7 feet above the final grade in areas with sidewalk and 5 feet above the final grade in areas without sidewalk.
- B. A fire hydrant mounted whip may be installed in addition to fire hydrant sign if approved by the Engineer. Fire hydrant whip shall be mounted to the fire hydrant opposite the pumper nozzle in accordance with the manufacturer's specifications.

3.15 FIRE HYDRANT REMOVAL

- A. If the plans show removal of a fire hydrant, remove the entire hydrant assembly, including the following:
 - 1. Auxiliary gate valve and box, unless otherwise approved by the Engineer or authorized representative.
 - 2. Internal valve assembly;
 - 3. Top bonnet;
 - 4. Standpipe; and
 - 5. Hydrant inlet body, unless otherwise approved by the Engineer.
- B. If the City of Kalamazoo approves leaving the auxiliary gate valve and box in place, remove to at least 3 feet below the pavement surface under the road, or at least 12 inches below planned grade outside the road.
- C. Stockpile the removed material at a location accessible to the City of Kalamazoo. The City of Kalamazoo will maintain ownership of the hydrant, and will remove the assembly from the project site

3.16 RELOCATING FIRE HYDRANTS

- A. If the plans show relocating a hydrant, arrange for the City of Kalamazoo to shut down the hydrant auxiliary valve. Remove the hydrant and reinstall at the required location. Reconnect the hydrant to the water main by shutting down the main, tapping a new hydrant outlet, or using the existing outlet. Install piping as required. If the relocated hydrant does not pass testing the hydrant shall be replaced with new at no cost to the City of Kalamazoo.

3.17 MISCELLANEOUS FITTINGS

- A. Install the following at the locations shown on the plans and in accordance with good construction practices and manufactures recommendations:
 - 1. Elbows,
 - 2. Tees,
 - 3. Corporation stops,
 - 4. Blow offs,
 - 5. Pipe adapters,
 - 6. Pipe couplings,

7. Retaining glands, and
8. Other miscellaneous fittings.

3.18 AIR RELEASE VALVES AND VAULTS

- A. Construct air release valves and vaults in accordance with the current WA-4-Series and WA-5-Series of the City of Kalamazoo Standard Plans.
- B. When installing the air release valves in conjunction with new water main construction, the contractor shall use ductile iron fittings.
- C. When installing the air release vaults as a retrofit to existing water main, live taps may be performed as directed by the engineer.

3.19 BACKFILLING AND COMPACTING

- A. Backfill and compaction shall be in accordance with Michigan Department of Transportation Standard plan for utility trenches R-83-Series.
- B. Backfilling Under Existing Conduits – Where it is necessary to undercut or replace existing utility conduits and/or service lines, the excavation beneath such lines shall be backfilled the entire length with granular bedding material tamped in place in 6-inch layers to the required density. The granular bedding shall extend outward from the spring line of the conduit a distance of 2-feet on either side and thence downward at its natural slope.
- C. Backfilling with Excavated Material – Unless otherwise specified or directed, material excavated in connection with the work shall be used for backfilling and other filling purposes, if it meets all requirements given elsewhere in this specification.
- D. Backfill Immediately Following Inspection – All trenches and excavations shall be backfilled immediately after pipe is laid therein, unless otherwise directed by the Engineer or authorized representative. Under no circumstances shall water be permitted to rise in un-backfilled trenches after pipe has been placed.
- E. Service leads shall not be backfilled until the pipe ends are referenced and the Engineer or authorized representative has measured the pipe for payment.
- F. Backfilling around and over structures and pipes shall be carefully done by hand and tamped with suitable tools of approved weight to a point 1-foot above the top of pipe. Selected material or, where specified or ordered by the Engineer, special backfill material shall be used in this area. The material shall be placed in uniform layers not exceeding 6-inch in depth up each side. Each layer shall be placed, then carefully and uniformly tamped to the specified density so as to eliminate the possibility of lateral displacement of pipe or structure.
- G. Backfilling by Machinery – After the backfill has been placed and compacted around the boxes and pipe to a height of 1-foot above the top. The remainder of the trench may be backfilled by machine. The backfill material shall be deposited in horizontal layers and each layer shall be thoroughly compacted to the specified density by approved methods before a succeeding layer is placed. In no case will backfill material from a bucket be allowed to fall directly on a structure or pipe and in all cases the bucket must be lowered so that the shock of the falling material will not cause damage.

3.20 COMPACTION REQUIREMENTS

- A. Compact each layer to 95% (90% if outside the influence of the roadway) maximum density as tested by the Michigan Department of Transportation Density Testing and Inspection Manual.

3.21 COMPACTION TEST

- A. Trenches and excavation around structures shall be backfilled and consolidated in layers, as specified, to the existing ground surface. Compaction tests shall be performed on each layer immediately after compaction.
- B. Initial test series for each type of backfill material shall be continued until the method of consolidation employed has proven to attain the required compaction. Any change in the proven method of consolidations will require additional testing and field verification of compaction.
- C. Subgrade below pavements, curbs, sidewalks, and structures shall be consolidated as specified. Compaction tests shall be performed to verify specified consolidation.

3.22 HYDROSTATIC TESTING

- A. Perform hydrostatic testing of water mains in accordance with AWWA C600.
- B. Ensure City of Kalamazoo personnel witness pressure testing. Give the City of Kalamazoo personnel at least 1 full working day notice before testing.
- C. Provide the personnel, temporary timber bracing, plugs, test pumps, temporary connections to the Municipal water system, and any other required apparatus. Provide the water for hydrostatic testing if not available from the City of Kalamazoo. Water must be pumped from a measurable source in order to determine testing allowance water.
- D. Before applying test pressure, expel air from the pipe in increments of no greater than 1,000 feet. Pressure test each section of water main. If the Contractor chooses not to pressure test against an existing valve, a new valve may be installed at the expense of the Contractor.
- E. Pipe shall be pumped with water to a minimum test pressure of 150 pounds per square inch (psi) at the highest point of elevation to begin test. Test shall last for at least 2 hours, with a maximum drop of pressure of 5 psi. If the pressure drop is greater than 5 psi but less than 20 psi, a testing allowance water test shall be performed. Testing allowance water, as measured by the quantity of water pumped into the pipe to attain the pressure at which the test began must not exceed the testing allowance.
- F. Testing allowance water is determined using the following formula

$$L = \frac{SD\sqrt{P}}{148,000}$$

Where

- L= testing allowance water in gallons per hour
- S= length of pipe in feet
- D= actual pipe diameter in inches, and
- P= 150 psi

- G. If testing allowance water is above the allowable limit occurs during hydrostatic testing, remove backfill to expose pipe and repair the joints. Repeat testing after repairs are complete. If multiple leaks occur the contractor may be required to reinstall main at Contractors expense.
- H. Correct visible leaks regardless of the amount of leakage. Replace faulty pipes, fittings, gate valves, or other accessories disclosed by testing. Repeat the test until the pipes, fittings, gate valves, and other accessories meet the requirements.

3.23 DISINFECTION, FLUSHING, AND BACTERIOROLOGICAL TESTING

- A. Disinfect the water main in accordance with AWWA C651 and applicable Michigan Department of Environment, Great Lakes, and Energy (EGLE) regulations after successful hydrostatic testing.
- B. Disinfect and flush new, and portions of existing, water mains as required by the EGLE.
- C. Use blow offs, fire hydrants, or other means as shown on the plans or approved by the Engineer, or authorized representative, to flush water mains in accordance with AWWA C651, with a velocity of at least 3 feet per second. Provide hoses and other equipment and arrange a means of disposing of the water without damaging the work or adjacent property.
- D. Use the continuous feed method with chorine added simultaneously with the water. Add chlorine or liquid hypochlorite to meet the requirement of at least 25 milligrams per liter of chlorine. Slowly add the water to the main and allow it to stand for at least 24 hours. At the end of the 24-hour period, ensure the chlorine residual is a minimum of 10 milligrams per liter. If not met, re-chlorinate and flush the water main until a minimum 10 milligrams per liter residual remains after 24 hours.
- E. After completing disinfection, initially flush the water mains with water at a velocity of at least 3 feet per second to replace the entire volume of chlorinated water in the pipeline. After initial flushing, perform final flushing until the residual chlorine content meets the standard level for the water distribution system. The City of Kalamazoo may require a waiting period after flushing and before bacteriological sampling.
- F. Dispose of chlorinated water in accordance with applicable state and local requirements. If necessary, apply a reducing agent to the water to neutralize the chlorine and create a chlorine residual of no greater than 1 ppm. Dechlorination shall be in accordance with AWWA C655.
- G. After flushing, perform bacteriological testing in accordance with AWWA C651 and EGLE requirements. Test chlorine residuals before taking each bacteriological sample. Ensure the chlorine residual is less than 1.5 milligrams per liter before taking a bacteriological sample. The City of Kalamazoo will collect samples from each branch of pipe in the presence of the Engineer, or authorized representative, and contractor personnel. The City of Kalamazoo will be responsible for the transportation of the samples to a State of Michigan approved lab for testing. Two consecutive bacteriologically safe tests at 24-hour intervals for each section of pipe are required. Acceptable tests are negative for bacteria and as otherwise defined by AWWA C651 and EGLE regulations.
- H. If a bacteriological test fails, repeat disinfection, flushing, and testing.
- I. Pressure and chlorination taps shall be removed within one business day of passing tests, so main can be activated.

3.24 POLYETHYLENE ENCASEMENT

- A. Polyethylene encasement will be required for all ductile iron installations when the soil test evaluation is greater than or equal to 10 points based as indicated in AWWA/ANSI C105/A21.5 or as directed by the Engineer. Sampling of the soils is to be completed by the developer or municipality responsible for the installation.
- B. Install polyethylene encasement on water mains and fittings installed through concrete floor and foundations and as indicated on the plans in accordance with the manufacturer's installation instructions and AWWA/ANSI C105/A21.10. Appropriately sized polyethylene encasement shall be used so that there are no longitudinal splices. This may require using one or more size larger diameter encasement than the pipe installed.

- C. Polyethylene encasement shall be required for all installations when groundwater is detected in the utility trench.
- D. Polyethylene encasement shall be required for all directional drilling installations involving ductile iron pipe.

3.25 WATER INFRASTRUCTURE IN STEEL CASING

- A. Work shall be performed in accordance with section 401 of the Michigan Department of Transportation *Standard Specifications for Construction* and as detailed herein. In all cases, the Contractor shall submit a work plan detailing the following:
 - 1. Means and methods for bracing and shoring;
 - 2. Methods of maintaining and adjusting line and grade;
 - 3. Drilled/bored diameter;
 - 4. Drill hole stabilization procedures;
 - 5. Size and location of the auger head relative to the casing;
 - 6. Methods of dealing with cobbles/boulders and obstructions;
 - 7. Estimated jacking thrust required;
 - 8. Method of monitoring casing elevation;
 - 9. Thrust block design calculations;
 - 10. Record keeping system to document casing advance and jacking pressures;
 - 11. Grouting procedures;
 - 12. Temporary dewatering measures and;
 - 13. Mitigation procedures if sinkholes or settlement above the pipe occurs or excessive movement of the settlement monitors is observed.
- B. Minimum Allowable Depths.
 - 1. The minimum allowable depth of the Horizontal Auger Bore (HAB) installed casing pipe shall be in accordance with Table 3.2

Table 3.2 Minimum Allowable Depths Table	
Location	Minimum Depth
Base of Rail	6 Feet
Existing Ground	5 Feet
Roadway	5 Feet
Ditch Flowline	5 Feet

- C. Access Pits.
 - 1. Excavate jacking and receiving pits as necessary. Provide and install all sheeting, shoring, bracing and any other earth retention measures in accordance with section 704 of the Michigan Department of Transportation *Standard Specifications for Construction*. Provide site drainage and subsurface dewatering and other items associated with the operation as necessary to facilitate the proposed work.
- D. Lead Auger/Overcut Allowance.

1. A full-size auger section shall be used as the lead section of the casing. The auger shall not protrude from the leading edge of the casing. However, if soil conditions halt the movement of the casing, the auger shall be allowed to protrude not more than 1 inch in front of the casing during the boring operation. Overcut is the annular space between the excavated hole and the outside diameter of the casing pipe. The allowable overcut diameter is one inch greater than the casing pipe radius.
- E. Watertight joints.
1. Watertight joints are required to ensure the integrity of the road and railroad bed. Casing pipe shall be constructed to prevent water leakage or earth infiltration and must be certified free from any breaks or leaks throughout its entire length.
- F. Lubrication Fluids.
1. Lubrication fluids are specifically required for this method regardless of the soil conditions. Any deviations from the use of lubrication shall require prior approval for the Engineer. The Contractor shall install vents on either side of the casing pipe to prevent fracking during installation. These vents shall also be used as relief in case of a water main break. Lubrication fluids, consisting of a mixture of water and bentonite or bentonite/polymer, shall be used in the annular space between the casing being installed and the native soil to stabilize and lubricate the drill hole. Grease will not be allowed for use as lubrication for this purpose.
- G. Pipe Locating and Tracking.
1. One of the following tracking, locating, and guidance systems shall be used:
 - a. Waterline system.
 - b. Mechanical control head.
 - c. Electronic (inertial) control head.
 - d. Walkover system.
 - e. Laser guided tunnel attachment.
 - f. Laser guided pilot rod.
 2. The Contractor will be responsible for submitting their proposed pipe locating tracking method at the preconstruction meeting for approval.
- H. Settlement/Heaving Monitoring.
1. Settlement/Heaving monitoring shall be performed in a manner that will minimize the movement of the ground in front of, above, and surrounding the horizontal auger bore operation; and will minimize subsidence of the surface above and in the vicinity of the boring. The ground shall be supported in a manner to prevent loss of ground and keep the perimeter and face of the boring stable at all times, including during shutdown periods. A survey shall be performed one day prior to initiating this operation at each required monitoring location. A similar survey shall then be performed at each location, on a daily basis, until the permitted activity has been completed. All survey readings shall be recorded to the nearest one-hundredth (0.01) of a foot. Digital photographs of the pavement and rail conditions shall also be taken prior and after the pipe installation. Specific monitoring locations and requirements may also be provided for railway crossings.
- I. Ground Water Control.

1. Dewatering shall be conducted whenever there is a high ground water table level to prevent flooding and facilitate the operation. The water table elevation shall be maintained at least 1 foot below the bottom of the casing at all times. When needed, dewatering may be initiated prior to any excavation.
2. Minor water seepage or pockets of saturated soil may be effectively controlled through bailing or pumping. This control shall be accomplished without removing any adjacent soil that could weaken or undermine any access pit, its supports, or other nearby structures.
3. Larger volumes of ground water shall be controlled with one or more well points or with staged deep wells. Well points and staged deep well pumping systems shall be installed and operated without damage to property or structures, and without interference with the right of the public, owners of private property, pedestrians, vehicular traffic, or the work of other contractors. Any pumping methods used for dewatering and control of ground water and seepage shall have properly designated filters to ensure that the adjacent soil is not pumped along the water. Well diameter, well spacing and the pump's pumping rate shall provide adequate draw down of the water level. Wells shall be located to intercept ground water that otherwise would enter the access pit excavation and interfere with the work. Upon removal of a well, the hole shall be filled and grouted.
4. Existing storm sewers shall only be used to discharge water from the dewatering operation in accordance with a permit obtained from the appropriate storm sewer owner. Filters or sediment control devices shall be required to ensure that the existing system is not adversely affected by construction debris or sediment.

J. Casing End Seals/Bulkheads

1. Casing ends shall be enclosed using 1/8 inch thick synthetic rubber casing ends seals in accordance with section 2.19.C of this document. Ensure end seals are water tight and attach securely to the casing pipe and the carrier pipe (water main). Ensure end seals are acceptable to the Engineer.

K. Backfill Requirements.

1. Remove the pits and backfill the excavations as necessary with material meeting the standard specifications as approved by the Engineer.

L. Railroad Specific Requirements.

1. For Steel casing pipe jacked in place under a railroad, the following will apply in accordance with the current AREMA Manual;
 - a. When steel casing pipe is used, the joints must be fully closed by welding or mechanical means as approved by the Engineer.
 - b. Minimum cover over the casing must be at least 6.0 feet from the bottom of the railroad tie to the top of the casing pipe at its closest point.
 - c. Casing pipe must extend beyond the limits of the entire railroad right-of-way.
 - d. Jacking construction requirements must be in accordance with the current AREMA Manual, Chapter 1, Part 4.

3.26 INSTALLATION OF LINE STOPS AND INSERTION VALVES

- A. Line Stops and Insertion Valves shall be performed in the locations as detailed on the plans or as directed by the Engineer. Prior to installation of the line stop or insertion valve, coordinate the deactivation of the water main so that all customers have been given proper notification

of the shutdown. No work shall be performed without the Engineer or authorized representative present.

B. Excavate and expose the water main. Remove scale from the water main and make sure there are no flaws which would affect the seal with the saddle.

C. Line Stops

1. Install permanent line stop body on the pipeline and perform line stop according to manufacturer's instructions. Upon completion of the work associated with the line stop, reactivate the water main and install permanent blind flange on the line stop body. Ensure that all as built information is recorded and submitted as detailed in section 1.03.

D. Insertion Valves

1. Install Insertion Valve body on the pipeline and perform valve insertion according to manufacturer's instructions. Operate the valve to ensure that it is fully functional.

2. Construct valve vault as detailed in WA-8-A of the City of Kalamazoo Standard Plans. Ensure that all as built information is recorded and submitted as detailed in section 1.03.

3.27 FINAL RESTORATION

A. Contractor shall restore site to preconstruction condition or better, or as detailed on the plans.

B. Final grade shall be 5 feet above completed water main or water service line, unless otherwise approved by the Engineer. If final grade is changed greater than 6 inches from the approved plans, the Developer or Contractor shall raise or lower water main and water services so that they are maintained at 5 feet below final grade. All costs associated with this work shall be paid for by the Developer or Contractor.

PART 4 MEASUREMENT AND PAYMENT

4.01 PAY ITEMS

Measurement a payment may not apply if construction is not being funded with City of Kalamazoo funds. Please review signed construction contract for actual measurement and payment specifications.

Pay Item	Pay Unit
Water Main, DI __ inch, Tr Det	Foot
Water Main, DI __ inch, in Casing.....	Foot
Water Main, DI __ inch, HDD.....	Foot
Gate Valve and Box, __ inch,.....	Each
Butterfly Valve and Box, __ inch.....	Each
Polyethylene Encasement.....	Foot
Water Main, __ inch, Cut and Plug	Each
Fire Hydrant	Each
Hydrant, Rem	Each
Hydrant Relocate, Case __.....	Each
Water Serv	Each
Water Serv, Long.....	Each
Water Serv, Conflict	Each
Water Serv, Yard	Each
Copper Tubing, Additional Length	Foot
Water Serv, 2 inch.....	Each
Water Serv, Conflict, 2 inch	Each
Copper Tubing, Additional Length, 2 inch	Foot

Steel Casing Pipe, __inch, Jacked in Place.....Foot

4.02 MEASUREMENT OF PAY ITEMS

- A. Payment for Water Mains shall be measured based on the sizes and trench details required, along the centerline of the pipe, with no deductions for fittings. The unit price of Water Main, DI, includes the cost of the following:
1. Excavation and backfill;
 2. Dewatering operations (trench and/or pipe);
 3. Provide temporary water system to maintain service during construction;
 4. Hydrostatic testing;
 5. Disinfecting and flushing the water main and bacteriological testing;
 6. All material, labor and equipment necessary to remedy an unsatisfactory hydrostatic test, including removing and replacing any backfill;
 7. Providing and installing fittings, gaskets, bracing or sheeting, blocking and miscellaneous items for installing pipe and reconnecting to the Municipal Water System;
 8. Preparing and providing as-constructed plans.
- D. The City of Kalamazoo may withhold payment and/or final acceptance until the City of Kalamazoo accepts the as-built plans.
- E. The cost of dewatering of trenches, pipe, or both associated with alterations to the Municipal Water System, is included in the unit price for relevant items of work.
- F. The cost of excavating, disposing of excess material, and providing, placing, and compacting the backfill, is included in the unit price for related items of work.
- G. The cost of removing or abandoning existing water mains, gate valve boxes, and other appurtenances to provide clearance for the proposed water main or roadway, is included in the unit price for relevant items of work.
- H. Payment for Gate Valves, Butterfly Valves, and Valve Boxes, shall be as follows:
1. The unit prices of **Gate Valve and Box** and **Butterfly Valve and Box**, of the types and sizes required, include the cost of providing and installing the valve and valve box, complete and ready for use.
- I. Payment for water services 1 ¼ and smaller shall be as follows:
1. **Water Serv** refers to services between the water main and the curb shut off no greater than 33 feet long. **Water Serv, Long** refers to services between the water main and the curb shut off greater than 33 feet long and up to 66 feet in length. **Water Serv, Yard** refers to the services between the curb shut off and the water meter setting, up to 25 feet in length. **Copper Tubing, Additional Length** refers to the additional copper tubing and work needed when services between the curb shut off and the water meter setting are over 25 feet in length, and when the length of the service between the center of the road and the curb shut off exceeds 66 feet. **Water Serv, Conflict** refers to relocating only a portion of a water service.
- J. Payment for water services 2 inches in size shall be as follows:
1. **Water Serv, 2 inch** refers to the services between the water main and the water meter setting no greater than 58 feet in length. **Water Serv Conflict, 2 inch** refers to relocating only a portion of a 2 inch water service. **Copper Tubing, Additional length, 2 inch** refers to the additional copper tubing and work needed when services exceed 58

feet in length.

- K. Services with a diameter larger than 2 inches will be measured and paid for as water mains.
- L. The unit prices for **Water Serv, Water Serv, Long, Water Serv, Yard, Copper Tubing, Additional Length, Water Serv Conflict, Water Serv, 2 inch, Water Serv Conflict, 2 inch**, and **Copper Tubing, Additional Length, 2 inch**, include the cost of the following, unless otherwise accounted for in other pay items:
 - 1. Earth excavation;
 - 2. Removing pavement;
 - 3. Replacing pavement;
 - 4. Jacking and boring;
 - 5. Providing and installing type K copper tubing, service saddle, corporation stops, service stops, and service boxes;
 - 6. Disinfecting;
 - 7. Providing, placing, and compacting backfill;
 - 8. Slope Restoration to equal or better conditions; and
 - 9. Miscellaneous material, equipment, or operations.
- M. Payment for additional service connections, not shown on the plans, but maintained, protected, and reconnected or disposed of by the Contractor will be paid for as **Water Serv**, or **Water Serv, Long**.
- N. The pay item **Water Serv, Conflict** will apply only to portions of water services requiring relocation due to direct conflict with utilities, other items of work, or as otherwise approved by the City of Kalamazoo. Payment for all other relocations requiring replacement of corporation or service stops will be paid for as Water Serv or Water Serv, Long.
- O. Payment for **Water Main, __inch, Cut and Plug** includes the cost of cutting the existing water main, providing and placing the required plug, and thrust blocks.
- P. Payment for **Fire Hydrant** includes the cost of providing and installing the hydrant, hydrant valve, valve box, and all pieces between the valve and hydrant, including the coarse gravel and concrete base, fire hydrant marker at the locations shown on the plans in a ready-for-use condition unless noted otherwise.
- Q. Payment for **Hydrant, Rem** includes the cost of breaking down the auxiliary gate valve, gate box, the hydrant assembly, backfilling, and plugging the opening in the existing main.
- R. Payment for **Hydrant, Relocate, Case __** (of the case required), includes the cost of vertically adjusting the relocated hydrant to final grade and the following:
 - 1. Case 1 includes the cost of removing the hydrant, extending the existing hydrant lead from the gate valve, reinstalling the hydrant in a ready-for-use condition, adjusting the existing gate box and hydrant to final grade, and providing and installing sleeves, fittings, and joint restraints.
 - 2. Case 2 includes the cost of removing the existing hydrant, gate valve and box, and reinstalling the hydrant and gate valve in a ready-for-use condition, adjusting the existing gate box and hydrant to final grade, and providing and installing the cutting-in-sleeve, pipe coupling, tee, elbow, and joint restraints.
- S. Payment for **Steel Casing Pipe, __inch, Jacked in Place** of the size required will be paid for by the length installed. The unit price for **Steel Casing Pipe, Jacked in Place** includes the cost of excavating the pits, providing and installing sheeting, bracing, and any other safety devices, providing jacking equipment: drainage and dewatering; bulkheading and sealing the casing, providing and installing vents, grouting the annular space between the casing and native soil and any other items associated with the operation.

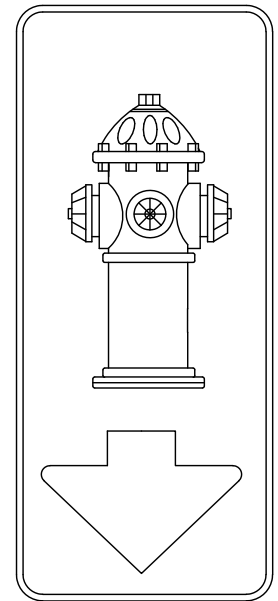
- T. Payment for **Water Main, DI, __inch, in Casing**, of the size required will be paid for by the length installed. The unit price for **Water Main, DI __inch, in Casing** shall include the cost for furnishing and installing the water main and casing spacers inside the casing.
- U. Payment for **Water Main, DI, __inch, HDD**, of the size required will be paid for by the length installed. The unit price shall include the cost of all equipment and materials, excavation and backfill, dewatering operations (trench, pit or pipe), temporary water system to maintain service during construction, hydrostatic testing, disinfecting and flushing the water mains, and bacteriological testing, all materials, labor and equipment necessary to remedy and unsatisfactory hydrostatic test, including removing and replacing any backfill, providing and install all, gaskets, bracing or sheeting, blocking and miscellaneous items for installing pipe of the required size and material and reconnecting to the water system as shown on the plans.

END OF SECTION

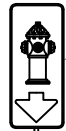
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WA-1-D

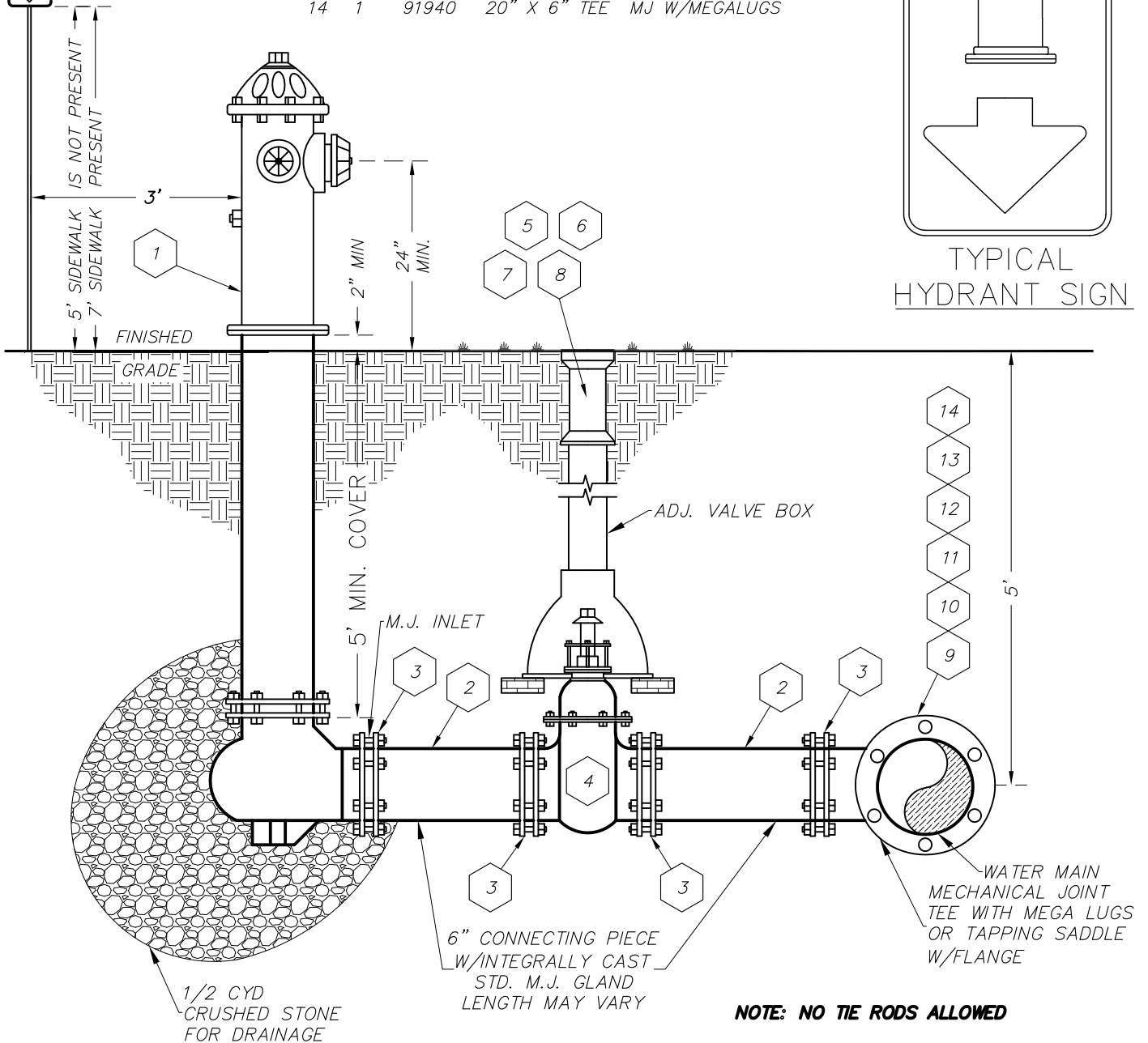
ITEM	QTY.	#	DESCRIPTION
1	1	39887	6" HYDRANT W/CARROLL DRAIN
2	2	70000	CONNECTING PIECE (13")
3	4	33801	6" GASKET (MJ)
4	1	96696	6" GATE VALVE (MJ)
5	1	08550	VALVE BOX BOTTOM
6	1	08520	VALVE BOX TOP SECTION
7	1	08500	VALVE BOX RING CASTING
8	1	08490	VALVE BOX COVER
9	1	91440	6" TEE MJ
10	1	91525	8" X 6" TEE MJ W/MEGALUGS
11	1	91750	10" X 6" TEE MJ W/MEGALUGS
12	1	91825	12" X 6" TEE MJ W/MEGALUGS
13	1	91909	16" X 6" TEE MJ W/MEGALUGS
14	1	91940	20" X 6" TEE MJ W/MEGALUGS



TYPICAL
HYDRANT SIGN



DOUBLE SIDED
HYDRANT SIGN



CITY OF KALAMAZOO
Department Of Public Services

TYPICAL FIRE HYDRANT & GATE VALVE DETAIL

RECOMMENDED BY _____

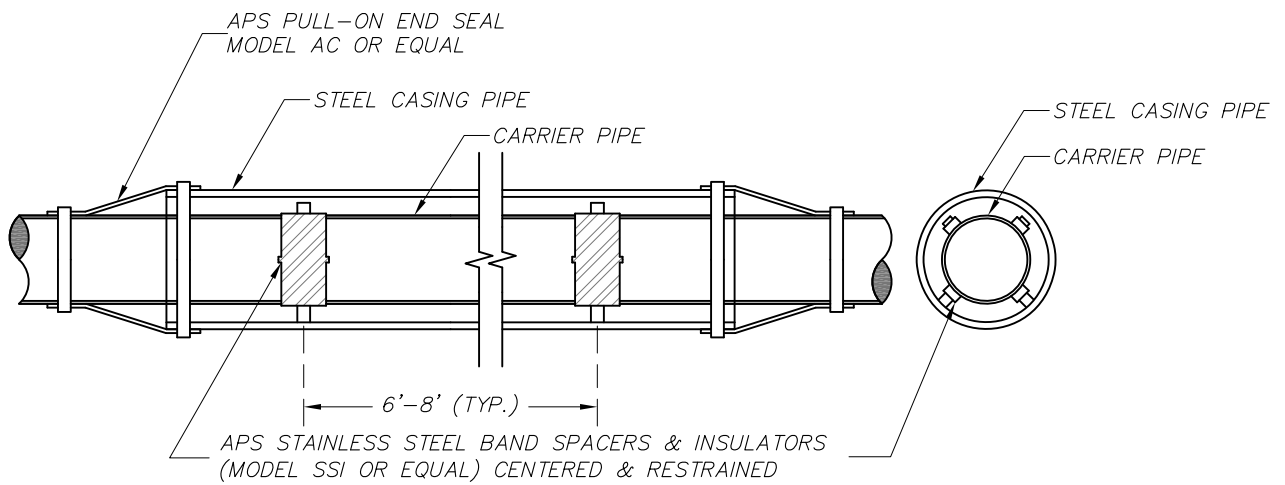
APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE

WA-2-A



CASING CARRIER PIPE DETAIL

SIZE CASING AND CARRIER PIPES PER PLAN AND SPECIFICATIONS

TYPICAL BAND SPACER POSITIONING:
ONE PLACED NOT MORE THAN 1 FOOT FROM EACH END OF THE CASING AND
PIPE JOINTS WITH SUBSEQUENT SPACERS PLACED EVERY 6-8 FEET THEREAFTER.
FOR 18 FOOT PIPE THERE SHALL BE THREE BAND SPACERS.
FOR 20 FOOT PIPE THERE SHALL BE FOUR BAND SPACERS.



CITY OF KALAMAZOO
Department Of Public Services

CASING CARRIER PIPE

RECOMMENDED BY _____

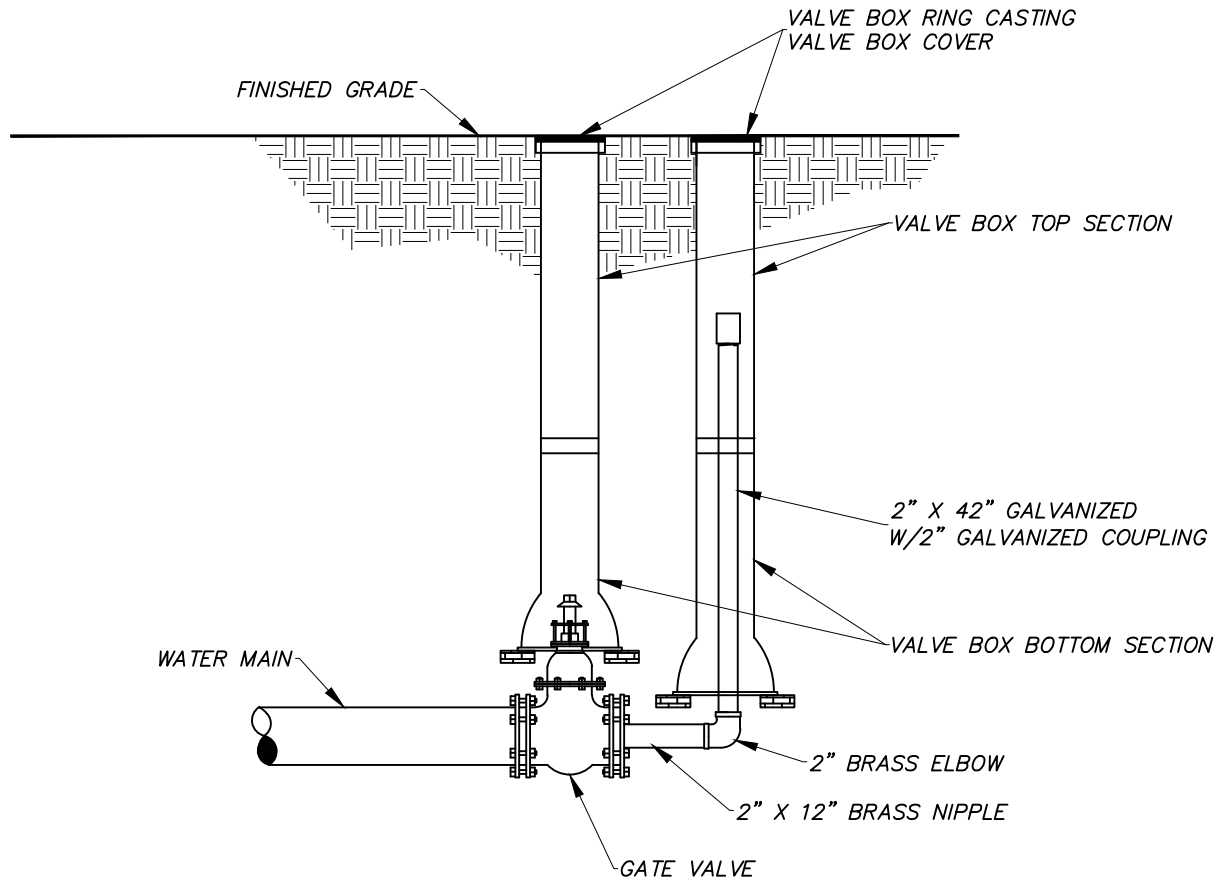
APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE

WA-3-C



NOT TO SCALE



CITY OF KALAMAZOO
Department Of Public Services

**2" BLOW OFF
CONNECTION**

RECOMMENDED BY _____

APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE

WA-04-B



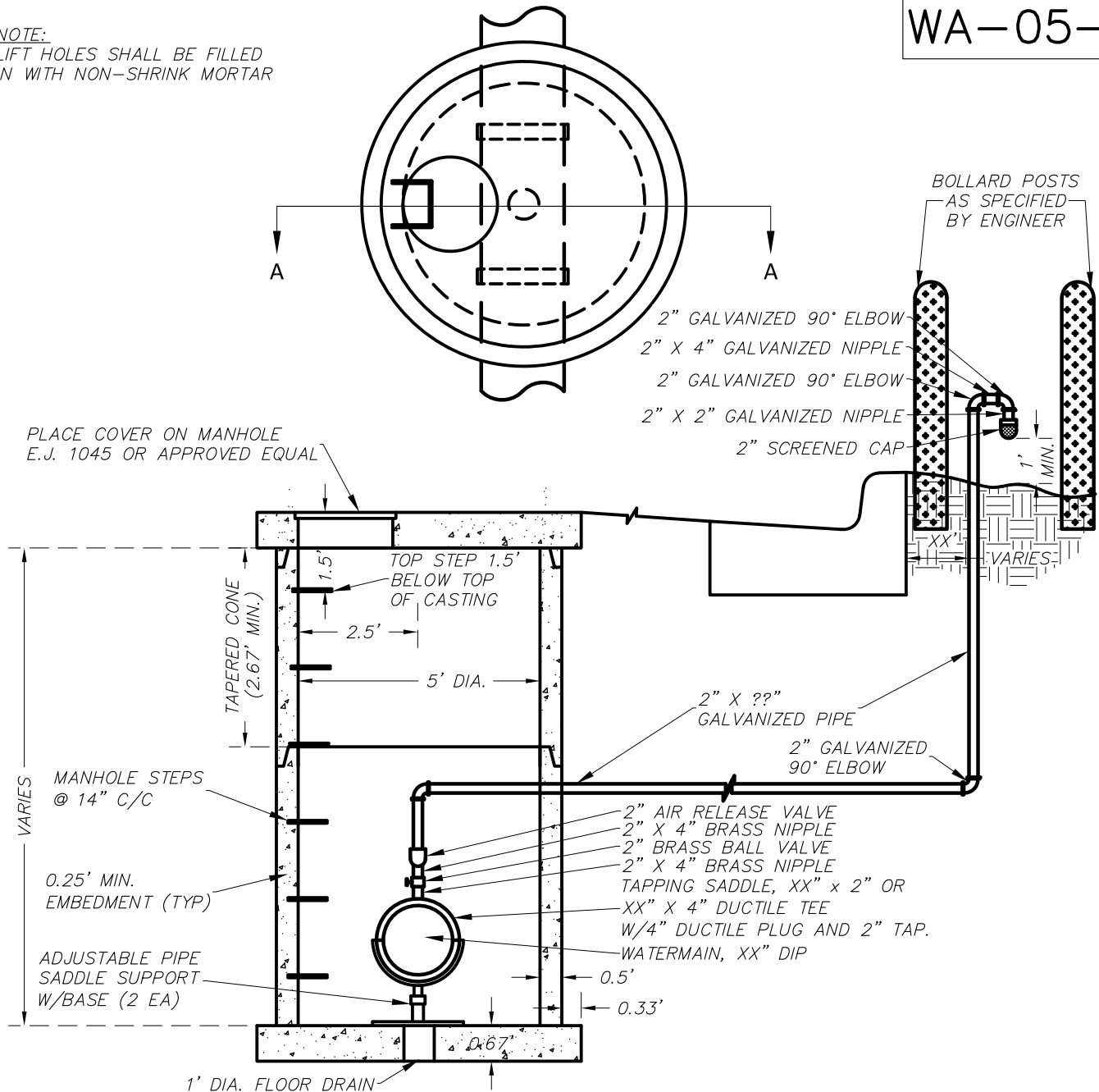
SCHEDULE OF FITTINGS

ITEM DESCRIPTION	QUANTITY
TAPPING SADDLE, XX X 2"	1
BRASS BALL VALVE, 2"	1
BRASS NIPPLE, 2" X 4"	2

NOTE:

LIFT HOLES SHALL BE FILLED
IN WITH NON-SHRINK MORTAR

WA-05-C



TYPICAL 2" AIR RELEASE MANHOLE

PRECAST REINFORCED CONCRETE SHOWN (OTHER OPTIONS INCLUDE
CONCRETE BLOCK, BRICK OR CAST IN PLACE WALL SECTIONS)

SCHEDULE OF FITTINGS

ITEM DESCRIPTION	QUANTITY
AIR RELEASE VALVE, 2"	1
GALVANIZED PIPE, 2" X 60"	1
GALVANIZED NIPPLE, 2" X 4"	1
GALVANIZED NIPPLE, 2" X 2"	1
GALVANIZED 90° ELBOW, 2"	2
PIPE SUPPORT BASE	2

ITEM DESCRIPTION	QUANTITY
TAPPING SADDLE, XX X 2"	1
BRASS BALL VALVE, 2"	1
BRASS NIPPLE, 2" X 4"	2



CITY OF KALAMAZOO
Department Of Public Services

AIR RELEASE MANHOLE IN ROADWAY

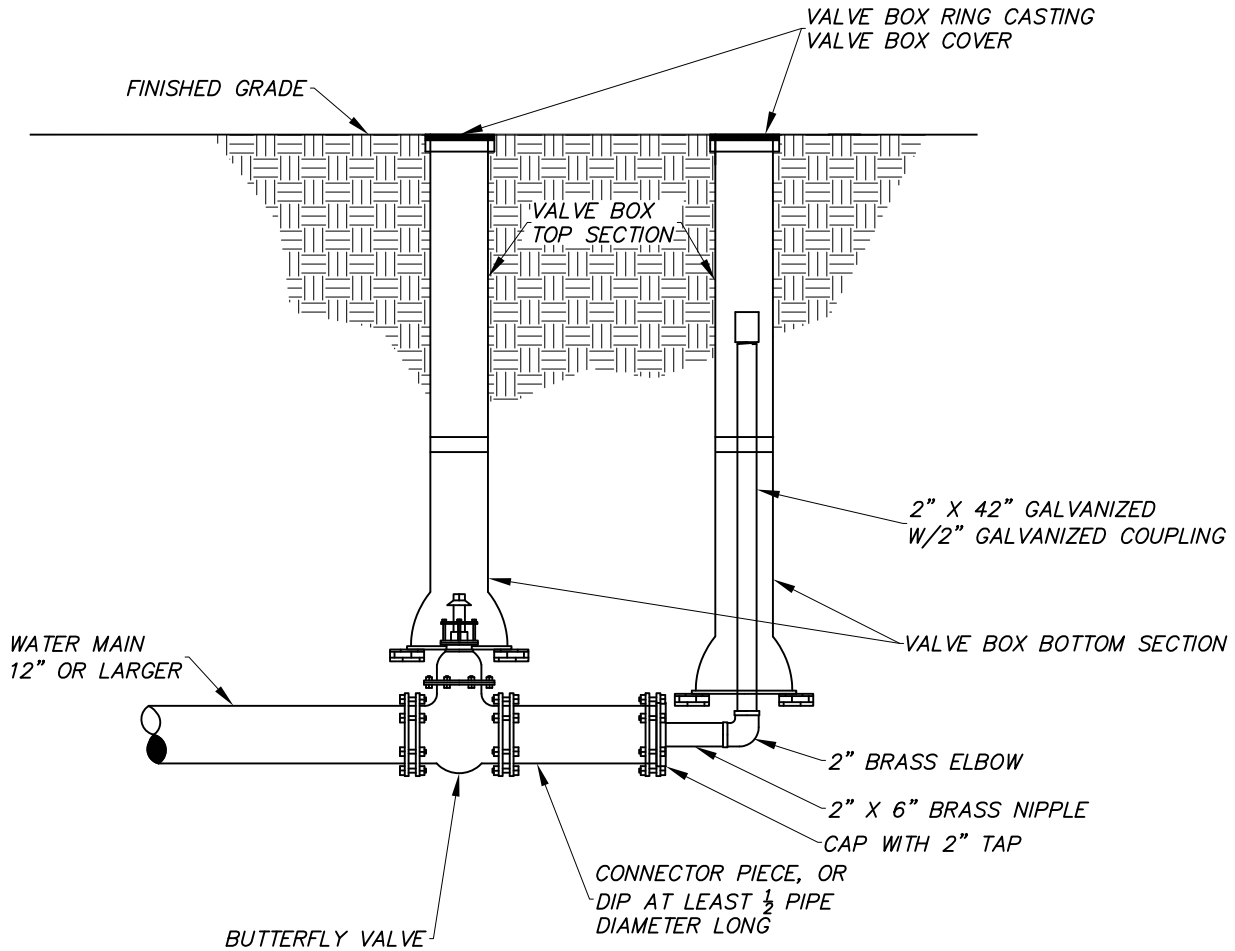
RECOMMENDED BY _____

APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE



NOT TO SCALE



CITY OF KALAMAZOO
Department Of Public Services

**2" BLOW OFF
CONNECTION
12" OR LARGER MAIN**

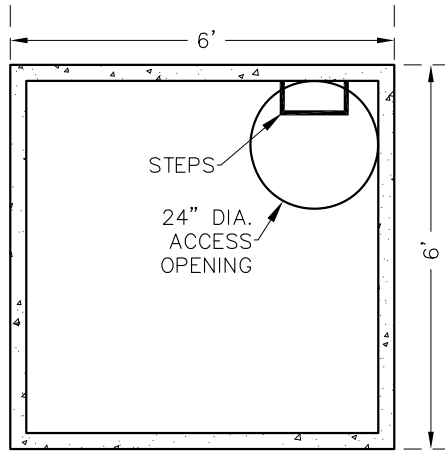
RECOMMENDED BY _____

APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE



TOP VIEW

NOTES:

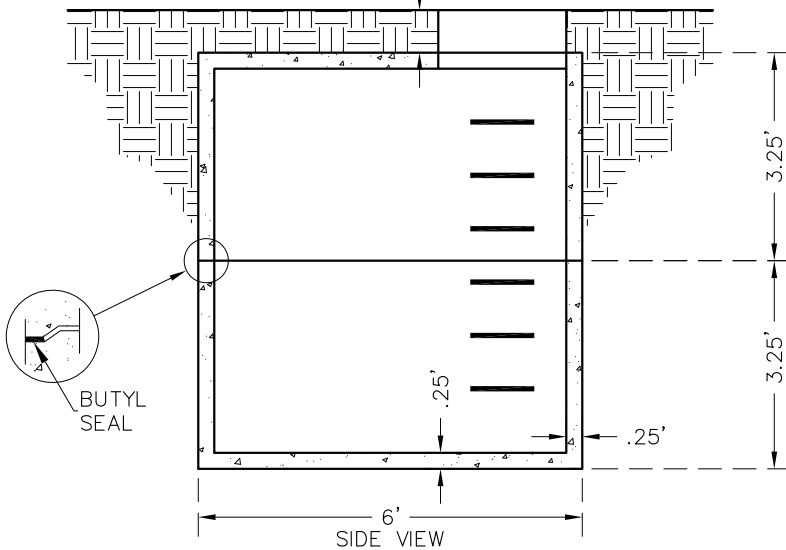
1. METER VAULT DESIGN TO BE SUBMITTED AND APPROVED FOR EACH INDIVIDUAL INSTALLATION. DESIGN SHALL CONFORM TO KALAMAZOO WATER ENGINEERING STANDARDS LATEST REVISION.

2. THE DISTANCE BETWEEN RUNGS, CLEATS AND STEPS SHALL NOT EXCEED 12 INCHES AND SHALL BE UNIFORM THROUGHOUT THE LENGTH OF THE LADDER.

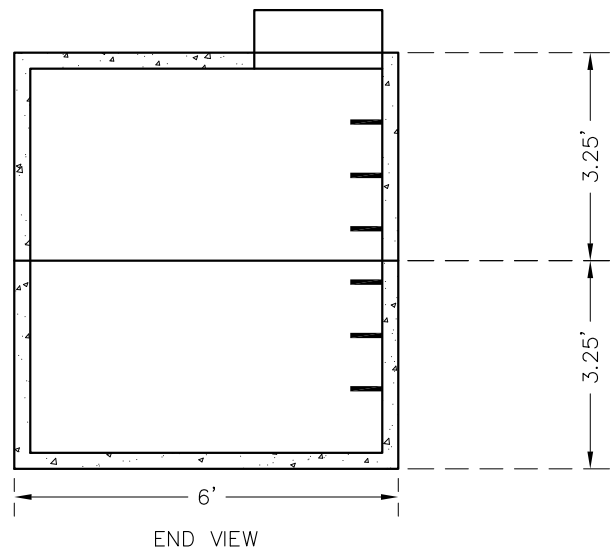
3. PLACEMENT OF CURB BOX CAN VARY FROM A MAXIMUM OF 5 FEET OUTSIDE THE PROPERTY LINE TO A MAXIMUM OF 5 FEET INSIDE THE PROPERTY LINE. PLACEMENT OF THE CURB BOX OUTSIDE THE PROPERTY LINE IS PREFERRED.

4. ACCESS COVER - FORD MC-24-MB-T WITH AN INNER LID, VESTAL 32-055, 32-104, AND 32-046 OR APPROVED EQUAL.

TOP OF PIT TO FINAL GRADE
SHALL NOT EXCEED 8"



SIDE VIEW



END VIEW



CITY OF KALAMAZOO
Department Of Public Services

STANDARD METER PIT

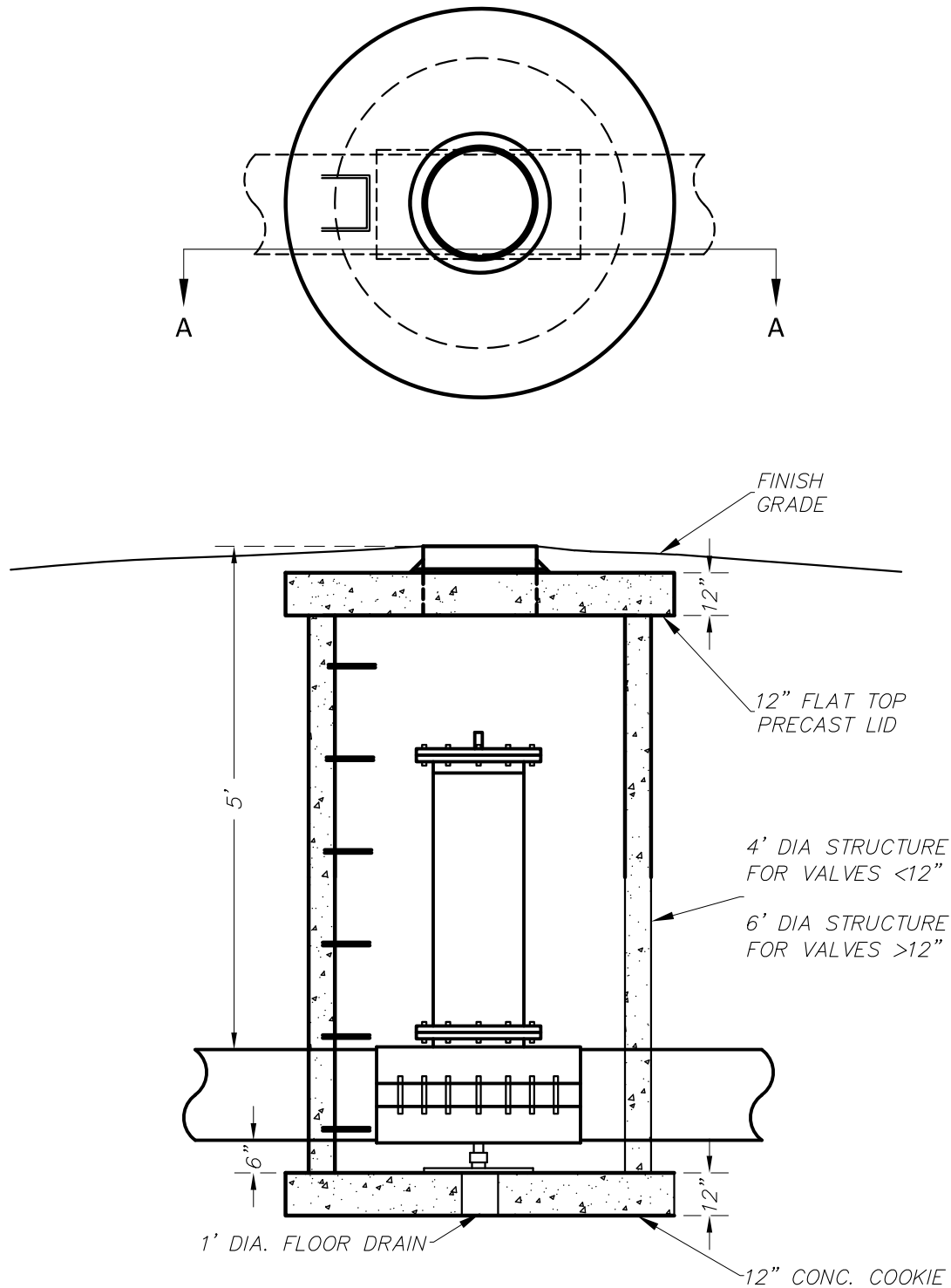
RECOMMENDED BY _____

APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE



TYPICAL INSERTA – VALVE
PRECAST REINFORCED CONCRETE SHOWN



CITY OF KALAMAZOO
 Department Of Public Services

**INSERTA-VALVE
 STRUCTURE**

RECOMMENDED BY _____

APPROVED BY _____

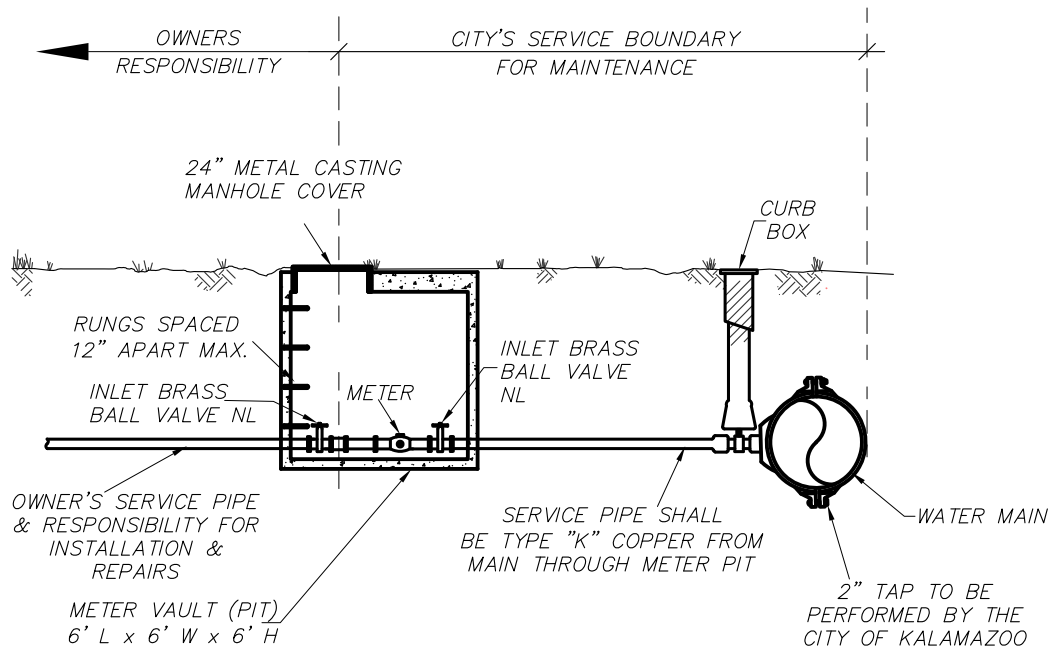
APPROVED BY _____

ACCEPTED BY _____

DATE

NOTES:

1. METER VAULT (PIT) DESIGN MUST BE SUBMITTED AND APPROVED FOR EACH INDIVIDUAL INSTALLATION. DESIGN SHALL CONFORM TO THE CITY OF KALAMAZOO STANDARD SPECIFICATIONS FOR WATER MAIN AND SERVICE INSTALLATION LATEST REVISION.
2. THE DISTANCE BETWEEN RUNGS, CLEATS & STEPS SHALL NOT EXCEED 12 INCHES AND SHALL BE UNIFORM THROUGHOUT THE LENGTH OF THE LADDER.
3. CURB BOX WILL BE INSTALLED AT THE WATER MAIN.
4. COVER FOR METER PIT & CURB BOX SHALL BE INSTALLED & MAINTAINED LEVEL WITH THE ADJACENT GROUND.



CITY OF KALAMAZOO
Department Of Public Services

2" SERVICE LINE METER VAULT

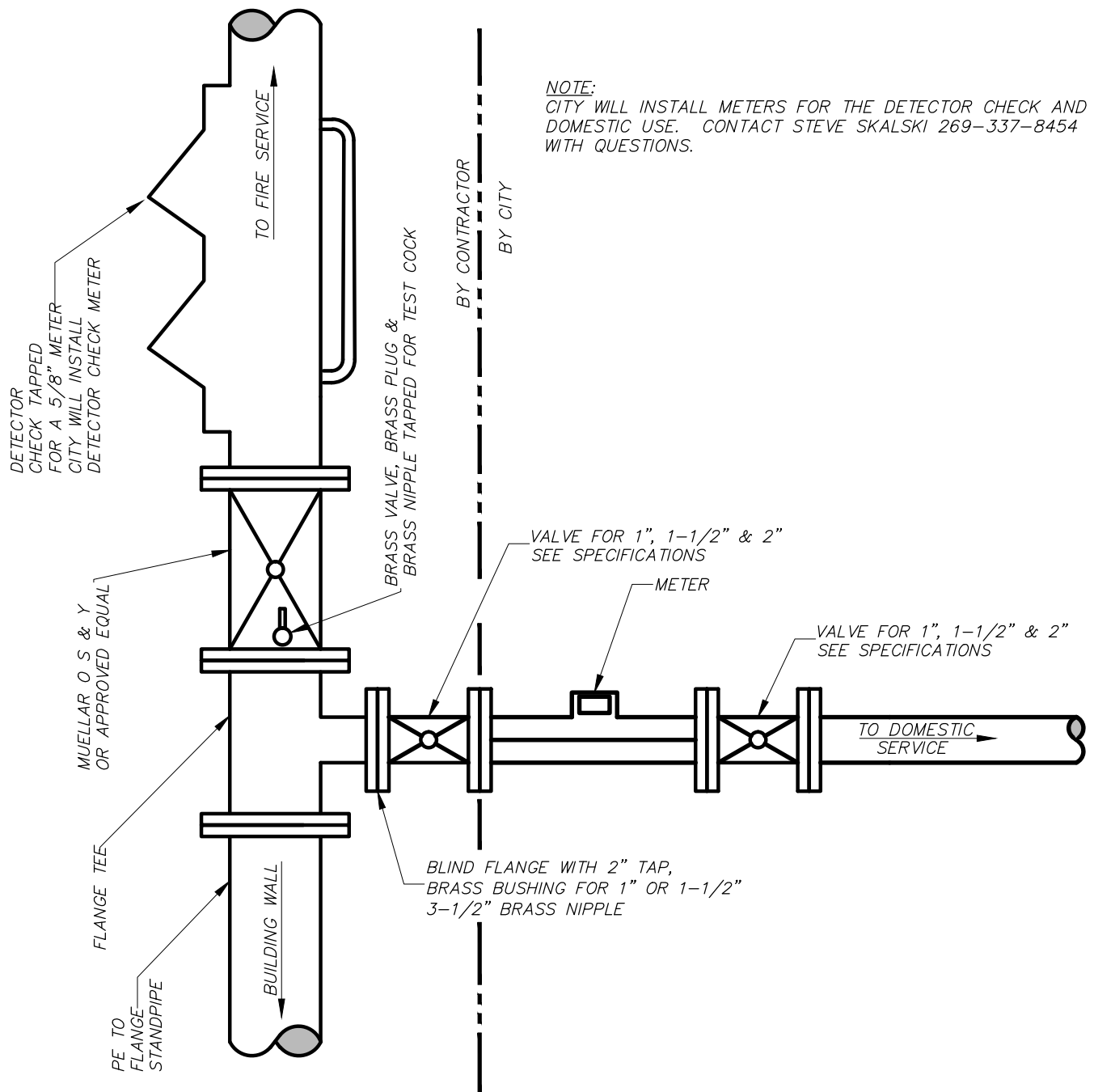
RECOMMENDED BY _____

APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE



NOTE:
CITY WILL INSTALL METERS FOR THE DETECTOR CHECK AND DOMESTIC USE. CONTACT STEVE SKALSKI 269-337-8454 WITH QUESTIONS.



CITY OF KALAMAZOO
Department Of Public Services
**TYPICAL FIRE SERVICE
DETAIL**
1" 1-1/2" 2"

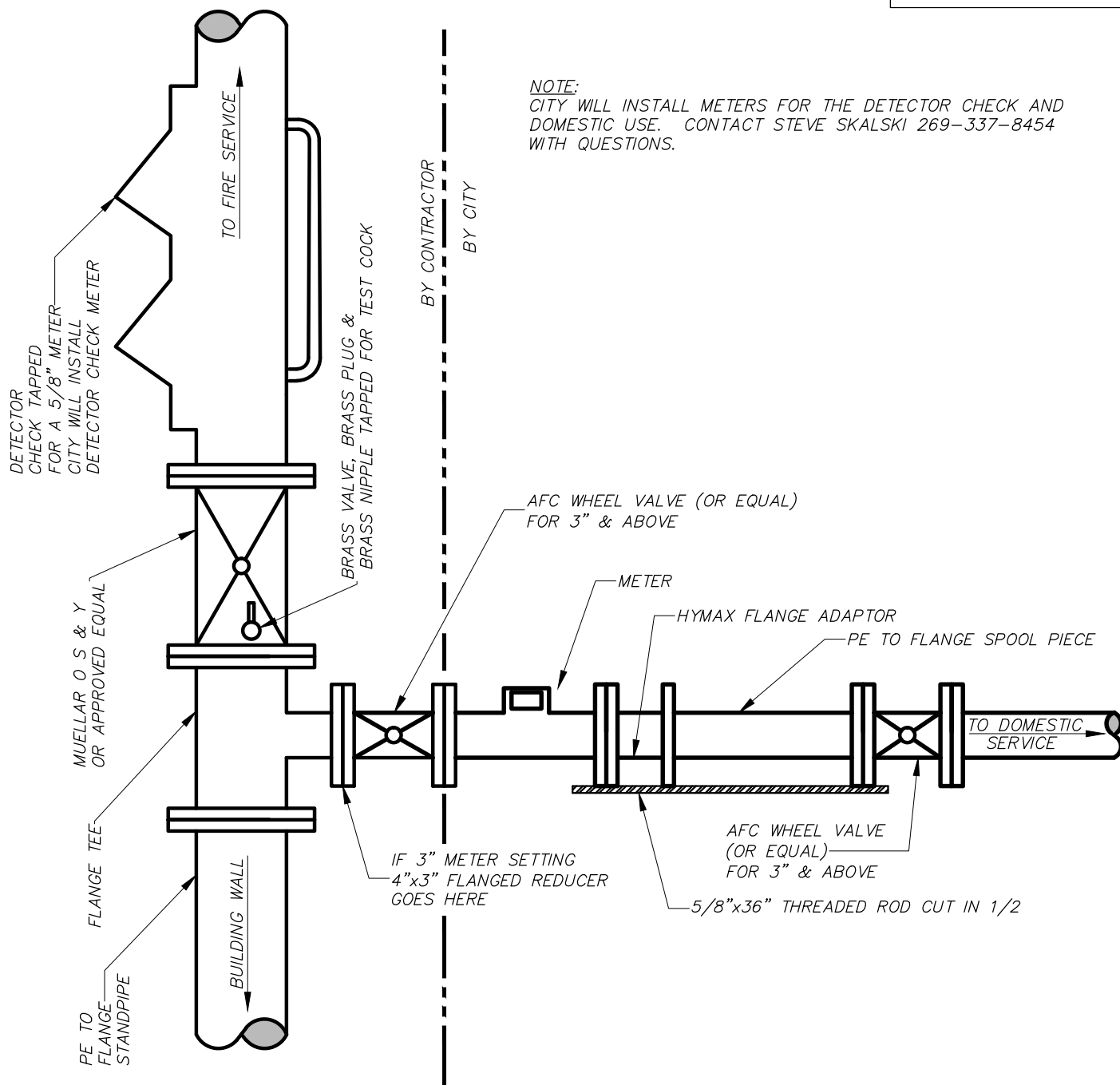
RECOMMENDED BY _____

APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE



CITY OF KALAMAZOO
Department Of Public Services
**TYPICAL FIRE SERVICE
DETAIL**
3" 4" 6"

RECOMMENDED BY _____

APPROVED BY _____

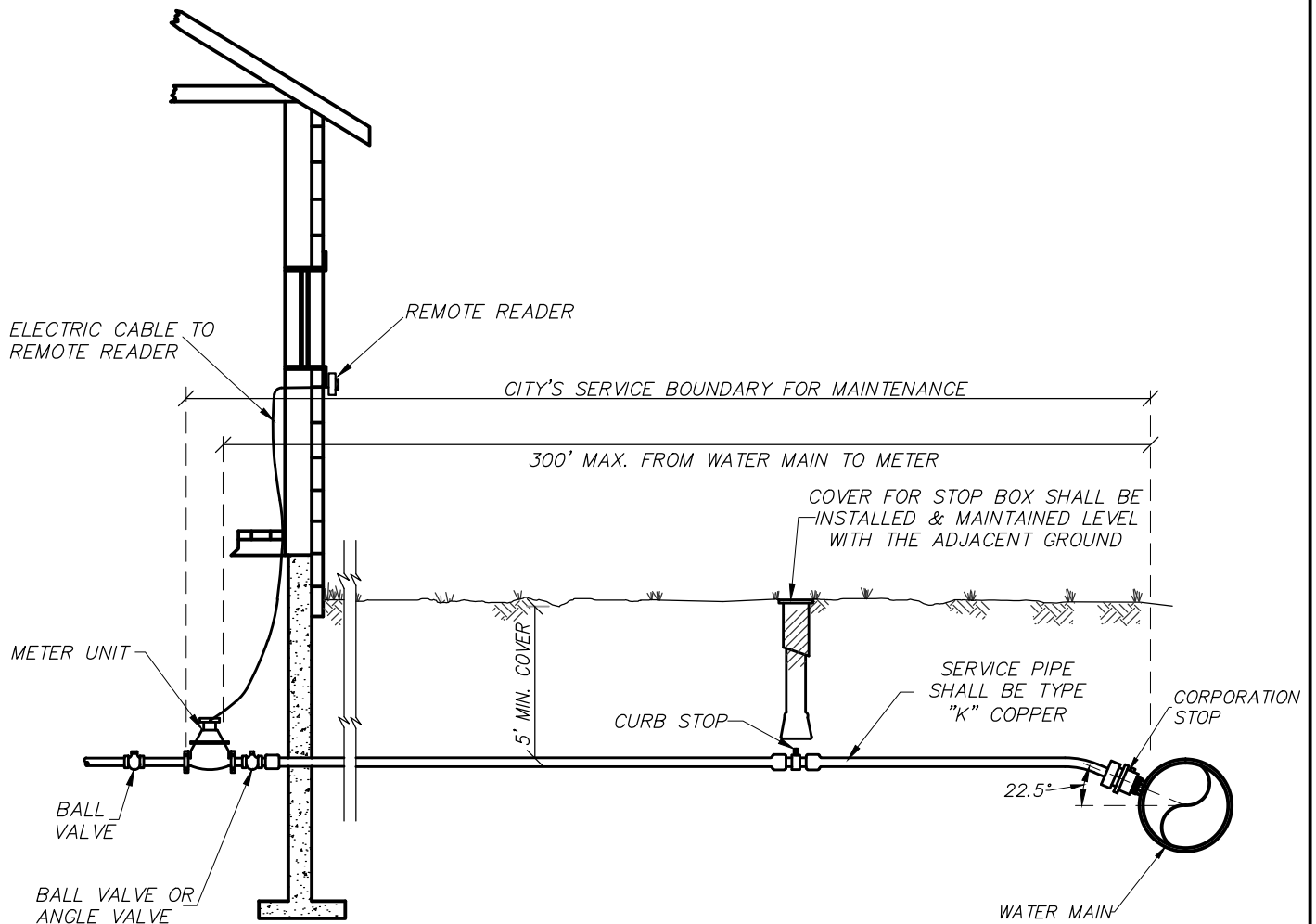
APPROVED BY _____

ACCEPTED BY _____

DATE

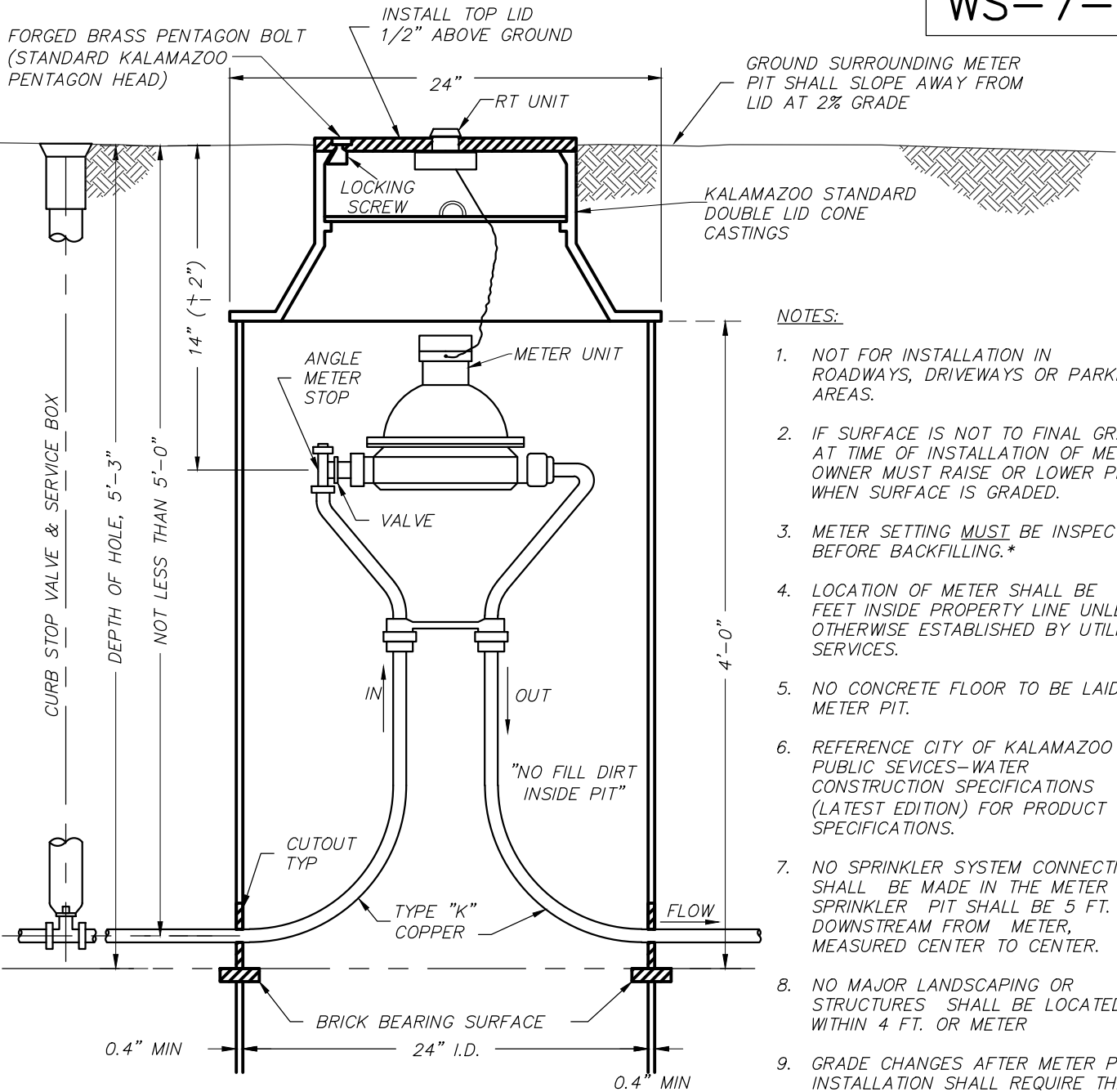
NOTES:

1. PLACEMENT OF STOP BOX CAN VARY FROM A MAXIMUM OF 5 FEET OUTSIDE THE PROPERTY LINE TO A MAXIMUM OF 5 FEET INSIDE THE PROPERTY LINE. PLACEMENT OF THE STOP BOX OUTSIDE THE PROPERTY LINE IS PREFERRED.
2. CITY WATER WILL REPAIR LEAKS ON SERVICE LINES WHEN NOTIFIED, FROM THE CORPORATION STOP TO METER.



J:\COK CAD STANDARDS\STANDARD DETAILS\WATER\UPDATED DRAWINGS\WS-7-A OUTSIDE METER 1 INCH.dwg, 4/1/2014 8:18:07 AM

WS-7-A



NOTES:

1. NOT FOR INSTALLATION IN ROADWAYS, DRIVEWAYS OR PARKING AREAS.
2. IF SURFACE IS NOT TO FINAL GRADE AT TIME OF INSTALLATION OF METER, OWNER MUST RAISE OR LOWER PIT WHEN SURFACE IS GRADED.
3. METER SETTING MUST BE INSPECTED BEFORE BACKFILLING.*
4. LOCATION OF METER SHALL BE 5 FEET INSIDE PROPERTY LINE UNLESS OTHERWISE ESTABLISHED BY UTILITY SERVICES.
5. NO CONCRETE FLOOR TO BE LAID IN METER PIT.
6. REFERENCE CITY OF KALAMAZOO PUBLIC SERVICES-WATER CONSTRUCTION SPECIFICATIONS (LATEST EDITION) FOR PRODUCT SPECIFICATIONS.
7. NO SPRINKLER SYSTEM CONNECTIONS SHALL BE MADE IN THE METER PIT. SPRINKLER PIT SHALL BE 5 FT. DOWNSTREAM FROM METER, MEASURED CENTER TO CENTER.
8. NO MAJOR LANDSCAPING OR STRUCTURES SHALL BE LOCATED WITHIN 4 FT. OF METER
9. GRADE CHANGES AFTER METER PIT INSTALLATION SHALL REQUIRE THAT THE OWNER ADJUST METER PIT COVER TO 1/2" ABOVE FINAL GRADE.
10. IF PRESSURE REDUCING VALVE IS REQUIRED BY PLUMBING CODE, IT SHALL BE INSTALLED INSIDE THE BUILDING, IMMEDIATELY FOLLOWING THE MAIN SHUT OFF VALVE.
11. COPPER PIPE SHALL SHOW NO VISIBLE CRIMPING.

* FOR INSPECTION CALL (269) 998-6433 INSPECTOR
* FOR INSPECTION CALL (269) 337-8769 ENGINEER



CITY OF KALAMAZOO
Department Of Public Services

OUTSIDE SETTING FOR
1" METER

RECOMMENDED BY _____

APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE

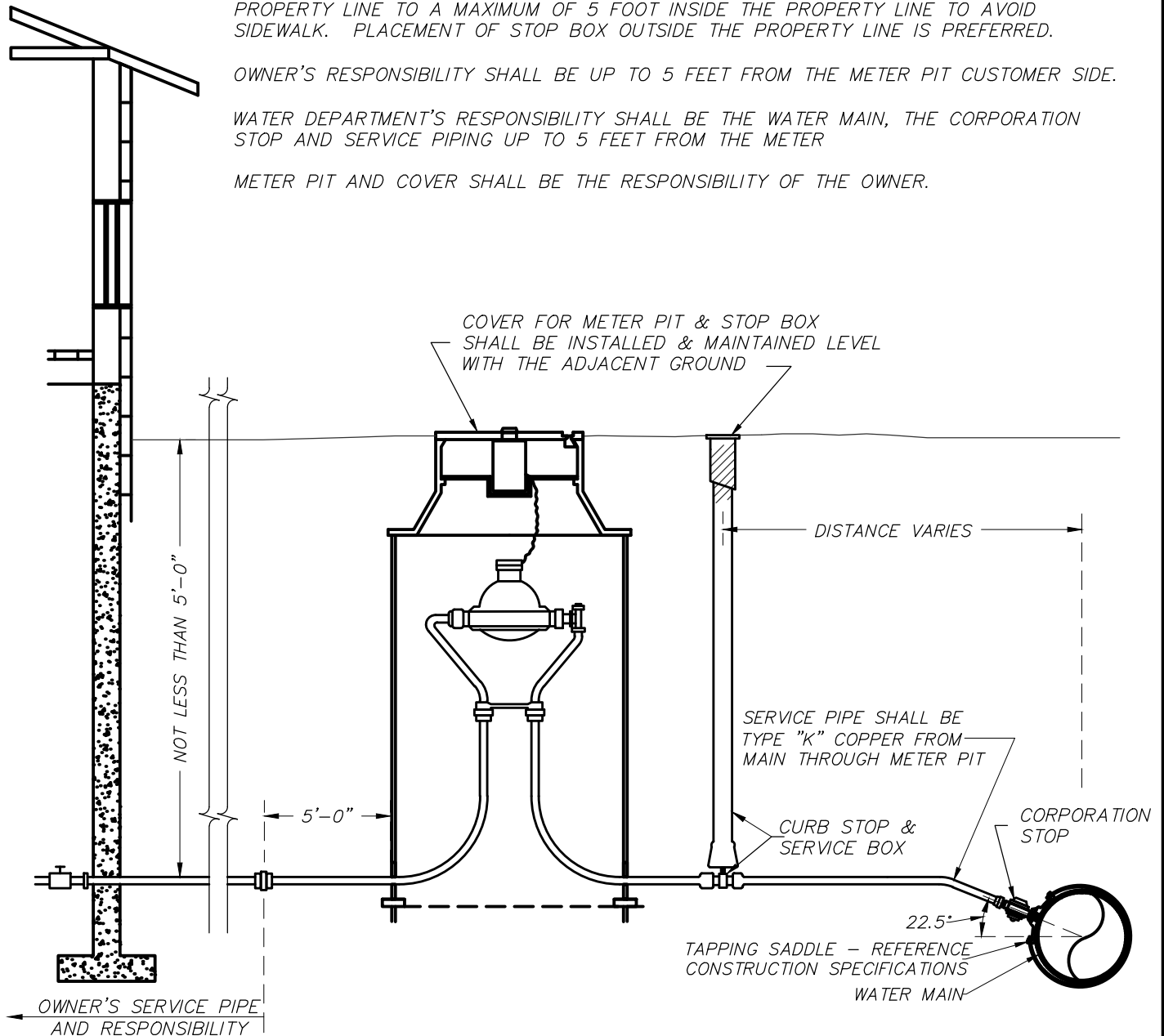
NOTES:

PLACEMENT OF STOP BOX CAN VARY FROM A MAXIMUM OF 5 FOOT OUTSIDE THE PROPERTY LINE TO A MAXIMUM OF 5 FOOT INSIDE THE PROPERTY LINE TO AVOID SIDEWALK. PLACEMENT OF STOP BOX OUTSIDE THE PROPERTY LINE IS PREFERRED.

OWNER'S RESPONSIBILITY SHALL BE UP TO 5 FEET FROM THE METER PIT CUSTOMER SIDE.

WATER DEPARTMENT'S RESPONSIBILITY SHALL BE THE WATER MAIN, THE CORPORATION STOP AND SERVICE PIPING UP TO 5 FEET FROM THE METER

METER PIT AND COVER SHALL BE THE RESPONSIBILITY OF THE OWNER.



CITY OF KALAMAZOO
Department Of Public Services

**1-1/4" SERVICE LINE,
STOP BOX AND OUTSIDE
METER INSTALLATION**

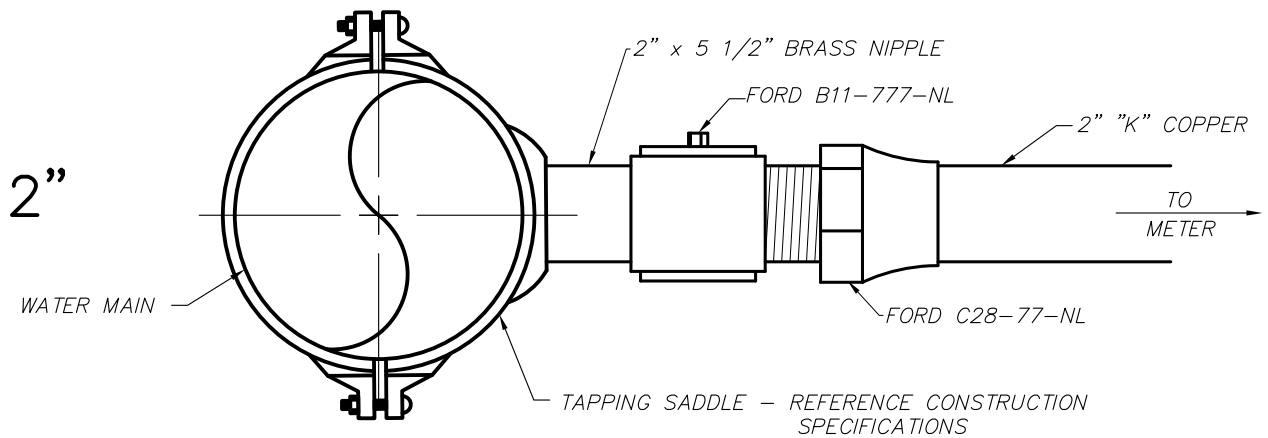
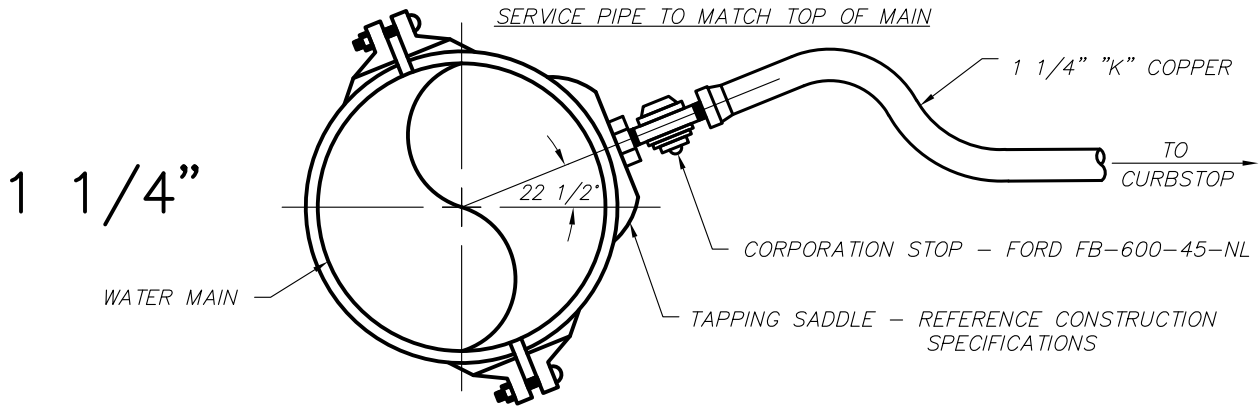
RECOMMENDED BY _____

APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE



CITY OF KALAMAZOO
Department Of Public Services

WATER SERVICE TAPPING SLEEVE

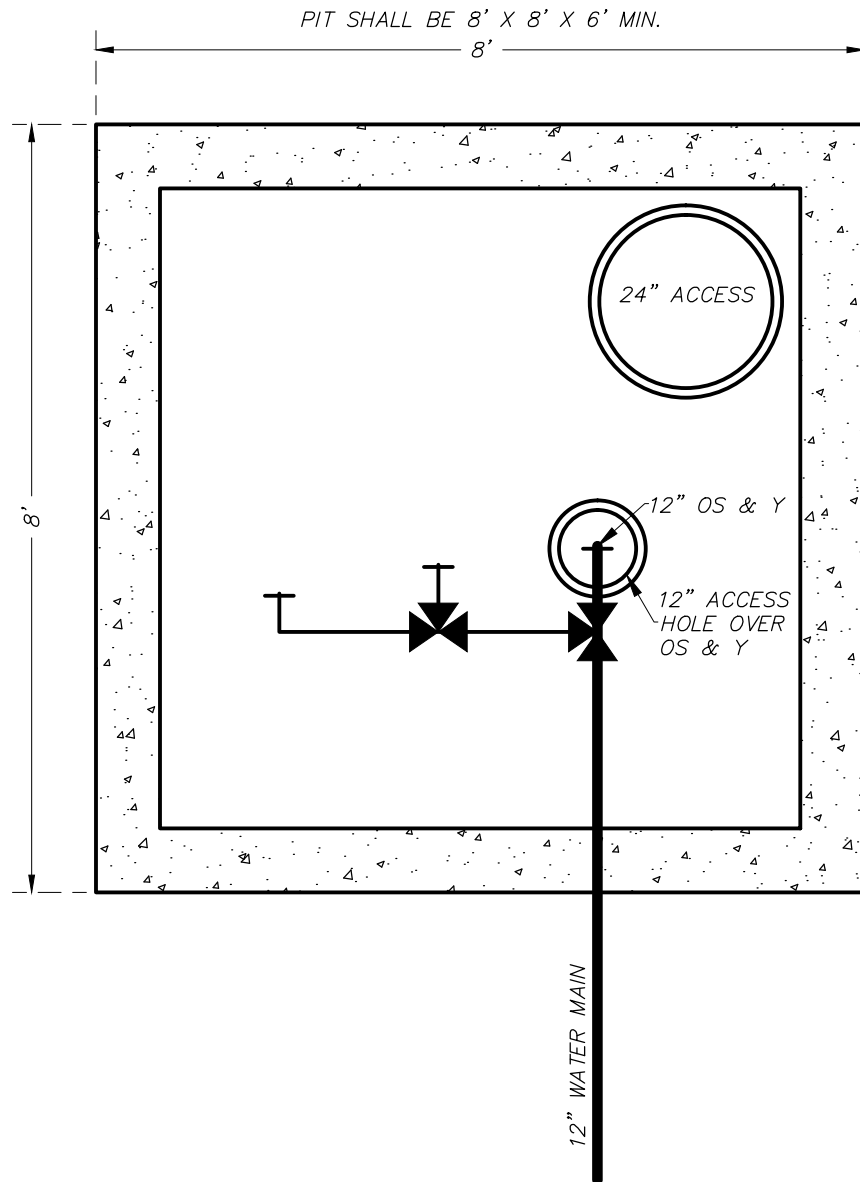
RECOMMENDED BY _____

APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE



CITY OF KALAMAZOO
Department Of Public Services

12 INCH METER PIT

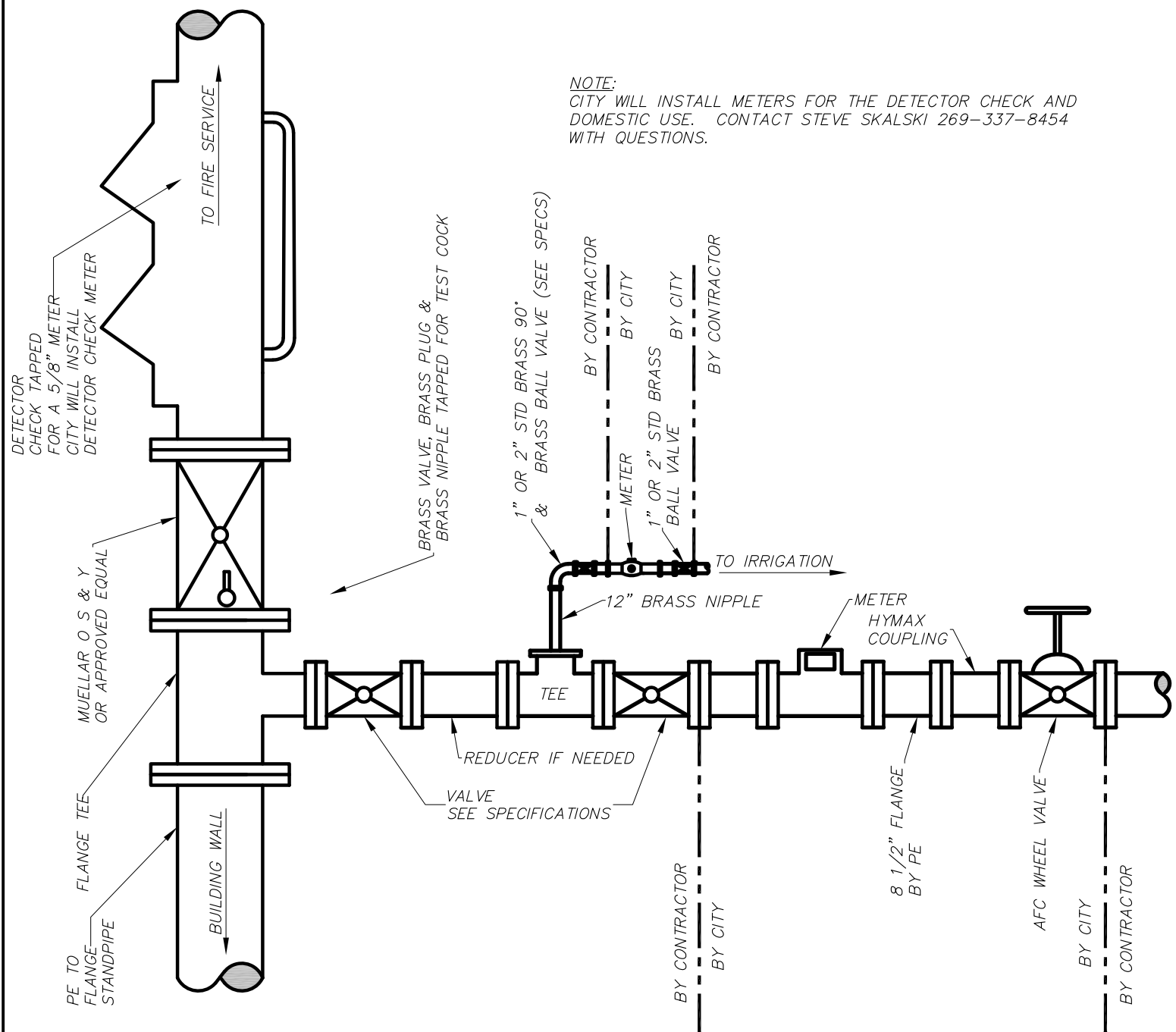
RECOMMENDED BY _____

APPROVED BY _____

APPROVED BY _____

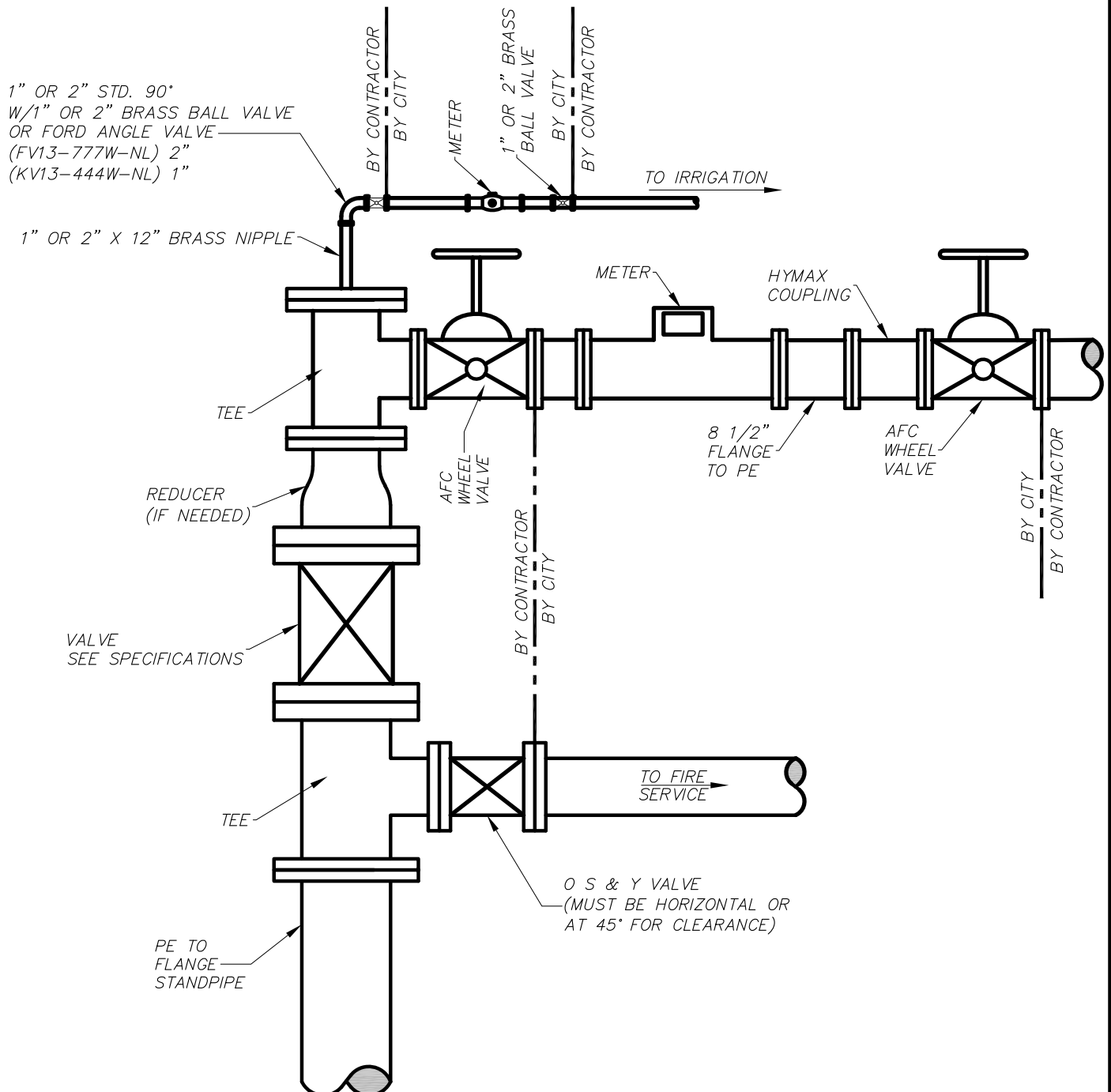
ACCEPTED BY _____

DATE



CITY WILL INSTALL METERS FOR THE DETECTOR CHECK AND DOMESTIC USE. CONTACT STEVE SKALSKI 269-337-8454 WITH QUESTIONS.

NOTE:
CITY WILL INSTALL METERS FOR THE DETECTOR CHECK AND DOMESTIC USE. CONTACT STEVE SKALSKI 269-337-8454 WITH QUESTIONS.



CITY OF KALAMAZOO
Department Of Public Services
TYPICAL FIRE SERVICE DETAIL
HORIZONTAL SETTING
W/3", 4", OR 6" DOMESTIC
& 1" OR 2" IRRIGATION

RECOMMENDED BY _____

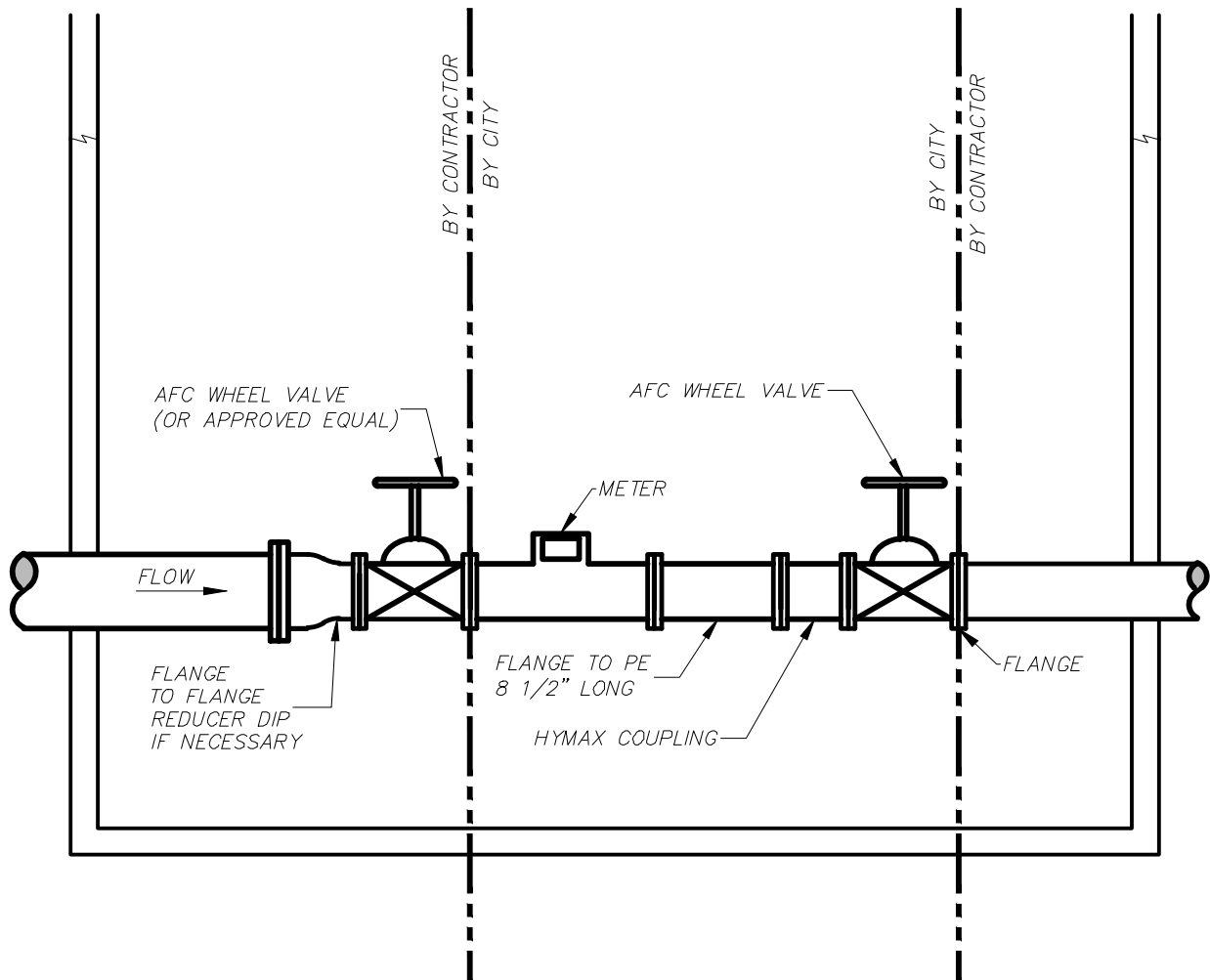
APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE

NOTE:
CITY WILL INSTALL METERS FOR THE DETECTOR CHECK AND DOMESTIC USE. CONTACT STEVE SKALSKI 269-337-8454 WITH QUESTIONS.



CITY OF KALAMAZOO
Department Of Public Services
**PIT METER SETTING
DETAIL FOR
3", 4", 6" & 8"**

RECOMMENDED BY _____

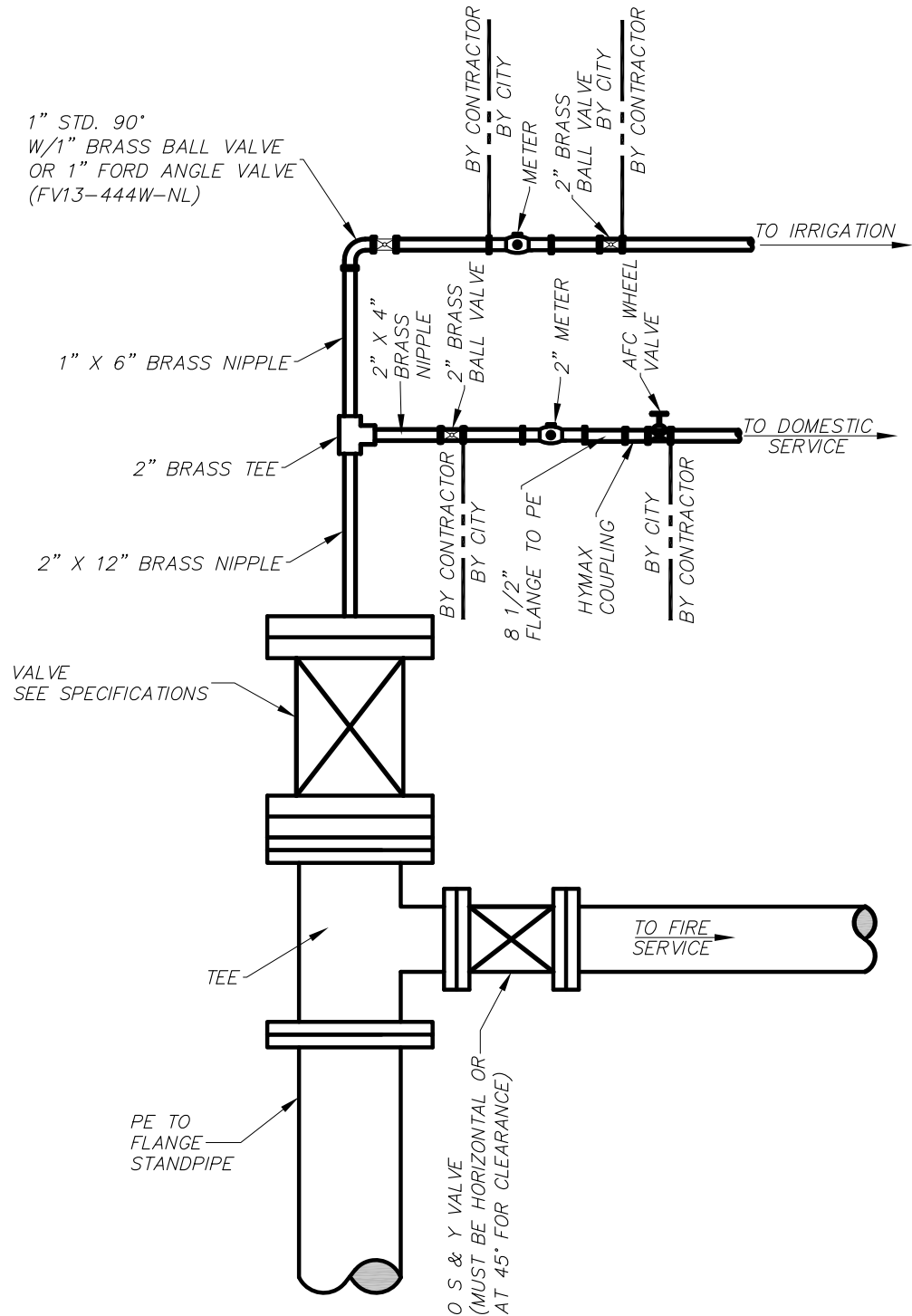
APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE

NOTE:
CITY WILL INSTALL METERS FOR THE DETECTOR CHECK AND DOMESTIC USE. CONTACT STEVE SKALSKI 269-337-8454 WITH QUESTIONS.



CITY OF KALAMAZOO
Department Of Public Services

**TYPICAL FIRE SERVICE DETAIL
HORIZONTAL SETTING
2" DOMESTIC
1" IRRIGATION**

RECOMMENDED BY _____

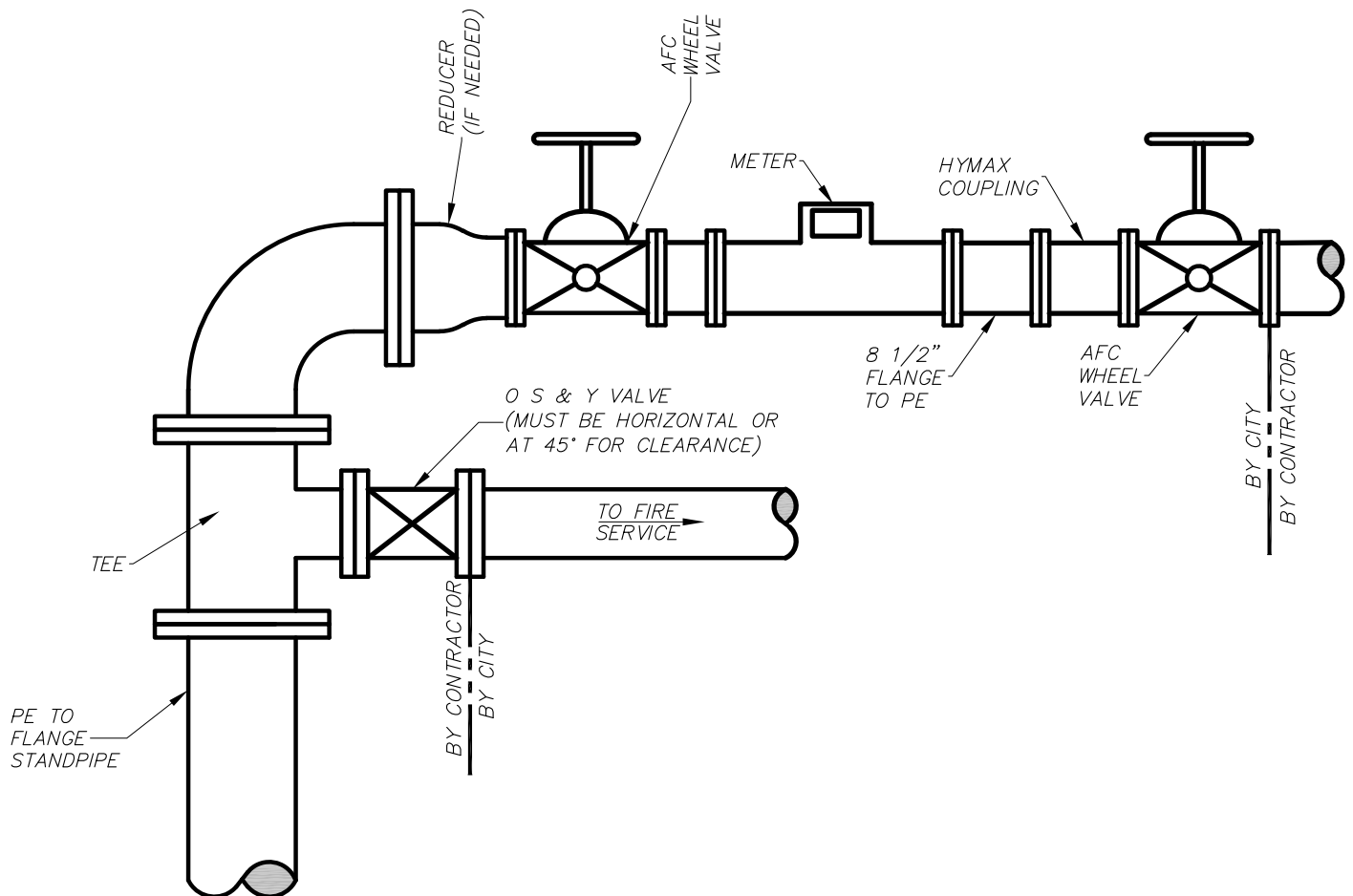
APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE

NOTE:
CITY WILL INSTALL METERS FOR THE DETECTOR CHECK AND
DOMESTIC USE. CONTACT STEVE SKALSKI 269-337-8454
WITH QUESTIONS.



CITY OF KALAMAZOO
Department Of Public Services

**TYPICAL FIRE SERVICE DETAIL
HORIZONTAL SETTING
W/3", 4", OR 6" DOMESTIC**

RECOMMENDED BY _____

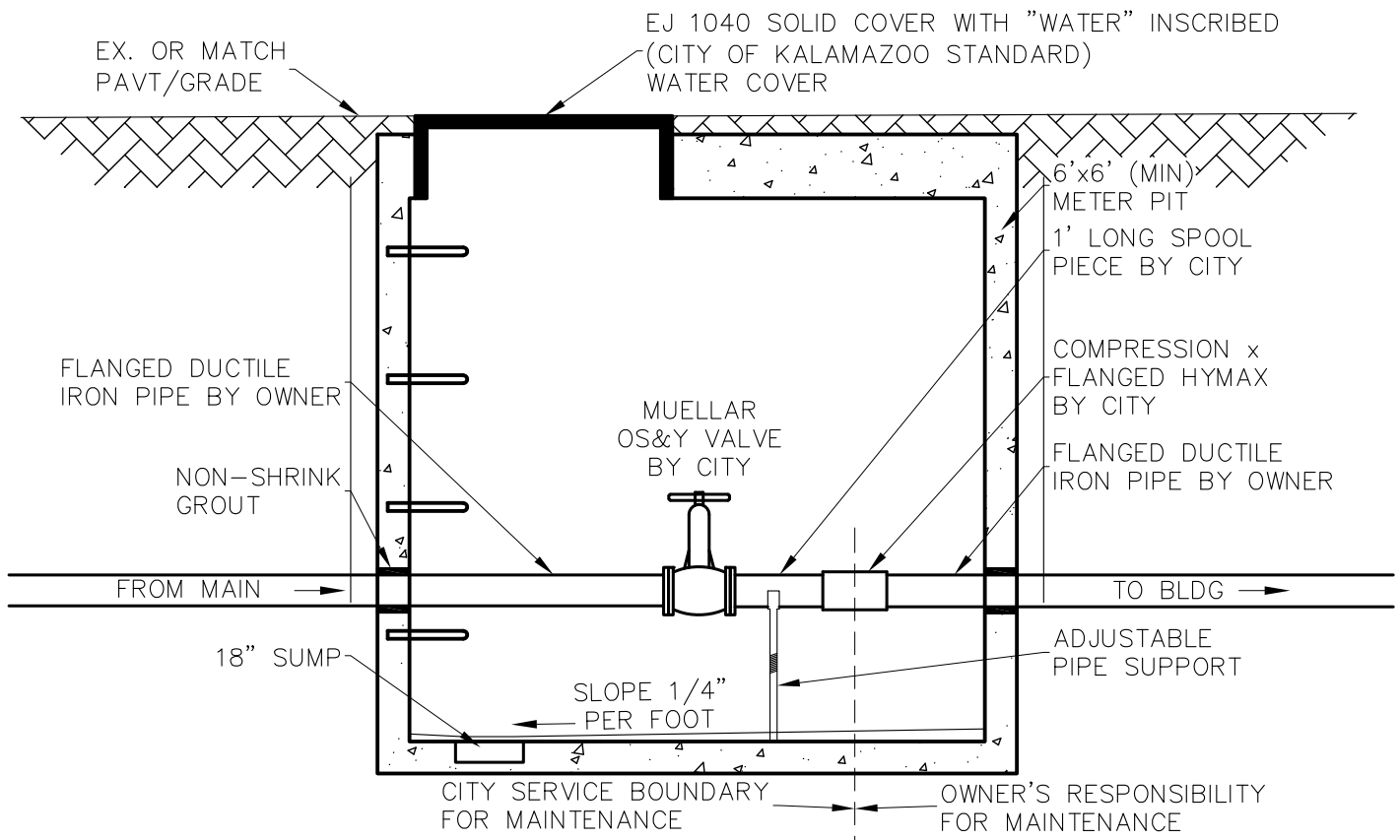
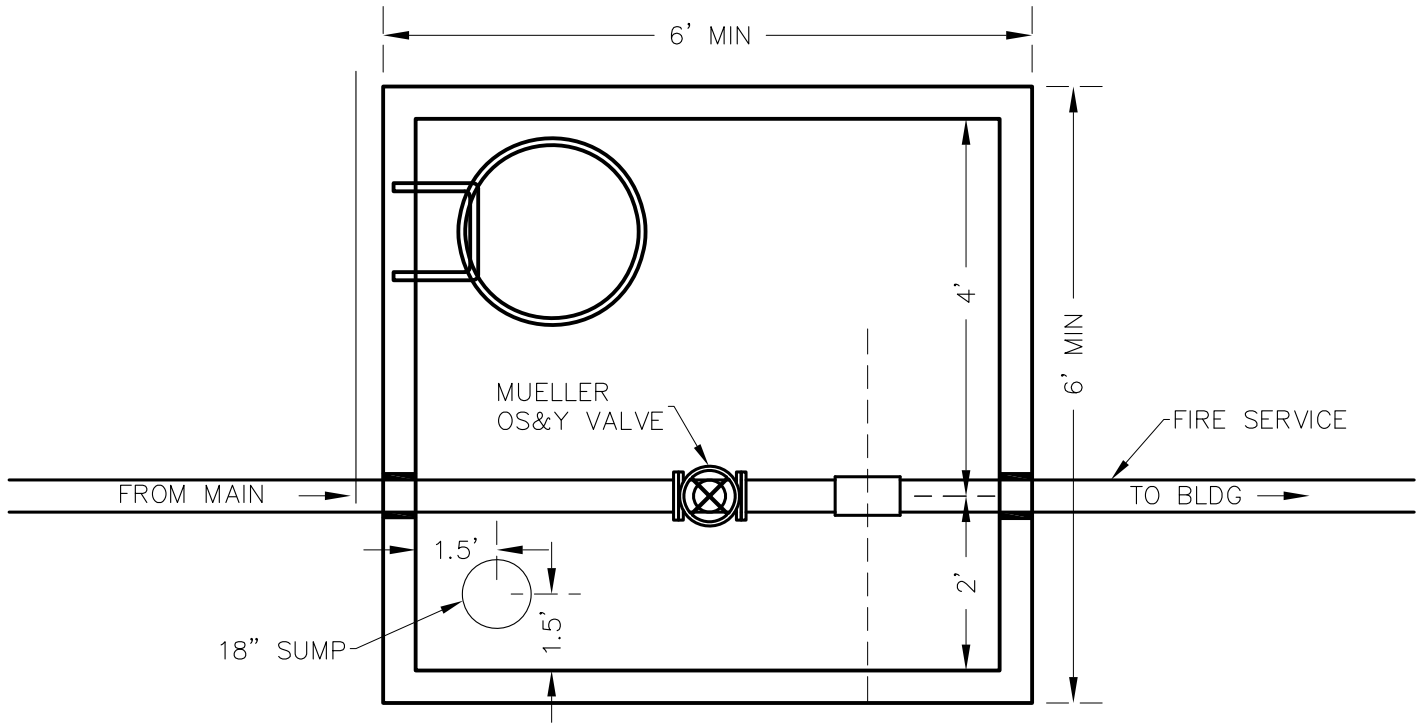
APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE

WS-16-A



CITY OF KALAMAZOO
Department Of Public Services

FIRE SERVICE IN PIT DETAIL

RECOMMENDED BY _____

APPROVED BY _____

APPROVED BY _____

ACCEPTED BY _____

DATE

APPENDIX A - Filter Media Testing

Trace Analytical Laboratories, Inc.
2241 Black Creek Road
Muskegon, MI 49444-2673



231-773-5998 Phone
888-979-4469 Fax
www.trace-labs.com

March 25, 2024

Ms. Malissa Miller
Kalamazoo, City of
1415 N. Harrison St.
Kalamazoo, MI 49007

RE: Trace Project 24B1325
Client Project TP001 Filter Media TCLP TENORM

Dear Ms. Miller:

Enclosed are your analytical results. The results of this report relate only to the samples listed in the body of this report.

All reports were examined through Trace's validation process to ensure that requirements for quality and completeness were satisfied. All reported analytical results were obtained in accordance with the methods referenced on the reports. Every practical effort was made to meet the reporting limit specifications for this work, however, some results may have raised reporting limits to correct for percent solids.

For clients that require NELAP Accreditation, Trace certifies that these test results meet all requirements of the NELAP Standard, except for those analytes with a "N" notation. These analytes have not been evaluated by NELAP at Trace's discretion and will not be reported unless requested by client.

If you have questions concerning this report, please contact me at 231.773.5998 or by email at tbrewer@trace-labs.com.

Sincerely,

A handwritten signature in black ink, appearing to read "Timothy W. Brewer".

Tim Brewer
Project Manager
Enclosures



TNI EL V1:2016

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Trace Analytical Laboratories, Inc.
2241 Black Creek Road
Muskegon, MI 49444-2673



231-773-5998 Phone
888-979-4469 Fax
www.trace-labs.com

SAMPLE SUMMARY

Trace Project ID: 24B1325
Client Project ID: TP001 Filter Media TCLP TENORM

Trace ID	Sample ID	Matrix	Collected By	Date Collected	Date Received
24B1325-01	24-02-19-TP001 TCLP TENORM	Solid	Client	02/19/24 13:00	02/21/24 13:55

CERTIFICATE OF ANALYSIS

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Muskegon, MI 49444-2673



231-773-5998 Phone
888-979-4469 Fax
www.trace-labs.com

ANALYTICAL RESULTS

Trace Project ID: 24B1325
Client Project ID: TP001 Filter Media TCLP TENORM

Trace ID: 24B1325-01 Matrix: Solid Date Collected: 02/19/24 13:00
Sample ID: 24-02-19-TP001 TCLP TENORM Date Received: 02/21/24 13:55

PARAMETERS	RESULTS	UNITS	RDL	DILUTION	PREPARED	BY	ANALYZED	BY	NOTES	MCL
------------	---------	-------	-----	----------	----------	----	----------	----	-------	-----

METALS, TCLP

Analysis Method: EPA 6020B

Batch: T147475

Arsenic	<0.30	mg/L	0.30	1	02/27/24	nt	02/27/24	acs		5.0
Barium	<1.0	mg/L	1.0	1	02/27/24	nt	02/27/24	acs		100
Cadmium	<0.10	mg/L	0.10	1	02/27/24	nt	02/27/24	acs		1.0
Chromium	<0.50	mg/L	0.50	1	02/27/24	nt	02/27/24	acs		5.0
Lead	<0.50	mg/L	0.50	1	02/27/24	nt	02/27/24	acs		5.0
Selenium	<0.60	mg/L	0.60	1	02/27/24	nt	02/27/24	acs		1.0
Silver	<0.10	mg/L	0.10	1	02/27/24	nt	02/27/24	acs		5.0

Analysis Method: EPA 7470A

Batch: T147714

Mercury	<0.010	mg/L	0.010	1	02/28/24	fs	02/29/24	acs		0.20
---------	--------	------	-------	---	----------	----	----------	-----	--	------

SEMI-VOLATILE ORGANIC COMPOUNDS, TCLP

DL03

Analysis Method: EPA 8270E

Batch: T147671

Pyridine	<5.0	mg/L	5.0	5	02/27/24	kbc	02/29/24	drm		5.0
2-Methylphenol (o-Cresol)	<0.62	mg/L	0.62	5	02/27/24	kbc	02/29/24	drm		200
3,4-Methylphenol (m,p Cresol)	<0.62	mg/L	0.62	5	02/27/24	kbc	02/29/24	drm		200
Hexachloroethane	<0.62	mg/L	0.62	5	02/27/24	kbc	02/29/24	drm		3.0
Nitrobenzene	<0.25	mg/L	0.25	5	02/27/24	kbc	02/29/24	drm		2.0
Hexachlorobutadiene	<0.62	mg/L	0.62	5	02/27/24	kbc	02/29/24	drm		0.50
2,4,6-Trichlorophenol	<0.25	mg/L	0.25	5	02/27/24	kbc	02/29/24	drm		2.0
2,4,5-Trichlorophenol	<0.62	mg/L	0.62	5	02/27/24	kbc	02/29/24	drm		400
2,4-Dinitrotoluene	<0.62	mg/L	0.62	5	02/27/24	kbc	02/29/24	drm		0.13
Hexachlorobenzene	<0.62	mg/L	0.62	5	02/27/24	kbc	02/29/24	drm		0.13
Pentachlorophenol	<1.2	mg/L	1.2	5	02/27/24	kbc	02/29/24	drm		100

Surrogates:

2-Fluorophenol	*	%	20-53	5	02/27/24	kbc	02/29/24	drm	S05	
Phenol-d5	*	%	11-40	5	02/27/24	kbc	02/29/24	drm	S05	
Nitrobenzene-d5		40 %	36-103	5	02/27/24	kbc	02/29/24	drm		
2-Fluorobiphenyl		39 %	36-119	5	02/27/24	kbc	02/29/24	drm	N	
2,4,6-Tribromophenol		38 %	30-105	5	02/27/24	kbc	02/29/24	drm	N	

CERTIFICATE OF ANALYSIS

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Trace Analytical Laboratories, Inc.
2241 Black Creek Road
Muskegon, MI 49444-2673



231-773-5998 Phone
888-979-4469 Fax
www.trace-labs.com

ANALYTICAL RESULTS

Trace Project ID: 24B1325
Client Project ID: TP001 Filter Media TCLP TENORM

Trace ID: 24B1325-01 Matrix: Solid Date Collected: 02/19/24 13:00
Sample ID: 24-02-19-TP001 TCLP TENORM Date Received: 02/21/24 13:55

PARAMETERS	RESULTS UNITS	RDL	DILUTION	PREPARED	BY	ANALYZED	BY	NOTES	MCL
SEMI-VOLATILE ORGANIC COMPOUNDS, TCLP								DL03	
Terphenyl-d14	56 %	37-109	5	02/27/24	kbc	02/29/24	drm		
VOLATILE ORGANIC COMPOUNDS, TCLP									
Analysis Method: EPA 8260D									
<i>Batch: T147660</i>									
Vinyl chloride	<0.080 mg/L	0.080	100	02/26/24	ats	02/26/24	ats		0.20
1,1-Dichloroethene	<0.10 mg/L	0.10	100	02/26/24	ats	02/26/24	ats		0.70
2-Butanone	<1.5 mg/L	1.5	100	02/26/24	ats	02/26/24	ats		200
Chloroform	<0.10 mg/L	0.10	100	02/26/24	ats	02/26/24	ats		6.0
Carbon tetrachloride	<0.10 mg/L	0.10	100	02/26/24	ats	02/26/24	ats		0.50
Benzene	<0.10 mg/L	0.10	100	02/26/24	ats	02/26/24	ats		0.50
1,2-Dichloroethane	<0.10 mg/L	0.10	100	02/26/24	ats	02/26/24	ats		0.50
Trichloroethene	<0.10 mg/L	0.10	100	02/26/24	ats	02/26/24	ats		0.50
Tetrachloroethene	<0.10 mg/L	0.10	100	02/26/24	ats	02/26/24	ats		0.70
Chlorobenzene	<0.10 mg/L	0.10	100	02/26/24	ats	02/26/24	ats		100
1,4-Dichlorobenzene	<0.10 mg/L	0.10	100	02/26/24	ats	02/26/24	ats		7.5
Surrogates:									
1,2-Dichloroethane-d4	129 %	68-133	100	02/26/24	ats	02/26/24	ats		
Toluene-d8	108 %	75-120	100	02/26/24	ats	02/26/24	ats		
4-Bromofluorobenzene	92 %	69-119	100	02/26/24	ats	02/26/24	ats		
1,2-Dichlorobenzene-d4	102 %	72-127	100	02/26/24	ats	02/26/24	ats		

CERTIFICATE OF ANALYSIS

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ANALYTICAL REPORT

PREPARED FOR

Attn: Jon Mink
Trace Analytical Laboratories
2241 Black Creek Rd
Muskegon, Michigan 49444

Generated 3/25/2024 9:50:11 AM

JOB DESCRIPTION

TENORM Analysis

JOB NUMBER

160-53273-1

Job Notes

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins TestAmerica Project Manager.

Authorization



Generated
3/25/2024 9:50:11 AM

Authorized for release by
Casey Robertson, Project Manager
Casey.Robertson@et.eurofinsus.com
(314)298-8566

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QC Sample Results	12
QC Association Summary	13



Case Narrative

Client: Trace Analytical Laboratories
Project: TENORM Analysis

Job ID: 160-53273-1

Job ID: 160-53273-1

Eurofins St. Louis

Job Narrative 160-53273-1

All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS/LCSD is as close to the samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

Receipt

The sample was received on 2/26/2024 12:40 PM. Unless otherwise noted below, the sample arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 18.4°C.

Method 901.1 - Radium-226 & Other Gamma Emitters (GS)

Sample 24-02-19-TP001 TCLP TENORM (160-53273-1) was analyzed for Radium-226 & Other Gamma Emitters (GS). The sample was leached on 2/26/2024, prepared on 2/29/2024 and analyzed on 3/21/2024.

Gamma Prep Batch 650325:

Due to sample matrix the following sample is under the target prep weight of 260g indicating low density: 24-02-19-TP001 TCLP TENORM (160-53273-1). As such, there may be a bias to the results.

The detection goal for Pb-210 was not met. This is caused by the elevated Compton Background due to elevated activity from bismuth-214 (and lead-214). The data have been reported with this narrative. 24-02-19-TP001 TCLP TENORM (160-53273-1)

Many isotopes requested by gamma spectrometry analysis do not have any gamma emissions, the gamma emissions they do have are very poor, and/or are reported by assuming secular equilibrium with a longer-lived parent (or vice-versa). For example, Th-232 (which does not have a good gamma-ray) is often reported assuming the shorter-lived Ra-228 daughter is in equilibrium with the Th-232 parent. Or, Pb-214 and/or Bi-214, daughters of potentially volatile Rn-222 in the Ra-226 decay chain, may not be in equilibrium with the parent unless sufficient time has been allowed since the break in equilibrium (e.g. 21 days in the case of Ra-226-supported ingrowth). The client should ensure that such inference is acceptable for their sample based upon process knowledge.

The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Eurofins St. Louis

Case Narrative

Client: Trace Analytical Laboratories
Project: TENORM Analysis

Job ID: 160-53273-1

Job ID: 160-53273-1 (Continued)

Eurofins St. Louis

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

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Eurofins St. Louis

Login Sample Receipt Checklist

Client: Trace Analytical Laboratories

Job Number: 160-53273-1

Login Number: 53273

List Source: Eurofins St. Louis

List Number: 1

Creator: Pinette, Meadow L

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	Samplers name is not on the COC
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Trace Analytical Laboratories
Project/Site: TENORM Analysis

Job ID: 160-53273-1

Qualifiers

Rad

Qualifier	Qualifier Description
G	The Sample MDC is greater than the requested RL.
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Trace Analytical Laboratories
Project/Site: TENORM Analysis

Job ID: 160-53273-1

Method	Method Description	Protocol	Laboratory
901.1	Radium-226 & Other Gamma Emitters (GS)	EPA	EET SL
Dry and Grind	Preparation, Dry and Grind	None	EET SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	EET SL

Protocol References:

EPA = US Environmental Protection Agency
None = None

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Trace Analytical Laboratories
Project/Site: TENORM Analysis

Job ID: 160-53273-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-53273-1	24-02-19-TP001 TCLP TENORM	Solid	02/19/24 13:00	02/26/24 12:40

- 1
- 2
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- 9
- 10
- 11

Client Sample Results

Client: Trace Analytical Laboratories
Project/Site: TENORM Analysis

Job ID: 160-53273-1

Client Sample ID: 24-02-19-TP001 TCLP TENORM
Date Collected: 02/19/24 13:00
Date Received: 02/26/24 12:40

Lab Sample ID: 160-53273-1
Matrix: Solid

Method: EPA 901.1 - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Lead-210	-1.89	U G	4.70	4.71	5.00	7.79	pCi/g	02/29/24 14:23	03/21/24 09:23	1
Radium-226	8.85		0.435	1.02	1.00	0.305	pCi/g	02/29/24 14:23	03/21/24 09:23	1
Radium-228	14.7		0.590	1.61	1.00	0.382	pCi/g	02/29/24 14:23	03/21/24 09:23	1

QC Sample Results

Client: Trace Analytical Laboratories
Project/Site: TENORM Analysis

Job ID: 160-53273-1

Method: 901.1 - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-650325/1-A
Matrix: Solid
Analysis Batch: 653472

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 650325

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Lead-210	-1.157	U	1.52	1.53	5.00	2.56	pCi/g	02/29/24 14:23	03/21/24 09:22	1
Radium-226	-0.01446	U	0.0673	0.0673	1.00	0.300	pCi/g	02/29/24 14:23	03/21/24 09:22	1
Radium-228	0.001076	U	0.0176	0.0176	1.00	0.284	pCi/g	02/29/24 14:23	03/21/24 09:22	1

Lab Sample ID: LCS 160-650325/2-A
Matrix: Solid
Analysis Batch: 653473

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 650325

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Americium-241	95.9	92.81		9.74		0.993	pCi/g	97	75 - 125
Cesium-137	24.8	23.79		2.53		0.154	pCi/g	96	75 - 125
Cobalt-60	6.16	5.932		0.639		0.0604	pCi/g	96	75 - 125

Lab Sample ID: 180-169797-A-2-C DU
Matrix: Solid
Analysis Batch: 653472

Client Sample ID: Duplicate
Prep Type: Total/NA
Prep Batch: 650325

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	RER Limit
Lead-210	0.837	U	3.529		2.28	5.00	2.82	pCi/g	0.69	1
Radium-226	0.846		0.9832		0.217	1.00	0.165	pCi/g	0.32	1
Radium-228	1.70		1.581		0.319	1.00	0.295	pCi/g	0.18	1

QC Association Summary

Client: Trace Analytical Laboratories
Project/Site: TENORM Analysis

Job ID: 160-53273-1

Rad

Leach Batch: 649871

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-53273-1	24-02-19-TP001 TCLP TENORM	Total/NA	Solid	Dry and Grind	

Leach Batch: 650059

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-169797-A-2-C DU	Duplicate	Total/NA	Solid	Dry and Grind	

Prep Batch: 650325

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-53273-1	24-02-19-TP001 TCLP TENORM	Total/NA	Solid	Fill_Geo-21	649871
MB 160-650325/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-650325/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
180-169797-A-2-C DU	Duplicate	Total/NA	Solid	Fill_Geo-21	650059

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QUALITY CONTROL RESULTS

Trace Project ID: 24B1325

Client Project ID: TP001 Filter Media TCLP TENORM

QC Batch: T147634

Analysis Description: TCLP Extraction, SVOC

QC Batch Method: Leaching procedures

Analysis Method: EPA 1311

Trace Project ID: 24B1325

Client Project ID: TP001 Filter Media TCLP TENORM

QC Batch: T147475

Analysis Description: Selenium, TCLP

QC Batch Method: EPA 3015 Microwave Assisted Digestions
for Liquids

Analysis Method: EPA 6020B

METHOD BLANK: T147475-BLK1

Parameter	Units	Blank Result	Reporting Limit	Notes
Silver	mg/L	<0.10	0.10	
Arsenic	mg/L	<0.30	0.30	
Barium	mg/L	<1.0	1.0	
Cadmium	mg/L	<0.10	0.10	
Chromium	mg/L	<0.50	0.50	
Lead	mg/L	<0.50	0.50	
Selenium	mg/L	<0.60	0.60	

METHOD BLANK: T147475-BLK2

Parameter	Units	Blank Result	Reporting Limit	Notes
Silver	mg/L	<0.10	0.10	
Arsenic	mg/L	<0.30	0.30	
Barium	mg/L	<1.0	1.0	
Cadmium	mg/L	<0.10	0.10	
Chromium	mg/L	<0.50	0.50	
Lead	mg/L	<0.50	0.50	
Selenium	mg/L	<0.60	0.60	

METHOD BLANK: T147475-BLK3

Parameter	Units	Blank Result	Reporting Limit	Notes
Silver	mg/L	<0.10	0.10	
Arsenic	mg/L	<0.30	0.30	
Barium	mg/L	<1.0	1.0	
Cadmium	mg/L	<0.10	0.10	
Chromium	mg/L	<0.50	0.50	
Lead	mg/L	<0.50	0.50	

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METHOD BLANK: T147475-BLK3

Parameter	Units	Blank Result	Reporting Limit	Notes
Selenium	mg/L	<0.60	0.60	

LABORATORY CONTROL SAMPLE: T147475-BS1

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limit	Notes
Silver	mg/L	0.0278	<0.10	100	80-120	
Arsenic	mg/L	0.0556	<0.30	98	80-120	
Barium	mg/L	0.889	<1.0	101	80-120	
Cadmium	mg/L	0.0278	<0.10	95	80-120	
Chromium	mg/L	0.0278	<0.50	92	80-120	
Lead	mg/L	0.0556	<0.50	95	80-120	
Selenium	mg/L	0.0556	<0.60	98	80-120	

Trace Project ID: 24B1325

Client Project ID: TP001 Filter Media TCLP TENORM

QC Batch: T147714

Analysis Description: Mercury, TCLP

QC Batch Method: EPA 7470A Prep

Analysis Method: EPA 7470A

METHOD BLANK: T147714-BLK1

Parameter	Units	Blank Result	Reporting Limit	Notes
Mercury	mg/L	<0.010	0.010	

METHOD BLANK: T147714-BLK2

Parameter	Units	Blank Result	Reporting Limit	Notes
Mercury	mg/L	<0.010	0.010	

METHOD BLANK: T147714-BLK3

Parameter	Units	Blank Result	Reporting Limit	Notes
Mercury	mg/L	<0.010	0.010	

LABORATORY CONTROL SAMPLE: T147714-BS1

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limit	Notes
Mercury	mg/L	0.00200	<0.010	96	80-120	

Trace Project ID: 24B1325

Client Project ID: TP001 Filter Media TCLP TENORM

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QC Batch: T147461

Analysis Description: TCLP ZHE, Volatiles

QC Batch Method: Leaching procedures

Analysis Method: EPA 1311

Trace Project ID: 24B1325

Client Project ID: TP001 Filter Media TCLP TENORM

QC Batch: T147641

Analysis Description: TCLP Extraction, Metals

QC Batch Method: Leaching procedures

Analysis Method: EPA 1311

Trace Project ID: 24B1325

Client Project ID: TP001 Filter Media TCLP TENORM

QC Batch: T147671

Analysis Description: TCLP Semi-Volatiles

QC Batch Method: EPA 3510C Separatory Funnel
Liquid-Liquid Extr.

Analysis Method: EPA 8270E

METHOD BLANK: T147671-BLK1

Parameter	Units	Blank Result	Reporting Limit	Notes
Pyridine	mg/L	<0.020	0.020	
2-Methylphenol (o-Cresol)	mg/L	<0.0025	0.0025	
3,4-Methylphenol (m,p Cresol)	mg/L	<0.0025	0.0025	
Hexachloroethane	mg/L	<0.0025	0.0025	
Nitrobenzene	mg/L	<0.0010	0.0010	
Hexachlorobutadiene	mg/L	<0.0010	0.0010	
2,4,6-Trichlorophenol	mg/L	<0.0010	0.0010	
2,4,5-Trichlorophenol	mg/L	<0.0025	0.0025	
2,4-Dinitrotoluene	mg/L	<0.0010	0.0010	
Hexachlorobenzene	mg/L	<0.0010	0.0010	
Pentachlorophenol	mg/L	<0.0050	0.0050	
2-Fluorophenol (S)	%	27	20-53	
Phenol-d5 (S)	%	13	11-40	
Nitrobenzene-d5 (S)	%	62	36-103	
2-Fluorobiphenyl (S)	%	58	36-119	
2,4,6-Tribromophenol (S)	%	72	30-105	
Terphenyl-d14 (S)	%	78	37-109	

LABORATORY CONTROL SAMPLE: T147671-BS1

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limit	Notes
2-Methylphenol (o-Cresol)	mg/L	0.100	0.0415	42	30-116	
3,4-Methylphenol (m,p Cresol)	mg/L	0.100	0.0337	34	31-115	
Hexachloroethane	mg/L	0.100	0.0477	48	38-85	
Nitrobenzene	mg/L	0.100	0.0647	65	47-99	
Hexachlorobutadiene	mg/L	0.100	0.0532	53	36-93	
2,4,6-Trichlorophenol	mg/L	0.100	0.0744	74	48-106	
2,4,5-Trichlorophenol	mg/L	0.100	0.0708	71	36-115	

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LABORATORY CONTROL SAMPLE: T147671-BS1

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limit	Notes
2,4-Dinitrotoluene	mg/L	0.100	0.0739	74	39-105	
Hexachlorobenzene	mg/L	0.100	0.0684	68	52-106	
Pentachlorophenol	mg/L	0.100	0.0653	65	38-102	
2-Fluorophenol (S)	%	0.100	0.0251	25	20-53	
Phenol-d5 (S)	%	0.103	0.0144	14	11-40	
Nitrobenzene-d5 (S)	%	0.100	0.0697	70	36-103	
2-Fluorobiphenyl (S)	%	0.101	0.0693	69	36-119	
2,4,6-Tribromophenol (S)	%	0.100	0.0708	71	30-105	
Terphenyl-d14 (S)	%	0.100	0.0807	81	37-109	

Trace Project ID: 24B1325

Client Project ID: TP001 Filter Media TCLP TENORM

QC Batch: T147660

Analysis Description: TCLP Volatiles

QC Batch Method: EPA 5030B Purge-and-Trap for Aqueous Samples

Analysis Method: EPA 8260D

METHOD BLANK: T147660-BLK1

Parameter	Units	Blank Result	Reporting Limit	Notes
Vinyl chloride	mg/L	<0.050	0.050	
1,1-Dichloroethene	mg/L	<0.050	0.050	
2-Butanone	mg/L	<0.25	0.25	
Chloroform	mg/L	<0.050	0.050	
Carbon tetrachloride	mg/L	<0.050	0.050	
Benzene	mg/L	<0.050	0.050	
1,2-Dichloroethane	mg/L	<0.050	0.050	
Trichloroethene	mg/L	<0.050	0.050	
Tetrachloroethene	mg/L	<0.050	0.050	
Chlorobenzene	mg/L	<0.050	0.050	
1,4-Dichlorobenzene	mg/L	<0.050	0.050	
1,2-Dichloroethane-d4 (S)	%	123	68-133	
Toluene-d8 (S)	%	105	75-120	
4-Bromofluorobenzene (S)	%	89	69-119	
1,2-Dichlorobenzene-d4 (S)	%	103	72-127	

LABORATORY CONTROL SAMPLE: T147660-BS1

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limit	Notes
Vinyl chloride	mg/L	0.0500	0.151	301	47-184	BS05
1,1-Dichloroethene	mg/L	0.0500	<0.050	97	64-156	
2-Butanone	mg/L	0.0500	<0.25	120	70-130	

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LABORATORY CONTROL SAMPLE: T147660-BS1

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limit	Notes
Chloroform	mg/L	0.0500	0.0553	111	80-120	
Carbon tetrachloride	mg/L	0.0500	0.0601	120	79-141	
Benzene	mg/L	0.0500	0.0560	112	80-120	
1,2-Dichloroethane	mg/L	0.0500	0.0633	127	80-120	BS05
Trichloroethene	mg/L	0.0500	0.0503	101	69-133	
Tetrachloroethene	mg/L	0.0500	<0.050	85	70-120	
Chlorobenzene	mg/L	0.0500	0.0500	100	80-120	
1,4-Dichlorobenzene	mg/L	0.0500	0.0551	110	80-120	
1,2-Dichloroethane-d4 (S)	%	30.0	36.8	122	68-133	
Toluene-d8 (S)	%	30.0	32.4	108	75-120	
4-Bromofluorobenzene (S)	%	30.0	28.2	94	69-119	
1,2-Dichlorobenzene-d4 (S)	%	30.0	29.9	100	72-127	

MATRIX SPIKE / MATRIX SPIKE DUPLICATE: T147660-MSD1

Original: **24B1325-01**

Parameter	Units	Original Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Notes
Vinyl chloride	mg/L	0	5.00	17.6	16.0	352	320	60-153	9	13	MS05
1,1-Dichloroethene	mg/L	0	5.00	5.12	4.90	102	98	60-146	4	15	
2-Butanone	mg/L	0	5.00	5.77	5.91	115	118	60-140	2	23	
Chloroform	mg/L	0	5.00	5.84	5.58	117	112	68-124	4	13	
Carbon tetrachloride	mg/L	0	5.00	6.42	6.00	128	120	68-125	7	12	
Benzene	mg/L	0	5.00	5.91	5.67	118	113	78-114	4	11	MS01
1,2-Dichloroethane	mg/L	0	5.00	6.88	6.67	138	133	63-132	3	11	MS05
Trichloroethene	mg/L	0	5.00	5.16	5.01	103	100	70-117	3	14	
Tetrachloroethene	mg/L	0	5.00	4.29	4.12	86	82	57-126	4	12	
Chlorobenzene	mg/L	0	5.00	5.08	4.99	102	100	75-116	2	12	
1,4-Dichlorobenzene	mg/L	0	5.00	5.75	5.59	115	112	69-118	3	18	
1,2-Dichloroethane-d4 (S)	%		30.0	37.6	37.0	125	123	68-133			
Toluene-d8 (S)	%		30.0	32.9	32.5	110	108	75-120			
4-Bromofluorobenzene (S)	%		30.0	28.6	27.7	95	92	69-119			
1,2-Dichlorobenzene-d4 (S)	%		30.0	30.1	30.2	100	101	72-127			

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AN EXPLANATION OF TERMS AND SYMBOLS WHICH MAY OCCUR IN THIS REPORT

DEFINITIONS

LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MS	Matrix Spike
MSD	Matrix Spike Duplicate
RPD	Relative Percent Difference
DUP	Matrix Duplicate
RDL	Reporting Detection Limit
MCL	Maximum Contamination Limit
TIC	Tentatively Identified Compound
<, ND or U	Indicates the compound was analyzed for but not detected
*	Indicates a result that exceeds its associated MCL or Surrogate control limits
N	Indicates that the laboratory is not accredited by NELAP for this compound
NA	Indicates that the compound is not available.

NOTE: Samples for volatiles that have been extracted with a water miscible solvent were corrected for the total volume of the solvent/water mixture.
Solid matrices Method Blanks are at 100% solids as such results are the same wet or dry.

DATA QUALIFIERS

Trace ID: 24B1325-01

Analysis: EPA 8270E

	Note DL03 : The reporting limit was raised due to a dilution required because of matrix interference and/or analyte interference.
2-Fluorophenol	Note S05 : The surrogate recovery was not available due to dilution of the extract.
Phenol-d5	Note S05 : The surrogate recovery was not available due to dilution of the extract.

Trace ID: T147660-BS1

Analysis: EPA 8260D

1,2-Dichloroethane	Note BS05 : The BS recovery was out of control high. Because there were no positive results for this analyte in this QC batch, no data require qualification.
Vinyl chloride	Note BS05 : The BS recovery was out of control high. Because there were no positive results for this analyte in this QC batch, no data require qualification.

Trace ID: T147660-MS1

Analysis: EPA 8260D

1,2-Dichloroethane	Note MS05 : The MS and MSD were out of control high. Because there was no positive result in the non-spiked version of the sample, no data require qualification.
Carbon tetrachloride	Note MS01 : One of the following: MS, MSD or RPD was out of control. Because two of the results are in control, no data requires qualification.
Vinyl chloride	Note MS05 : The MS and MSD were out of control high. Because there was no positive result in the non-spiked version of the sample, no data require qualification.

CERTIFICATE OF ANALYSIS

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Trace Analytical Laboratories, Inc.
2241 Black Creek Road
Muskegon, MI 49444-2673



231-773-5998 Phone
888-979-4469 Fax
www.trace-labs.com

Trace ID: T147660-MSD1

Analysis: EPA 8260D

1,2-Dichloroethane	Note MS05 : The MS and MSD were out of control high. Because there was no positive result in the non-spiked version of the sample, no data require qualification.
Benzene	Note MS01 : One of the following: MS, MSD or RPD was out of control. Because two of the results are in control, no data requires qualification.
Vinyl chloride	Note MS05 : The MS and MSD were out of control high. Because there was no positive result in the non-spiked version of the sample, no data require qualification.

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Page 12 of 13

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Muskegon, MI 49444-2673



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888-979-4469 Fax
www.trace-labs.com

24B1325

Kalamazoo, City of
Project Manager: Tim Brewer

Sample Log In Checklist

Date: 2/21/24	Original Observation	Corrected Temperature	IR-9 (CF: 0.0°C)	IR-10 (CF: +0.1°C)	IR-12 (CF: 0.0°C)	SR1 (CF: -0.2°C)	SR2 (CF: -0.1°C)	Temp Blank	Client Sample
Time: 16:28									
Initials: MJ									
Package Description: Cooler									
Package Temp °C	0.2	0.2							
Representative Sample Temp °C	3.0	3.0							

Sample Receipt

Yes No

☒ ☐ Received on ice or other coolant

☒ ☐ Ice still present upon receipt

☐ ☒ Custody seals present

☒ Trace Courier ☐ Client Drop-off

☐ Yes ☐ No Custody seals intact (if applicable)

☐ UPS ☐ Fed Ex ☐ US Mail ☐ Other

Sample Condition

Yes No N/A

☒ ☐ ☐ All sample containers arrived unbroken and labeled

☒ ☐ ☐ Sufficient sample to run requested analyses

☐ ☐ ☒ Correct chemical preservative added to samples

☐ ☐ ☒ Samples preserved at Trace

☐ ☐ ☒ Chemical preservation verified, check EMD pH test strip used (if applicable)

☐ ☐ ☐ pH 0-2.5 (Lot: HC311850) ☐ pH 11.0-13.0 (Lot: HC022540) ☐ Other

☐ ☐ ☒ Air bubbles absent from VOAs

Chain of Custody (COC)

Yes No

☒ ☐ All bottle labels agree with COC

☒ ☐ COC filled out properly

☒ ☐ COC signed by client

Notes:

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APPENDIX B - WesTech Cleaning Media Retaining Nozzles

Cleaning Media Retaining Nozzles

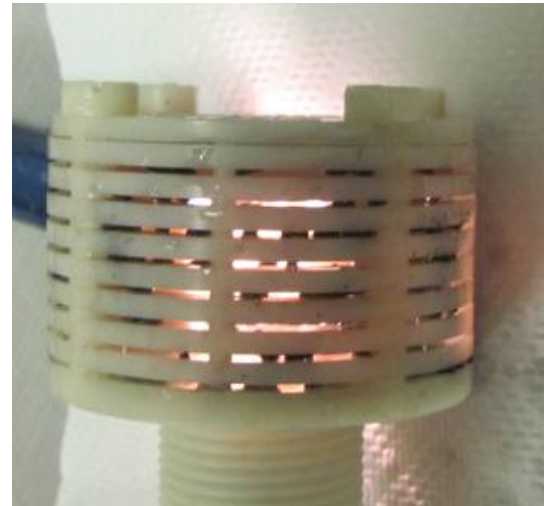
Nozzle Removal – Complete Media Removal

- Option 1 – Complete media removal.
 - Remove and store ALL media from filter cell prior to nozzle removal.
 - Avoid damaging nozzles during the removal process. Shovels and spades will damage nozzles. Be very careful not to step on, kick, or otherwise damage the strainers during or after installation.
 - Vacuum any residual materials from area around nozzle.
 - Do not allow residual water or any material to enter into insert while nozzle is removed. This may result in underdrain contamination.
 - Once the filter floor is cleaned, begin removing nozzles one or two rows at a time.
- **WARNING! AVOID UNDERDRAIN CONTAMINATION!!!!**

Partial Media Removal

- Option 2 –
- In certain cases removing all the filter media is not an option. Partial media removal can be used but care must be taken to avoid underdrain contamination.
- It is suggested that a wooden dam or barrier be constructed to keep excavated filter media from caving in. Plywood or other materials can be used.
- **WARNING! AVOID UNDERDRAIN CONTAMINATION!!!!**

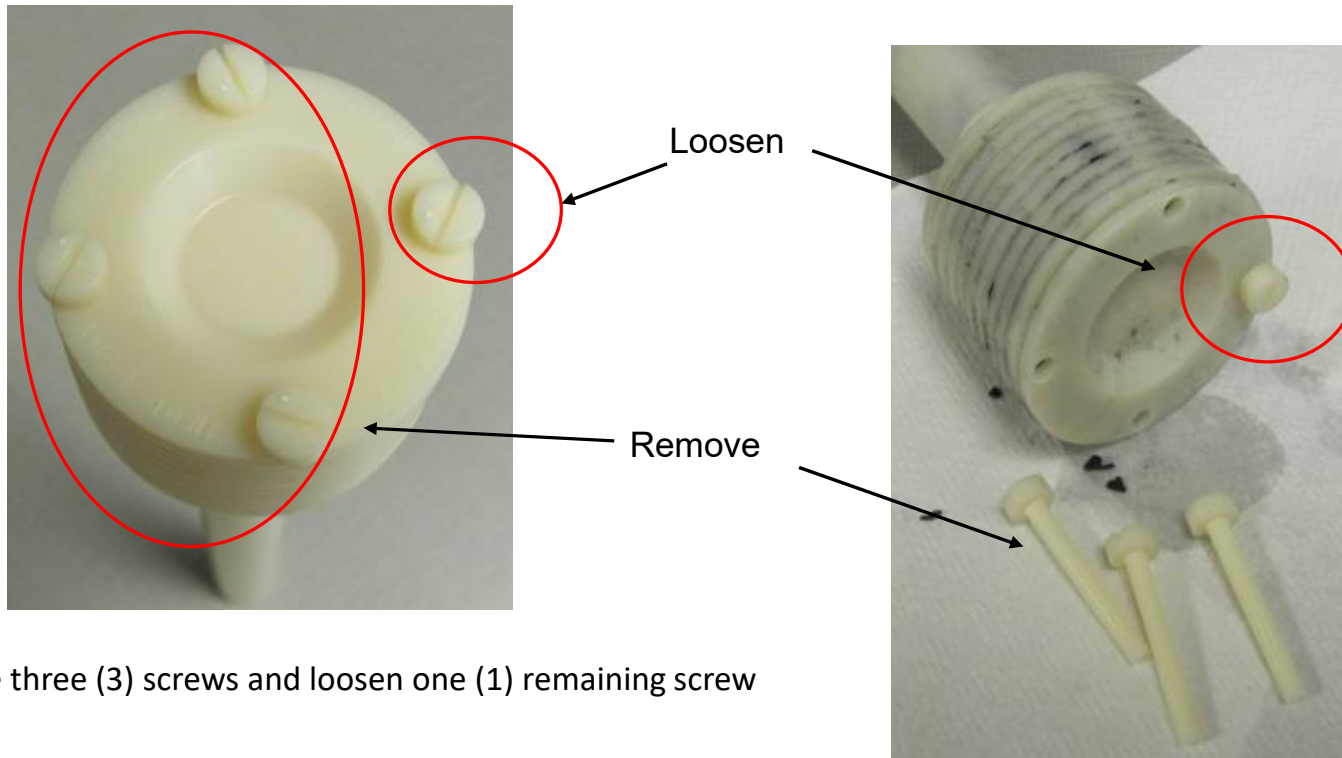
Nozzle Inspection



Note: Filter Media in Strainer

- Clean VS Dirty

Nozzle Cleaning: Disassembly



- Remove three (3) screws and loosen one (1) remaining screw

Nozzle Cleaning – Removing Fouling

- Clean the nozzle in a bucket of clean water to remove the trapped media / contaminants.
- Swish rapidly in the water and use hands if necessary to remove contaminants.

Media Removed



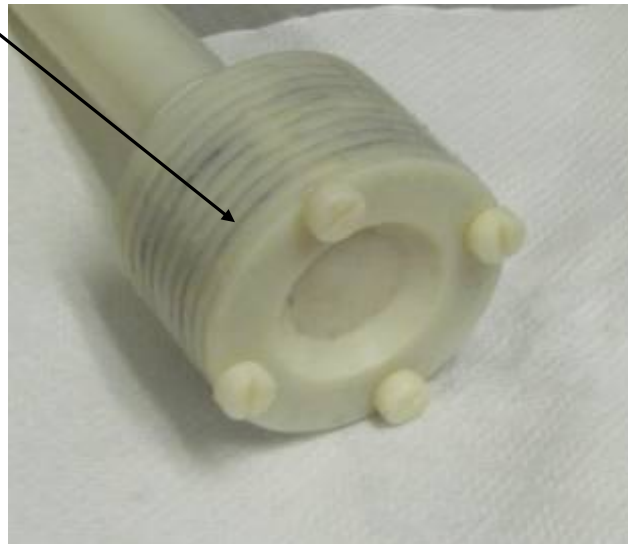
Note: Color or staining is not critical. All material not part of the nozzle assembly needs to be removed.

Nozzle Cleaning – Re-assembly

- Screws Re-installed

Plastic screws should be installed at a torque rating of two (2) inch pounds at 75 deg F.

Note:
Torque range can and will
change due to
temperature.



Tighten screws until they are just snug against the plastic top.

Do Not Over Tighten ***

Nozzle Cleaning – Inspection & Quality Control

- Tips:
- Properly tighten all four (4) screws.
- View nozzle using a light.
- Nozzle should be free of debris.
- Randomly conduct the “Wet Test”. See photos. Lower photo displays partially fouled nozzle. Notice water “jets”. Upper nozzle free from debris.



Re-Installing Nozzles

- 1. Tighten strainer assemblies hand tight to insert surface. Strainers must not tighten in threads but must tighten firmly against the o-ring. If difficulty is encountered, run a stiff nylon brush into strainer insert to clean threads.
- 2. Do not use any power tool or wrench to install strainers.
- 3. Do not use pipe dope, or any other thread sealer on the strainers. strainers should be installed dry.
- 4. Be very careful not to step on, kick, or otherwise damage the strainers during or after installation.
- 5. Do not hit strainer assemblies with any shovel or other heavy tool.
- 6. Take special notice of notes 4 and 5 above when installing filter media.
- 7. Protect strainers from all foreign materials which may adversely effect the plastic. This is particularly true of paints, solvents, oils, greases, etc.

Tricks and Tips

- Methodically remove, clean and replace nozzles.
- Do NOT contaminate underdrain.
- Misuse of shovels will damage nozzles.
- Remember the O-Ring.
- Properly tighten nozzles. Have a second person inspect.



Cleaning Media Retaining Nozzles

- **Contact:**
- **WesTech Engineering**
- **Ames, IA 50010**
- **Customer Service**
- **515-268-8400**



WORK PRACTICE

City of Kalamazoo
Public Services Department

WP Number: WP wsuppy010	Computer Path: M:\Public Services\Water Supply\Work Practices
Title: Water Facility Enter	Written By: Brock VanDyken Date: 06/13/2023
	Reviewed By: Date:
	Approved By: Joe Bonhomme Date: 06/14/2023

I. PURPOSE AND SCOPE:

The Purpose of this work practice document is to provide steps necessary to ensure better Water Supply Facility security and knowledge of who is entering facilities and for what purpose. This document does not give location of buttons, timers, or keypads for entry alarms. This information can be obtained from Water Supply (337-8179).

II. REQUIREMENTS

- A. Permission to perform work in or around Water Supply Facilities.
- B. Notification to Water Supply of who is entering which facility. So that we know that entrants are authorized to do so and for what reason.
- C. Knowledge of where to find and how to use the alarm deactivation device.

III. DEFINITIONS

Public Services Personnel – This includes but is not limited to: Well Drillers, Water Maintenance, Lab Techs, Process Control, Electricians, Water Supply, Engineering, Utility Locators, Building Maintenance, and all others doing work in and around these facilities.

Water Supply Facility – Includes any water pumping station, storage tank, boost/bleed station, pit, or any other water facility.

Normal hours – 7:00 AM to 3:30 PM

After hours – 3:30 PM to 7:00 AM

IV. RESPONSIBILITIES:

During normal hours all **Public Services Personnel, Private Contractors, and Consultants** are to contact Water Supply by Phone (337-8179), before entering any Kalamazoo Water Supply Facility. Call Water Supply (337-8179) to make sure all alarms are reset, and the area is secure before you leave. After hours **ALL** persons are to contact **Water Supply** on-call Personnel by phone (337-8874) before entering any Kalamazoo Water Supply Facility.

V. PROCEDURE:

Proper procedure for all persons entering and exiting water facilities in the field.

1. Prior to entry
 - A. During normal operating hours call Water Supply (337-8179) on which facility you are entering.
 - B. After hours call Water Supply on-call Personnel (337-8874) on which facility you are entering.
2. Open door or hatch and enter.
3. Press button, keypad or turn time to deactivate alarm mode. You will have 30 seconds to complete the circuit.
 - A. If you don't actuate the alarm defeat device, Water Supply will consider you under duress and will call 911 to have the police come and checkout the situation.
 - B. If you need to work at the station for an extended period of time call Water Supply so that they can override the alarm timer on SCADA.
 - 337-8179 – during normal operating hours
 - 337-8874 – after hours
4. Shut doors or any other openings that you passed through and lock up. Call Water Supply to make sure all alarms are reset, and the area is secure before you leave.
 - A. 337-8179 – during normal operating hours
 - B. 337-8874 – after hours

VI. REFERENCES:

VII. WORK PRACTICE REVISION HISOTRY:

Revision	Date	Approval

Spill Contingency Plan

WATER PUMPING STATION # 1

215 W. Stockbridge Avenue,
Kalamazoo, MI 49008

 Public Services Department	Written By: Ashley Richardson	Date: 4/16/2025
	Revised By: Jean Talanda Eric Sajtar	Date: TBD
	Annual Approval:	Date:

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1.0 GENERAL FACILITY INFORMATION

1.1 Contact and Permit Information

Facility Information:

- Name of Facility: **City of Kalamazoo Station #1**
- Facility Address: **215 W Stockbridge Avenue, Kalamazoo, MI 49008**
- City or Township: **City of Kalamazoo**
- Owner or Authorized Representative: **City of Kalamazoo, Department of Public Services**

Michigan Community Public Water Supply Information:

- Name: **City of Kalamazoo Water Supply**
- Water Supply Serial Number: **03520**
- County: **Kalamazoo**
- Population: **196,000**
- Source: **Groundwater**

Facility Contact Information:

- Name: **Joe Bonhomme**
- Title: **Water Resources Division Manager**
- Telephone: **269-337-8716**
- Email Address: **bonhommej@kalamazoocity.org**
- Mailing Address: **1415 Harrison Street, Kalamazoo, MI 49007**

Certified Waterworks System Operator Information:

- Name: **Dylan Doak**
- Title: **Water Operation Supervisor**
- Certification Number & Expiration Date: **#20130, exp. 01/15/2027**
- Telephone: **269-370-2269**
- Email Address: **doakd@kalamazoocity.org**
- Mailing Address: **1415 Harrison Street, Kalamazoo, MI 49007**

Wellhead Protection Program Information:

- Name: **Jean Talanda**
- Title: **Water Programs Manager**
- Telephone: **269-337-8583**
- Email Address: **talandaj@kalamazoocity.org**
- Mailing Address: **1415 Harrison Street, Kalamazoo, MI 49007**

National Pollution Discharge Elimination System (NPDES) Permit Information (Stormwater):

- General Municipal Stormwater Permit Number: **MIS040000**
- Certificate of Coverage (COC) or Individual Permit Number: **MI0060009 V2.0**
- COC or Individual Permit Effective Date of Coverage: **6/1/2024 (expires October 1, 2025)**
- Receiving Waters: **Portage & Arcadia Creeks, Kalamazoo River mainstream 3 corridor**
- Required Monitoring: **Yes**
- Identify the Total Maximum Daily Load (TMDL) Listed on COC: **Total Phosphorus, E. Coli**

Brief Industrial Activity Description:

The Department of Public Services, Water Pumping Station (WPS) Wellfield (Facility) activities include:

- Loading, unloading, and other material handling operations.
- Maintenance and cleaning of vehicles, machines, and equipment.
- Wellhead protection from any third-party incidental complaints, spills, or damage.

1.2 Facility Description

The Facility is used by Water Supply Operations and Maintenance, Process Control, and Environmental Services staff. The site includes six production wells, which are used for the extraction of groundwater and one water pumping station for pumping of water out to the water main for distribution. An air stripper and filters tanks are used to aid in the removal of iron.

Photographs of the Facility components are included as **Appendix A – WPS-1 Site Photographs**. An aerial map of the site is included as **Figure 1 – General Site Overview Map** for reference, material use locations are identified on **Figure 2 - Significant Material Use and Storage Map**, and the surrounding utilities are identified on **Figure 3 - Waterway & Utility Structures Map**.

1.3 Compliance and Modifications

This Spill Contingency Plan (SCP) will be evaluated, updated, and amended when any of the following occurs:

1. At the time the permittee is reissued coverage under a new permit, whenever changes at the Facility have the potential to increase the exposure of significant materials to stormwater or groundwater,
2. Significant spills/leaks occur at the Facility,
3. When the SCP is determined by the Department to be ineffective in achieving the general objectives of controlling pollutants in stormwater and groundwater discharges associated with industrial activity,
4. As necessary, to ensure the contact information is current,
5. A change in design, construction, operation, or maintenance that has a significant effect on the potential for the discharge of pollutants to the groundwater or the Municipal Separate Storm Sewer System (MS4),
6. Inspections conducted in accordance with this SCP, Environmental Protection Agency (EPA) or the Michigan Department of Environment, Great Lakes, and Energy (EGLE) indicate deficiencies in the SCP or Best Management Practices (BMPs) prescribed in the SCP,
7. Multiple site inspections indicate pollutants have not been minimized or new sources of pollutants may need to be addressed, or have been identified near the station, and
8. In accordance with the findings and recommendations of the annual Comprehensive Compliance Evaluation.

Each year the SCP inspections and process will be assessed for changes and documented on the Annual Comprehensive Compliance Evaluation Form. Once changes are made, the SCP will be certified by the Stormwater Pollution Prevention Team. The SCP Completion Certificate is provided

in **Section 10.0**. The Annual SCP Comprehensive Compliance Evaluation Form is provided in **Appendix B**.

2.0 WELLHEAD PROTECTION AND STORMWATER POLLUTION PREVENTION TEAM

Name & Title	Responsibility
<i>Joe Bonhomme, Water Resources Division Manager</i>	<i>Primary SCP contact; overall administration of SCP; signing the Comprehensive Compliance Evaluation</i>
<i>Eric Sajtar, Senior Civil Engineer – Public Services</i>	<i>Design, implementation, and maintenance planning of secondary containment and structural controls</i>
<i>Dylan Doak, Water Operations Supervisor</i>	<i>Record keeping, submitting reports, conducting comprehensive compliance evaluation</i>
<u>Additional members and their responsibility:</u> <i>Jean Talanda, Water Programs Manager – Wellhead Protection Program, NPDES MS4 General Permit / Phase II Program Compliance</i>	

3.0 SITE MAPS

Refer to **Figure 1** – General Site Overview Map, **Figure 2** – Significant Material Use and Storage, **Figure 3** - Waterway & Utility Structures Map, **Figure 4** – Spill Response Map (currently under review), and **Appendix A** – WPS-1 Site Photographs, for the location of the following applicable items:

1. Buildings and other permanent structures,
2. Water, wastewater, stormwater utilities, specifically: production wells, stormwater discharge points (which include outfalls and points of discharge), location of stormwater and non-stormwater inlets,
3. Storage, use, or disposal areas for significant materials,
4. Safety shower, eyewash station, fire extinguisher, spill kit, first aid, and personal protective equipment (PPE),
5. Secondary containment structures and descriptions of what they contain in the primary containment structures,
6. If applicable, outlines of the drainage areas contributing to each discharge point,
7. Structural runoff controls or stormwater treatment facilities,
8. Areas of vegetation (with brief description such as lawn, old field, marsh, wooded, etc.),
9. Areas of exposed and/or erodible soils and gravel lots,
10. Impervious surfaces (roofs, asphalt, concrete, etc.), and
11. Name and location of receiving waters.

4.0 SIGNIFICANT MATERIALS

Definition: Significant materials are any material which could degrade or impair water quality, including but not limited to:

- ✓ Raw Materials
- ✓ Fuels
- ✓ Solvents
- ✓ Detergents
- ✓ Plastic pellets
- ✓ Finished materials (i.e., metallic products)
- ✓ Hazardous Substances designated under section 101(14) of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), see 40 CFR 372.65
- ✓ Any chemical the facility is required to report pursuant to section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA)
- ✓ Polluting Materials – Oil and any material, in solid or liquid form, identified as polluting material under the Part 5 Rules (Rules 324.2001 through 324.2009 of the Michigan Administrative Code)
- ✓ Hazardous Wastes as defined in Part 111 of the Michigan Act
- ✓ Fertilizers
- ✓ Pesticides
- ✓ Waste Products (i.e., ashes, slag, sludge, plant waste, animal waste)

4.1 Inventory of Exposed Significant Materials

The Significant Materials Inventory for the Facility is provided as **Table 1**. All significant materials at the Facility are used and stored indoors except for ice melt, which is stored inside the main office but applied to outside walkways on an as needed basis.

4.2 Description of Industrial Activities & Significant Material Storage Areas

The Facility has been evaluated for the reasonable potential of significant materials to reach groundwater or stormwater runoff from the following areas or activities:

- ✓ Loading, unloading, and other material handling operations
- ✓ Maintenance and cleaning of vehicles, machines, and equipment
- ✓ Areas of exposed and/or erodible soils
- ✓ Operation and maintenance of the underground waste holding tank
- ✓ Other areas where stormwater may contact significant materials

Results of the evaluation are included in **Table 2** – Description of Industrial Activity or Significant Material Storage Areas.

4.3 List of Significant Spills

There have been no reported significant spills at this Facility in the three years prior to the effective date of this SCP. In the event of a significant spill or leak of polluting material, it will be documented in the Lucity system. This listing will include the date, volume, exact location of release, and actions taken to clean up the material and/or prevent exposure to groundwater and stormwater runoff or contamination of surface waters of the state.

Reportable spills and releases under Part 201 or Part 213 of the Natural Resources and Environmental Protection Act (NREPA) will be reported to EGLE using the Pollution Emergency Alert System (PEAS) Hotline. Information will be provided using EGLE's Spill or Release Report included as **Appendix C**.

4.4 Actions Taken to Investigate Floor Drain Connections

Existing floor drains inside the chemical rooms and pumping room currently connect to an underground waste holding tank located to the north of the dock. In the case of uncertain floor drain connections, Water Operations will investigate the source using dye testing. The City's dye testing Certification of Approval can be found in **Appendix D** along with the dye testing Safety Data Sheet (SDS).

All floor drains found to be non-sanitary will be permanently plugged or re-routed to a drainage containment tank or the sanitary sewer system, in accordance with the authorization from the Kalamazoo Water Reclamation Plant. Any stormwater discharge from facility floor drains is a violation of the conditions of this NPDES MS4 permit and will be considered an illicit connection. If an illicit connection is identified, a resolution will be proposed to the Public Service's Stormwater Engineer for approval prior to implementation.

Illicit connections will be documented in Lucity per the City's MS4 NPDES permit requirements.

4.5 Summary of Waste Characterization Procedure

The underground waste holding tank will be inspected on a biannual basis. Waste will be sampled and characterized prior to pumping and disposal as a best management practice. Results of the sampling event will determine the proper means of disposal in accordance with Part 111 or Part 121 of NREPA. Liquid Industrial Byproduct (LIB) manifests will be maintained and retained for 5 years. Once the Lucity system is created, the City will house the SCP data and biannual inspections in the system.

5.0 NON-STRUCTURAL CONTROLS

Non-structural controls implemented at the Facility are intended to reduce the potential of pollution getting into groundwater, stormwater, and the surface waters of the state and are generally implemented to address the problem at the source. They do not require any structural changes to the Facility. These are everyday types of activities undertaken by employees at the Facility. The SCP for this Facility, at a minimum, includes each of the following non-structural controls as outlined in Sections 5.1 through 5.5.4.

5.1 Process Monitoring Program

The Facility is equipped with process control monitors. The processes monitored and frequency of monitoring is outlined below. The inspection and maintenance of control devices is managed by the Public Services Process Control Engineering Supervisor. Inspection and testing of equipment and systems helps to uncover conditions that could cause breakdowns or failures resulting in discharges of pollutants to ground or surface waters.

Process Monitoring Program Table			
Task	Monitor type	Frequency	Local / Remote
Hydrofluorosilicic Acid inventory by weight	Scale	Daily (when station is online)	Local
Chlorine Gas inventory by weight	Scale	Daily (when station is online)	Local

5.2 Daily Inspection Program

This SCP includes a written outline of existing daily inspections to maintain a clean, orderly facility. Daily inspections are preventative measures which are intended to reduce the potential for significant materials to meet groundwater or stormwater. The table below describes the Daily Inspection Program:

Daily Inspection Program Table		
Task	Area	Inspector
Sodium Hexametaphosphate	Chemical Storage Room	Water Operator / Maintainer
Check condition of chemical feed pumps	Chemical Rooms	Water Operator / Maintainer
Check to make sure area is free of leaks or spills	Entire Facility	Water Operator / Maintainer

5.3 Comprehensive Compliance Evaluation

The SCP and Facility will be reviewed annually, and the reviews will be maintained in the Lucity system. Based on the review, the SCP will be amended as needed to ensure continued compliance with the terms and conditions of the City of Kalamazoo Wellhead Protection Ordinance 2057 of 2022, and the associated Performance Standards for Groundwater Protection within Capture Zones and Stormwater Management, Revised 2022.

The comprehensive compliance evaluation will include, but not be limited to, inspection of the areas identified in the daily inspection program. In addition, corrective action reports, spill/release reports and any other paperwork associated with the SCP will be reviewed during each comprehensive compliance evaluation. The comprehensive compliance evaluation will be conducted by the Water Operations Supervisor, Senior Civil Engineer, and Water Programs Manager.

A report of the comprehensive compliance evaluation results will be prepared and retained for at least five years. Once the Lucity system is created by the City, documentation will house the SCP data and inspections in the system. The report will include the following information:

- ✓ Date of the inspection
- ✓ Name(s), title(s), and certification number(s) of the personnel conducting the inspection
- ✓ Precipitation information (i.e., a description of recent rainfall or snow met events)
- ✓ All observations relating to the implementation of control measures
- ✓ Any required revisions to the SCP resulting from the inspection
- ✓ A certification stating the facility follows the NPDES MS4 permit and the SCP, including instances of noncompliance

The Comprehensive Compliance Evaluation Form can be found in **Appendix B**.

5.4 Employee Training Program

Employee training is a major component in ensuring the success of this Facility's SCP. The more knowledgeable all employees are about the Facility's SCP and what is expected of them, the greater the chance that this plan will be effective.

An employee training program will be implemented to inform appropriate personnel at all levels of responsibility of the components and goals of the SCP. In addition, pollution prevention training videos will be made available through the Public Services' Water Programs Manager.

The Employee Training Form can be found in **Appendix E**.

6.0 STRUCTURAL CONTROLS

This section provides a description of the location, function, and design criteria of structural controls for chemical release prevention and containment. **Figure 1** highlights the structural controls and **Figure 3** illustrates the City of Kalamazoo utilities for WPS-1. These structural controls are in addition to the implementation of non-structural controls listed in the previous section.

The structural controls are used to divert, isolate, or otherwise contain spills or releases in a manner that reduces the likelihood of significant materials entering groundwater or stormwater and provides compliance with the Water Quality Standards.

Examples of structural controls include the following:

- ✓ Signs and Labels
- ✓ Temporary and permanent coverings
- ✓ Stormwater Conveyances
- ✓ Diversion Dikes
- ✓ Grading
- ✓ Paving
- ✓ Curbing
- ✓ Drip Pans
- ✓ Secondary Containment
- ✓ Catch Basin Inserts

6.1 Marking and Labeling

All significant materials, including waste, will be properly marked, and labeled in accordance with all federal, state, and local regulations. Any significant materials transferred into smaller containers will be marked with the chemical name and hazard.

6.2 Container Management

All significant materials will be stored inside of the Facility in designated storage areas. All containers will be in good condition and compatible with the materials stored within. All materials that are transferred from a larger to a smaller container will be transferred by use of a funnel or spigot. Empty containers will be stored in an organized manner and disposed of properly.

6.3 Secondary Containment

Any significant material with potential for release to the environment will be stored within appropriate secondary containment. Secondary containment will be checked routinely, and any spills identified in secondary containment will be immediately cleaned up, removed, and disposed of accordingly.

Secondary containment is currently under review and reconsideration for each of the significant materials listed in the below table. The table below highlights some examples of secondary containment structural controls that may be used at this Facility.

Refer to **Figure 2** for the location of all significant materials.

Secondary Containment Structural Control Table		
Description of secondary containment	Location of secondary containment	Significant Materials intended to be managed by secondary containment
UltraTech IBC Spill Pallet Plus 1157- No drain	Chemical feed room	Hexametaphosphate
PIG Utility Spill Basin	Chemical feed room	HEXAPHOS
UltraTech IBC Spill Pallet Plus 1157- No drain	Chemical feed room	Hydrofluorosilicic Acid
Utility Tray – Pallet Tray, 45 Gallon, 53x45x5 1/2"	Chemical feed room	Fluorosilicic Acid

7.0 SPILL RESPONSE

7.1 Material Handling

For complete guidance on material handling, the Safety Data Sheets of significant materials are stored on site in the SDS binder located inside either the chemical room or pump room. There should also be an SDS binder inside the Control room at the Harrison Facility in the Water Supply office. The Standard Operating Procedure (SOP) for each significant material is provided as **Appendix F**. The table below provides quick reference of significant material location, use, storage, properties, and the material's applicable spill kit.

Material Handling & Spill Response Table					
Significant Material Name	Material Location	Material Use	Container Type and Volume per container	Material Properties	Applicable
				(See SDS for exclusive summary)	Spill Kit
Carus 8400	Chemical storage	Corrosion control	Polyethylene tank, 15 gallons Polyethylene barrel, (57) 50 gallons	non-hazardous,	Chemical Spill Kit
				non-combustible,	
				environmental pollutant	
Fluorosilicic Acid	Chemical storage	Dental hygiene	Polyethylene tanks, 200,75 gallons	Corrosive material. Incompatible with glass, stoneware, metals, bases, steam, and water.	Chemical Spill Kit
Hydrofluorosilicic Acid	Chemical storage, Fluoride Room	Dental hygiene	Polyethylene barrel, (10) 30 gallons	Corrosive material. Incompatible with glass, stoneware, metals, bases, steam, and water.	Chemical Spill Kit
Sodium Hexametaphosphate	Chemical storage, Chemical Room	Corrosion control	Polyethylene tank, 115 gallons	non-hazardous,	Chemical Spill Kit
				non-combustible,	
				environmental pollutant	
HEXAPHOS	Chemical storage	Corrosion control	Paper bag, (399) 50 pounds	non-hazardous,	Chemical Spill Kit
				non-combustible,	
				environmental pollutant	

Chlorine Gas Cylinders	Chlorine Room	Disinfection	1-ton cylinders, 150 lb. cylinders (varies)	See SDS. Avoid release to the environment. IF ON SKIN: Wash with plenty of water. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Store in a well-ventilated place. Keep container tightly closed. Protect from sunlight. Store in a well-ventilated place.	Stop flow of gas, move leaking cylinder to open air if without risk. Identify possible material restrictions.
Ice Melt	Pump Room, Office Room	Seasonal sidewalk treatment	Plastic Bag, 50 pounds, 5-gallon bucket with lid	May be harmful to freshwater aquatic species, reactive with oxidizing agents, acids, lithium, and bromine trifluoride.	Chemical Spill Kit
Muriatic Acid (Hydrochloric Acid, HCL	Chemical storage	Descaling agent	Polyethylene barrel, (4) 50 gallons, (3) 5 gallons	Do not mix with alkaline materials or metals, store separate from oxidizers, environmental pollutant, nonflammable, forms flammable hydrogen gas on contact with metals	Neutralize liquid with soda ash, sodium sesquicarbonate, slaked lime, or sodium bicarbonate and flush to a sanitary sewer.

Sodium Hydroxide	Chemical storage	Neutralizing agent	Variable, Emergency chlorine scrubber unit	Environmental pollutant, non-explosive, clear, colorless, odorless liquid, generates heat with acids and can react violently with acids, incompatible with acids, organic materials, chlorinated solvents, aluminum, phosphorus, tin oxides, zinc; hazardous decomposition products are sodium oxides, hydrogen	Chemical Spill Kit, Land spill of sodium hydroxide: Solutions should be contained by diking with inert material, such as sand or earth.
Sodium Hypochlorite	Chemical room	Disinfection	Polyethylene tank, 15 gallons	Incompatible with acids, ammonia, bases, floor sweeping compounds, calcium hypochlorite, reducing agents, organic solvents, and compounds. Do not get material wet with water. Avoid contact with easily oxidizable organic material.	(See SDS for cleanup)
Accu-Tab Calcium Hypochlorite	Chemical storage	Disinfection	HDPE Bucket, 60 pounds	Oxider, not explosive	Large Spills: Wet down with water and dike for later disposal. Shovel the material into waste container. Following product recovery, flush area with water. Small Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. Clean surface thoroughly to remove residual contamination.

7.2 Spill Kit Inventories

Equipment and procedures necessary for cleaning up spills and preventing the spilled materials from being discharged are identified in **Table 3** – Chemical and Diesel Spill Kit inventory. The Facility's spill equipment and storage locations are provided on **Figure 4** – Spill Response Map.

7.3 Emergency Contact Numbers

Kalamazoo Public Safety (Emergency).....	911
Kalamazoo Public Safety Central Dispatch (Non-Emergency)	269-337-8994
EGLE 24-hour Pollution Emergency Alert System (PEAS) Hotline.....	800-292-4706
National Response Center (NRC).....	800-424-8802
Taplin Emergency Clean-up (notify Jean Talanda also).....	269-375-9595
City of Kalamazoo Water Programs Manager, Jean Talanda.....	269-337-8583
City of Kalamazoo Safety and Training Manager, Matt Dunklee.....	269-337-8129
City of Kalamazoo Safety and Training Coordinator, Erin Lassen.....	269-337-8927
EGLE Kalamazoo District Main Office.....	269-567-3500
EGLE Contact for Emergency Spill/Release, Donovan Thomas.....	269-615-4451
EGLE Contact for Release to City MS4 Storm Sewer / Creek, Janelle Hohm.....	269-568-2699

7.4 Response Procedure

The City of Kalamazoo created a Spill Response Packet which outlines the procedures and protocol for minor and major spills. Below is a quick reference on how to approach minor and major spills accordingly. For additional information on the City of Kalamazoo's spill response procedures, please see the Spill Response Packet located inside the SDS binder at Station 1 or in the Water Supply office at the Harrison Facility.

INCIDENTAL (MINOR) SPILLS: These are ordinary spills that pose no danger to health, or the environment and cleanup will be handled by water operations employees or contractors in the immediate vicinity.

1. Eliminate the source of the spill.
 - a. Examples: actions include rolling a drum so that a puncture will not drain, turning off a valve, placing a container in an upright position, etc.
2. Contain the spill to prevent the released material from entering any drain system and from leaving the building.
 - a. Examples: closing entrances, using adsorbent material as a barrier, etc.
3. Reference the significant material SDSs to properly handle the spill and dispose of the waste.
4. Notify Water Operations Supervisor and the Water Programs Manager prior to acting (unless immediate actions are necessary) and provide the following information: the material spilled, details of the incident, approximate volume, exact location of the spill, and containment performed and/or clean-up needed. Refer to **Section 7.3 for contact information**.
5. Never address an incident if you did not have proper training and/or feel uncomfortable for any reason by acting.

EMERGENCY (MAJOR) SPILLS: These are spills that may pose danger to health, or the environment, and cleanup activities likely require outside assistance.

1. Immediately alert area occupants and evacuate the area, if necessary.
2. **If fire, medical or public safety risks are present, immediately call 911.**
3. Implement measures to prevent the spill from entering a drain system or the environment if this can be done safely. If the spill is near a storm drain, place a drain cover over the drain immediately. Place absorbent materials over the spill area. A shovel can also be used to place soil around the spill area to act like a berm to detain and prevent spreading.
4. As soon as practically possible, notify the Water Operations Supervisor and Water Programs Manager (refer to **Section 7.3 for contacts**) and describe the incident, including:
 - a. The type of material released.
 - b. The approximate quantity of the material spilled.
 - c. Any danger to human health or the environment.
 - d. Any control measures already implemented.

- e. Any response agencies (e.g., fire department) already contacted.
- 5. The Water Operations Supervisor or Water Program Manager will contact a spill response contractor to remove the spill, if appropriate.
 - a. **Emergency Contractor: Taplin Enterprises at 269-375-9595** (reference the emergency response P.O.). If Taplin is called, also call the Water Programs Manager (see below).
 - b. **Water Operations Supervisor contact 269-370-2269.**
 - c. **Water Programs Manager contacts, Office 269-337-8583, Cell 269-370-1939.**
- 6. Refer to **Appendix G** - Details to Document, for notes to take during the event.
- 7. Refer to **Appendix H** – EGLE Release Notification Information, for details on reporting procedures after the event.

8.0 NON-STORMWATER DISCHARGES

Currently there are no unauthorized non-stormwater discharges at the site that need separate permits or approvals.

Discharges from fire-fighting activities are authorized by the NPDES MS4 permit but are exempted from the requirement to be identified in the SCP.

Any non-stormwater discharges discovered on site will be investigated and recorded in accordance with the Wellhead Protection Program and emergency response plans.

Non-stormwater Discharges Table				
Check the Applicable Non-Stormwater Discharges at the Facility		Pollution Prevention Controls Implemented	Impacted Inlet(s)	Impacted Discharge Point(s)
X	1. Discharges from fire hydrant flushing	Seasonal hydrant flushing standard operating procedures	STILKC221649	None
X	2. Potable water sources including water line flushing	water lines will be flushed over a vegetated pervious surface	None	None
	3. Water from the fire system testing and fire-fighting training without burned materials or chemical fire suppressants			
	4. Irrigation drainage			
	5. Lawn watering			
	6. Routine building washdown that does not use detergents or other compounds			
	7. Pavement wash waters where contamination by toxic or hazardous materials has not occurred and where detergents are not used			
	8. Uncontaminated condensate from air conditioners, coolers, and other compressors, and from the outside storage of refrigerated gases or liquids			
X	9. Uncontaminated groundwater	Directed toward a vegetated pervious surface	None	None
	10. Foundation or footing drains where flows are not contaminated with process materials such as solvents			

9.0 RECORD KEEPING

The City will maintain records of all SCP related inspection and maintenance activities. Records will also be kept describing incidents such as spills or other discharges that can affect the quality of groundwater and stormwater runoff. All such records will be retained in the Lucity system for at least five years. The following records are required for this Facility:

- ✓ Comprehensive Compliance Evaluation data (refer to Section 5.3)
- ✓ Employee training records data (refer to Section 5.4)
- ✓ Written summaries of the annual SCP review data (refer to Section 9.0)
- ✓ Underground waste holding tank data (refer to Section 4.5)
- ✓ Liquid Industrial Byproduct hauling manifests (refer to Section 4.5)

10.0 CERTIFICATION

The SCP will be reviewed and signed by the Water Resources Division Manager, the Certified Waterworks System Operator, and be retained on-site at the Facility.

I certify that this SCP has been developed in accordance with the terms and conditions of the Wellhead Protection Program and NPDES MS4 permit, and the City of Kalamazoo Performance Standards for Groundwater Protection within Wellhead Protection Capture Zones and Stormwater Management, and within good engineering practices.

To the best of my knowledge and belief, the information submitted is true, accurate, and complete. At the time this plan was completed no unauthorized discharges were present.

Water Resources Division Manager
Printed Name & Title:
Signature & Date:
Certified Waterworks System Operator
Printed Name & Title:
Signature & Date:

Tables

Table 1: Significant Materials Inventory

Table 1 – Significant Materials Inventory

Material Name	Material Use	Container Type	Quantity on Site
Sodium Hexametaphosphate	corrosion control	polyethylene tank	360 gallons
HEXAPHOS	corrosion control	paper bag	(399) 50 lb. bags
Carus 8400	corrosion control	polyethylene barrel	(57) 50 gallons
Carus 8400	corrosion control	polyethylene tank	15 gallons
Hydrofluorosilicic Acid	dental hygiene	polyethylene tanks	200 gallons, 75 gallons
Fluorosilicic Acid	dental hygiene	polyethylene barrel	(10) 30 gallons
Chlorine Gas	disinfectant	1-ton cylinders	(6) 1 ton
Sodium Hypochlorite	disinfectant	polyethylene barrel	(8) 50 gallons (2) 5 gallons
Sodium Hypochlorite	disinfectant	polyethylene tank	15 gallons
Accu-Tab Calcium Hypochlorite	disinfectant	HDPE bucket	(9) 60 lb. bucket
Muriatic Acid	descaling agent	polyethylene barrel	(4) 50 gallons (3) 5 gallons
Sodium Hydroxide	neutralizing agent	emergency chlorine scrubber unit	Variable
Ice Melt	seasonal sidewalk treatment	HDPE bucket	(1) 6.5 gallons

Table 2: Description of Industrial Activity or Significant Storage Areas

Table 2 – Description of Industrial Activity or Significant Storage Areas

Section Listed in General Permit	Storage Areas / Activity Areas	Significant Materials	Exposure Method	Reasonable Potential Evaluation (High, Medium, Low)	Inlet(s)	Outfall (s)
1. Loading, unloading and other material handling operations	The loading dock of the pump station	Carus 8400, Fluorosilicic acid, Muriatic Acid, Sodium Hypochlorite, Sodium Hydroxide	Spill or leak	Medium	STCBKC221395, STCBKC221385, STCBKC221667,	STOPKC224026
	Chemical storage and chemical feed rooms	Carus 8400, Fluorosilicic acid, Muriatic Acid, Sodium Hypochlorite, Sodium Hydroxide	Spill or leak	Low	STCBKC221395, STCBKC221385, STCBKC221667,	STOPKC224026
2. Outdoor storage including secondary containment structures	None					
3. Outdoor manufacturing or processing activities	None					
4. Significant dust or particulate generating processes	None					
5. Discharge from vents, stacks, and air emission controls	None					
6. On-site waste disposal practices	Empty material storage containers are taken off-site for disposal.	Carus 8400, Fluorosilicic acid, Muriatic Acid, Sodium Hypochlorite, Sodium Hydroxide	Spill or leak	Medium	STCBKC221395, STCBKC221385, STCBKC221667,	STOPKC224026
	Waste Holding Tank	Carus 8400, Fluorosilicic acid, Muriatic Acid, Sodium Hypochlorite, Sodium Hydroxide	Spill or leak while pumping out the tank	Low	STCBKC221395, STCBKC221385, STCBKC221667,	STOPKC224026
7. Maintenance and cleaning of vehicles, machines, and equipment	Chemical transfer equipment is washed in the pump station chemical feed room.	Carus 8400, Fluorosilicic acid, Muriatic Acid, Sodium Hypochlorite, Sodium Hydroxide	Spill or leak	Low	STCBKC221395, STCBKC221385, STCBKC221667,	STOPKC224026
8. Areas of exposed and/or erodible soils	Dirt/gravel roads from site entrance to pump condos	None	Sediment runoff	Low	None	None
9. Sites of Environmental Contamination listed under Part 201	None					
10. Areas of significant material residues	None					
11. Areas where animals congregate (wild or domestic) and deposit wastes	None					
12. Other areas where storm water may contact significant materials	None					

Table 3: Chemical Spill Kit Inventory

Table 3 – Chemical Spill Kit Inventory

Category	Spill Kit Type	Location	Item	Quantity
Acids/Bases/Unknowns Spill Kit				
Other Supplies (warning tape, labels, markers, etc.)	PIG® HazMat Spill Kit in 5-Gallon High-Visibility Economy Container	Chemical Storage Room	Polyethylene Disposal Bags (18" × 30")	2
Other Supplies (warning tape, labels, markers, etc.)	PIG® HazMat Spill Kit in 5-Gallon High-Visibility Economy Container	Chemical Storage Room	Tamperproof Seal Labels (2" × 6")	6
Other Supplies (warning tape, labels, markers, etc.)	PIG® HazMat Spill Kit in 5-Gallon High-Visibility Economy Container	Chemical Storage Room	Spill Kit Instructions	1
Other Supplies (warning tape, labels, markers, etc.)	PIG® HazMat Spill Kit in 5-Gallon High-Visibility Economy Container	Chemical Storage Room	5-Gallon Plastic Pail with Lid	1
Absorbents (pads, booms, kitty litter, etc.)	PIG® HazMat Spill Kit in 5-Gallon High-Visibility Economy Container	Chemical Storage Room	HazMat Absorbent Sock (PIG® 124CR)	3
Absorbents (pads, booms, kitty litter, etc.)	PIG® HazMat Spill Kit in 5-Gallon High-Visibility Economy Container	Chemical Storage Room	HazMat Absorbent Mat Pad (PIG® MAT301)	8

Figures

Figure 1 – General Site Overview Map



Site Map Notes:

- No waterbodies intercept the site boundary - Axtell Creek runs a long the station on to the west.
- The property is covered in vegetation and contains a paved driveway and parking lot to the north of the pump building.
- There are five production wells within the site boundary and one well is located across the street in front of Axtell Creek
- The underground waste holding tank is located directly in front of the dock with a large composite manhole lid.

Legend

-  Waterways
-  Production Well
-  Site Boundary
-  Vegetation
-  Pump Station
-  Waste Holding Tank
-  Pavement



City of Kalamazoo
215 W Stockbridge Ave.

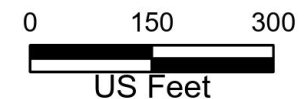


Figure 2 – Significant Material Use and Storage Map



Legend

- + Production Well
- Carus 8400
- Chlorine Gas
- Fluorosilicic Acid
- Hexaphos SHMP
- Hydrofluorosilicic Acid
- Ice Melt
- LPD-CHLOR Tablets
- Muriatic Acid
- Sodium Hexametaphosphate
- Sodium Hypochlorite
- Chlorinator Room (empty)
- Material Storage Area
- Fluoride Room
- Chlorine Room
- Chemical Storage
- Site Boundary
- Waste Holding Tank
- Material Use Area
- Pumping Room



City of Kalamazoo
215 W Stockbridge Ave.

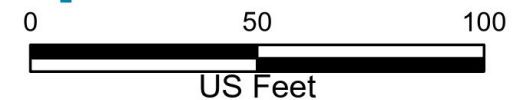
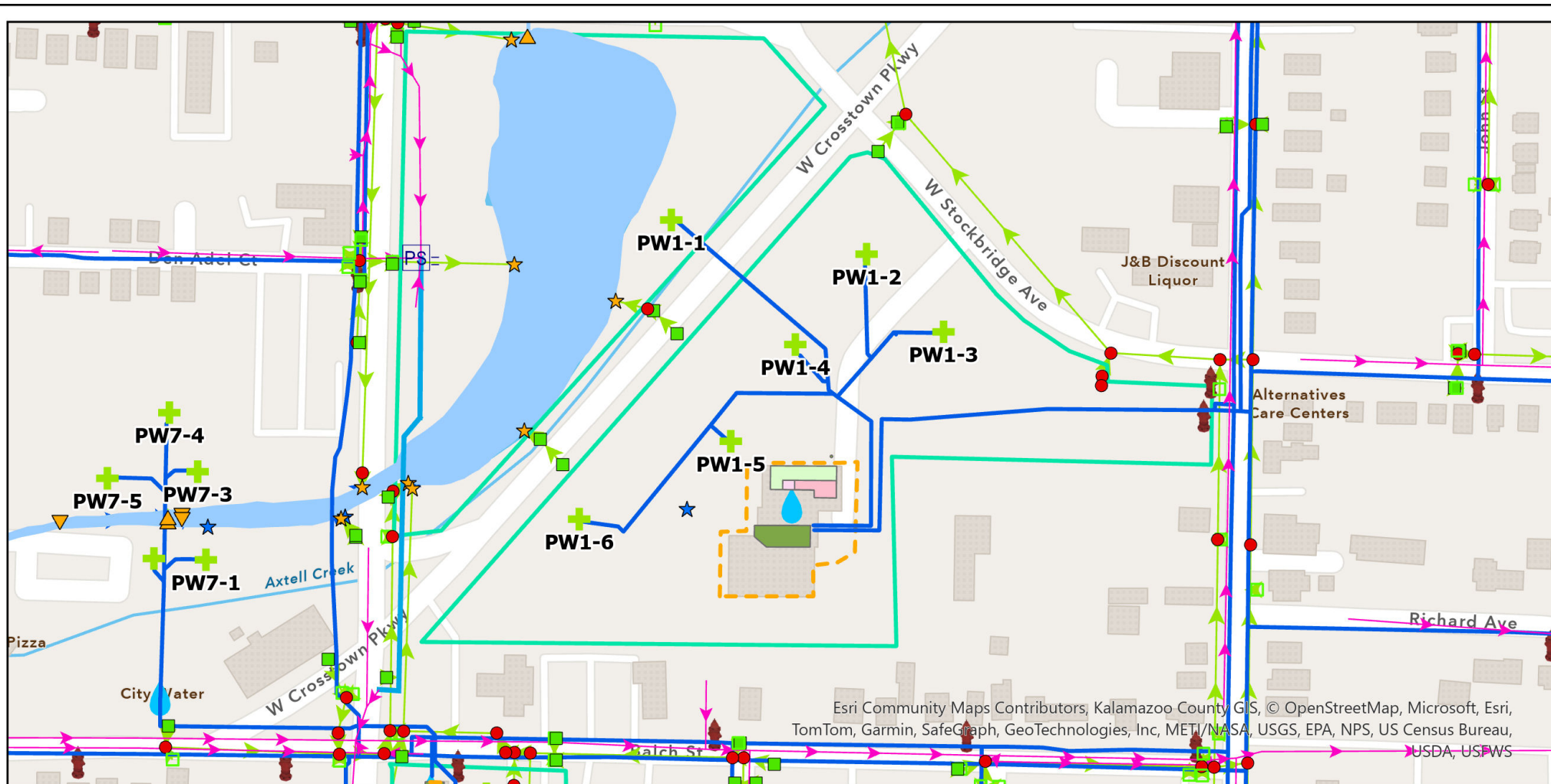


Figure 3 – Spill Response Map



Legend

- | | | | |
|--------------------|--------------------|------------------|------------------------------------|
| Material Use Area | Fluoride Room | Outfall to Water | Catch Basin |
| Waste Holding Tank | Chlorine Storage | Private Outfall | Culvert In |
| Chlorine Room | Chemical Storage | Gravity Main | Culvert Out |
| Pumping Room | Hydrants | Force Main | Inlet |
| Pump Station | Surface water body | Production Well | Manhole |
| Waterway Network | Site Boundary | Water Main | City of Kalamazoo Stormwater Sewer |

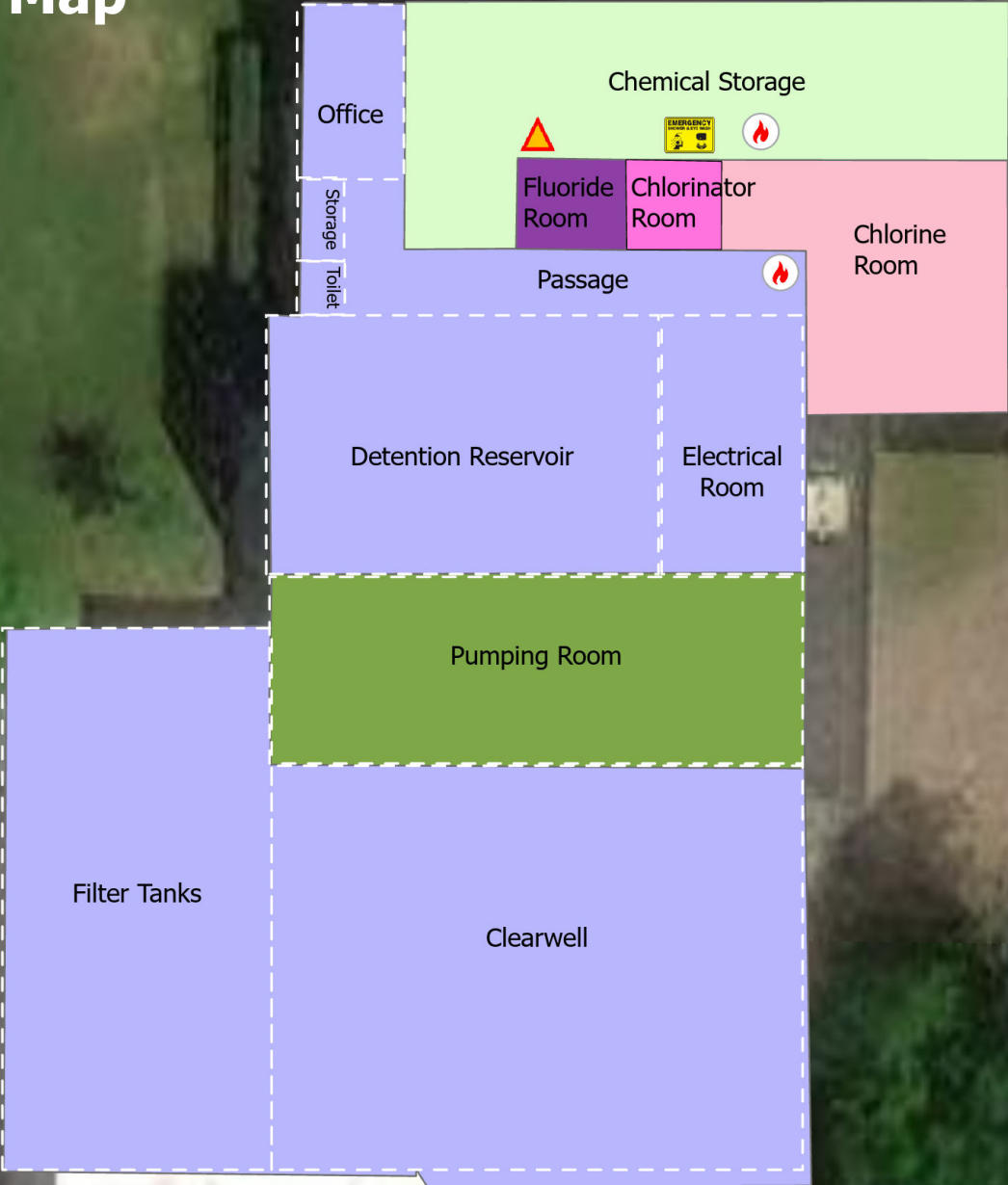


City of Kalamazoo
215 W Stockbridge Ave.

0 150 300
US Feet

Figure 4 – Spill Response Map

Station 11 Spill Response Map



Legend

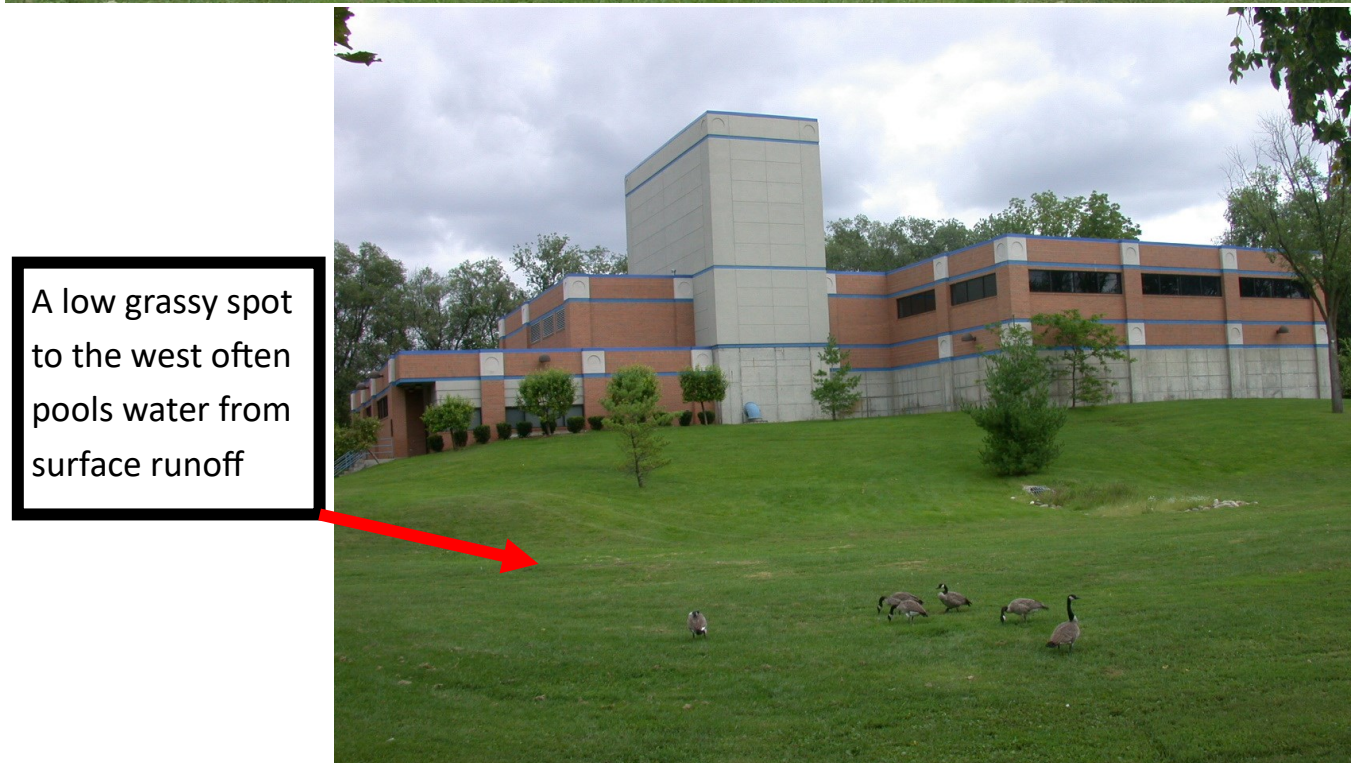
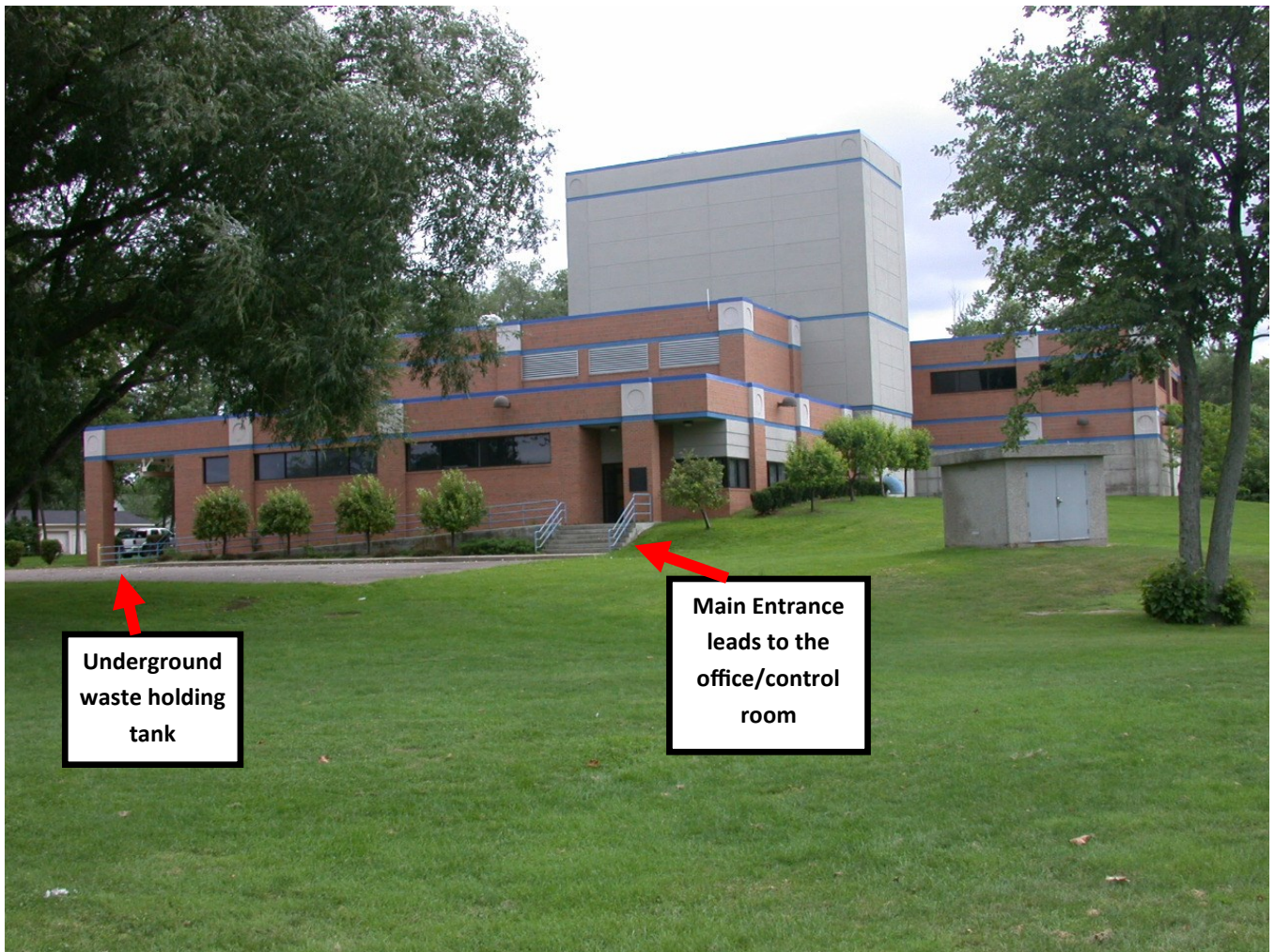
-  Chlorinator Room (empty)
-  Fluoride Room
-  Chlorine Room
-  Chemical Storage
-  Waste Holding Tank
-  Pumping Room
-  Safety Eye Wash/Shower
-  Fire Extinguisher
-  Spill Kit



Appendices

Appendix A - WPS-1 Photographs

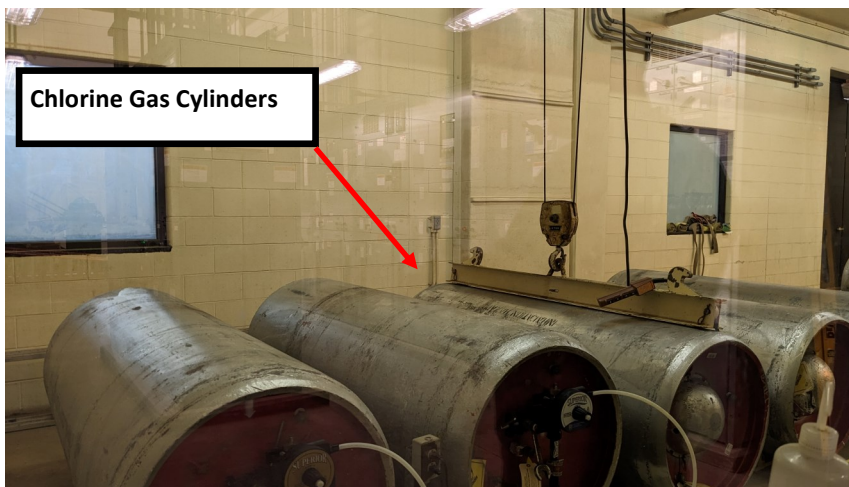
Station 1 Building Exterior



Station 1 Fluoride Room

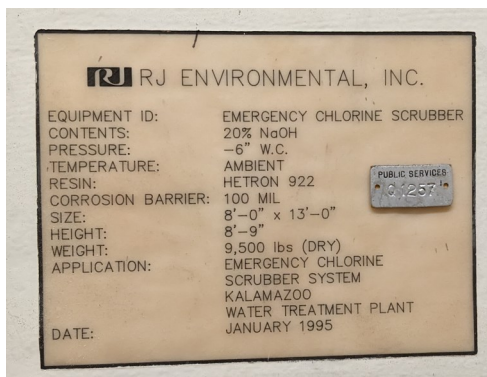


Station 1 Chlorine Room/(Chlorinator Room is empty)



Caustic Soda
is above the
chlorine
room

Emergency Chlorine
Scrubber



Station 1 Chemical Storage Room



Station 1 Chemical Storage Room



Safety shower/eyewash station

Chlorine Room

Safety shower is located in front of the chlorine room inside of the chemical storage room



Sodium Hypochlorite and Muriatic Acid barrels

Fire extinguisher

Empty pallets

Appendix B - Comprehensive Compliance Evaluation

Appendix B - Comprehensive Compliance Evaluation

Facility Information	
Designated Name:	Certificate of Coverage No. <u>or</u> Individual Permit No.:
Facility Address:	County:
Facility Contact Information	
Name:	Telephone No.:
Email Address:	Certification No.:
Backup Facility Contact Information	
Name:	Telephone No.:
Email Address:	Certification No.:
Certified Waterworks System Operator Information	
Name:	Telephone No.:
Email Address:	Certification No.:
Space to list additional operators if applicable:	

In addition to answering the following questions, the Facility listed above shall be inspected annually.			
1. Facility general information is current and accurate	Yes ☐	No ☐	
2. Site maps are current and accurate	Yes ☐	No ☐	
3. Significant material inventory is current and accurate	Yes ☐	No ☐	
4. New exposures, processes and related controls have been documented appropriately in the SCP	Yes ☐	No ☐	NA ☐
5. Spills have been recorded and reported as appropriate	Yes ☐	No ☐	NA ☐
6. Employee SCP training was conducted and documented	Yes ☐	No ☐	
	Yes ☐	No ☐	
8. A comprehensive site inspection has been completed, certified and filed in Lucity	Yes ☐	No ☐	
9. All waste charicarization results and LIB hauling manifests have been reviewed and are filed in Lucity.	Yes ☐	No ☐	NA ☐
10. Corrective actions noted in the inspection reports have been completed	Yes ☐	No ☐	
11. The site is compliant with the NPDES MS4 permit and has been reviewed by the Senior Civil Engineer.	Yes ☐	No ☐	
Additional Comments:			

I certify that the above information is correct:	
Name:	Signature / Date:

Appendix C - EGLE Spill or Release Report Form

Appendix C - EGLE Spill or Release Report Form



MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
ENVIRONMENTAL SUPPORT DIVISION

SPILL OR RELEASE REPORT

NOTE: Some State and Federal regulations require a specific form to use and procedures to follow when reporting a release. Those forms and procedures **MUST** be used and followed if reporting under those regulations. Please refer to the Michigan Reporting Requirements Tool to aid you in determining the proper form to use. This report form, although not required to be used, is designed to aid person to report releases under regulations. To report a release, some regulations require a facility to call the EGLE PEAS Hotline at 800-292-4706 (or the EGLE District Office that oversees the county where it occurred) and other agencies and provide information that is included in this form. This form may also be used for the written follow-up report to the department. If you prefer to submit this report electronically by FAX or e-mail, contact the regulating agency for the correct telephone number or e-mail address. Go to www.michigan.gov/chemrelease for more information.

Please print or type all information.

Name of Person Submitting Written Report		Title of Person Submitting Written Report		Telephone Number (provide area code)		
Name of Business		Release Location (Provide address if different than business, if known, and give directions to the spill location. Include nearest highway, town, road intersection, etc.)				
Street Address						
City	State					ZIP
Business Telephone Number (provide area code)						
Site Identification Number and Other Identifying Numbers (if applicable)		County	Township	Tier/Range/Section (if known)		
Release Data: Complete all applicable categories. Check all the boxes that apply to the release. Provide the best available information regarding the release and its impacts. Attach additional pages if necessary.						
Date of Release (if known)	Date of Discovery	Duration of Release (if known)	Type of Incident			
Time of Release (if known)	Time of Discovery	☐ days ☐ hours ☐ minutes	☐ Explosion ☐ Loading/unloading release ☐ Fire ☐ Pipe/valve leak or rupture ☐ Leaking container ☐ Vehicle accident ☐ Other			
Material Released (chemical or trade name)		CAS Number or Hazardous Waste Code	Estimated Quantity Released (indicate unit e.g. lbs, gals, cu ft or yds)	Physical State Released (indicate if solid, liquid, or gas)		
☐ Check here if additional materials listed on the attached page						

Factors Contributing to Release		Source of Loss	
☐ Equipment failure ☐ Operator error ☐ Faulty process design	☐ Training deficiencies ☐ Unusual weather conditions ☐ Other 	☐ Container ☐ Railroad car ☐ Pipeline ☐ Ship	☐ Tanker ☐ Tank ☐ Truck ☐ Other
Type of Material Released	Material Listed on or Defined by	Immediate Actions Taken	
☐ Agricultural: manure, pesticide, fertilizer ☐ Chemicals ☐ Flammable or combustible liquid ☐ Hazardous waste ☐ Liquid industrial waste ☐ Oil/petroleum products or waste ☐ Salt ☐ Sewage ☐ Unknown ☐ Other 	☐ CAA Section 112(r) list (40 CFR Part 68) ☐ CERCLA Table 302.4 (40 CFR Part 302) ☐ EPCRA Extremely Hazardous Substance (40 CFR Part 355) ☐ NREPA Part 31, Part 5 Rules polluting material ☐ NREPA Part 111 or RCRA hazardous waste ☐ NREPA Part 121 liquid industrial waste ☐ Unknown ☐ Other 	☐ Containment ☐ Diversion of release to treatment ☐ Dilution ☐ Evacuation ☐ Decontamination of persons or equipment ☐ Hazard removal ☐ Neutralization ☐ Monitoring ☐ System shut down ☐ Other 	
Release Reached			
☐ Surface waters (include name of river, lake, drain involved)			
☐ Distance from spill location to surface water, in feet			
☐ Drain connected to sanitary sewer (include name of wastewater treatment plant and/or street drain, if known)			
☐ Drain connected to storm sewer (include name of drain or water body it discharges into, if known)			
☐ Groundwater: Is it a known or suspected drinking water source? Yes ☐ No ☐ What is the name of aquifer, if known?			
☐ Soils (include type e.g. clay, sand, loam, etc.)			
☐ Ambient Air			
☐ Spill contained on impervious surface			
Extent of Injuries(if any)	Was Anyone Hospitalized? ☐ Yes Number Hospitalized: ☐ No	Number of Injuries Treated Onsite: 	

Describe the incident, the type of equipment involved in the release, how the volume of loss was determined, along with any resulting environmental damage caused by the release. Identify who immediately responded to the incident (own employees or contractor — include cleanup company name, contact person, and telephone number). Also identify who did further cleanup activities if performed or known when report submitted.

☐ **Check here if description or additional comments are included on attached page**

Estimated quantity of any recovered materials and a description of how those materials were managed (include disposal method if applicable)

☐ **Check here if description or additional comments are included on attached page**

Assessment of actual or potential hazards to human health (Include known acute or immediate and chronic or delayed effects, and where appropriate, advice regarding medical attention necessary for exposed individuals.)

☐ **Check here if description or additional comments are included on attached page**

Michigan Department of Environment, Great Lakes, and Energy Notified

Initial Contact by: ☐ Phone ☐ FAX
☐ Email ☐ Other

Date of Initial Contact

Time of Initial Contact

All EGLE Staff Contacted

Telephone Number

Name of Person Making Initial Report

Title of Person Making Initial Report

Contact made by calling EGLE Pollution Emergency Alerting System (PEAS):
800-292-4706

Log Number Assigned

EGLE District or Field Office:

- | | | |
|--|------------------------------------|------------------------------------|
| ☐ Bay City | ☐ Cadillac | ☐ Calumet |
| ☐ Crystal Falls | ☐ Detroit | ☐ Gaylord |
| ☐ Grand Rapids | ☐ Jackson | ☐ Kalamazoo |
| ☐ Lansing | ☐ Marquette | ☐ Newberry |
| ☐ Warren | | |

Note: EGLE Office locations are subject to change

Divisions or Offices Contacted

- ☐ Air Quality Division
- ☐ Drinking Water and Environmental Health Division
- ☐ Environmental Support Division
- ☐ Materials Management Division
- ☐ Office of Climate and Energy
- ☐ Office of the Clean Water Public Advocate
- ☐ Office of the Environmental Justice Public Advocate
- ☐ Office of the Great Lakes
- ☐ Oil, Gas, and Minerals Division
- ☐ Remediation and Redevelopment Division
- ☐ Water Resources Division

Other Entities Notified

- ☐ National Response Center (NRC): 800-424-8802
- ☐ US Coast Guard Office:
 - ☐ Detroit ☐ Grand Haven ☐ Sault Ste. Marie
- ☐ US Department of Transportation
- ☐ US Environmental Protection Agency
- ☐ 911 (or primary public safety answering point)
- ☐ Local Fire Department
- ☐ Local Police/State Police/Sheriff Dept
- ☐ Local Emergency Planning Committee
- ☐ State Emergency Response Commission via MI SARA Title III Pgm
- ☐ Wastewater Treatment Plant Authority
- ☐ Hazmat Team
- ☐ Local Health Department
- ☐ MIOSHA
- ☐ Bureau of Fire Services Fire Marshal Division
- ☐ MI Dept of Agriculture & Rural Development: 800-405-0101
- ☐ Other

Date: Time:

Person Contacted:

Telephone Number:

Date Written Report Submitted

Signature of Person Submitting Written Report

For information or assistance on this publication, please contact the Environmental Support Division, through EGLE Environmental Assistance Center at 800-662-9278. This publication is available in alternative formats upon request.

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This form and its contents are subject to the Freedom of Information Act and may be released to the public.

Appendix D - Dye Testing Certification

Appendix D - Dye Testing Certification and SDSs

GENERAL RULE 97 CERTIFICATION OF APPROVAL

R97-20/001

In compliance with the provisions of Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), and Rule R323.1097 of the Part 4, Water Quality Standards, promulgated thereunder, tracer dyes containing certain active ingredients are authorized to be applied to surface waters of the state, directly or indirectly, for the purpose of identifying and eliminating illicit discharges and cross connections, identifying pipeline and tank failures during hydrostatic pressure testing, discharge point location studies, mixing zone mapping, or time-of-passage studies by an entity submitting a complete Notification of Intent under this certification. This certification does not authorize the discharge of tracer dyes for any purposes other than those noted above.

The Notice of Intent and instructions for its submittal are available from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Web site at <https://www.michigan.gov/egle/about/organization/water-resources/rule-97-certifications> or by contacting Water Resources Division at 517-284-5567 or by emailing Sue Ashcraft, Lansing District Office, Water Resources Division at AshcraftS@Michigan.gov.

The application or discharge of tracer dyes to surface waters of the state is authorized by this certification only under, and contingent upon, full compliance with the following conditions:

1. A complete Notice of Intent is submitted.
2. The extent of the dye plume(s) in waters of the state shall be minimized to the maximum extent practicable.
3. The application of tracer dye(s) shall be conducted in accordance with all pertinent label instructions and additional restrictions identified in this certification.
4. Only the tracer dye(s) containing the active ingredients identified in the Acceptable Michigan Tracer Dye List (<https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/WRD/SWAS/rule97-acceptable-dye.pdf>) are authorized under this certification. Upon authorization, the dyes shall only be applied at concentrations resulting in active ingredient concentrations at or below the concentration limit. The active ingredient Chemical Abstract Service (CAS) number and concentration to be used shall also be identified in the applicant's Notification of Intent in order to be authorized.
5. The following agencies shall be notified 48 hours prior to application:
 - Local Municipality (city, township, village, etc.)
 - Local County Health Department
 - Downstream Health Departments if they could be potentially affected.
 - Local Area Emergency Coordinator

6. EGLE, Water Resources Division (WRD), staff shall also be notified 48 hours prior to applications of tracer dyes directly to surface waters of the state. WRD staff must also be notified if visible discharges of tracer dyes are observed in the surface waters of the state as a result of indirect application (illicit discharge and connections studies or discharge point location). Notification to WRD staff shall be as follows:
 - During normal working hours, please contact the appropriate WRD District Office <https://www.michigan.gov/-/media/Project/Websites/egle/Documents/Programs/WRD/About-Us/district-offices.pdf>.
 - After hours, weekends, or holidays, please contact the Pollution Emergency Alert System (PEAS) at 1-800-292-4706.
7. The entity applying the tracer dye(s) to the surface waters of the state, or to another area that has the potential to enter waters of the state, shall retain records for a minimum of three years from the date of dye application identifying treatment locations; dates of treatment; name of applicator(s); and the name, CAS number, and concentration of the active ingredient applied at each location.
8. In the event that any of the conditions of this certification are not, or may not be met, the entity applying the tracer dye(s) shall immediately notify the appropriate WRD District Office staff <https://www.michigan.gov/-/media/Project/Websites/egle/Documents/Programs/WRD/About-Us/district-offices.pdf> of the area in which the application occurred.
9. The issuance of this certification does not authorize the violation of any federal, state, or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other EGLE permits or approvals from other units of government as may be required by law.

Issued this 7th day of December 2021, by EGLE, this Certification of Approval shall become effective on January 1, 2022, and shall expire at midnight on December 31, 2023.



Jon Russell, Manager
Field Operations Section – Lakes Erie and Huron
Water Resources Division

REQUESTING INDIVIDUAL RULE 97 CERTIFICATION OF APPROVAL

WATER RESOURCES GUIDANCE

All projects involving the application of materials to waters of the state for water resource management purposes require a Rule 97 Certification of Approval from the Michigan Department of Environment, Great Lakes and Energy (EGLE).

Rule 97 of the Michigan Water Quality Standards states:

“The application of materials for water resources management projects pursuant to state statutory provisions is not subject to the standards as prescribed by these rules, but all projects shall be reviewed and approved by the commission before application.”

Water resource management projects requiring an Individual Rule 97 Certification of Approval include but are not limited to:

- application of products to surface waters of the state to control phosphorus.
- use of explosives to remove ice dams.
- application of rotenone for fish removal.

The following items must accompany any individual Rule 97 Approval request:

1. Description and purpose of the proposed water resource management project. A copy of any relevant standard operating procedures should be provided, if available.
2. Please describe any available water quality data that supports the necessity of the proposed treatment. Please state whether any water quality parameters will be monitored as part of the project. If so, please describe the monitoring regime and parameters to be measured.
3. Name and/or type of water body(ies) potentially affected by the proposed project.
4. Geographic location(s) of the specific water body(ies) potentially affected by the proposed project. The county, township/range/section data should be included to identify the affected site(s) location.
5. Name of material(s) to be applied to the water body(ies). A Safety Data Sheet and product manufacturer’s label should also be included. If bacteria are being used in the treatment, all bacterial strains, other ingredients, and any trace name formulations should be listed.

6. Specific time period when the treatment will occur. It is acceptable for a single request to cover multiple treatment applications scheduled over an extended time period (e.g., ten treatments of water body(ies) planned from April to November with a spacing of three to four weeks between treatments).
7. Total load(s) and dosage concentration(s) of the materials to be applied to the water body(ies). If the proposed dosage deviates from dosage recommendations on the manufacturer's label, a brief explanation should be provided.
8. The surface area of the water body(ies) that will potentially be affected by the treatment.
9. The name and contact information for the company selling the material to the applicant.
10. Lake ownership information, whether public or private. If private, what individual, group, or company has ownership.

The requests for approval to apply materials under Rule 97 should be submitted for review to Dr. Sara Nedrich, Water Toxics Unit, Surface Water Assessment Section, Water Resources Division by email at NedrichS@Michigan.gov or by mail at:

Dr. Sara Nedrich
Michigan Department of Environment, Great Lakes, and Energy
Water Resources Division, 3rd Floor South
P.O. Box 30458
Lansing, Michigan 48909-7958

By providing the information described in items 1-10, we will be able to provide a prompt review of your request.

Please contact Dr. Nedrich at NedrichS@Michigan.gov or 517-242-4989 with any questions.

This publication is intended for guidance only and may be impacted by changes in legislation, rules, policies, and procedures adopted after the date of publication. Although this publication makes every effort to teach users how to meet applicable compliance obligations, use of this publication does not constitute the rendering of legal advice.

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To request this material in an alternate format, contact EGLE-Accessibility@Michigan.gov or 800-662-9278.

Talanda, Jean

From: Page, Denise (EGLE) <PAGED@michigan.gov>
Sent: Monday, December 11, 2023 11:09 AM
To: Talanda, Jean; Klang, Jennifer (EGLE)
Cc: Cox, Kevin (EGLE)
Subject: [External Email] TRACER DYE APPROVAL - CITY OF KALAMAZOO - FROM DECEMBER 11, 2023 - DECEMBER 31, 2025
Attachments: 2024 EQP9269-Notification-of-Intent-to-Treat Form - Signed City of Kalamazoo.pdf

Hi Jean,

Per the information on the attached application, you are approved to use the tracer dyes from December 11, 2023 – December 31, 2025.

The following agencies shall be notified 48 hours prior to application:

- Local municipality (city, township, village, etc.).
- Local county health department.
- Downstream health departments if they could be potentially affected.
- Local Area Emergency Coordinator.

Jennifer Klang, Kalamazoo District Supervisor shall be notified at 269-568-2697 or KlangJ@Michigan.gov 48 hours prior to applications of tracer dyes directly to surface waters of the state.

Jennifer Klang must also be notified if visible discharges of tracer dyes are observed in the surface waters of the state as a result of indirect application (illicit discharge and connections studies or discharge point location). After hours, weekends, or holidays, please contact the Pollution Emergency Alert System (PEAS) at 1-800-292-4706.

Please let me know if you have any questions.

Thank you.

Denise Page, Secretary
Surface Water Assessment Section
Water Resources Division

From: Talanda, Jean <talandaj@kalamazoocity.org>
Sent: Monday, December 11, 2023 9:40 AM
To: Page, Denise (EGLE) <PAGED@michigan.gov>
Subject: City of Kalamazoo - 2024 Notification of Intent to Treat

CAUTION: This is an External email. Please send suspicious emails to abuse@michigan.gov

Denise,

On behalf of the City of Kalamazoo, I am submitted our 2024 Notification of Intent to Treat form for approval. Please let me know if you need additional information.

Thank you,

Jean

Jean Talanda

Water Programs Manager

Department of Public Services

Water Resources Division

1415 N. Harrison Street

Kalamazoo, MI 49007

269.337.8583



Protect Your Water

<http://www.ProtectYourWater.net>

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Contact List for Notification of Intent for Dye Testing
with Potential to Impact Surface Water:

NOTE: 48 hours prior to administering dye testing the following agencies must be notified:

EGLE: Susan Ashcraft ashcrafts@michigan.gov

Kalamazoo County Health Department: Lucas Pols ldpols@kalcounty.com

Kalamazoo Public Safety non-emergency: 269-488-8911, Select 1 to connect to dispatch

Also Email: supervisors@kccda911.org

COK: Wendy Burlingham: burlinghamw@kalamazoocity.org

COK: 311

COK: Jean Talanda talandaj@kalamazoocity.org

Example Text Script for IDEP Email Notifications - Also provide general project location and dates:

Media Release

For Immediate Release

**Contacts: City of Kalamazoo Department of Public Services
Water Resources Division
269-337-8148**

DYE TESTING DOWNTOWN KALAMAZOO City of Kalamazoo's Illicit Discharge Elimination Program (IDEP)

On (date), Kalamazoo, MI – Personnel of the Kalamazoo Dept. of Public Services will be using tracer dye to assist in the implementation of the City's Illicit Discharge Elimination Program (IDEP) pursuant to its Stormwater Phase II NPDES Permit (MS4 General NPDES Permit). The State of Michigan Department of Environment, Great Lakes and Energy (EGLE) has been notified and has approved the tracer dye testing.

The purpose of the dye testing is to investigate possible illicit discharges to the City's stormwater sewer system. The dye can appear in local surface water like shown in the picture below. This can be alarming

to citizens. Since the storm sewers in the City of Kalamazoo discharge stormwater directly to local lakes, rivers and streams, the City works to protect those local water resources.

Sometimes the City will use dye testing to help eliminate plumbing connections to the stormwater sewer system that should not be connected or to investigate materials being dumped into the stormwater sewer system. The dyes are determined to be safe and approved for use. They work as a very useful tool to help eliminate potentially harmful materials from getting into our local lakes, rivers and streams.



Photo from: <https://ecology.wa.gov/Blog/Posts/April-2013/Stories-about-Getting-to-Clean-Water-Stormwater-Sl>.

1 Company and Substance / Formulation Identification

- **Product identifier**
 - **Product name:** LIQUID POWDER TRACING DYE BLUE
 - **Product Code** LPB-C
- **Relevant identified uses of the substance or mixture and uses advised against**
No further relevant information available.
- **Application of the substance / preparation** Dyestuff/Colouring agent
- **Details of the supplier of the safety data sheet**
 - **Manufacturer/Supplier:**
Norlab, Inc.
7465 Industrial Parkway
Lorain, OH 44053
 - **Department:** Regulatory
 - **Emergency Telephone:**
1-800-247-9422

2 Hazard(s) identification

- **Classification of the substance or mixture**
The product is not classified according to the Globally Harmonized System (GHS).
- **Label elements**
 - **GHS label elements** Void
 - **Hazard pictograms** Void
 - **Signal word** Void
 - **Hazard statements** Void
 - **Additional information:** Non-classified.
 - **Classification system:**
 - **NFPA ratings (scale 0 - 4)**



- **HMIS-ratings (scale 0 - 4)**



3 Composition/information on ingredients

- **Chemical characterization: Mixtures**
 - **Description:** Mixture of the substances listed below with nonhazardous additions.
 - **Hazardous components:** Void

4 First-aid measures

- **Description of first aid measures**
 - **General information:** No special measures required.

(Contd. on page 2)

Product name: LIQUID POWDER TRACING DYE BLUE

(Contd. from page 1)

- **After inhalation:** Supply fresh air; consult doctor in case of complaints.
- **After skin contact:**
Immediately wash with water and soap and rinse thoroughly.
If skin irritation continues, consult a doctor.
- **After eye contact:**
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
- **After swallowing:**
Rinse out mouth and then drink plenty of water.
If symptoms persist consult doctor.
- **Most important symptoms and effects, both acute and delayed** No further relevant information available.
- **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

- **Extinguishing media**
 - **Suitable extinguishing agents:**
Use fire fighting measures that suit the environment.
CO₂, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards arising from the substance or mixture**
Formation of toxic gases is possible during heating or in case of fire.
- **Advice for firefighters**
 - **Protective equipment:** Wear fully protective suit.
 - **Additional information**
Dispose of fire debris and contaminated fire fighting water in accordance with official regulations.
Collect contaminated fire fighting water separately.

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures**
Product forms slippery surface when combined with water.
Wear protective clothing.
- **Environmental precautions:** Keep contaminated washing water and dispose of appropriately.
- **Methods and material for containment and cleaning up:**
Clean the affected area carefully; suitable cleaners are:
Warm water
- **Reference to other sections**
No dangerous substances are released.
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

- **Precautions for safe handling**
Store in cool, dry place in tightly closed receptacles.
No special measures required.
- **Protection against explosions and fires:** No special measures required.

(Contd. on page 3)

Safety Data Sheet

OSHA 29 CFR 1910.1200

Reviewed on 01/29/2019

Product name: LIQUID POWDER TRACING DYE BLUE

(Contd. from page 2)

- **Special Sensitivity:** KEEP FROM FREEZING.
- **Conditions for safe storage, including any incompatibilities**
 - **Storage:**
 - **Requirements for storerooms and containers:** Store only in the original receptacle.
 - **Further information about storage conditions:**
 - Protect from frost.
 - Store in cool, dry conditions in well sealed receptacles.
 - **Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

- **Technical systems:**

Facilities using this material should be equipped with an eye wash station and a safety shower.
- **Control parameters**
 - **Components with limit values that require monitoring at the workplace:**

The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
 - **Additional information:** The lists that were valid during the creation were used as basis.
- **Exposure controls**
 - **Personal protective equipment:**
 - **General protective and hygienic measures:**

The usual precautionary measures for handling chemicals should be followed.
Product is a concentrated colorant and can stain skin and/or various articles. The hazards of this product should be low under normal industrial and commercial use. Handle with care to minimize exposure.
 - **Breathing equipment:** Not required.
 - **Protection of hands:**

Use of gloves suggested; concentrated dye/pigment products may stain skin if directly contacted.

 - **Glove Material** No specified glove material; most liquid-impervious protective gloves will suffice.
 - **Eye protection:** General eye protection suggested when handling any chemical product.
 - **Body protection:** Protective work clothing

9 Physical and chemical properties

- **Information on basic physical and chemical properties**
 - **General Information**
 - **Appearance:**
 - **Form:** Liquid
 - **Color:** Dark blue
 - **Odor:** Odorless
 - **Odour threshold:** Not determined.
 - **pH-value:** Not determined.
 - **Change in condition**
 - **Melting point/Melting range:** Undetermined.
 - **Boiling point/Boiling range:** 95 °C (203 °F)
 - **Flash point:** Not applicable.

(Contd. on page 4)

USA

Safety Data Sheet

OSHA 29 CFR 1910.1200

Reviewed on 01/29/2019

Product name: LIQUID POWDER TRACING DYE BLUE

(Contd. from page 3)

· Ignition temperature:	
· Decomposition temperature:	Not determined.
· Auto igniting:	Product is not selfigniting.
· Danger of explosion:	Product does not present an explosion hazard.
· Explosion limits:	
· Lower:	Not determined.
· Upper:	Not determined.
· Vapor pressure:	Not determined.
· Density at 20 °C (68 °F):	1.16 g/cm ³ (9.68 lbs/gal)
· Relative density	Not determined.
· Vapour density	Not determined.
· Evaporation rate	Not determined.
· Solubility in / Miscibility with	
· Water:	Soluble.
· Partition coefficient (n-octanol/water):	Not determined.
· Other information	No further relevant information available.

10 Stability and reactivity

- **Reactivity**
- **Chemical stability**
 - **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
- **Possibility of hazardous reactions** No dangerous reactions known.
- **Conditions to avoid** No further relevant information available.
- **Incompatible materials:** Avoid contact with strong oxidizing agents.
- **Hazardous decomposition products:**
In the case of a fire, oxides of carbon, fumes, and smoke may be produced.

11 Toxicological information

- **Information on toxicological effects**
 - **Acute toxicity:**
 - **LD/LC50 values that are relevant for classification:**
Product has not been tested.
Based on the known information of the ingredients, product is expected to have a low level of acute oral toxicity. (Oral LD50 >2,000 mg/kg)
 - **Primary irritant effect:**
 - **on the skin:** No irritant effect.
 - **on the eye:** No irritating effect.
 - **Sensitization:** No sensitizing effects known.
 - **Additional toxicological information:**
The product is not subject to classification according to internally approved calculation methods for preparations:
When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to us.

(Contd. on page 5)

USA

Safety Data Sheet

OSHA 29 CFR 1910.1200

Reviewed on 01/29/2019

Product name: LIQUID POWDER TRACING DYE BLUE

(Contd. from page 4)

· Carcinogenic categories

· IARC (International Agency for Research on Cancer)

None of the ingredients is listed.

· NTP (National Toxicology Program)

None of the ingredients is listed.

· OSHA-Ca (Occupational Safety & Health Administration)

None of the ingredients is listed.

12 Ecological information

· Toxicity

· **Aquatic toxicity:** No further relevant information available.

· **Persistence and degradability** The product is biodegradable after prolonged adaptation.

· **Bioaccumulative potential** No further relevant information available.

· **Mobility in soil** No further relevant information available.

· **Additional ecological information:**

· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· Waste treatment methods

· **Recommendation:** Must be specially treated adhering to official regulations.

· Uncleaned packagings:

· **Recommendation:** Packaging can be reused or recycled after cleaning.

· **Recommended cleansing agent:** Water, if necessary with cleansing agents.

14 Transport information

· UN-Number

· DOT, ADR, ADN, IMDG, IATA Void

· UN proper shipping name

· DOT, ADR, ADN, IMDG, IATA Void

· Transport hazard class(es)

· DOT, ADR, ADN, IMDG, IATA

· Class Void

· Packing group

· DOT, ADR, IMDG, IATA Void

· **Environmental hazards:** Not applicable.

· **Special precautions for user** Not applicable.

· **UN "Model Regulation":** -

USA

(Contd. on page 6)

Safety Data Sheet

OSHA 29 CFR 1910.1200

Reviewed on 01/29/2019

Product name: LIQUID POWDER TRACING DYE BLUE

(Contd. from page 5)

15 Regulatory information

· Safety, health and environmental regulations/legislation specific for the substance or mixture

· SARA

· Section 355 (extremely hazardous substances):

None of the ingredients is listed.

· Section 313 (Specific toxic chemical listings):

None of the ingredients is listed.

· TSCA (Toxic Substances Control Act):

All ingredients are listed.

· Proposition 65

· Chemicals known to cause cancer: No known Proposition 65 substances.

· Carcinogenic categories

· EPA (Environmental Protection Agency)

None of the ingredients is listed.

· TLV (Threshold Limit Value established by ACGIH)

None of the ingredients is listed.

· NIOSH-Ca (National Institute for Occupational Safety and Health)

None of the ingredients is listed.

· GHS label elements Void

· Hazard pictograms Void

· Signal word Void

· Hazard statements Void

16 Other information

The data in this Material Safety Data Sheet relates only to the specific material designated herein. It does not relate to use in combination with any other material or in any process. This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of the manufacturer/supplier. The data on this sheet are related only to the specific material designated herein, and the information available for all ingredients at the time of creation. Manufacturer/supplier assumes no responsibility for use or reliance upon these data. Any information that is withheld herein (such as exact chemical identity or exact concentration) has been reserved as a trade secret as per applicable regulations.

1 Company and Substance / Formulation Identification

- **Product identifier**
 - **Product name:** LIQUID POWDER TRACING DYE YELLOWGREEN
 - **Product Code** LPY-C
 - **Relevant identified uses of the substance or mixture and uses advised against**
No further relevant information available.
 - **Sector of Use** SU3 Industrial uses: Uses of substances as such or in preparations at industrial sites
 - **Application of the substance / preparation** Dyestuff/Colouring agent
- **Details of the supplier of the safety data sheet**
 - **Manufacturer/Supplier:**
Norlab Inc.
7465 Industrial Parkway
Lorain, Ohio 44053 USA
(800) 247-9422
 - **Department:** Regulatory
 - **Emergency Telephone:**
1-800-247-9422

2 Hazards identification

- **Classification of the substance or mixture**
The product is not classified according to the Globally Harmonized System (GHS).
- **Label elements**
 - **GHS label elements** Void
 - **Hazard pictograms** Void
 - **Signal word** Void
 - **Hazard statements** Void
- **Classification system:**
 - **NFPA ratings (scale 0 - 4)**


Health = 1
Fire = 0
Reactivity = 0
 - **HMIS-ratings (scale 0 - 4)**

HEALTH	1	Health = 1
FIRE	0	Fire = 0
REACTIVITY	0	Reactivity = 0
- **Other hazards** Personal Protection Index: B

3 Composition/information on ingredients

- **Chemical characterization: Mixtures**
 - **Description:** Mixture of the substances listed below with nonhazardous additions.
 - **Hazardous components:** Void

Product name: LIQUID POWDER TRACING DYE YELLOWGREEN

4 First-aid measures

(Contd. from page 1)

- **Description of first aid measures**

- **General information:** No special measures required.

- **After inhalation:** Supply fresh air; consult doctor in case of complaints.

- **After skin contact:**

- Immediately wash with water and soap and rinse thoroughly.
 - If skin irritation continues, consult a doctor.

- **After eye contact:**

- Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.

- **After swallowing:**

- Rinse out mouth and then drink plenty of water.
 - Seek immediate medical advice.

- **Information for doctor:**

- **Most important symptoms and effects, both acute and delayed**

- No further relevant information available.

- **Indication of any immediate medical attention and special treatment needed**

- No further relevant information available.

5 Fire-fighting measures

- **Extinguishing media**

- **Suitable extinguishing agents:**

- Use fire fighting measures that suit the environment.

- CO₂, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

- **Special hazards arising from the substance or mixture**

- Formation of toxic gases is possible during heating or in case of fire.

- **Advice for firefighters**

- **Protective equipment:** Wear fully protective suit.

- **Additional information**

- Dispose of fire debris and contaminated fire fighting water in accordance with official regulations.

- Collect contaminated fire fighting water separately.

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures**

- Product forms slippery surface when combined with water.

- Wear protective clothing.

- **Environmental precautions:**

- Material is approved for controlled release for certain water tracing applications.

- Refer to any and all applicable state or municipal regulations to determine tracer study requirements.

- **Methods and material for containment and cleaning up:**

- Clean the affected area carefully; suitable cleaners are:

- Warm water

- Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).

- **Reference to other sections**

- No dangerous substances are released.

- See Section 7 for information on safe handling.

- See Section 8 for information on personal protection equipment.

Product name: LIQUID POWDER TRACING DYE YELLOWGREEN

See Section 13 for disposal information.

(Contd. from page 2)

7 Handling and storage

- **Handling:**
 - **Precautions for safe handling**
Store in cool, dry place in tightly closed receptacles.
No special measures required.
 - **Protection against explosions and fires:** No special measures required.
 - **Special Sensitivity:** KEEP FROM FREEZING.
- **Conditions for safe storage, including any incompatibilities**
 - **Storage:**
 - **Requirements for storerooms and containers:** Store only in the original receptacle.
 - **Further information about storage conditions:** Store in cool, dry conditions in well sealed receptacles.
 - **Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

- **Technical systems:**
Facilities using this material should be equipped with an eye wash station and a safety shower.
- **Control parameters**
 - **Components with limit values that require monitoring at the workplace:**
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
 - **Additional information:** The lists that were valid during the creation were used as basis.
- **Exposure controls**
 - **Personal protective equipment:**
 - **General protective and hygienic measures:**
The usual precautionary measures for handling chemicals should be followed.
Product is a concentrated colorant and can stain skin and/or various articles. The hazards of this product should be low under normal industrial and commercial use. Handle with care to minimize exposure.
 - **Breathing equipment:** Use suitable respiratory protective device in case of insufficient ventilation.
 - **Protection of hands:**
Use of gloves suggested; concentrated dye/pigment products may stain skin if directly contacted.
 - **Glove Material** No specified glove material; most liquid-impervious protective gloves will suffice.
 - **Eye protection:** General eye protection suggested when handling any chemical product.
 - **Body protection:** Protective work clothing

9 Physical and chemical properties

- **Information on basic physical and chemical properties**
 - **General Information**
 - **Appearance:**
 - **Form:** Liquid
 - **Color:** Dark yellow
 - **Odor:** Odorless
 - **Odour threshold:** Not determined.
 - **pH-value at 20°C (68 °F):** 8.6 - 11.0

(Contd. on page 4)

Safety Data Sheet

OSHA 29 CFR 1910.1200

Reviewed on 01/29/2019

Product name: LIQUID POWDER TRACING DYE YELLOWGREEN

(Contd. from page 3)

· Change in condition	
· Melting point/Melting range:	Undetermined.
· Boiling point/Boiling range:	Undetermined.
· Flash point:	Not applicable.
· Ignition temperature:	
· Decomposition temperature:	Not determined.
· Auto igniting:	Product is not selfigniting.
· Danger of explosion:	Product does not present an explosion hazard.
· Vapor pressure:	Not determined.
· Density at 20°C (68 °F):	1.27 g/cm ³ (10.598 lbs/gal)
· Relative density	Not determined.
· Solubility in / Miscibility with	
· Water:	Soluble.
· Viscosity:	
· Dynamic:	Not determined.
· Kinematic:	Not determined.
· Other information	No further relevant information available.

10 Stability and reactivity

- **Reactivity**
- **Chemical stability**
 - **Thermal decomposition / conditions to be avoided:**
No decomposition if used according to specifications.
- **Possibility of hazardous reactions** No dangerous reactions known.
- **Conditions to avoid** No further relevant information available.
- **Incompatible materials:** No further relevant information available.
- **Hazardous decomposition products:**
In the case of a fire, oxides of carbon, fumes, and smoke may be produced.

11 Toxicological information

- **Information on toxicological effects**
- **Acute toxicity:**
 - **LD/LC50 values that are relevant for classification:**
Based on the known information of the ingredients, product is expected to have a low level of acute oral toxicity. (Oral LD50 >2,000 mg/kg)
 - **Primary irritant effect:**
 - **on the skin:** Contact may cause irritation.
 - **on the eye:** Contact may cause irritation.
 - **Sensitization:** No sensitizing effects known.

(Contd. on page 5)

USA

Safety Data Sheet

OSHA 29 CFR 1910.1200

Reviewed on 01/29/2019

Product name: LIQUID POWDER TRACING DYE YELLOWGREEN

(Contd. from page 4)

· **Additional toxicological information:**

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**

None of the ingredients is listed.

· **NTP (National Toxicology Program)**

None of the ingredients is listed.

12 Ecological information

· **Toxicity**

· **Aquatic toxicity:** No further relevant information available.

· **Persistence and degradability** No further relevant information available.

· **Behavior in environmental systems:**

· **Bioaccumulative potential** No further relevant information available.

· **Mobility in soil** No further relevant information available.

· **Additional ecological information:**

· **General notes:**

Not known to be hazardous to water.

· **Other adverse effects:** No further relevant information available

13 Disposal considerations

· **Waste treatment methods**

· **Recommendation:** Must be specially treated adhering to official regulations.

· **Uncleaned packagings:**

· **Recommendation:** Packaging can be reused or recycled after cleaning.

· **Recommended cleansing agent:** Water, if necessary with cleansing agents.

14 Transport information

· **UN-Number**

· **DOT, ADR, IMDG, IATA** Void

· **UN proper shipping name**

· **DOT, ADR, IMDG, IATA** Void

· **Transport hazard class(es)**

· **DOT, ADR, IMDG, IATA**

· **Class** Void

· **Packing group**

· **DOT, ADR, IMDG, IATA** Void

· **Special precautions for user** Not applicable.

· **UN "Model Regulation":** -

USA

(Contd. on page 6)

Safety Data Sheet

OSHA 29 CFR 1910.1200

Reviewed on 01/29/2019

Product name: LIQUID POWDER TRACING DYE YELLOWGREEN

(Contd. from page 5)

15 Regulatory information

· Safety, health and environmental regulations/legislation specific for the substance or mixture

· SARA

· Section 355 (extremely hazardous substances):

None of the ingredients is listed.

· Section 313 (Specific toxic chemical listings):

None of the ingredients is listed.

· TSCA (Toxic Substances Control Act):

All ingredients are listed.

· Proposition 65

· Chemicals known to cause cancer:

None of the ingredients is listed.

· Chemicals known to cause reproductive toxicity for females:

None of the ingredients is listed.

· Chemicals known to cause reproductive toxicity for males:

None of the ingredients is listed.

· Chemicals known to cause developmental toxicity:

None of the ingredients is listed.

· Carcinogenic categories

· EPA (Environmental Protection Agency)

None of the ingredients is listed.

· TLV (Threshold Limit Value established by ACGIH)

None of the ingredients is listed.

· NIOSH-Ca (National Institute for Occupational Safety and Health)

None of the ingredients is listed.

· OSHA (Occupational Safety & Health Administration)

None of the ingredients is listed.

· GHS label elements Void

· Hazard pictograms Void

· Signal word Void

· Hazard statements Void

16 Other information

The data in this Material Safety Data Sheet relates only to the specific material designated herein. It does not relate to use in combination with any other material or in any process. This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of the manufacturer/supplier. The data on this sheet are related only to the specific material designated herein, and the information available for all ingredients at the time of creation. Manufacturer/supplier assumes no responsibility for use or reliance upon these data. Any information that is withheld herein (such as exact chemical identity or exact concentration) has been reserved as a trade secret as per applicable regulations.

Appendix E - Employee Training Form

Appendix E - Employee Training Form

**Storm
Watch**

MUNICIPAL STORMWATER POLLUTION PREVENTION

Acknowledgment
of Training

I, the undersigned, acknowledge that on this date: _____

I attended a training session at the following facility: _____

Facility Name: _____

Address: _____

Trainers Name: _____

This training session presented information on Municipal Stormwater Pollution Prevention.
During this session, I viewed the following Video Training Program:

- ☐ **Storm Watch: Municipal Storm Water Pollution Prevention**
- ☐ **Illicit Discharge Detection and Elimination**
- ☐ **Spills and Skills Non-Emergency HAZMAT Spill Response**
- ☐ **Stormwater Pollution Prevention**

Questions? Contact Jean Talanda, Water Resources Environmental Project Manager (269)337-8583
or via email at talandaj@kalamazoo-city.org

Employee Number

Employee Print Name

Employee Signature

Department

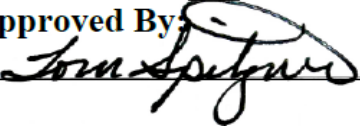
Division

☐ Temporary or Seasonal Employee

☐ Full-Time Employee

Appendix F - Material Handling SOPs

Appendix F - Material Handling SOPs

 City of Kalamazoo Public Services Department Harrison Street Facility	SOP / WP PROCEDURE No.: PSD-W/WWD-WOM-GEN-004	
	Computer Path: K:\WaterOps\SOP's\General\Chemicals\Sodium Hexametaphosphate\PSD-WWWD-WOM-GEN-004 - Sodium Hexametaphosphate.pdf	
Title: PSD-WWWD-WOM-GEN-004 - Sodium Hexametaphosphate	Written By: DLR/JACG	Date: March 2014
	Reviewed By: DLR/JACG	Date: July 2016
Annual Approval	Date	
	Approved By: 	Date 7/25/16

I. PURPOSE AND SCOPE

The purpose of this SWP is to provide a procedure for the safe handling, storage and usage of sodium hexametaphosphate referred to as P2.

II. PRECAUTIONS (if required)

PPE: i.e. gloves, dust mask

III. REQUIREMENTS

Sodium Hexametaphosphate is a white glass/crystal with fine odorless powder.

IV. DEFINITIONS

- A. Store this product in a cool dry location away from acids, perchlorates, and peroxides
- B. Avoid dusts and mists of the powder or solutions. These can be a skin, eye, and inhalation irritant
- C. When transferring material from its original factory container to the chemical crocks take care not to tear the double lined paper bag
- D. Product is very slippery when wet
- E. If a spill occurs or when coming in contact with this material flush with copious amounts of water

V. PROCEDURE

- A. Have your personal protective equipment on.
- B. Two 50-lb bags make 45-kg of solution.
- C. Empty bags into basket in chemical crock that needs to be filled.
- D. Add water using markings on the side of the crock.
- E. Dispose of bags in City of Kalamazoo facility dumpsters.

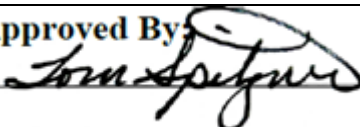
VI. REFERENCES

SDS

VII. LEGAL AND/OR REGULATORY REQUIREMENTS

ATPSD-WWWD-WOM-GEN-004 -Attachment 1 - SDS Sodium
Hexametaphosphate

SOP / WP Revision History		
Revision	Date	Approval

 City of Kalamazoo Public Services Department Harrison Street Facility	SOP / WP PROCEDURE No.: PSD-W/WWD-WOM-GEN-003	
	Computer Path: K:\WaterOps\SOP's\General\Chemicals\PSD- WWDDWOM-GEN-003 - Hydrofluorosilicic Acid.pdf	
Title: PSD-WWDDWOM-GEN-003 - Hydrofluorosilicic Acid	Written By: DLR/JACG	Date: March 2014
	Reviewed By: DLR/JACG	Date: March 2014
Annual Approval	Approved By: 	Date: 3/18/15
Date		

I. PURPOSE AND SCOPE

The purpose of this SWP is to provide a detailed procedure for the physical task of handling liquid fluoride.

II. PRECAUTIONS (if required)

- A. Acid gas cartridge respirator
- B. Chemical resistant PPE (i.e. non-ventilated goggles, face shield, rubber apron, boots and gloves)

III. DEFINITIONS

- A. Fluoride is a colorless to yellow colored liquid with a pungent, sour penetrating odor.
- B. Chemical Transfer Pump: motorized hand pump used to transfer chemical from factory containers to chemical crocks.
- C. Chemical Crocks: containers that store and measure the chemical solutions being fed.

IV. PRECAUTIONS/RESPONSIBILITIES

- A. This product is COMPLETELY soluble in water.
- B. This product@25% strength is 22% heavier than water.
- C. Can be neutralized with hydrated lime.
- D. Reacts with many metals, water, and steam.
- E. Produces highly toxic, corrosive fumes that can be highly flammable.
- F. Store product in closed containers in a cool, dry, well ventilated area away from sources of heat above 225°F or below -4°F
- G. NEVER store or transfer liquid into metal, glass or stoneware.
- H. Always use non-sparking tools.

- I. Keep separated from alkali metals, oxidizing agents, combustible solids and organic peroxides.
- J. If exposed above the OSHA PEL of 2.5mg/m³ as F seek medical aid immediately.
Pulmonary edema may be delayed up to 48 hours.
- K. Do not wear contact lenses.
- L. If a spill occurs do not allow the product to enter any sanitary sewer, storm sewer or surface waterways
- M. Capture spills with dikes and dilute any spilled material with water or hydrated lime.
- N. Dispose of neutralized material through an approved industrial treatment facility in accordance with local, state, and federal regulations.

V. PROCEDURE

- A. Have your personal protective equipment on.
- B. Open barrel.
- C. Put chemical transfer pump in barrel.
- D. Attach discharge hose of chemical transfer pump to the chemical crock.
- E. Plug in the chemical transfer pump and turn it on.
- F. When all the hydrofluorosilicic acid has been pumped over, turn off chemical transfer pump.
- G. Unplug chemical transfer pump and detach from the chemical crock. Rinse it thoroughly with water and store it on its hook.
- H. Pour over any excess into the pour-over barrel.
- I. Close the barrel and rinse it with water.

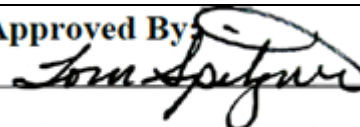
VII. REFERENCES

SDS

VI. LEGAL AND/OR REGULATORY REQUIREMENTS

PSD-WWWD-WOM-GEN-003 - Attachment 1 - SDS Hydrofluorosilicic Acid

SOP / WP Revision History		
Revision	Date	Approval
Removed MSDS attachment and added SDS attachment.	7/26/16	TS

 City of Kalamazoo Public Services Department Harrison Street Facility	SOP / WP PROCEDURE No.: PSD-W/WWD-WOM-GEN-012	
	Computer Path: K:\WaterOps\SOP's\General\Chemicals\PSD- WWWDWOM-GEN-012 - 150lb Chlorine Cylinders.pdf	
Title: PSD-WWWD-WOM-GEN-012 - 150lb Chlorine Cylinders	Written By: DLR/JACG	Date: March 2014
	Reviewed By: DLR/JACG	Date: March 2014
Annual Approval	Date	Approved By:  Date: 3/18/15

I. PURPOSE AND SCOPE

This SOP revision has been created to provide a detailed procedure for the physical task of safely handling and changing 150lb chlorine cylinders.

II. REQUIREMENTS

- A. Chlorine gas detector
- B. Ammonia solution
- C. Two qualified persons
- D. Chlorine cartridge type respirator
- E. Personal Protective Equipment

III. DEFINITIONS

- A. Chlorine gas: a greenish - yellowish gas that is 2.5 times heavier than air and extremely corrosive and potentially deadly.
- B. Fusible Plug: a safety relief device found on all chlorine containers. It is made of a metal alloy containing bismuth, lead, tin, and aluminum. It is designed to melt at 158°F. One plug per cylinder located on the valve directly above the valve seat thread.

IV. PRECAUTIONS/RESPONSIBILITIES

- A. All Chlorine make up will be made with 2 qualified employees with the proper equipment and knowledge of safety procedures to complete the task safely.
- B. Never expose cylinders to heat or store near heat sources, combustibles, or flammable Materials.
- C. Never tamper with the fusible plug.
- D. Always keep the protective hood in place when not in use.
- E. Never lift a cylinder by its protective hood.
- F. Never drop or knock over a cylinder.

- G. Always secure cylinders with chains.
- H. The station **MUST** be running during a chlorine change.
- I. A chlorine cartridge respirator will be on the person and available for immediate use.
- J. A portable chlorine gas badge will be used when changing a cylinder.
- K. Any other PPE should be accessible i.e. Chemical resistant non-ventilated goggles, rubber gloves, long sleeves, aprons, boots, etc.

V. PROCEDURE

SPECIAL NOTE: the personal chlorine badge will alarm at 1ppm and the station will alarm at 5ppm.

- A. Verify that the station is running and will not shut down.
- B. Have the chlorine gas badge on and ready for use.
- C. Have PPE available and ready for use.
- D. Choose the cylinder in use and turn the valve stem clockwise to close.
- E. Choose the empty cylinder that has been purged of vapors and turn the valve stem clockwise to close.
- F. Verify that the float in the rate tube/rotameter has dropped to zero, giving a few minutes to make certain the valves are closed, and the lines are cleared.
- G. Proceed by loosening feeder yoke & removing chlorinator assembly from the cylinder.
- H. Place chlorinator assembly on hook on wall, or other safe area, ensuring the assembly cannot fall and the attached line will not kink.
- H. Secure and tighten the cylinder's brass valve cap and replace the protective hood.
- I. Remove the cylinder from the scale and place it in the empties holding area secured by Chains.
- J. Zero scale or tare to required weight based on type of scale in use.
- K. Place a full cylinder back on the scale with the operating valve oriented to face forward and ensure cylinder is properly chained.
- L. Remove the protective hood & place it in a safe location.
- M. Verify that the valve is closed then remove the brass valve cap.
- N. When replacing the chlorinator assembly verify that the used lead washer has been removed, inspect mating surface and cylinder valve for build up or debris.
- O. **ALWAYS** use a new lead gasket in the chlorinator assembly before reattaching the yolk to the cylinder.
- P. Once the yoke is placed back on the cylinder, secure it while paying close attention to **NOT** over tighten.
- Q. Double check all components for proper assembly and attachment.
- R. Test the replacement cylinder first by opening the cylinder valve $\frac{1}{4}$ of a turn, then quickly closing it. Check for leaks with the ammonia solution and (or) a portable gas badge.

- S. A leak will be verified by a white smoky cloud or an audible alarm.
- T. If you experience a leak, verify that all valves are closed and investigate possible culprits by reviewing procedure again.
- U. If no leaks occur, open the "in use" cylinder valve to ¼ of a turn, while checking it for leaks and leave the cylinder in service.
- V. Open the replacement cylinder valve to ¼ of a turn, while checking for leaks once again.
- W. If no leaks occur ensure the cylinder valve is ¼ of a turn open, reset the chlorinator, and place it in standby, recheck everything one more time.
- X. Leave wrenches on the cylinder valves.
- Y. After any chlorine change make a complete detailed inspection of the chlorine system to verify its proper operation.

IF A LEAK OCCURS AND THE STATION ALARM SOUNDS: secure your respirator, shut off cylinder valves and exit the area immediately. Verify that the air scrubber was initiated and that the room is venting. Do not enter until the alarm has cleared. When the alarm has cleared re-enter the area, verify the problem and make the repair.

IF THE LEAK CANNOT BE STOPPED and the station alarm does not clear evacuate the location. Seek out a higher elevation up wind of the leak, call "911" requesting Hazmat assistance for a chlorine gas leak and secure the perimeter. Contact the supervisor and inform of your actions.

VI. REFERENCES

Alexander Chemical Corporation Presents Chlorine, Sulfur Dioxide, Sodium Hypochlorite & Sodium Bisulfite Safety and Handling

VII. LEGAL AND/OR REGULATORY REQUIREMENTS

VIII. ATTACHMENTS

PSD-WWWD-WOM-GEN-012 - Attachment 1 - SDS Chlorine Gas

SOP / WP Revision History		
Revision	Date	Approval
Removed MSDS attachment and added SDS attachment.	7/26/16	TS
Revised procedure	3/18/2024	Brock VanDyken
Revised procedure	9/5/2024	Brock VanDyken

Appendix G - Details to Document

Appendix G - Details to Document

Details to Document

When you witness, or are a part of, a spill/release, it is very important to grab a pen and paper and start to DOCUMENT DETAILS either during your response efforts or Immediately after. Some items the City and the State will NEED TO KNOW are:

YOUR NAME AND TITLE

YOUR TELEPHONE NUMBER

ADDRESS OF SPILL/RELEASE

DESCRIPTION OF LOCATION

DATE AND TIME OF RELEASE (IF KNOWN)

DATE AND TIME OF DISCOVERY

DURATION OF RELEASE

MATERIAL RELEASED

ESTIMATED QUANTITY RELEASED

DESCRIBE THE INCIDENT THAT LED TO THE RELEASE

IMMEDIATE ACTIONS TAKEN

CONTRACTOR CALLED

DATE AND TIME OF CALL

TIME OF CONTRACTOR ARRIVAL

NAME AND PHONE NUMBER OF CONTRACTOR CONTACT

STATE (EGLE) NOTIFICATION (Release during business hours)

TIME OF CALL

NAME(S) AND PHONE NUMBER(S) OF EGLE STAFF CONTACTED

PEAS HOTLINE CALLED (Release AFTER business hours)

TIME OF CALL

LOG NUMBER ASSIGNED

ANY OTHER ENTITIES NOTIFIED List Here

DID THE RELEASE REACH:

SURFACE WATERS?

List the body of water. If it did not reach the body of water, list the distance from the surface water (in feet)

SANITARY SEWER?

List name of street drain(s) if known or take a picture/make a drawing so it can be identified later.

DRAIN CONNECTED TO STORM SEWER?

List name of storm drain(s) or take a picture/make a drawing so it can be identified later.

GROUND?

Record a brief description of ground type (asphalt, gravel, soil, grass, etc.)

Appendix H - EGLE Release Notification Information

ENVIRONMENTAL RELEASE REPORTING

Release Notification Requirements in Michigan*

This document should be used as a tool to identify potential reporting requirements before a release occurs, and to identify required follow-up reporting based on the release and relevant regulations. It outlines what releases must be reported, when they must be reported, and to whom they must be reported. Refer to individual state and federal acts and regulations for specific information and requirements as this document is not a substitution for individual state and federal acts and regulations).

Always check your facility permits, licenses, registrations, pollution prevention plans, and local ordinances for additional release reporting requirements. In particular, all National Pollutant Discharge Elimination System (NPDES) permits, and most air permits, contain release reporting requirements that are not outlined in this document.

While diligent efforts have been made to assure that the information contained herein is accurate and complete, there is no guarantee that it covers all of the regulatory requirements for release notification and reporting in Michigan*.

This document was prepared by the Michigan Department of Environment, Great Lakes, and Energy - SARA Title III Program.

If the release is an
Immediate **THREAT TO HUMAN HEALTH or SAFETY**,
call 911 or your local fire department

*This table covers only those reporting requirements found in rules and regulations that apply in Michigan. **Releases might be reportable under multiple regulations.** Additional reporting requirements might be found in permits, licenses, registrations, contingency and pollution prevention plans, and local ordinances

Release Notification Requirements in Michigan*

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To request this material in an alternative format, contact EGLE-Accessibility@Michigan.gov or call 800-662-9278.

Release Notification Requirements in Michigan*

Extremely Hazardous Substances (EHS) and Hazardous Substances

(under SARA Title III, Section 304, 40 CFR 355.40)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Release of a CERCLA hazardous substance (40 CFR 302, Table 302.4) or Extremely Hazardous Substance (40 CFR 355, Appendix A) from a facility (all buildings, equipment, etc. located on a single site or adjacent sites owned or operated by the same person) at which a hazardous chemical (as defined under 29 CFR 1910.1200(c)) is used, produced or stored (including motor vehicles, rolling stock, and aircraft) in a quantity equal to or greater than its corresponding reportable quantity in any 24-hr period that migrates beyond the facility boundaries. Includes continuous release reportable under CERCLA Section 103. Excludes release that is federally permitted or that results in exposure to persons solely within the boundaries of the facility. See 67 FR 18899 (4/17/02) for guidance on the CERCLA federally permitted release definition for certain air emissions. Does not apply to the application, handling, and storage by an agricultural producer of a pesticide product registered under FIFRA. Excludes release < 1000 lbs. of NO_x released to the air from combustion or combustion-related activities.	Immediate (within 15 minutes after discovery) to: LEPC(s) of any area(s) potentially affected, and SERC (<i>EGLE/PEAS line accepts notification on behalf of SERC</i>) by owner or operator. Continuous releases must be identified as such and are reported initially and when there is a significant change in the release. See 73 FR 76948 (12/18/08): Only CAFOs are required to report continuous releases to the air from animal waste. Transportation-related releases can be reported to 911.	As soon as practicable (within 30 days) after release: to LEPC(s) and SERC. Not required for releases that occur during transportation or from storage incident to transportation. For continuous releases: Initial written within 30 days after initial telephone notification: to LEPC(s) and SERC. Michigan SARA Title III Program accepts reports on behalf of the SERC.	PEAS: 800-292-4706 Contact your LEPC for a phone number to report releases. Call 911 if your LEPC is not active. For further information & LEPC contact information, contact Michigan SARA Title III Program 517-284-7272

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Hazardous Substances

(Under CERCLA, Section 103, 40 CFR 302)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Release into the environment of a CERCLA hazardous substance (40 CFR 302, Table 302.4) or hazardous constituent in a mixture or solution (including hazardous waste streams) from a vessel or facility (any building, structure, etc. including motor vehicles, rolling stock, aircraft, pipe, pipeline, well, pond, lagoon, impoundment, ditch, landfill, or site where a hazardous substance has come to be located) in a quantity equal to or greater than its corresponding reportable quantity in any 24-hour period. Excludes petroleum, including oil, or any fraction thereof. See 40 CFR 302.6 for notification requirements for radionuclide releases. Includes continuous release: occurs without interruption or abatement or that is routine, anticipated, and intermittent and incidental to normal operations or treatment processes. See 67 FR 18899 (4/17/02) for guidance on the CERCLA federally permitted release definition for certain air emissions. See 71 FR 58525 (10/4/06) re Exemption for NOx releases to the air of < 1000 lbs. from combustion or combustion-related activities. Does not apply to the application, handling, and storage by an agricultural producer of a pesticide product registered under FIFRA.	Immediate (within 15 minutes after discovery) to: NRC by person in charge of vessel or offshore or onshore facility. Continuous releases must be identified as such and are reported initially and when there is a significant change in the release. See 73 FR 76948 (12/18/08) re Exemption from reporting continuous releases to the air from animal waste.	For continuous releases only: Initial written within 30 days after initial telephone notification and Follow-up within 30 days of first anniversary of initial written notification to: EPA Region 5.	NRC: 800-424-8802 or www.nrc.uscg.mil For further information contact Michigan SARA Title III Program 517-284-7272 or EPA's Superfund, TRI, EPCRA, RMP, and Oil Information Center 800-424-9346

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Environmental Remediation

(Under NREPA, 1994 PA 451, Part 201)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
(i) Unpermitted release into the environment over a 24-hour period of a hazardous substance (<i>July 1, 2012, edition of the CERCLA list, 40 CFR 302, Table 302.4</i>) in a quantity equal to or greater than its corresponding reportable quantity. Does not include release solely from UST systems regulated under Part 213, and release solely from disposal area licensed under Part 115 and discovered through disposal area's hydrogeological monitoring plan. Release of substance regulated by Michigan Department of Agriculture & Rural Development (MDARD) (fertilizer, soil conditioner, or pesticide) excluding normal agricultural practices: <i>also</i> report to MDARD. (ii) The owner or operator has reason to believe that one or more hazardous substances are migrating or have migrated from his or her property and are present beyond the property boundary at a concentration in excess of cleanup criteria for unrestricted residential use. (iii) The release is a result of an activity that is subject to permitting under NREPA Part 615 and the owner or operator is not the owner of the surface property and the release results in hazardous substance concentrations in excess of cleanup criteria for unrestricted residential use. Hazardous substance means a hazardous substance defined in CERCLA (40 CFR 302), hazardous waste as defined in NREPA part 111, petroleum as defined in NREPA part 213, or any substance demonstrated to pose an unacceptable risk to public health, safety, welfare, or the environment. Cleanup criteria for unrestricted residential use means criteria that satisfy the requirements in section 20120a(1)(a) or (16); or as defined under NREPA part 213.	Within 24 hours after discovery: to EGLE-RRD district office (PEAS after hours) by owner or operator or person holding easement interest. Report agricultural release to MDARD. Off-site Migration: Within 30 days after discovery: to EGLE-RRD district office and owners of property to which hazardous substances migrated or owner of surface property by owner or operator of property where release occurred. Specific form required: "Notice of Migration of Contamination" (Form EQP4482).	Upon request: Provide a response activity plan to EGLE-RRD district supervisor.	PEAS: 800-292-4706 MDARD Agriculture Pollution Emergency Hotline: 800-405-0101 For further information contact EGLE-RRD

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Agricultural

(Under NREPA, 1994 PA 451, Part 83, **Pesticide Control**, Regulation 640, Commercial Pesticide Bulk Storage)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Release to the environment of a commercial pesticide >5 gallons or 100 pounds. Reportable agrichemical spills as defined in the provisions of SARA Title III section 304 and CERCLA section 103 shall be immediately reported to PEAS and the NRC. The term “release” excludes normal agricultural practices.	Immediate to PEAS* Also notify NRC for spills reportable under SARA Title III & CERCLA. *MDARD prefers direct notification to their hotline. PEAS forwards all agriculture calls to MDARD.	Within 90 days: a revised site plan to MDARD Pesticide and Plant Pest Management Division	MDARD Agriculture Pollution Emergency Hotline: 800-405-0101 PEAS: 800-292-4706 NRC: 800-424-8802 or online at www.nrc.uscg.mil For further information contact MDARD: 517-284-5644

Agricultural

NREPA, 1994 PA 451, Part 85, **Fertilizers**. Regulation 641 Commercial Fertilizer Bulk Storage, Regulation 642, On Farm Fertilizer Bulk Storage

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Release to the environment of a commercial fertilizer >55 gallons liquid or 650 pounds dry, or tank overfills; or an on farm fertilizer > 55 gallons liquid. For storage tank with bladder system instead of diking: also report all overfills and internal spills. The term “release” excludes normal agricultural practices. The term “liquid fertilizer” excludes anhydrous ammonia.	Immediate: to MDARD by commercial bulk storage facility personnel (For farms, the regulation does not specify who makes the report.)	Not required.	MDARD Agriculture Pollution Emergency Hotline: 800-405-0101 For further information contact MDARD 517-284-5644

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Fire Prevention

(Under Fire Prevention Code, 1941 PA 207, Section 29.5g)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
A fire, explosion, spill, leak, accident, or related occurrence that involves the transportation, storage, handling, sale, use, or processing of hazardous material by a firm, person, or vehicle. Hazardous material = explosives, pyrotechnics, flammable gas, flammable compressed gas, flammable liquid, nonflammable compressed gas, combustible liquid, oxidizing material, poisonous gas or liquid, LPG, or irritating, etiologic, radioactive, or corrosive material. Act 207 amended 6/19/2006. The State Fire Marshall is in LARA, Bureau of Fire Services.	Immediately following incident, report known details regarding incident: to LARA Bureau of Fire Services <i>and</i> organized local fire department by owner of firm or vehicle or the person <i>and</i> the chief of first police or organized fire department upon scene of incident.	Not required.	Contact LARA Bureau of Fire Services by calling the MSP HazMat hotline: 800-525-5555 For further information: contact local fire department

Fire Prevention

(Fire Prevention Code, 1941 PA 207, Part 2 of Storage and Handling of **Flammable and Combustible Liquids** rules [FL/CL])

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
A release from an AST system of > 55 gal of any flammable or combustible liquid (flash point < 200°F) to the ground or within a secondary containment area during any 24 hour period. Note: Many liquid pesticides are combustible (flash point between 100 and 200°F).	As soon as practicable after detection of release: to PEAS by owner or operator.	Within 10 days after release: to LARA Bureau of Fire Services, Storage Tank Division, outlining cause, discovery, response to prevent recurrence.	PEAS: 800-292-4706 For further information: contact LARA Bureau of Fire Services, Storage Tank Division 517-335-7211

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Transportation of Hazardous Materials and Hazardous Waste

(Under 49 CFR 171)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Initial verbal notice: Incident during transportation (including loading, unloading, temporary storage) involving (1) hazardous material and resulting in death, injury requiring hospitalization, public evacuation $\geq$ 1 hour, major transportation artery or facility closure $\geq$ 1 hour, or flight pattern alteration; (2) fire, breakage, spillage, or suspected radioactive contamination occurs involving a radioactive material; (3) fire, breakage, spillage or suspected contamination involving an infectious substance other than a regulated medical waste; (4) marine pollutant release exceeding 450 L (119 gal) liquid or 400 kg (882 lbs.) solid; (5) other per judgment of person in possession of the hazardous material (e.g., continuing danger to life exists at scene of incident); (6) during transportation by aircraft, a fire, violent rupture, explosion or dangerous evolution of heat occurs as a direct result of a battery or battery-powered device. Hazardous material = CERCLA hazardous substance (40 CFR 302, Table 302.4), hazardous waste (40 CFR 262), marine pollutant (49 CFR 172.101 Appendix B), elevated temperature material, listed on Hazardous Materials Table (49 CFR 172.101), or meets criteria for hazard class/division in 49 CFR 173. Written follow-up report: Required for all of above, plus any unintentional release of hazardous material from a package (including tank); or any quantity of hazardous waste discharged during transportation; or structural damage to lading retention system, even if no release, on specification cargo tank with $\geq$ 1000 gal capacity containing hazardous material; or undeclared hazardous material discovered.	As soon as practical but no later than 12 hours after occurrence of the incident: to NRC by each person in physical possession of the hazardous material. (A reportable incident <i>must</i> be reported by telephone, not online.) For infectious substances, notice may be given to the Director, Centers for Disease Control and Prevention, U.S. Public Health Service instead of NRC.	Within 30 days after discovery: to US DOT on DOT Form F 5800.1 (01-2004) "Hazardous Materials Incident Report." Report online at https://hazmatonline.phmsa.dot.gov/incident/ Report must be updated within 1 year of incident if: Death results from injury; hazardous material or package info on prior report on prior report becomes known or changes by \$25,000 or 10%. See regulation for exceptions to written report.	NRC 800-424-8802 or online at www.nrc.uscg.mil U.S. Public Health Service 800-232-0124 For further information contact US DOT Hazardous Materials Information Center at 800-467-4922 or online at www.phmsa.dot.gov/hazmat

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Release to Surface or Ground, Surface Water, Ground Water, or Public Sewer System

(Under NREPA, 1994 PA 451, Part 31, Water Resources Protection)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Unpermitted release directly or indirectly to public sewer system, surface of ground, surface water or groundwater from an oil storage facility or on-land facility of a “polluting material” (oil, salt, or any material specified in table 1 in R 324.2009) in excess of its threshold reporting quantity during any 24-hour period. See Part 5 rules, effective 8/31/01, for details and exemptions. HB 5586 effective 6/15/04 amended the reporting requirements. <i>Rule revisions pending.</i>	As soon as practicable after detection: to PEAS <i>and</i> 911 by owner, operator or manager. State agencies call 911 if release reported to them by another state or Canada.	Within 10 days after release: to EGLE-WRD district supervisor <i>and</i> to the local health department where the release occurred, outlining cause, discovery, response & prevention of recurrence.	PEAS: 800-292-4706 For further information contact EGLE-WRD

Sewer Systems

(Under NREPA, 1994 PA 451, Part 31, Water Resources Protection)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Discharge of untreated sewage or partially treated sewage from a sewer system onto land or into the waters of the state. “Sewer system” means a sewer system designed and used to convey sanitary sewage or storm water, or both.	Immediate (within 24 hours): to EGLE-WRD via its MiWaters system on the form entitled “Report of Discharge (CSO\SSO\RTB).” Notify Local health departments; Daily newspaper circulated in source & affected counties; & affected municipalities.	At end of discharge: to same parties notified initially. Final report to EGLE-WRD via its MiWaters system on the form entitled “Report of Discharge (CSO\SSO\RTB).” Includes results of E. coli testing.	MiWaters: https://miwaters.deq.state.mi.us For further information contact EGLE-WRD

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Sewerage Systems

(Under NREPA, 1994 PA 451, Part 41)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Discharges of pollutants from sewerage systems (which can include combined sewers) in excess of those authorized by a discharge permit issued by the EGLE to surface water or groundwater as a result of a facility breakdown or emergency. Sewerage systems handle sanitary sewage or other industrial liquid wastes.	Promptly: to EGLE-WRD district office (PEAS after hours) by owner.	Within 5 days: to EGLE-WRD submitted via the MiWaters system, outlining cause, discovery, corrective actions taken to minimize impact, restore operations, and eliminate future unpermitted discharges.	PEAS: 800-292-4706 MiWaters: miwaters.deq.state.mi.us For further information contact EGLE-WRD

Control of Pollution by Oil and Hazardous Substances, Discharge Removal

(Under CWA, Section 311. 33 CFR 153 -- **Navigable waters** – Coast Guard/DOT)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Discharge of a harmful quantity of oil or a hazardous substance from a vessel or onshore or offshore facility into or upon navigable waters of the United States or adjoining shorelines. Harmful quantity = oil discharge that violates applicable water quality standards, or causes a film or sheen upon or discoloration of the surface of the water or adjoining shorelines, or causes a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines; or a CERCLA hazardous substance (40 CFR 302, Table 302.4) in a quantity equal to or greater than its corresponding reportable quantity. Oil = oil of any kind or in any form including petroleum, crude oil, petroleum refined products, sludge, oil refuse, oil mixed with wastes, etc., as well as vegetable and animal oils.	Immediate: to NRC by person in charge of vessel or facility. If direct reporting to NRC not practicable, may report to district Coast Guard or EPA predesignated OSC.	Not required.	NRC: 800-424-8802 or online at www.nrc.uscg.mil District 9 Coast Guard 216-902-6117 EPA Region 5 for predesignated OSC 312-353-2318 More information: contact EPA Region 5 (312-353-8200) or District 9 Coast Guard (216-902-6045)

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Discharge of Oil

(Under CWA, Section 311, 40 CFR 110)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Discharges of oil that violate applicable water quality standards or cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines, or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines. Oil = oil of any kind or in any form including petroleum, crude oil, petroleum refined products, sludge, oil refuse, oil mixed with wastes, etc., as well as vegetable and animal oils.	Immediate: to NRC by person in charge of vessel or facility.	Not required.	NRC: 800-424-8802 or online at www.nrc.uscg.mil For further information contact EGLE-WRD

Underground Storage Tanks

(Under NREPA, 1994 PA 451, Part 211, **Underground Storage Tanks** and Part 213, Leaking Underground Storage Tanks)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Releases of a regulated substance of any amount from underground storage tank (UST) systems (includes the emergency shutoff valve on down) subject to registration; overfill from UST fillpipe or vent onto ground; release from aboveground pipe attached to UST system. Regulated substance = petroleum or CERCLA hazardous substance (40 CFR 302, Table 302.4) or substance listed in CAA title 1 part A sect 112. Petroleum includes, but is not limited to, crude oil, motor fuels, jet fuels, distillate fuel oils, residual fuel oils, lubricants, and petroleum solvents.	(Part 211) Within 24 hours after discovery: to LARA Bureau of Fire Services, Storage Tank Division by email or fax on Form EQP 3826 (Rev. 4/12) If free phase, Form EQP 3800 (Rev 02/2003) required by UST owner or operator, or employee of owner or operator. Includes releases discovered years after UST system removed	(Part 213) At 180 days: Initial Assessment Report on Form EQP3841 (Rev. 02/2003) if not closed; at 365 days: Final Assessment Report on Form EQP3842 (Rev. 11/2006) if still not closed; at closure: Closure Report on Form EQP3843 (Rev. 02/2003) to EGLE-RRD district project manager.	Email: EGLE-std-tanks@michigan.gov Fax: 517-335-2245 For further information contact EGLE-RRD or phone 800-MICHUST

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Generators; Treatment, Storage & Disposal Facilities (TSDF); Transporters

(Under NREPA, 1994 PA 451, Part 111, **Hazardous Waste** Management)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Any amount of characteristic hazardous waste or listed hazardous waste (as defined in R 299.9203 "Hazardous Waste Rule 203") reaches the surface water or groundwater, or A fire, explosion, or other release of hazardous waste or hazardous waste constituent occurs that could threaten human health or the environment. or A release of >1lb (or ≤1lb if not immediately cleaned up) hazardous waste to the environment from a tank system or associated secondary containment system. Additional hazardous waste reporting requirements under NREPA Part 201 and CERCLA. NREPA Part 111 requires transporters to comply with 49 CFR 171 and 33 CFR 153.	Immediate: to PEAS (or for Tank systems/secondary containment, within 24 hours of discovery to EGLE-MMD) and to NRC if threat to human health or environment outside facility by generator, or owner or operator of TSDF, or transporter.	For large quantity generators and TSDF: Within 15 days after incident IF the contingency plan had to be implemented to: EGLE-MMD. For tank/secondary containment systems: Within 30 days of discovery to: EGLE-MMD. For transporters: to US DOT if required per 49 CFR 171.	PEAS: 800-292-4706 NRC 800-424-8802 or online at www.nrc.uscg.mil For further information contact EGLE-MMD

Liquid Industrial By-Product

(Under NREPA 1994 PA 451, Part 121)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
The liquid industrial by-product spill could threaten public health, safety, welfare, or the environment, or has reached surface water or groundwater. Liquid industrial by-product includes nonhazardous brine, by-product, industrial wastewater, leachate, off-spec commercial chemical product, sludge, sanitary or storm sewer clean-out residue, grease trap clean-out residue, spill residue, used oil, or other liquid by-product not regulated by other laws.	Immediate: to PEAS and local authorities by generator, transporter, or owner or operator of facility. Refer to MCL 324.12111(1) for required report elements	Prepare within 30 days after incident. Submit upon request to: EGLE-MMD district supervisor. Refer to MCL 324.12111(1) for required report elements	PEAS: 800-292-4706 For further information contact EGLE-MMD

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Hazardous or Toxic Air Pollutants

(Under NREPA, 1994 PA 451, Part 55, **Air Pollution** Control)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Abnormal condition, start-up, shutdown, or malfunction that results in emissions exceeding permissible (in rule, permit or order) levels of hazardous air pollutants (HAPs) (CAA Sect. 112(b)) or toxic air contaminants (as specified in permit) for >1 hour, or any air contaminant for >2 hours. Written follow-up report only required for emission exceedances lasting > 2 hours.	As soon as possible, but not later than 2 business days after discovery to: EGLE-AQD district office (PEAS after hours) by owner or operator.	Within 10 days after start-up, shutdown, or abnormal condition, malfunction corrected. Or within 30 days of abnormal condition, malfunction discovery- whichever first: to EGLE-AQD district supervisor.	PEAS: 800-292-4706 For further information contact EGLE-AQD

Natural or Field Gas Emergency Venting

(Under NREPA, 1994 PA 451, Part 55, **Air Pollution** Control – Permit to Install Exemptions)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Emergency venting of natural gas from transmission and distributions systems or field gas from gathering lines in amounts > 1,000,000 standard cubic feet per event. Emergency = unforeseen event that disrupts normal operating conditions and poses a threat to human life, health, property or the environment if not controlled immediately. See R 336.1285(mm), effective 6/20/2008, for details.	Within 24 hours of the event: to PEAS by owner or operator.	Not required.	PEAS: 800-292-4706 For further information contact EGLE-AQD

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Dry Cleaning

(Under Public Health Code, 1978 PA 368, Part 133)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Condition or incident presents a threat or hazard to public health or safety.	Immediate to: EGLE-AQD district office (PEAS after hours) by owner or operator.	Within 30 days after incident: To EGLE-AQD district supervisor.	PEAS: 800-292-4706 For further information contact EGLE-AQD

Oil and gas production fields

(Under NREPA, 1994 PA 451, Part 615, Supervisor of Wells)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
A loss, spill or release of 1) any amount of brine, crude oil, or oil or gas field waste 2) <i>unless</i> it is less than 42 gallons and occurs while an authorized representative is on site and is completely contained and cleaned up within 1 hour, or 3) any unpermitted amount of natural gas , or 4) (3) chemicals used in association with oil and gas activities.	Within 8 hours after discovery of: 42 gallons or more of brine, crude oil, or oil or gas field waste, or any amount of chemical or natural gas, or; less than 42 gallons if the spill contacts surface water, groundwater, or other environmentally sensitive resources, or is not completely contained and cleaned up within 48 hours to: EGLE-OOGM district office (PEAS after hours) by permittee.	Within 10 days after discovery of loss or spill to: EGLE-OGMD district supervisor on Form EQP-7233 (Rev 1/2012) "Report of Loss or Spill" by permittee Written report only for less than 42 gal. of brine, crude oil, or oil and gas field waste if spill does not contact surface water, groundwater, or other environmentally sensitive resources, and is completely contained and cleaned up within 48 hrs.	PEAS: 800-292-4706 For further information contact EGLE-OGMD

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Transportation of Natural and Other Gas by Pipeline

(Under 49 CFR 191)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
An incident, meaning: 1) Event that involves a release of gas from a pipeline, or of liquefied natural gas, liquefied petroleum gas, refrigerant gas, or gas from an LNG facility that results in: Death or hospitalization; or Property damage $\geq$ \$50,000; or estimated gas loss of $\geq$ three million cubic feet. 2) Event that results in emergency shutdown of LNG facility. 3) Significant event per operator. Written Incident reports not required for LNG facilities. Applies to pipeline systems and the transportation of gas through those systems in or affecting interstate or foreign commerce. (See 49 CFR 191.3 for details.)	Earliest practicable moment following discovery to: NRC by operator. Notification must be electronic unless there is a safety-related condition to report.	As soon as practical, and within 30 days after discovery: to US DOT on DOT Form PHMSA F 7100.1 "Incident Report – Gas Distribution System." or PHMAS F 7100.2 "Incident Report – Gas Transmission and Gathering Systems" or PHMSA F 7100.3 "Incident Report – Liquefied Natural Gas (LNG) Facilities" Supplemental report filed as necessary as soon as practical.	NRC 800-424-8802 or online at www.nrc.uscg.mil For further information contact US DOT Pipeline Safety Information Center: 202-366-4595 or http://ops.dot.gov

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Transportation of Hazardous Liquids by Pipeline

(Under 49 CFR 195)

Reporting Criteria	Initial Notification	Written Follow-up	Notes
Release of hazardous liquid (petroleum, petroleum products, or anhydrous ammonia) or carbon dioxide from a pipeline system that results in any of the following: (a) Explosion or fire; (b) Release of ≥ 5 gallons (except if < 5 barrels released due to maintenance and release not otherwise reportable, confined to property, does not pollute water, and cleaned up promptly); (c) Death of any person; (d) Injury requiring hospitalization; or (e) Property damage $> \\$50,000$. (See 49 CFR 195.50, revised 1/8/02, for details) Applies to pipeline facilities and the transportation of hazardous liquids associated with those facilities in or affecting interstate or foreign commerce. (See 49 CFR 195.1 for details.)	Earliest practical moment following discovery: to NRC by operator if Release caused: Death or hospitalization; Fire or explosion; Property damage; Water pollution; or was Significant per the operator.	As soon as practical, and within 30 days after discovery: to U.S. DOT on DOT Form PHMSA F 7000-1 "Accident Report – Hazardous Liquid Pipeline Systems" Supplemental report must be filed within 30 days after operator receives changes or additions to original report.	NRC 800-424-8802 or online at www.nrc.uscg.mil For further information contact US DOT Pipeline Safety Information Center at 202-366-4595 or online at http://ops.dot.gov

Fatalities or Hospitalization

(Under MIOSHA, 1974 PA 154, Section 61, Records & Reports; Notice of)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
A release that results in a fatality within 30 days of the incident or in-patient hospitalization within 24 hours of the incident. Note: the OSHA amendment to require employers to report all work-related hospitalizations within 24 hours becomes effective Jan 1, 2015. Michigan intends to adopt the new rules by reference within 6 months of the Sept 18, 2014 FR publication.	Within 8 hours for a fatality Within 24 hours for hospitalization to: MIOSHA Hotline by Employer.	Not required.	MIOSHA Fatality or Catastrophe Hotline 800-858-0397 For further information contact LARA-MIOSHA 517-322-1831

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Radioactive Material

(Under 1978 PA 368, Part 135, **Radiation** Control)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Registrants and licensees of EGLE for releases of radioactive material to the environment <i>Immediate notice if:</i> Release concentration >5000 times limits specified in table II of R 325.5261 to R 325.5269, averaged over 24 hrs <i>Notice within 24 hours if:</i> Release concentration >500 times limits specified in table II of R 325.5261 to R 325.5269, averaged over 24 hrs <i>Written report within 30 days:</i> Radiation or concentration of radioactive material in unrestricted area >10 times any applicable limit.	to EGLE-MMD Radiological Protection via PEAS	Within 30 days after release: to EGLE-MMD Radiological Protection by registrant or licensee	PEAS: 800-292-4706 For further information contact EGLE-MMD Radiological Protection

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Nuclear Radioactive Material

(Under 10 CFR - Standards for Protection Against **Radiation**)

[illegible]

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

PCBs

(Under TSCA, 40 CFR 761.125 (**PCBs**))

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Spills of PCBs at concentrations of 50 ppm or more and subject to decontamination requirements under TSCA that: contaminate surface water, sewers, drinking water supplies, grazing lands or vegetable gardens, or exceed 10 pounds. (TSCA specifies that these requirements are in addition to any under CWA or CERCLA. e.g. CERCLA requires spills of 1 pound or more to be reported to NRC.)	As soon as possible after discovery, and within 24 hours: to EPA Region 5.	Not required to be submitted. Records of cleanup and certification of decontamination shall be documented.	EPA Region 5 Corrective Action Section 312-886-7890 For further information contact EPA Region 5 Corrective Action Section

Toxic Chemical Release Reporting

(Under SARA Title III, Section 313, 40 CFR 372)

Reporting Criteria	Initial Notification	Written Follow-up Report	Notes
Covered facilities as defined in 40 CFR 372 subpart B are subject to toxic chemical release reporting for toxic chemicals and chemical categories listed in 40 CFR 372 subpart D.	Not applicable.	Annually by July 1: to EPA & SERC on EPA's Form R "Toxic Chemical Release Inventory Reporting Form" (EPA Form 9350-1, Rev.10/2011) Report aggregate releases (permitted & unpermitted)	Michigan SARA Title III Program accepts reports on behalf of SERC For further information contact Michigan SARA Title III Program 517-284-7272

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.

Release Notification Requirements in Michigan*

Acronyms used in this document:

AQD = Air Quality Division
AST = Above Ground Storage Tank
CAA = Clean Air Act
CAFO = Concentrated Animal Feeding Operation
CERCLA = Comprehensive Environmental Response, Compensation and Liability Act of 1980
CFR = Code of Federal Regulations
CWA = Clean Water Act
EGLE= Michigan Department of Environment, Great Lake and Energy
DWMAD = Drinking Water & Municipal Assistance Division
DOT = Department of Transportation
EHS = Extremely Hazardous Substance
EPA = U. S. Environmental Protection Agency
EPCRA = Emergency Planning & Community Right-to-Know Act
FIFRA = Federal Insecticide, Fungicide, & Rodenticide Act
FL/CL = Flammable and combustible liquids
FR = Federal Register
HAP = Hazardous Air Pollutant
HazMat = Hazardous Materials
HB = House Bill
LARA = Michigan Department of Licensing & Regulatory Affairs
LEPC = Local Emergency Planning Committee
LNG = Liquefied Natural Gas
LPG = Liquefied Petroleum Gas
MCL = Michigan Compiled Laws

MDARD = Michigan Department of Agriculture & Rural Development
MIOSHA = Michigan Occupational Safety and Health Administration
MMD = Materials Management Division
MSP = Michigan Department of State Police
NRC = National Response Center (U.S. Coast Guard)
NREPA = Natural Resources & Environmental Protection Act
OGMD = Oil, Gas, and Minerals Division
OPS = Office of Pipeline Safety (US DOT)
OSC = On Scene Coordinator
PA = Public Act (Michigan)
PCB = Polychlorinated biphenyl
PEAS = Pollution Emergency Alerting System
PHMSA = Pipeline & Hazardous Materials Safety Administrator
RMP = Risk Management Program
RRD = Remediation and Redevelopment Division
SARA = Superfund Amendments and Reauthorization Act of 1986
SERC = State Emergency Response Commission
TRI = Toxic Chemical Release Inventory
TSCA = Toxic Substance Control Act
TSDF = Treatment, Storage & Disposal Facility
US DOT = U.S. Department of Transportation
USNRC = U. S. Nuclear Regulatory Commission
UST = Underground Storage Tank
WRD = Water Resources Division

NOTE: If the release is an Immediate **THREAT TO HUMAN HEALTH or SAFETY**, call 911 or your local fire department.