

GRAND HAVEN CHARTER TOWNSHIP

PUBLIC SERVICES DEPARTMENT

WASTEWATER MAIN CONSTRUCTION SPECIFICATIONS

1. All work shall be completed in accordance with the plans and specifications and shall meet the approval of the Grand Haven Charter Township Public Services Department.
2. A street cut permit shall be obtained from the Ottawa County Road Commission before any road crossings begin.
3. Wastewater main construction and testing shall be in accordance with the "Regulations and Standard Specifications of the Ottawa County Water and Sewer System" with the following exceptions:

PIPE MATERIALS

| Depth | Materials | Strength |
|--------------------|----------------|---------------------|
| <18 feet | Solid Wall PVC | ASTM D-3034, SDR-35 |
| 18 feet and deeper | Solid Wall PVC | ASTM D-3034, SDR-26 |

MANHOLES

Pipe joint at the manhole walls shall be Res-Seal, Press-Wedge II, or Lock Joint, Flexible Rubber Manhole Joints or Grand Haven Township approved equal.

MANHOLE COATING

The coating shall be AURATAPOXY; A-6 manufactured by American Chemical Company, Saint Louis, MO, 1-800-325-5832 or Warren Environmental P301, S-301, T-301 spray system Carver, MA, 1-508-866-5721.

- A. **Qualifications**
The applicator shall have a minimum of five (5) years experience in the application of the specified coating and at least five projects of similar size, scope and difficulty.
- B. **Warranty**
Applicator shall warrant all work against defects in materials and workmanship for a period of five (5) years from the date of final acceptance of the project. A one-time visual inspection shall be completed by the applicator, one year from the date of

project acceptance. The applicator shall, upon written notice, repair defects in materials or workmanship which may develop during said five (5) year period, and any damage to other work caused by such defects or the repairing of same, at his own expense and without cost to the owner. The warranty shall be backed by a five year bond made out to Grand Haven Charter Township.

C. Submittals

Provide a minimum of five references of similar size and scope for contractor actually involved in application of coating system. References shall include the name of project, the type of structure coated, date of work, name and telephone number of owner's contact.

Submit written verification from the coating manufacture documenting authorization for applicator to install coating system and meets the qualification requirement of this specification.

Provide manufacturer's written instructions for applying and repairing the specified coating system in the manner specified herein, including material handling, mixing ratios, mixing procedures, proper application temperature and environmental controls during application.

Provide written schedule work. Any proposed deviation from approved schedule shall be submitted in writing to the engineer a minimum of three days prior to the proposed changed.

D. Test Reports

*Performance Testing

Submit certified test reports, to the engineer, from an approved independent third party laboratory that the specified coating material was manufactured and tested in accordance with the ASTM standards specified herein, and are of the same formulation as tested and specified. All tests shall be completed at the specified final coating thickness.

ASTM D638 Tensile Strength

ASTM D638 Ultimate Elongation

ASTM D790 Flexural Modulus

ASTM D790 Flexural Strength

ASTM D2583 Shore Hardness

ASTM D1653 Water Vaport Transmission, Method B, Condition C

*Chemical Testing

Submit to the engineer from an approved independent third party laboratory, Gel Permeation Chromatography and Infrared Spectroscopy results for each component of the specified coating system, in its cured and uncured state.

E. Performance Demonstration

The coating contractor shall complete a performance demonstration. The demonstration shall be conducted following completion and approval of all lining submittals and prior to any lining work activities on any other structures. Demonstration lining material shall be from an approved batch of lining material.

The coating contractor shall complete installation of the specified coating per the specifications including but not limited to manhole preparation, coating, and testing of four structures as the performance demonstration. The engineer will select demonstration structures. Structures may not necessarily be adjacent to each other. Selected structures will be identified following coordination with the general contractor.

Once the coating contractor has completed the application of the approved lining material following this specification the selected structures will be inspected and tested in conformance to Section 5.13 of this specification. Results of the demonstration structures inspection and testing will be submitted to the engineer for evaluation and acceptance.

The owner reserves the right to reject the coating contractor, the material, and/or delete the manhole coating portion of the contract if it is determined that the coating contractor and/or the material does not meet the intent of this specification. Rejected installed materials shall be removed at no cost to the owner. No payment will be made for demonstration structures, which failed to meet the intent of this specification.

F. Intent/Execution

Coatings shall be applied to all interior surfaces of manhole structures, protruding pipes, inverts and underside of castings to provide a 100 percent physically bonded monolithic pinhole free coating that meets section 5.13 Inspection and Testing of this specification. The cured surface shall be smooth and continuous with proper sealing connections to all unsurfaced areas. Care shall be taken to prevent coating material from entering sewer pipe and excessive amounts of coating material accumulating within the flow channel.

All material shall be new and be delivered to the project site in unopened containers that plainly show, at the time of use, the designated name, date of manufacture, and name of manufacturer, batch or lot number. Resins shall be stored in a suitable protected area that is heated or cooled as required to maintain temperatures within the range recommended by the resin manufacturer.

Active flows shall be dammed, plugged, bypass pumped, or diverted as required to ensure that the liquid flow is maintained below the surfaces to be coated and is the responsibility of the coating contractor and is included in the manhole coating pay item.

No coating shall be immersed without proper curing specified by the manufacturer.

The coating contractor shall not exceed having a maximum of ten structures installed without being tested and approved at any one time.

Temperature of the surface to be coated shall be between 55 degrees F and 90 degrees F during application of the coating. Prior to and during application, care shall be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated. Portable heaters shall not be used at any time during the coating process.

G. Existing Conditions

Standard Portland Cement or new concrete shall have been properly cured for a minimum of 28 days prior to application of the protective coating. Quick setting high strength cement, if used, shall be approved by the coating manufacturer for coating.

Standard Portland Cement, new concrete, or quick setting high strength concrete shall not contain latex or curing agents that are not compatible with the protective coating.

Any existing conditions/products that may be incompatible with the specified coating or the compressive or tensile strength of the product is in question the bond strength of the coating shall be tested via a test patch and elcometer test prior to coating and evaluated by the engineer.

H. Safety

Coating installation shall be performed in strict accordance with the safety recommendations of the resin manufacture.

Contractor must be in compliance with all state and federal safety requirements, including confined space requirements.

All traffic control necessary during manhole coating shall be the responsibility of the general contractor.

I. Preparation of Metal Surfaces

Applicator shall inspect all surfaces specified to receive a protective coating prior to surface preparation. Applicator shall notify engineer of any noticeable disparity in the surfaces which may interfere with the proper preparation of the protective coating.

All workmanship for metal surface preparation shall be in strict conformance with the current Steel Structures Painting Council (SSPC) specification for SP 5, White Metal Blast Cleaning for severe-duty immersion service of the coated areas. Anchor profile shall be 3.0-5.0 mil.

All loose scale, large deposits, oil, grease, cutting oils, dirt and other contaminants shall be removed prior to abrasive blasting.

All metal surfaces to be coated shall be dry abrasive blast cleaned only. Compressed air used for abrasive blasting should be free of oil and water. Filter separators which remove both contaminants must be inserted in the compressed air lines as close as possible to the blasting equipment.

The abrasive blast material shall be crushed slag material to produce a surface profile that meets the criteria above. The abrasive shall not be reused. All blast media and other debris shall be contained within the structure and removed on a daily basis by dry extraction methods and disposed of by the applicator in an approved landfill.

Abrasive blasting shall not be performed when the air or metal surface temperature is below 40 degrees F, when the relative humidity exceeds 80%, or when the metal surface temperature is less than 5 degrees F warmer than the dew point.

Prior to application of the coating metal surface shall be sprayed with a chlorine bleach solution sufficient to kill any living microorganisms on metal or coating.

Surfaces shall be coated the same day they are abrasive blasted. Surfaces that show signs of flash rust shall be re-blasted before they are coated.

J. Preparation of Concrete Surfaces

Applicator shall inspect all surfaces specified to receive a protective coating prior to surface preparation. Applicator shall notify engineer of any noticeable disparity in the surfaces which may interfere with the proper preparation of the protective coating.

All surfaces to be coated shall be dry abrasive blast cleaned. Compressed air used for abrasive blasting should be free of oil and water. Filter separators which remove both contaminants must be inserted in the compressed air lines as close as possible to the blasting equipment.

The abrasive blast material shall be a crushed slag material to produce a surface profile that provides a clean open and exposed aggregate surface. The abrasive shall not be reused. All blast media and other debris shall be contained within the structure and removed on a daily basis by dry extraction methods and disposed of by the applicator in an approved landfill.

Upon completion of the dry abrasive blast the surface to be coated shall be inspected by the applicator to insure the desired profile has been attained.

All contaminants including, but not limited to oils, grease, dirt, incompatible existing

coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed by an environmentally safe degreaser, detergent, or other suitable cleaning method.

The surface shall be water blasted to remove any tightly adhered grease or other contaminants by using a mild solution of trisodium phosphate and water mixed in accordance with manufacturer instructions. Under no circumstances shall the surface being water blasted receive less than 2,000 psi.

Active water infiltration shall be stopped by the applicator using a cementitious water plug or hydroactive grout, which is compatible with the specified repair mortar and is suitable for top coating with the specified coatings.

The prepared concrete surface shall have a pH between 6.0 and 8.0, adjust pH in accordance with manufacturers recommendations. Test results shall be taken prior to the coating applications and retained for review by the engineer.

Prior to application of the coating the concrete surface shall be sprayed with a chlorine bleach solution sufficient to kill any living microorganisms on the concrete.

K. Coating System Application

Application procedures shall conform to the recommendations of the protective coating manufacturer, including material handling, mixing ratio, mixing, proper coating application temperatures, environmental controls during application, and safety.

During application, coatings shall be protected against exposure to direct sunlight or other intense heat source.

The coating shall be applied to all surfaces in a minimum of three coats each applied in a manner that will produce a smooth continuous even film of uniform thickness. The total coating thickness shall be not less than 60 mils. Each coat shall be sprayed only via a pleural component pumping system approved by the manufacture for the application of specified coating. The color shall be white.

Only airless spray application equipment shall be used to apply the specified coating.

Following the application and curing of the intermediate coats the entire structures surface shall be inspected for any surface defect, pinholes, bugholes, or honeycomb in excess of 1/16 of an inch shall be repaired, prior to the application of the final coat according to the manufactures recommended practices and engineer approval.

The application of additional coats of the protective coating should occur as soon as the prior or basecoat becomes tack free, but no more than 24 hours after the prior coat has been applied. Should 24 hours pass prior to recoating, the coating contractor

shall pressure wash the surface to be coated with a minimum of 2,000 psi prior to additional lining application.

The final coat shall be applied to achieve a total thickness of 60 mils and to present a smooth and uniform appearance over the laminating resin.

L. Coating Repair Procedure

Coating repair procedure shall be submitted to the engineer for approval.

M. Pipe/Structure Interface

All pipe structure interfaces will be built up and hand troweled to a smooth uniform transition from pipe to structure interface with the specified material or engineer approved equal. The connection shall provide a smooth continuous bond to all pipes and structure interface.

N. Inspection and Testing

Verification of coating thickness shall be accomplished by standard wet gauge testing as the coating is applied. The final coating dry film thickness shall be verified by the applicator at a minimum of four random locations by an ultrasonic detector (PosiTector 100-C1 or equivalent).

Following the necessary curing of the lining material the entire surface of the structure shall be inspected and spark tested. The spark tester shall be set at a minimum of 300 volts per 1 mil of dry film thickness or maximum of 12,000 volts. Areas of the coating determined to be deficient following spark testing shall be repaired in an engineer approved method and manner.

Additionally, the adhesion of the coating shall be tested by a minimum of one destructive pull test. The test shall be performed on the wall of the structure following ASTM-D4541, no test shall be less than 400 psi. The sample removed shall be retained and examined to determine proper coating bond. Test shall commence no earlier than 24 hours after application of the final coat or per manufacture recommendation. Test areas shall be repaired per coating repair procedures stated above. Any areas detected to have inadequate bond strength shall be evaluated by the engineer. Additional bond tests may be performed at the coating contractor's expense to determine the extent of potentially deficient bonded areas.

O. Sampling and Laboratory Testing

During the project, random samples of the coating material will be taken and sent to an independent third party laboratory where the samples of the material in its cured and uncured state will be tested for its conformance to the performance test results submitted by the coating contractor. Also cured and uncured samples of the specified coating will have gel permeation chromatography and infrared spectroscopy tests completed, results will be compared to the test submitted by the coating contractor to ensure the coating material and mixing meet the intent of the specifications.

Retainage samples of all components of the coating material shall be provided from every lot or batch of material used in the project. Samples will be taken from the recirculation line or return line from the pumping system.

Random plate samples will be cast in a manner in which the coating will be applied. The plate sample will be cast with the coating material pumped through the static mixer attached to the pumping system. If it is determined the samples tested do not meet the performance or chemical submittals provided by the coating contractor, additional testing will be done at the coat contractor's expense. If it is determined that three samples from the same batch do not match the submittals the structure is coated with, that batch or lot number will be rejected and no payment will be made.

SEWER LATERALS

- A. *Pipe:* Unless otherwise approved, sanitary laterals shall be 6" diameter. All sewer laterals shall be laid at two percent (2%) uniform grade (1/4 inch per foot) from the main sewer to the property line. Where sewer depth permits and no riser is required, a steeper grade may be permitted, but under no circumstances shall lateral grade be less than 1/8 inch per foot. Lateral alignment shall be at right angles to the street.
- B. *Wye:* All wyes shall be the same classification as the pipe and may be either 45 degree or 60 degree wyes. Joints shall be the same as the sewer pipe.
- C. *Depth of Laterals:* It is the intent of all our sanitary sewer construction projects to provide service to all basements where possible.

Where the sanitary sewer is more than 12 feet deep, measured from the established or proposed street grade, a main line riser shall be constructed. For the "sloping trench" detail, concrete encasement will not be required.

The depth (invert) of the lateral at the point where the bend is installed for the property line riser (approximately 5 feet from the right-of-way line) shall be 12 feet below the first floor. Where 12 feet is not possible due to the depth of the mainline sewer the lateral shall be laid at 1/8 inch per foot from the mainline.

Prior to backfilling, the distance from the first floor to the invert of the lateral shall be verified by the engineer.

- D. *Property Line Risers:* Property line risers shall be required for all laterals not connected to homes. The property line riser shall consist of a 6" sewer lateral pipe extended upward to a minimum of one foot above the normal groundwater table of a maximum of 5 feet below grade, whichever is higher. The end of the riser pipe shall be plugged in the same manner as a sewer lateral. The distance from the main sewer line to the top of the property line riser will be determined in the field.

E. *Lateral Location:* Service lines shall be provided from the main sewer to the property line for each lot and acreage parcel where applicable. The actual location of the lateral within the lot or the parcel boundaries shall be determined in the field during construction as follows:

1. Existing houses or buildings - to suit property owners and staked by the Engineer and approved by the Township.
2. Vacant lot - Center of the building sites and staked by the Engineer and approved by the Township.
3. Acreage Parcel - Per property owner's request and staked by the Engineer and approved by the Township.

The Township reserves the right to add or subtract service laterals during the construction when in their judgement, it serves the best interest of the Township.

F. *Lateral End Markers:* After installation of the service lateral but prior to backfilling, the contractor shall provide and install 2" x 2" wood markers for each service. In addition, a ½ inch diameter by 6 feet long rerod shall be placed vertical and adjacent to the wood marker with the top of rerod set at 6 inches below finish grade.

AIR TEST

All sanitary sewer which is submerged by groundwater by an average depth of greater than 7 feet at the time of the test shall be subject to an infiltration test. All other sanitary sewers shall be subject to an air test. The pressure used in the air test shall be 3.5 psi greater than the average back pressure of the groundwater that submerges the pipe.

MANDRELL TESTING

The completed installation at no point shall have out-of-round pipe deflections greater than 5% of the diameter of the pipe. All plastic and truss pipe shall be tested for deflection. Pipe with deflections greater than 5% will be considered unacceptable and shall be relaid by the contractor. Mandrell testing shall occur no sooner than 30 days after installation of a completed line.

FINAL FLUSHING

After all pipe laying and restoration is completed the contractor shall flush all the pipe and manholes installed. Sand and debris shall be removed and properly disposed of. A plug shall be placed and remain in the line to prevent any sand or debris from entering the existing sewer.

TELEVISION

Prior to placement of paved surfaces and prior to acceptance or activation, the contractor shall conduct a recorded internal television inspection of all sanitary sewers. The recording shall be accomplished on professional quality, standard ½" color VHS tape cassettes with audio input. The contractor shall provide a written report and two copies of the tape recording. The tape shall show the name of the project, the date and approximate time of taping, the name of the street, the manhole numbers of each end of each run (the "from" and "to" manholes) and stationing between manholes. The tape shall clearly show the pipe interior, joints, alignment, and wye locations and stations, and shall be reviewed by the engineer for evidence of compliance with the contract documents for workmanship and materials. The written report shall contain a log for each tape to provide a written record of the information provided on the tape, and shall show the name of the project and all other pertinent data.

INSPECTION

Construction inspection shall be performed by a licensed engineering firm doing business within the state of Michigan.

PROJECT COMPLETION

Prior to final acceptance of any project, the engineering firm shall provide the following items to the Township:

- 1) A notarized certificate, signed by the inspector and an owner of the engineering firm stating that the project has been completed as per the plans and the specifications as stated above.
- 2) As-built plans showing the locations of all appurtenances, including but not limited to manholes and laterals, including depths and lengths.