

## ITEM 7 - SPLIT RAIL FENCE

I. DESCRIPTION – This work is the furnishing and installation of a three-rail wooden post and rail fence including posts, rails, wire fabric mesh and hardware as indicated on the plans and that meet design standards.

### II. MATERIAL –

- Posts and Rails: Pressure treated wood, free from loose knots, cracks, and other imperfections.
- Vinyl Coated welded wire fabric – Section 1110.01 (a)1, Type IV, 4" x 1" opening, color Dark Green.
- Fastening hardware – Galvanized screws, fasteners, staples, clips, brackets

### III. CONSTRUCTION –

- Install posts and hardware in curb per the manufacturer's requirements. Do not use any material or hardware that are broken in a way that reduces the fence's effectiveness.
- Drill end post holes in bituminous pavement. Provide a minimum post hole diameter of 12". Bury posts 30 inches (minimum) in the ground and fill with concrete and allow to set firmly until post is stable before adding rails. Backfill post holes to the existing ground elevation.
- Provide brackets with 2 holes for surface mounting of posts as indicated. Use ASTM A 307 ¾" diameter minimum bolts, nuts and washers in accordance with PennDOT Publication 408 Section 1105.02(c). Galvanize bolts, nuts and washers in accordance with Section 1105.02(s).
- Align each post vertically and laterally true to line and grade. Shim posts on curb connection as needed.
- Accurately cut and fit rails to match into post holes with sufficient overlap to be stable. Cut and attach vinyl coated welded wire fabric to fence posts, a minimum of 8" spacing, and tension properly.
- Design the fence to resist 50 plf horizontal load applied normal to the top rail for the length of the fence. Design values of visually graded dimension lumber are based on the provisions of ASTM D1990-91, Establishing Allowable Properties for Visually Graded Dimension Lumber From In-Grade Tests of Full-Size Specimens. Design value for visually graded timbers, decking, and some species and grades of dimension lumber are based on the provisions of ASTM D245-88, Establishing Structural Grades and Related Allowable Properties for Visually Graded Lumber.
- Submit shop drawings to the Engineer for approval prior to fabrication and installation.
- Submit calculations for post bracket design with shop drawings for approval.
- Upon receipt at the job site, check all materials to ensure that no damages occurred during shipping or handling. Store materials in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.
- Fabricate the fence so that posts are vertical in the erected position. Rails are parallel with the grade of the bridge.

IV. MEASUREMENT AND PAYMENT – Linear Foot. Includes all labor, fencing materials, excavation, concrete, backfill and vinyl coated welded wire fabric.

## ITEM 11 - STONE MASONRY WALL REPOINTING

DESCRIPTION - This work is the cleaning and repointing of existing stone masonry joints.

MATERIAL - Mortar, Section 705.7(b) and as follows:

Provide a minimum of three (3) mortar samples to the Township for color, consistency, composition and matching approval. Cure the samples as described below (3 days). Then allow for seven days to pass before making the selection that best matches the existing conditions.

CONSTRUCTION - as indicated and as follows:

As directed by the Representative, thoroughly clean exposed masonry joints of loose mortar and dirt to a depth of not less than twice the joint width. Thoroughly saturate the joints with clean water, fill with mortar and ram well in place. Satisfactorily finish with a pointing tool. Do not point in freezing weather. Remove and replace work damaged by frost. Keep the wall wet while pointing. Protect pointed masonry from the weather and keep wet for a period of at least three (3) days. Satisfactorily clean the exposed masonry faces.

MEASUREMENT AND PAYMENT – Linear feet

## ITEM 12 - REPLACE EXISTING BEARING WITH LAMINATED ELASTOMERIC BEARINGS

DESCRIPTION – This work is the replacement of the expansion bearings at the locations indicated on the Contract Plans. This work includes removal of the existing bearings, existing anchor bolts, and the replacement with new laminated elastomeric bearing pads. Also included are the anchor bolts and the sole plates.

### MATERIAL -

Obtain material and perform work in accordance with the provisions of the following sections of Publication 408, except as specifically modified herein:

- Swedged Anchor Bolts - Section 1105.02(c)2
- Beam Seat Leveling Mortar – Section 1080.02(e)
- Fabricated Structural Steel - Section 1105.02, conform to AASHTO M270M/M270 (ASTM A709M/A709) Grade 36
- Neoprene Bearing Pads – Sections 1113.02 and 1113.03(g)
- Field Welding - Section 1105.02(t)
- Dowel Holes - Section 1003
- Non-shrink Grout - Section 1001.2(e)

### CONSTRUCTION –

#### a. General.

1. Verify all dimensions in the field prior to starting work.
2. Remove existing girder from existing bearing.
3. Remove existing masonry plate and bearing plate. Cut and remove the existing anchor bolts flush with the top of abutment seat. Grind smooth existing bearing seat.
4. Install new Sole Plate on the beam as indicated on the plans. Clean and paint steel surfaces in accordance Section 1070.
5. Drill dowel holes at locations and depths indicated on the plans.
6. Prior to placing new bearings, flush the dowel holes with clean water or oil free compressed air to remove cuttings and debris. Install new dowel bars/anchor bolts as indicated on the plans. Do not allow the hole to stand more than 8 hours prior to installation of dowel bars/anchor bolt and grout.
7. Lower beam onto new bearing pads and secure anchor bolts with new hardware as indicated on plans. Ensure full uniform contact with the bearing surfaces. Set elastomeric bearing pads as specified in Section 1080.3(c)2.
8. After all dead loads are applied to the bridge superstructure, inspect bearings to ensure bearing pads are placed within acceptable tolerance limits.

Protect bearing from damage during construction in accordance with the manufacturer's recommendation.

### MEASUREMENT AND PAYMENT - EACH

Any and all concrete surface preparation, burning, cutting, drilling, welding, bolting, including all labor and material required for the removal of existing bearings, and the installation of the new bearings, including new bearing pads, anchor bolts, sole plates, and other hardware of the size and type indicated on the plans is incidental to this item.

Any damage to the existing portions of the structure to remain will be repaired as per the Engineer at no additional cost to the Department.

Field verifying of dimensions are included in this item.

Includes field welding and painting of steel plates.

Removal and disposal of the existing bearings shall be considered incidental to the applicable bearing replacement item.

## ITEM 13 - STONE MASONRY WALL REPAIR

DESCRIPTION - This work is the cleaning, repair and resetting of loose, broken or missing wall stones.

MATERIAL - Mortar, Section 705.7(b), and Epoxy Bonding Compound, Section 706, and as follows:

Provide a minimum of three (3) mortar samples to the Township for color, consistency and matching approval. Cure the samples as described below (3 days). Then allow for seven days to pass before making the selection that best matches the existing conditions.

CONSTRUCTION - as indicated and as follows:

Wall & Abutment Repair: As directed by the township, remove loose, broken or missing stones up to maximum depth of one foot from the wall and thoroughly clean the wall cavity and adjacent stones of loose mortar and dirt. Retain the removed stones for replacement; thoroughly clean the loose stones by removing dirt and mortar from their surface.

Thoroughly saturate the wall cavity with clean water, apply an epoxy bonding compound to the wall cavity in accordance with the manufacturer's specifications, butter the stones with mortar and set the stones in a mortar bed so that all sides of the stone are in contact with the mortar. Satisfactorily finish the wall face with a pointing tool to match the existing joints. Do not repair and/or reconstruct the wall in freezing weather. Remove and replace work damaged by frost. Keep the wall wet after pointing. Protect the repaired wall from the weather and keep wet for a period of at least three (3) days. Satisfactorily clean the exposed masonry faces.

Wingwall Crack Repair: Thoroughly clean the open crack joint in the wall and wall cap of loose mortar and dirt to a depth of not less than three times the joint width. Thoroughly saturate the crack joints with clean water, apply an epoxy bonding compound to the wall cavity in accordance with the manufacturer's specifications, fill with mortar and ram well in place. Satisfactorily finish with a pointing tool. Do not point in freezing weather. Remove and replace work damaged by frost. Keep the wall wet while pointing. Protect pointed masonry from the weather and keep wet for a period of at least three (3) days. Satisfactorily clean the exposed masonry faces.

MEASUREMENT AND PAYMENT - Square foot.

The maximum depth of repair is one (1) foot.

#### ITEM 14 - REMOVAL OF EXISTING BRIDGE

In accordance with Section 1018 and as follows:

##### DESCRIPTION –

Revise Section 1018.1 to read:

This work is the removal and disposal of a portion of the existing bridge as indicated in accordance with federal, state, and local laws. Portions to be removed include the deck, the floorbeams, deteriorated sections of the superstructure, and other structural components as indicated on the Contract Drawings.

##### CONSTRUCTION –

In accordance with Section 1018.3 and add the following to (a) GENERAL:

Submit a proposed plan of demolition to the Engineer showing and describing the removal methods to be used for removal of portions of the existing bridge. Do not proceed with this work until written approval is received from the Engineer.

Provide satisfactory shielding below and adjacent to the removal area to prevent damage or injury to pedestrians, property or vehicles as a result of the removal operations. Do not permit debris to fall onto the streambed below.

Do not impact the adjacent mill site and Chandler Mill Nature Preserve and Center.

Do not overstress the structure during removal operations.

Do not damage or remove any portion of the existing bridge which is to remain in place. Repair any damage to the bridge beyond the removal limits as a result of the construction operations to the satisfaction of the Engineer and at no additional cost to the Township.

Use pneumatic hammers not exceeding an impact rating of 30 foot-pounds.

Do not store any material removed during these operations on adjacent private property unless written permission from the property owner is obtained.

##### MEASUREMENT AND PAYMENT –

Section 1018.4 Revise to read:

Removal of portion of existing bridge. Lump Sum.

Includes all materials, equipment and labor necessary to remove the portion of existing bridge.

## ITEM 15 - DISPOSAL OF BRIDGE WASTE

### Section 9073.1 DESCRIPTION -

#### (a) General

1. This Item provides the material and execution requirements for ensuring that all project waste is properly collected, handled, stored, classified, transported, and disposed of in accordance with applicable EPA and Pennsylvania DEP regulations. The Environmental Compliance Plan required under this Item is for the protection of the workers, the public, and the environment from exposure to harmful levels of dust, lead, and other toxic metals that may be present in the paint being removed or repaired.

2. Implement and maintain programs and procedures which comply with the requirements of this Item and all applicable Federal, State, County, and City regulations.

3. Comply with all applicable regulations even if the regulation is not specifically referenced herein. If a State, County, or City regulation is more restrictive than the requirements of this Item, follow the more restrictive requirements.

4. Identification of the items below which are of specific interest to the Township in no way relieves the Contractor of the responsibility to comply with all EPA requirements, nor should it be construed that the Township, the EPA and DEP, or City and County regulators are only interested in these items.

#### (b) Definitions

1. CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act; commonly called Superfund. Federal laws addressing the clean-up of hazardous waste sites. Amended in 1986 by Superfund Amendments and Re-Authorization Act (SARA). EPA implementing regulations are contained in 40 CFR 300-373.

2. Containment System - Complete enclosure built around hazardous (toxic metal) paint removal areas designed to contain debris and prevent emissions to the environment.

3. Competent Person - One who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to eliminate them.

4. DEP - Pennsylvania Department of Environmental Protection

5. Township, Representative – Kennett Township or Representative of Kennett Township

6. Disposal - The discharge, deposit, dumping, spilling, leaking or placing of any solid liquid waste or hazardous waste into or on any air, land or water, so that the solid liquid waste or hazardous waste, or any constituent thereof, may enter the environment or be emitted into the air, or discharged into any waters, including groundwaters.

7. Disposal Facility - A licensed facility where hazardous, residual, or non-hazardous waste is intentionally placed, and in which the waste will remain after closure.

8. Emission - A release of material to the air, water, or ground.

9. EPA - The U.S. Environmental Protection Agency. Regulations are contained in Title 40 of the Code of Federal Regulations (40 CFR).

10. EPA Hazardous Waste Number - The Federal number assigned to each hazardous waste. The number assigned to lead waste is D008.

11. Flood Plain - A flat, low-lying portion of a stream valley subject to periodic (50 to 100 years) inundation during a flood.

12. Generator - Any facility owner, operator or person whose act or process produces hazardous waste or whose act first causes a hazardous waste to become subject to regulation. The Township is the Generator for the work under this Item and will obtain the EPA provisional ID Number.

13. Hazardous Waste (lead paint debris) - Waste that is classified as hazardous due to its concentrations of regulated hazardous substances. Wastes may be classified as hazardous based on the characteristics of toxicity, ignitability, corrosivity, and reactivity. Paint debris is typically classified as hazardous waste based on the characteristic of toxicity. This is determined by testing representative samples of the waste using the Toxicity Characteristic Leaching Procedure (TCLP). If the leachate contains any of the 8 metals or other substances in concentrations at or above limits established in 40 CFR 261, Identification and Listing of Hazardous Wastes, it is classified as hazardous (see Residual Waste).

14. HEPA - A high efficiency particulate filter (HEPA) that is 99.97% efficient against particles of 0.3 microns in size or larger.

15. Ignitability - A characteristic of waste that caused it to be classified as hazardous. Waste is determined to be ignitable if it is found to be capable of being set afire, or of bursting into flame spontaneously or by interaction with another substance or material, when tested in accordance with 40 CFR 261. Spent solvents and liquid paint waste typically fall into this category.

16. Leachate - The amount of a specific substance (e.g. lead) that is carried off or dissolved out of a material. The amount of leachable lead that classifies paint debris as being hazardous is 5 mg/L (ppm) when tested by TCLP.

17. Lead - Metallic lead, all inorganic lead compounds, and organic lead soaps. The lead pigments used in paints comply with this definition.

18. ug/m<sup>3</sup> - Micrograms per cubic meter. Common units for reporting airborne concentrations of lead.

19. mg/L - Milligrams per liter. Common units for reporting a concentration of a specific substance in units of mass per volume (e.g. amount of hazardous material contained in paint debris).

20. NIOSH - National Institute of Occupational Safety and Health.

21. OSHA - Occupational Safety and Health Administration. Standards are contained in Title 29 of the Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 29 CFR 1926).

22. POTW - Publicly Owned Treatment Works

23. PPM - Parts per million. Common units for reporting a concentration of a specific substance (e.g. amount of hazardous material contained in paint debris).



24. RCRA - Resource Conservation and Recovery Act. RCRA regulations addressing waste handling and disposal and are found in 40 CFR 240 through 280.

25. Regulated Area - Area established by the Contractor to demarcate the areas where airborne concentrations of lead exceed, or can be expected to exceed, the Action Level.

26. Representative Sample - A sample of debris from a pile, drum, or container of debris which can be expected to exhibit the average properties of that pile, drum, or container of debris.

27. Residual waste - Residual waste is defined as waste resulting from industrial operations that is not classified as a hazardous waste. Residual waste in Pennsylvania is addressed under Title 25, Chapters 287 through 299 Residual Waste Management.

28. TCLP - Toxicity Characteristic Leaching Procedure. Laboratory tests conducted on wastes that determine the amount of hazardous materials that leach out into a test solution. The test is intended to simulate the properties of water as it leaches through a solid waste landfill. TCLP testing is defined in 40 CFR 261, Appendix II.

29. Treatment - Any method or process designed to change the physical, chemical or biological characteristics or the composition of any hazardous waste so as to neutralize such waste to make it non-hazardous.

30. Treatment, Storage, and Disposal (TSD) Facility - The TSD facility is the last phase of the cradle-to-grave concept in handling hazardous waste and is responsible for its proper disposal. Requirements are found in 40 CFR 264 and 265.

31. Waste Stream - A waste stream represents debris of a similar type and make up. The paint debris from bridge represents a single waste stream if the coating system and method of removal is constant. The debris represents a different waste stream, if different coating materials or methods of removal are involved. The waste created when using recycled steel grit generates a different waste stream than waste created using a disposable abrasive (e.g., Black Beauty).

#### (c) Reference Standards and Regulations

1. The latest edition of the following regulations, guides, and standards form a part of this Item.

#### 2. Code of Federal Regulations (CFR)

- 29 CFR 1926, Occupational Safety and Health Regulations for Construction
- 40 CFR 261, Appendix II EPA, Toxicity Characteristic Leaching Procedure
- 40 CFR 262, Standards Applicable to Generators of Hazardous Waste
- 40 CFR 263, Standards Applicable to Transporters of Hazardous Waste
- 40 CFR 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
- 40 CFR 265, Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
- 40 CFR 265, Subpart C, Preparedness and Prevention
- 40 CFR 265, Subpart D, Contingency Plan and Emergency Procedures
- 40 CFR 265.16, Personnel Training
- 40 CFR 268, Land Disposal Restrictions
- 40 CFR 302, Designation, Reportable Quantities and Notification
- 40 CFR 355, Emergency Planning and Notification
- 49 CFR 171-179, Hazardous Materials Regulations

### 3. EPA Methods

- SW 846, Test Methods for Evaluating Solid Waste - Physical/Chemical Methods
- Method 3050, Acid Digestion of Sediment, Sludge, and Soils
- Method 1311, Toxicity Characteristic Leaching Procedure (TCLP)

### 4. State, County, and City Regulations

- State - Title 25, Chapters 260a-266a, 266b and 268a-270a, Pennsylvania Department of Environmental Protection – Hazardous Waste Management
- State - Title 25, Chapter 271, Pennsylvania Department of Environmental Protection - Municipal Waste Management
- State - Title 25, Chapter 273, Pennsylvania Department of Environmental Protection - Municipal Waste Landfills - Permitting Requirements
- State - Title 25, Chapter 279, Pennsylvania Department of Environmental Protection - Transfer Facilities
- State - Title 25, Chapter 285, Pennsylvania Department of Environmental Protection - Storage, Collection and Transportation of Municipal Waste
- Allegheny County - Article VIII, Rules and Regulations of Allegheny County, Solid Waste Management.

### 5. Society for Protective Coatings (SSPC)

- Guide 7, Guide for the Disposal of Lead-Contaminated Surface Preparation Debris
- SSPC 93-02, Industrial Lead Paint Removal Handbook, 2nd Edition, Volume I
- SSPC 95-06, Project Design, Industrial Lead Paint Removal Handbook, Volume II

(d) Submittals - Submit the following plans, programs, and transportation/disposal company information for review and acceptance a minimum of 21 calendar days before the start of the paint removal operation.

- Waste Handling Plan: A written program that addresses the proper handling and disposal of all waste. Include the procedures that will be followed for the collection of representative samples of the waste; the procedures for the site handling, storage, and packaging of the waste; and contingency plans in the event of a spill.
- Transporter Information: The names, addresses, license or permit numbers, and qualifications of the proposed haulers of hazardous waste, non-hazardous waste, and waste water. Note that for work in Allegheny County, Article VIII has specific requirements for the permitting of solid waste transportation vehicles. Note the restrictions stipulated below for the use of Ohio transporters.
- Hazardous Waste Disposal Information: Advise legally permitted recycling or waste disposal facilities that bridge paint debris will be generated (e.g., abrasive/paint debris), and identify the toxic metals that the waste will likely contain. Based on that information, request a letter from one or more of the hazardous waste recycling or disposal facilities, stating that the facility can accept this type of waste, is authorized to accept the waste under the laws of the state of residence; has the required capability to treat and dispose of the materials; and will provide or assure the ultimate disposal method indicated on the Uniform Hazardous Waste Manifest. Provide the Representative with the original letter signed by a legally authorized representative of the facility. Note the restrictions stipulated below for the use of Ohio transporters.

- **Restrictions on the Use of Ohio Hazardous Waste Transporters and Disposal Facilities:** There are special restrictions on the use of Ohio hazardous waste transporters and disposal facilities. If the use of Ohio firms is proposed, have each proposed Ohio transporter and disposal facility complete the Certificate of Non-Affiliation Sheet (attached as Exhibit 1). Include the original sheet(s) with the submittals. **Non-Hazardous and Other Waste Disposal Information:** Submit the name and address of the permitted municipal waste landfill that will accept the non-hazardous and residual waste generated by the Contractor.
- **Waste Water:** Provide a letter from the proposed facility that will be accepting the waste water for disposal, indicating that the facility has the capability to handle and properly dispose of the water. Advise the facility of all of the toxic metals that may be present in the water. Provide the Representative with the original letter signed by a legally authorized representative of the facility.
- **Laboratory Qualifications:** Provide the name, address, experience, and qualifications of the laboratory and/or firm that will be used for the waste sampling and analysis required under this Item.

(e) **Review:** Do not construe acceptance of Contractor submittals to imply approval of any particular method or sequence for conducting the work, or for addressing health and safety. Acceptance of the programs does not relieve the Contractor from the responsibility to conduct the work in strict accordance with the requirements of this Item for the proper disposal of all waste, or to adequately protect the health and safety of all workers involved in the project, the public, and the environment. The Contractor remains solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.

## SECTION 9073.2 MATERIAL

### (a) Waste Containers

1. **Hazardous and Residual Waste:** Provide DOT-approved containers of the appropriate size and type for the hazardous waste generated on the project. Use containers that are resistant to rust and corrosion (painted, if constructed of steel), that have tight fitting lids or covers, and which are water resistant and leak proof.
2. **Municipal/Construction Waste:** Provide all containers for non-hazardous municipal/construction waste. Use containers that are free of loose debris when brought on-site.
3. **Spent Solvents:** Provide all containers for spent solvents. Do not mix spent solvents with spent abrasives, paint debris, water, or other waste.

### (b) Container Maintenance

1. Maintain all containers in good operating condition with all lids and closing mechanisms intact and operational to prevent the escape of debris by wind, spilling of the contents, or access by unauthorized personnel.

## SECTION 9073.3 CONSTRUCTION

### (a) General

1. The Township is the generator of the hazardous waste for permitting purposes, and will provide the EPA provisional identification number, but the Contractor is responsible for the collection, handling, storage, transportation and disposal of all wastes.

2. Recover all waste products generated during cleaning and painting work, including but not limited to rags, tape, disposable coveralls, filters, paint debris, and paint cans. Unless otherwise directed by the Representative, contain the waste only within the legal right-of-way.

3. Select the location of the secured waste storage area together with the Representative. Transport the waste to the secured storage area at the frequency agreed upon by the Representative.

4. Conduct the work in strict accordance with Federal, state, and local regulations governing the collection, handling, transportation and disposal of waste. When collecting and storing the waste, comply with Section 9077 for the protection of the workers, and to prevent the dispersion of the debris or dust.

(b) Items Provided by the Township- An EPA provisional ID number and signatures on the hazardous waste manifest will be provided by the Township.

(c) Items Provided by the Contractor

1. Containerizing, testing (classifying), handling, and storage of all waste.

2. Contracting with licensed and/or permitted waste transporters for the transportation of all hazardous, residual, and non-hazardous waste, as well as waste water.

3. Contracting with licensed and/or permitted recyclers or disposers of all waste.

4. Locations for waste storage together with appropriate measures to assure that the area is secure (Note: storage locations must be approved by the Township).

5. Completed Waste Characterization Data Sheets for Township signature.

6. Completed hazardous waste manifests for Township signature.

7. Bill of Lading for non-hazardous waste.

(d) Waste Sampling, Testing, and Classification

1. Sampling

- Collect representative samples of the paint debris generated by project activities. Collect all samples under the observation of the Representative.
- Collect samples in accordance with SW-846, "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods." Describe the sampling methods in the Waste Handling Plan.
- Handle and treat paint waste generated through the use of steel abrasives as hazardous. Collect and analyze a minimum of one representative sample of the steel grit/paint debris to identify the composition of the waste.
- Collect and have analyzed, a minimum of four representative samples of all other waste streams (i.e., waste streams which do not contain steel abrasives). Use a random sampling technique to collect the samples.

- Complete the initial sampling of each waste stream immediately upon filling the first container, but do not allow waste to accumulate for longer than 30 days before sampling. After the representative samples are collected, send them immediately to the laboratory for analysis.
- Unless otherwise directed by the Representative or required by state regulations or the waste recycling or disposal facility, once each waste stream is sampled, tested, and classified, additional sampling and analysis are not required for subsequent shipments unless the waste stream changes.

## 2. Testing

- Have all testing performed by a qualified laboratory acceptable to the Township. Direct the laboratory test the waste in accordance with 40 CFR 261, Appendix II, Method 1311 Toxicity Characteristic Leaching Procedure (TCLP), to determine if it is hazardous.
- Analyze the first two samples from each waste stream by TCLP for all eight (8) metals and other hazardous substances. Analyze subsequent samples of the waste stream(s) for any metal or hazardous material that is detected in the initial TCLP testing. When chemicals strippers are used, test all liquids and sludge. Include pH to determine corrosivity.

## 3. Classification

- Paint debris is classified as hazardous waste if the leachate contains any of the 8 metals or other hazardous substances in concentrations at or above limits established in 40 CFR 261. The presence of these metals at lower concentrations, classifies the waste as residual.

Arsenic -	5.0 mg/L
Barium -	100.0 mg/L
Cadmium -	1.0 mg/L
Chromium -	5.0 mg/L
Lead -	5.0 mg/L
Mercury -	0.2 mg/L
Selenium -	1.0 mg/L
Silver -	5.0 mg/L

Note that paint debris that is generated through the use of steel abrasives has been classified by the as hazardous for lead even though it passes the TCLP test. In Box 9b of the waste manifest, identify this waste as "paint chips-hazardous."

The above includes only those elements typically associated with paints. Take into account other substances that may be present which can cause debris to be classified as hazardous waste as defined in 40 CFR 261 (e.g., pH less than or equal to 2.0 or greater than or equal 12.5 resulting in corrosivity, or the characteristic of ignitability).

#### 4. Laboratory Report

- Have the laboratory send the original test report directly to the Representative with copies of the test results to the Contractor. Issue the reports no later than ten (10) calendar days after the representative samples are collected.
- Include the following minimum information in each report: Identity of the waste stream(s) analyzed, the number of samples collected and tested, dates of sampling and testing, laboratory test procedures utilized, the names and signatures of the individuals collecting the samples and conducting the laboratory tests, and an interpretation of the test results. Include copies of the chain-of-custody forms in the documentation.
- Prepare the Waste Characterization Data Sheet (WCDS) and provide to the Representative for review and signature. Once approved, submit the original WCDS to the Township.

#### (e) Waste Handling, Packaging, and Storage

1. Comply with 40 CFR 262 and Pennsylvania Title 25, Chapters 260a-266a, 266b and 268a-270a for the on-site handling, packaging, and storage of all hazardous waste generated by the project.

2. Comply with Pennsylvania Title 25, Chapters 285 and 299 for the handling, packaging, and storage of residual and municipal construction non-hazardous waste. Comply with additional County and City regulations as applicable.

3. Do not place hazardous waste on the unprotected ground (e.g., cover the ground with impervious tarping). Locate in a secure area with signs around the perimeter and shield adequately to prevent dispersion of the waste by wind or water. Contact the Representative for approval of the storage location(s).

4. Collect and store the waste at the end of each working day in storage drums or containers such that no waste is left exposed overnight, at a minimum. Use DOT-approved containers for hazardous and residual waste storage.

5. Cover all containers immediately upon filling and confirm that all lids are attached except when filling. Verify that all labels remain intact.

6. Store non-hazardous waste separately from hazardous waste. Do not co-mix hazardous waste with non-hazardous waste. Do not mix different types of hazardous waste together unless specifically approved by the Representative and the disposal facility.

7. Arrange containers in the storage area for easy accessibility. Stage the containers together in lots no greater than two rows of five containers each. Maintain a minimum lane clearance of 915 mm (36 inches) between each lot of ten containers.

8. Verify that all waste (hazardous, residual, and non-hazardous) is transported to the appropriate recycling or disposal facility within 90 days after waste is first placed into the container.

9. Improper waste storage is cause for immediate project shut down until appropriate corrective action is completed.

10. Train all personnel in the proper handling of the hazardous waste at the work site in accordance with 40 CFR 265.16. Include procedures in the Waste Handling Plan that will be followed in the event of

a release or spill, required notifications, and methods to be used for cleanup. Maintain all training records on-site.

11. Do not fill any container or roll-off in excess of the capacity marked on the container. If delays during pick-up are caused by overfilled containers, remediate the situation at no additional cost to the Township.

12. Place the soil into separate containers and assume all costs for its disposal, if soil remediation is required as a result of Contractor activities.

#### (f) Labeling of Containers

1. Label all containers of project waste and debris immediately to identify the contents. Label containers of spent abrasive as "BRIDGE BLAST ABRASIVE WASTE, Contains Lead". Include the Contract Number and the Bridge Identification Number or SR and SEC Number. Provide similar labels on containers of other project waste and debris.

2. Apply hazardous waste labels after the TCLP test results are received, if the waste tests hazardous. Label each container or rolloff of hazardous waste in accordance with 40 CFR 262, 49 CFR 171-179, and Pennsylvania Title 25, Chapters 260a-266a, 266b and 268a-270a. Include the following minimum information:

- Hazardous Waste. Federal law prohibits improper disposal. If found, contact the nearest police, or public safety authority, or the U.S. Environmental Protection Agency.
- Proper DOT Shipping Name
- Manifest Document Number
- Generator Name, Address, and EPA ID Number
- Date of Accumulation
- EPA Waste Number

3. Apply non-hazardous, municipal, or residual waste classification labels, as applicable, on all other project waste in accordance with Pennsylvania Title 25, Chapter 285 and 299.

4. Enter the above information using permanent marking material, printed in English, and displayed on a background of contrasting color unobscured by other labels or attachments. Locate labeling away from other markings that could substantially reduce its effectiveness.

5. Complete the labeling, marking, and placarding activities under the observation of the Representative, before storing or transporting any container or rolloff.

#### (g) Waste Transportation and Disposal

##### 1. Hazardous Waste

- Prepare the hazardous waste manifest for each shipment and provide to the Representative for review and signature.
- Arrange for the transportation of all hazardous waste by a licensed transporter in accordance with 40 CFR 263, 49 CFR 171-179, and Pennsylvania Title 25, Chapters 260a-266a, 266b and 268a-270a. Also comply with applicable County or City regulations. Verify that all waste is completely covered during transport. Provide the name, address, and qualifications of the licensed waste transporter to the Township for acceptance.

- Arrange for the recycling or disposal of all hazardous waste in accordance with 40 CFR 264, 40 CFR 268, and Pennsylvania Title 25, Chapters 260a-266a, 266b and 268a-270a. Verify that only licensed recycling or TSD facilities are used. Provide the name, address, qualifications, and letter of commitment from the recycling or TSD facility to the Township for acceptance.
- Comply with all of the manifesting, certification, and reporting requirements for hazardous waste in accordance with 40 CFR 262, 40 CFR 268 and Pennsylvania Title 25, Chapters 260a-266a, 266b and 268a-270a, including certificates of final disposal for each shipment.
- Provide a certification for each manifested shipment that the waste was accepted by the recycling or disposal facility, and properly treated and disposed.

## 2. Residual and Non-Hazardous Municipal/Construction Waste

- Transport, and dispose of all residual and non-hazardous municipal construction waste in accordance with Pennsylvania Title 25, Chapters 271, 273, 279, 285, and 299.
- Verify that waste is completely covered during transport.
- Verify that the truck is properly designated with a residual waste sign measuring 150 mm (6 inches) in height when transporting residual waste.
- Verify that the transportation vehicle has a Pollution Prevention and Contingency Plan and carries the following information: County and state where waste originated, name and address of the carrier, name and location of disposal facility, and fire extinguisher.
- Comply with additional County and City regulations as applicable.

### (h) Special Handling and Disposal Conditions for Waste Resulting from the Use of Recycled Steel Abrasives

1. Treat the waste as hazardous when recycled steel abrasives are used. Notify the waste recycling or disposal facility that the waste contains high levels of lead and that further stabilization is required before disposal. Use stabilization methods that would have been used in the event the waste tested hazardous.

2. Comply with the requirements for the site collection, handling, storage, and transportation of the waste as if it tested hazardous. Identify the waste in box 11 of the manifest as "Paint Chips - nonhazardous."

### (i) Special Handling and Disposal Conditions for Waste Water

1. Provide containers for the collection and retention of all waste water, including but not limited to the water used for hygiene purposes, laundering of clothing if done on site, and cleanup activities.

2. Filter visible paint chips and particulate from the water before placing it into the containers. Before disposal, test the water for total toxic metals and provide ample filtration (e.g., through a multi-stage filtration system ending in 5 microns or better if needed) until the water is not classified as hazardous.

3. Make disposal arrangements with the local publicly owned treatment works (POTW), sanitation company, or other appropriate permitted facility. Provide the Representative with documentation signed by an official of the facility stating that the facility will accept the waste, and that the levels of any lead remaining in the water are acceptable.

4. Provide the Township with the name and address of the transporter and disposal facility for acceptance before use.



(j) Recordkeeping

1. Provide the following information to the Representative: all manifests, a listing of the type and quantity of all waste generated, and the transportation and disposal facilities used for all waste.

SECTION 9073.4 MEASUREMENT AND PAYMENT

Lump Sum. Includes full compensation for collection, testing, handling, storage, transportation and disposal of all waste (hazardous, residual, and non-hazardous including waste water). Partial payment may be made for this item. Payment will be made only after the Township receives all properly executed waste disposal documentation, including certificates of disposal. If there are discrepancies in quantities or in any of the documentation requirements, payment will be withheld until the discrepancies are resolved.

## ITEM 16 - CONTAINMENT

### Section 9075.1 DESCRIPTION -

#### (a) General

1. This Item provides the material and execution requirements for the installation and use of containment systems for a variety of different types of paint removal methods. Containment systems are required when specified by the Township in order to control, below harmful levels, exposures of dust, lead, and other toxic metals that may be present in the paint being removed.

2. Design and use a containment system that is capable of controlling project emissions for the protection of the public and the environment in accordance with the criteria established in Section 1079 and controlling worker exposures in accordance with the requirements of Section 9077.

3. Comply with the requirements of this Item and all applicable Federal, State, County, and City regulations.

4. Comply with all applicable regulations even if the regulation is not specifically referenced herein. Follow the more restrictive requirements if a State, County, or City regulation is more restrictive than the requirements of this Item.

5. Identification of the items below which are of specific interest to the Township in no way relieves the Contractor of the responsibility to comply with all EPA requirements, nor should it be construed that the Township, the EPA and DEP, or City and County regulators are only interested in these items.

#### (b) Definitions

1. Containment System - Complete enclosure built around hazardous (toxic metal) paint removal areas designed to contain debris and prevent emissions to the environment.

2. Competent Person - One who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to eliminate them.

3. DEP - Pennsylvania Department of Environmental Protection

4. Township, Representative – Kennett Township or Representative of Kennett Township

5. Engineering Controls - The use of technologically feasible controls in the work areas for the purpose of reducing and maintaining employee exposure to lead to or below the PEL, and for controlling emissions from the work area. Examples of engineering controls are mechanical dilution ventilation for the enclosure, or methods which capture the dust at the point of generation such as vacuum blast cleaning.

6. Emission - A release of material to the air, water, or ground.

7. EPA - The U.S. Environmental Protection Agency. Regulations are contained in Title 40 of the Code of Federal Regulations (40 CFR).

8. Hazardous Waste (lead paint debris) - Waste that is classified as hazardous due to its concentrations of regulated hazardous substances. Paint debris is classified as hazardous waste if, after

testing by the Toxicity Characteristic Leaching Procedure (TCLP), the leachate contains any of the 8 metals or other substances in concentrations at or above limits established in 40 CFR 261, EPA, Identification and Listing of Hazardous Wastes.

9. HEPA - A high efficiency particulate filter (HEPA) that is 99.97% efficient against particles of 0.3 microns in size or larger.

10. Lead - Metallic lead, all inorganic lead compounds, and organic lead soaps. The lead pigments used in paints comply with this definition.

11. ug/m<sup>3</sup> - Micrograms per cubic meter. Common units for reporting airborne concentrations of lead.

12. NIOSH - National Institute of Occupational Safety and Health.

13. OSHA - Occupational Safety and Health Administration. Standards are contained in Title 29 of the Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 29 CFR 1926).

(c) Reference Standards and Regulations

1. The latest edition of the following regulations, guides, and standards form a part of this Item.

2. Code of Federal Regulations (CFR)

- 29 CFR 1926, Occupational Safety and Health Regulations for Construction
- 29 CFR 1926.451, Scaffolding

3. State, County, and City Regulations

- State - Title 25, Chapter 123, Pennsylvania Department of Environmental Resources- Standards for Contaminants
- Allegheny County - Article XXI, 2105.51, Rules and Regulations of Allegheny County Bureau of Environmental Quality, Abrasive Blasting
- Philadelphia County - Regulation 2, Section 8, Philadelphia County Air Monitoring Regulation - Air Contaminated Fugitive Dust

4. Society for Protective Coating (SSPC)

- Guide 6, Guide for Containing Debris Generated During Paint Removal Operations
- SSPC 93-02, Industrial Lead Paint Removal Handbook, 2nd Edition, Volume I
- SSPC 95-06, Project Design, Industrial Lead Paint Removal Handbook, Volume II

(d) Submittals - Provide the following containment working drawings and other information for review and acceptance a minimum of 21 calendar days prior to the erection of the containment system:

- Detailed drawings stamped by a Professional Engineer licensed in the State of Pennsylvania. Have the engineer analyze the system for the effects of wind forces on the bridge structure as well as the containment system itself and all other imposed loads (e.g., equipment, waste, traffic, etc.). Do not allow the containment system to induce a load on the bridge which will create an overstress condition or otherwise effect the structural integrity of the bridge, and do not allow the system to encroach upon the required bridge clearances.

- Data, calculations, and assumptions used for the design of the containment and ventilation system and the imposed loads on the existing structure.
- The plan for staging, installing, moving, and removing the containment; and the methods of attachment that will be used. Make attachment points to substantial framing members only.
- Provisions for dropping the containment in inclement weather, for movement out of navigation lanes, and the controls exercised to prevent excessive sagging during cable installation (e.g., temporary cradles) to ensure the protection of traffic.
- Plans for maintaining the navigational lighting during the work.
- Plans for the collection and removal of debris from the surface of water when working over streams, rivers, lakes, and other bodies of water.
- Any other information needed to thoroughly describe the containment plan.

(e) Review: Do not construe acceptance of Contractor submittals to imply approval of any particular method or sequence for conducting the work, or for addressing health and safety. Acceptance of the programs does not relieve the Contractor from the responsibility to conduct the work in strict accordance with the requirements of this Item, or to adequately protect the health and safety of all workers involved in the project, the public, and the environment. The Contractor remains solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.

## SECTION 9075.2 MATERIAL

(a) Supply all materials needed to contain project debris in accordance with the provisions of this Item. This includes ground covers, rigging, scaffolding, planking, and containment materials.

(b) Use materials that are free of loose dust and debris when brought onto each bridge site, and upon removal.

(c) Provide the Representative with two portable light meters with a scale of 0.0 - 538 LUX (0.0 - 50.0 foot-candles).

## SECTION 9075.3 CONSTRUCTION

### (a) General

1. Use a containment system that maintains the work area free of emissions of dust and debris in accordance with all provisions of this Item.

2. Follow the containment requirements as specified in this Item and as stipulated in SSPC Guide 6 for the selected method of removal as summarized in Table 1 attached to this Section.

### (b) Certification of Installation

1. Have a licensed Professional Engineer registered in the State of Pennsylvania certify that the containment system has been assembled as shown on the approved, signed and sealed drawings, after the containment system is installed.

2. Submit the certification to the Engineer before starting any work within the containment.

### (c) Special Restrictions

1. Comply with the project-specific vertical clearance requirements established by the District.

2. Do not allow equipment and workers to be present or to operate over any lanes that are open to traffic, unless specifically approved by the Township.

(d) Enclosure System

1. Cover the floor or ground beneath the structure being prepared with air and dust impenetrable materials such as solid panels of plywood or flexible materials such as tarpaulins, if it serves as the base of the containment. Maintain the materials throughout the project to avoid losing debris through rips, tears, or breaks in the coverings.

2. Verify that the platform and its components are designed and constructed to support at least 4 times its maximum intended load without failure with wire cables capable of supporting at least 6 times their intended load without failure, if a suspended or elevated platform is constructed to serve as the base of the containment. Strictly follow all applicable OSHA regulations regarding scaffolding. Cover the platform or scaffolding with air and dust impenetrable materials.

3. Remove debris from the containment materials and equipment prior to relocation to another point along the structure or within the facility. Clean to the extent that debris or dust are not dislodged by winds or physical contact during handling and transportation.

(e) Containment Requirements - Table 1: Table 1 identifies a series of components that serve as the basis for minimum requirements for the containment system for various methods of paint removal. The components are defined in this Item.

1. Rigidity of Containment Materials: Rigid containment materials consist of solid panels of plywood, aluminum, rigid metal, plastic, fiberglass, composites, or similar materials. Flexible materials consist of screens, tarps, drapes, plastic sheeting, or similar materials.

2. Permeability of Containment Materials: The containment materials are identified as air impenetrable if they are impervious to dust or wind such as provided by rigid panels, coated solid tarps, or plastic sheeting. Air penetrable materials are those that are formed or woven to allow air flow. Water impermeable materials are those that are capable of containing and controlling water when wet methods of preparation are used. Chemical resistant materials are those resistant to chemical and solvent stripping solutions.

3. Support Structure: Rigid support structures consist of scaffolding and framing to which the containment materials are affixed to minimize movement of the containment cocoon. Flexible support structures are comprised of cables, chains, or similar systems to which the containment materials are affixed. Minimal support structures involve nothing more than the cables or connections necessary to attach the material to the structure being prepared and/or to the ground.

4. Containment Joints: Fully sealed joints require that mating surfaces between the containment materials and to the structure being prepared are completely sealed. Sealing measures include tape, caulk, Velcro, clamps, or other similar material capable of forming a continuous, impenetrable or impermeable seal. The use of overlapping containment materials (300 mm (1 foot) minimum overlap) to achieve fully sealed joints is acceptable only if emissions of dust and debris are controlled. If emissions escape at the joints, more positive means of sealing are required. Partially sealed joints involve the mating of the materials to one another and to the structure being prepared with concern for the structural soundness of the joint, but without consideration for creating a continuous, impenetrable or impermeable seal.

5. Entryway: An airlock entryway involves a minimum of one stage that is fully sealed to the containment and which is maintained under negative pressure using the ventilation system of the containment. Resealable door entryways involve the use of flexible or rigid doors capable of being

repeatedly opened and resealed. Sealing methods include the use of zippers, Velcro, clamps, or similar fasteners. Overlapping door tarpaulin entryways consist of two or three overlapping door tarpaulins. Open seam entryways involve entrance into the containment through any open seam.

6. Mechanical Ventilation: The requirement for mechanical ventilation is to ensure that adequate air movement is achieved to reduce worker exposure to toxic metals to as low as feasible, and to enhance visibility. Design the system with proper exhaust ports or plenums, adequately sized ductwork, adequately sized discharge fans and air cleaning devices (dust collectors) and properly sized and distributed make-up air points. Natural ventilation does not require the use of mechanical equipment for moving dust and debris through the work area. It relies on natural air flow patterns, if any, through the containment.

7. Negative Pressure: If negative pressure is specified, verify its performance through instrument monitoring to achieve a minimum of 0.75 mm (0.03 inch) water column (W.C.) relative to ambient conditions, or through visual assessments for the concave appearance of the containment enclosure.

8. Exhaust Ventilation: When mechanical ventilation systems are used, provide filtration of the exhaust air, otherwise airborne particulate from the containment will be exhausted directly into the surrounding air. Provide a filtration efficiency of 0.5 microns or better.

(f) Work Over Water - Containment Restrictions and Water Booms

1. Provide the necessary material and equipment on site to contain inadvertent spills or releases of dust and debris, when working over or near water. Materials and equipment that are typically acceptable include water booms and boats with skimmers. Remove all project-related dust and debris from the surface of the water or from sediment at the end of each work day at a minimum. Conduct more frequent cleaning, if directed by the Township. Describe the methods that will be used to control spills in the Containment submittals.

(g) Maintenance of Bridge Lighting Systems and Containment Lighting Requirements

1. Maintain all navigational lighting throughout the project. Provide the lighting plan to the Township for approval in advance.

2. Provide adequate lighting for all surface preparation, paint application, and inspection work. Maintain a minimum of 107 LUX (10 foot-candles) for surface preparation and painting, and a minimum of 322 LUX (30 foot-candles) of general area lighting for inspection. Increase the lighting if workers or inspectors have difficulty in seeing. Use explosion-proof lighting.

(h) Protection of Drainage Systems

1. Protect storm sewers and drains from the entrance of debris from project activities. Keep all protective systems clean and operational throughout the entire project. Remove all visible debris from the protective devices or from areas where rain water could carry the debris into drains or storm sewers at the end of each work day at a minimum. Conduct more frequent cleaning as directed by the Representative.

2. Identify the methods that will be used to route run-off from the existing deck drains through the containment enclosure. Do not close any bridge deck drains without the explicit approval of the Representative.

(i) Cleaning of Contractor Materials and Equipment During Relocation and Demobilization

1. Remove loose dust and debris to the extent that they will not be dislodged during movement prior to relocating containment materials and equipment from one portion of the project to the next. Use compressed air for cleaning only if it is accomplished inside a contained area that is equipped with an operating ventilation system capable of capturing the dust and debris.

2. Remove all Contractor equipment and materials upon completion of project activities.

- Thoroughly HEPA vacuum, wash, or otherwise decontaminate reusable items until all loose surface dust and debris have been removed. These items include, but are not limited to, paint removal equipment, containment materials, ground covers, and scaffolding.
- Treat materials as a separate waste stream, and at no additional cost to the Township, dispose of properly, if adequate cleaning is not possible. Collect water used for cleaning and dispose of in accordance with the requirements of Section 9073.

3. Comply with Section 1079 for the clean-up and clearance of the project site.

#### SECTION 9075.4 MEASUREMENT AND PAYMENT

Lump Sum. Price includes full compensation for all labor, containment and ventilation materials and equipment, engineering, drawings, and any equipment or facilities needed to install, operate, move, clean, dismantle, and remove the containment system from the project site. Partial payments for containment will be made based on the percentage of the structure that has been prepared and fully primed.

## ITEM 17 - WORKER HEALTH & SAFETY

### Section 9077.1 DESCRIPTION -

#### (a) General

1. This Item provides the material and execution requirements for implementing a Lead (Toxic Metal) Health and Safety Program for the protection of Contractor workers in strict compliance with all of the applicable OSHA regulations. The program is for the protection of workers from over exposure to lead and other toxic metals that may be present in the paint being removed or repaired.

2. Test results for lead, cadmium, chromium and/or arsenic are not provided so assume that the unreported elements are present and take necessary precautions to comply with local, State and Federal regulations dealing with protection of the workers' health and safety, waste disposal, and environmental protection. Test results are for bidding purposes only. The contractor, at his cost, may obtain laboratory analysis of existing paint prior to bidding. Conduct work exposure monitoring at the project startup, and adjust all protection, training, medical surveillance, and record keeping provisions according to the results.

3. Implement and maintain programs and procedures which comply with the requirements of this Item and all applicable Federal and local OSHA standards or regulations.

4. Comply with all applicable regulations even if the regulation is not specifically referenced herein. If a State, County, or City regulation is more restrictive than the requirements of this Item, follow the more restrictive requirements.

5. Identification of the items below which are of specific interest to the Township in no way relieves the Contractor of the responsibility to comply with all OSHA and EPA requirements, nor should it be construed that the Township, OSHA, the EPA and DEP, or City and County regulators are only interested in these items.

#### (b) Definitions

1. Action Level - Employee exposure, without regard to the use of respirators, to an airborne concentration in micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ) calculated as an eight hour time-weighted average (TWA). The Action Level for lead is  $30 \mu\text{g}/\text{m}^3$ .

2. CIH - Certified Industrial Hygienist

3. Competent Person - One who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions and who has authorization to take prompt corrective measures to eliminate them.

4. Township, Representative – Kennett Township or Representative of Kennett Township

5. Employee Lead Exposure - Exposure which would occur if the employee were not using a respirator.

6. Engineering Controls - The use of technologically feasible controls in the work areas for the purpose of reducing and maintaining employee exposure to lead to or below the PEL, and for controlling emissions from the work area. Examples of engineering controls are mechanical dilution ventilation for the enclosure, or methods which capture the dust at the point of generation such as vacuum blast cleaning.



7. EPA - The U.S. Environmental Protection Agency. Regulations are contained in Title 40 of the Code of Federal Regulations (40 CFR).

8. Hazardous Waste (lead paint debris) - Waste that is classified as hazardous due to its concentrations of regulated hazardous substances. Paint debris is classified as hazardous waste if, after testing by the Toxicity Characteristic Leaching Procedure (TCLP), the leachate contains any of the 8 metals or other substances in concentrations at or above limits established in 40 CFR 261, EPA, Identification and Listing of Hazardous Wastes.

9. HEPA - A high efficiency particulate filter (HEPA) that is 99.97% efficient against particles of 0.3 microns in size or larger.

10. Lead - Metallic lead, all inorganic lead compounds, and organic lead soaps. The lead pigments used in paints comply with this definition.

11. ug/m<sup>3</sup> - Micrograms per cubic meter. Common units for reporting airborne concentrations of lead.

12. NIOSH - National Institute of Occupational Safety and Health.

13. OSHA - Occupational Safety and Health Administration. Standards are contained in Title 29 of the Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 29 CFR 1926).

14. POTW - Publicly Owned Treatment Works

15. Permissible Exposure Limit (PEL) - Employee exposure, without regard to the use of respirators, to an airborne concentration in micrograms per cubic meter of air (ug/m<sup>3</sup>), calculated as an eight hour time-weighted average (TWA). The PEL for lead is 50 ug/m<sup>3</sup> as an 8 hour TWA. If an employee works for longer than 8 hours in a given day, the PEL is reduced using the following formula: Permissible Limit = (PEL x 8) divided by (hours worked in the day)

16. Regulated Area - Area established by the Contractor to demarcate the areas where airborne concentrations of lead exceed, or can be expected to exceed, the Action Level.

(c) Reference Standards

1. The latest edition of the following regulations, guides, and standards form a part of this Item.

2. Code of Federal Regulations (CFR)

- 29 CFR 1926, Occupational Safety and Health Regulations for Construction o 29 CFR 1926.51, Sanitation
- 29 CFR 1926.55, Gases, Vapors, Fumes, Dusts, and Mists
- 29 CFR 1926.62, Lead
- 29 CFR 1926.1127, Cadmium
- 29 CFR 1926.1118, Inorganic Arsenic

3. State, County, and City Regulations

4. NIOSH Methods

- Method 7048, Cadmium

- Method 7082, Lead
- Method 7300, Chromium
- Method 7900, Arsenic

#### 5. Society for Protective Coating (SSPC)

- Guide 6, Guide for Containing Debris Generated During Paint Removal Operations
- SSPC 93-02, Industrial Lead Paint Removal Handbook, 2nd Edition, Volume I
- SSPC 95-06, Project Design, Industrial Lead Paint Removal Handbook, Volume II

#### 6. American Industrial Hygiene Association

- Environmental Lead Proficiency Analytical Testing Program (ELPAT)

(d) Submittals - Submit the following plans and programs for review and acceptance a minimum of 21 calendar days prior to exposure to toxic metals.

- **Lead (Toxic Metal) Health and Safety Compliance Program:** A written project-specific compliance program, prepared under the direction of, and signed by, a Certified Industrial Hygienist (CIH), for the protection of Contractor workers from lead in accordance with 29 CFR 1926.62 and other toxic metals in the paint. Include the name of the competent person who will be making routine inspections of project activities to ensure compliance with the program. Verify that any Subcontractors working for the Contractor are included in the program or in a separate program which meets the requirements of this Item. If Subcontractors are operating under a separate program, include the program with the submittals.
  - **Personnel Qualifications:** Provide the name, experience, and qualifications of both the CIH who will be overseeing the development of the compliance program, and the competent person who will be assigned to the project.
  - **Outside Laundry:** Provide the name, address, and qualifications of the launderer, if one will be used, for the cleaning of reusable clothing. Provide a letter from the laundry indicating that it is permitted to handle clothing contaminated with lead and/or the other toxic metals of concern.
  - **Laboratory Qualifications:** Provide the name of the laboratory and/or firm that will be used for the worker and area exposure monitoring required under this Item. Verify that the analytical laboratory is American Industrial Hygiene Association (AIHA) accredited for metals analysis and/or has successfully participated (previous 12 months at a minimum) in the AIHA ELPAT program.
  - **Personal Protective Equipment for Representative Use:** Acknowledge that all protective clothing and equipment, laundering or disposal, fit testing as needed, and hygiene facilities will be provided for two Representatives at each site for each shift.
  - **Training for Representatives:** Acknowledge that site training in accordance with the requirements of 29 CFR 1926.62 will be provided for two Representatives at each site per shift if there is the potential for lead exposures on the project. Include training as appropriate for other toxic metals that are present in the paint.

(e) Review: Do not construe acceptance of Contractor submittals to imply approval of any particular method or sequence for conducting the work, or for addressing health and safety. Acceptance of the programs does not relieve the Contractor from the responsibility to conduct the work in strict accordance with the requirements of this Item, or to adequately protect the health and safety of all workers involved in the project, the public, and the environment. The Contractor remains solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.

### SECTION 9077.2 MATERIAL

#### (a) Monitoring and Testing Equipment

1. Supply the instrumentation needed for the monitoring of worker and area exposures including all equipment needed for its operation (e.g., generators, batteries, power cords, fuel, etc.).

2. Use equipment that is free of loose dust and debris when brought onto each bridge site, and upon removal.

(b) Personal Protective Equipment and Hygiene Facilities

1. Provide all personal protective clothing and equipment (PPE) needed for contractor workers, and for two Representatives each shift, including proper cleaning and disposal.

2. Repair or replace PPE as required to assure that it continues to provide its intended purpose.

3. Use PPE and hygiene facilities that are free of loose dust and debris when brought onto each bridge site, and upon removal. Properly handle and dispose of all hygiene water, cleaning materials, and PPE that cannot be cleaned for reuse. Comply with Section 9073 for disposal.

## SECTION 9077.3 CONSTRUCTION

(a) General

1. Conduct the work in strict accordance with Federal, state, and local regulations governing worker protection. All worker protection requirements apply to Contractor and Subcontractor personnel working for the Contractor who are exposed to lead and other toxic metals.

2. Requirements identified below are based primarily on the OSHA Lead in Construction Standard, 29 CFR 1926.62, but protect employees from exposure to any of the other toxic metals which may be present in the paint in addition to lead.

(b) Compliance Program

1. Develop a written Compliance Program under the direction of a CIH to establish and implement practices and procedures for protecting the health of those employees exposed to lead and other toxic metals contained in the paint. This program is in addition to other OSHA hazard communication and safety and health requirements of the project. Revise and update the program at least every six months during the portion(s) of the project which involve the disturbance of toxic metals. Verify that the CIH signs off on all six month reviews and revisions.

2. Establish methods for complying with this Item and any OSHA standards published for the toxic metals present in the paint (e.g., 29 CFR 1926.62 for lead, 29 CFR 1926.1127 for cadmium, and 29 CFR 1926.1118 for inorganic arsenic). Include statements that the workers will not be exposed above the PEL established for the metal as identified in 29 CFR 1926.55, when toxic metals are present in the paint for which OSHA has not developed a comprehensive health and safety standard.

3. Identify the methods of compliance that will be used to reduce worker exposures to toxic metals. Rely on respiratory protection only after feasible engineering and work practice controls have been first implemented to reduce airborne exposures.

4. Confirm that daily inspections of the work area will be made by a competent person. Identify the project competent person by name in the compliance program, his or her qualifications, and indicate the frequency of inspections that will be undertaken.

5. Include in the plan, a detailed checklist for site inspections by the competent person.

### (c) Exposure Monitoring/Initial Protection

1. Collect representative personal air samples at the beginning of the paint removal work (at project start-up) to determine employee exposures to lead and other toxic metals that might be present in the coating. Tasks resulting in the potential exposure to toxic metals include, but are not limited to, paint removal activities, cleanup, and debris handling operations. Collect full shift (at least 7 hours) air samples for each job classification in each exposure area, including Representatives. Provide the Township with the results of the analysis within the same 5 day notification period required for the employees.

2. Protect workers during the initial monitoring to the anticipated exposure levels as dictated by 29 CFR 1926.62 and as specified below when lead is present. A few activities in addition to those dictated by OSHA are included. Use the same level of protection when other toxic metals are found in the coating, unless OSHA has developed a comprehensive health and safety standard for that metal (e.g., cadmium and inorganic arsenic). In those cases, implement the protection requirements of the standard for that metal.

- Assume an exposure of at least 500  $\mu\text{g}/\text{m}^3$  : Structures containing lead-containing coatings or paint (e.g., dry wall), manual scraping, manual sanding, heat gun applications, power tool cleaning with dust collection systems, and spray painting with lead paint. Although not identified in 29 CFR 1926.62, include chemical stripping, water washing, and the operation of abrasive grit recovery equipment in this category.
- Assume an exposure of at least 2,500  $\mu\text{g}/\text{m}^3$  : Using lead-containing mortar, lead burning, or conducting the following activities where lead-containing coatings or paint are present: rivet busting, power tool cleaning without dust collection systems, cleanup activities where dry expendable abrasives are used, and the movement and removal of abrasive blasting enclosures. Although not identified in 29 CFR 1926.62, include water jetting and wet abrasive blasting removal of paint in this category.
- Assume an exposure of more than 2,500  $\mu\text{g}/\text{m}^3$  : Activities involving lead containing coatings or paint on structures disturbed by abrasive blasting, welding, cutting, and torch burning.

3. Provide appropriate respiratory protection, personal protective clothing and equipment, change areas and washing facilities, blood lead and zinc protoporphyrin monitoring, and employee training during any of the above activities. Maintain the protection as specified above until the test results are received, then modify the protection measures as necessary.

4. Collect and analyze all air samples according to the appropriate NIOSH method, or equivalent, for the metal of concern (e.g., Method 7082 for lead, Method 7048 for cadmium, Method 7300 for chromium, Method 7900 for inorganic arsenic). Use only laboratories successfully participating (at least in the previous twelve months) in the ELPAT Program and/or accredited by the American Industrial Hygiene Association for metals analysis. Submit the name and qualifications of the laboratory to the Township for review and acceptance prior to use.

5. Conduct periodic worker and Representative exposure monitoring and provide written employee notifications within five days of receipt of results in strict accordance with the applicable OSHA standard for the metal of concern (e.g., 29 CFR 1926.62 for lead). At a minimum, this requires monitoring at project start up and after any changes in work practices are made which could have an effect on airborne exposures. Conduct the monitoring and employee notification based on the requirements of OSHA 29 CFR 1926.62, if a standard does not exist. Provide the Township with the results of any subsequent monitoring within the same 5 day notification period required for the employee.

### (d) Action Level

1. The Action Level for lead is 30  $\mu\text{g}/\text{m}^3$  as an eight (8) hour Time Weighted Average (TWA), the Action Level for cadmium is 2.5  $\mu\text{g}/\text{m}^3$  as an 8 hour TWA, and the Action Level for inorganic arsenic is 5

ug/m<sup>3</sup> as an 8 hour TWA. For other metals that are found in the coating, and for which no Action Level exists, establish the Action Level at 1/2 of the PEL.

2. Invoke the following protective measures when the airborne exposure to a toxic metal found in the coating exceeds the Action Level:

- Exposure Monitoring
- Housekeeping
- Employee Medical Surveillance and Medical Removal Protection
- Employee Information and Training
- Signs and Regulated Areas
- Record keeping

(e) Permissible Exposure Limit

1. The PEL for airborne lead exposure is 50 ug/m<sup>3</sup> as an 8 hour TWA. The PEL for cadmium is 5 ug/m<sup>3</sup> as an 8 hour TWA, and for inorganic arsenic is 10 ug/m<sup>3</sup> as an 8 hour TWA. The PELs for other metals can be found in 29 CFR 1926.55.

2. In addition to complying with the requirements identified when exceeding the Action Level, invoke the following protective measures when the airborne exposure to a toxic metal found in the coating exceeds the PEL:

- Compliance Program
- Respiratory Protection
- Protective Clothing and Equipment
- Hygiene Facilities and Practices

(f) Respiratory Protection

1. Use respiratory protection if necessary, to maintain employees' exposures to lead and other toxic metals below the PEL after feasible engineering controls and work practices have been implemented. Require the use of respirators for all employees, inspectors, observers, or other personnel who enter areas where airborne exposures exceed or are expected to exceed the PEL, or when entering regulated areas.

2. Provide respiratory protection for two Representatives at each site for each shift, including fit tests. The Township is responsible for verifying that the Representatives are medically fit to wear respirators.

3. Develop a written Respiratory Protection Program in compliance with 29 CFR 1926.103, including commitments to provide the necessary medical examinations. Include the provisions of 29 CFR 1926.62 when lead is present. Include 29 CFR 1926.1127 when cadmium is present. Include 29 CFR 1926.1118 when inorganic arsenic is present. Address the selection, use, maintenance and inspection of respirators, and qualifications for respirator users.

4. Treat used respirator cartridges as hazardous waste and dispose of in accordance with Section 9073.

(g) Protective Clothing and Equipment

1. Provide protective clothing and equipment and ensure they are worn by all employees whose exposures exceed the PEL. Provide all required protective clothing and equipment for use by two Representatives at each site for each shift.

2. Do not allow workers to wear street clothing beneath protective clothing in any areas where exposures to toxic metals exceed the PEL.

3. Clean or replace the protective clothing as required by the appropriate OSHA standard for the toxic metal that is present. In the case of lead, clean or replace the clothing weekly if the airborne exposure levels are less than 200 ug/m<sup>3</sup> as an 8 hour TWA, or daily if the exposure levels are greater than or equal to 200 ug/m<sup>3</sup>. In the case of inorganic arsenic, the threshold for daily versus weekly cleaning is 100 ug/m<sup>3</sup>. Do not use disposable clothing for any longer than one day.

4. Do not remove or clean the clothing by any means which reintroduces the toxic metals into the ambient air such as brushing, shaking, or blowing. Use vacuums equipped with HEPA filters for cleaning.

5. Store the used clothing in sealed containers.

- Label the containers with the following: "CAUTION: CLOTHING CONTAMINATED WITH LEAD. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, OR FEDERAL REGULATIONS," if the clothing is to be laundered and it has been exposed to lead. Modify the above text accordingly if the clothing has been exposed to cadmium, chromium, or inorganic arsenic.
- Label the containers as lead-contaminated clothing if the clothing is disposable. Apply hazardous waste labels as appropriate after testing.

6. Provide containers for the collection and retention of the water after filtration if the clothing is washed on site. Provide ample filtration (e.g., through a multi-stage filtration system ending in 5 microns or better if needed) until the water can be disposed of as non-hazardous. Conduct all required tests of the water and comply with Section 9073 for its disposal.

#### (h) Housekeeping

1. Clean accumulations of dust or debris containing lead or other toxic metals daily, at a minimum. Clean more frequently if visible accumulations are observed that could be carried outside of the regulated area by wind, workers shoes, rain water, or other means. Containerize the debris for proper disposal.

2. Conduct all cleaning with HEPA-filtered vacuums and deposit all dust and debris in sealed containers. Do not use compressed air for housekeeping purposes unless it is used in conjunction with a ventilation system capable of capturing the resulting airborne particulate.

#### (i) Personal Hygiene Facilities and Equipment

1. Provide clean lavatory and hand washing facilities in accordance with OSHA sanitation standard 29 CFR 1926.51. Locate the hand washing facilities in close proximity to the paint removal operation, in an area that is convenient for washing prior to eating or smoking. Provide showers when exposures exceed the PEL. Confirm that all employees whose exposures exceed the PEL shower prior to leaving the project site.

2. Filter and containerize all water and make arrangements with the local POTW for proper disposal. Provide ample filtration (e.g., through a multi-stage filtration system ending in 5 microns or better if needed) until the water can be disposed of as non-hazardous. Conduct all required tests of the water and comply with Section 9073 for its disposal.

3. Prohibit eating, drinking, smoking, chewing of food or tobacco products, or the application of cosmetics in any area where the exposure to toxic metals exceeds the PELs or within regulated areas, and confirm that workers thoroughly wash hands and face prior to undertaking any of these activities.

4. Provide clean lunch and break areas for use by all employees and maintain airborne concentrations in these areas below the Action Levels.

5. Provide clean change area(s) for employees whose exposures exceed the PELs. Equip the change area(s) with separate storage facilities for street clothing that are adequately segregated to prevent cross-contamination from work clothing. Assure that employees do not leave the project site wearing any clothing that was worn while performing activities where exposures exceeded the PELs.

(j) Medical Surveillance and Medical Removal Protection

1. Provide all employees with initial and periodic blood and zinc protoporphyrin (ZPP) sampling and analysis, and medical surveillance as required by the published OSHA health and safety standards that exist for the metal of concern such as 1926.62 for lead and 1926.1127 for cadmium. Verify that the blood analysis is conducted by laboratories certified by both the PA Department of Health and OSHA. Provide the specialized medical surveillance and X-rays required by 1926.1118 for employees exposed to inorganic arsenic.

2. Conduct blood sampling and analysis at a minimum of once every two months for the first six months of exposure, and at six month intervals thereafter when lead is present. Conduct exit blood tests for each worker upon completion of his/her project activities which involve exposure to lead, even if this occurs prior to the completion of the Contractor's work on the project.

3. Do not use workers with initial blood lead tests of 40 ug/dl for any work activities involving exposure to lead above the Action Level.

4. Provide for the temporary removal of employees from exposures above the Action Level for the metal of concern when the blood analysis indicates that unacceptable results are occurring (e.g., 50 ug/dl or above in the case of blood lead). Protect employees' benefits during any period of medical removal and conduct all tests required by the appropriate OSHA standards during the removal period. In the case of lead, return workers to exposures above the PEL only after two consecutive blood tests are below 40 ug/dl.

5. Provide all physical examinations as required by the appropriate OSHA standards for metal(s) of concern and verify that all examinations are performed by or under the direct supervision of the licensed physician.

6. Provide all exam information and test results to the employees in writing within 5 days of receipt.

7. Provide the Township with a letter report signed by a CIH which summarizes all examination results as described in 9077.3 (m).

(k) Employee Training and Information

1. Provide initial and annual refresher training for all employees who will be exposed to toxic metals above the respective Action Levels on any one day in a 12-month period. Include all of the elements of training that are required by the appropriate OSHA standard. Use the training requirements of 29 CFR 1926.62 as the basis of the training program highlighting the differences as appropriate for the other metals of concern, if a standard for the metal does not exist. Provide the necessary training for two Representatives at each site for each shift in addition to the training of the Contractors' personnel.

2. Notify other contractors or employers of the nature of the lead exposure work, the need to remain out of exposure areas, the warning signs and labeling system in effect, and the potential need for them to take measures to protect their employees in accordance with the applicable OSHA regulations when they are present at the site.

(l) Signs and Regulated Areas

1. Establish zones (regulated areas) around areas or activities that might generate airborne emissions of lead, cadmium, chromium, inorganic arsenic, or other toxic metal in excess of the Action Level (e.g., paint removal and clean-up locations, dust collector staging areas, waste storage areas, etc.). Use ropes, ribbons, tape, or other visible means to define the areas and prohibit entrance into the regulated areas by unprotected or untrained personnel to ensure that they are not exposed to toxic metals from project activities.

2. Unless otherwise directed by the Representative, until test results are available to establish the perimeter of the regulated area, initially establish the boundary a minimum of 4.6 m (15 feet) away from any equipment or operations that might generate airborne emissions of toxic metals.

3. Post caution signs around the regulated area. If a regulation does not exist for the metal of concern, use the legend for the CAUTION sign as found in 29 CFR 1926.62 as the basis, inserting the name(s) of the other toxic metals. Sign requirements for lead, cadmium, and inorganic arsenic are as follows:

WARNING  
LEAD WORK AREA  
POISON  
NO SMOKING OR EATING

DANGER, CADMIUM,  
CANCER HAZARD,  
CAN CAUSE LUNG AND KIDNEY DISEASE,  
AUTHORIZED PERSONNEL ONLY,  
RESPIRATORS REQUIRED IN THIS AREA

DANGER  
INORGANIC ARSENIC  
CANCER HAZARD  
AUTHORIZED PERSONNEL ONLY  
NO SMOKING OR EATING  
RESPIRATOR REQUIRED

Use signs that are a minimum of 215 mm (8 ½ inches) by 275 mm (11 inches) in size with black block lettering on a white, yellow, or orange background. Do not use caution ribbons as a substitute for signs.

4. Conduct sampling according to NIOSH Method 7082, or equivalent for the other metals of concern at the pre-established boundaries of the regulated area(s). Collect the samples throughout an entire work shift upon commencement of the paint removal activities (at project-start-up).

- Establish the boundary at that location and discontinue monitoring if the monitoring confirms that project emissions at the established boundary do not exceed the Action Level as an 8 hour TWA.
- Modify and improve work practices and containment to provide better controls over the emissions or reestablish the boundary at a different location if the monitoring shows that the emissions exceed the Action Level. Repeat the monitoring in either case.



5. After the boundaries have been established through instrument monitoring, additional monitoring is not required unless directed by the Representative, if suspect visible emissions occur, or there are changes to the work practices or equipment being used within the regulated areas. In these cases, conduct additional monitoring to confirm the adequacy of the control systems in place, and to verify the suitability of the existing regulated area(s).

6. Verify that cassettes are only analyzed by laboratories that have been accepted for use by the Township. Have the laboratory provide results within 72 hours of the field sampling. Provide the test results to the Township verbally within one day of receipt, and in writing within one week thereafter.

7. Verify that all workers who enter the regulated area have had the proper training, blood analysis and medical examinations, and are wearing the required protective clothing and equipment. Prohibit eating, drinking, smoking, and chewing of food or tobacco products in any area where the exposures exceed the Action Level.

(m) Recordkeeping

1. Retain all records related to training, medical examinations, blood analysis, exposure monitoring, respirator fit testing, inspections by a competent person, and other related project documentation on file at the project site.

2. Provide the Township with letter reports signed by a CIH which summarize all examination results that are indicative of worker exposures to (or which demonstrate proper protection from) toxic metals. In the case of lead, summarize the blood lead and ZPP results, indicate any observed trends, and identify worker removal provisions that were invoked based on the results. Provide summary reports of the test results prior to worker exposures to project activities, periodic surveillance results, and results upon completion of site exposures. Provide a copy of each report with an original signature within 10 calendar days after issuing the test results to the employees.

3. Retain all records for the duration of employment plus 30 years.

#### SECTION 9077.4 MEASUREMENT AND PAYMENT

Lump Sum. Price includes full compensation for protection of all Contractor personnel, including protective clothing and equipment, medical surveillance, hygiene facilities, laundering, establishment and maintenance of regulated areas, and documentation. Price also includes protective clothing and equipment for two Representatives at each site for each shift, as well as lead training in accordance with 29 CFR 1926.62. Partial payments for worker protection will be made based on the percentage of the structure that has been prepared and fully coated.

ITEM 20 - POLYMER / SILICONE JOINT

I. DESCRIPTION - This work is the furnishing and installation of expansion dams with two-part, Rapid Cure Silicone Joint Sealant for Bridge Joints. The dimensions for the dams and joint widths shall be as specified or shown on plan drawings.

II. MATERIAL

a) JOINT BACKING MATERIAL. Provide backer rod material that is extruded, soft type, low density polyethylene, with a skin-like outer texture that will not bond to the silicone sealant.

b) SILICONE SEALANT. Provide a two-part, rapid curing, 100 percent, silicone sealant meeting the following physical requirements.

AS SUPPLIED	PART A	TEST METHOD
Flow	Self Leveling	ASTM C 639 Type I
Extrusion rate	200-550 grams/min	MIL- S-8802
Specific gravity	1.25-1.34	ASTM D 792 Method A
As installed at 77°F and 50% relative humidity		

AS SUPPLIED	PART B	
Flow	Self Leveling	ASTM C 639 Type I
Extrusion rate	180-550 grams/min	MIL-S-8802
Specific gravity	1.25-1.34	ASTM D 792 Method A

AS CURED (MIX PART A WITH PART B, MIX RATIO 1:1)

Skin over time at 77°F,	20 min. max	MIL-S-8802
Nonvolatile Content	93-99%	ASTM D 2822
5g/2h/150C/A1 cup		
Elongation <sup>1</sup>	600 % min	ASTM D 3583, Section 14 modified
Modulus <sup>1</sup> @100%, PSI	3-12	ASTM D 3583, Section 14 modified

<sup>1</sup> Cured 72 hours at 77±2°F and 50±5% relative humidity.

c) PRIMER FOR SILICONE SEALANT. The primer shall be in accordance with the silicone manufacturer's recommendations.

d) POLYMER MORTAR. The mortar material shall be a two-component, rapid curing, flexible epoxy with aggregate, that cures to a dense, semi-flexible, weather, abrasion, and impact resistant epoxy concrete. The material shall have the following physical properties:

Mixed Epoxy Without Aggregate:

Tensile Strength	900 PSI min.	ASTM D 638*
Elongation at Break	45% min.	ASTM D 638*
Shore D Hardness	45-75	ASTM D 2240
Gel Time	20-60 minutes	AASHTO M200
		*Molded Specimens, .25M Thickness

Mixed Epoxy With Aggregate

Compressive Strength at 24 hours	2500 PSI min	ASTM C 579 Method B
Shear Strength	750* PSI min	ASTM C 882
Abrasion Resistance	1.5 max	ASTM C 501, TABER H22
Resilience	70% min	OKLA Test Procedure OHD L6

Thermal Compatibility

PASS

ASTM C 884

\*Or concrete failure

e) AGGREGATE. The aggregate shall be furnished by the manufacturer. It shall be well graded, clean and dry.

III. CONSTRUCTION. Construct as shown on the plans and as follows:

Joints shall be inspected for proper depth, width, alignment and preparation as detailed in the plans and shall be approved by the engineer before installing the mortar and sealant material.

Sandblasting and cleaning shall be as recommended by the manufacturer and any compressed air used shall be filtered to separate oil and moisture.

The mortar shall be installed when the substrate temperature is 45 degrees F and rising. The use of accelerator and heat, when recommended by the manufacturer, may be used to improve the curing time of the mortar.

Mixing, placing & curing of the mortar shall be in accordance with the manufacturer's instructions, a copy of which shall be furnished to the engineer prior to the start of work.

The sealant shall be installed when the mortar has developed sufficient strength. After the temporary joint form is removed, the joint faces shall be sandblasted to remove all residue of the form material. The joint faces are then primed with approved primer in accordance with manufacturer's instructions. The backer rod is then installed to the proper depth and the silicone is extruded into the joint. The silicone sealant is self leveling, therefore care must be taken to insure that leak-by is not a problem.

A qualified representative of the manufacturer shall be present at the start of work to insure proper installation.

IV. MEASUREMENT AND PAYMENT. The polymer silicone joint will be measured per linear feet of the joint and paid for under the bridge structure lump sum.

## ITEM 21 - REMOVABLE BOLLARDS

I. DESCRIPTION – This section includes specifications for the Removable Bollards.

This Item shall govern for furnished and installed removable bollards, including removable bollard foundations at the locations shown on the plans or as directed by the Township.

II. MATERIAL –

- Painted steel removable bollards. Schedule 40 steel pipe with steel domed top, 42 inch height, 6 inch diameter.
- Removable Embedded (RE) mounting, Class A Cement Concrete – Section 704.
- Finish. Black thermoplastic polyester powder coating or other approved rust-preventative paint.

Removable bollards shall consist of a locking system, including all necessary items, connections, foundations, etc. necessary to provide a complete and working bollard assembly as shown on the plans or as directed by the Township. Bollards shall have a minimum of 3, 1-inch wide strips of reflective tape wrapped around the upper 6 in. of each bollard to increase visibility.

Prior to purchase or construction, submit shop drawings for approval by the Township.

III. CONSTRUCTION – The bollard foundation shall be constructed in accordance with the Construction Drawings and manufacturer's specifications and the bollard assembly shall be installed in accordance with the manufacturer's specifications.

IV. MEASUREMENT AND PAYMENT – Each.

This Item will be measured as each Removable Bollard, including foundation, complete in place as shown on the plans.

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Removable Bollards". This price is full compensation for furnishing, preparing, hauling, and installing materials; for excavation and backfill; and for labor, tools, equipment, and incidentals.