



*Technical Specifications*

**PARCHMENT  
WATER STORAGE TANK PAINTING**

**Bid Reference #: 90900-019.0**

**March 2024**

# SUBMITTAL CHECKLIST

**PROJECT: Kalamazoo 200,000 Gallon Spheroid (Parchment) Rehabilitation**

**CONTRACTOR:** \_\_\_\_\_

**DIXON PROJECT MANAGER:** \_\_\_\_\_

Specification Section	Title	Date Received	Date Reviewed	Accepted	Reviewed with comments	Rejected
General Conditions	Progress Schedule					
<b>Maintenance of Cast-in Place Concrete</b>						
03 01 30	SDS and PDS - Bonding Agents					
03 01 30	SDS and PDS - Patching Mortar					
03 01 30	Concrete Maintenance Specialist name and (3) references					
<b>Miscellaneous Cast-in Place Concrete- splash pad</b>						
03 30 53	SDS and PDS - Concrete materials					
03 30 53	PDS -Grating					
03 30 53	Design Mixtures					
03 30 53	Concrete Maintenance Specialist name and (3) references					
<b>Metal Repairs</b>						
05 00 00	PDS and SDS - Welding Rod					
05 00 00	Welder's Certification					
05 00 00	Expansion Joint Replacement - Temporary Pipe Support Plan					
05 00 00	PDS - Roof Hatch Gasket, PDS and SDS - adhesive					
05 00 00	PDS - Corporation Stop					
05 00 00	PDS - Expansion Joint and gaskets					
05 00 00	PDS - Mud Valve and Discharge Hose					
05 00 00	PDS - Check valve for Condensate Drain Line					
05 00 00	PDS - Overflow Screen					
05 00 00	PDS - Fall Prevention Device					
05 00 00	PDS - Vent Screen					
05 00 00	PDS - Neoprene Sheeting and banding clamps for Access Tube Air Gap Covers					
05 00 00	SDS - Joint Compound for threaded fittings					
05 00 00	PDS - Overflow Duckbill Check Valve					
<b>Steel Coating</b>						
09 97 13	OSHA Safety and Health Program					
09 97 13	OSHA Safety certifications for site personnel					
09 97 13	Designated OSHA Competent Person					
09 97 13	Fall Prevention Plan					
09 97 13	Site Specific Fall Prevention Plan					
09 97 13	Certifications for spiders, scaffolding, stages, etc.					
09 97 13	SDS and PDS - Coatings, Thinners, Coating Additives, and Caulking					
09 97 13	SDS and PDS - Cleaners and Degreasers					
09 97 13	SDS and PDS - Chlorine					

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**CONTRACTOR:** \_\_\_\_\_

**DIXON PROJECT MANAGER:** \_\_\_\_\_

Specification Section	Title	Date Received	Date Reviewed	Accepted	Reviewed with comments	Rejected
09 97 13	SDS and PDS - Abrasives, additives and pretreatments					
<b>Ventilation</b>						
11 00 00	PDS - Ventilation Materials					
<b>Flow Meter</b>						
12 00 00	PDS - Flow Meter Materials					
<b>Electric Work</b>						
16 05 02	Electrician Certifications or Electrical Sub-Contractor Name					
16 05 02	PDS and SDS - Light Bulbs					
<b>Impressed Current Cathodic Protection</b>						
26 42 21	Shop Drawings					
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## **SECTION 00 91 18**

### **DEFINITIONS for TECHNICAL SPECIFICATIONS**

#### **PART 1 – GENERAL**

##### **1.01 DEFINITIONS FOR TECHNICAL SPECIFICATIONS**

- A. Wet Interior: Internal surfaces, excluding inaccessible areas, to the roof, shell, bottom, accessories, and appurtenances that are exposed to the stored water or its vapor. Examples are the interior of the roof, sidewall, bowl, and exterior of the access tube within the tank.
- B. Dry Interior: Surfaces of the finished structure, excluding inaccessible areas, that are not exposed to the elemental atmosphere or the stored water or its vapor. Examples are the interior of the access tube, interior of the riser, and underside of the bowl above the riser.
- C. Exterior: External surfaces, excluding inaccessible areas, of the roof, sidewall, riser, accessories, and appurtenances that are exposed to the elemental atmosphere.
- D. Inaccessible Areas: Areas of the finished structure that, by virtue of the configuration of the completed structure, cannot be accessed to perform surface preparation or coating application (with or without the use of scaffolding, rigging, or staging). Inaccessible areas include such areas as the contact surfaces of roof plate lap joints, underside of roof plates where they cross supporting members, top surface of rafters directly supporting roof plates, contact surfaces of bolted connections, underside of column baseplates, contact surfaces of mating parts not intended to be removed or disassembled during routine operation or maintenance of the structure and inside of risers less than a nominal 36 in. diameter.
- E. Sidewall: Vertical walls to the weld seam of the roof.
- F. Access Tube: Cylindrical tube extending from top of the riser to the roof through the tank including all steel appurtenances (i.e., ladder, overflow pipe, brackets, etc.). There may be a transition cone that connects the bowl to the access tube
- G. Condensate Platform: Platform that covers entire area of the dry riser and used to collect and stop condensation from entering the basebell.
- H. Top Platform: Landing area directly under tank's access tube.
- I. Basebell: Conic surface that starts at the ground that supports the riser.
- J. Roof: Very top of the structure, including top seam of sidewall.
- K. Bottom: Lower area of the tank proper shaped like a bowl.
- L. Riser: Center support between the basebell and bowl.

**SECTION 00 91 19.01**  
**SCHEDULING FOR RPR SERVICES**

**PART 1 – COMMUNICATION**

**1.01 RESIDENT PROJECT REPRESENTATIVE (RPR) SERVICES**

- A. DIXON provides three types of RPR services or any combination of the three:
1. Hold Point Site Visits (sometimes called Critical Phase Visits) where RPR Services are for defined Hold Point, where Work stops until that portion of Work is reviewed on Site by a professional RPR.
  2. Full Time RPR is a professional RPR staying in lodging away from home and living on per diem expenses.
  3. Daily RPR is a professional RPR living at home and traveling to Site on a daily basis.
  4. Based on the type of Project the RPR services may change from Daily or Full Time to Hold Point or from Hold Point to Daily or Full Time.
  5. Intended Beneficiary: The onsite observation services for this Project are for the benefit of the Owner. There are no intended benefits to the Contractor, or any other third parties. Contractor still provides quality control (QC).

**1.02 HOLD POINT OBSERVATIONS AND MEETINGS**

- A. Each Hold Point requires an onsite visit for Observation. Example: If the Contractor coats over, or otherwise makes Work inaccessible for Observation, the Work will be considered failed. Remove Work and recoat or repair in accordance with this specification. At least two (2) new Hold Points, surface preparation and coating, may be created when Work fails after the primer has been applied.
- B. Stop Work and schedule Observation times for the following Hold Points as a minimum. Additional Hold Points may be determined at the Preconstruction Meeting. Each Hold Point requires a Site visit and observation. Schedule of Hold Points – Preliminary:
1. Hold Point Meeting: The Preconstruction Meeting is the initial Hold Point. The Preconstruction Meeting will not be scheduled until five (5) days after all required submittals are received and reviewed by the Engineer and no exceptions are taken to the shop drawings.
  2. Hold Point - Prior to draining tank:
    - a. To ensure all Section of 01 50 00 and 01 53 43 environmental requirements are met.
    - b. To ensure blasting equipment are on-site and in working order.
  3. Hold Points – 03 01 30 Maintenance of Cast-in-place Concrete and 03 30 53 Miscellaneous Cast-in-place Concrete.
    - a. To locate or quantify repairs as necessary.

- b. To review surface preparation prior to concrete or grout installation and review all products prior to installation.
- c. After concrete or grout application is complete for quality assurance.
- 4. Hold Points – Section 05 00 00 – Metal Repairs:
  - a. To locate or quantify repairs as necessary.
  - b. To review surface preparation prior to welding and review all products prior to installation.
  - c. After welding is complete for quality assurance.
- 5. Hold Points – Sections 09 97 13 – Steel Coating and 09 97 13.10 Steel Coating Surface Preparation:
  - a. Prior to surface preparation to set the standard.
  - b. Prior to primer application to verify cleanliness, profile, thoroughness, and ambient conditions for coating application.
  - c. Prior to application of each successive coat for quality assurance and ambient conditions for the next coat.
  - d. Prior to application of the final coat to verify all non-conformance issues have been resolved.
  - e. Scheduled pre-final Observation: Allow engineer access to all locations so a complete punch list can be prepared. Final coat on ladders or other access points can be delayed until after this Observation and included as a punch list item.
  - f. Scheduled final Observation: After ALL punch list items have been completed (including painting ladders), provide access to all items on the punch list.

**1.03 SCHEDULING FOR RPR SERVICES FOR HOLD POINT OBSERVATIONS**

- A. Prior to First Observation 48 hours advance Notice is required
- B. All Subsequent Hold Points are to be scheduled by 6:00 P.M (Eastern Time) the previous day.
  - 1. Scheduling with a Central Contract Administrator. Names and phone numbers of a Contract Administrator and a Second Contract Administrator will be given to the Contractor during the Preconstruction Meeting.
- C. The Contract Administrator may be contacted by cell phone. If no answer a voice mail may be left with all details of RPR request included, or
- D. The Contract Administrator may be contacted by text to their cell phone.
- E. If the Contract Administrator is not available, DIXON’s Corporate Office may be contacted during regular working hours at 1-800-327-1578.
- F. Scheduling through a Project Manager is not an alternative.
- G. Scheduling through an RPR is not an alternative for Hold Point Observation.



#### **1.04 SCHEDULING FOR RPR SERVICES FOR FULL TIME OR DAILY OBSERVATIONS**

##### **A. Productive Work**

1. Do not start, continue, or complete any Productive Work if RPR is not present on the Project Site.
2. Productive Work includes, but is not limited to, all elements of abrasive blast cleaning, power washing, high pressure water jetting or high/low pressure water cleaning, power tool cleaning, rigging, painting, metal repairs, concrete repairs, punch list items, and clean-up.
3. Preparation, mobilization, containment erection, and other non-productive work does not require observation if completed before the structure is removed from service, nor does demobilization after tank is returned to service.
4. If containment erection is completed while other productive work progresses, then a RPR is required.
5. If welding is completed for contracted work (antenna rails, painter's rails, ladders, etc.) during containment erection welding, then contracted work is considered Productive Work and an RPR is to be present. Any spot painting during containment erection is also considered Productive Work.
6. After the Project has been completed and after all punch list items have been completed, cure time and site clean-up, excluding any waste coating or abrasive issues, are not considered Productive Work.
7. After the Project has been completed, complaints from Owner or neighbors concerning health, environmental, or damage issues, and any waste coating or waste abrasive issues, are considered Productive Work requiring a RPR even after the structure is returned to service.
8. Essentially all work completed between the out-of-service date and the Substantial Completion Date, excluding cure and disinfection, is considered Productive Work and requires the presence of a RPR.

#### **1.05 SCHEDULING WITH A CENTRAL CONTRACT ADMINISTRATOR**

- A. The Contract Administrator may be contacted by cell phone. If no answer, a voice mail may be left with all details of RPR request included, or
- B. The Contract Administrator may be contacted by text to their cell phone.
- C. If the Contract Administrator is not available, DIXON's Corporate Office may be contacted during regular working hours at 1-800-327-1578.
- D. Scheduling through a Project Manager is not an alternative.

#### **1.06 SCHEDULING THROUGH ONSITE RPR**

- A. Scheduling through an on-site RPR, completing Full Time or Daily RPR Services, may be considered a properly completed Request if completed by the Foreman and

RPR before leaving site. If not completed on site, then schedule through the Central Contract Administrator.

### **1.07 SUMMARY OF SCHEDULING HOLD POINT OBSERVATIONS**

- A. Contract Administrator
  - 1. by phone
  - 2. by text
  - 3. by voice mail
- B. Second Contract Administrator
  - 1. by phone
  - 2. by text
  - 3. by voice mail
- C. Corporate Office during work hours
  - 1. by phone
  - 2. NO voicemail
- D. Do NOT contact Project Manager

### **1.08 SUMMARY OF SCHEDULING FOR FULL TIME OR DAILY OBSERVATIONS**

- A. Contract Administrator
  - 1. by phone
  - 2. by text
  - 3. by voice mail
- B. Second Contract Administrator
  - 1. by phone
  - 2. by text
  - 3. by voice mail
- C. Corporate Office during work hours
  - 1. by phone
  - 2. NO voicemail
- D. RPR on site
- E. Do NOT contact Project Manager

### **1.09 CONTRACTOR'S RESPONSIBILITIES**

- A. The Engineer and Owner are to have full access to the Site at reasonable times for their Observation, testing, and Contractor's personnel and equipment is to be available to the Owner and Engineer/RPR to expedite Observations. Provide Owner, Engineer/RPR proper and safe conditions for such access, including rigging, and advise them of Contractor's site safety procedures and programs so that they may comply as applicable.
- B. Contractor is responsible for all of Contractor's manpower needs and scheduling and work to be completed. RPR is to be available to expedite the Project and complete

- their services with minimal interference of the Contractor's Work. Successful Project completion is dependent on Contractor's proper scheduling and use of RPR services.
- C. The Contractor is financially responsible for efficient scheduling of RPR services, See Section 00 91 19.02.

#### **1.10 DELAY IN ARRIVAL OF RPR**

- A. RPRs for Hold Point, Full-Time or Daily observations may be delayed by traffic or other reason from arriving at the scheduled time. The Contractor is to contact the Contract Administrator immediately if the RPR has not arrived at the scheduled time.
- B. The Contract Administrator will locate the missing RPR, return to the Contractor with a revised arrival time, and discuss with Contractor what other work can be completed until RPR arrives for Observation.

#### **1.11 REJECTED DEFECTIVE WORK**

- A. All Productive Work completed without an RPR present is to be considered Defective Work and rejected per the General Conditions. This includes work completed:
  - 1. Without proper scheduling an RPR
  - 2. Prior to the scheduled arrival of the RPR
  - 3. When Day has been scheduled as a No Workday
  - 4. When RPR is delayed, and Contract Administrator has not been notified.

#### **1.12 NON-CONFORMANCE REPORTS (NCR)**

- A. The RPR will issue a Non-Conformance Report for every performance item, material, or equipment supplied, and/or environmental situation that fails to meet the requirements of the specifications.
- B. All Work in non-conformance will be considered Defective Work to be replaced, repaired per terms of the General Conditions.
- C. Do not start Work until all required equipment and RPR are on-site.
- D. Immediately correct all environmental non-conformance to prevent an accident. If an incident has already occurred, contact the proper governmental environmental agency, and conduct an immediate clean-up per their direction.
- E. If the Nonconformance Report is issued because of equipment specified but not delivered, repaired, or replaced then the financial Set-off will be 140% \* of the rental value of equipment in non-conformance (i.e., non-working decontamination trailer, hand wash facilities, are filtration units, etc.).
- F. If the Nonconformance Report issued is because of noncompliance with environmental equipment or practices, the Set-off will be 140%\* of the estimated cost of compliance.

\*The costs of items E and F above are damage estimates. The cost of equipment will be the rental charge from a reputable local dealer with 40% extra being for operation cost. Cost of environmental compliance is the estimated cost of compliance. The

extra 40% is potential risk to the Owner for non-conformance. In no situation will the Owner assume liability.

- G. All additional Engineering/RPR expenses incurred because of a Non-Conformance Report is subject to Set-off by Owner.

## **SECTION 00 91 19 .02**

### **CONTRACTOR'S FINANCIAL RESPONSIBILITY FOR RPR**

#### **PART 1 - PROGRESS SCHEDULE and RPR SCHEDULE**

##### **1.01 GENERAL**

- A. The Contractor is financially responsible for the proper and efficient use of RPR services.

##### **1.02 HOLD POINTS AND RPR SERVICES**

- A. Fees for Hold Point RPR Services are contracted with the Owner at a Unit Price and are calculated to include the following: travel time to and from Site, reimbursable expenses, observation and report time. Time required for Contractor to repair or redo small areas that failed Observation, are not included in the unit price. Failure may be minimal compared to all Work observed, but failed Work still must be observed before proceeding. For minor failures that can be quickly repaired, the Contractor may entirely at their option:
  - 1. Accept a Non-Conformance for failed Observation.
  - 2. Request the RPR wait for a reasonable period while repairs are completed.
  - 3. Proceed with the next phase for all areas which have not failed, and “work around” failed areas. The failed areas would then be observed at the next Hold Point.
- B. The Fee for extended onsite time, or a new Hold Point is the responsibility of the Contractor.

##### **1.03.1 FULL TIME OR DAILY RPR SERVICES**

- A. It is the intention of the Owner, that the RPR fees be used to observe Productive Work. Productive Work is defined in previous Section 00 91 19 .01 Scheduling for RPR Services, with examples. The Owner will pay for all RPR service fees generated observing Productive Work that meets specification requirements. Normally this will be the first time for most observations.
- B. The Contractor will pay all RPR and/or Engineer fees generated by failed Observations of Productive Work.
- C. The availability of RPR and RPR's ability to timely perform the required Services are dependent on Contractor's communication. RPR is to be available to meet the Progress Schedule demands and complete RPR services with minimal interference of the Contractor's Work, if Contractor properly scheduled RPR Services.

##### **1.03.2 FULL TIME OR DAILY RPR SERVICES**

- A. Contractor Pays for RPR or Engineering Services resulting from:
  - 1. Productive Work on a Holiday

2. Failed or Improper Scheduling,
3. Failure to Request Observation per Section 00 91 19 .01,
4. Less than 8 hours per day or On-call Time as a result of:
  - a. Premature Request for RPR Services,
  - b. No show or late start,
  - c. Rejection of Work and/or Non-Conformance reports,
  - d. Equipment failure, insufficient manpower, materials, or equipment
  - e. Weather reasons per 1.04.B.03

### **1.03 RPR FEE CALCULATIONS FOR FAILED OBSERVATIONS**

- A. The basis for Fees assessed to Contractor is based on the Owner/DIXON contract. Fees will be calculated in the same manner as in the Owner/Engineer Agreement, i.e., if the RPR is working at an overtime rate for Owner, then fee for unproductive services will be documented at the same rate.
  1. Hold Point for Welding or Coating Observation, or extra Progress Meetings
    - a. The same Unit Price Fee as would be charged to Owner for each respective Observation or meeting. Note the fee will be determined by the Contract and may vary between types of Hold Point services.
    - b. Extended time at site charged at Regular Rate (See definition below)
  2. Daily Observation is to be the same fee as charged to Owner from the Owner/DIXON contract.
    - a. Minimum workday is 8 hours plus travel time
    - b. reimbursable mileage
  3. Full-time Observation Fee is to be the same as charged to Owner for the same Service.
    - a. Minimum workday is 8 hours
    - b. Minimum work week is 40 hours
    - c. Reimbursable expenses/ Per Diem
  4. Fees common to Full Time, Daily and Hold Points with extended stays, and On-call Time
    - a. Regular Pay for RPR is charged at the rate matching the RPR's experience and qualifications.
    - b. Overtime Rate is 1.5 times Regular Rate
      - 1) For all time worked on the actual holiday
      - 2) Weekend work by RPR
      - 3) For time over 40 hours. (The standard work week for overtime (over 40) begins on Monday as Sunday is already paid at overtime rate.)
- B. Fees of misused or unnecessary Engineer/RPR Services will be documented and submitted to the Owner for Set-off.

- C. The right to Set-off is a contracted right of Owner per the General Conditions, or Additions to General Conditions, and the right to enforce those rights are at the Owner's discretion.

#### **1.04 ON-CALL TIME**

- A. RPR's are professional personnel that get paid a minimum of 8 hours per day even though the Contractor's operations or methods results in less than an 8-hour day.
- B. If the Contractor has scheduled a Workday, and if RPR is not free to spend the day at RPR's discretion or to be reassigned; then the RPR will be considered On-call.
  - 1. The RPR will be considered, if scheduled, On-call every morning and day unless work is cancelled per Section 00 19 91.01.
  - 2. For Daily observation the On-call time will not exceed 8 hours, any travel time should occur within those 8 hours.
    - a. Late Starts - Agreed start time will be scheduled with the Contract Administrator at the Preconstruction Meeting.
    - b. The RPR's On-call time starts at the agreed start time, if RPR is on Site and available to Work, and On-call time continues until Work starts.
  - 3. For weather reasons
    - a. 8 hours if adverse weather conditions were clearly forecast
    - b. Two hours plus time worked up to 8 hours or actual time worked if greater, if forecast was less than 20% weather meeting definition of a weather day.
  - 4. For reasons other than weather, eight (8) hours will be considered the minimum On-call Time. This includes, but is not limited to, equipment failure, insufficient materials, damaged containment, etc.
- C. The actual charged On-call time will be eight (8) hours, minus the number of hours actually worked.
- D. Overtime, Weekend, Holiday pay requirements apply to all On-call time pay. On-call hours will count towards forty (40) hour week triggering overtime at forty (40) hours.
- E. If Work is cancelled per requirements in Section 00 19 91.01 (by prior night) in advance and RPR is notified in advance, there is no On-call time.
- F. If Contractor schedules days off per Scheduling requirements, the inspector will return to his/her home base and there will be no show time charges. Based on the Contract the RPR may be entitled to Mobilization or Demobilization.

## **SECTION 01 50 00**

### **TEMPORARY CONSTRUCTION FACILITIES and UTILITIES**

#### **PART 1 - GENERAL**

##### **1.01 SUMMARY**

- A. The Contractor is fully responsible to provide and maintain temporary facilities and utilities required for construction as described herein, and to remove the same upon completion of work.

##### **1.02 QUALITY ASSURANCE**

- A. Regulatory Requirements:
  - 1. National Fire Protection Association (NFPA): NFPA No.70-93
  - 2. National Electrical Code (NEC) and local amendments thereto.
  - 3. Comply with all federal, state, and local codes and regulations, and utility company requirements.

#### **PART 2 - PRODUCTS**

##### **2.01 TEMPORARY ELECTRICITY and LIGHTING**

- A. Supply temporary lighting sufficient to enable Contractor to safely access all work areas.
- B. Electrical requirements more than the capacity of existing electrical service is to be responsibility of Contractor.
- C. Provide, maintain, and remove temporary electric service facilities.
- D. Facilities exposed to weather is to be weatherproof-type and electrical equipment enclosure locked to prevent access by unauthorized personnel.
- E. Contractor is to pay for and arrange for the installation of temporary services.
- F. Patch affected surfaces and structures after temporary services have been removed.
- G. Provide explosion proof lamps, wiring, switches, sockets, and similar equipment required for temporary lighting and small power tools.

##### **2.02 WATER for CONSTRUCTION**

- A. Owner will provide water required for cleaning and other purposes.
- B. Water use is not to exceed usage that might endanger the Owner's water system's integrity.

##### **2.03 SANITARY FACILITIES**

- A. Provide temporary sanitary toilet facilities conforming to state and local health and sanitation regulations, in sufficient number for use by Contractor's employees.



- B. Maintain in sanitary condition and properly supply with toilet paper.
- C. Remove from site before final acceptance of work.

#### **2.04 TEMPORARY FIRE PROTECTION**

- A. Provide and maintain in working order a minimum of two fire extinguishers and such other fire protective equipment and devices as would be reasonably effective in extinguishing fires.

#### **2.05 DAMAGE to EXISTING PROPERTY**

- A. Contractor is responsible for replacing or repairing damage to existing buildings, sidewalks, roads, parking lot surfacing, and other existing assets.
- B. Owner has the option of contracting for such work and having cost deducted from contract amount if the Contractor is not qualified to complete repairs or fails to act in a timely manner.

#### **2.06 SECURITY**

- A. Security is not provided by Owner.
- B. Contractor is to be responsible for loss or injury to persons or property where work is involved and is to provide security and take precautionary measures to protect Contractor's and Owner's interests.

#### **2.07 TEMPORARY PARKING**

- A. Parking for equipment and Contractor employees are to be designated and approved by Owner.
- B. Make parking arrangements for employees' vehicles.
- C. Any costs involved in obtaining parking area is to be borne by Contractor.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- A. Maintain and operate systems to ensure continuous service.
- B. Modify and extend systems as work progress requires.

#### **3.02 REMOVAL**

- A. Completely remove temporary materials and equipment when no longer required.
- B. Clean and repair damage caused by temporary installation or use of temporary facilities.
- C. Restore existing or permanent facilities used for temporary service to specified or original condition.

### **3.03 BARRIERS and ENCLOSURES**

- A. The Contractor is to furnish, install, and maintain as long as necessary, required adequate barriers, warning signs or lights at all dangerous points throughout the work for protection of property, workers, and the public. The Contractor is to hold the Owner harmless from damage or claims arising out of any injury or damage that may be sustained by any person or persons as a result of the work under the Contract.
- B. Fence removal and re-installation that is necessary to complete the work shall be incidental to the Project. Site shall be secured with temporary fencing and/or barricades while the existing fencing is displaced.

**SECTION 01 53 43**  
**PROTECTION of ENVIRONMENT**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Contractor in executing work is to maintain work areas, on-and-off site in accordance with federal, state, or local regulations.
- B. The Contractor is responsible for any, and all clean-up of any hazardous waste that may be necessary, including all applicable costs for clean-up and disposal.

**1.02 LAWS and REGULATIONS**

- A. Environmental regulations may be met with different available technologies. It is the Contractor's sole responsibility to comply with these and all applicable environmental regulations.
- B. If a release occurs work will stop until corrective actions are complete as determined by the appropriate regulatory agency.

**1.03 PROTECTION of SEWERS**

- A. Take adequate measures to prevent impairment of operation of existing sewer system. Prevent construction material, pavement, concrete, earth, or other debris from entering sewer or sewer structure.

**1.04 PROTECTION of WATERWAYS**

- A. Observe rules and regulations of local and state agencies, and agencies of U.S. government prohibiting pollution of any lake, stream, river, or wetland by dumping of refuse, rubbish, dredge material, or debris therein.
- B. Provide containment that will divert flows, including storm flows and flows created by construction activity, to prevent loss of residues and excessive silting of waterways or flooding damage to property.
- C. Comply with procedures outlined in U.S. EPA manuals entitled "Guidelines for Erosion and Sedimentation Control Planning and Implementation," Manual EPA-72-015 and "Processes, Procedures, and Methods to Control Pollution Resulting from all Construction Activity," Manual EPA 43019-73-007.

**1.05 DISPOSAL of EXCESS EXCAVATED and OTHER WASTE MATERIALS**

- A. Dispose of waste material in accordance with federal and state codes, and local zoning ordinances.

- B. Unacceptable disposal sites include, but are not limited to, sites within wetland or critical habitat, and sites where disposal will have detrimental effect on surface water or groundwater quality.
- C. Make arrangements for disposal, subject to submission of proof to Engineer that Owner(s) of proposed site(s) has valid fill permit issued by appropriate government agency and submission of haul route plan, including map of proposed route(s).
- D. Provide watertight conveyance for liquid, semi-liquid, or saturated solids that have potential to leak during transport. Liquid loss from transported materials is not permitted, whether being delivered to construction site or hauled away for disposal. Fluid materials hauled for disposal must be specifically acceptable at selected disposal site.

#### **1.06 PROTECTION of AIR QUALITY**

- A. Contain paint aerosols and VOCs by acceptable work practices.
- B. Minimize air pollution by requiring use of properly operating combustion emission control devices on construction vehicles and equipment used by Contractor and encouraging shutdown of motorized equipment not actually in use.
- C. Trash burning not permitted on construction site.
- D. If temporary heating devices are necessary for protection of work, they are not to cause air pollution.

#### **1.07 PROTECTION from FUEL and SOLVENTS**

- A. Protect the ground from spills of fuel, oils, petroleum distillates, or solvents by use of containment system.
- B. Total paint, thinner, oils, and fuel delivered to and stored on-site cannot exceed supplied capacity of spill containment provided (i.e., fuel and oil to be sized to exceed possible spill).
- C. Provide proper containment unit under fuel tank and oil reservoirs for all equipment and fuel storage tanks.
- D. Barrels of solvents, even for cleaning, are prohibited. Do not deliver paint thinners in containers greater than five (5) gallons.
- E. Disposal of waste fluids are to be in conformance with federal, state, and local laws and regulations.

#### **1.08 USE of CHEMICALS**

- A. Chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of U.S. EPA, U.S. Department of Agriculture, state, or any other applicable regulatory agency.

- B. Use of such chemicals and disposal of residues are to be in conformance with manufacturer's written instructions and applicable regulatory requirements.

### **1.09 NOISE CONTROL**

- A. Conduct operations to cause least annoyance to residents in vicinity of work and comply with applicable local ordinances.
- B. Equip compressors, hoists, and other apparatus with mechanical devices necessary to minimize noise and dust. Equip compressors with silencers on intake lines.
- C. Equip gasoline or oil-operated equipment with silencers or mufflers on intake and exhaust lines.
- D. Route vehicles carrying materials over such streets as will cause least annoyance to public and do not operate on public streets between hours of 6:00 P.M. and 7:00 A.M., or on Saturdays, Sundays, or legal holidays unless approved by Owner.

### **PART 2 - PRODUCTS**

(Not Applicable)

### **PART 3 - EXECUTION**

#### **3.01 HAZARDOUS MATERIALS PROJECT PROCEDURES**

- A. Applicable Regulations:
  - 1. RCRA, 1976 – Resource Conservation and Recovery Act: This federal statute regulates generation, transportation, treatment, storage, and disposal of hazardous wastes nationally.
  - 2. Act 64, 1979 – Michigan's Hazardous Waste Management Act: This statute regulates generation, transportation, treatment, storage, and disposal of hazardous wastes.
  - 3. Act 451, 1994 – Natural Resources and Environmental Protection Act: This statute regulates discharge of certain substances into the environment, regulates use of certain lands, waters and other natural resources.
  - 4. Act 641 as amended 1990 – Michigan's Solid Waste Act: This statute regulates generation, transportation, treatment, storage, and disposal of solid wastes.
- B. Use the Uniform Hazardous Waste Manifest (shipping paper) to use an off-site hazardous waste disposal facility.
- C. Federal, State and local laws and regulations may apply to the storage, handling and disposal of hazardous materials and wastes. The list below includes the regulations which are most frequently encountered:

<u>Topic</u>	<u>Agency and Telephone Number</u>
Small quantity hazardous waste management, including hazardous waste stored in tanks	Hazardous Waste Division, EGLE (517) 373-2730 in Lansing, or District Office Certified County Health Department
Hazard Communication Standards (for chemical in the workplace)	Occupational Health Division, Michigan Department of Consumer, and Industrial Services (517) 373-1410
Burning of waste oil and other discharges to the air	Air Quality Division, EGLE (517) 322-1333 in Lansing, or District Office
Local fire prevention regulations and codes (including chemical storage requirements)	Local fire chief or fire marshal

D. Department of Environment, Great Lakes, and Energy

Hazardous Waste Division  
Compliance Section District Offices

Kalamazoo District Office  
7953 Adobe Rd.  
Kalamazoo, MI 49009-5025  
(269) 567-3500  
(269) 567-3555 (fax)

**SECTION 03 01 30**  
**MAINTENANCE OF CAST-IN-PLACE CONCRETE**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Repair of deteriorated and damaged concrete.

**1.02 RELATED DOCUMENTS**

- A. General provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. Section 03 30 53 “Miscellaneous Cast-in-Place Concrete”.

**1.03 REFERENCES**

- A. Codes, specifications, and standards referred to by number or title shall form a part of this specification to the extent required by the references thereto. The latest revisions shall apply in all cases.
  - 1. “Building Code Requirements for Structural Concrete (ACI 318) and Commentary (ACI 318R),” American Concrete Institute.

**1.04 DEFINITIONS**

- A. Concrete Maintenance Specialist: Company that is experienced with concrete repairs performed in accordance with ACI standards. Work can be performed by the General Contractor if qualified, see submittals for requirements.

**1.05 WORK INCLUDED**

- A. Repair foundation spalls.

**1.06 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to concrete maintenance including, but not limited to, the following:
    - a. Verify concrete-maintenance specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
    - b. Materials, material application, sequencing, tolerances, and required clearances.
    - c. Quality-control program.
- B. Contractor shall notify engineer a minimum of twenty-four hours before placing concrete or grout repair material.

- C. Do not place any repair material until surface preparation has been reviewed and approved by engineer.

### **1.07 SUBMITTALS**

- A. Submit the following ten (10) days prior to the preconstruction meeting:
  - 1. Provide for employees one (1) copy of all data sheets at the job site for employee access.
  - 2. Provide an electronic copy to the Engineer.
  - 3. No work may commence without the complete filing. All SDS shall conform to the requirements of SARA (EPCRA) Right-to-Know Act.
  - 4. Safety Data Sheets (SDS) and Product Data Sheets:
    - a. Furnish from all suppliers Safety Data Sheets and product data sheets for all applicable materials including, but not limited to, concrete, grouts admixtures, sealers.
  - 5. Concrete-Maintenance Specialist: The Contractor is to indicate whether the work is to be performed by in-house personnel or subcontracted. In either case submit three (3) similar projects including the scope with references. References to include client organization names and contact names with phone numbers.

### **1.08 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Each manufacturer shall employ factory-authorized service representatives who are available for consultation and Project-site inspection and on-site assistance.
- B. Concrete Maintenance Specialist Qualifications: Installers and supervisors who are trained and approved by the manufacturer to apply materials necessary to perform work of this Section. Installers shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing or patching new concrete is insufficient experience for concrete-maintenance work.

### **1.09 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.
- B. Store cementitious materials off the ground, under cover, and in a dry location.
- C. Store aggregates covered and in a dry location; maintain grading and other required characteristics and prevent contamination.
- D. Promptly remove damaged or unsuitable products from the job site. Replace products with undamaged, suitable products.



## **1.10 FIELD CONDITIONS**

- A. Cold-Weather Requirements for Cementitious Materials: Do not apply material unless concrete-surface and air temperatures are above 40 degrees F (5 deg C) and will remain so for at least 48 hours after completion of Work.
- B. Hot-Weather Requirements for Cementitious Materials: Protect repair work when temperature and humidity conditions produce excessive evaporation of water from patching materials. Use cooled materials as required. Do not apply material to substrates with temperatures of 90 deg F (32 deg C) and above.

## **1.11 INSTALLATION REQUIREMENTS**

- A. Apply all repair material within manufacturer's guidelines.

## **PART 2 – PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Source Limitations: For repair products, obtain each color, grade, finish, type, and variety of product from single source and from single manufacturer with resources to provide products of consistent quality in appearance and physical properties.

### **2.02 BONDING AGENTS**

- A. Mortar Scrub Coat: Mix consisting of 1-part portland cement and 1-part fine aggregate complying with ASTM C 144 except 100 percent passing a No. 16 (1.18-mm) sieve.

### **2.03 CONCRETE MATERIALS**

- A. Concrete: As specified in Section 03 30 53 "Miscellaneous Cast-in-Place Concrete"

### **2.04 PATCHING MORTAR – SPALLS**

- A. Patching Mortar Requirements:
  - 1. Only use patching mortars that are recommended by manufacturer for each applicable horizontal, vertical, or overhead use orientation.
  - 2. Coarse Aggregate for Patching Mortar: ASTM C 33/C 33M, washed aggregate, Size No. 8, Class 5S. Add to patching-mortar mix only as permitted by patching-mortar manufacturer.
- B. Cementitious Patching Mortar: Packaged, dry mix for repair of concrete.
  - 1. Approved material is Sika Quick VOH as manufactured by Sika Corp. [www.usa.sika.com](http://www.usa.sika.com) 1-800-933-7452, or approved equal.

### **2.05 MISCELLANEOUS MATERIALS**

- A. Water: Potable.

## **2.06 MIXES**

- A. General: Mix products, in clean containers, according to manufacturer's written instructions.
  - 1. Do not add water, thinners, or additives unless recommended by the manufacturer.
  - 2. When practical, use manufacturer's premeasured packages to ensure that materials are mixed in proper proportions. When premeasured packages are not used, measure ingredients using graduated measuring containers; do not estimate quantities or use shovel or trowel as unit of measure.
  - 3. Do not mix more materials than can be used within time limits recommended by the manufacturer. Discard materials that have begun to set.
- B. Mortar Scrub Coat: Mix dry ingredients with enough water to provide consistency per manufacturer's recommendations.
- C. Concrete: Comply with Section 03 30 53 "Miscellaneous Cast-in-Place Concrete"

## **PART 3 – EXECUTION**

### **3.01 CONCRETE MAINTENANCE**

- A. Concrete-maintenance work is to be performed only by qualified concrete-maintenance specialists.
- B. Comply with manufacturers' written instructions for surface preparation and product application.
- C. Spall repairs to be completed with patching mortar and/or new concrete placement as determined by the contractor.

### **3.02 EXAMINATION**

- A. Notify Engineer seven days in advance of dates when areas of deteriorated or delaminated concrete and deteriorated reinforcing bars will be located.
- B. Locate areas of deteriorated or delaminated concrete using hammer or chain-drag sounding and mark boundaries. Mark areas for removal by simplifying and squaring off boundaries. At columns and walls make boundaries level and plumb unless otherwise indicated.
- C. Perform surveys as the Work progresses to detect hazards resulting from concrete-maintenance work.

### **3.03 PREPARATION**

- A. Ensure that supervisory personnel are on-site and on duty when concrete maintenance work begins and during its progress.

- B. Protect persons, equipment and surrounding surfaces of the structure being repaired from harm resulting from concrete maintenance work.
  - 1. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.
  - 2. Use only proven protection methods appropriate to each area and surface being protected.
  - 3. Work to be performed in a manner to prevent dust and debris from reaching areas outside of the immediate work site.
- C. Preparation for Concrete Removal: Examine construction to be repaired to determine best methods to safely and effectively perform concrete maintenance work. Examine adjacent work to determine what protective measures will be necessary. Make explorations, probes, and inquiries as necessary to determine the condition of construction to be removed during repair.
  - 1. Inventory and record the condition of items to be removed for reinstallation or salvage.

### **3.04 CONCRETE REMOVAL - SPALLS**

- A. Saw-cut perimeter of areas identified for removal to a depth of at least 1/2 inch (13 mm). Make cuts perpendicular to concrete surfaces and no deeper than cover on reinforcement.
- B. Remove deteriorated and delaminated concrete by breaking up and dislodging from reinforcement.
- C. Remove additional concrete if necessary to provide a depth of removal of at least 1/2 inch (13 mm) over the entire removal area.
- D. Where half or more of the perimeter of reinforcing bar is exposed, bond between reinforcing bar and surrounding concrete is broken, or reinforcing bar is corroded, remove concrete from entire perimeter of bar and to provide at least 1 1/2 inch clearance around bar.
- E. Test areas where concrete has been removed by tapping with hammer and remove additional concrete until unsound and disbonded concrete is completely removed.
- F. Provide surfaces with a fractured profile of at least 1/8 inch (3 mm) that are approximately perpendicular or parallel to original concrete surfaces. Restore original profile unless otherwise directed.
- G. Thoroughly clean removal areas of loose concrete, dust, and debris.
- H. Payment is a separate line item "Spall Repair" based on the quantity of two (2) square feet at two (2) inches deep, which the owner reserves the right to increase, decrease or delete this item.

### **3.05 BONDING AGENT APPLICATION – SPALL REPAIR**

- A. Mortar Scrub Coat for Job-Mixed Patching Mortar and Concrete: Dampen repair area and surrounding concrete 6 inches (150 mm) beyond repair area. Remove standing water and apply scrub coat with a brush, scrubbing it into surface and thoroughly coating repair area. If scrub coat dries, recoat before placing patching mortar or concrete.
- B. Slurry Coat for Cementitious Patching Mortar: Wet substrate thoroughly and then remove standing water. Scrub a slurry of neat patching mortar into substrate, filling pores and voids.

### **3.06 PATCHING MORTAR APPLICATION – SPALL REPAIR**

- A. Place patching mortar as specified in this article unless otherwise recommended in writing by manufacturer.
  - 1. Provide forms where necessary to confine patch to required shape.
  - 2. Wet substrate and forms thoroughly and then remove standing water.
- B. Pretreatment: Apply specified slurry coat.
- C. General Placement: Place patching mortar by troweling toward edges of patch to force intimate contact with edge surfaces. For large patches, fill edges first and then work toward center, always troweling toward edges of patch.
- D. Consolidation: After each lift is placed, consolidate material and screed surface.
- E. Multiple Lifts: Where multiple lifts are used, score the surface of lifts to provide a rough surface for placing subsequent lifts. Allow each lift to reach the final set before placing subsequent lifts.
- F. Finishing: Allow surfaces of the lifts to remain exposed to become firm and then finish to a surface matching adjacent concrete.
- G. Curing: Wet-cure cementitious patching materials, including polymer-modified cementitious patching materials, for not less than seven days by water-fog spray or water-saturated absorptive cover.

### **3.07 CONCRETE PLACEMENT**

- A. Pretreatment: Apply mortar scrub coat to concrete substrate and reinforcing steel.
- B. Place concrete according to Section 03 30 53 "Miscellaneous Cast in Place Concrete".
  - 1. Use vibrators to consolidate concrete as it is placed.
  - 2. On unformed surfaces, screed concrete to produce a surface that when finished with patching mortar will match the required profile and surrounding concrete.
- C. Form-and-Pump Placement: Place concrete by form-and-pump method where indicated.
  - 1. Design and construct forms to resist pumping pressure in addition to the weight of wet concrete. Seal joints and seams in forms and where forms abut existing concrete.

2. Pump concrete into place from bottom to top, releasing air from forms as concrete is introduced. When formed space is full, close air vents and pressurize to 14 psi (96 kPa).
  3. Use vibrators to consolidate concrete as it is placed.
- D. Wet-cure concrete for not less than seven days by leaving forms in place or keeping surfaces continuously wet by water-fog spray or water-saturated absorptive cover.
  - E. Fill placement cavities with dry-pack mortar and repair voids with patching mortar. Finish to match surrounding concrete.

**3.01 PROTECTION OF EXISTING CONCRETE**

- A. Protect the existing concrete not identified by the Engineer as needing repair/replacement.
- B. Any damage to the existing concrete from the work performed will be repaired/replaced by the Contractor and is incidental to the project.

**SECTION 03 30 53**  
**MISCELLANEOUS CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

A. Surface preparation and installation of concrete splash pad for the overflow pipe.

**1.02 RELATED DOCUMENTS**

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

**1.03 REFERENCES**

A. Codes, specifications, and standards referred to by number or title shall form a part of this specification to the extent required by the references thereto. The latest revisions shall apply in all cases.

Parchment "Building Code Requirements for Structural Concrete (ACI 318) and Commentary (ACI 318R)," American Concrete Institute.

**1.04 DEFINITIONS**

A. Concrete Maintenance Specialist: Company that is experienced with concrete repairs performed in accordance with ACI standards. Work can be performed by the General Contractor if qualified, see submittals for requirements.

**1.05 WORK INCLUDED**

A. Install a concrete splash pad at the overflow pipe discharge.

B. Payment is a separate line item "Splash Pad" which the owner reserves the right to delete.

**1.06 SUBMITTALS**

A. Submit the following ten (10) days prior to the preconstruction meeting:

1. Provide for employees one (1) copy of all data sheets at the job site for employee access.
2. Provide an electronic copy to the Engineer.
3. No work may commence without the complete filing. All SDS shall conform to the requirements of SARA (EPCRA) Right-to-Know Act.
4. Safety Data Sheets (SDS) and Product Data Sheets:
  - a. Furnish from all suppliers Safety Data Sheets and product data sheets for all applicable materials including, but not limited to, concrete and admixtures.
5. Design Mixtures: For each concrete mixture.
6. Concrete-Maintenance Specialist: The Contractor is to indicate whether the work is to be performed by in-house personnel or subcontracted. In either case submit

three (3) similar projects including the scope with references. References to include client organization names, and contact names with phone numbers.

### **1.07 QUALITY ASSURANCE**

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
- B. Comply with the following sections of ACI 301, unless modified by requirements in the Contract Documents:
  - 1. "General Requirements."
  - 2. "Formwork and Formwork Accessories."
  - 3. "Reinforcement and Reinforcement Supports."
  - 4. "Concrete Mixtures."
  - 5. "Handling, Placing, and Constructing."
- C. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- D. Concrete-Maintenance Specialist Qualifications: Installers and supervisors who are trained and approved by the manufacturer to apply materials necessary to perform work of this Section. Installers shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience in only installing or patching new concrete is insufficient experience for concrete-maintenance work.
  - 1. Field Supervision: Concrete-maintenance specialist firm shall maintain experienced full-time supervisors on Project site during times that concrete-maintenance work is in progress.

## **PART 2 - PRODUCTS**

### **2.01 FORMWORK**

- A. Furnish formwork and formwork accessories according to ACI 301.

### **2.02 STEEL REINFORCEMENT**

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

### **2.03 CONCRETE MATERIALS**

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout Project:
  - 1. Portland Cement: ASTM C 150, Type I/II
    - a. Fly Ash: ASTM C 618, Class C or F.
- B. Normal-Weight Aggregate: ASTM C 33, crushed limestone, graded, 1 ½ inch nominal maximum aggregate size.
- C. Water: ASTM C 94.
- D. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride

ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

#### **2.04 CURING MATERIALS**

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth or cotton mats.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.

#### **2.05 CONCRETE MIXTURES**

- A. Comply with ACI 301 requirements for concrete mixtures.
- B. Normal-Weight Concrete: Prepare design mixes, proportioned according to ACI 301, as follows:
  1. Minimum Compressive Strength: 4000 psi at 28 days.
  2. Maximum Water-Cementitious Materials Ratio: 0.50.
  3. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
  4. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of trowel-finished floor slabs to exceed 3 percent.

#### **2.06 CONCRETE MIXING**

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.
  1. When the air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

#### **2.07 GRATING**

- A. Galvanized steel 1 in. x 3/16 in., with band spacing of 4 in. x 1-3/16 in.
- B. Manufactured/supplied by McMaster-Carr. [www.mcmaster.com](http://www.mcmaster.com) (562) 692-5911, or approved equal.

### **EXECUTION**

#### **3.01 GROUND PREPARATION AND DESIGN**

- A. Excavate area to a depth sufficient to construct the splash pad and connect to the existing below grade drain pipe.
- B. Backfill 4 in. of clean gravel.



- C. Construct a 4 ft. x 4 ft. x 6 in. (min) thick concrete splash pad with the width centered under the overflow.
- D. Trim the existing below grade drain pipe and slope the pad towards the drain at minimum 1 inch rise per 1 ft. of run all around so the splash pad slopes toward the drain.
- E. Install reinforcement in the new concrete.
- F. See Drawing 01.

### **3.02 FORMWORK**

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301.

### **3.03 STEEL REINFORCEMENT**

- A. Install steel reinforcement per ACI 318 minimum requirements.
- B. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- C. Reinforce with a minimum 10 gauge wire mesh.

### **3.04 CONCRETE PLACEMENT**

- A. Comply with ACI 301 for placing concrete.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
- C. Consolidate concrete with mechanical vibrating equipment as needed.

### **3.05 FINISHING FORMED SURFACES**

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch.
  - 1. Apply to all concrete surfaces.

### **3.06 CONCRETE PROTECTING AND CURING**

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
- B. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- C. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with a 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

### **3.07 REPAIRS**

- A. Remove and replace concrete that does not comply with requirements as identified by the Contractor or by the Owner.

## **SECTION 05 00 00** **METAL REPAIRS**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Steel and Miscellaneous Repairs.

#### **1.02 REFERENCES**

- A. AWWA D100 Weld Standard
- B. AWS Weld Standard
- C. API 650 Standard

#### **1.03 OMISSIONS**

- A. The specifications include all work and materials necessary for completion of the work. Any incidental item(s) of material, labor, or detail(s) required for the proper execution and completion of the work are included.

#### **1.04 DEFINITIONS**

- A. Ground Flush: Ground even with adjacent metal with no transition. This preparation is intended for all removed items.
- B. Ground Smooth: Ground welds to the point that no cuts or scratches occur when rubbing your hand over the weld. Rebuild with weld any concavity discovered during grinding. This preparation is intended for all newly added steel.

#### **1.05 WORK INCLUDED**

- 1) Replace the wet interior roof hatch.
- 2) Replace the access tube roof hatch.
- 3) Trim the platform hatch covers.
- 4) Install ladder extension at the condensate platform.
- 5) Install deflector bars on the fill/draw pipe.
- 6) Install a chemical feed tap on the fill/draw pipe.
- 7) Replace the expansion joint.
- 8) Replace the mud valve.
- 9) Replace the condensate drain line.
- 10) Install an overflow flap gate.
- 11) Install a fall prevention device on the baseball ladder.
- 12) Install a pressure vacuum vent.
- 13) Install a seal at the access tube air gap.
- 14) Weld a rigging lug on the bowl.

- 15) Install opening for ventilation in the basebell.
- 16) Reroute the overflow pipe and install a duck bill check valve - alternate.

#### **1.06 WORKMANSHIP**

- A. Provide material and workmanship necessary to complete the project to the standards specified.
- B. All weld spatter is to be removed prior to coating application.
- C. Welds at all removed steel items are to be ground flush with surrounding surface. All new welds are to be ground smooth.
- D. Removed items are to become the property of the Contractor. The Contractor is to properly dispose of all removed items.

#### **1.07 WELDER QUALIFICATIONS**

- A. Certified for type and position of weld specified.
- B. The welder is to be specialized in industrial or heavy commercial welding and experienced in rigging and elevated work.

#### **1.08 SUBMITTALS**

- A. Submit the following ten (10) days prior to the preconstruction meeting:
  1. Provide for employees one (1) copy of all data sheets at the job site for employee access.
  2. Provide an electronic copy to the Engineer.
  3. No work may commence without the complete filing. All SDS are to conform to requirements of SARA (EPCRA) Right-to-Know Act.
  4. Safety Data Sheets (SDS) and Product Data Sheets:
    - a. Safety Data Sheets (SDS) for all chemicals or products that contain chemicals.
    - b. Product Data Sheets (PDS) or Technical Data Sheets (TDS) for all items.
  5. Welder's certification.
  6. Expansion Joint Replacement – Temporary Pipe Support Plan.

#### **1.09 WORK SEQUENCING**

- A. The Contractor is to monitor for flammable gases inside the tank prior to any welding or cutting. Monitoring is to be performed whether the tank is full or empty. Monitoring is also to be performed whether or not interior access is to be gained during welding and/or cutting.
- B. The following is NOT a ways-and-means decision of the Contractor. It is accepted and good painting practice and is to be completed by the Contractor in this specified fashion:
  1. Complete ahead of all cutting and welding all surface preparation, such as removal of heavy metal bearing coating in the immediate area.

2. Complete all welding repairs prior to commencement of any power washing, surface preparation, or coating application.
3. Do not install non-painted items (i.e., vents, fall prevention devices, etc.) or store items on or in the tank until after painting has been completed.
4. Remove existing items that are not to be painted after water cleaning, store in a secure location.
5. Disassemble appurtenances with mating surfaces (i.e., overflow flap gate, vent flange, etc.), surface prepare and coat mating surfaces and reassemble after topcoat is dry.
6. Remove fall prevention devices in areas to be coated before painting and reinstall after completion. Supply temporary fall prevention devices with steel cables during blasting and painting.

#### **1.10 NEW STEEL COATING**

- A. The new carbon steel and weld burn surfaces are to be prepared and coated in accordance with Sections 09 97 13 and 09 97 13.10.

### **PART 2 – PRODUCTS**

#### **2.01 SUBSTITUTIONS**

- A. All products specified herein have been determined to meet a minimal standard. The products specified are the standard to which all proposed substitutions are to be compared.

#### **2.02 STEEL PLATING and OTHER STRUCTURAL SHAPES**

- A. General Steel: ASTM – A36.
- B. General Stainless Steel: ASTM – 316.
- C. Rebar for ladder rungs: A706 Weldable Rebar.
- D. Threading on all couplings and plugs to meet NPT and FPT standards.

#### **2.03 BOLTS and NUTS**

- A. Stainless Steel
  1. ASTM F594G – 316 Stainless Steel Bolts.
  2. ASTM F594G – 316 Stainless Steel Nuts.
- B. Galvanized Steel
  1. ASTM A307 Grade A zinc coated Steel Bolts.
  2. ASTM A307 Grade A zinc coated Nuts.

#### **2.04 WELDING ROD**

- A. Final – E70XX Electrodes.

- B. Root – E60XX Electrodes.
- C. Wire – ER70S Electrodes.

## **2.05 STEEL LADDERS**

- A. General Steel: ASTM – A36.
- B. Rebar for ladder rungs: A706 Weldable Rebar.
- C. All new ladders are to meet current OSHA requirements. In addition to the requirements, rung clearances when immovable obstructions are within the required 7-inch toe clearance shall be as follows:
  - 1. Maintain a 1½” clearance between the center line of any rung and the top of any immovable obstruction.
  - 2. Maintain a 4½” clearance between the center line of any rung and the bottom of any obstruction.

## **2.06 ROOF HATCH GASKET**

- A. Roof hatch manway gaskets for access points above the high-water level (not in contact with potable water).
- B. There are two options:
  - 1. Full sheet adhered to the interior of the hatch cover:  
Gaskets to be meet ASTM D2000 requirements. Gaskets to be ¼ inch thick Ethylene Propylene Diene (EPDM) AB-576 item number 386-16-482 as manufactured/supplied by American Biltrite [www.american-biltrite.com](http://www.american-biltrite.com) (888) 275-7075, or approved equal.
  - 2. Gasket adhered to the edge of the hatch curb:  
EPDM foam and vinyl rubber Water and Weather Resistant Rubber Push-on Seal as manufactured/supplied by McMaster-Carr. [www.mcmaster.com](http://www.mcmaster.com) (562) 692-5911, or approved equal.
- C. Adhesive for gasket to be 3M Super Weather strip and Gasket Adhesive as Manufactured by 3M [www.3m.com](http://www.3m.com) (888) 364-3577, or approved equal.

## **2.07 CORPORATION STOP**

- A. Mueller 300 Ball Corporation 1 inch Valve Model B-20046N, or approved equal. Manufactured/supplied by Mueller. [www.muellercompany.com](http://www.muellercompany.com) (800) 423-1323.

## **2.08 EXPANSION JOINT**

- A. Flanged Bellows-Type with a pressure rating of 150 psi, flanged ends, 316 stainless bellows, minimum axial movement of 1 in. and minimum lateral movement of 0.1 in. Flanges are to be AWWA Class D C207.

- B. Manufactured/supplied by Kadant Johnson LLC <https://fluidhandling.kadant.com> 269-278-1715 or UIP International [www.uipintl.com](http://www.uipintl.com) 1-800-257-2467 or approved equal.
- C. Gaskets to be minimum of 1/8-inch-thick Ethylene Propylene Diene (EPDM) that meet NSF 61/600 requirements as manufactured/supplied by Sur-Seal [www.sur-seal.com](http://www.sur-seal.com) (866) 915-4916, or approved equal.

## **2.09 MUD VALVE**

- A. Babco-NFW 3 in. x 2.5 in. No Freeze Valve, or approved equal.  
Manufactured/supplied by Superior Sales & Service, Inc. [www.superiorsales.com](http://www.superiorsales.com) (402) 296-1010.
- B. Discharge hose, smooth, clear PVC. Nutriflow series, or approved equal.  
Manufactured/supplied by Goodyear Engineered Products [www.goodyearhose.com](http://www.goodyearhose.com) (866) 711-4673.

## **2.10 CONDENSATE DRAIN LINE CHECK VALVE**

- A. Proflo PFX31 2-inch brass threaded swing check valve with NSF61/600 certification, or approved equal. Manufactured/supplied by Ferguson Waterworks [www.ferguson.com](http://www.ferguson.com) (800) 721-2590.

## **2.11 OVERFLOW SCREEN**

- A. 316 stainless steel wire, twenty-four (24) or thirty (30) mesh.
- B. Manufactured/supplied by McMaster-Carr. [www.mcmaster.com](http://www.mcmaster.com) (562) 692-5911, manufactured by McNichols [www.mcnichols.com](http://www.mcnichols.com) (855) 463-5736, or approved equal.

## **2.12 FALL PREVENTION DEVICE**

- A. Cable-Type system as manufactured/supplied by 3M/DBI Sala, [www.3m.com](http://www.3m.com) (888) 364-3577, or approved equal.
  - 1. System: Lad-Saf Model and all connecting clips, etc.
  - 2. Dry interior ladder:
    - a. Climb Extension, 2 User, galvanized steel #6116636 for vertical ladders with no obstruction so cable extends above the ladder.

## **2.13 VENT SCREEN**

- A. Aluminum wire, maximum twenty-four (24) mesh or thirty (30) mesh..
- B. Manufactured/supplied by McMaster-Carr. [www.mcmaster.com](http://www.mcmaster.com) (562) 692-5911, or Wire Cloth Man [www.wireclothman.com](http://www.wireclothman.com) (800) 947-3626, or approved equal.

## **2.14 NEOPRENE SHEETING FOR ACCESS TUBE AIR GAP COVERS**

- A. Neoprene sheeting for access tube air gaps
- B. Sheeting to meet ASTM D2240 requirements. Gaskets to be 3/8-inch-thick Neoprene IM-252 item number 201-24-482 as manufactured/supplied by American Biltrite [www.american-biltrite.com](http://www.american-biltrite.com) (888) 275-7075, or approved equal.
- C. Sheeting is to be attached using stainless steel banding clamps Make-A-Clamp Kit, or approved equal. Manufactured by Breeze [www.breezehoseclamps.com](http://www.breezehoseclamps.com) (908)298-8600.

## **2.15 JOINT COMPOUND FOR THREADED FITTINGS**

- A. Great White Pipe Joint Compound as Manufactured by Oatey [www.oatey.com](http://www.oatey.com) (800) 321-9532, or approved equal.

## **2.16 OVERFLOW DUCKBILL CHECK VALVE**

- A. Duck bill check valve with 304 stainless steel ANSI flange. Tideflex series 35, or approved equal.
- B. Manufactured/supplied by Tideflex Technologies [www.redvalve.com](http://www.redvalve.com) (412) 279-0044.

## **PART 3 - EXECUTION**

### **3.01 WET INTERIOR ROOF HATCH**

- A. Replace the existing wet interior hatch.
- B. Furnish and install a 30 in. diameter hinged hatch.
- C. Weld a 16 in. x 3 in. x 3/4 in. diameter rung on the roof for a handhold. Location to be determined by the Engineer.
- D. The handhold is to be located on the ladder side of the opening.
- E. The Owner is to supply a lock or the Contractor to supply nut and bolt to install on the roof hatch hasp.
- F. Install the gasket after the exterior coating is dry to the touch. Install roof hatch gasket using adhesive.
- G. See Drawing 02.
- H. Payment is a separate line item "Wet Interior Roof Hatch" which the Owner reserves the right to delete.

### **3.02 ACCESS TUBE ROOF HATCH**

- A. Remove the existing access tube roof hatch.
- B. Furnish and install a 30 in. diameter hinged hatch.
- C. Verify that the new hatch will fit on the access tube cover without interference from the antenna cable penetrations prior to fabrication. The hatch neck and cover may



need to be modified if the penetrations interfere. Notify the engineer if redesign is required.

- D. Weld a 16 in. x 3 in. x  $\frac{3}{4}$  in. diameter rung on the roof for a handhold. Location to be determined by the Engineer.
- E. The handhold is to be located on the ladder side of the opening.
- F. See Drawing 03.
- G. Payment is a separate line item "Access Tube Roof Hatch" which the Owner reserves the right to delete.

### **3.03 PLATFORM HATCH COVER MODIFICATION**

- A. Trim the covers on the condensate and top platform hatches so the covers can completely close with the fall prevention device in place.
- B. Trim the edge of the cover and grind smooth. Ensure that the cover does not touch the cable once it is closed.
- C. Payment is incidental to the project.

### **3.04 LADDER EXTENSION AT THE CONDENSATE PLATFORM**

- A. Furnish and install a ladder section on the top of the condensate platform.
- B. Ladder to extend 5 rungs above the platform, keep spacing 12 inches between the existing ladder and new section.
- C. The ladder is to meet or exceed all OSHA requirements.
- D. See Drawing 04.
- E. Payment is a separate line item "Condensate Platform Ladder Extension" which the Owner reserves the right to delete.

### **3.05 FILL/DRAW PIPE DEFLECTOR BAR**

- A. Furnish and install deflector bars on the fill/draw pipe.
- B. See Drawing 05.
- C. Payment is a separate line item "Fill/Draw Pipe Deflector Bar" which the Owner reserves the right to delete.

### **3.06 CHEMICAL FEED TAP**

- A. Install a chemical feed tap in the fill/draw pipe at the basebell.
- B. Install a 1-inch heavy wall threaded coupling on the pipe and weld using  $\frac{1}{4}$  inch full fillet weld.
- C. Install a dielectric union then a 1-inch corporation stop.
- D. Install approximately 4 ft. above grade.
- E. All threaded connections are to be installed with joint compound.
- F. Remove the insulation from the chemical feed tap location. Reinstall the insulation after all coating repairs are performed. Drill a hole in the insulation and jacketing to

- accept the new coupling and chemical feed tap. Use a drill saw to create a clean cut, center the hole on the new chemical feed tap. Hole to be no larger than 3" diameter.
- G. Payment is incidental to the project.

### **3.07 EXPANSION JOINT REPLACEMENT**

- A. Remove the existing expansion joint located in the pit. Install a flanged spool section in place of the removed expansion joint. Spool to be STD size the flanges are to match the existing, install new galvanized steel bolts and nuts. The bolt and nut size are to match the existing flanges.
- B. The pipe diameter is approximately 12 inches. Field verify fill pipe size and opening required for new expansion joint prior to fabrication or ordering components. The Contractor is responsible for any existing pipe alterations required for new joint fitting.
- C. Install gasket between the existing flanges and the new expansion joint per AWWA C207.
- D. Use stainless steel nuts and bolts with dielectric isolation sleeves for the connection to the bellows joint, size bolts to fit the flange holes. Use galvanized steel nuts and bolts for connecting the spool section to the existing piping, size bolts to fit the flange holes.
- E. Reinstall or replace existing insulation over the entire joint and spool piece.
- F. Temporarily support the pipe during expansion joint replacement.
1. The Contractor is to submit a plan for the temporary support of the pipe during expansion joint replacement.
  2. These required submittals will be reviewed for information only, not for approval.
  3. Contractor is responsible for correcting any damage to the existing infrastructure caused by the Contractor's actions, including insufficiently supporting the pipe or allowing excessive pipe movement.
  4. Protect or plug and replace the existing tap and associated piping located above the existing expansion joint.
- G. See Drawing 06a-06b.
- H. Payment is a separate line item "Expansion Joint Replacement" which the Owner reserves the right to delete.

### **3.08 MUD VALVE**

- A. Remove the existing mud valve from the bowl to the overflow pipe, reuse coupling and drain line for the new valve installation if possible.
- B. Install a new frost-free mud valve in the lowest section of the mud settling area. Coupling is to be a heavy or extra heavy coupling and is not extend more than  $\frac{3}{8}$  in. into wet interior surfaces.

- C. Install a new hose that is to discharge into the overflow pipe. Cut a hole in the overflow (or use the existing opening, enlarge as needed).
- D. Contractor to ensure that the discharge hose does not kink. Install adaptors (i.e., steel elbow etc.) as needed to prevent kinking.
- E. See Drawing 07.
- F. Payment is a separate line item “Mud Valve” which the Owner reserves the right to delete.

### **3.09 CONDENSATE DRAIN LINE**

- A. Remove the condensate drain line from the condensate ceiling to the point of discharge outside of the basebell wall.
- B. Install a new condensate drain line.
- C. Weld a steel plate over the hole in the basebell left from removal of the existing line.
- D. Pipe to discharge into the overflow pipe. Cut hole in overflow.
- E. Furnish and install a bronze seating check valve. The check valve must normally be open and capable of operating vertically or diagonally.
- F. All threaded fittings to be covered with Teflon tape.
- G. See Drawing 08.
- H. Payment is a separate line item “Condensate Drain Line” which the Owner reserves the right to delete.

### **3.10 OVERFLOW FLAP GATE with SCREEN**

- A. Construct and install a new overflow flap gate at the pipe discharge.
- B. The flap gate is to allow for closed positioning during non-flow conditions, and open operation during overflow conditions.
- C. Field verify existing overflow pipe dimensions.
- D. Use steel plates as weights attached to the lever arm to assure complete closure at end of cycle, number may need to be more than shown on the drawing to ensure complete closure.
- E. Install PVC or plastic washers and/or spacers between the hinge bolts and lever arm, use enough washers to ensure a snug fit without damaging the coating during movement.
- F. Remove the existing flange and weld a new flange onto the discharge end of the overflow pipe. Use a minimum of ¼” steel plate, flange outside diameter to match that of the flap gate outside diameter.
- G. See Drawing 09.
- H. Payment is a separate line item “Overflow Flap Gate” which the Owner reserves the right to delete.

### **3.11 FALL PREVENTION DEVICE**

- A. Furnish and install a cable-type fall prevention device on the dry interior basebell ladder.
- B. Device is to be installed after the topcoat is dry to the touch. Use temporary safety lines during construction.
- C. Begin installation of the dry interior devices at the base of the foundation (bottom of ladder) and extend to the top of the basebell ladder.
- D. Install cable guides every 15 ft. on center.
- E. Payment is a separate line item "Fall Prevention Device" which the Owner reserves the right to delete.

### **3.12 PRESSURE VACUUM ROOF VENT**

- A. Furnish and install a pressure vacuum roof vent on a bolted flange.
- B. Location to be verified by the Engineer.
- C. See Drawings 10a-10d.
- D. Payment is a separate line item "Roof Vent" which the Owner reserves the right to delete.

### **3.13 ACCESS TUBE AIR GAP SEAL**

- A. Weld a curb extension on the access tube cover plate. Furnish and install a neoprene sheet to cover the air gap at the access tube.
- B. Remove the existing screen and mounting hardware.
- C. Attach neoprene sheet at the access tube air gap using two (2) ½" wide stainless-steel banding clamps.
- D. Work to be performed after the surface is surface prepared and coated.
- E. See Drawing 11.
- F. Payment is a separate line item "Access Tube Air Gap Seal" which the Owner reserves the right to delete.

### **3.14 BOWL RIGGING LUG**

- A. Install a lug on the bowl above the top platform ladder opening.
- B. See Drawing 12.
- C. Payment is incidental to the project.

### **3.15 BASEBELL VENTILATION OPENING**

- A. Install one (1) opening with frame and reinforcement in the basebell for installation of a ventilation system.
- B. Install steel plates along the basebell for installation of electrical conduit and receptacles for the vents.
- C. See Drawing 13.

- D. Payment is a separate line item “Basebell Ventilation Opening” which the Owner reserves the right to delete.

### **3.16 OVERFLOW REROUTING WITH DUCK BILL CHECK VALVE - ALTERNATE**

- A. Reroute the overflow pipe so the penetration through the basebell is sufficient to install a downward elbow Trim the end of the overflow and install a downward facing elbow. Install a duck bill check valve on the new elbow.
- B. Field verify existing overflow pipe dimensions.
- C. Weld a minimum of ¼ inch steel ANSI flange on the end of the discharge and bolt the duck bill check valve on the flange.
- D. Install gasket between the existing flange and the new flange per AWWA C207 with a full face and a minimal thickness of 1/16 inch.
- E. The bolts are to be stainless steel.
- F. See Drawing 14.
- G. Payment is a separate line item “Overflow Pipe Discharge Modification - Alternate” which the Owner reserves the right to delete.

## **PART 4 – SPECIAL PROVISIONS**

### **4.01 STEEL REPLACEMENT COATING**

- A. All large pieces of steel to be shop primed using the specified prime coat over a SSPC-SP10 near white surface preparation.
- B. Do not prime 3 in. from area to be welded.
- C. After installation, spot clean welded areas to a SSPC-SP11 and apply coating as specified.
- D. Use only one manufacturer for repair coating.
- E. Payment is incidental to metal repairs.

### **4.02 WELD PREPARATION PRIOR to COATING**

- A. Prepare all new welds per NACE SP0178 prior to coating application. Grind welds to category D.

### **4.03 COATING REPAIR – WET INTERIOR**

- A. Complete all welding and cutting prior to any surface preparation for painting to avoid contamination of surfaces.
- B. Remove any residue and weld smoke by solvent cleaning.
- C. Power tool clean to a SSPC-SP11 finish all areas damaged by welding.
- D. Use 3M Scotch-Brite Clean’n Strip Discs.
- E. Feather edges of adjacent coating a minimum of ½ in. from exposed steel.

F. Apply repair system at 4.0 - 6.0 mils per coat as follows:

<u>Manufacturer</u>	<u>System</u>
Tnemec	21/21
Induron	PE-70/PE-70
Sherwin Williams	5500LT/5500LT

G. Contractor has the option to apply one (1) coat of PPG Aquatopoxy A-61 at 6.0-10.0 mils in lieu of the two-coat system.

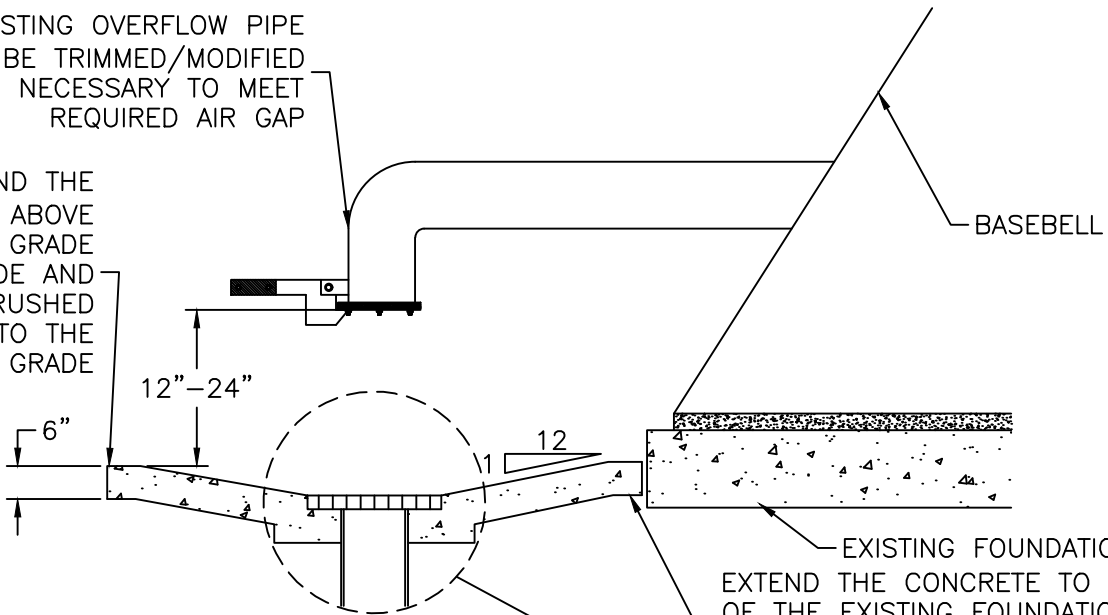
H. System to meet all National Sanitation Foundation 61 certification standards for potable water contact. Use only colors approved by NSF 61/600 are to be used in the wet interior.

I. Contractor to follow the relevant items from Sections 09 97 13 and 09 97 13.10.

J. Payment is incidental to weld repairs.

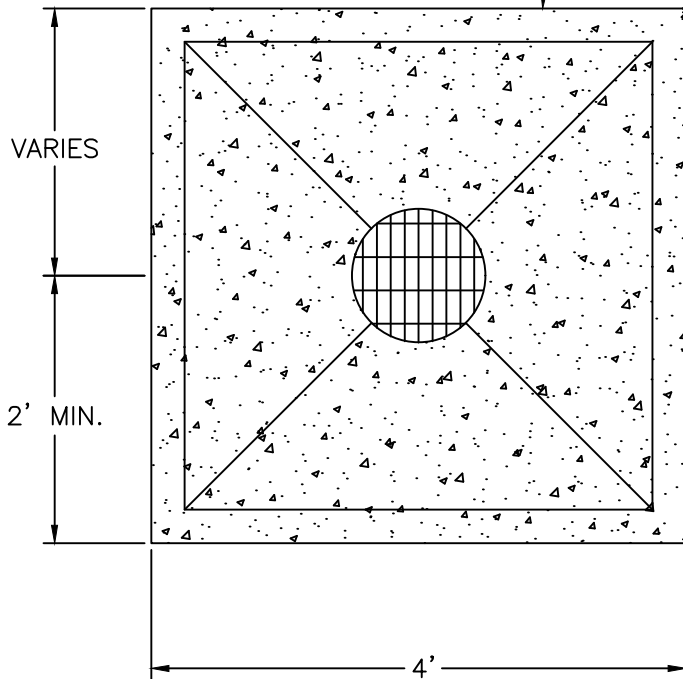
THE EXISTING OVERFLOW PIPE IS TO BE TRIMMED/MODIFIED AS NECESSARY TO MEET REQUIRED AIR GAP

EXTEND THE CONCRETE 2" ABOVE THE EXISTING GRADE AND GRADE AND SLOPE 21AA CRUSHED LIMESTONE TO THE EXISTING GRADE

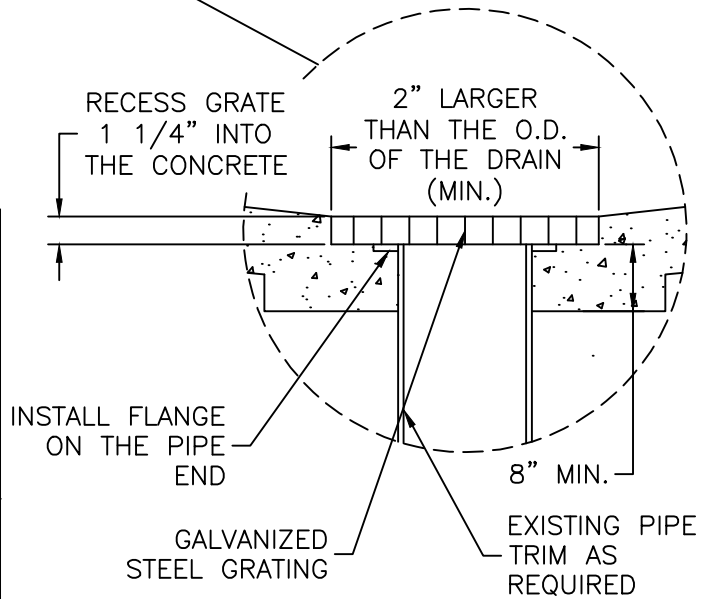


SIDE VIEW

WATER TOWER FOUNDATION SIDE, MATCH THE RADIUS OF THE FOUNDATION, PLACE WATER STOP BETWEEN THE FOUNDATION AND THE SPLASH PAD



PLAN VIEW



Note: Drawing not to scale.



Kalamazoo, MI 250,000 Spheroid

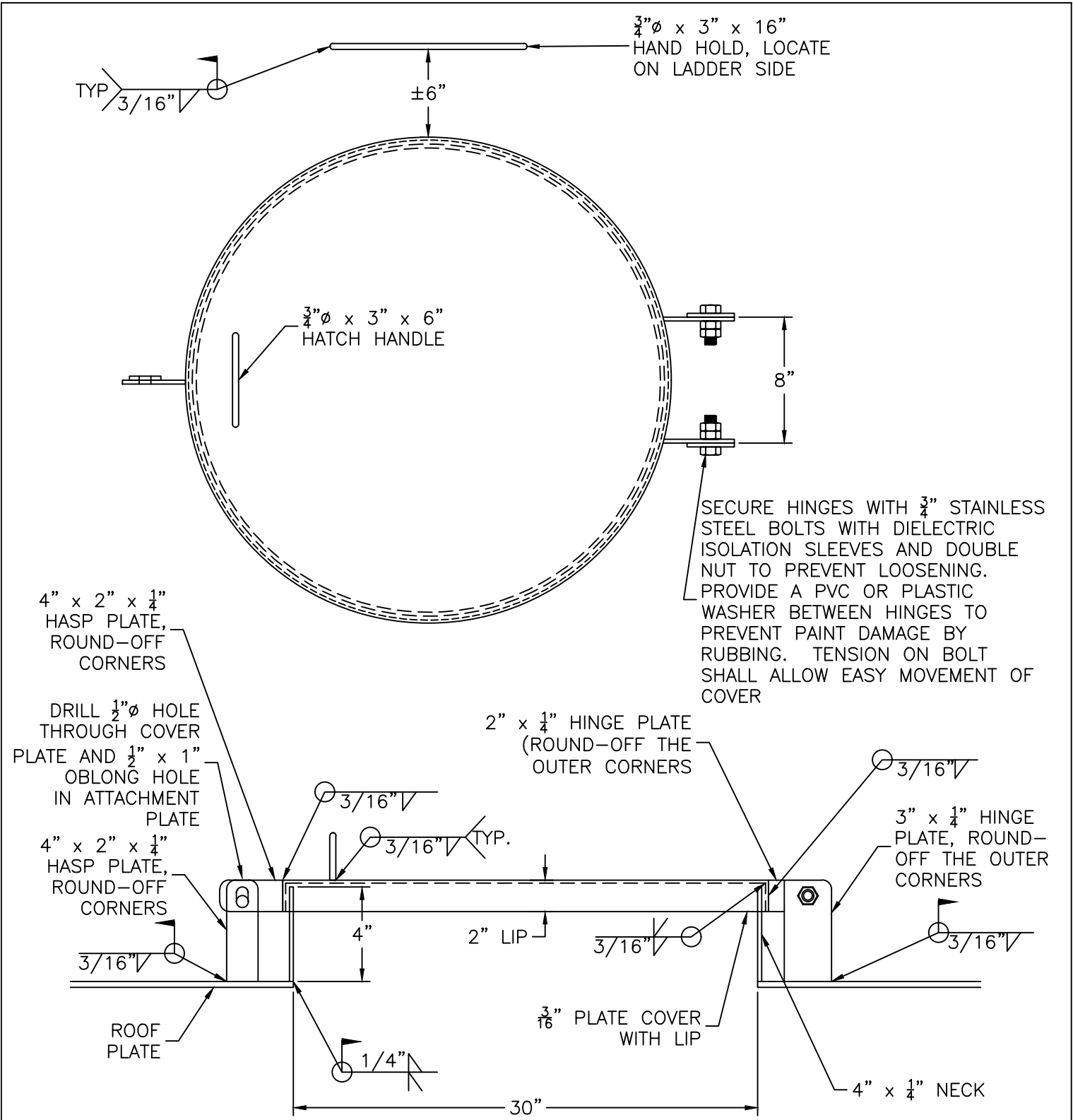
Overflow Splash Pad

Drawn By: TMF

Date: 2/07/24

Checked By: JVR

DWG: 01



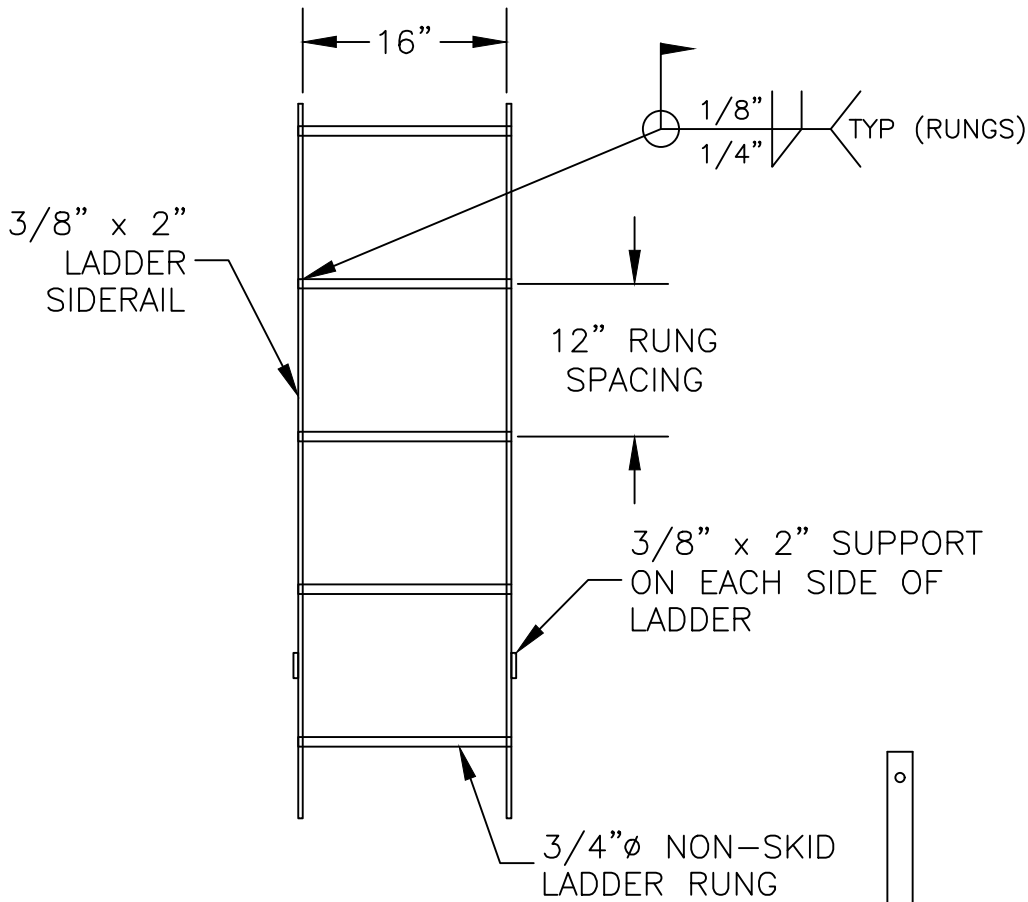
- NOTES:**
1. LOCATION OF THE MANWAY TO BE DETERMINED BY THE ENGINEER.
  2. INSTALL A GASKET ON THE COVER.
  3. HATCH COVER IS TO SEAT ON TOP OF THE ENTIRE CURB WHEN CLOSED.

Note: Drawing not to scale.

<b>DIXON</b> ENGINEERING, INC.	
Kalamazoo, MI 250,000 Spheroid	
30" Wet Interior Roof Hatch	
Drawn By: TMF	Date: 02/07/24
Checked By: JVR	DWG: 02



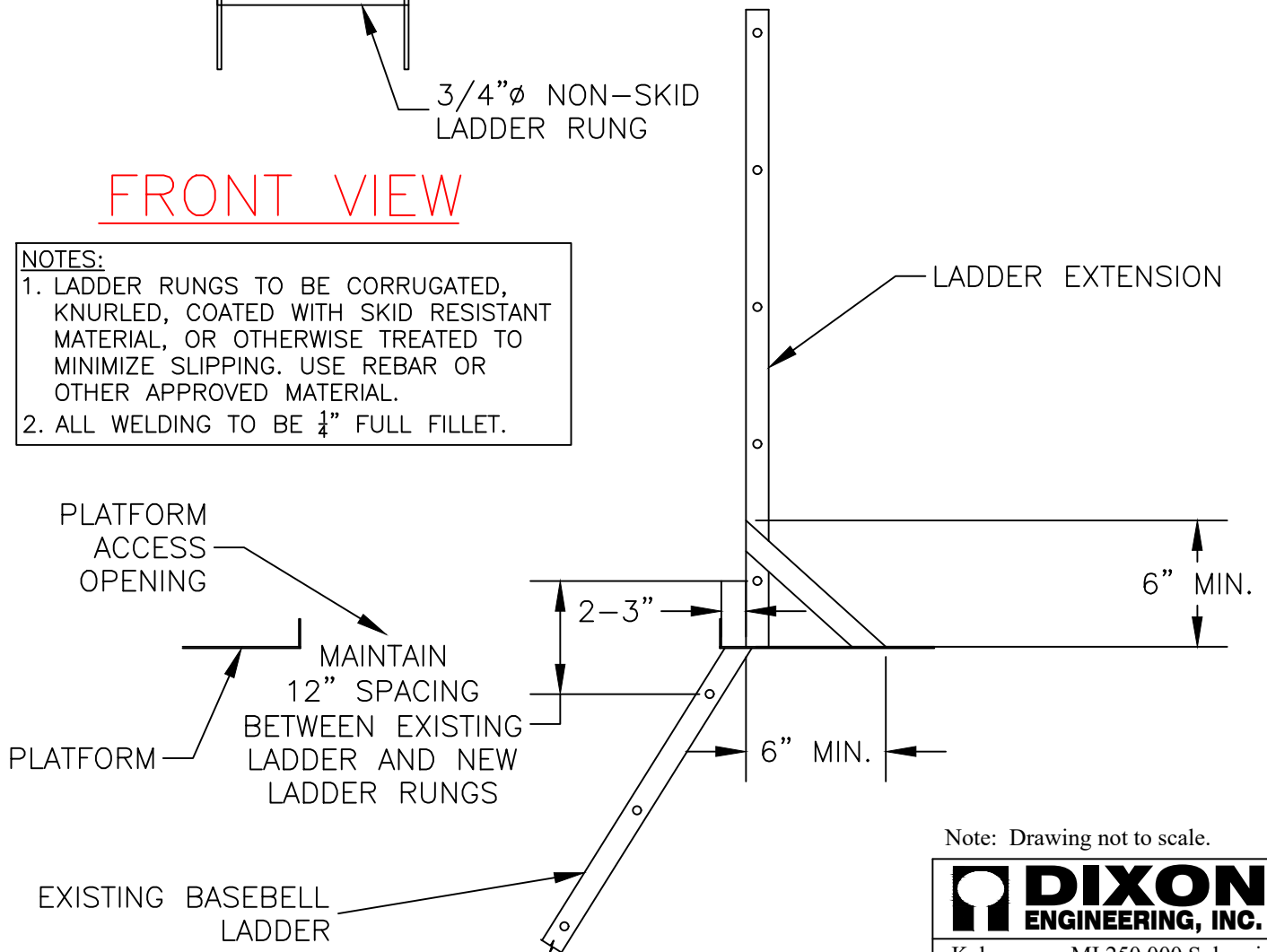




## FRONT VIEW

**NOTES:**

1. LADDER RUNGS TO BE CORRUGATED, KNURLED, COATED WITH SKID RESISTANT MATERIAL, OR OTHERWISE TREATED TO MINIMIZE SLIPPING. USE REBAR OR OTHER APPROVED MATERIAL.
2. ALL WELDING TO BE 1/4" FULL FILLET.



## SIDE VIEW

Note: Drawing not to scale.



Kalamazoo, MI 250,000 Spheroid

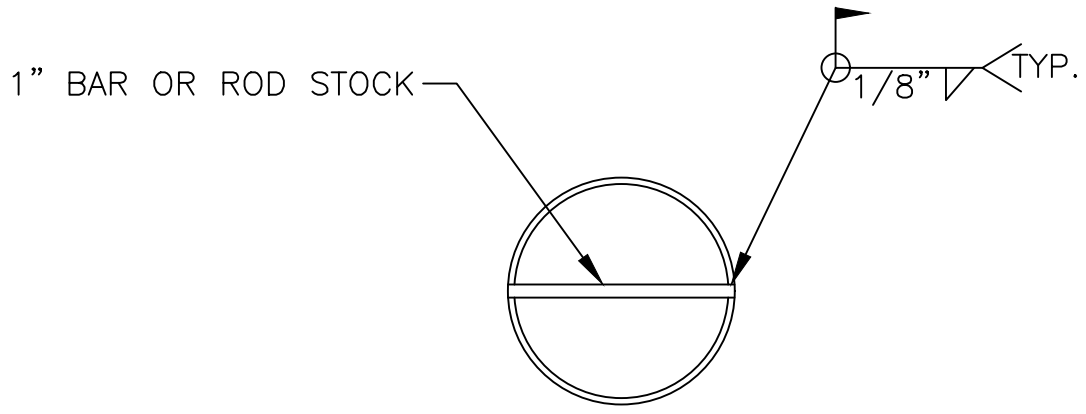
Ladder Extension

Drawn By: TMF

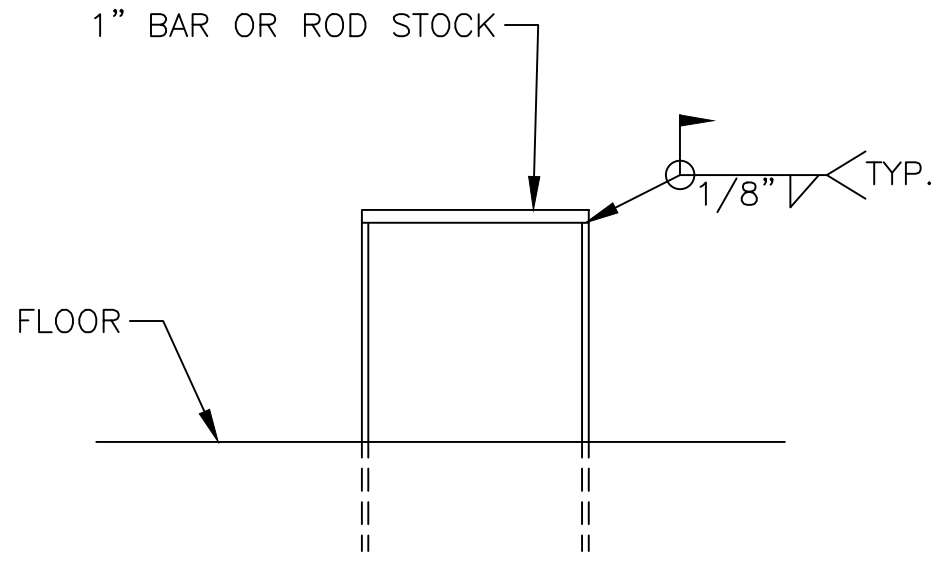
Date: 11/21/23

Checked By: JVR

DWG: 04




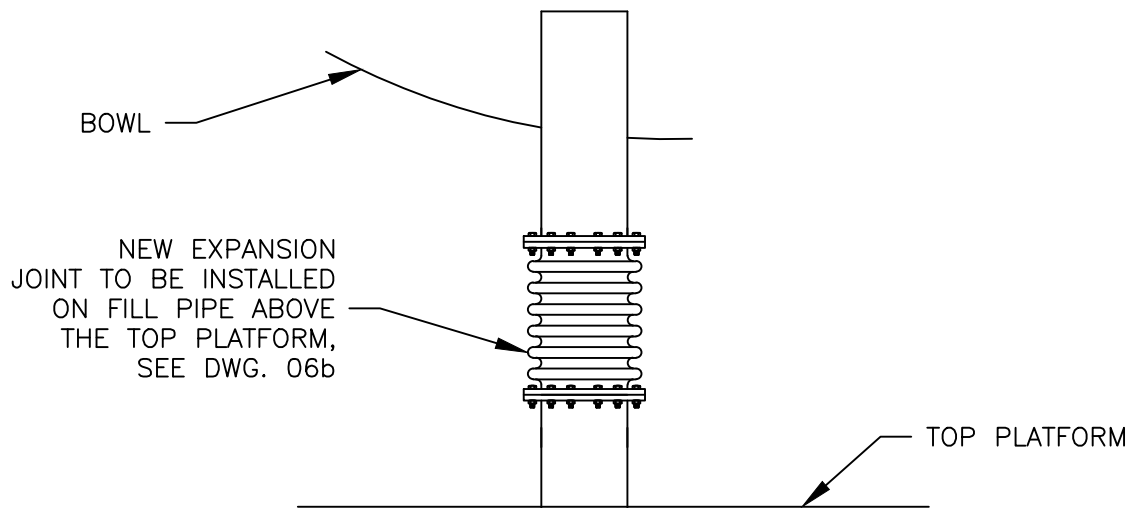
PLAN VIEW



SIDE VIEW

Note: Drawing not to scale.

	
Kalamazoo, MI 250,000 Spheroid	
Fill/Draw Pipe Deflector Bar	
Drawn By: TMF	Date: 11/21/23
Checked By: JVR	DWG: 05



AWWA C207 CLASS D RING FLANGE  
 TYP. OF 2, HOLE SIZE AND PATTERN TO  
 MATCH EXISTING PIPE FLANGES  
 BOLTS TO BE GALVANIZED, NUT AND BOLT  
 SIZE TO MATCH THE EXISTING

NEW STD SCHEDULE SPOOL  
 SECTION TO REPLACE THE  
 REMOVED EXPANSION JOINT

Note: Drawing not to scale.



Kalamazoo, MI 250,000 Spheroid

Expansion Joint

Drawn By: TMF Date: 11/21/23

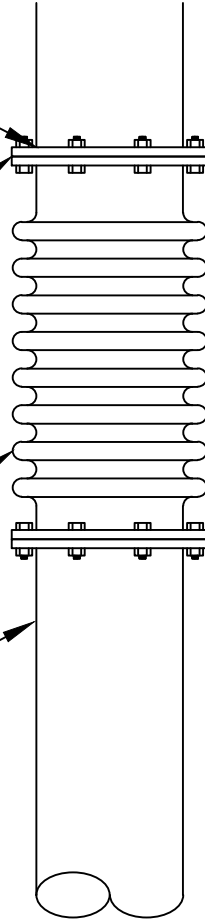
Checked By: JVR DWG: 06a

AWWA C207 CLASS D RING FLANGE TYP. OF 2, HOLE SIZE AND PATTERN TO MATCH NEW BELLOWS EXPANSION JOINT BOLTS TO BE 316 STAINLESS STEEL WITH DIELECTRIC SLEEVES

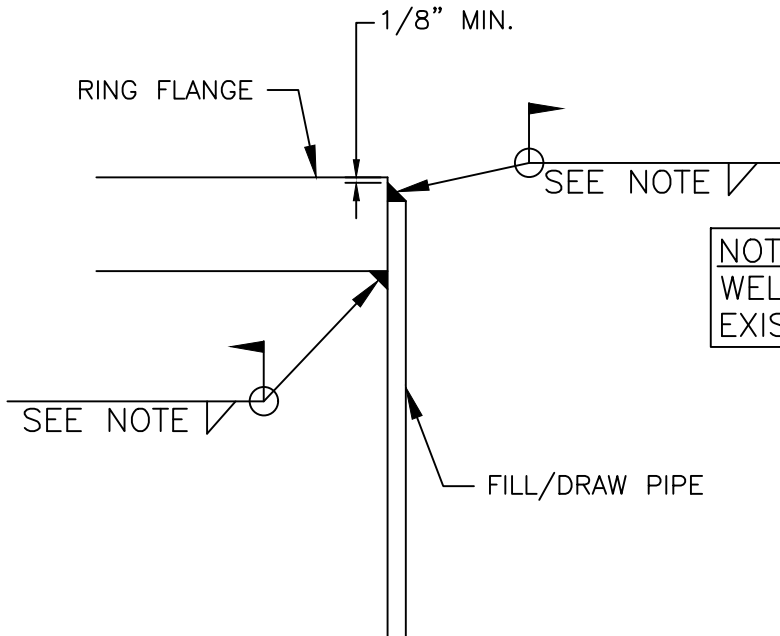
INSTALL MINIMUM OF 1/8" GASKET MATERIAL BETWEEN STAINLESS STEEL FLANGE AND STEEL FLANGE, TYPICAL OF 2

STAINLESS STEEL BELLOWS WITH FLANGED ENDS

TRIM FILL/DRAW PIPE AS NEEDED TO FIT THE NEW JOINT, FLANGE AND GASKET MATERIAL



## EXPANSION JOINT REPLACEMENT



**NOTE:**  
WELD SIZE TO MATCH  
EXISTING PIPE THICKNESS

Note: Drawing not to scale.



Kalamazoo, MI 250,000 Spheroid

Expansion Joint

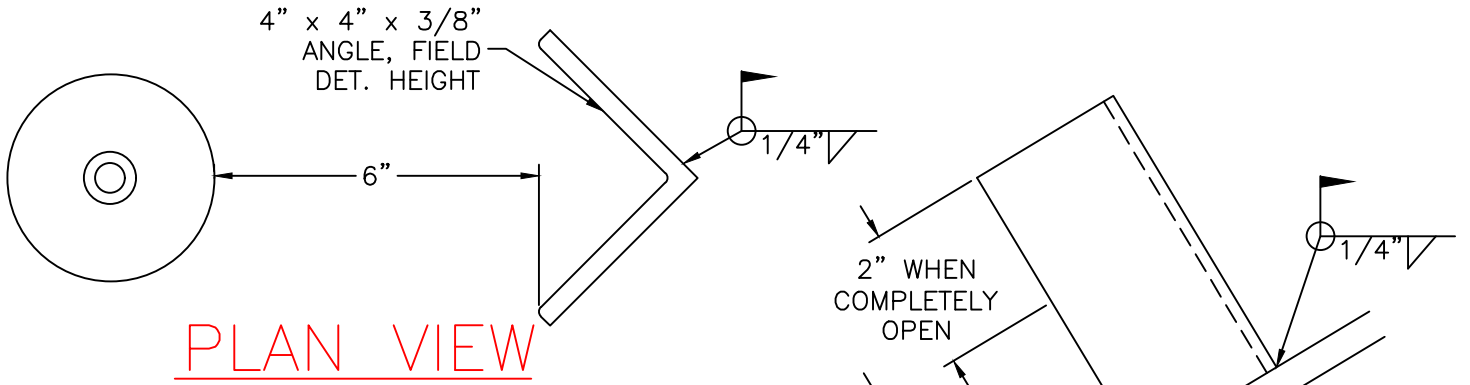
Drawn By: TMF

Date: 02/07/24

Checked By: JVR

DWG: 06b

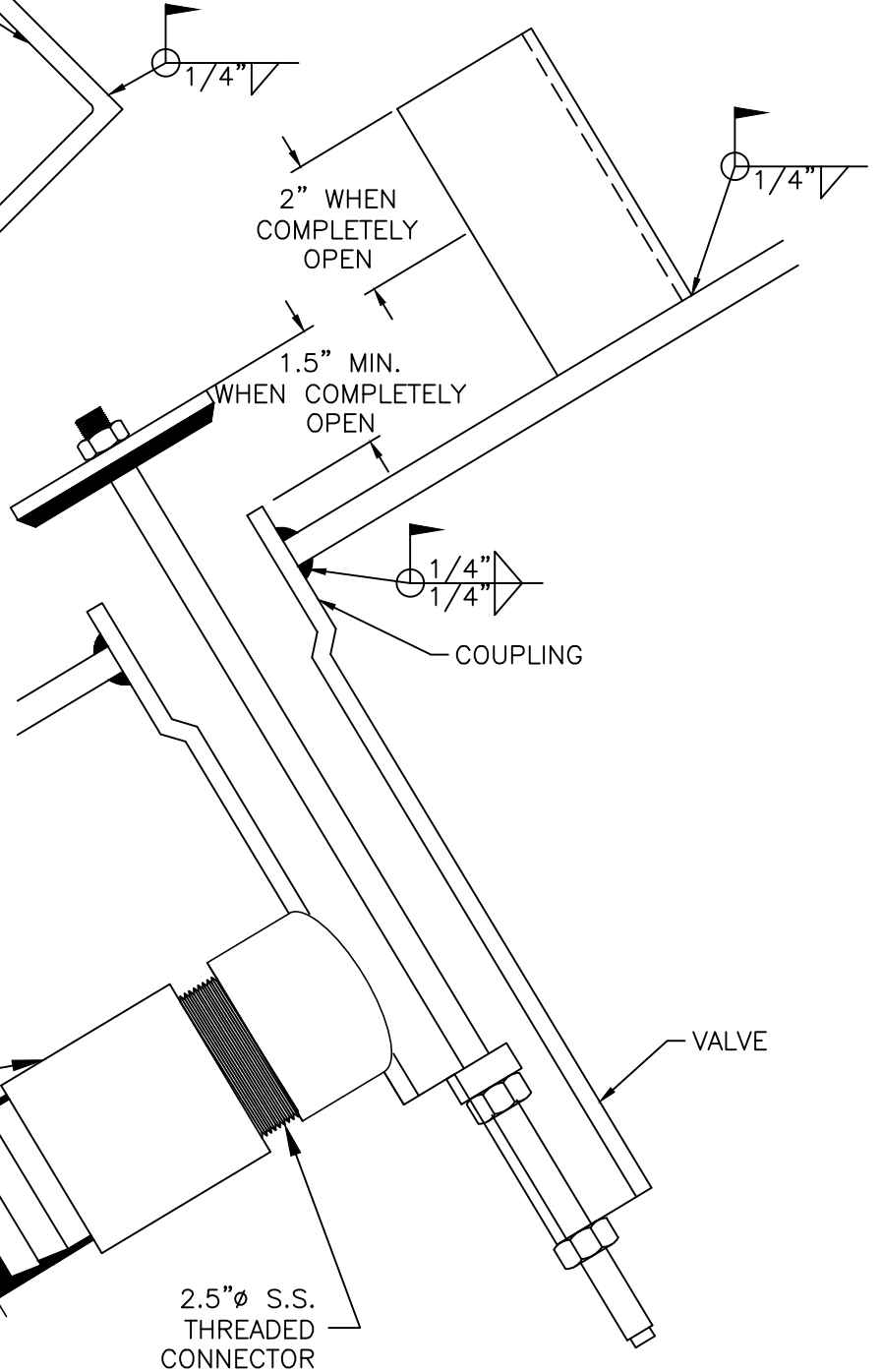
## FLANGE WELD DETAIL



PLAN VIEW

**NOTES:**

1. THE THREADED FEMALE COUPLING IS TO BE 2 1/2" LONG SCH. 80, EXTEND 3/8" INTO THE BOWL.
2. INSTALL AS CLOSE TO THE ACCESS TUBE AS POSSIBLE.
3. THREADED CONNECTIONS ARE TO BE SEALED WITH PIPE JOINT COMPOUND (OATEY GREAT WHITE OR APPROVED EQUAL).
4. VALVE AND PIPING IS NOT TO INTERFERE WITH LADDER ACCESSIBILITY.
5. VALVE TO BE EQUIPPED WITH A HANDLE.



2.5"φ S.S. BARBED FITTING TYP. OF (2)

2.5"φ S.S. THREADED CONNECTOR

2.5"φ HOSE, FIELD DETERMINE LENGTH REQ'D, INSTALL 22° OR 30° THREADED PIPE SECTION AS NEEDED TO ENSURE THE HOSE DOESN'T KINK

2.5"φ SCH. 40 THREADED DRAIN PIPE FIELD DETERMINE LENGTH REQ'D

EXISTING OVERFLOW PIPE, CUT HOLE TO ACCEPT MUD VALVE DRAIN PIPE

Note: Drawing not to scale.



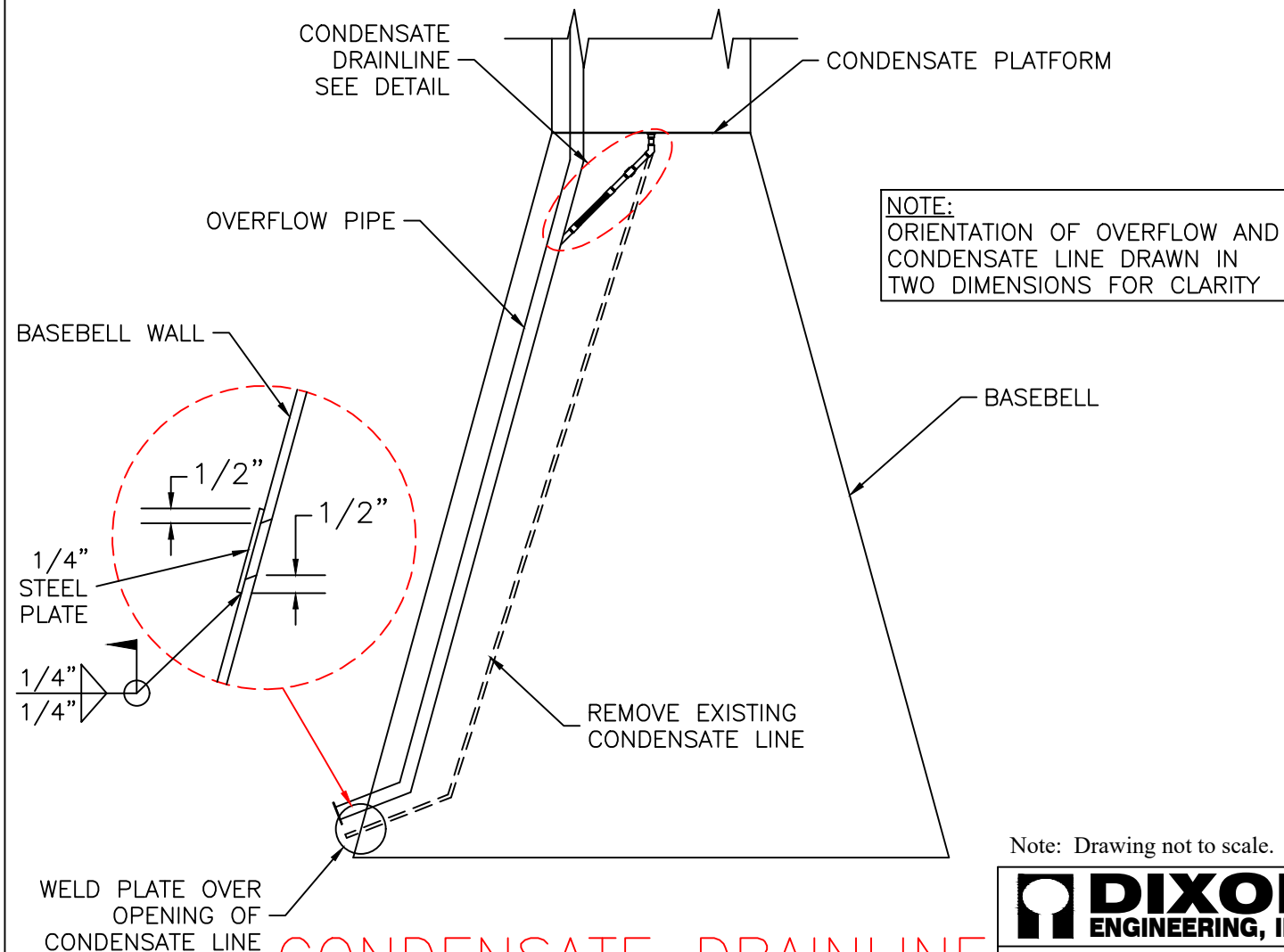
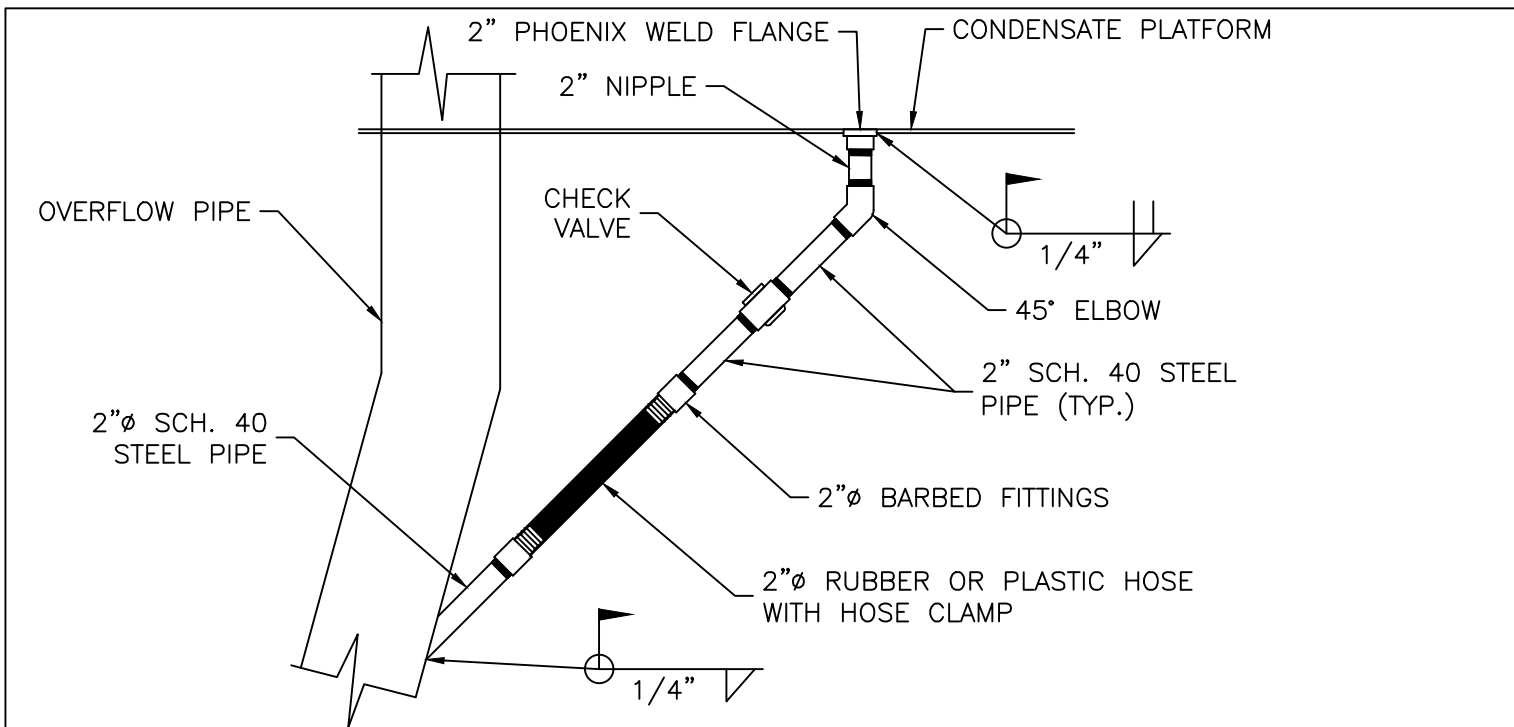
Kalamazoo, MI 250,000 Spheroid

Mud Valve

Drawn By: TMF Date: 11/21/23

Checked By: JVR DWG: 07

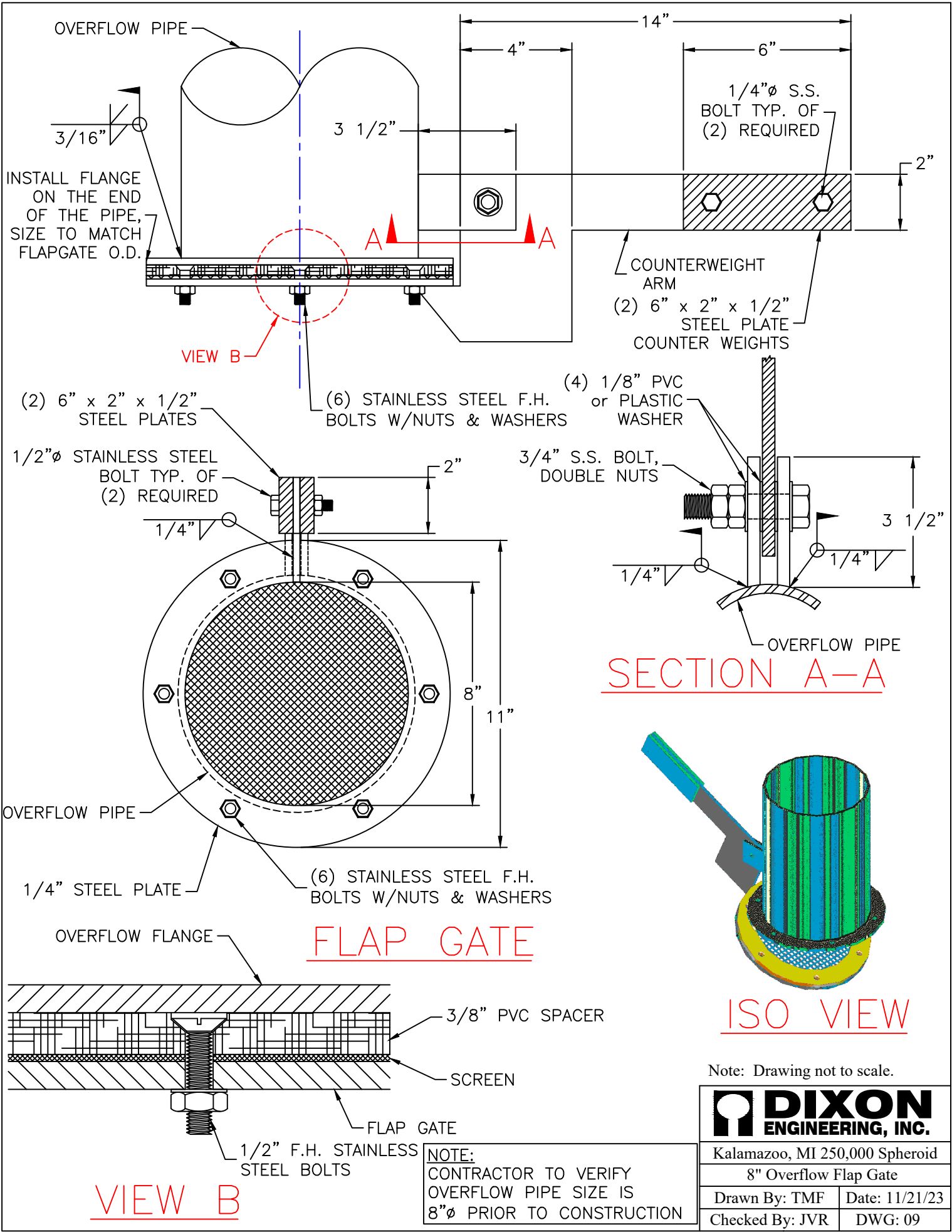
MUD VALVE



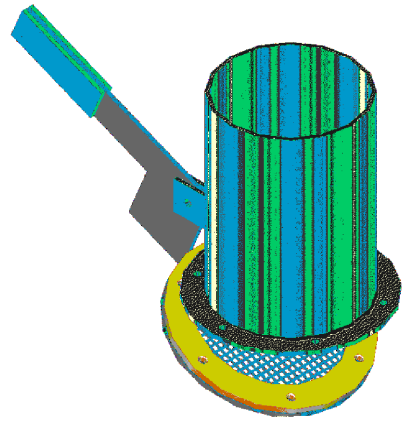
CONDENSATE DRAINLINE

Note: Drawing not to scale.

<b>DIXON ENGINEERING, INC.</b>	
Kalamazoo, MI 250,000 Spheroid	
Condensate Drainline	
Drawn By: TMF	Date: 11/21/23
Checked By: JVR	DWG: 08



SECTION A-A



ISO VIEW

Note: Drawing not to scale.

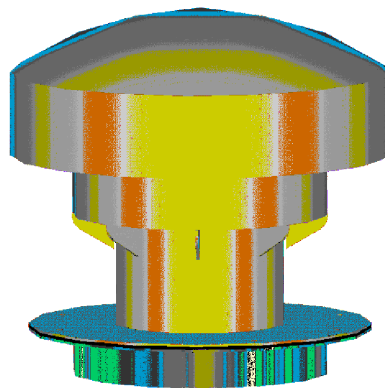
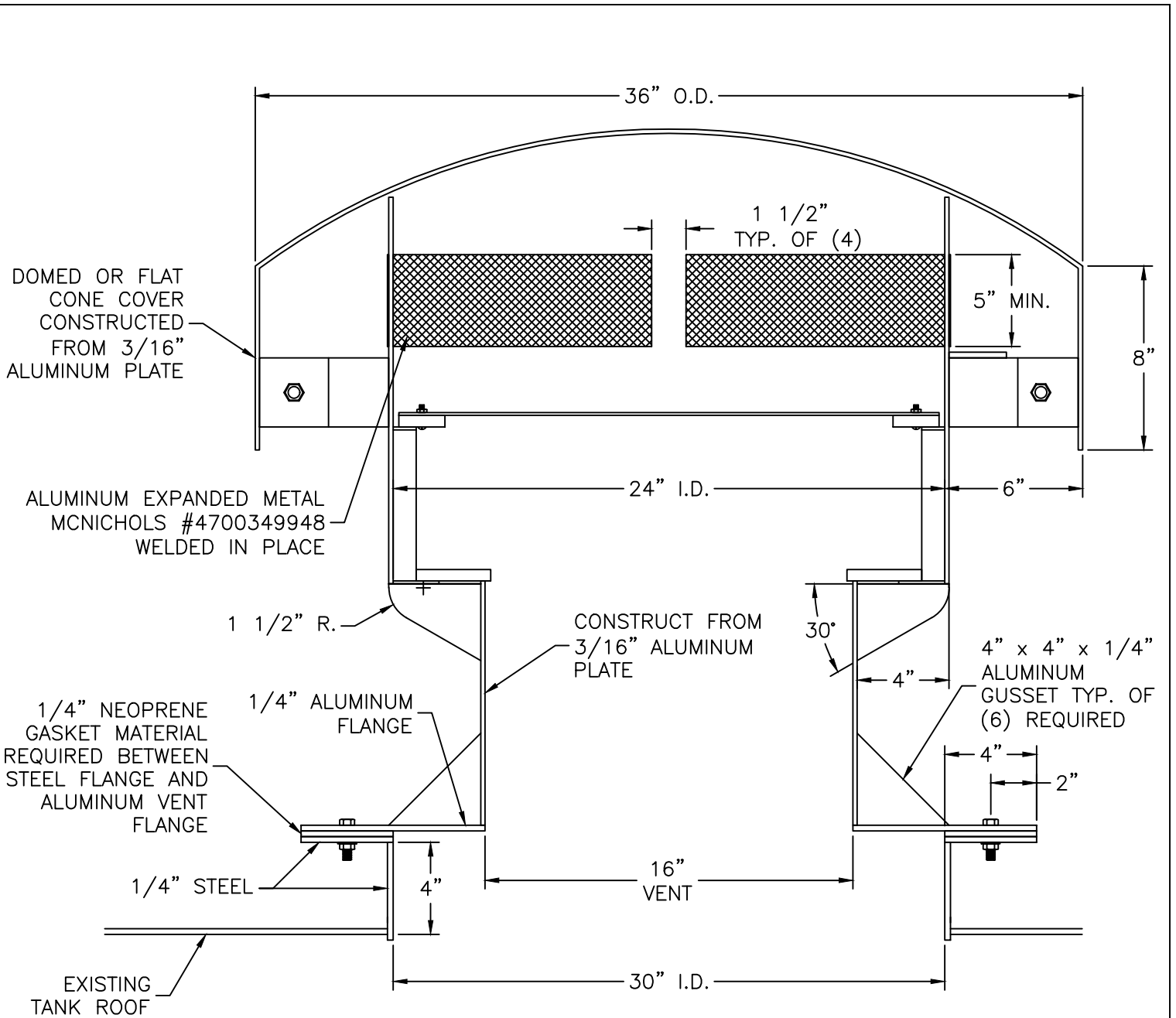
		Kalamazoo, MI 250,000 Spheroid	
		8" Overflow Flap Gate	
Drawn By: TMF	Date: 11/21/23		
Checked By: JVR	DWG: 09		

NOTE:  
CONTRACTOR TO VERIFY  
OVERFLOW PIPE SIZE IS  
8"Ø PRIOR TO CONSTRUCTION

VIEW B

FLAP GATE





ISO VIEW

Note: Drawing not to scale.



Kalamazoo, MI 250,000 Spheroid

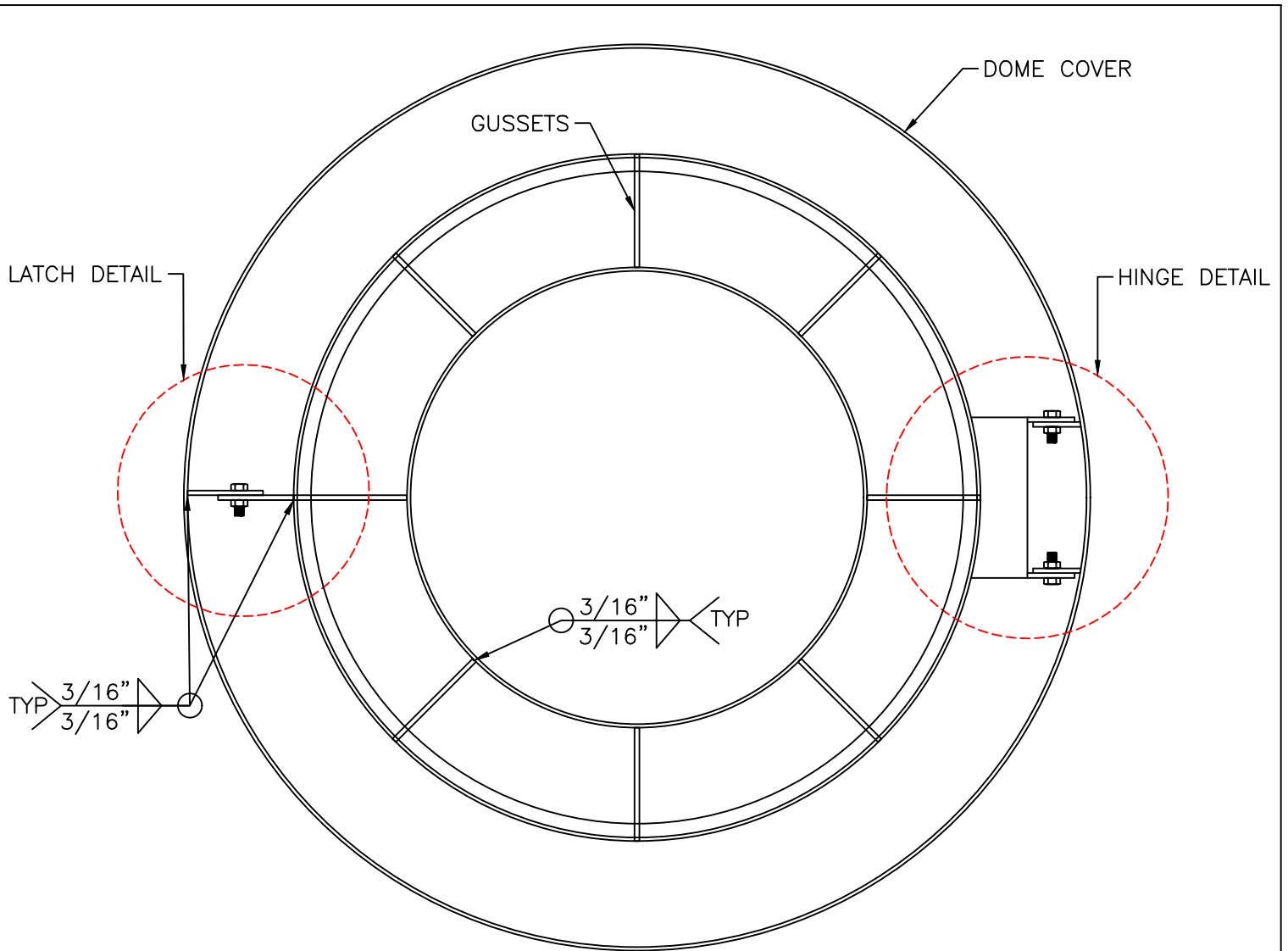
16" Pressure Vacuum Roof Vent

Drawn By: TMF

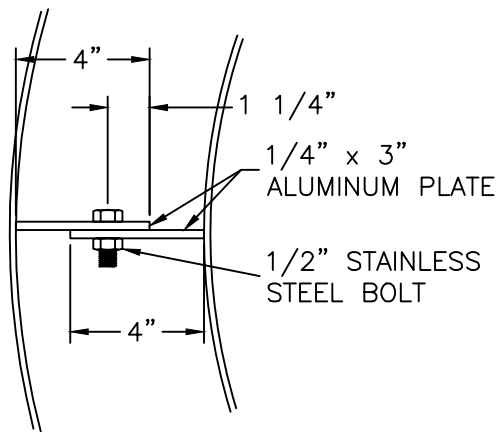
Date: 11/21/23

Checked By: JVR

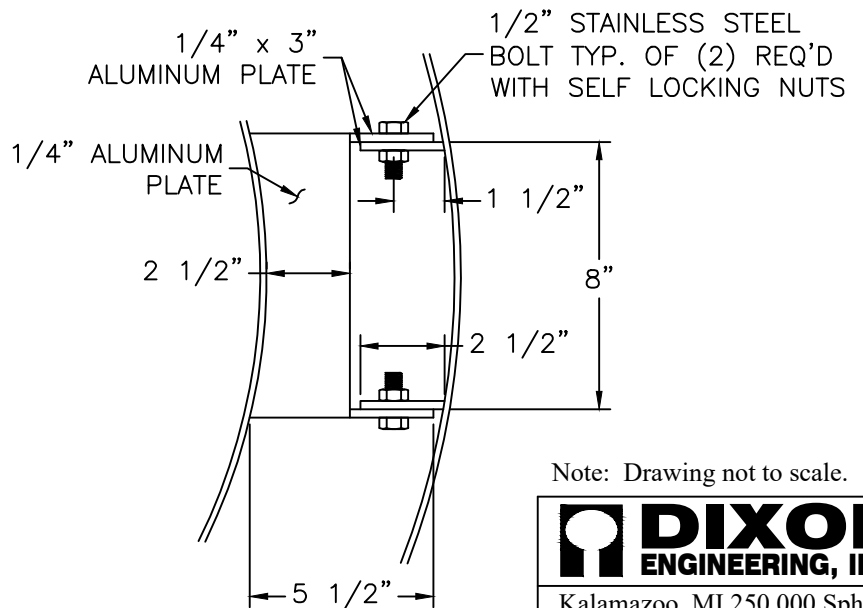
DWG: 10a



PLAN VIEW



LATCH DETAIL



HINGE DETAIL

Note: Drawing not to scale.



Kalamazoo, MI 250,000 Spheroid

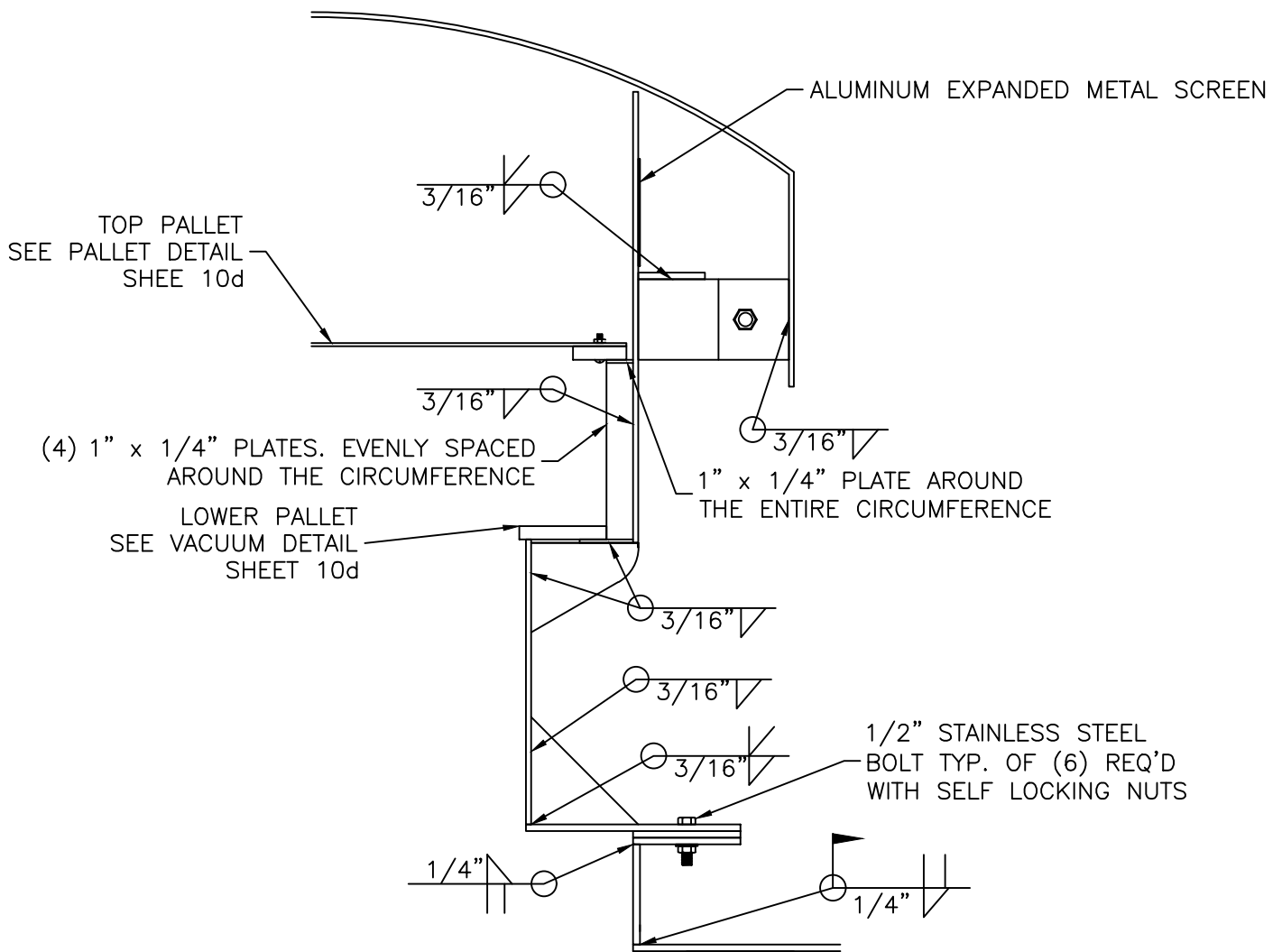
16" Pressure Vacuum Roof Vent

Drawn By: TMF

Date: 11/21/23

Checked By: JVR

DWG: 10b



## WELDING DETAIL

Note: Drawing not to scale.

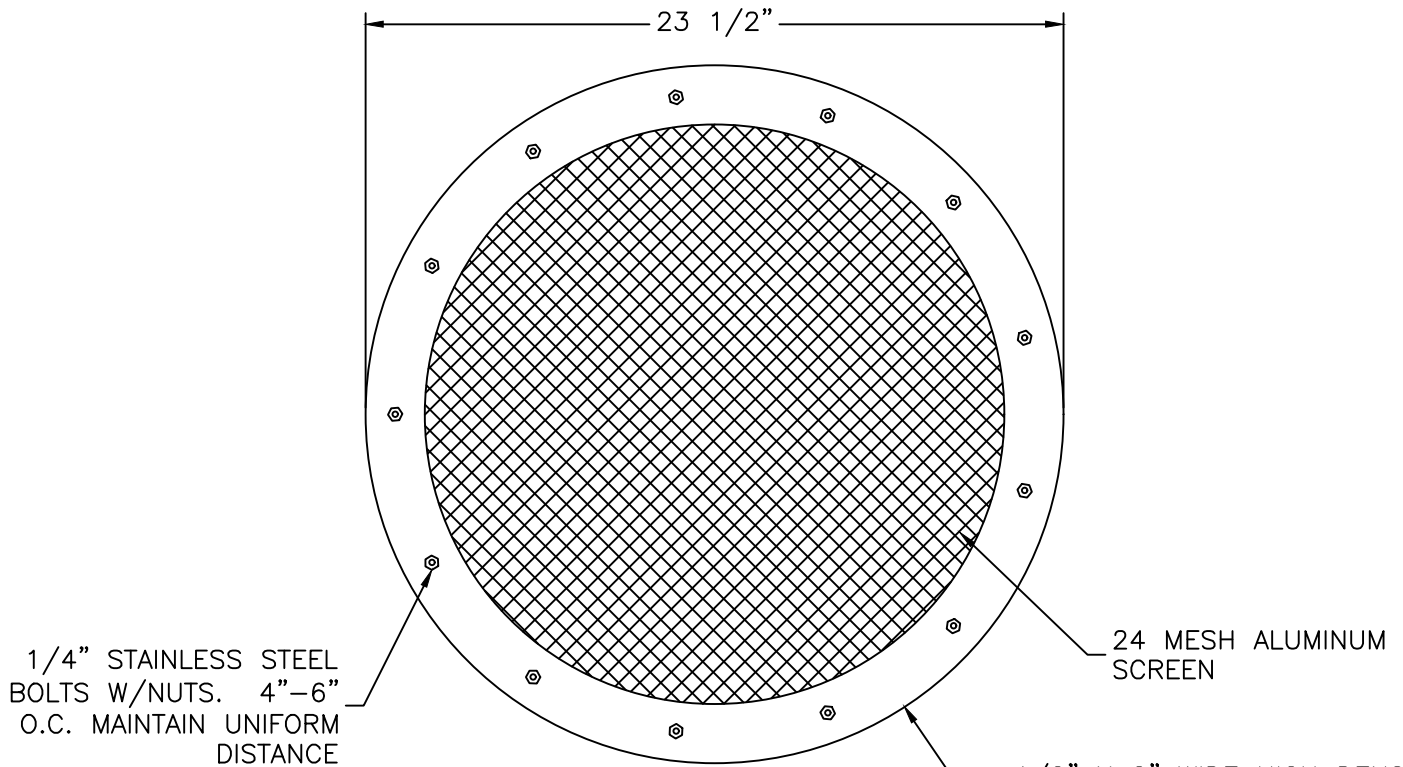


Kalamazoo, MI 250,000 Spheroid

16" Pressure Vacuum Roof Vent

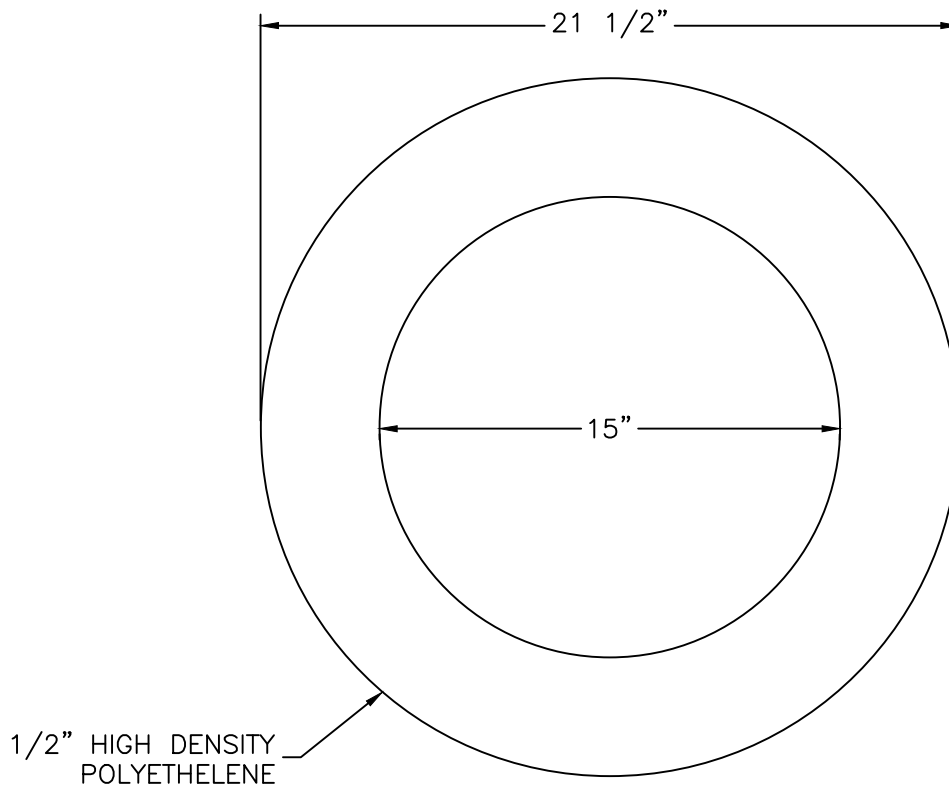
Drawn By: TMF      Date: 11/21/23

Checked By: JVR      DWG: 10c



TOP PALLET

1/2" X 2" WIDE HIGH DENSITY POLYETHELENE TYPICAL OF TWO SECTIONS, SCREEN TO BE SANDWICHED BETWEEN THE TWO RINGS



VACUUM PALLET

Note: Drawing not to scale.



Kalamazoo, MI 250,000 Spheroid

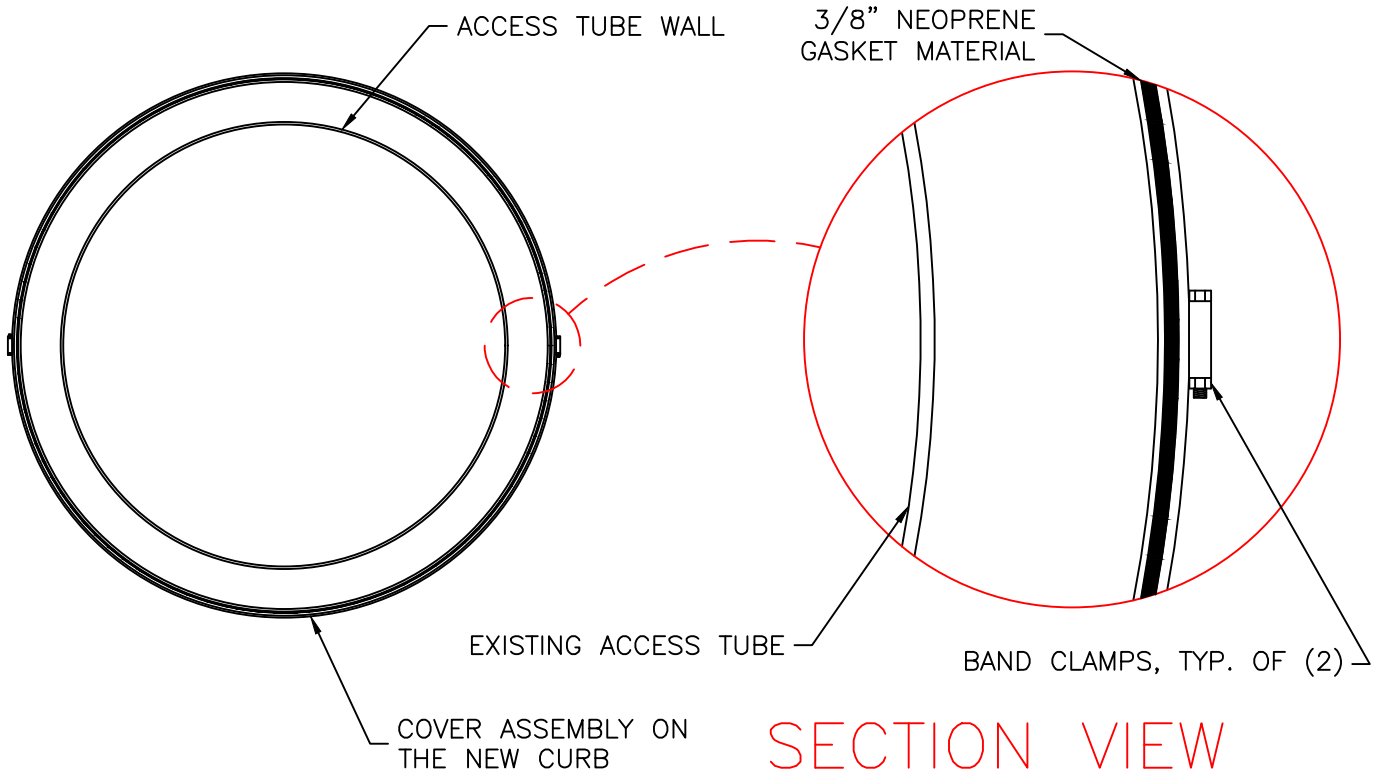
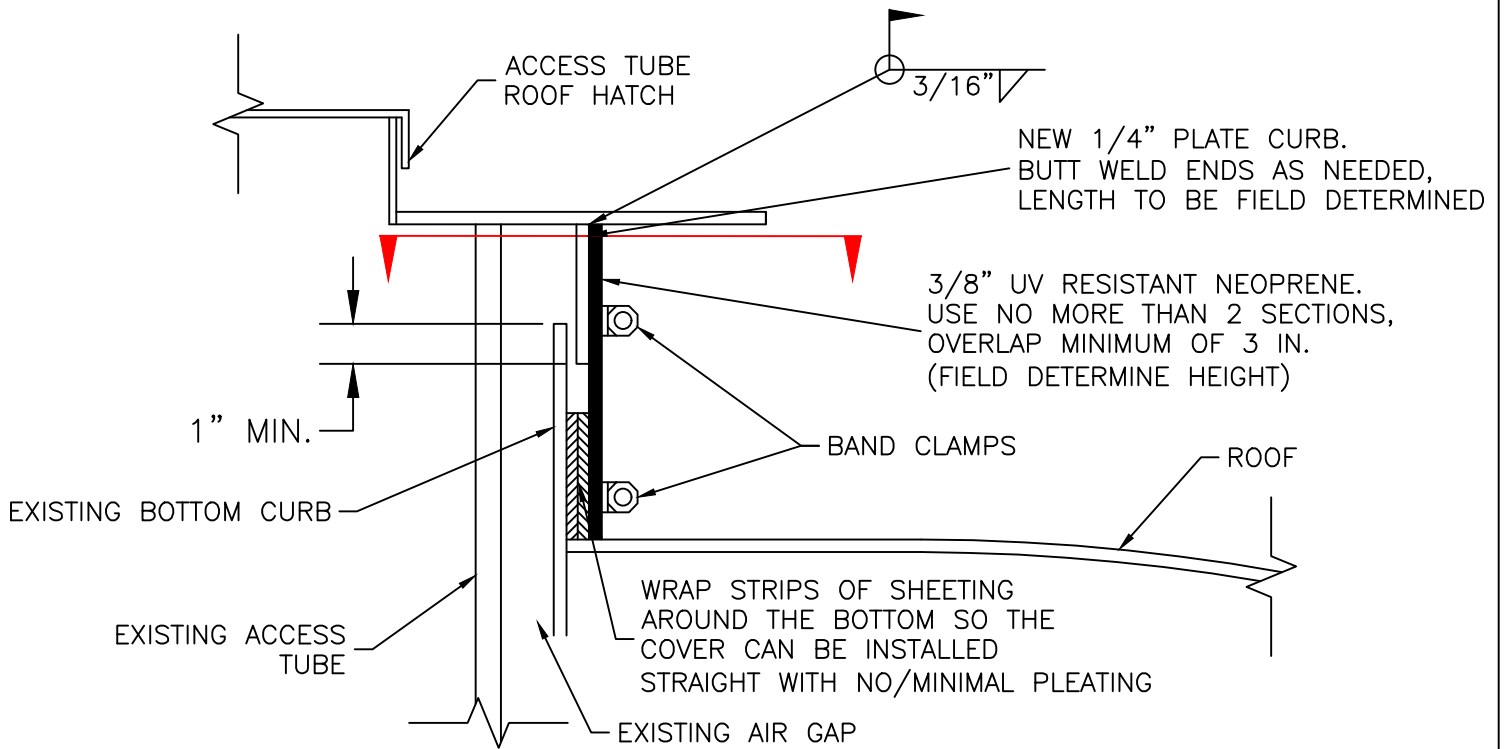
16" Pressure Vacuum Roof Vent

Drawn By: TMF

Date: 11/21/23

Checked By: JVR

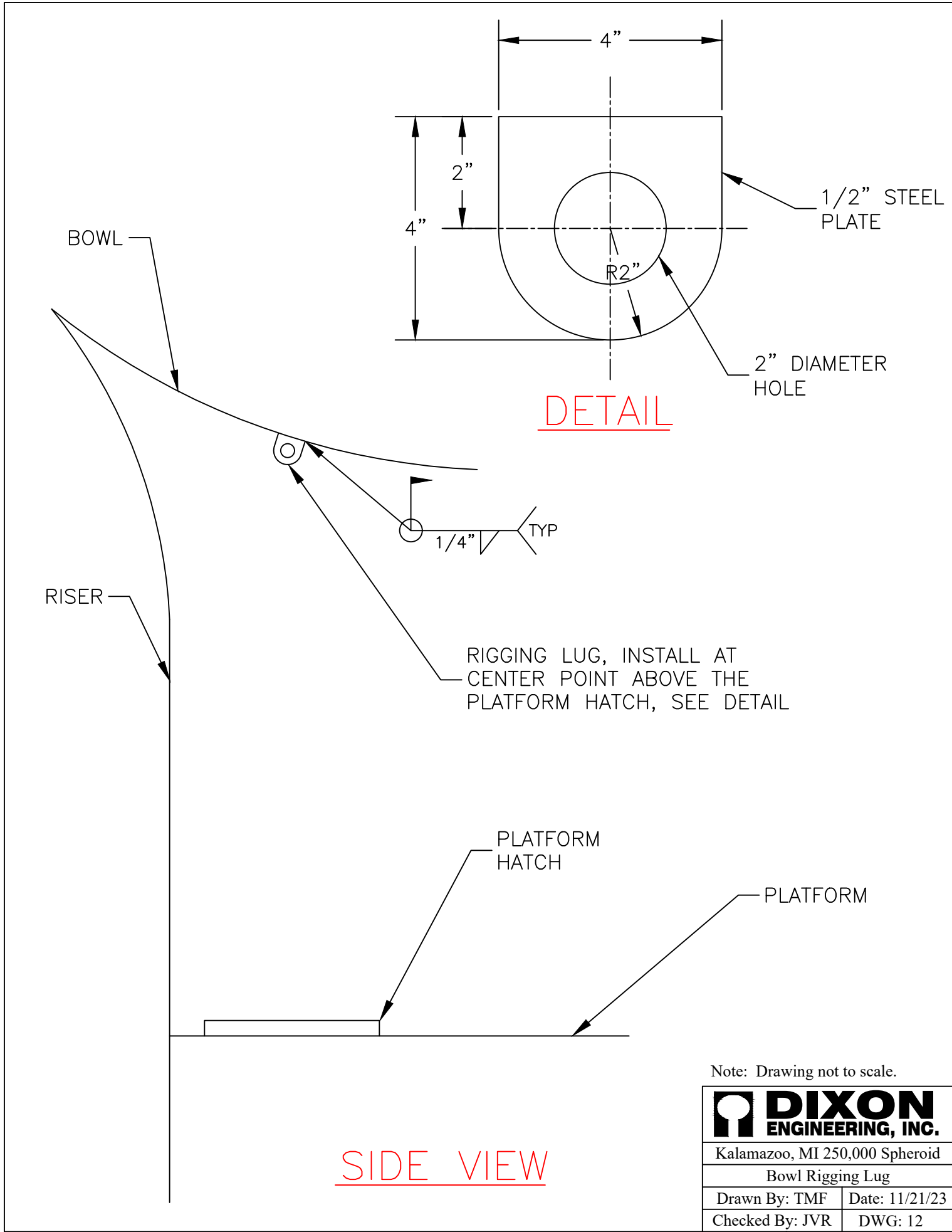
DWG: 10d



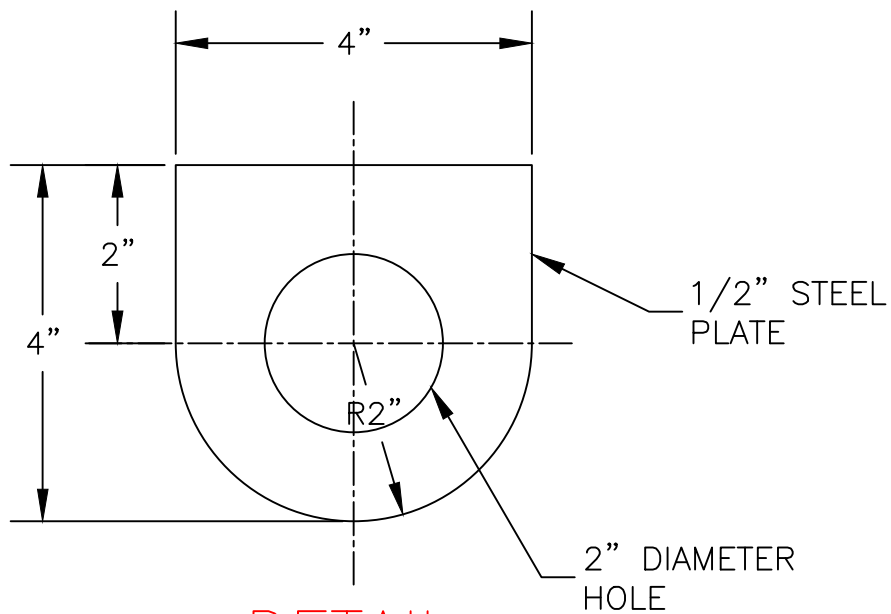
ACCESS TUBE SEAL

Note: Drawing not to scale.

Kalamazoo, MI 250,000 Spheroid	
Access Tube Air Gap Seal	
Drawn By: TMF	Date: 11/21/23
Checked By: JVR	DWG: 11



BOWL

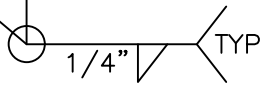


1/2" STEEL PLATE

2" DIAMETER HOLE

DETAIL

RISER



RIGGING LUG, INSTALL AT CENTER POINT ABOVE THE PLATFORM HATCH, SEE DETAIL

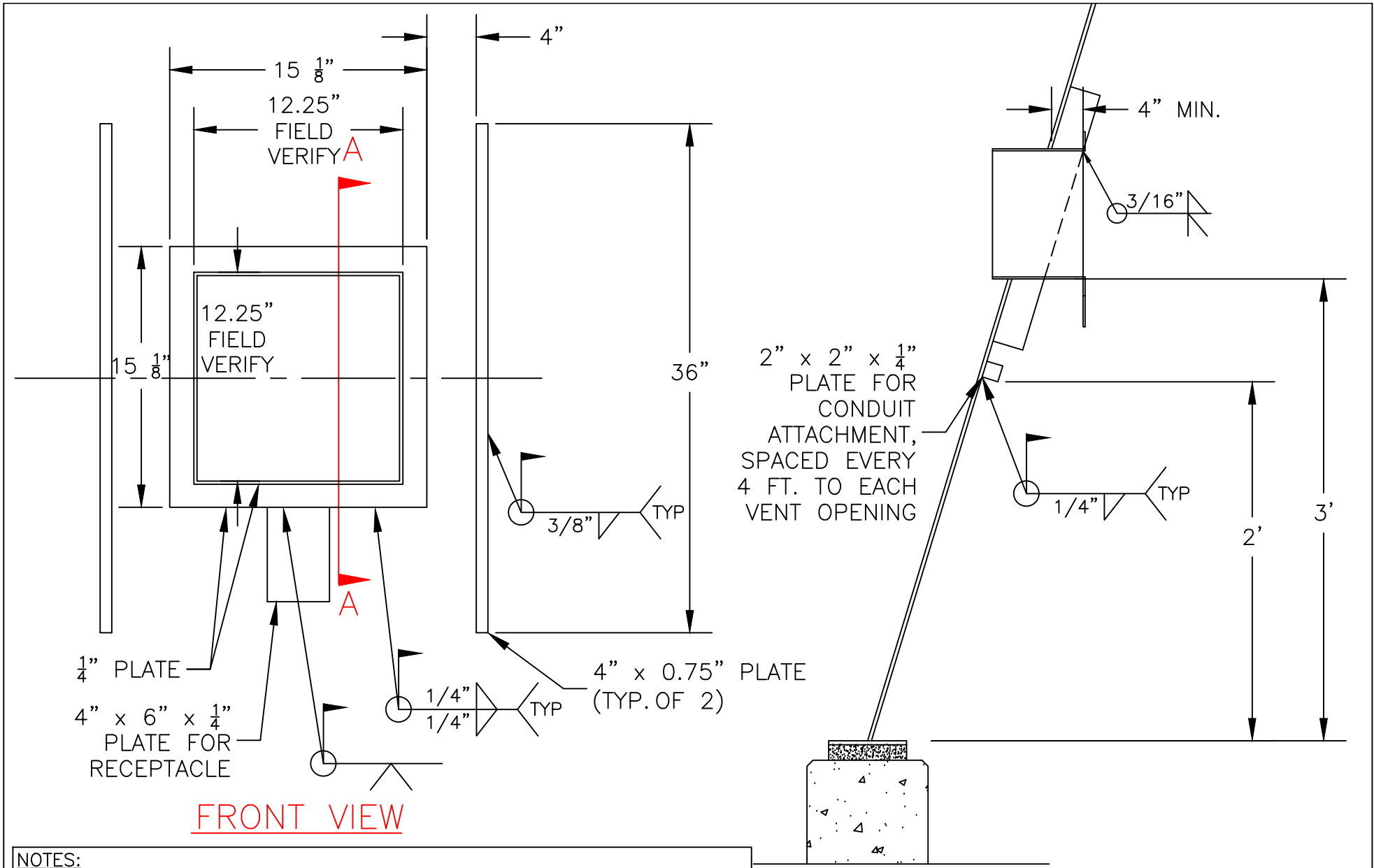
PLATFORM HATCH

PLATFORM

SIDE VIEW

Note: Drawing not to scale.

	
Kalamazoo, MI 250,000 Spheroid	
Bowl Rigging Lug	
Drawn By: TMF	Date: 11/21/23
Checked By: JVR	DWG: 12



**NOTES:**

- 1) INSTALL ONE OPENING IN THE BASEBALL, FIELD DETERMINE LOCATION WITH THE ENGINEER/OWNER.
- 2) FRAME JOINT TO BE JOINED WITH FULL PENETRATION GROOVE WELDS.
- 3) INSTALL THE SHUTTER AND THE TRANSITION TO THE FRAME USING GALVANIZED BOLTS AND NUTS, WITH A GASKET BETWEEN THE SHUTTER AND THE STEEL FRAME, THEN INSTALL THE MODIFIED SQUARE TO ROUND TRANSITION.

Note: Drawing not to scale.

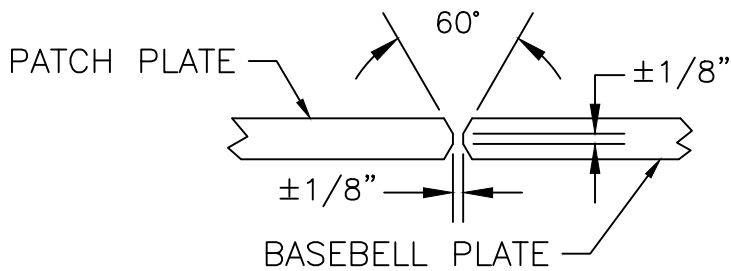


Kalamazoo, MI 250,000 Spheroid

Ventilation Opening

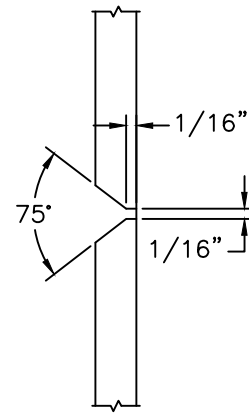
Drawn By: TMF | Date: 02/07/24

Checked By: JVR | DWG: 13

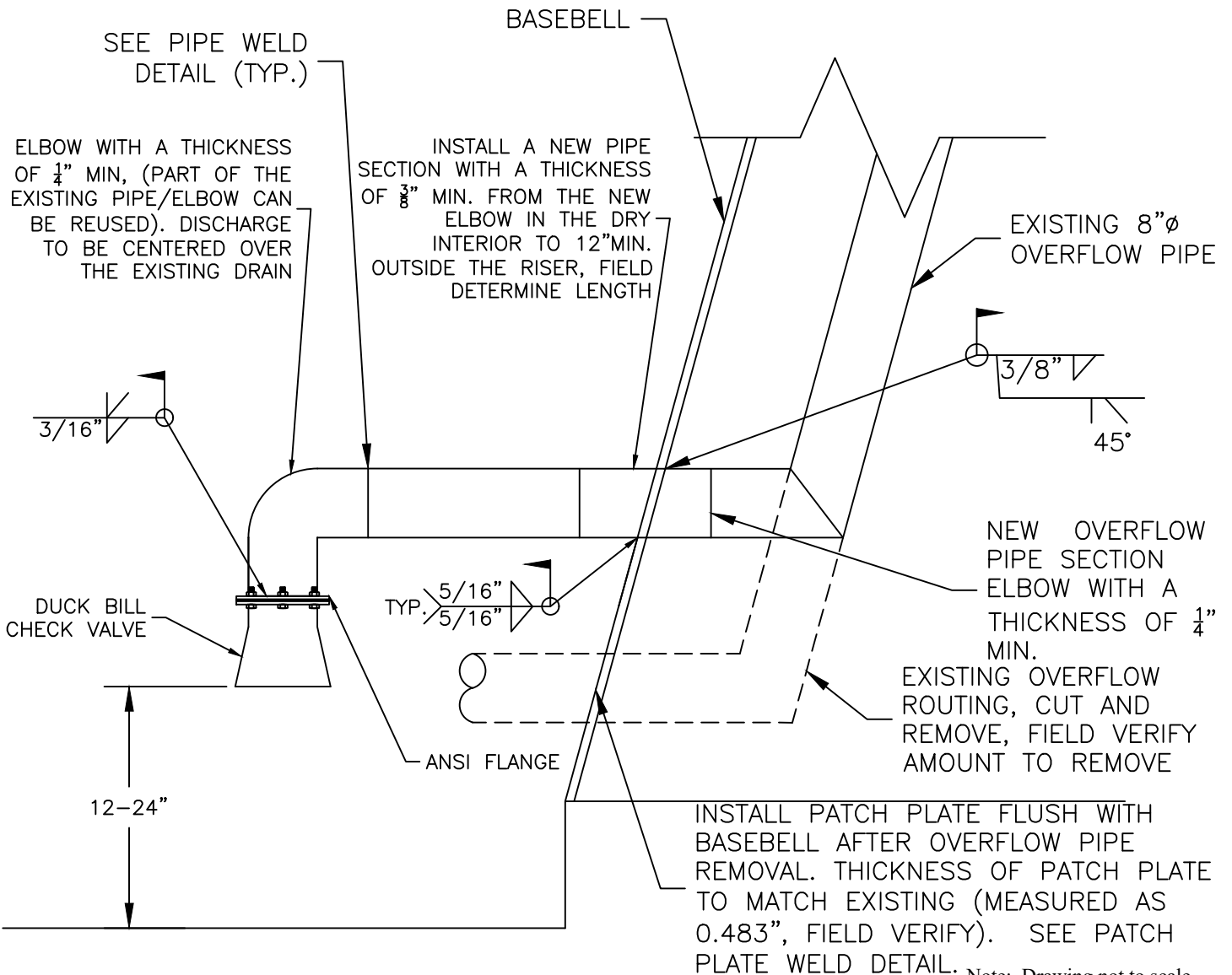


PATCH PLATE WELD DETAIL

(FULL PENETRATION FIELD WELD, BOTH SIDES)



PIPE WELD DETAIL



Note: Drawing not to scale.

<b>DIXON</b> ENGINEERING, INC.	
Kalamazoo, MI 250,000 Spheroid	
Reroute Overflow Pipe	
Drawn By: TMF	Date: 02/07/24
Checked By: JVR	DWG: 14



## **SECTION 09 97 13** **STEEL COATING**

### **PART 1 – GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Painting of steel structures.
- B. Interior cleaning and disinfection.

#### **1.02 REFERENCES**

- A. AWWA Standards (latest versions):
  - 1. D102 – Painting Steel Water Storage Tanks.
  - 2. C652 – Disinfection of Water Storage Facilities.
  - 3. C655 – Field Dechlorination.
- B. NSF/ANSI (latest versions)
  - 1. NSF/ANSI 60/600 and 61/600.

#### **1.03 WORK INCLUDED**

- A. Exterior: Apply a three (3) coat epoxy urethane fluoropolymer system.
- B. Dry Interior: Apply a spot two (2) coat epoxy system to the prepared surfaces.

#### **1.04 EXISTING COATING CONDITIONS**

- A. Exterior: Unknown coating system applied over a SSPC-SP6 blast in 2010.
- B. Wet Interior: Presumed to be an epoxy system that was applied in 2010.
- C. Dry Interior: Spot repair system that is presumed to be an epoxy applied in 2010.  
The coated tested for lead at 0.0058% by weight.

#### **1.05 OMISSIONS or INCIDENTAL ITEMS**

- A. It is the intent of these specifications to coat the structure for the purpose of corrosion protection on wet interior surfaces. It is the intent to coat the exterior for corrosion protection and aesthetics.
- B. Any minor or incidental items not specifically detailed in the schedule, but inherently a part of the work is included at no additional cost to the Owner.
- C. Engineer, as interpreter of the specifications, will determine if disputed items fall under this category. Prevailing custom and trade practices will be considered in this determination.

#### **1.06 PAINTER QUALIFICATIONS**

- A. The Contractor is to complete all coating and surface preparation.
- B. Painter is to be specialized in industrial or heavy commercial painting.

- C. ALL CONTRACTORS ARE TO BE PREQUALIFIED with Dixon Engineering for projects of this size and complexity.

## **1.07 SUBMITTALS**

- A. Submit the following with the annual prequalification:
1. Occupational Safety and Health Programs and certification that all site personnel have been trained as required by law.
- B. Submit the following ten (10) days prior to the preconstruction meeting:
1. Provide for employees one (1) copy of all data sheets at the job site for employee access.
  2. Provide an electronic copy to the Engineer.
  3. No work may commence without the complete filing. All SDS are to conform to requirements of SARA (EPCRA) Right-to-Know Act.
  4. Safety Data Sheets (SDS) and Product Data Sheets:
    - a. Furnish from all suppliers Safety Data Sheets and product data sheets for all applicable materials including but not limited to: coatings, thinners, additives, cleaners, caulking, degreasers, chlorine, abrasives, abrasive additives, and pretreatments.
  5. Fall Prevention Plan and Site-Specific Fall Hazard Evaluation:
    - a. Site specific plan to contain a description and/or generic drawing of the existing structure and appurtenances of this structure and reflect safety changes specified for this project.
    - b. Certifications for all spiders, scaffolding, stages, etc., to be used on the project. All certifications to be current, less than one (1) year old.
- C. Submit the following at the preconstruction meeting:
1. Designated OSHA Competent Person and qualifications, if not previously submitted.
- D. Submit the following within two (2) weeks of project completion with final pay request:
1. Waivers of lien.
  2. Copies of any formal worker safety or environmental citations received on the project.

## **1.08 OWNER RESPONSIBILITY**

- A. Drain the structure with seven (7) day notice after Contractor meets all precedent conditions of the contract.
- B. Fill the tank and draw samples and test after chlorination; responsibility for passing test results remains with the Contractor. Failing test results could result in added costs to Contractor, including re-chlorination, cost of water, plus possible liquidated damages.

### **1.09 DELIVERY and STORAGE of MATERIAL**

- A. Due to supply chain issues, the Owner reserves the right to require that the Contractor is to have all of the required coating for the project delivered to the site or to the Contractor's storage facility prior to the tank being taken out-of-service and commencement of the project.
- B. Submit manufacturer's invoice, with or without paint cost, to the Engineer for review. This submittal will be used to identify the quantity of paint recommended by the manufacturer for a job of this size and design and will be used to check the quantity actually delivered to the project.
- C. Cover bulk materials subject to deterioration because of dampness, weather, or contamination, and protect while in storage.
- D. Maintain materials in original, sealed containers, unopened and with labels plainly indicating the manufacturer's name, brand, type, grade of material, and batch numbers.
- E. Remove from the work site containers that are broken, opened, water marked, and/or contain caked, lumpy, or otherwise damaged materials. They are unacceptable.
- F. Store the material in a climate controlled designated area where the temperature will not exceed the manufacturer's storage recommendations. Heat the storage area to the manufacturer's recommended minimum mixing temperature.
- G. Keep equipment stored outdoors from contact with the ground, away from areas subject to flooding, and covered with weatherproof plastic sheeting or tarpaulins.
- H. Store all painting materials in a location outside the structure.
- I. Do not store or have on-site unapproved material, material from different manufacturers, or materials from different projects.

### **1.10 ACCESS and RPR SAFETY**

- A. Provide access to all portions of the project where work is being completed. Access must be close enough and secure enough to allow the RPR to use equipment without extensions.
- B. Provide personnel to assist with access and to ensure Contractor's access equipment is safely used.
- C. Provide separate fall protection devices and safety lines for the Owner and observers. Limit fall to five vertical feet.
- D. These specifications require the Contractor to supply a separate fall protection cable and safety grab for each tie-off point for the observer's use. The Contractor is encouraged to provide a separate cable and tie-off for each worker. The cables may be connected to the same tie-off point as the RPR, but a separate cable and safety grab are required for each user.

- E. The Project area is located in an active City Park. Contractor shall provide unhindered access to park facilities and parking areas at all times and shall implement safety measures necessary to protect park users from falling objects, overspray, etc. via the use of temporary fencing or other necessary and acceptable means. The parking area immediately south of the water tower may be used by the Contractor and access to the public may be limited on an as-needed basis.

#### **1.11 OBSERVATION and TESTING**

- A. Prior to the scheduled observation, remove all dust, spent abrasive, and foreign material from the surface to be coated.
- B. The Contractor is to furnish an instrument for measuring the wet film thickness, and also a calibrated instrument for measuring dry film thickness of each field coat of paint. The dry film thickness testing gauge to be the magnetic type as manufactured by Elcometer Co., or the Nordson Gauge Co.; spring loaded model with two percent (2%) accuracy margin over a range of one-to-twenty-one (1-100) mils or equal.
- C. The Engineer will furnish and operate observation equipment for their own use as quality assurance.
- D. Certify to the Owner that the specified paint has been applied at the paint manufacturer's recommended coverage, and to the specified thickness required. Also, certify that the paint has been applied in accordance with this contract.
- E. Take all necessary steps, including dry striping by brush or roller, to ensure a holiday-free coating system.
- F. The wet interior coating repairs are subject to low or high voltage holiday testing.
- G. The Owner and Engineer reserve the right to perform destructive testing under conditions deemed necessary. Testing may include, but is not limited to, the Tooke thickness test and adhesion testing. Any damage caused by these tests will be corrected to specifications at the Contractor's expense.

#### **1.12 CLIMATIC CONDITIONS**

- A. Do not apply paint when the temperature, as measured in the shade, is below the manufacturer's required ambient and surface temperatures.
- B. Do not apply paint to wet or damp surfaces, or during rain, snow, or fog.
- C. Do not apply paint when it is expected the relative humidity will exceed 85%, or the surface temperature is less than 5° F above dew point, or the air temperature will drop below the manufacturer's requirements for proper cure. Anticipate dew or moisture condensation, and if such conditions are prevalent, delay painting until the observer is satisfied the surfaces are dry.

### **1.13 APPLICATION**

- A. Complete all painting and surface preparation in strict accordance with these specifications, approved paint manufacturer's specifications, and good painting practices per SSPC.
- B. Apply each coating at the rate and in the manner specified by the manufacturer. Check the wet film thickness every 200 sq. ft. to ensure each coat applied meets the dry film thickness range requirements.
- C. Allow sufficient time for each coat of paint to dry and cure. Allow a minimum of twenty-four (24) hours between coats, unless product requirements have a maximum time less than 24 hours.
- D. Apply exterior coating by brush and roller only. Spray application is not permitted without prior approval of the Engineer. Even with prior approval, responsibility for damage to any property caused by spray application still remains with the Contractor.
- E. Coatings are to be applied using methods to eliminate roller or spray marks in the finished product on the exterior.
- F. Painting may be delayed because of poor coverage or the potential damage from overspray and/or dry spray. In all cases, responsibility for damages rests with the Contractor.
- G. The Contractor is responsible for the appearance of the finished project and is warned to prevent contact with any freshly applied coating. Removal of rigging is to be completed so not to mar or damage the coating.
- H. Additional coats required for coverage or to eliminate roller marks, spray marks and to repair dry spray and overspray are the responsibility of the Contractor at no additional cost to the Owner.
- I. Use of pole extension on spray guns is prohibited for all paint application.
- J. Mixing partial kits is not permitted. All partial cans of coating must be removed from the site.
- K. Mixing blades to be clean. The Engineer has the right to reject mixing blades based on cleanliness or paint build-up. Do not use the same mixing blade for different coatings (i.e., epoxy and urethane coatings).

### **1.14 PRESSURE RELIEF VALVES**

- A. Furnish two (2) pressure relief valves.
- B. The valves are to be Aquatrol series 69F1 manufactured by Aquatrol Valve Company, Inc. [www.aquatrol.com](http://www.aquatrol.com) 800-323-0688, or approved equal.
- C. Valves will need to be fitted with a hydrant thread adaptor. Valves to be adjustable with range a minimum of 30 to 90 psi. Set valve at 60 psi.
- D. Supply three (3) days prior to draining of the structure.
- E. After work on the structure and successful disinfection have been completed, the Owner will return the valves to the possession of the Contractor.

F. Cost is incidental to the project.

## **PART 2 – PRODUCTS**

### **2.01 COLOR**

#### **A. Exterior Coatings:**

1. Supply the Engineer with a color chart to allow the Owner ample time for the exterior topcoat color selection.
2. Factory tint the intermediate coat(s) for all areas of the structure if similar to the finish coat. Tinting is to be sufficient to allow visibility of the dissimilar color from 1 ft., and from 100 ft.
3. The Owner is to select or verify the topcoat color at the preconstruction meeting.
  - a. All bids are to be based on Tnemec “Fairway 21GN” color.

#### **B. Wet Interior and Dry Interior Coatings:**

1. The color is to be a different tint between coats. Tinting to be performed in the factory. The final color is to be white, blue, or off-white as selected by the Owner. The topcoat color is to be verified at the preconstruction meeting.
2. Only colors approved by NSF 61/600 are to be used in the wet interior.

### **2.02 SUBSTITUTIONS**

- A. All coatings specified and approved herein have met or exceeded a specified list of ASTM standards. The materials specified are the standard to which all others are to be compared.
- B. The purpose is to establish a standard of design and quality, and not to limit competition.
- C. Manufacturers wishing to have their products approved are to have their coatings tested using the same test methods.
- D. Approval by ANSI/NSF Standard 61/600 is also a requirement for potable water contact coatings.
- E. The selection of coatings also has taken into consideration the manufacturer’s current and past performance on availability, stocking, and shipping capabilities, ability to resolve disputes, and any applicable warranties.

### **2.03 EQUIPMENT COVERING**

- A. Use material that is 8 – 10 mils thick, and 100% impermeable to all vulnerable equipment.
- B. Use material resistant to tear and/or rip by mechanical action from abrasive blasting during blasting operations.
- C. Make coverings airtight by use of duct tape at the openings, or other suitable measures.

- D. Meet with representative of equipment owners to verify covering will not damage equipment. Damage is the Contractor's responsibility. This includes not only the Owner's equipment, but also telecommunication antennas, cables, buildings, controls, etc.

#### **2.04 AIR DRYER for COMPRESSOR**

- A. Use air dryers that are sufficient to remove 98% of the moisture from the compressed air. Size the dryers on total cfm using manufacturer supplied charts. Upon request, provide charts to the Engineer for verification.
- B. If the dryer fan is not operable, cease all blasting until the dryer is replaced or repaired.
- C. Supply air dryer with an air draw-off valve to check air for dryness, oil contamination, and cleanliness on the outlet side of the air dryer.
- D. For cleaning operations, draw clean air from the outlet side of the air dryer.

### **PART 3 – EXECUTION**

#### **3.01 DISINFECTION**

- A. Disinfect the completely painted structure in accordance with AWWA Standard C652 Chlorination Method No. 3.
- B. Furnish the material and labor necessary to disinfect the structure in the required manner. Any chlorine products used are to be NSF 60/600 approved. Assist the Owner during filling and ensure that any manways are free of leaks after filling. The Contractor is to adjust the manways and replace gaskets as needed to ensure there are no leaks.
- C. Do not allow water to enter the distribution system until satisfactory bacteriological test results are received.
- D. The Owner is responsible for collecting two consecutive bacteriological samples, 24 hours apart, following disinfection. Satisfactory results are required before the tank can be returned to service.
- E. Water drained to waste may not contain any substances in concentrations that can adversely affect the natural environment. No total residual chlorine may be measured in water discharged to surface water. It is recommended that the water be dechlorinated per AWWA C655 Field Dechlorination.
- F. Pay all additional expenses if it is necessary to repeat the testing and disinfection procedure as a result of defective work.

#### **3.02 PROTECTION of NON-WORK AREAS**

- A. Protect all non-painted surfaces, turf, and parking areas prior to all painting, and paint removal, grinding, and blasting activities.

- B. Protect and seal all controls and electrical components (even if they are not in the immediate work area) that are in danger from the project. Coordinate with the Owner so all controls are shut down and/or vented if necessary.

### **3.03 ANTENNA REMOVAL**

- A. There is one (1) antenna mounted on the roof, and one (1) on the riser. The number of antennas listed are from the last known condition, the Contractor is to field verify number of antennas.
- B. The antennas and cables are to be removed by the Contractor prior to the start of the project and reinstalled after coating is completed.
- C. All welded brackets will remain in place for the Contractor to surface prepare and paint.
- D. Any galvanized or stainless-steel materials are to be removed by the antenna carrier prior to tank surface preparation and reinstalled by the antenna carrier after the topcoat is dry to the touch.
- E. All previously coated items are to be removed surface prepared, coated and reinstalled with the original brackets after the topcoat is dry to the touch.
- F. Antenna removal and reinstallation, where required, shall be performed by the Contractor and associated costs shall be incidental to the Project. The disconnection, reconnection, and storage of the equipment is coordinated with the City's recommended contact to ensure that work is completed properly.

### **3.04 ANTENNA EQUIPMENT COATING**

- A. Antenna equipment that is currently coated the same color as the tank is to be surface prepared and coated to match the exterior tank per these specifications including but not limited to: brackets and mounting poles.
- B. All previously coated items are to be coated per the exterior specifications. Any galvanized, stainless steel or other uncoated materials are to remain uncoated.
- C. Cable connections are to be removed during surface preparation and coating application. Temporary supports may be needed to hold the cables in place during the project. Reinstall the cable attachments or install new connections if the attachment is a zip-tie or electrical tape. Note that the antenna and any miscellaneous equipment attachment points are to remain in place throughout the project, unless Contractor is directed to remove and reinstall them (e.g. City owned antennas).
- D. Cost is incidental to the project.

### **3.05 HAND WASH FACILITY**

- A. Provide OSHA approved hand wash facility with running water. Hot water is not required.
- B. Stock facility with soap and towels and keep supply replenished.



C. Test and dispose of the water properly after the project is completed.

### **3.06 LIGHTING of WORKSPACE**

- A. Provide durable lighting fixtures designed for the intended work environment for use during blasting, painting, and during all observations.
- B. Encase portable lamps in a non-conductive, shatterproof material. Use only heavily insulated cable with an abrasive resistant casing.
- C. Install all temporary electrical items in accordance with all local, state, and federal codes, including OSHA.
- D. Protect from paint overspray and damage from abrasive materials.
- E. Measure required illumination during surface preparation and coating application at the work surface. Supply 20 ft. candles minimum illumination during blasting and painting, and 30 ft. candles minimum prior to and during observation, per SSPC-Guide 12. Inspect the prepared surface at the higher illumination prior to calling for observation. All work must conform to specification requirements prior to the scheduled observation.
- F. Measure the illumination at the work surface in the plane of the work.

## **PART 4 – SPECIAL PROVISIONS**

### **4.01 SCHEDULING**

- A. Complete all welding and any other work that damages the coating before paint operations begin, including surface preparation. The exception is paint removal in the weld area.
- B. If Contractor wants a variance in this schedule, request the change and provide a reason in writing to the Owner. The Project Manager will reply with a written Field Order if the change is approved. The Engineer reserves the right to put further restrictions in Field Order. If the Contractor objects to restrictions, he may revert to the original specifications.

### **4.02 GRASS RESTORATION**

- A. The Contractor is to report any damaged ground at the construction site in writing prior to mobilization of equipment, otherwise all repairs to the damaged ground will be the responsibility of the Contractor.
- B. Refill all holes, ruts etc. with clean topsoil, and level area around the construction site to the original grade.
- C. Fill material to be clean soil, no gravel, rocks, or construction debris is to be used as fill material without the Owner's consent.
- D. Bring soil to a friable condition by disking, harrowing, or otherwise loosening and mixing to a depth of 3 in. – 4 in. Thoroughly break all lumps and clods.

- E. Rake area to be seeded. Sow seed at a minimum rate of 220 lbs./acre. Use seed intended for the climate.
- F. Work to be completed to the Owner's satisfaction.
- G. Cost is incidental to the project.

## **SECTION 09 97 13.10**

### **STEEL COATING SURFACE PREPARATION**

#### **PART 1 – GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Power Tool Cleaning.
- B. High Pressure Water Cleaning.

##### **1.02 REFERENCES**

- A. AWWA Standards (latest version):
  - 1. D102 Painting Steel Water Storage Tanks.
- B. SSPC and NACE Standards (latest versions):
  - 1. SP11 – Power Tool Cleaning to Bare Metal.
  - 2. SP12/NACE No. 5 – Surface Preparation and Cleaning of Metals by Water Jetting  
Prior to Recoating
  - 3. VIS 3 (Visual standard for hand and power tool cleaned metal).

##### **1.03 WORK INCLUDED – SURFACE PREPARATION**

- A. Exterior: High pressure water clean (5,000 to 10,000 psi), spot power tool clean to a SSPC-SP11 standard.
- B. Dry Interior: Spot power tool clean the spot coating failures throughout to a SSPC-SP11 standard.

#### **PART 2 – PRODUCTS**

##### **2.01 EXTERIOR CLEANER**

- A. United 727 Weather-Zyme as manufactured by United Laboratories, 320 37<sup>th</sup> Ave., St. Charles, IL 60174 1-800-323-2594.

#### **PART 3 – EXECUTION**

##### **3.01 WET INTERIOR CLEANING**

- A. Low pressure water clean all surfaces and appurtenances at 4,000 psi to remove sediment, minerals, and other contaminants. Remove any remaining water.
- B. Staining may remain in place, the Engineer to approve cleanliness.
- C. The cost is incidental to the project.

### **3.02 HIGH PRESSURE WATER CLEANING (SSPC-SP12/NACE No. 5) - EXTERIOR**

- A. Solvent clean all visible grease, oil, salt, algae, and residue in accordance with SSPC-SP1.
- B. High pressure water clean all exterior surfaces and appurtenances at 5,000 – 10,000 psi per SSPC-SP12/NACE No. 5 HP WC to remove all dirt, chalk, algae, other foreign material, and all brittle or loose coating and rust.
- C. Operational pressure will be determined by the Engineer based on field conditions.
- D. Maintain a water jet nozzle distance of 2 in. – 10 in. away from the surface.
- E. Hold the water jet nozzle with 0° - 15° tip perpendicular (90°) to the surface at all times.
- F. Only use machines rated at and capable of achieving and maintaining 10,000 psi. Use of a rotating/reciprocating nozzle during water cleaning is permitted but not to increase the pressure of a washer rated lower than required.
- G. Do NOT exceed a rate of 10 sq. ft./minute.
- H. The gauge measuring time of use must be operational on the unit, if not operational the Contractor may be shut down and/or deducted price for rental of an operational unit from the final payment.
- I. Feather all edges using power tools per this specification.
- J. **SURFACES WITH AN EXISTING CLEAR COAT WILL REQUIRE SANDING. ALL CLEAR COAT REMAINING AFTER POWER WASHING IS TO BE SCARIFIED AND SHARP EDGES ARE TO BE REMOVED USING 30-60 GRIT PAPER. SCARIFY THE SURFACE PRIOR TO THE APPLICATION OF THE FIRST FULL COAT.**

### **3.03 POWER TOOL CLEAN (SSPC-SP11) – EXTERIOR AND DRY INTERIOR**

- A. Solvent clean all visible grease, oil, salts, and residue.
- B. Power tool clean all surfaces and appurtenances to bare metal (SSPC-SP11) in areas where steel is exposed or rusted, or where coating is abraded.
- C. Retain or produce a surface profile. Surface profile is to be greater than 1.0 mil.
- D. Edges of adjacent coating is to be feathered a minimum of ½ in. from the exposed steel with 3M Scotch-Brite Clean'n Strip discs.

**SECTION 09 97 13.19.01**

**DRY INTERIOR STEEL COATING – SPOT TWO COAT EPOXY**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

A. Partial painting in the dry interior.

**1.02 REFERENCES**

A. SSPC and NACE Standards:

1. PA1 – Paint Application.
2. PA2 – Measurements and Calibration.
3. NACE RP 0178 Surface Finish Requirements.

**1.03 WORK INCLUDED**

A. Application of a spot epoxy system.

**PART 2 – PRODUCTS**

**2.01 EPOXY SPOT SYSTEM**

A. Approved suppliers and system:

<u>Manufacturer</u>	<u>System</u>
Tnemec	V69/V69
Induron	PE-70/PE-70
Sherwin Williams	646FC/646FC

**PART 3 – EXECUTION**

**3.01 EPOXY SPOT SYSTEM**

A. Apply to all prepared areas a spot two (2) coat epoxy system.

B. Surface preparation is defined in Section 09 97 13.10.

C. Apply each coat at the following rates:

<u>Coat</u>	<u>Minimum</u>	<u>Maximum</u>
	<u>D.F.T. (mils)</u>	<u>D.F.T. (mils)</u>
Primer (spot)	3.5	5.5
Topcoat (spot)	<u>3.5</u>	<u>5.5</u>
Total	7.0	11.0

D. Each coat to be a different color from the previous coat and is to be approved by the engineer. No color bleedthrough should occur if proper application rates are observed.

- E. Apply all coats in uniform color and sheen without streaks, laps, runs, sags, cloudy, or missed areas. Correct all defects before application of the successive coat.
- F. Allow a minimum of twenty-four (24) hours between coats. Additional time may be necessary if low temperatures require an increase in the necessary cure time.

**3.02 SCHEDULE of WORK**

- A. Complete all exterior and interior welding prior to surface preparation.

**SECTION 09 97 13.24.14**  
**EXTERIOR STEEL COATING – THREE COAT EPOXY**  
**FLUOROPOLYMER OVERCOAT**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Painting on the exterior.

**1.02 REFERENCES**

A. SSPC and NACE Standards:

- 1. PA1 – Paint Application.
- 2. NACE RP 0178 Surface Finish Requirements.
- 3. NACE RP 0178 Surface Finish Requirements.

**1.03 WORK INCLUDED**

- A. Application of a fluoropolymer system.
- B. Application of lettering.

**PART 2 – PRODUCTS**

**2.01 FLUOROPOLYMER OVERCOAT SYSTEM**

- A. The contractor is advised to follow all requirements for safety concerning isocyanates.
- B. Ultraviolet protection additives mixed at factory only. There will be no tinting or addition of any material other than the manufacturer's thinners.
- C. Approved suppliers and systems:

<u>Manufacturer</u>	<u>System</u>
Tnemec	108(spot)/108/1095/V700
Induron	Ebond100(spot)/Ebond100/I-6600 Plus LV/Perma-Gloss LV
Sherwin Williams	5000/5000/Hi-Solids Poly-250/Fluorokem HS 100

**PART 3 – EXECUTION**

**3.01 FLUOROPOLYMER OVERCOAT SYSTEM**

- A. Apply to all prepared surfaces a three (3) coat epoxy fluoropolymer system.
- B. Surface preparation is defined in Section 09 97 13.10.

C. Apply each coat at the following rates:

<u>Coat</u>	<u>Minimum</u>	<u>Maximum</u>
	<u>D.F.T. (mils)</u>	<u>D.F.T. (mils)</u>
Primer (spot)	1.0	2.0
Intermediate	1.0	2.0
Urethane Intermediate	2.0	3.0
Topcoat	<u>2.0</u>	<u>3.0</u>
Total	6.0	10.0

D. Each full coat to be a different color from the previous coat and is to be approved by the engineer. No color bleedthrough should occur if proper application rates are observed.

E. Apply all coats in uniform color and sheen without streaks, laps, runs, sags, cloudy, or missed areas. Correct all defects before application of the successive coat.

F. Allow a minimum of twenty-four (24) hours between coats. Additional time may be necessary if low temperatures require an increase in the necessary cure time.

### 3.02 LETTERING

A. Paint the name "City of Parchment" in two (2) locations on the tank.

B. Paint the lettering the same size, style, and color as the existing lettering, and place the lettering in the same locations. Verify size and document locations for application purposes.

C. Approved Fluoropolymer urethane coating system.

<u>Manufacturer</u>	<u>System</u>
Tnemec	V700
Induron	Perma-Gloss LV
Sherwin Williams	Fluorokem HS 100

D. Apply lettering coating at 2.0 to 3.0 mils. The color is to be white.

E. Payment is incidental to exterior repainting.

### 3.03 SCHEDULE of WORK

A. Complete all exterior and interior welding prior to surface preparation.





*City of  
Parchment*



**SECTION 09 97 23.23.01**

**CONCRETE FOUNDATION COATING – TWO COAT EPOXY**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

A. Painting of the concrete foundation(s).

**1.02 REFERENCES**

A. SSPC and NACE Standards:

1. PA1 – Paint Application.
2. PA2 – Measurements and Calibration.

**1.03 WORK INCLUDED**

A. Application of an epoxy system.

**PART 2 – PRODUCTS**

**2.01 EPOXY SYSTEM**

A. Approved suppliers and manufacturers:

<u>Manufacturer</u>	<u>System</u>
Tnemec	V69/V69
Induron	PE-70/PE-70
Sherwin Williams	646FC/646FC

**PART 3 – EXECUTION**

**3.01 EPOXY SYSTEM**

- A. Apply to all prepared areas a two (2) coat epoxy system.
- B. Remove soil 3” below grade around the entire foundation prior to coating, backfill once the topcoat is dry to the touch.
- C. Foundations to be water cleaned at 3,500 to 5,000 psi to remove all contaminants.
- D. Apply each coat at the following rates:

<u>Coat</u>	<u>Min. D.F.T. (mils)</u>	<u>Max. D.F.T. (mils)</u>
Primer	3.5	5.5
Topcoat	<u>3.5</u>	<u>5.5</u>
Total	7.0	11.0

- E. Allow the manufacturer’s minimum time between coatings.
- F. Cost is incidental to exterior painting.

## **SECTION 11 00 00** **VENTILATION SYSTEM**

### **PART 1 – GENERAL**

#### **1.01 SCOPE**

- A. Installation of a ventilation system shutter.

#### **1.02 SUBMITTALS**

- A. The following information shall be included in the submittal for this section:
  - 1. Product Data Sheets for all materials to be installed for the ventilation system.

### **PART 2 – PRODUCTS**

#### **2.01 VENTILATION MATERIALS**

- A. (1) 12 in. x 12 in. shutter model #T9F245711 as manufactured/supplied by Global Industrial Shutter [www.globalindustrial.com](http://www.globalindustrial.com) (888) 978-7759.
- B. (1) square to round sheet metal transition model #STR. as manufactured/supplied by Jer-air [www.jerair.com](http://www.jerair.com) (352) 591-2674.
- C. Gasket to be ¼ inch thick Ethylene Propylene Diene (EPDM) AB-576 item number 386-16-482 as manufactured/supplied by American Biltrite [www.american-biltrite.com](http://www.american-biltrite.com) (888) 275-7075, or approved equal. Note that the gasket material is not required to meet NSF-61 requirements.

### **PART 3 – EXECUTION**

#### **3.01 INSTALLATION**

- A. The Contractor is to install the shutter (louver), gasket and square to round transition onto the penetration in the basebell.
- B. Modify the sheet metal transition by removing the curb, the outside dimensions are to be 15 in. x 15 in.
- C. The ventilation system, hoses, etc. will be installed by the Owner after the completion of the project.
- D. Payment is a separate line item “Shutter Installation” which the Owner reserves the right to delete.

## **SECTION 12 00 00** **FLOW METER**

### **PART 1 – GENERAL**

#### **1.01 SCOPE**

- A. This section describes the requirements for a Full Profile Insertion electromagnetic flow meter and microprocessor-based signal converter. Under this item, the contractor shall furnish and install the magnetic flowmeter equipment and accessories as indicated on the plans and as herein specified.

#### **1.02 SUBMITTALS**

- A. The following information shall be included in the submittal for this section:
1. Data sheets and catalog literature for the 395L or 394L Insertion Mag meter and the microprocessor-based signal converter.
  2. Connection diagrams for equipment wiring.
  3. List of spare parts and optional equipment.

### **PART 2 – PRODUCTS**

#### **2.01 ELECTROMAGNETIC FLOWMETER (FULL PROFILE INSERTION MAGMETER)**

- A. The electromagnetic flow meter shall consist of a flow sensor based on Faraday's Law of Electromagnetic Induction and microprocessor-based signal converter. Equipment shall meet all requirements of Midwest Municipal Instrumentation Quote # 20231130-Kzoo Parch. Water Tower, dated 11/30/23, unless directed otherwise by the Owner.
- B. Sensor:
1. Operating principle: Utilizing Faraday's Law of Electromagnetic Induction, the flow of a conductive liquid around the sensor induces an electrical voltage that is proportional to the velocity of the flow.
  2. Construction: The sensor material shall be constructed of 316 Stainless Steel and coated with NSF 61 certified approved epoxy coating.
  3. 316 Stainless Steel Electrodes shall be used.
  4. Sensor operating Temp: +14° to +170° F @ 250 PS.
  5. Electronics operating temperature (Converter): -4° to +140° F
  6. Size: 12" long
  7. Installation hardware shall include a Stainless Steel 2" full ported valve with a Stainless Steel nipple.

8. Submergence: a. The sensor shall be NEMA 6P or IP68 rated to be permanently submerged up to 6 feet. b. The sensor shall be NEMA 6P or IP68 rated to be permanently submerged up to 30 feet (option with IP68 rated strain relief connection only).
9. Converter enclosure: NEMA 4X or IP67 enclosure
10. Display: Background illumination with a three button menu driven alphanumeric 5-line, 40-character display to indicate flow rate, totalized values, settings, and faults
11. Power supply: 90/265 VAC or 11-35VDC
12. Outputs: 4-20mA (0–21mA) into 1000 ohms max.
13. Standard Outputs: a. Four separate digital programmable outputs: open collector transistor useable for pulse, frequency, or alarm settings, for standard converters and Modbus configuration. b. Two separate digital programmable outputs: open collector transistor usable for pulse, frequency, or alarm settings, for Profibus and HART configurations.
14. Communications: Option: RS-485 Modbus, Profibus Protocols and HART (Must specify at the time of order.)
15. Sensor and signal converter performance: a. Flow Range: 0.3 fps to 32\* fps for accuracies stated below. \*Maximum velocities may be restricted to less than 32 fps in larger diameter applications. b. Accuracy: +/- 0.5% of actual flow for flow range of 1 f/s to 32 f/s, and +/-1% from .3 f/s to 1 f/s c. Separation: Maximum distance of 500 feet between signal converter and sensor without the use of any additional equipment. Longer cable lengths shall be available upon request. Please contact the factory. d. Bi-directional flow capabilities (Optional)
16. Totalizer: Three eight-digit counters for forward flow, reverse flow and net 17. The electromagnetic insertion flow meter shall be McCrometer 394L Bi-directional Full Profile Insertion Mag Meter or equal.

## **2.02 ELECTROMAGNETIC FLOWMETER (FULL PROFILE INSERTION MAGMETER)**

- A. Spare parts for the equipment shall include the following, unless otherwise noted.
- B. One set of manufacturers recommended spare parts.
- C. Extra operation manuals as required.

## **2.03 OPERATOR FUNCTIONS**

- A. Calibration
  1. Each flow sensor shall be N.I.S.T. wet calibrated and all of the calibration information and factory settings matching the sensor shall be stored integrally within the converter's non – volatile memory. At initial commissioning, the flow meter commences measurement without any initial programming. Should the

signal converter need to be replaced, the new signal converter will upload all previous settings and resume measurement without any need for reprogramming or rewiring.

2. An N.I.S.T traceable certificate of calibration shall accompany each flow sensor.

### **PART 3 – EXECUTION**

#### **3.01 INSTALLATION**

- A. The flow meter is to be installed on the fill/draw pipe inside the wooden enclosure inside the basebell.
- B. Follow manufacturer's recommendation for the minimum upstream and downstream installation requirements for the flow sensor.
- C. Wiring between flow sensors and remote mounted signal converters shall use cable type and procedures as per the manufacturer's recommendations.
- D. Work to be performed by Midwest Municipal Instrumentation Inc. 517-764-4736 as a sub-contractor (paid by the Contractor).
- E. The Contactor is to coordinate installation of the flow meter and is to weld a 2 in. threaded coupling in the fill/draw pipe for installation of the meter. Contactor to verify coupling size with Midwest Municipal Instrumentation Inc. prior to installation. Welds to be ¼ in. full fillet welds. Contractor to provide dielectric isolation where dissimilar metals are used.
- F. Midwest Municipal Instrumentation Inc. is to perform Startup of the equipment.
- G. Payment is a separate line item "Flow Meter Installation" which the Owner reserves the right to delete.

#### **3.02 MANUFACTURER'S ASSISTANCE**

- A. Warranty
  1. The manufacturer of the electromagnetic flow meter shall guarantee for five years of operation that the equipment shall be free from defects in design, workmanship, or materials.
  2. In the event a component fails to perform as specified, or is proven defective in service during the guarantee period, the manufacturer shall promptly repair or replace the defective part at no cost to the owner.

## **SECTION 16 05 02** **ELECTRIC WORK**

### **PART 1 – GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Furnish and coordinate all labor, equipment, materials, tools, testing, and temporary work necessary to perform the repairs.

#### **1.02 REFERENCES**

- A. NEC.
- B. FAA.
- C. Local Codes and Regulations.

#### **1.03 OMISSIONS**

- A. The specifications include all work and materials necessary for completion of the work. Any incidental items of material, labor, or detail required for the proper execution and completion of the work are included.

#### **1.04 WORK INCLUDED**

- 1) Replace the dry interior light bulbs.
- 2) Install electrical receptacle for ventilation.
- 3) Install an electrical receptacle for the flow meter.

#### **1.05 WORKMANSHIP**

- A. Provide material and workmanship necessary to complete the project to the standards specified.

#### **1.06 ELECTRICIAN QUALIFICATIONS**

- A. The electrician must conform to all licensing and/or certification requirements of the State.
- B. The electrician shall be experienced in rigging and elevated work.

#### **1.07 SUBMITTALS**

- A. Submit the following ten (10) days prior to the preconstruction meeting.
- B. Provide for employees one (1) copy of all data sheets at the job site for employee access.
- C. Provide an electronic copy to the Engineer.
- D. Product Data Sheets (PDS) and Safety Data Sheets (SDS) for light bulbs.

- E. Subcontracted Electrician name or electrician certifications if work is to be performed by General Contractor.

## **PART 2 – PRODUCTS**

### **2.01 GENERAL**

- A. Use electrical materials and equipment designed and manufactured with UL Label.
- B. Supply all new equipment and materials from products of the same manufacturer.
- C. Furnish all equipment and materials from an established, reputable manufacturer of quality construction, design, and guaranteed to perform the service required.

### **2.02 CONDUIT**

- A. Use rigid galvanized steel, stainless steel or aluminum conduit.

### **2.03 CONDUIT FITTINGS and BOXES**

- A. Use standard threaded type of cast ferrous alloy conduit fittings to suit the location and purpose. Use fittings manufactured by Crouse-Hinds, Appleton Electric, or equal.
- B. Use waterproof and insect proof galvanized malleable or cast iron, aluminum, or corrosion resistant stainless-steel boxes. Note that conduit material are to match box and fitting materials.

### **2.04 WIRING**

- A. Use only soft drawn annealed copper wire of 98% conductivity with THHN/THWN insulation.
- B. Use #12 or larger wires with ground for all lines.
- C. Use cable terminators designed for wire size and usage.

### **2.05 ELECTRICAL RECEPTACLES**

- A. Duplex receptacles and switches, 120 volt, 20 amp, GFCI receptacles suitable for severe environment outdoor service.

### **2.06 LIGHT BULBS**

- A. Dry interior bulbs to be bright white LED bulbs with a minimum brightness of 800 lumens and a color of light at a minimum of 5,000K and a minimum rated life of 25,000 hours., size A19.



## **PART 3 – EXECUTION**

### **3.01 REPLACE LIGHT BULBS**

- A. Replace all dry interior bulbs with LED light bulbs.
- B. Change all of the bulbs whether the existing are operational or not. Change bulbs after all blasting and painting equipment has been removed from the tank.
- C. All bulbs to have the same color and brightness throughout the dry interior.
- D. Payment is incidental to the project.

### **3.02 ELECTRIC RECEPTACLE FOR VENTILATION**

- A. Install one (1) receptacle outlet, at ventilation opening.
- B. There is a 120-volt power available in the basebell. Route wiring inside conduit from the electrical panel to the ventilation opening.
- C. Attach the conduit to steel plates installed per section 05 00 00 Part 3.15. Attach the receptacle to a steel plate installed per section 05 00 00 Part 3.15.
- D. Payment is separate line item “Receptacle Installation - Ventilation” which the Owner reserves the right to delete.

### **3.03 ELECTRIC RECEPTACLE FOR FLOW METER**

- A. Install one (1) receptacle outlet located inside the wooden enclosure inside the basebell.
- B. There is a 120-volt power available in the basebell. Route wiring inside conduit from the electrical panel into the enclosure.
- C. Attach the receptacle box to the wooden structure.
- D. Payment is separate line item “Receptacle Installation – Flow Meter” which the Owner reserves the right to delete.

## **SECTION 26 42 21**

### **IMPRESSED CURRENT CATHODIC PROTECTION SYSTEM**

#### **PART 1 – GENERAL**

##### **1.01 DESCRIPTION**

- A. **SCOPE:** Furnish and install a complete automatic controlled impressed current cathodic protection system to prevent corrosion on the submerged interior surfaces of the water storage tank. All work and material are to meet the standards established in AWWA D104-Automatically Controlled Impressed-Current Cathodic Protection for the Interior of Steel Water Tanks.
- B. **CONFLICTS:** Requirements contained in these specifications apply to and govern the work under this section. All General Condition items and Information for Bidder items applicable or contained in these specifications apply. This Technical Specification is intended to expand the General Conditions and/or other Technical Specifications and is not intended to conflict or override any items unless specifically stated. If a conflict is noted, the engineer will review prior to proceeding with the project. If a conflict does exist, the Technical Specifications govern over any General Conditions or Information for Bidders.
- C. Payment is a separate line item “Cathodic Protection System” which the owner reserves the right to delete.

##### **1.02 QUALIFICATIONS of CATHODIC PROTECTION MANUFACTURER**

- A. The bidder is to have a minimum of five (5) continuous years of successful experience in the manufacture, installation, and servicing of automatic cathodic protection systems for water storage tanks. The bidder is to have a permanent service organization located within three hundred (300) miles of the tank location. The contractor (manufacturer) is to have a minimum of twenty-five (25) successful units installed in water storage tanks. The manufacturer and/or his subcontractor must own and maintain or lease the equipment necessary for installation and have proper training in regard to the safety requirements.
- B. New firms may also bid this project; however, they will be subjected to thorough review based on individual experiences of staff, proof of the continuation with firm (i.e. stock ownership, etc.) and financial stability of the firm. Essentially, they will be required to provide sufficient documentation to convince the owner they will be available throughout the ten (10) years to service the system, if needed.

##### **1.03 SUBMITTALS**

- A. Submit the following ten (10) days prior to the preconstruction meeting.
  - 1. Provide an electronic copy to the Engineer.

- a. Shop Drawings
- b. Operation/Maintenance Manuals

#### **1.04 GUARANTEE**

A. Guarantee the cathodic protection system against all defects in materials and workmanship and further guarantee to prevent corrosion, when maintained in a continuous operation in accordance with the contractor's instructions, as evidence by the absence of pitting (or additional pitting) below the high waterline in the tank for a period of one (1) year. The requirement of a maintenance contract may be beneficial but cannot be made a precondition to this warranty. In the event corrosion is not prevented, the contractor is to readjust, repair, or replace the system. Guarantee the reference anodes for five (5) years. It is the intention of the owner to inspect the tank, as necessary, to review the performance of the cathodic protection system.

#### **1.05 DESIGN and PERFORMANCE REQUIREMENTS**

##### **A. DESIGN CRITERIA:**

1. The tank is a 250,000-gallon spheroid elevated water storage tank. It is approximately 76.25 ft. to bottom of the tank.
  2. Total bare surface area to be protected shall be 50% of the tank surface up to the high waterline.
  3. Design tank-to-water potential is to be -900 mv with units capable of adjustment from -850 mv to -1050 mv. The design potential is to be IR drop-free (type A) and based on a copper/copper sulfate reference anode.
  4. Minimum current density is to be 0.5 MA/sq. ft. of the bare surface area.
  5. The minimum design anode system life is to be ten (10) years.
- B. The intent of these specifications is to procure a quality product by an established manufacturer of the latest design. Cost of the equipment is to include all royalty costs arising from patents and licenses associated with furnishing the specified equipment. Design all material to withstand the stresses created under ice conditions. Use the latest state-of-the-art "permanent" system which is designed to be ice-free and designed for use in tanks with ice conditions. Use corrosion resistant materials for all equipment or protect with corrosion resistant industrial coating approved by the engineer.

### **PART 2 – PRODUCTS**

#### **2.01 CATHODIC PROTECTION SYSTEM**

A. Provide a cathodic protection system (ice-free) that is to be a suspended or floating ring-type system. Furnish all items, as necessary, for the complete operating system.

## 2.02 MATERIALS

- A. Furnish materials for the best quality, regularly used in commercial practice and conforming to the following specifications. Specifically design the cathodic protection system for operation in icing conditions and protect against damage from ice.
- B. Supply only material for use inside the wet interior (i.e., all material in contact with water shall meet NSF 61/600 Standards and bears the NSF or UL label verifying compliance).
- C. Mount the power unit as directed in Part 3 – Execution in a stainless steel, waterproof cabinet suitable for outdoor use, adequately ventilated with stainless steel screens, and with provision for locking. Secure cabinet by using mounting brackets. If mounted on steel, electrically isolate from steel with non-conductive insulator.
- D. Use an electrical insulating material having suitable thickness and mechanical strength for the mounting board. Mount accurate D.C. meters with a D.C. voltmeter on the panel board for indicating output of rectifier.
- E. Include a potential indicating voltmeter on the panel board. This voltmeter is to be part of the sensing circuit and is to continuously indicate the structure potential value that the control system is maintaining.
- F. Panel Board is to contain the following equipment:
  1. Power Unit: The power unit is to have the necessary circuit breakers, transformer, selenium or silicon rectifying elements, voltmeter(s), ammeter(s), lightning, surge, overload protection, wiring and appurtenances of adequate capacity to meet the requirements established by the Engineering Survey for each corrosion problem. Provide a power unit with voltage adjustments to regulate the current required for corrosion control. The unit is to be adjustable over the entire range of 0-100% of rated capacity. Design the power unit for Single Phase, 60 Hz, 110-120 volt A.C. rated to operate at an ambient temperature of 45° Centigrade. Include a circuit breaker for the A.C. and an overload relay in the D.C. circuit. The entire power unit is to be fully field serviceable. The overall efficiency of the power unit is to exceed 65%, and the power factor is to exceed 90% of full load and rated voltage to the power unit, in the conversion of A.C. to D.C. The power factor is to be greater than 85% at outputs exceeding 25% of the rated capacity.
  2. Automatic Controller: House the controller integrally with the rectifier unit. The automatic controller is to be completely solid-state design having no moving parts and capable of automatically maintaining the tank-to-water potential at (-)900 millivolts with respect to a copper-copper sulphate reference electrode within an accuracy of 25 millivolts. The tank-to-water potential measured and maintained by the controller is to be free of “IR” drop error (Type A).

3. Rectifier: Use non-aging tri-amp selenium or silicon rectifiers of the approved selenium type, as manufactured by General Instrument Corporations or equal for rectifier stacks. The rectifier stacks are to have adequate cooling fins so their normal temperature rise at rated capacity will not exceed that specified by the N.E.M.A. and by the manufacturer of the rectifier stacks for cathodic protection service. Use air-cooled rectifier stacks.

Design the transformer for use in cathodic protection rectifiers having separate primary and secondary copper windings. The rectifiers are to be capable of automatically adjusting output to maintain potential within +/- 25mv of -900mv, and to be adjustable over 0-100% of its rated capacity.

4. Tank-to-Water Potential Meter: Equip the controller with a calibrated potential monitoring and display circuit having an integral impedance exceeding 1000 megohms which is to be so connected to read from the system reference cell the tank-to-water potential being maintained by the cathodic protection system.

This voltage reading is to be free of "IR" drop error.

NOTE: If digital readout is provided, provide access to all readings required above.

- G. Run positive wires from the power unit to the anode circuits in rigid galvanized steel , stainless steel, or aluminum conduits, as established by the National Electrical Code for the allowable current-carrying capacity. Use rigid galvanized steel , stainless steel, or aluminum, the final 2-3 ft. of the connections at the rectifier and junction box can be non-metallic flexible conduit. Use state code for underground wire. Use HMWPE (High Moly) wire from the rectifier to and in the tank, all underground wiring is to be inside PVC conduit.
- H. Equip the system with copper-copper sulfate reference electrode designed for a minimum five (5) year life. Install two (2) electrodes on opposite sides of the bowl. If either electrode fails within five (5) years, replace as often as necessary, free of charge to the owner.
- I. Design the anode system for a minimum life of ten (10) years and securely attach to the tank to prevent damage from ice conditions. Include all labor and material for installation of the anodes, and use submerged floating anodes. The anode system uses mixed metal oxide wire anodes. Attach the anodes to a buoyant submerged structure that is maintained in a totally submerged condition, down to access tube. Anode and reference electrode lead wires are to enter the tank below the minimum water level through pressure tight fittings. Use 3,000 lb. couplings for fitting. Use a separate cord to encircle the supporting cord approximately 8 in. greater radius and design the cord to relieve tension in the loading. Use  $\frac{5}{16}$  in. polyester or nylon rope.

- J. Protect all units using lightning arresters, surge protectors, and automatic overload protection in all modes and comply with all FCC regulations. All patent requirements are the responsibility of the contractor.

### **2.03 ALARM and TELEMETRY CONTROLS**

- A. The alarm and telemetry circuits are to be a secondary system designed to read controls and not to interfere in any manner with the primary controls. Use four-to-twenty (4-20) milliamp sensors to read voltage, amperage and potential of both circuits. One alarm light shall be furnished on the cover of the rectifier box. The light shall be activated by a change in amperage, voltage or potential that would signal a possible system failure.

## **PART 3 – EXECUTION**

### **3.01 INSTALLATION**

- A. The cathodic protection system is to be installed by full-time employees of the supplier of the system who are specifically trained to install and service water tank cathodic protection systems. Subcontractors who are specialized tank personnel may install the cathodic protection system under direct, on-site supervision by a responsible employee of the manufacturer.
- B. Install clips, pressure fitting, mounting supports, and/or brackets prior to any coating application.
- C. Contractor shall consult with the Owner prior to connecting the system to the existing electrical panels and/or controls. The Owner reserves the right to perform connections to the existing equipment. The Owner will modify/program the existing controls to communicate with proposed cathodic protection equipment. Contractor shall assist the Owner as necessary.

### **3.02 CLIPS AND PRESSURE FITTING**

- A. Use existing clips and pressure fitting if possible. If needed furnish and install new attachment clips and pressure fitting.
- B. Clips to be installed using ¼ in. fillet welds all around. No area may be left which would be susceptible to crevice corrosion.
- C. Weld the pressure fitting with ¼ in. fillet continuous welds all around on both the tank's wet interior and exterior.

### **3.03 INSTRUCTIONS**

- A. After installation is complete, energize the system and adjust for optimum operations. After the unit is adjusted, take tank-to-water potential measurements using a copper-

copper sulfate reference electrode. Submit a report to the engineer, including all the test results obtained.

- B. After supervising of inspection and start-up operations, provide one (1) additional day for training of the owner and/or his representative. The training is to include minor troubleshooting practices, recordkeeping, and methods used to determine the effectiveness of the system. The training period is at the owner's discretion within one (1) year of start-up.

### **3.04 MOUNTING PANEL**

- A. Locate waterproof cabinet rectifier in the basebell at location approved by the owner.
- B. Mount on the existing mount if room is available, see manufacturers recommendations for clearance requirements.
- C. If space is not available on the existing panel weld a mounting plate in-place with 1/8 in. continuous fillet weld in the interior basebell.
- D. Mounting plate to be constructed of minimum of 3/16 inch steel. Bend plate to create a mounting face that is a minimum of 20 inches wide and 20 inches tall. Set mounting panel 5 ft. on center above grade.
- E. Welds to be 3/16-inch fillet seal welds.
- F. Drill four 11/32-inch holes and bolt onto the panel using stainless steel bolts. Verify hole size and location.
- G. Surface prepare and coat the mounting plate prior to installation of the rectifier.

### **3.05 PAINT REPAIR**

- A. All interior burns shall be power tool cleaned to a SSPC-SP11 bare metal condition, and spot coated with the following two (2) coat system at 4.0 to 6.0 mils per coat:

<u>Manufacturer</u>	<u>System</u>
Tnemec	21/21
Induron	PE-70/PE-70
Sherwin Williams	5500LT/5500LT

- B. Contractor may apply one (1) coat of Aquatopoxy A-61 at 6.0 to 10.0 mils in lieu of the two-coat system.

### **3.06 OPERATION of SYSTEM**

- A. Startup of the system is to be performed once all work is complete.
- B. Complete the requirements from the Instructions Section above when scheduled with the Owner.

### **3.07 ELECTRICAL SUPPLY**

- A. There is a 120-volt power source with a circuit breaker panel available in the basebell.

B. Coordinate with owner and connect electrical source to cathodic protection controls.