ASSET MANAGEMENT IN THE DISTRIBUTION SYSTEM

CITY OF LIMA

11/18/2024

Daryl Bowling
USG Water
937-765-7827
Daryl.Bowling@USGWater.com

USG WATER SOLUTIONS

THANK YOU!

USG WATER SOLUTIONS

WHO IS USG WATER?

USG WATER SOLUTIONS

USG WATER

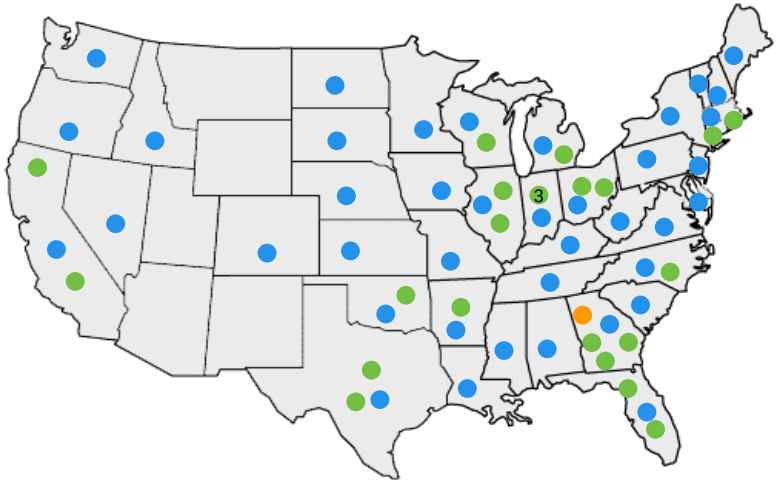
NORTH AMERICAN LEADER IN WATER ASSET MANAGEMENT SOLUTIONS

6,000+
Municipal & industrial customers

10,000 +
Water assets managed

1,900+
Renovations in 2023

ISO 9001 Certified
3rd party audited for Quality Assurance



- Corporate Office
- 24 Service Centers
- Water System Consultants

5
lines of business

Tank Asset Management
(Lowest Life Cycle Cost) (EPA Compliance)

Water Quality
TRS, RCS, Mixers

Concrete and Plant Rehabilitation
Concrete Tanks, Filter Plants, MBR

Network Asset Management
SIPP, Pipe Asset Management Plan

Metering Asset Management
AMI

USG WATER SOLUTIONS

Who is USG Water?

Who is USG Water?

City of Bryan, OH

400,000 Gallon Elevated Tank
Spangler Tank

Revision Date: 6/29/22 Rev 13

Approval

Signature _____

Name _____ *Date* _____

PAGE 2 OF 8

USG WATER SOLUTIONS

City of Bryan, OH

400,000 Gallon Elevated Tank
Spangler Tank

Revision Date: 6/29/22 Rev 13

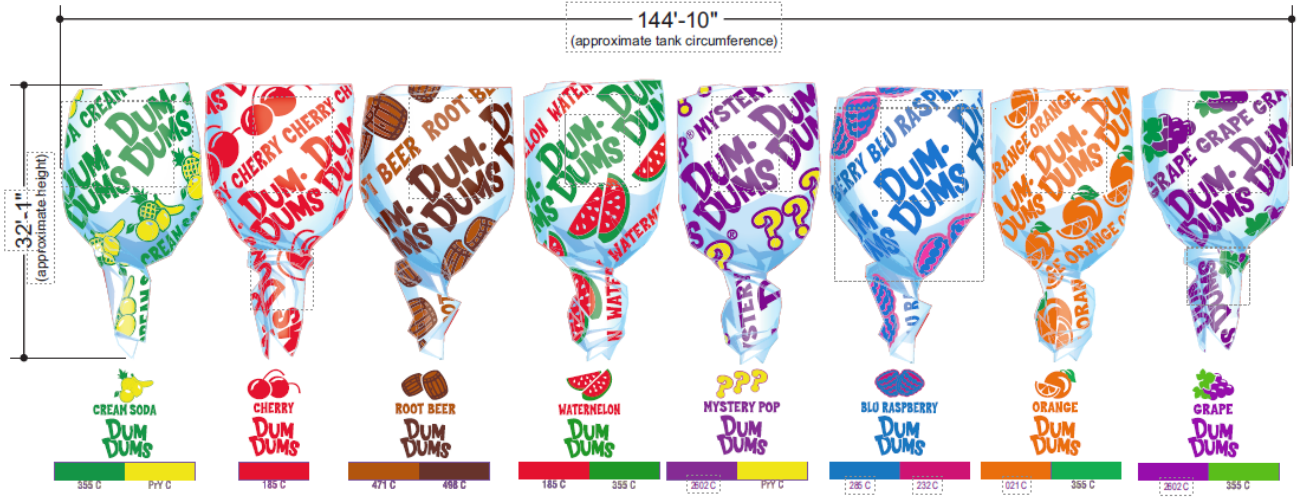
Approval

Signature _____

Name _____ *Date* _____

PAGE 5 OF 8

USG WATER SOLUTIONS



Tank Surfaces
2035 C

"Sticks" and Riser Pipe Surfaces
Tnemec
00WH White

PMS 355 C

PMS Process Yellow C

PMS 185 C

PMS 471 C

PMS 498 C

PMS 2602 C

PMS 285 C

PMS 232 C

PMS 021 C

Bryan OH Lettering
PMS 282

City of Bryan, OH

400,000 Gallon Elevated Tank
Spangler Tank

Revision Date: 6/29/22 Rev 13

Approval

Signature _____

Name _____ *Date* _____

PAGE 8 OF 8

USG WATER SOLUTIONS

Asset Management - Lima

Today we are going to discuss one way that the City of Lima is using Asset Management in their distribution system.

We are also going to discuss the process of how we set up their program.

What is Asset Management?

"...maintaining a desired level of service for what you want your assets to provide at the lowest life-cycle cost."[1]

[1]"Asset Management: A Best Practices Guide." U.S. Environmental Protection Agency. 1 Apr. 2008. web. 20 Jan. 2016.

Ohio Environmental Protection Agency

Question?

What is the useful life of a water tower?

There is a tank in Ohio from:

1894

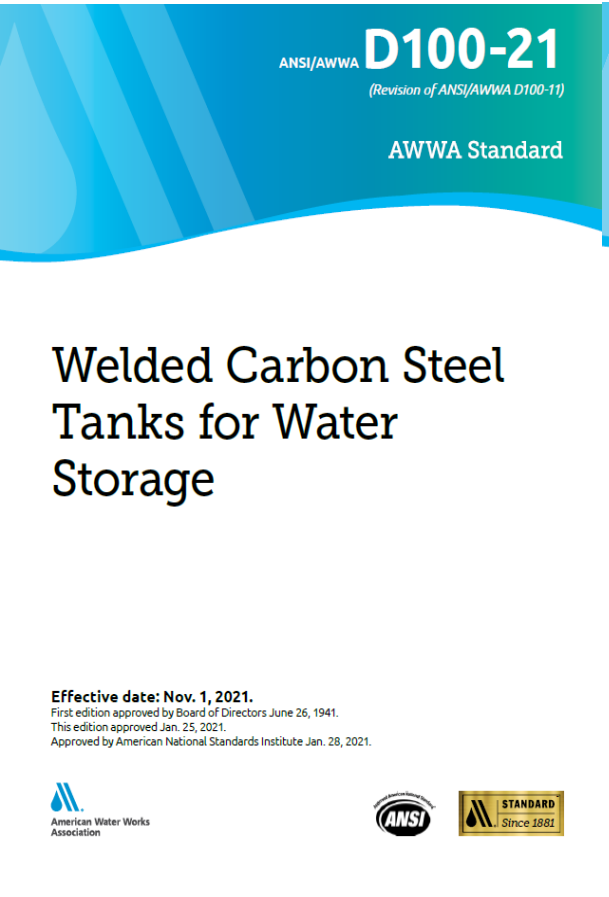
What is the process?

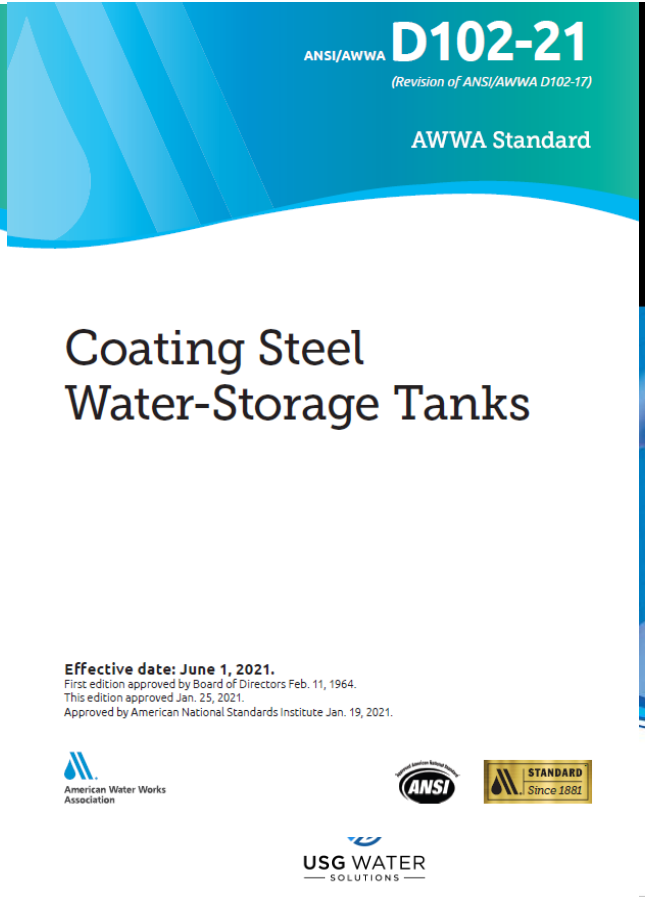
1. Determine the current condition of the water tower
2. Educate the owner on the current condition
3. Develop a scope of work to get the tower back to A+ condition
4. Develop a plan to keep it maintained in the future
5. The plan should minimize life cycle cost
6. The plan should achieve state/local compliance (AWWA-10 State Standards)

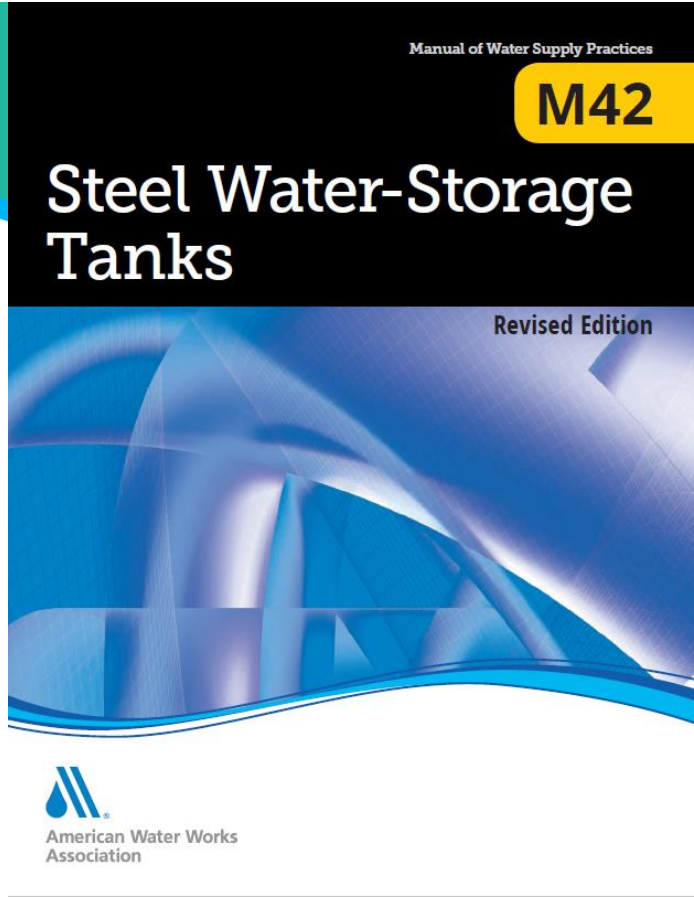
Inspection is the first step

- Inspected all 3 towers (Inspected by a NACE inspector)
- Tank inspected for compliance for AWWA, EPA, OSHA, 10 State Standards
- 5 areas of concern are reviewed during inspections
  - Coatings
  - Sanitary
  - Security
  - Structural
  - Safety
    - Paint samples collected and sent to a lab
      - Determine current coating system on the tank
      - Reviewed for lead and chromium content

What regulations do we follow?







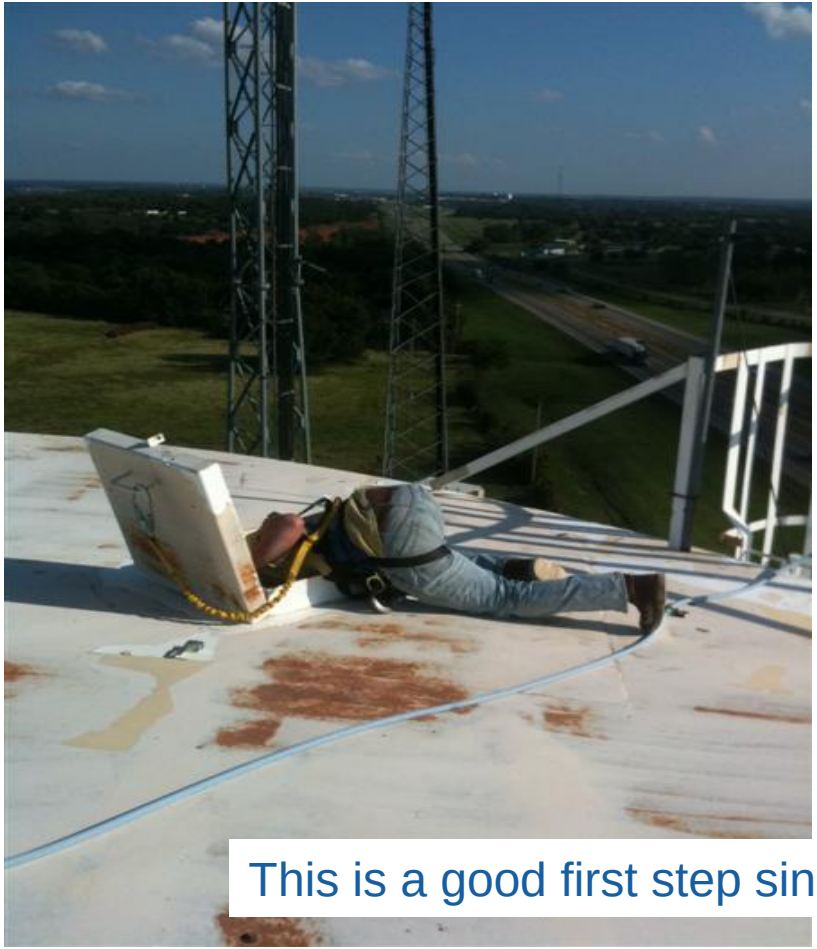
10 State Standards

Common Tools

TYPES OF INSPECTIONS

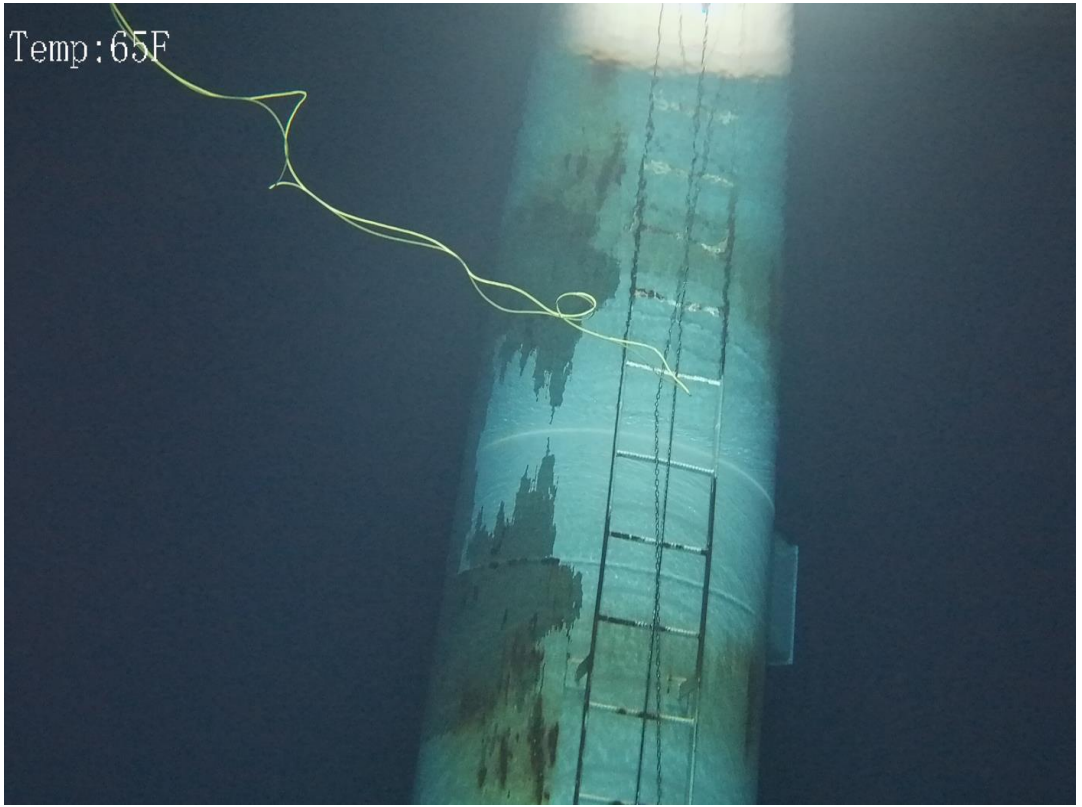
USG WATER SOLUTIONS

Visual Inspection (most common)



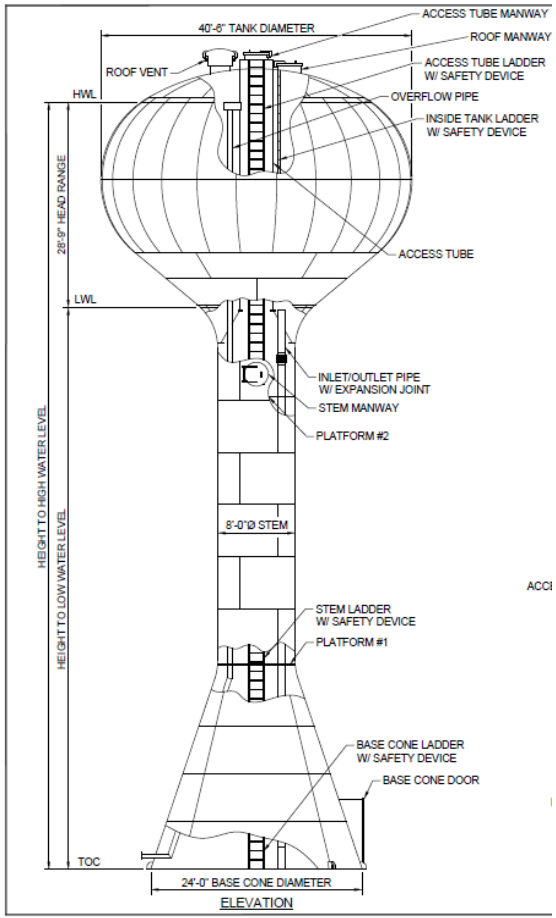
This is a good first step since it is easier for the owner.

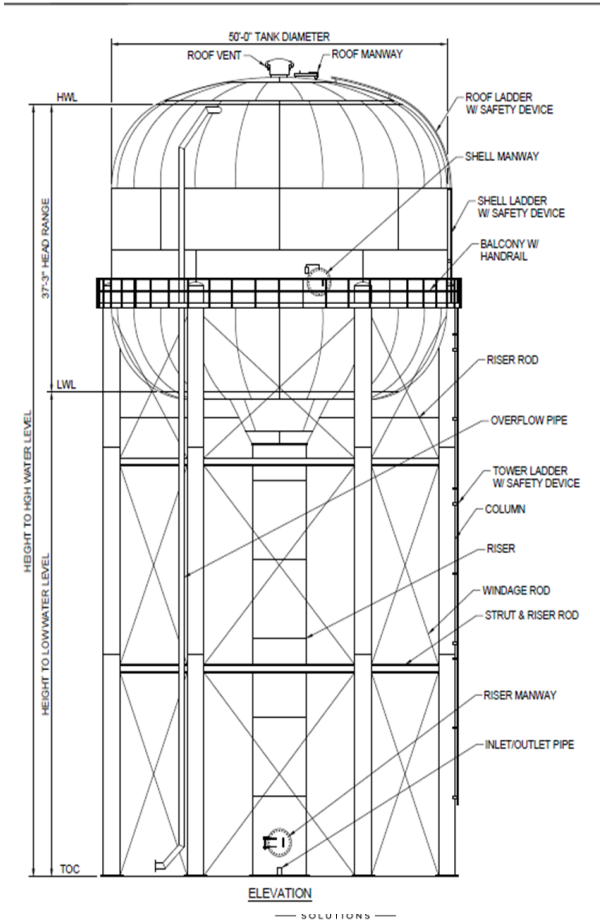
Visual Inspection and ROV

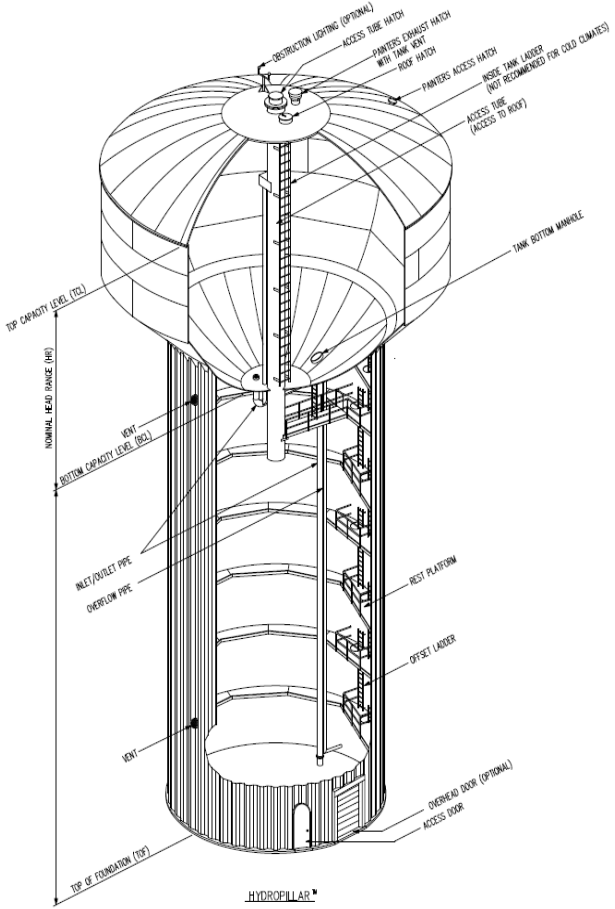


Washout Inspection

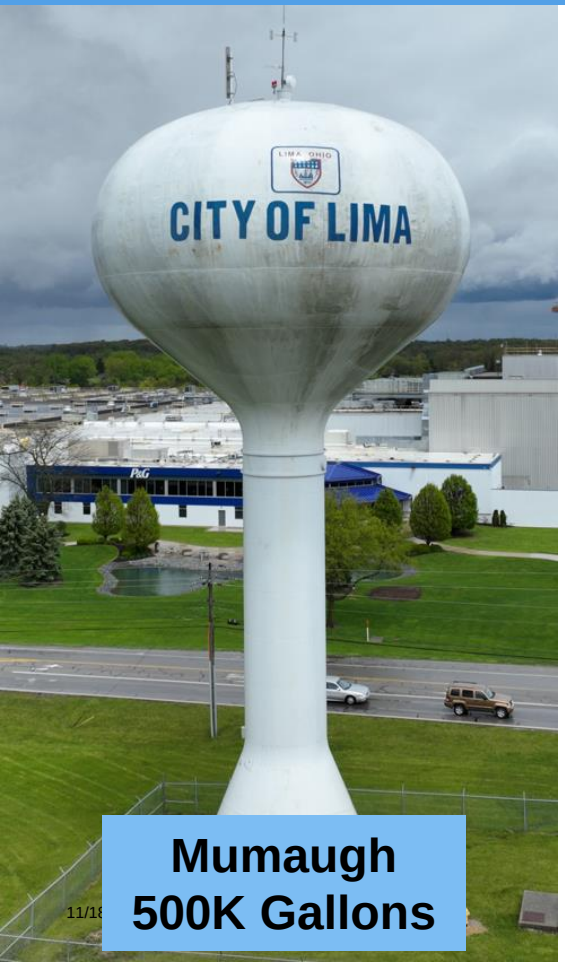
City of Lima


40'-6" TANK DIAMETER
ACCESS TUBE MANWAY
ROOF MANWAY
ROOF VENT
ACCESS TUBE LADDER W/ SAFETY DEVICE
OVERFLOW PIPE
INSIDE TANK LADDER W/ SAFETY DEVICE
HWL
25'-9" HEAD RANGE
ACCESS TUBE
LWL
INLET/OUTLET PIPE W/ EXPANSION JOINT
STEM MANWAY
PLATFORM #2
HEIGHT TO HIGH WATER LEVEL
HEIGHT TO LOW WATER LEVEL
8'-0"Ø STEM
STEM LADDER W/ SAFETY DEVICE
PLATFORM #1
BASE CONE LADDER W/ SAFETY DEVICE
BASE CONE DOOR
TOC
24'-0" BASE CONE DIAMETER
ELEVATION


50'-0" TANK DIAMETER
ROOF VENT
ROOF MANWAY
HWL
ROOF LADDER W/ SAFETY DEVICE
SHELL MANWAY
SHELL LADDER W/ SAFETY DEVICE
BALCONY W/ HANDRAIL
37'-3" HEAD RANGE
LWL
RISER ROD
OVERFLOW PIPE
TOWER LADDER W/ SAFETY DEVICE
HEIGHT TO HIGH WATER LEVEL
HEIGHT TO LOW WATER LEVEL
COLUMN
RISER
WINDAGE ROD
STRUT & RISER ROD
RISER MANWAY
INLET/OUTLET PIPE
TOC
ELEVATION


OBSTRUCTION LIGHTING (OPTIONAL)
ACCESS TUBE HATCH
PAINTERS EXHAUST HATCH WITH TANK VENT
ROOF HATCH
PAINTERS ACCESS HATCH
INSIDE TANK LADDER (NOT RECOMMENDED FOR COLD CLIMATES)
ACCESS TUBE (ACCESS TO ROOF)
TANK BOTTOM MANHOLE
TOP CAPACITY LEVEL (TCL)
NOMINAL HEAD RANGE (HH)
VENT
BOTTOM CAPACITY LEVEL (BCL)
INLET/OUTLET PIPE
OVERFLOW PIPE
REST PLATFORM
OFFSET LADDER
VENT
OVERHEAD DOOR (OPTIONAL)
ACCESS DOOR
TOP OF FOUNDATION (TOF)
HYDROPILLAR™

City of Lima – 3 towers



Mumaugh
500K Gallons

Paul Street
500K Gallons

Central Point
1.5 MG

Check list - APP

Water Storage Tank Condition Assessment Report

Project:		**Proj #:**		**Evaluation Type:**	
Location:		**Task #:**		**Tank Design:**	
Inspector:		**Date:**		**Capacity:**	Gallons

Exterior Tank Conditions: All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Tank Area	Item of Concern	Status
Exterior	Coating visual assessment? (G/F/P)		Vent	Design meets state standards?	
Coating	Actionable checking / delamination?			Screen intact?	
	Actionable corrosion / deterioration?			Separate vent and overflow?	
	Is there any graffiti paint or etchings?			Vent is accessible for repair?	
	Coating adhesion assessment? (G/F/P)			Vent extends to exterior of enclosure?	
	Does soiling impact visual appearance?		Overflow	Meets state standard?	
	Head wall to cylinder sealant intact?			Actionable corrosion / deterioration?	
Exterior	Structural visual assessment? (G/F/P)			Unsealed penetrations present?	
Structure	Are all plate seams sealed?			Overflow extends to exterior of enclosure?	
	Significant pitting or metal loss visible?			Required air gap present?	
	Are all visible penetrations sealed?			Screen is intact or was replaced?	
	Circulation lines in sound condition?			Flapper is functional or was replaced?	
	Sight glass / sensors in sound condition?			Drain, spillway or rip-rap present?	
Tank Access	At least two manholes present?		Tank Safety	Access tube, ladder or stairway present?	
	Access points meet state standards?			Required fall arrest system present?	
	All external access points secured?			Safe access to tank interior possible?	
	Ground entry at least 24" above grade?			Confined space ventilation required?	
	External equipment limits tank access?			Unsafe standing water near electrical?	
Tank Support	Cylinder equipped with external support?		Pump House	Tank access inside secondary structure?	
	Actionable corrosion / deterioration?		or Enclosure	Is entry to the enclosure locked?	
	External soil coverage erosion occurring?			Coating on pipes & valves? (G/F/P)	
	Leakage from the head wall evident?			Enclosure equipped with a sump / drain?	
	Undermining of the tank grounds noted.			Enclosure free of standing water?	

Interior Tank & Site Conditions: All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Tank Area	Item of Concern	Status
Interior	Coating visual assessment? (G/F/P)		Water quality	Water quality visually acceptable?	
Coatings	Actionable blistering / delamination?			Significant staining or biofilm present?	
	Actionable corrosion / deterioration?			Root growth or soil infiltration present?	
	Coating adhesion assessment? (G/F/P)			Significant floor sediment present?	
	Coating at penetrations is acceptable?			Is there a mixing system present?	
Interior	Structural visual assessment? (G/F/P)			Is there a cathodics system present?	
Structure	Are cylinder round seams sealed?		Site	Is site equipped with a security fence?	

SANITARY

USG WATER SOLUTIONS

Sanitary

1. Vents
2. Screens
3. Hatches
4. Cathodic protection roof plates
5. Rigging couplers – Open on the roof

Let’s take a look at some these items.

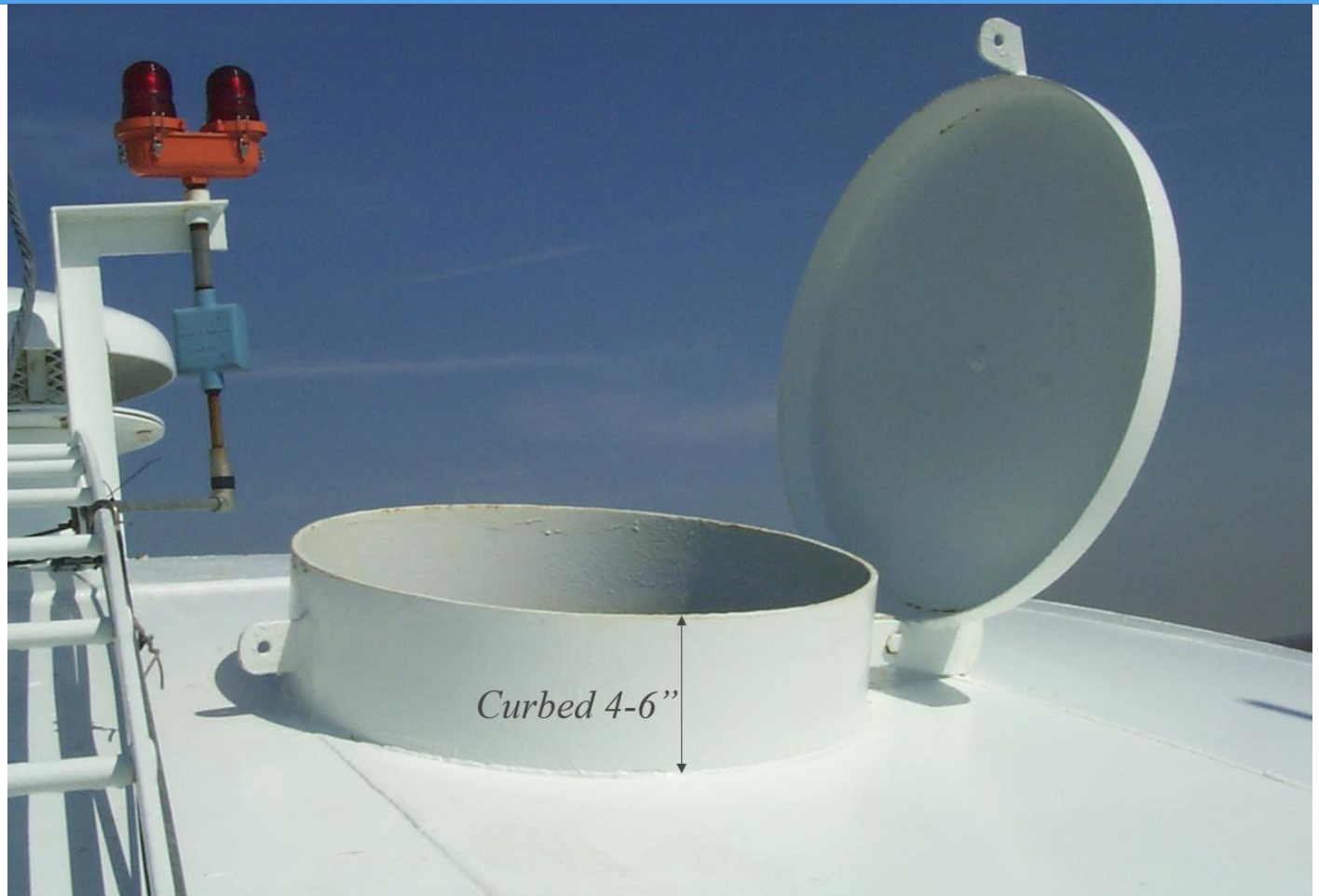
These are NOT from Lima, just examples of things we see.

Sanitary

Old style hatch that does not have a curb.

Why is this important?

Sanitary



Sanitary

Old style cathodic protection plate. We would seal weld these shut.

Sanitary

Replaced Cathodic Protection plates with seal welded rigging couplers. These have been primed before the tank was painted.

Sanitary

Sanitary

What's the white stuff on the vent and the top of the tank?

Sanitary

Sanitary

7.1.9 Vents

Finished water storage structures shall be vented. The overflow pipe shall not be considered a vent. Open construction between the sidewall and roof is not permissible.

Vents:

a) Shall prevent the entrance of surface water and rainwater.

b) Shall exclude birds and other animals.

c) Should exclude insects and dust, as much as this function can be made compatible with effective

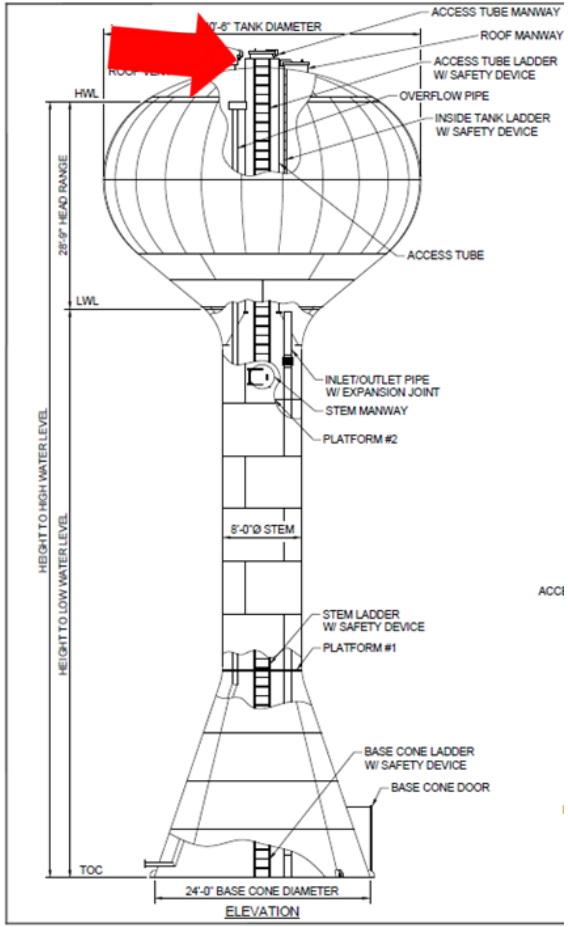
e) Shall, on elevated tanks and standpipes, open downward, and be fitted with twenty-four mesh non-corrodible screen in combination with an automatically resetting pressure-vacuum relief mechanism.

Sanitary

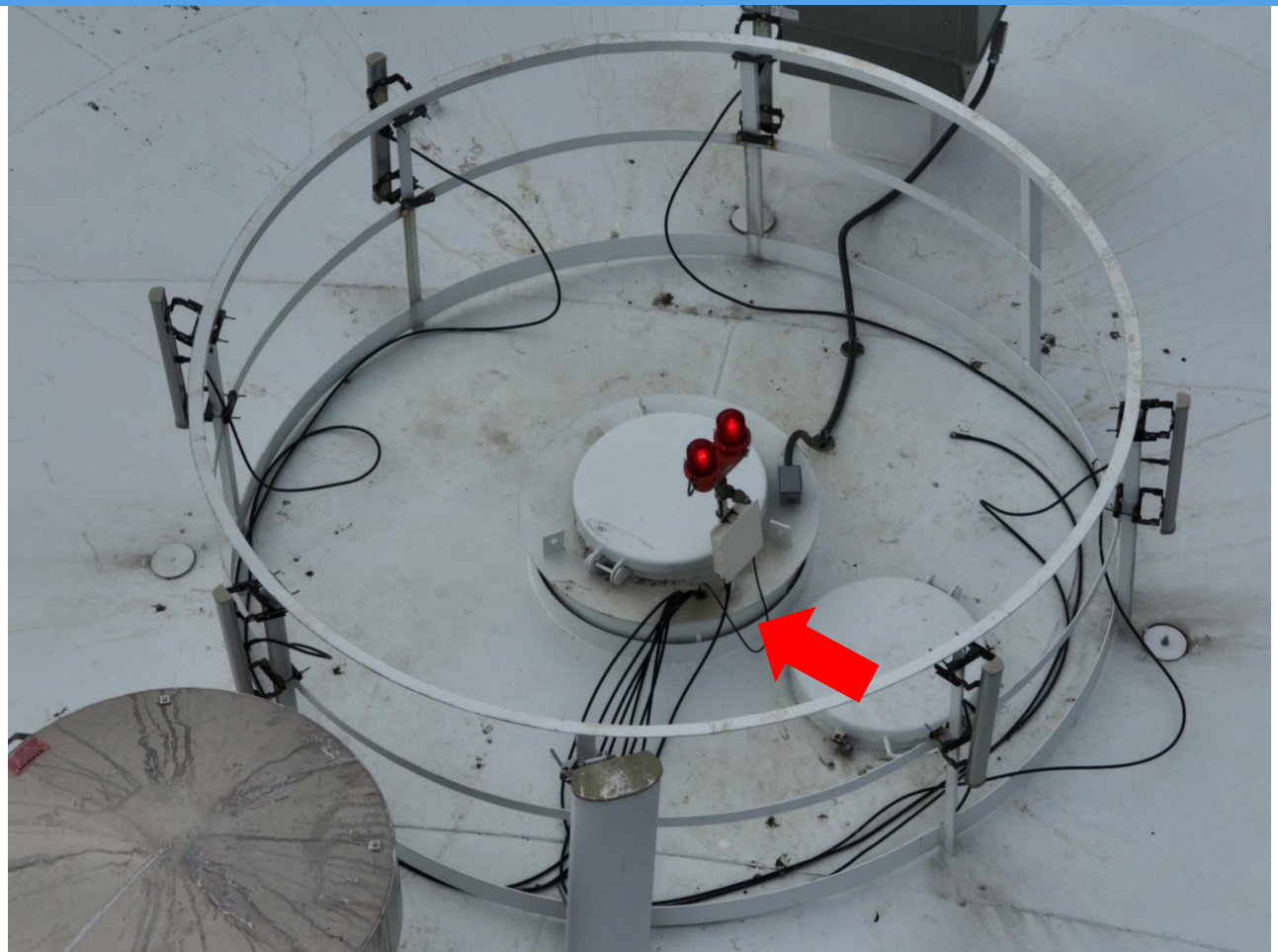
Sanitary

Sanitary

Sanitary


ACCESS TUBE MANWAY
ROOF MANWAY
ACCESS TUBE LADDER
W/ SAFETY DEVICE
OVERFLOW PIPE
INSIDE TANK LADDER
W/ SAFETY DEVICE
HWL
28'-9" HEAD RANGE
ACCESS TUBE
LWL
INLET/OUTLET PIPE
W/ EXPANSION JOINT
STEM MANWAY
PLATFORM #2
HEIGHT TO HIGH WATER LEVEL
HEIGHT TO LOW WATER LEVEL
8'-0"Ø STEM
STEM LADDER
W/ SAFETY DEVICE
PLATFORM #1
BASE CONE LADDER
W/ SAFETY DEVICE
BASE CONE DOOR
TOC
24'-0" BASE CONE DIAMETER
ELEVATION

Sanitary



Sanitary

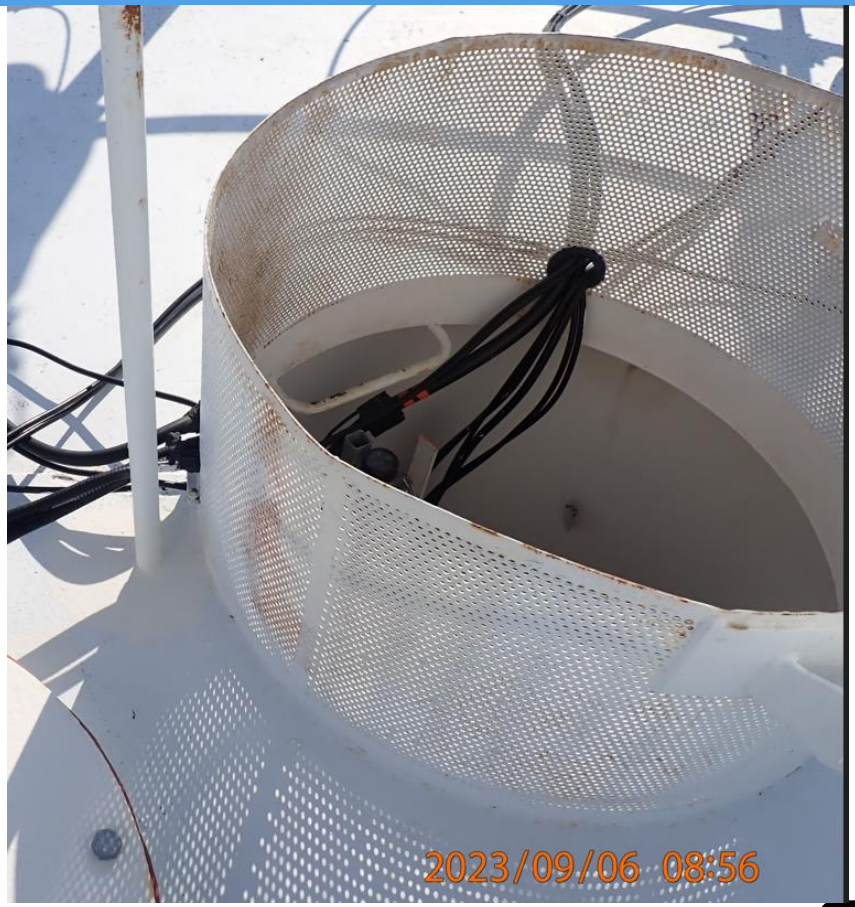
Sanitary

Sanitary

Sanitary

Where is the roof vent?

Sanitary



Sanitary

Sanitary

7.1.7 Overflow

All water storage structures shall be provided with an overflow that extends down to an elevation between 12 and 24 inches above the ground surface, and discharges over a drainage inlet structure or a splash plate. No overflow may be connected directly to any drain, sanitary sewer or storm sewer. All overflow pipes shall be located so that any discharge is visible.

a) When an internal overflow pipe is used on elevated tanks, it shall be in the access tube or inside an enclosed support structure. For vertical drops on other types of storage facilities, the overflow pipe shall be located on the outside of the structure.

b) Overflow pipe shall not be in the wetted interior of the storage structure.

c) The overflow shall open downward and be screened with twenty-four mesh non-corrodible screen. The screen shall be installed within the overflow pipe at a location least susceptible to damage by vandalism. A mesh-fitted mechanical flap valve is acceptable provided the flapper is supplied with non-corroding and non-seizing hinges. The flap valve shall be spring loaded or counterweighted, so it closes and forms a tight seal after the overflow event.

d) Use of a solid flapper or duckbill valve should be considered to minimize air movement and ice formation in the tank. When a solid flapper is used, a screen shall be provided inside the overflow. If a duckbill valve is used, a screen is not required. Provisions must be included to prevent the flapper or duckbill from freezing shut.

e) The overflow pipe shall be of sufficient diameter to permit the discharge of water in excess of the maximum filling rate.

Sanitary

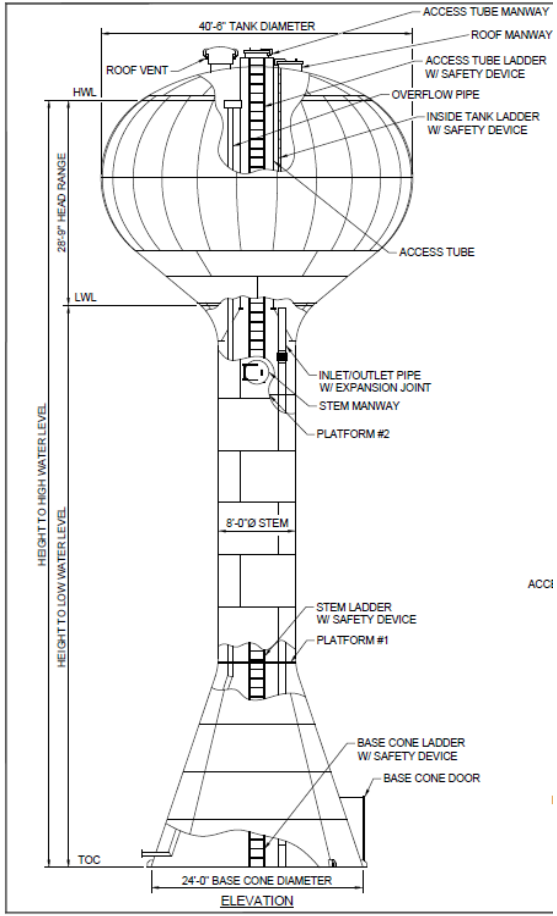
So, now we have a list of Sanitary items that need to be resolved.

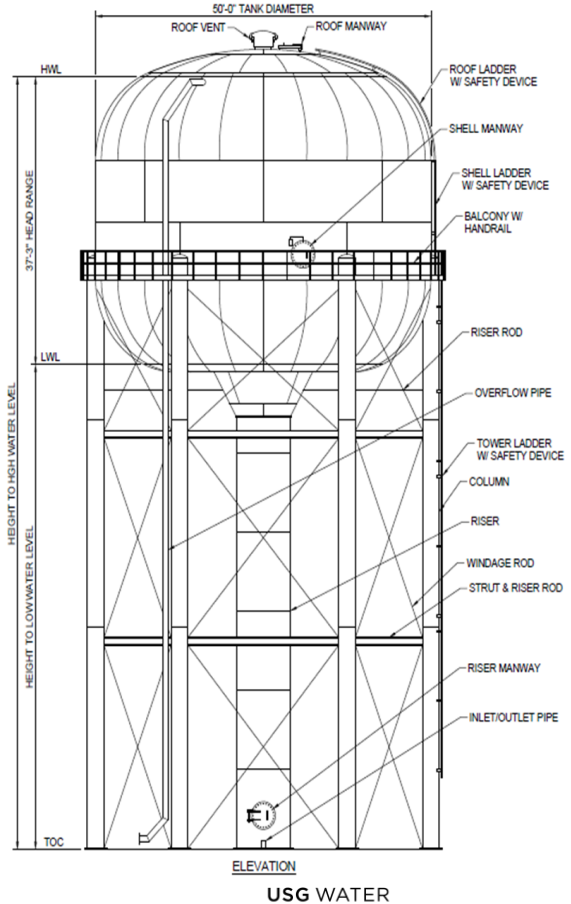
Now, let’s look at coatings.

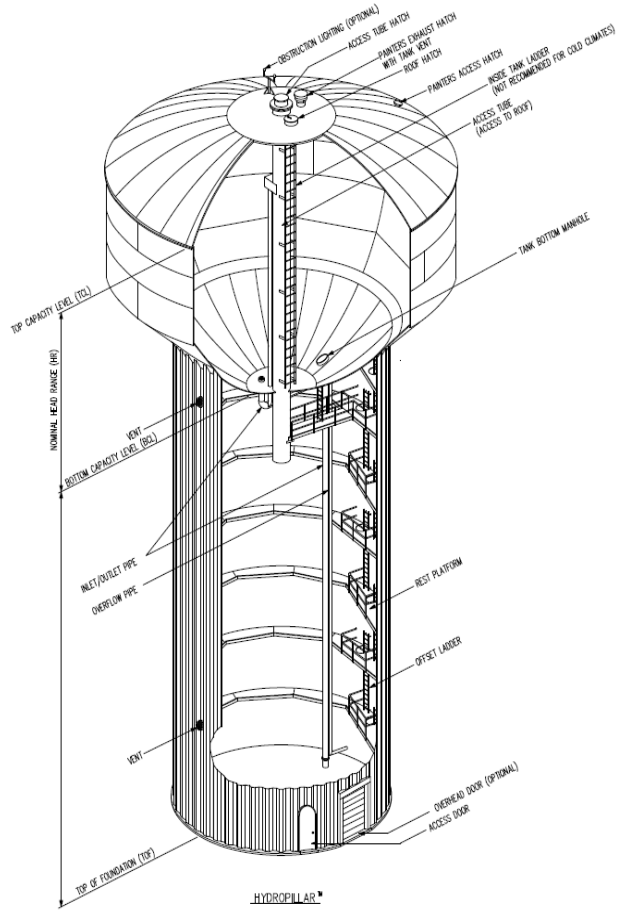
COATINGS

USG WATER SOLUTIONS

Coatings

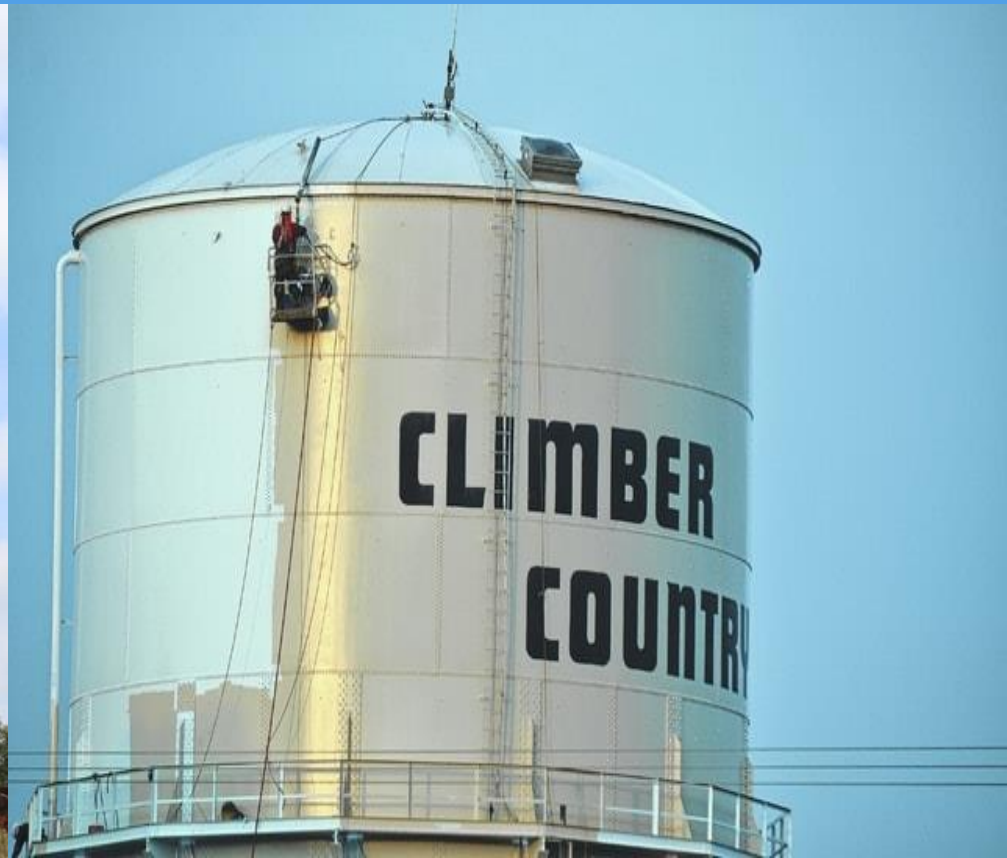




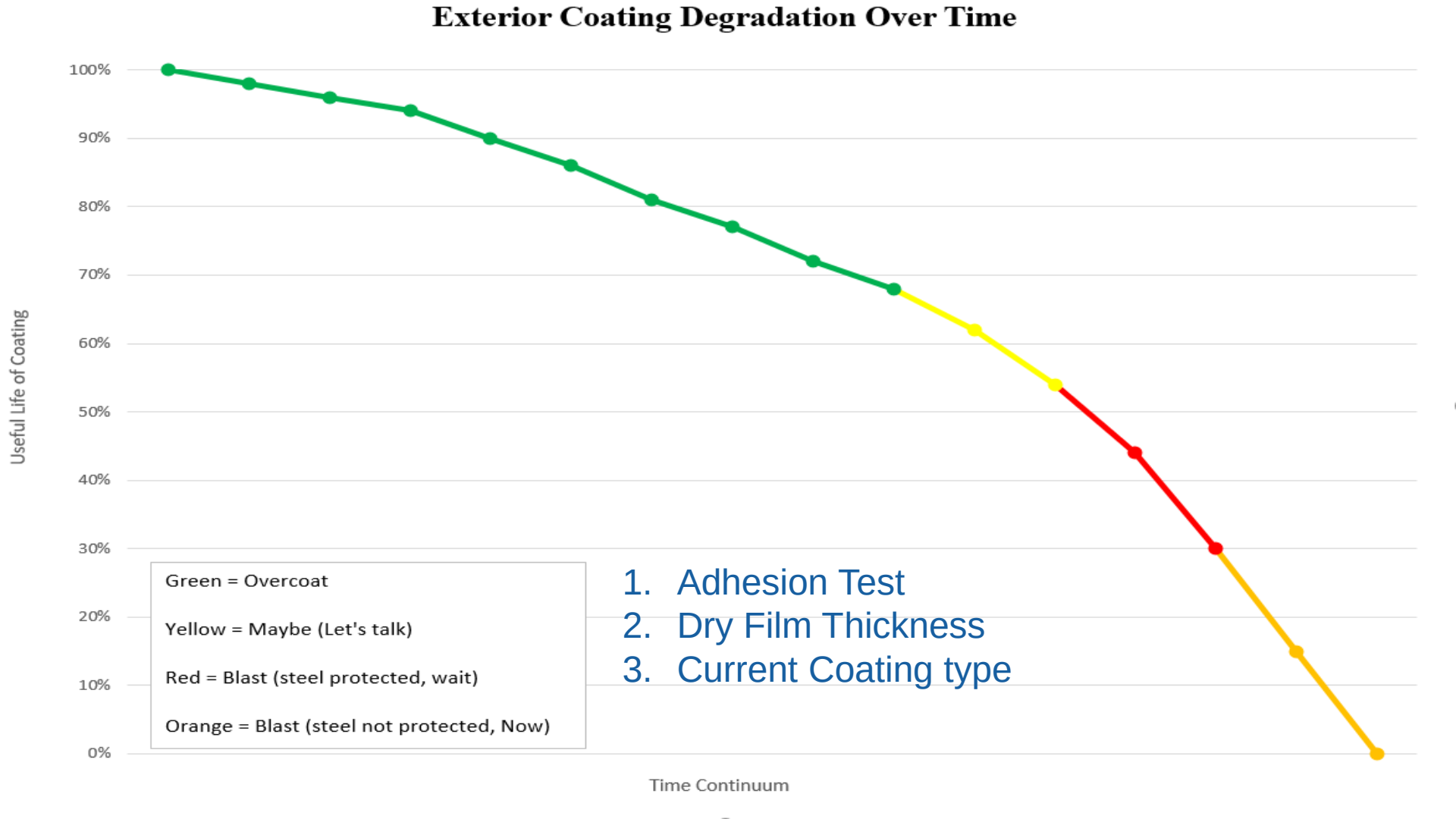


USG WATER SOLUTIONS

Coatings
Full Exterior Blast vs an Overcoat



Exterior Coating Degradation Over Time



Exterior Coatings

Coatings attach to the tank in 2 ways

1. Mechanical Bond
2. Chemical Bond

We send samples of the coatings to a 3rd party lab. The lab will tell us the type of coatings that are currently on the tank. This will help us determine the correct coating to apply so we get a chemical bond.

The lab also does a heavy metal test for us to determine if there is any lead or chromium in the coatings

Exterior Coatings- AWWA D102

AWWA D102 Coating Systems

OUTSIDE COATING SYSTEMS

OCS No. 1 (three or four coat alkyd) Aluminum, Metallic, Alkyd, Silicone Alkyd

OCS No. 2 (three coat) Moisture cured Polyurethane

OCS No. 3 (three coat) Water-based Acrylic or Modified Acrylic

OCS No. 4 (three coat) Zinc rich primer (organic or inorganic), Aliphatic Polyurethane, Aliphatic Fluorourethane

OCS No. 5 (three coat) Epoxy primer, Epoxy intermediate, Aliphatic Polyurethane

OCS No. 6 (three coat) Zinc rich primer (organic or inorganic), Epoxy intermediate, Aliphatic Polyurethane

Exterior Coatings- ASTM D 3359

ASTM D 3359 – Method a test:

Designation: D 3359 – 97

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428

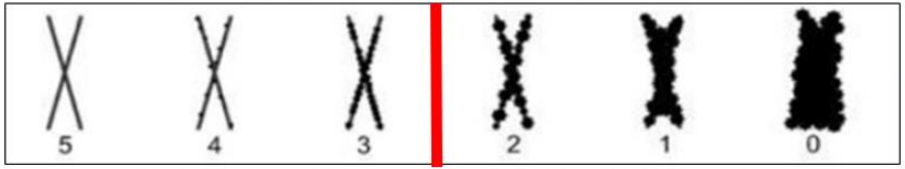
Standard Test Methods for Measuring Adhesion by Tape Test[1]

1. Scope

1.1 These test methods cover procedures for assessing the adhesion of coating films to metallic substrates by applying and removing pressure-sensitive tape over cuts made in the film. Page No 1

3.1 *Test Method A*—An X-cut is made in the film to the substrate, pressure-sensitive tape is applied over the cut and then removed, and adhesion is assessed qualitatively on the 0 to 5 scale. Page No 1

Rating	Description
5A	No peeling or removal
4A	Trace peeling or removal along the incisions
3A	Jagged removal along the incisions up to 1/16″ on either side
2A	Jagged removal along the incisions up to 1/8″ on either side
1A	Removal of most of the coating from the area of the "X" unde the tape
0A	Removal of coating beyond the area of the "X"



Overcoat Full Blast

1. Cut "X" mark

2. Place 25mm wide Transparent Tape.

3. Remove the tape quickly.

Exterior Coatings

Exterior Coatings – Overcoat

ASTM D 3359 – Method a test:

Designation: D 3359 – 97

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM

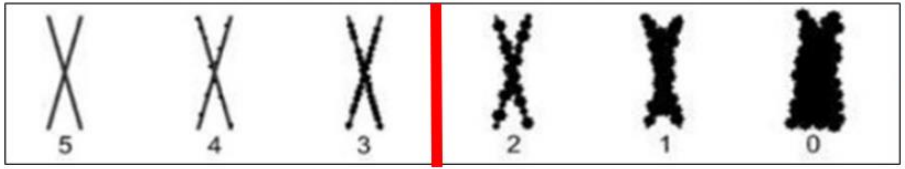
Standard Test Methods for Measuring Adhesion by Tape Test[1]

1. Scope

1.1 These test methods cover procedures for assessing the adhesion of coating films to metallic substrates by applying and removing pressure-sensitive tape over cuts made in the film. Page No 1

3.1 *Test Method A*—An X-cut is made in the film to the substrate, pressure-sensitive tape is applied over the cut and then removed, and adhesion is assessed qualitatively on the 0 to 5 scale. Page No 1

Rating	Description
5A	No peeling or removal
4A	Trace peeling or removal along the incisions
3A	Jagged removal along the incisions up to 1/16″ on either side
2A	Jagged removal along the incisions up to 1/8″ on either side
1A	Removal of most of the coating from the area of the "X" unde the tape
0A	Removal of coating beyond the area of the "X"



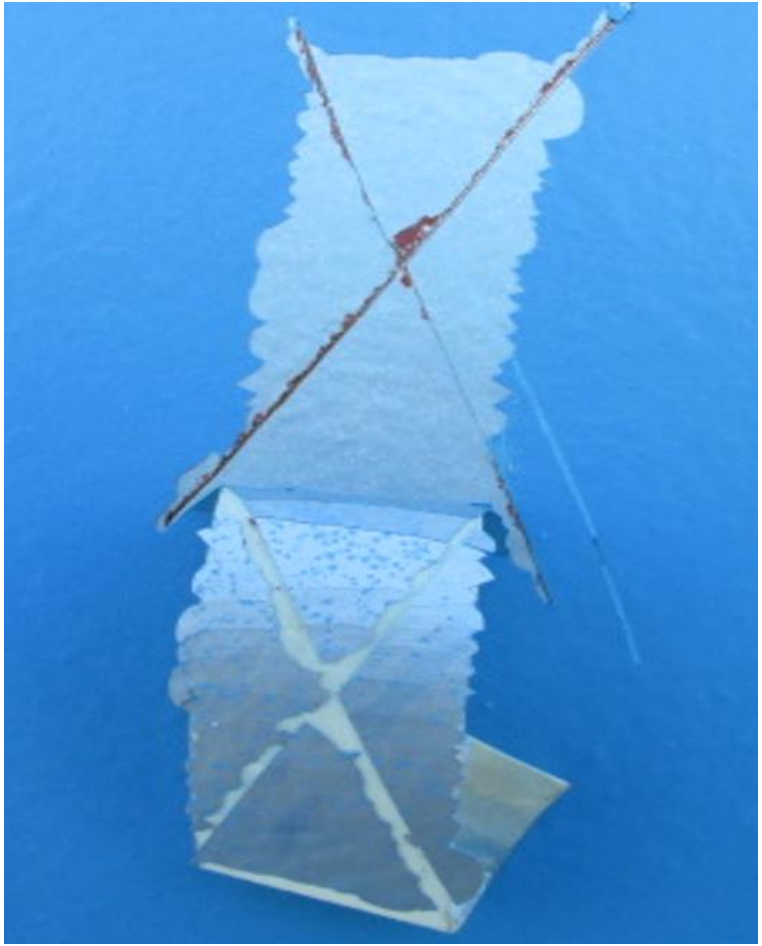
Overcoat Full Blast

1. Cut "X" mark

2. Place 25mm wide Transparent Tape.

3. Remove the tape quickly.

Exterior Coatings



Coatings are ***not*** chemically compatible.

The only way to solve this is to perform a full blast on the tower. You can't paint over this and solve the problem.

USG WATER SOLUTIONS

Exterior Coatings – Overcoat

ASTM D 3359 – Method a test:

Designation: D 3359 – 97

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM

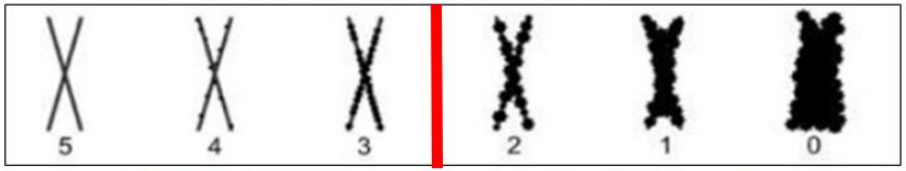
Standard Test Methods for Measuring Adhesion by Tape Test[1]

1. Scope

1.1 These test methods cover procedures for assessing the adhesion of coating films to metallic substrates by applying and removing pressure-sensitive tape over cuts made in the film. Page No 1

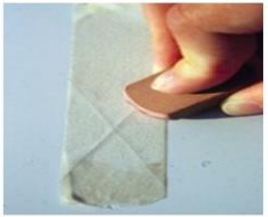
3.1 *Test Method A*—An X-cut is made in the film to the substrate, pressure-sensitive tape is applied over the cut and then removed, and adhesion is assessed qualitatively on the 0 to 5 scale. Page No 1

Rating	Description
5A	No peeling or removal
4A	Trace peeling or removal along the incisions
3A	Jagged removal along the incisions up to 1/16″ on either side
2A	Jagged removal along the incisions up to 1/8″ on either side
1A	Removal of most of the coating from the area of the "X" unde the tape
0A	Removal of coating beyond the area of the "X"



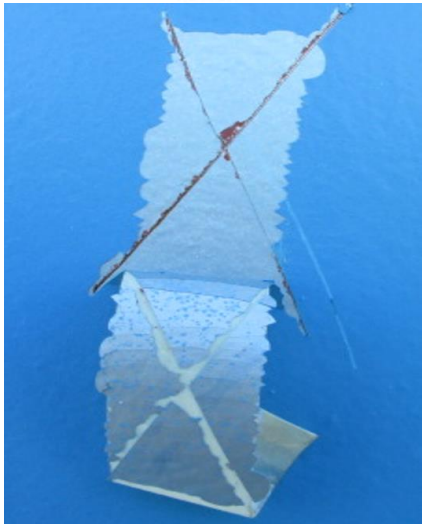
Overcoat Full Blast

1. Cut "X" mark

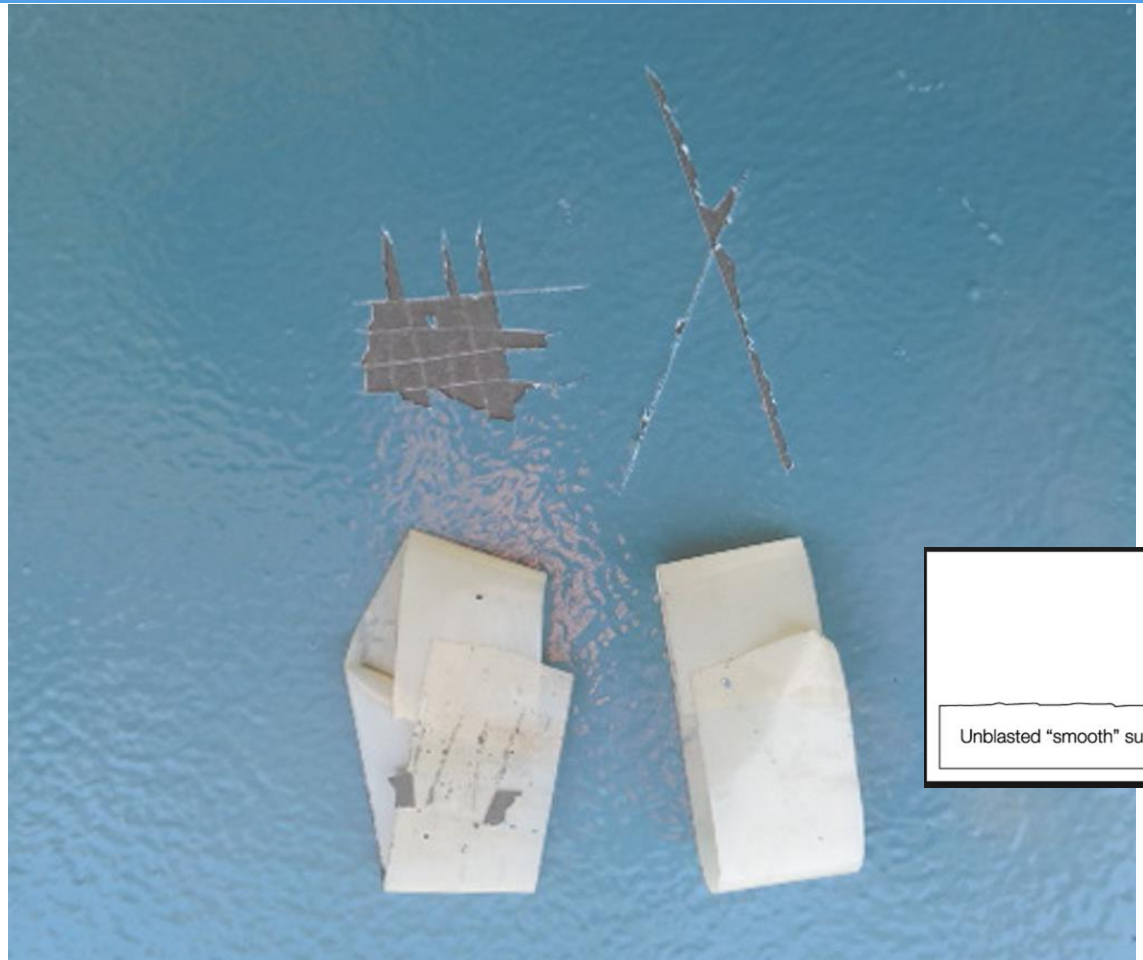


2. Place 25mm wide Transparent Tape.

3. Remove the tape quickly.

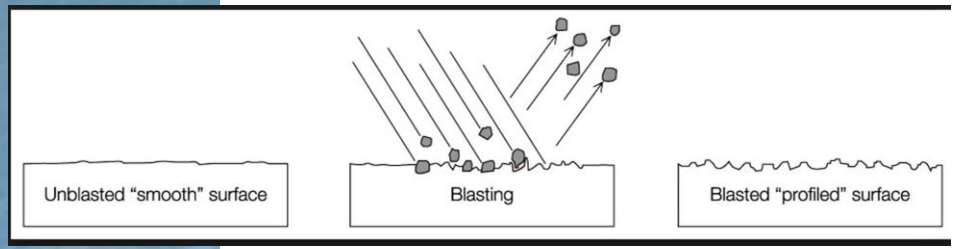


Exterior Coatings



Failure – What happened here?

This is a mechanical failure. The steel does not have a ***Profile*** to hold the coatings.



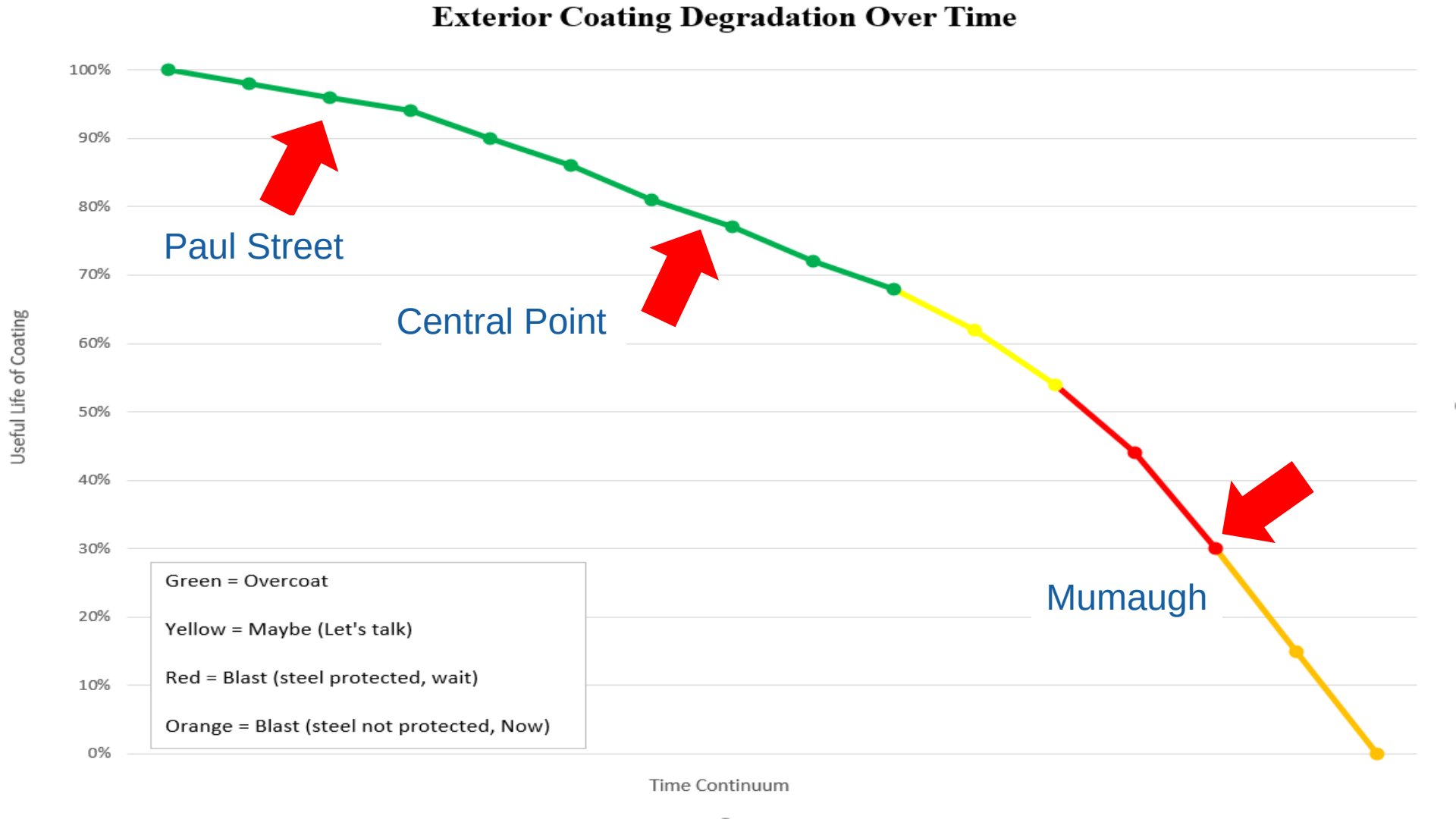
Exterior Coatings – Dry Film Thickness

Dry Film Thickness
What is it?
Why do we care?

Exterior Coatings – Lima

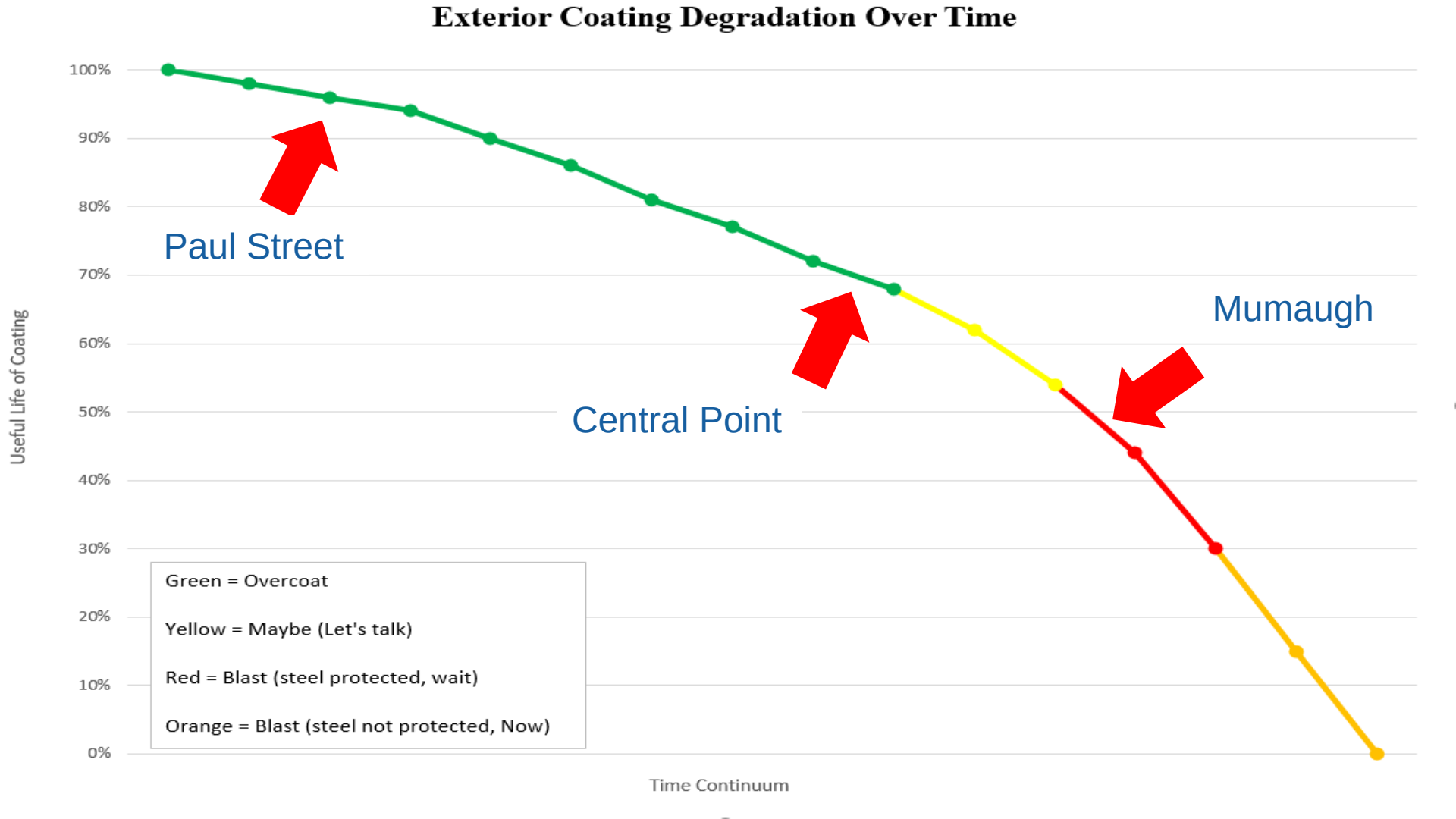
So, how did the exterior coatings look in Lima?

Exterior Coating Degradation Over Time



Exterior Coatings – Lima

What if …


Exterior Coating Degradation Over Time
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Useful Life of Coating
Paul Street
Central Point
Mumaugh
Green = Overcoat
Yellow = Maybe (Let's talk)
Red = Blast (steel protected, wait)
Orange = Blast (steel not protected, Now)
Time Continuum

Interior Dry

The goal of the interior dry is just to make sure the coatings are protecting the steel. Does not affect water quality at all nor does the public see the dry interior.

Interior Dry

1. Non compatible coatings were used.

2. Technically no corrosion of steel. Looks bad but no steel loss.

3. The only way to fix this is to do a full interior dry blast down to the steel and start over.

Interior Dry

The platforms in the dry interior tend to always have corrosion. We typically just hand tool clean/prep these areas and paint them. Again, we just want to stop corrosion.

Wet Interior

1. We typically always do a full blast (SSPC 10) and replace the wet interior. We do this based on AWWA D102 4.6.3.2.
2. *NSF 600 is now in place.
3. We do not touch the coatings until we have received the heavy metal results from the lab.
4. The interior bowl is a permit required confined space area per OSHA.

Wet Interior

Does cathodic protection help roof rafters?

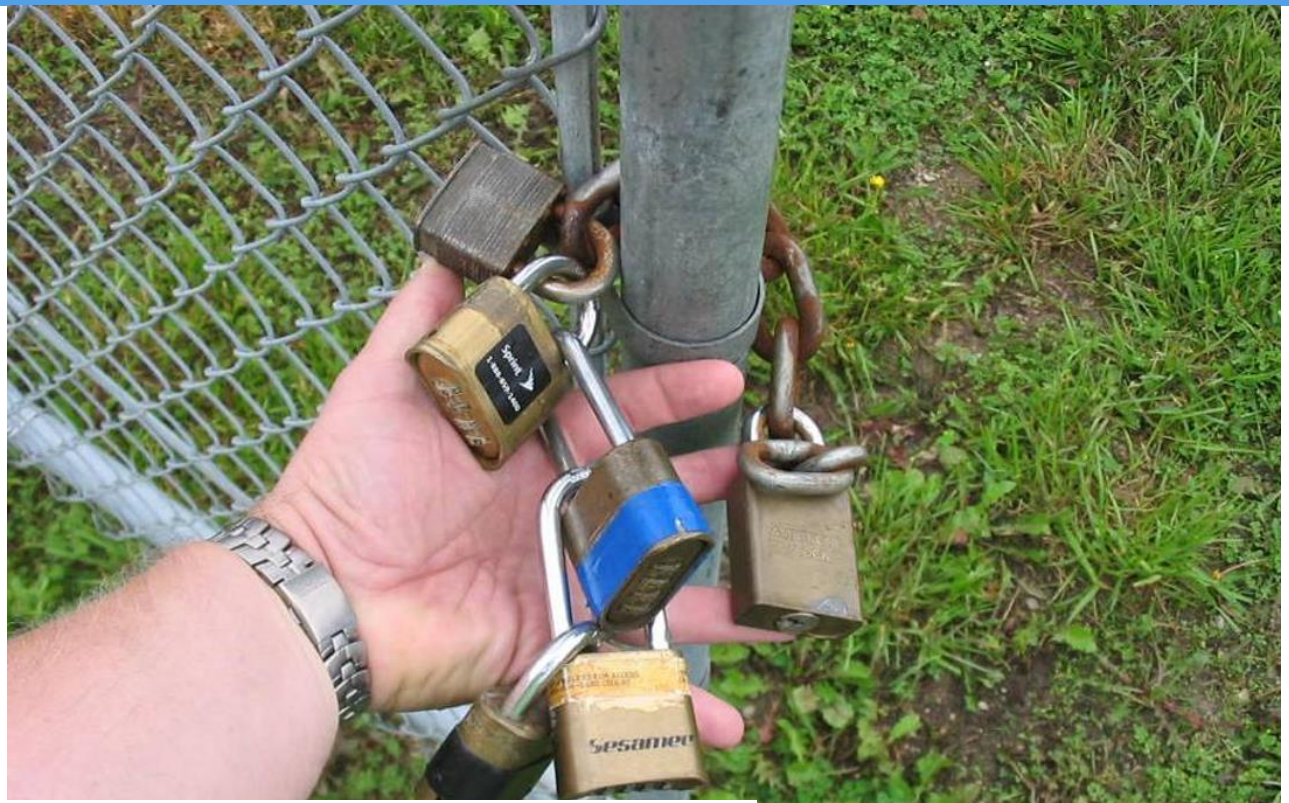
Wet Interior

SECURITY

USG WATER SOLUTIONS

Security - Fences

Security



7.1.4 Security

Fencing, locks on access manholes, and other necessary precautions shall be provided to prevent trespassing, vandalism, and sabotage. Consideration should be given to the installation of high strength, cut resistant locks or lock covers to prevent direct cutting of a lock. Refer to Section 2.19 for additional security considerations.

Security – Ladder Gate

Security

7.1.4 Security

Fencing, locks on access manholes, and other necessary precautions shall be provided to prevent trespassing, vandalism, and sabotage. Consideration should be given to the installation of high strength, cut resistant locks or lock covers to prevent direct cutting of a lock. Refer to Section 2.19 for additional security considerations.

STRUCTURAL

USG WATER SOLUTIONS

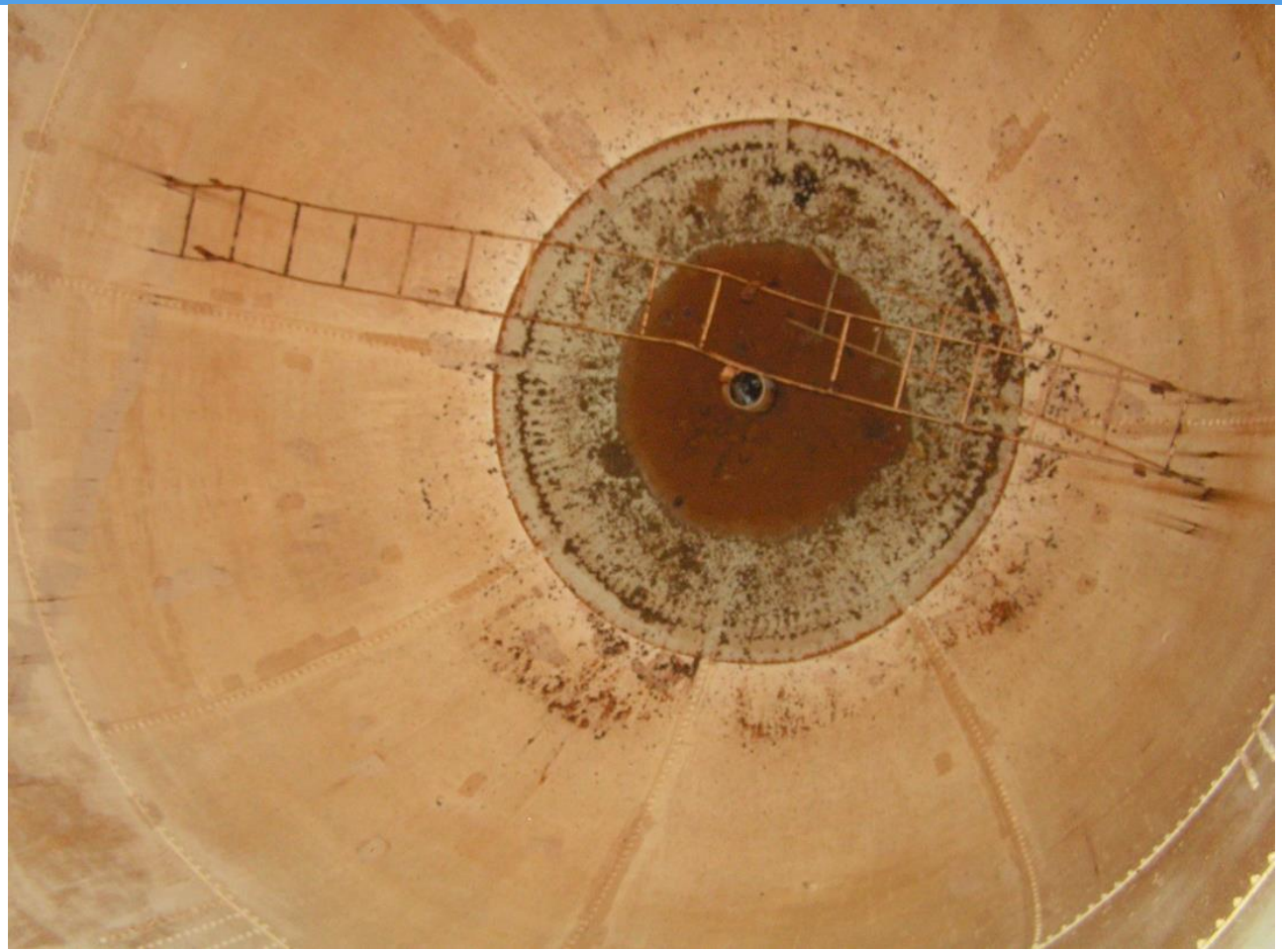
Structural

Structural

Structural

Structural

Structural



Structural

Structural

SAFETY

USG WATER SOLUTIONS

Safety

Safety Conditions: Fixed Ladders

- 29 CFR 1910.27
  - Minimum design load of 200 lbs.
  - 12 in. rung distance
  - 16 in. minimum side rail distance
  - 7 in. toe clearance
  - 15 in. clearance from centerline
  - 30 in. headroom

Safety

1. 12” rung distance
2. 15” clearance from centerline
3. 7” Toe Clearance

Safety

Safety

Ladders must be fixed now. They can’t roll.
This ladder looks safe… right?

Safety

Safety

What happens next?

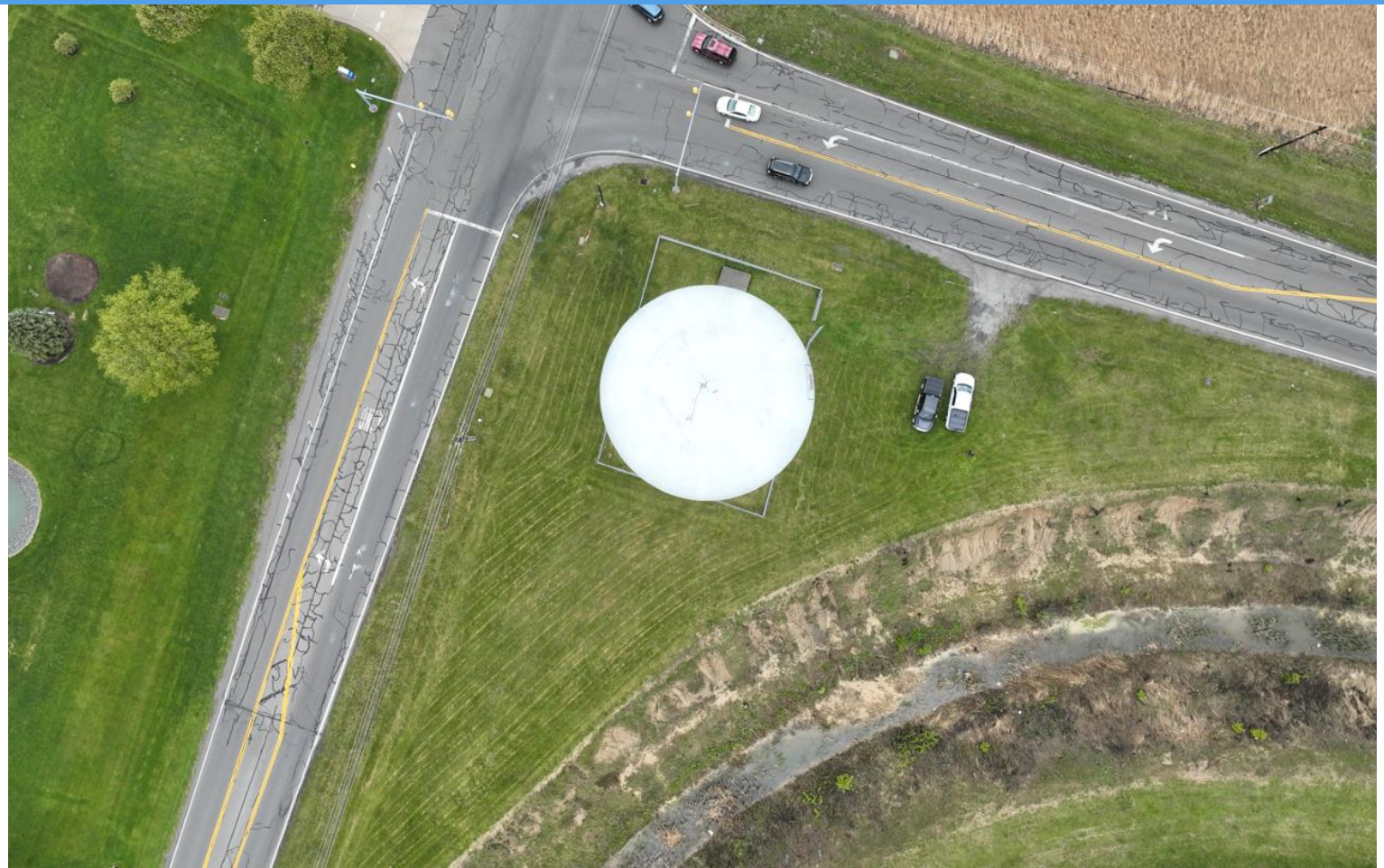
1. We submit all of our field data to our engineering team
2. We send all coating samples to the lab
3. We develop of list of repairs and prioritize sanitary issues
4. We develop a painting plan for the Exterior, Interior wet and Interior dry
5. We create budgetary proposal
6. Once the results from the lab are received, we sit with the owner and review about 150 pictures with them on a TV and educate them on our findings and explain our recommendations.

Lima – Overview of the program

City of Lima, Ohio

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Mumaugh	Full Blast Exterior Repairs Int washout	Visual Inspection	Visual Inspection	Visual Inspection	Full Blast Interior and Dry Int	Visual Inspection	Visual Inspection	Visual Inspection	Visual Inspection	Washout Inspection
Central Point	Visual Inspection	Visual Inspection	Exterior OC Washout interior Repairs	Visual Inspection	Visual Inspection	Visual Inspection	Wet Interior 100 %	Visual Inspection	Visual Inspection	Visual Inspection
Paul Street	Washout Inspection	Visual Inspection	Visual Inspection	Visual Inspection	Washout Inspection	Visual Inspection	Visual Inspection	Visual Inspection	Visual Inspection	Washout Inspection

Mumaugh




CITY

Mumaugh

If you do a “Full Containment Blast” on a water tower, can you leave antennas on the tower?

Tank White 15BL	Blue TBD	Red TBD	Gold TBD

Colors displayed are for representation purposes only. Refer to manufacturers color chart for actual colors.

City of Lima, OH
500,000 Gallon Single Pedestal Mumaugh Tank

Revision Date: 7/23/24 Rev 1

Approval

Signature _____

Name _____ *Date* _____

PAGE 1 OF 5

USG WATER SOLUTIONS

Tank White 15BL	Blue TBD	Red TBD	Gold TBD

Colors displayed are for representation purposes only. Refer to manufacturers color chart for actual colors.

City of Lima, OH
500,000 Gallon Single Pedestal Mumaugh Tank

Revision Date: 7/23/24 Rev 1

Approval

Signature _____

Name _____ *Date* _____

PAGE 3 OF 5

USG WATER SOLUTIONS


CITY OF
LIMA
EST. 1831


CITY OF
LIMA
EST. 1831


CITY OF
LIMA
EST. 1831

Benefits of Asset Management for Lima

1. Cost spread out over 8 years
2. Easy to budget
3. Helps with calculating water rates (fixed cost)
4. Cost savings over bidding out each tank separately.
5. No Change orders
6. Easy to manage because there is a schedule in place
7. Inspections and washouts performed for EPA compliance (portal)

THANK YOU

Daryl Bowling
USG Water
937-765-7827
Daryl.Bowling@USGWater.com

USG WATER SOLUTIONS