



**Gravelbourg Saskatchewan Multi-Legged Tank
Remote Inspection & Report
June 19, 2018**

July 18, 2018

Town of Gravelbourg

P.O. Box 359
Gravelbourg, SK S0H 1X0

Att: **Mr. Craig Faulkner**
gravelbourg.eng@sasktel.net

Tel: 306.648.3301 ext. 3

Re: **LMS Job #LM18004: Remotely Operated Vehicle Inspection
Gravelbourg Multi-legged Tank**

Dear Mr. Faulkner;

A comprehensive inspection was performed at the above mentioned potable water storage facility on June 19, 2018. Tank interior surfaces were inspected with a remotely operated vehicle (ROV). The ROV unit and tether cable were disinfected in accordance with AWWA-C652-11 Method #2 guidelines (200ppm solution) prior to entry into the tank interior. Landmark's ROV equipment is designated for potable water use only.

Please find a comprehensive report enclosed as follows;

- 1) Multi-legged Tank
- 2) Photographic Record of Report
 - Photographs are numbered in accordance with the corresponding numbers throughout the report.
- 3) Protective Coatings & Linings Report
- 5) Summary of Recommendations – Quotation #Q18134
- 6) ROV Video – Electronic copy on USB flash drive

Pages 1 – 5

Pages 6 - 28

Should you have any questions or comments regarding the content of this report, please contact us at 905 319 7700.

Yours sincerely,

LANDMARK MUNICIPAL SERVICES



Dave Baker
Landmark Municipal Services ULC

Encl.

This report has been prepared by Landmark Municipal Services for the Town of Gravelbourg.

This report has been prepared in order to provide the facility owner with a detailed description of the following:

The present condition of interior and exterior coatings, any pitting and/or corrosion on the interior of the water retaining vessel, the apparent condition of exposed foundations and the status of and recommendations for upgrades on safety equipment and other facility appurtenances.

Landmark Municipal Services has not performed a design review, an ultrasonic, x-ray, or destructive and/or non-destructive testing unless stated in the report. Comments and recommendations are based on visual inspection only and represent Landmark's professional judgement in reference to industry standards and best practices. This report may be based on information provided to Landmark which has not been independently verified. Its accuracy is limited to the time period and circumstances in which it was made. It was prepared for the specific purposes described in the report.

Any estimates regarding construction costs represent Landmark's judgement in light of our experience. Since Landmark has no control over market conditions, we do not make any representations or guarantees whatsoever with respect to such estimates or their potential variance from actual construction costs or schedules. Landmark accepts no responsibility for any potential losses.

In the case of subsurface, environmental or geotechnical conditions, the report may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time. Landmark makes no other representations or warranties whatsoever and accepts no responsibility for any events that may have occurred since the report was prepared.



MULTI - LEGGED TANK INSPECTION REPORT

Landmark Contract No. LM18004	Inspection Date 19-Jun-18	Last Inspection Date Unknown
Inspector P. Furtado	Report Date 12-Jul-18	Inspected By Unknown

OWNER / CONTACT

Owner	The Town of Gravelbourg	Contact	Mr. Craig Faulkner
Project Location	240 First Ave.	Title	Public Works Foreman
Address	Gravelbourg Saskatchewan	Phone	306-648-3301 ext.3
		Fax	306-648-3400
		Email	gravelbourg.eng@sasktel.net

TANK DESCRIPTION

Constructor	CBI / Horton	Tank Capacity	0.060 MIG (Imperial Gallons) 273 m3
Year Built	1928	Roof Type	Riveted steel cone
Tank Type	Multi-Column Riveted	Tank Diameter	30' 4"
Dwg's Available	No	Riser Diameter	10"
Dwg's Reviewed	No	Grade to Bottom of Tank	115'
Coating System	Refer to coating and linings report	HWL Elevation	150'
Lining System	Refer to coating and linings report	No. of Support Columns	4
Engineer	Unknown	Column Size	12"x3"x1/4" C-Channel - Riveted

REPORT SUMMARY

Repairs Made During Inspection	Photo No.	Photo No.
	--	--
	--	--
	--	--

Recommended Repairs

Siteworks

Accessories

	--	Supply & install ladder to valve pit	33
	--	Remove and replace all ladders	75, 94, 116
	--	Supply & install 1pc rest seat on ladder to catwalk	75
		New hatch required on tank roof - 30" x 30"	129
Security			
Security fence recommended around perimeter of tank	2	Remove and upgrade tank vent system c/w vacuum relief	121, 122
Security gate required at bottom of ladder	50	Swing stage couplings required on tank roof	--
Padlock required on hatch to tank interior	127	Roof handrail system required	1125 - 127
		Extend overflow pipe to grade level	113
Valve Chamber		Replace air craft warning light fixture	128
Install aluminum hatch at valve pit opening	31	Relocate antenna cables from ladder siderails	79
Sump pit and pump required	33 - 36		--
Replace corroded valves / piping within chamber	33 - 36		--
	--		--
	--		--

Support Leg Foundations

Fall Arrest System

Remove vegetation/overgrowth/gravel from piers	66 - 74	Fall arrest system required on all ladders	75, 114, 116
	--	5pc Transfer Station 'D' rings are required	--
	--		--

Catwalk / Landings

Confined Space & Rescue System

Landing beneath tank bowl		4pc Rescue port bases are required	--
Install mid rail and kickplate to existing handrail	90		--
Replace grating and reinforce landing platform	86		--
Perimeter Catwalk:			--
Reinforce platform as required	97		--
Increase height of handrail to 42"	97		--

Anchorage

Coating & Lining Condition

--	Separate Report available	--
--		--
--		--

Thank you for allowing Landmark Municipal Services to assist you in the maintenance of your elevated water storage facility. To maintain the integrity of your facility we recommend that you schedule your next:

Safety inspection and report

2019

Remote Inspection & Report (RIR)

2022

* 3 yrs after CIR*

Clean, inspect and report (CIR)

2019

SITWORKS

EXTERIOR VALVE PIT	Poor - deteriorating foundation, roof, walls and door	7 - 12
DRIVEWAY / WALKWAY	Fair	1 - 4
OVERFLOW SPILLWAY	None	--

REPAIRS OR MAINTENANCE REQUIRED**SECURITY**

FENCE & GATES	None	1
VERTICAL LADDER	Ladder cage present; Ladder gate recommended	76
HATCH LOCKS	None	127

REPAIRS OR MAINTENANCE REQUIRED

Security fence recommended around perimeter of tank

Security gate required at bottom of ladder

Padlock required on hatch to tank interior

VALVE CHAMBER

CONDITION OF VALVE PIT	Poor - flooded	33 - 36	
CONDITION OF PIPING	Severe surface corrosion	25 - 28	
CONDITION OF VALVES	Severe surface corrosion	25 - 28	
VALVE PIT HATCH	* Size	48" x 26" steel plate	30 - 32
	* Condition	Moderate surface corrosion	30 - 32
ARE THERE ANY INDICATIONS OF SETTLEMENT (EXTERIOR)?	Yes	33 - 36	
IS THE CONCRETE IN THE PIT CRACKED, SPALLED OR LEAKING?	N/I due to flooding	--	
ARE FOOT ELBOWS ANCHORED OR THRUSTED?	N/I due to flooding	--	
IS THERE ANY INDICATION OF PIPE MOVEMENT?	N/I due to flooding	--	

REPAIRS OR MAINTENANCE REQUIRED

Install aluminum hatch at valve pit opening

Sump pit and pump required

Replace corroded valves / piping within chamber

SUPPORT LEG FOUNDATIONS

HOW FAR DOES THE FOUNDATION EXTEND OUT OF THE GROUND? (Support Legs)	Nil	59 - 71
ARE THERE ANY INDICATIONS OF FOUNDATION SETTLEMENT?	No	59 - 71
IS CONCRETE OR GROUT CHIPPED OR CRACKED	Covered by gravel - N/I	59 - 71
IS THE SOIL AT THE BASE SATURATED OR IS THERE PONDED WATER?	No	59 - 71
IS THERE ANY INDICATION OF UNDERGROUND PIPE LEAKAGE?	No	59 - 71
IS THE SOIL AT THE BASE SATURATED OR ERODED?	No	59 - 71
IS THE FOUNDATION UNDERMINED OR EXPOSED?	No	59 - 71

REPAIRS OR MAINTENANCE REQUIRED

Remove vegetation/overgrowth/gravel from piers

SUPPORT STRUCTURE (not including the steel tank)

CONDITION OF CENTER RISER?	10" diameter riser pipe appears to be 'bowed'. Expansion joint may be required	23 - 32, 43
CONDITION OF SUPPORT LEGS?	4pc 'C' Channels are corroded throughout	37 - 64
SIGNS OF CORROSION OR REDUCTION TO GUY RODS?	Yes	58, 60, 63
CONDITION OF ROD & STRUT PINS AND BOLTS?	Moderate surface corrosion throughout	37 - 74
CONDITION OF STRUTS AND COLUMNS?	Moderate surface corrosion throughout	37 - 74

REPAIRS OR MAINTENANCE REQUIRED

CATWALK / LANDINGS**LANDING BENEATH TANK BOWL**

CONDITION OF FLOOR?	Moderate surface corrosion throughout	85 - 91
CONDITION OF HANDRAIL?	Poor - Mid rail required on one side; kickplate required	
CONDITION OF SPLICES, SUPPORTS AND SHAFT CONNECTIONS?	Moderate surface corrosion. Landing is unstable - reinforcement is required	

PERIMETER CATWALK (around tank)

CONDITION OF FLOOR?	Moderate to severe surface corrosion	97, 99, 102, 108
CONDITION OF BALCONY HANDRAIL?	Fair - Increase height to 42" min. Only 36"; kickplate and mid-rail required	
CONDITION OF SPLICES, SUPPORTS AND SHAFT CONNECTIONS?	Moderate surface corrosion - unstable	
DOES THE BALCONY FLOOR DRAIN?	Yes	

REPAIRS OR MAINTENANCE REQUIRED**Landing beneath tank bowl**

Install mid rail and kickplate to existing handrail
Replace grating and reinforce landing platform

Perimeter Catwalk:

Reinforce platform as required
Increase height of handrail to 42"

ANCHORAGE

ARE BASE PLATE DETERIORATED OR IN POOR CONDITION?	Yes - corrosion throughout	59-71
ARE ANCHORS, NUTS & BOLTS DETERIORATED OR IN POOR CONDITION?	Yes - corrosion throughout	59-71
ARE ANCHOR BOLT CHAIRS DETERIORATED OR IN POOR CONDITION?	Yes - corrosion throughout	59-71
ARE ANCHOR BOLTS TIGHT?	Yes	59-71

REPAIRS OR MAINTENANCE REQUIRED**ACCESSORIES**

LADDERS	* To Valve Pit	None	33
	* Ladder to bowl landing	Only 13" wide (code is 16")	75 - 79
	* Ladder to catwalk	Only 13" wide (code is 16")	94
	* Ladder to roof	Only 13" wide (code is 16")	114
	* Ladder on roof	Only 13" wide (code is 16"); ladder not secured on roof	116, 119, 126 - 127
REST SEAT		Recommended	84
ROOF HATCH	* Size	20" x 24" flat steel plate; upgrade required	127, 129
	* Condition	Severe surface corrosion; mounting curb must be 4" high	127, 129
VENT	* Type	4" stem Finial Ball	121 - 122
	* Condition	Upgrade required - temporary screen installed during inspection	121 - 122
PAINT RAIL / ROOF COUPLINGS		None	--
ROOF HANDRAIL		None	126
TANK ACCESS FROM SHELL		None	--
OVERFLOW PIPE		Poor - fine screen required; extend pipe to grade level	113
INLET / OUTLET PIPE		10" diameter insulated steel pipe	87 - 89
CATHODIC PROTECTION		None	--
AIRCRAFT WARNING LIGHTS		Poor - lenses required and one fixture broken	128
ANTENNAE	* Anchorage / Mounting	Anchored to balcony handrail	100 - 110
	* Cable Routing	Poor - Antenna cables mounted to ladder siderails	79
	* Surveys / Warning Signage as per Safety Code 6: Health Canada	None	--
MIXING SYSTEM		None	--

ACCESSORIES

REPAIRS OR MAINTENANCE REQUIRED

- Supply & install ladder to valve pit

- Remove and replace all ladders

- Supply & install 1pc rest seat on ladder to catwalk

- New hatch required on tank roof - 30" x 30"

- Remove and upgrade tank vent system c/w vacuum relief

- Swing stage couplings required on tank roof

- Roof handrail system required

- Extend overflow pipe to grade level

- Replace air craft warning light fixture

- Relocate antenna cables from ladder siderails

FALL ARREST SYSTEM

LOCATION	SYSTEM TYPE	COMMENTS	
* To Valve Pit	N/A	--	--
* To Catwalk	None	Recommended	75
* To Roof	None	Recommended	114
* On Roof	None	Recommended	116
* To Tank Interior	N/A	--	--

REPAIRS / UPGRADES OR MAINTENANCE REQUIRED

Fall arrest system required on all ladders

TRANSFER STATION 'D' RINGS

LOCATION	YES / NO	CONDITION	
* At Valve Pit	No	--	31
* At Top of Ladder (at landing)	No	--	86
* At Top of Ladder (at perimeter catwalk)	No	--	97
* At Roof hatch	No	--	129
* At Center of tank roof	No	--	121

REPAIRS OR MAINTENANCE REQUIRED

5pc Transfer Station 'D' rings are required

CONFINED SPACE & RESCUE

RESCUE PORT BASE

LOCATION	YES / NO	CONDITION	
* At Valve Pit	No	--	--
* At Top of Ladder (at landing)	No	--	--
* At Top of Ladder (at perimeter catwalk)	No	--	--
* At Roof hatch	No	--	--

REPAIRS OR MAINTENANCE REQUIRED

4pc Rescue port bases are required



1



Security fence recommended

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Security gate required at bottom of ladder

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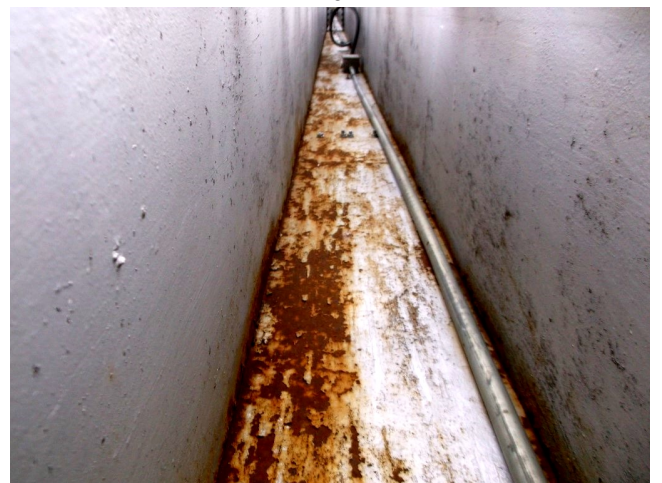
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**Remove and replace non-compliant ladder.
Fall arrest system required**

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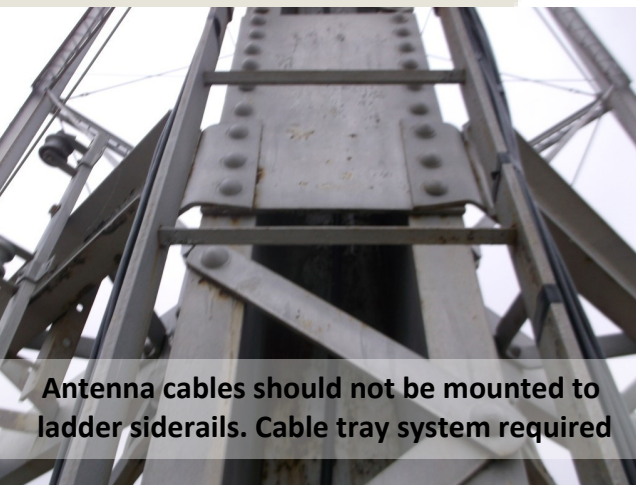
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**Antenna cables should not be mounted to
ladder siderails. Cable tray system required**

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'D' ring required at top of ladder

1pc rest seat recommended

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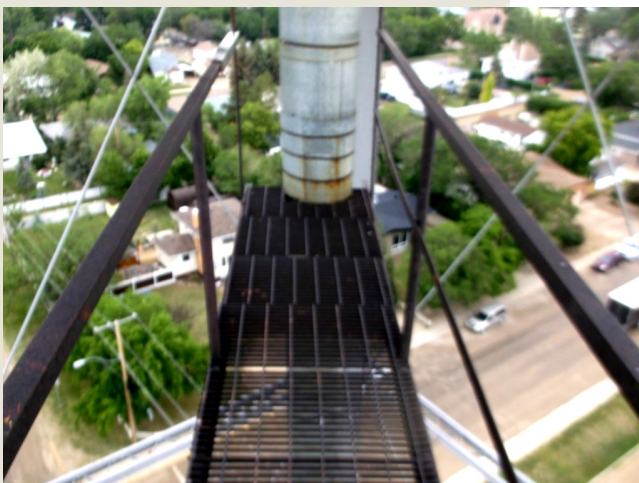
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Catwalk Upgrades:

- Install kickplate
- Install mid rail on one side of handrail
- Catwalk reinforcement required
- Remove and replace grating with galvanized

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Remove and replace non-compliant ladder.
Fall arrest system required

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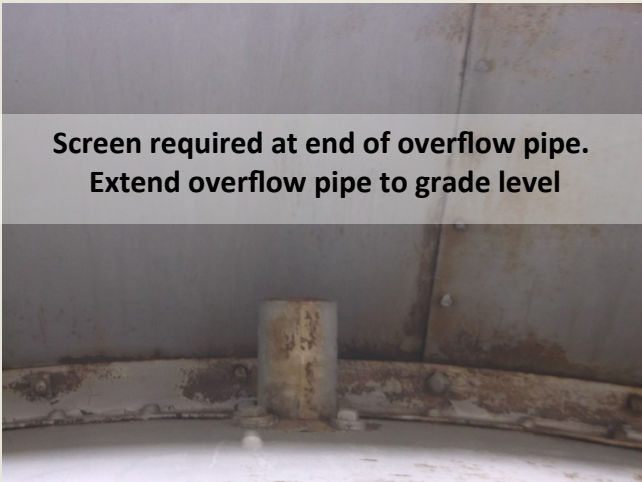
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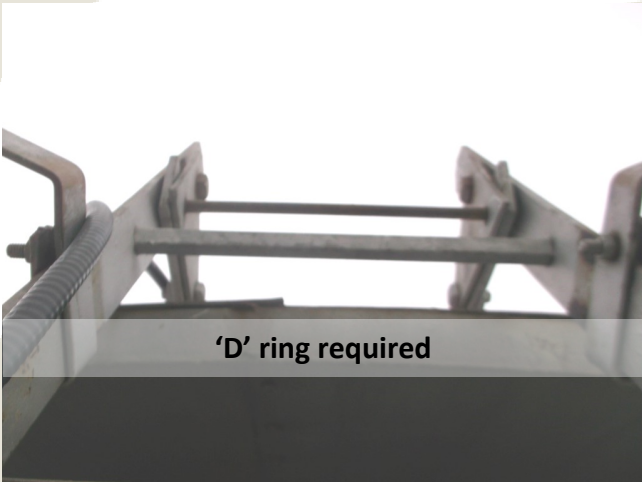
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Upgrade vent to 16" S.S. vent / vacuum relief unit

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Roof handrail recommended

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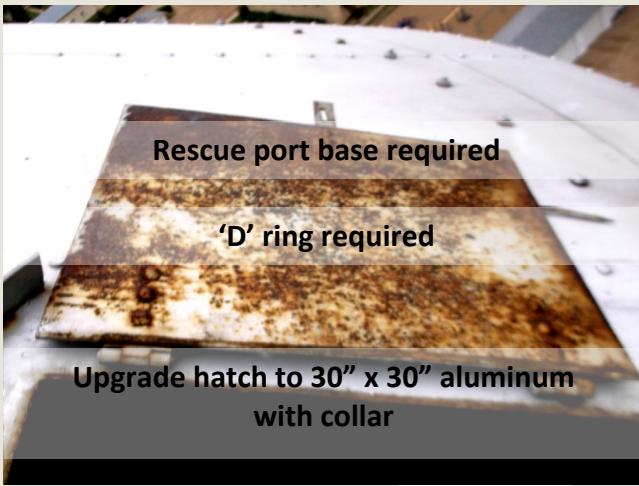
Padlock required on hatch to tank interior

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Replace aircraft warning light fixture

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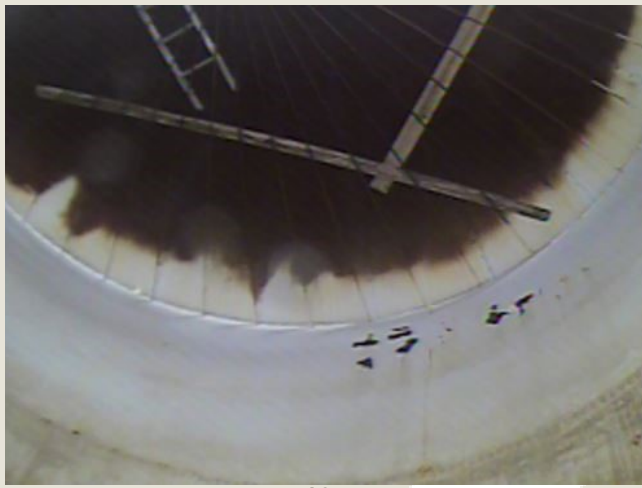
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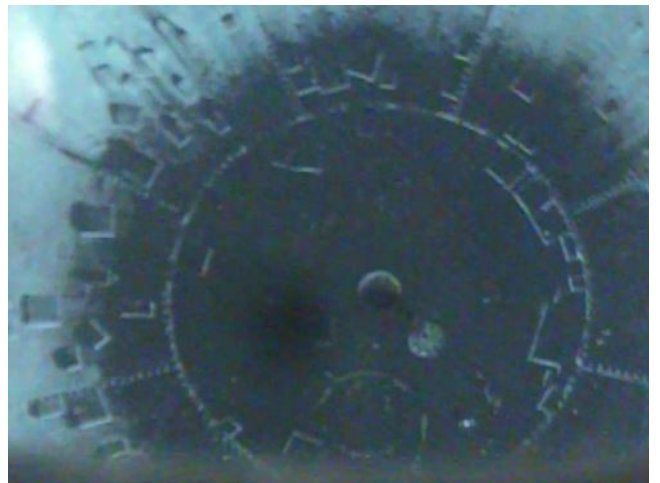
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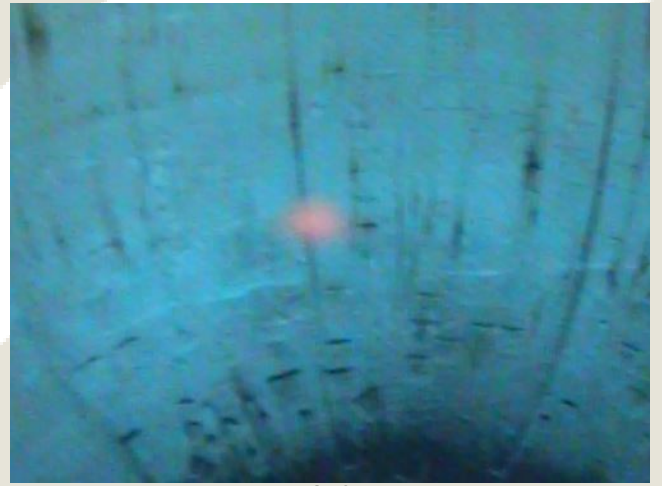
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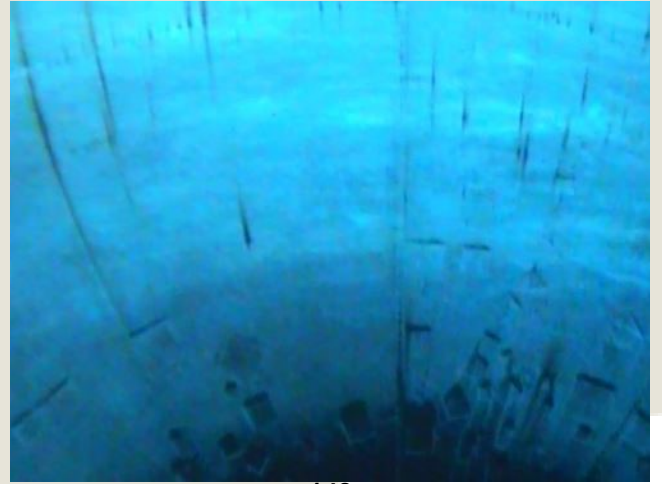
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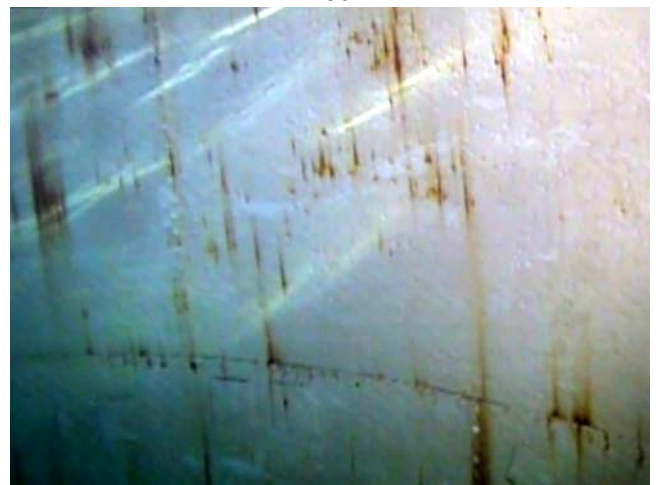
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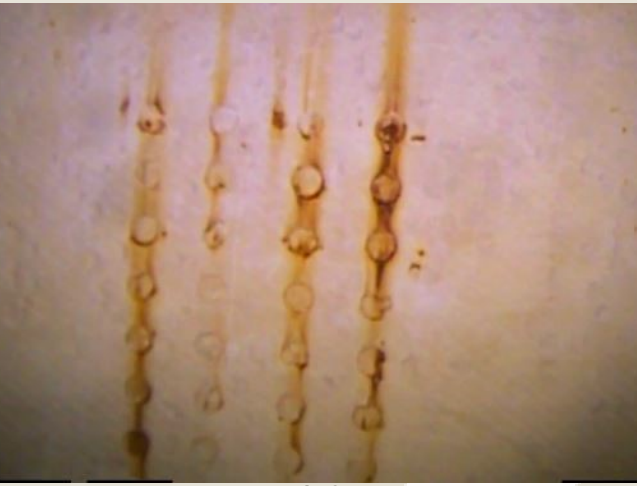
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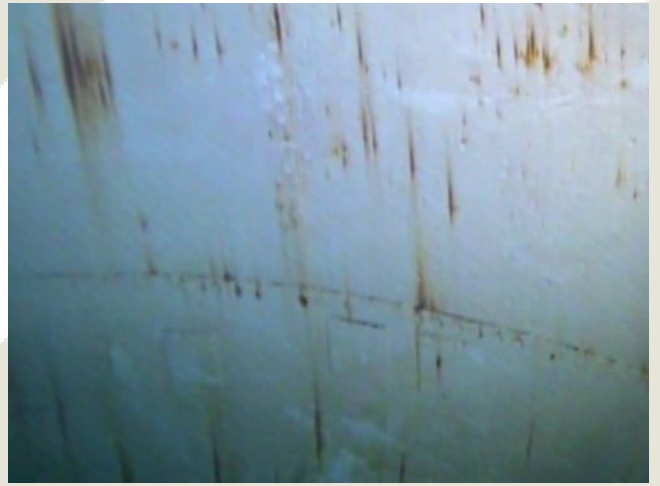
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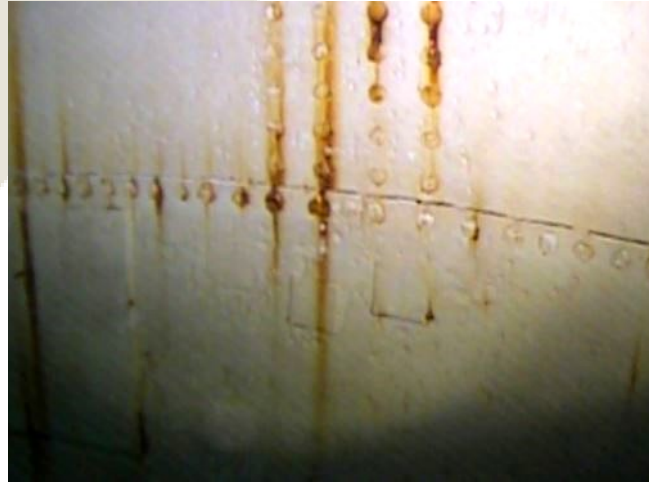
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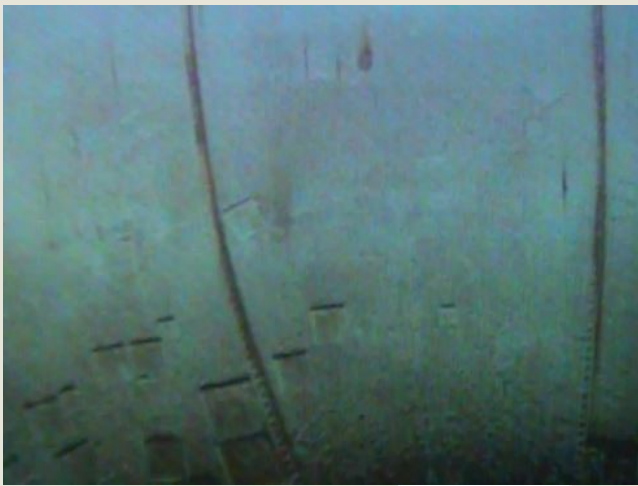
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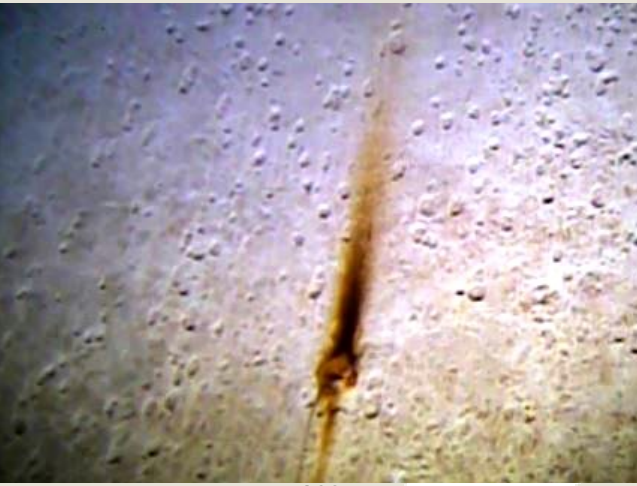
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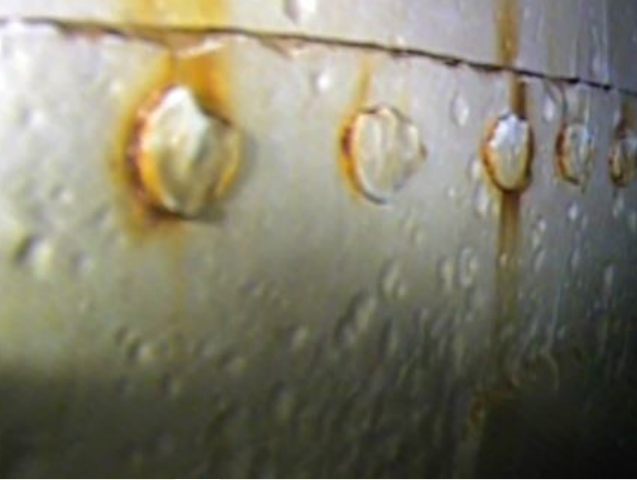
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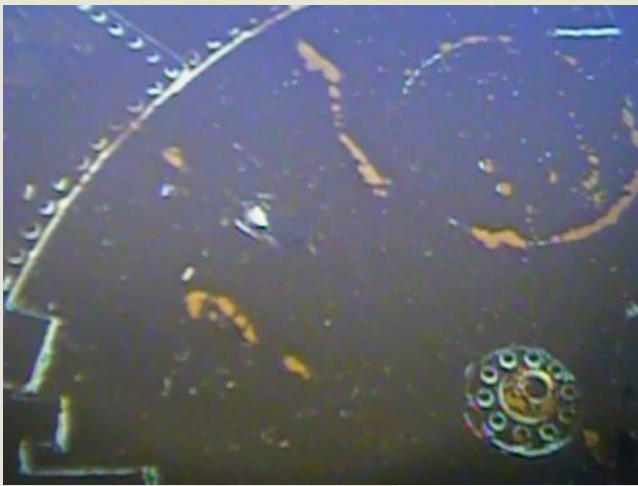
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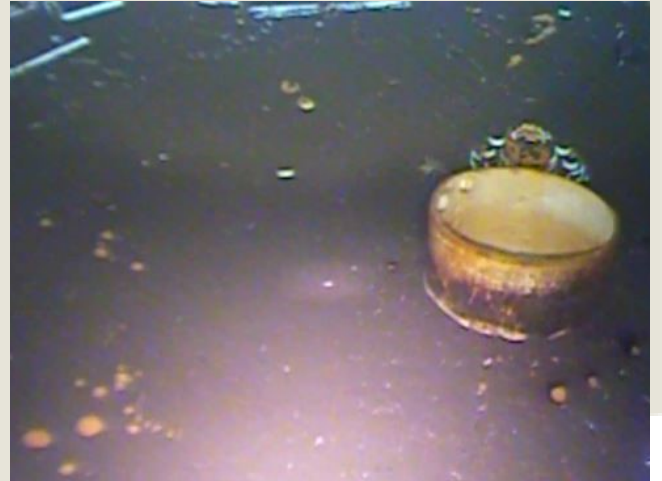
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July 18, 2018

Town of Gravelbourg

P.O. Box 359
Gravelbourg, SK S0H 1X0

Att: **Mr. Craig Faulkner**
gravelbourg.eng@sasktel.net

Tel: 306.648.3301 ext. 3

Re: **LMS Job #LM18004: Remotely Operated Vehicle Inspection
Gravelbourg Multi-legged Tank
Protective Coatings & Linings Report**

Dear Mr. Faulkner;

Exterior

The exterior of this tank is coated with an aluminum-filled alkyd which is in poor condition. There are many corroded areas, mainly amongst the riveted trellis legs and on the tank shell itself. There have been many patch repairs on this tank, and the weld seams of these patches are rusting due to inadequate surface preparation, stripe coating, and paint application at time of repair.

Interior

The interior of this tank is lined with what appears to be an epoxy type of system which is in poor condition. There are many corrosion cells throughout, likely many of them caused by ice damage, but most of them caused by Stress-Induced Plastic Deformation. The cold rolling process used to shape the tank plates results in Stress-Induced Plastic Deformation (SIPD). This phenomena appears as striations or pits running perpendicular to the crystalline stress lines, and is impossible to completely avoid or circumvent without adding stress loads to other components within the structure. It is caused by the steel trying to relax back to its original hot-formed shape by displacing ions to form bending planes via thinner areas. It is a prime area for corrosion to begin however, because it creates a sharp edge beneath the existing coating, and because this displacement of metal atoms is more of a chain reaction than an actual physical movement, the coating follows the original bonding pattern until the edge is formed and the coating becomes too thin, in turn starting a corrosion cell. This can lead to weakening of the structure and/or perforations and is the prime source of leaks in old water towers.

Sedimentation levels appear to be around 2 to 4 cm deep in the bottom of the bowl, and this was likely the cause of high turbidity readings in early spring when ice build-up on the walls released and slid down the bowl.

Recommendations – Coatings and Linings

The exterior of this tank will need to be removed and replaced with the next 1 to 4 years, before the corrosion between riveted surfaces becomes expanded and affects the structural integrity of the tower. This would involve complete enclosure, abrasive blasting to SSPC-SP10 Near-White metal clean, then applying an AWWA D-102 recommended system such as OCS-4, or OCS-6.

Within the next 1 to 3 years the interior lining of this tank should be completely removed via abrasive blast cleaning to SSPC-SP10 Near-White Metal Clean, then re-lined with an AWWA D102 ICS-4 or ICS-5 system. Any corrosion pits measuring more than 30% of the total thickness of the steel should be repaired by pool welding or welding in patch plates. If too much time goes by the corrosion cells on the interior walls will become leaks, which can be catastrophic in the winter months.

Please refer to quotation #18134 for budgetary pricing.

Replacement Consideration:

- Cost of Refurbishing the Gravelbourg Multi-Legged Tank: **\$1,900,000 - \$2,000,000**
 - Refer to Quote #18134 for pricing breakdown

Please note that a Finite Element Analysis is required to investigate the adequacy and structural stability of this tank based on the most recent building codes. Above pricing is based on a number of assumptions that require extensive analysis to confirm.

On-site structural evaluation includes complete access and comprehensive inspection of existing columns, plates, struts, braces, rods, and steel tank. Weld & Rivet examination and UT (ultrasonic thickness) testing will be included and the tank will need to remain empty for approximately 3 days.

Support structure foundations may need to be enlarged to increase their uplift capacity. Geotechnical investigations would need to be performed to confirm.

The on-site structural evaluation and geotechnical study will cost \$35 - 45,000.

- Replacement cost with 150,000 gallon Composite Elevated Tank: **\$1,850,000**
 - \$1,650,000 for new structure / tank.
 - Geotechnical report, site works, tank demolition allowance

The Industry recognized lifecycle for a D100 or D107 Welded Steel Tank is 80-100 years. This *riveted* tank is over 90 years old

Example: AWWA D107 Composite Elevated Tank:



Lifecycle cost results, 40 Year Period:

- New AWWA D107 Composite Elevated Tank Erected Year 1, Overcoated Year 20, Coatings Removed and Replaced Year 40

Water Storage Site - AWWA D107 Tank - 40 Year Life Cycle Cost Analysis (Net Present Value)				
Contractor	Capital Cost	Life Cycle Cost	Total Cost	Storage
Landmark	\$1,850,000.00	\$560,909.68	\$2,410,909.68	250,000
Net Present Value Calculation variables:			Inflation Rate	2.0%
			Interest Rate	3.0%

Conclusion:

It does not make financial sense to repair an antiquated asset (AWWA D100 Riveted Multi-Legged Tank) at an expense higher than replacing it with a significantly better, state of the art-asset (AWWA D107 Composite Elevated Tank) that is less expensive to maintain.

Also – the capital cost of repairing / refurbishing the existing tank is roughly the same as replacing it with a new, larger and more efficient tank. A new tank will be sized to allow for future growth, avoiding the large future cost of system capacity upgrades (a new elevated tank in future).

In addition to costs associated with the initial structural upgrades required on the existing tank, it is also important to note that the cost of maintaining the D107 Composite Elevated Tank is inherently lower than the cost of maintaining a D100 Multi-Leg Tank. It makes more sense in this case to have a lower maintenance asset in place sooner rather than later.

- The Composite Tank design has less surface area requiring paint.
- The least efficient (and most expensive) item to paint on a water tower is the legs. (The D107 CET Design has a concrete pedestal instead of legs.)
- All things equal, the cost of painting a D107 is always less than the cost of painting a Multi-leg tank.

Please let us know if you wish to explore this replacement option further. We would be pleased to meet with you to discuss this option in greater detail.

Should you have any questions or comments regarding the content of this report, please contact us at 905 319 7700.

Yours sincerely,



Dave Baker
Landmark Municipal Services ULC

July 18, 2018

Town of Gravelbourg

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Gravelbourg, SK S0H 1X0

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Tel: 306.648.3301 ext. 3

Re: **LMS Job #LM18004: Remotely Operated Vehicle Inspection**
Gravelbourg Multi-legged Tank
Quote #18134

Landmark Municipal Services is pleased to provide budgetary pricing for the following repairs & upgrades at the above mentioned potable water storage facility: **HST not included*

Security

- | | |
|--|----------------------|
| 1) Galvanized chain link fence recommended around perimeter of tank | \$ On Request |
| 2) Security gate required at bottom of vertical ladder | \$ 1,900 |
| 3) Install 'Town of Gravelbourg' keyed padlock on hatch to tank interior | \$ No Charge |

Valve Pit (below grade)

- | | |
|---|------------------|
| 4) Install new aluminum hatch / curb over existing opening | \$ 3,900 |
| 5) Pump / Drain all water out of valve pit and thoroughly inspect | \$ 2,000 |
| 6) Install sump basin and pump in pit | \$ 4,000 |
| 7) Budgetary price to replace all corroded piping and valves in pit | \$ 15,000 |

Support Leg Foundations

- | | |
|--|-----------------|
| 8) Remove vegetation / overgrowth from piers. Adjust grade | \$ 5,000 |
|--|-----------------|

Landing beneath tank bowl

- | | |
|--|------------------|
| 9) Reinforce Landing & replace grating with hot dipped galvanized material | \$ 20,000 |
| 10) Install mid rail and kickplate to existing handrail | \$ 5,000 |

Perimeter Catwalk

- | | |
|--|------------------|
| 11) Reinforce platform as required | \$ 20,000 |
| 12) Increase height of handrail to 42" | \$ 10,000 |

Accessories

- | | |
|---|------------------|
| 13) Supply and install galvanized ladder to valve pit | \$ 2,700 |
| 14) Remove and replace all ladders on water tower. Install fall arrest system | \$ 55,000 |
| 15) Supply and install 1pc rest seat on vertical ladder | \$ 1,500 |
| 16) Install new aluminum hatch and steel mounting curb on tank roof | \$ 6,000 |
| 17) Remove and upgrade tank vent system to 16" Stainless Steel frost proof
Combination vent / vacuum relief unit | \$ 6,500 |
| 18) Design, supply and install swing stage couplings for internal lining replacement | \$ 7,000 |
| 19) Roof handrail system required | \$ 15,000 |
| 20) Extend overflow pipe to grade level c/w spillway | \$ 20,000 |
| 21) Replace air craft warning light fixture, conduit, wiring | \$ 5,000 |
| 22) Relocate antenna cables from ladder siderails | \$ 7,500 |

Fall Arrest System

- | | |
|--|------------------|
| 23) Supply and install CSA certified fall arrest system on all ladders - <i>\$ included in item # 14</i>
<i>Fall arrest trolleys are available for \$675 ea</i> | |
| 24) Design, supply and install 5 pc transfer station D rings | \$ 10,000 |

Confined Space and Rescue

25) Design, supply and install 4 pc rescue port bases **\$ 20,000**

Coatings and Linings

A. INTERIOR LINING

Removal and replacement as recommended in *Coatings and Linings* report **\$ 300,000**

Allowance for unknown steel repairs – to be completed after sandblasting **\$ 75,000**

B. EXTERIOR COATINGS

Rigid scaffold / enclosure system **\$ 750,000**

Lead Abatement / Environmental **\$ 125,000**

Removal and replacement as recommended in *Coatings and Linings* report **\$ 400,000**

Allowance for unknown steel repairs – to be completed after sandblasting
& riveted seam sealant / repairs **\$ 100,000**

Summary

Tank Upgrades and Repairs: \$ 218,000

Coatings and Linings: \$ 1,575,000

Allowance for unknown steel repairs: \$ 175,000

Total Tank Refurbishment Budget \$ 1,968,000

Municipal Services

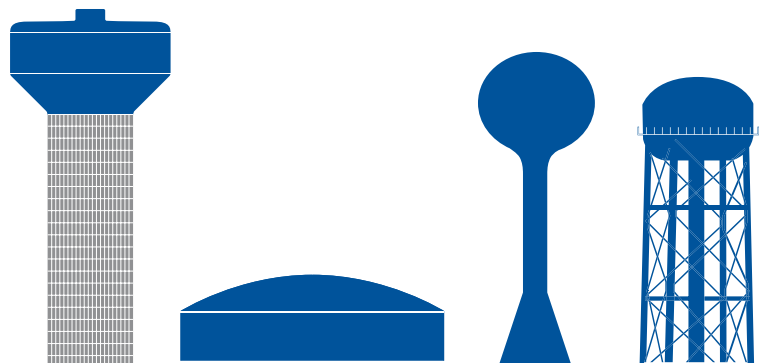
Storage Tank Maintenance

Extend Service Life

Single Source Responsibility



Expert Inspection, Maintenance And Repairs
For All Types Of Water Storage Tanks



Expert inspection, maintenance, and repairs for all types of water storage tanks

- Safe, efficient, issue-free operation of your water storage infrastructure
- Full compliance with all applicable regulations across Canada

Landmark Municipal Services (LMS) brings more than 30 years of insight and innovation in water storage to owners and operators of tanks and systems of all types. Our complete range of services and packages provide predictability, continuity and flexibility for this essential function of municipal governments.

Inspections

Regular, scheduled inspections are critical for long-term efficiency. LMS conducts various types of inspections, all with comprehensive reports detailing repairs performed or recommended and upgrade requirements, with photo documentation and related cost estimates.

CIR: Clean, Inspect & Report: AWWA (American Water Works Association) recommends that water storage tanks be washed out and inspected on a minimum three-year cycle.

SIR: Safety Inspection & Report: A thorough interior and exterior review of structure and operations for compliance with applicable government regulations.

ROV: Remotely Operated Vehicle: ROV inspections eliminate the inconvenience and expense of taking your tank out of service. LMS provides real-time, in-water evaluations with a remotely operated vehicle.

LMS inspections provide a complete review of all critical factors:

- Site works
- Foundations
- Support structure
- Ladders/landings
- Accessories
- Valves and piping
- Metal conditions
- Exterior coatings
- Interior linings
- Antenna and communications equipment
- Safety and rescue equipment



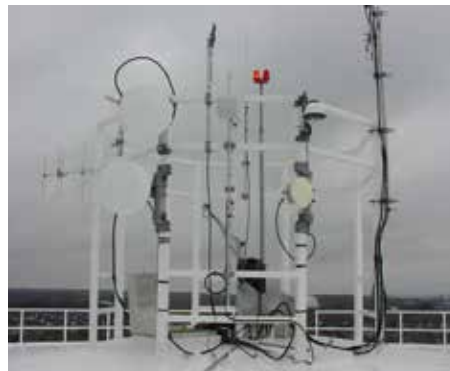
Safety Upgrades and Training

LMS can provide safe access and rescue systems that meet or exceed the requirements of the Occupational Health & Safety Act for “vessel entry and rescue” as well as “fall arrest.”



Tank Modifications

Skilled LMS professionals provide practical, proven and fully engineered modifications for all types of storage tanks, leveraging experience as one of the leading tank builders in North America. Our vertical integration adds design, fabrication and coatings expertise when needed, with single source management and responsibility.



Coatings and Linings

LMS services include all surface preparation and recoating of all interior and exterior areas. Options range from spot preparation to total blast cleaning with full containment for environmental protection. All lining materials applied to interior surfaces are ANSI and NSF 61 approved.





Inspections:

- Clean, Inspect & Report (CIR)
- Safety Inspection & Report (SIR)
- Remotely Operated Vehicle (ROV)

Safety:

- Confined space
- Fall arrest
- Training

Maintenance:

- Tank Asset Management Program (TAMP)
- Annual programs
- Coatings/linings

Lightning Protection:

- Design
- Installation
- Inspection

Antenna and Communications Systems

- Design
- Structural fabrication & installation
- Inspection

Demolition

- Partial
- Total

Modifications

- Engineering
- Tank hydrodynamic mixing systems
- Site works
- Balconies/handrills
- Manholes
- Hatches
- Venting and vacuum relief
- Welding and fabrication
- Electrical/instrumentation
- Heat trace
- Insulation and cladding
- Security systems

Landmark delivers consistent, high quality results.

Contact us today to discuss the best solution for your next project.



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www.teamlandmark.com • info@teamlandmark.com



Landmark Coatings

Specialty Mobile Operations

Uncompromising commitment to safety. World class technical skill. Go-anywhere mobility. Landmark delivers factory applied quality to your site.



 **LANDMARK**
Elevating Expectations

Developed and refined throughout 25 years of storage tank coatings and lining work, Landmark's specialty crews work wherever you need them...on projects that we design, fabricate and build, or on existing infrastructure requiring repair and recoating. The Society for Protective Coatings (SSPC) has recognized our technical skills and processes with their prestigious QP-1 certification, so you can rely on thoroughly tested multi-craft services on the most demanding jobs, with the added benefits of uncompromising safety and nationwide mobility.

We work in a wide range of applications for the private sector, the military and municipal authorities:

- Industrial facilities
- Oil and gas exploration and production
- Terminals
- Aircraft fueling facilities
- Petrochemical plants
- Lead abatement
- Water and wastewater



Landmark's uncompromising commitment to safety protects people, property and the environment. We apply equally rigorous standards for all locations, require ongoing training and testing for all crews, and utilize site evaluations, Hazard Identification and Risk Assessments (HIRA) and root cause analysis to continually drive performance improvement. Landmark employs the best available safeguards for the job, such as advanced, self-contained respiratory equipment on many applications. And we stay at the forefront of best practices and efficient reporting with our membership in ISNetworld. Core values and comprehensive safety and health programs, along with SSPC C-3 accreditation for de-leading steel structures, safeguards against environmental impact.

Skill

Landmark's technical capabilities start with specification assistance, based on in-depth knowledge of industry suppliers and their latest products, and insights from our own operations. Our crews are fully equipped to perform surface preparation and coatings work on virtually any type of steel structure, utilizing a broad array of coatings including polyurethanes, 100% solids and fiberglass reinforced systems. Our crews perform all coatings work in accordance with the Landmark Quality Assurance Manual for Surface Preparation and Coating. They are trained to implement all of the required process controls and conduct workmanship inspections to meet or exceed all applicable standards and client expectations.



Routine quality evaluations include but are not limited to:

- Measurement of environmental conditions
- Verification of surface cleanliness prior to coating or lining
- Wet and dry film thickness measurement
- Holiday testing (low or high voltage, depending on lining thickness)

Daily logs track all inspection activity, and are available upon request.

Specialized equipment enables Landmark to manage dehumidification on work in enclosed spaces such as tank lining and recoating, and to protect the environment with blast media recycling and a full or partial containment on exterior surface preparation and coating. In addition, site specific plans for environmental monitoring, hazardous material management, and disposal of wastes are developed for all tank rehabilitations where existing coatings contain toxic metals. And for high-profile projects with community impact, Landmark has perfected the art of translating even the most intricate graphics to the public stage with precise reproduction. The utilization of dust collection systems ensures complete extraction of dusts for not only a cleaner surface prior to paint application, but as well as containment of dusts generated. This provides necessary air exchanges for confined space work.

Mobility

Landmark capabilities are completely mobile for deployment nationwide or beyond, without limitations. Specially outfitted trailers move containerized equipment to the project site, and then serve as mobile command centers for the crews. All required assets are at hand, coordinated with local supply lines as appropriate.





You can count on Landmark Mobile Specialty Coatings to reliably protect your investment and extend the life of critical infrastructure. Contact us today to discuss the best solution and a quote on your next project.



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Phone 905.319.7700 Fax 905.319.1373

www.teamlandmark.com



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