"You Want to Do What?"
Managing Risk for a First-of-its-kind Project

LASALLE CANAL MGP SITE

Dave Lowry (AECOM), Andy Burkemper (AECOM) & Dave Palmer (Ameren)

November 22, 2019

Agenda

1

Introduction to MGP & Ameren's MGP Program

2

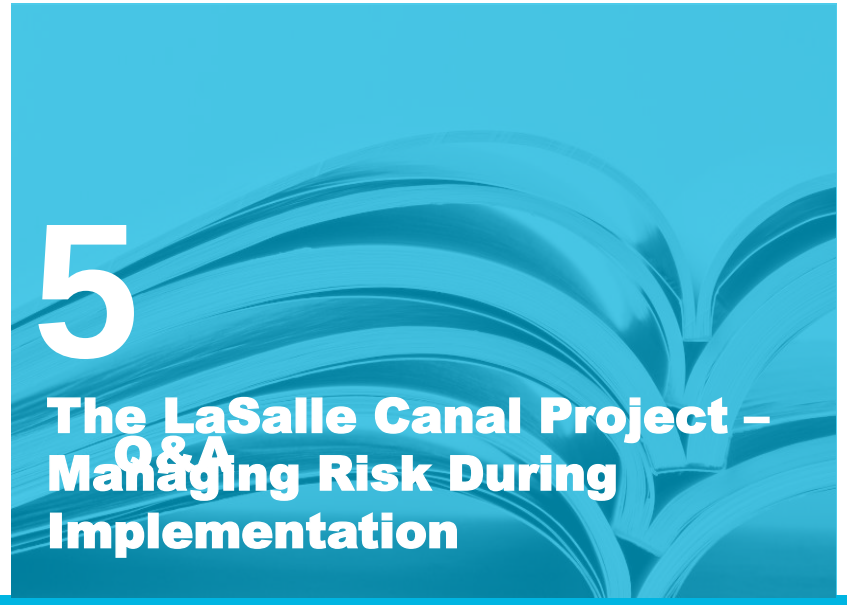
The LaSalle Canal Project – Identifying Issues

3

The LaSalle Canal Project – Finding a Solution

4

The LaSalle Canal Project – Getting to Approval



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The LaSalle Canal Project – Managing Risk During Implementation

Q&A

6

Q&A

Introduction to MGP

Manufactured Gas Plants (MGPs)

- Common from early 1800s to mid 1900s
- Converted coal/oil to gas for use in lighting, heating & cooking
- One in every city, up to 5,000 sites nationwide
- Produced various byproducts, including coal tar
- Ultimately replaced by natural gas
- Modern environmental liability

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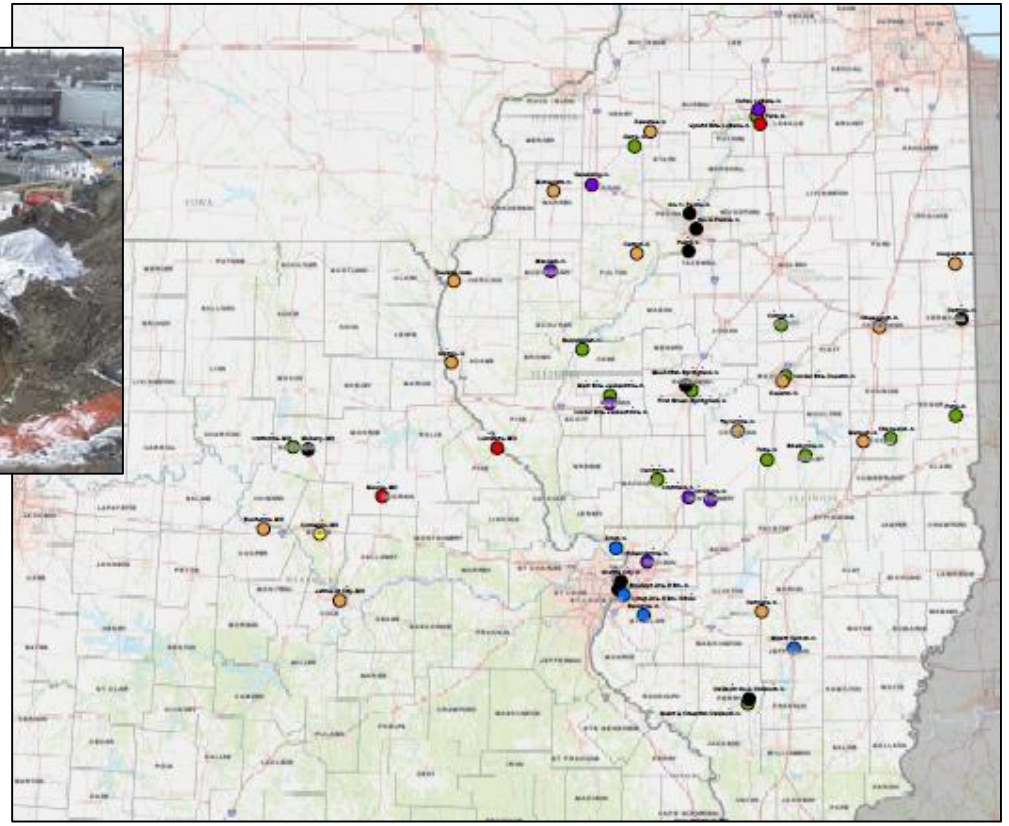
Ameren's MGP Program

- **55 former MGP sites in 3 states**
- **Started on identification, investigation, & remediation in 1986**
- **Currently working on a portfolio of 16 sites in Illinois**
- **Objective to achieve closure on all sites by 2023**
- **Historic approach to site remediation centered on excavation & landfilling**
- **Expanding review of options for remedy selection**

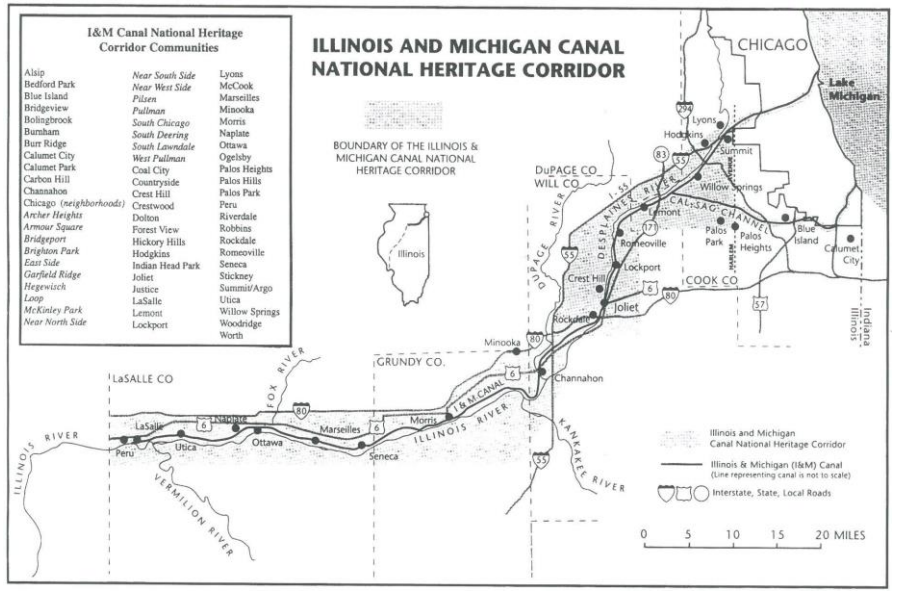


Ameren's MGP Program
LaSalle Canal Project Site Overview

I&M Canal Opened in 1848

97 Miles Long

Chicago to LaSalle/ Peru Linked Great Lakes to Gulf of Mexico



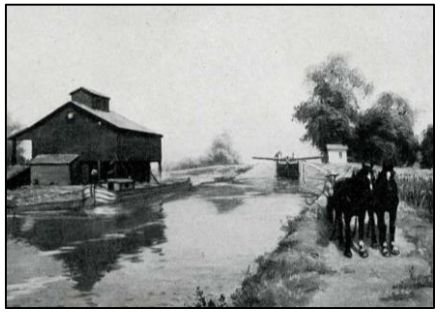
60' Wide x 6' Deep

Barges Towed by Mules

Series of 15 Locks

Replaced by Chicago Sanitary & Ship Canal in 1933


Fleet at Illinois and Michigan Canal Lock.
Photo by Frazer



LaSalle MGP Site Located Below Last Lock of I&M Canal

Operated From 1903 to 1943

Coal Tar Impacts Found in Canal

Canal Site is 250' Wide by 3,100' Long & 17.5 Acres

Water Depth Depends on River Stage & Zero to 20'+ Deep

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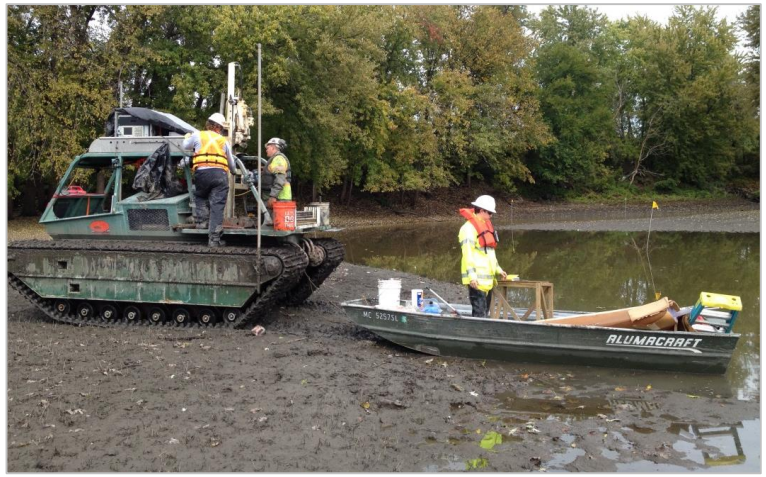
The LaSalle Canal Project – Identifying Issues
(2004-2015)

Investigation Summary

- Sediment sampling
  - 469 samples from 138 borings
  - Geoprobe®, HSA, HA, Vibracore
  - Lab analyses
    - Chemical, forensic, geotechnical
- TarGOST (Tar-specific Green Optical Screening Tool)
  - 118 locations, ~23’ deep



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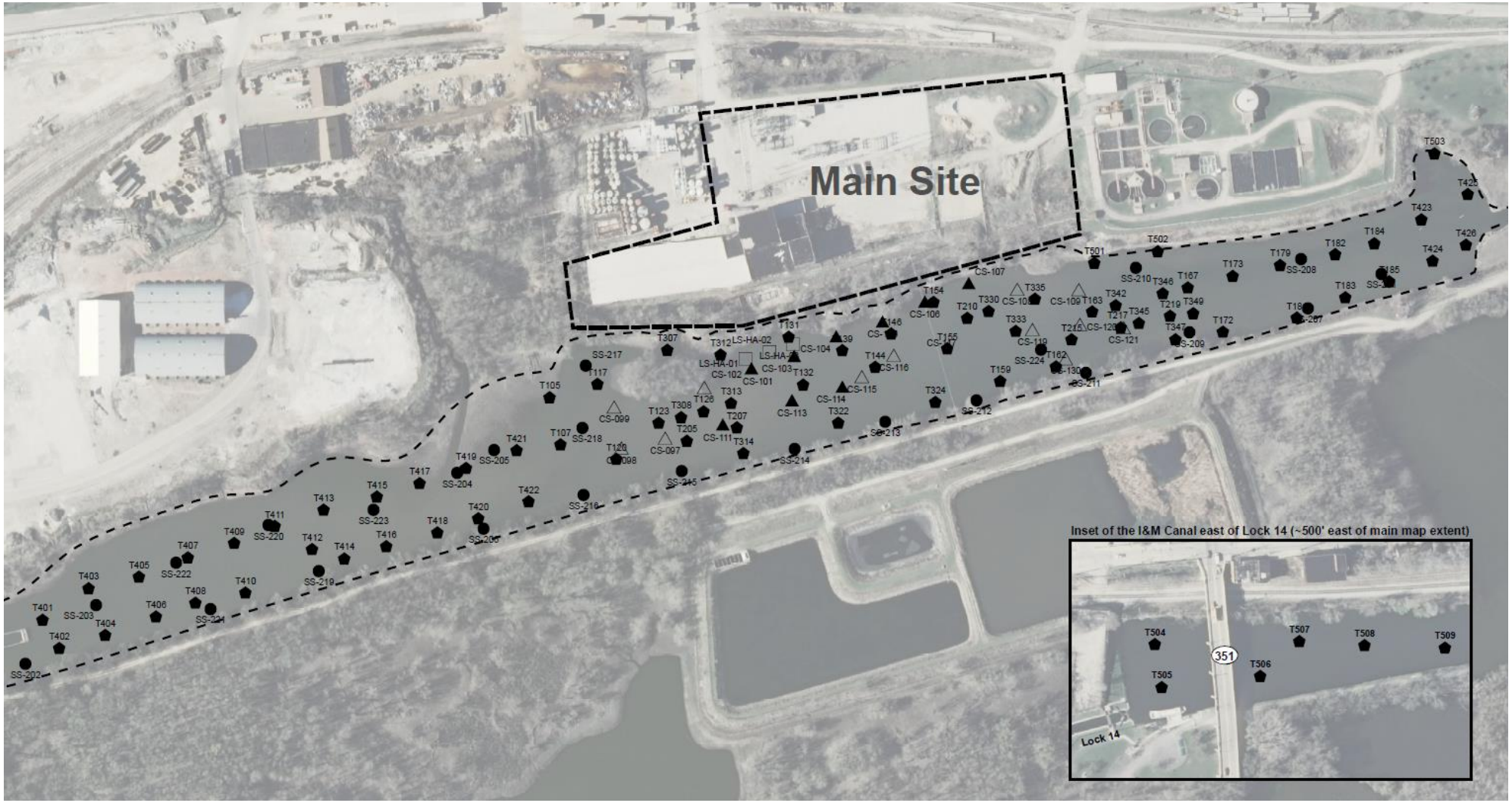
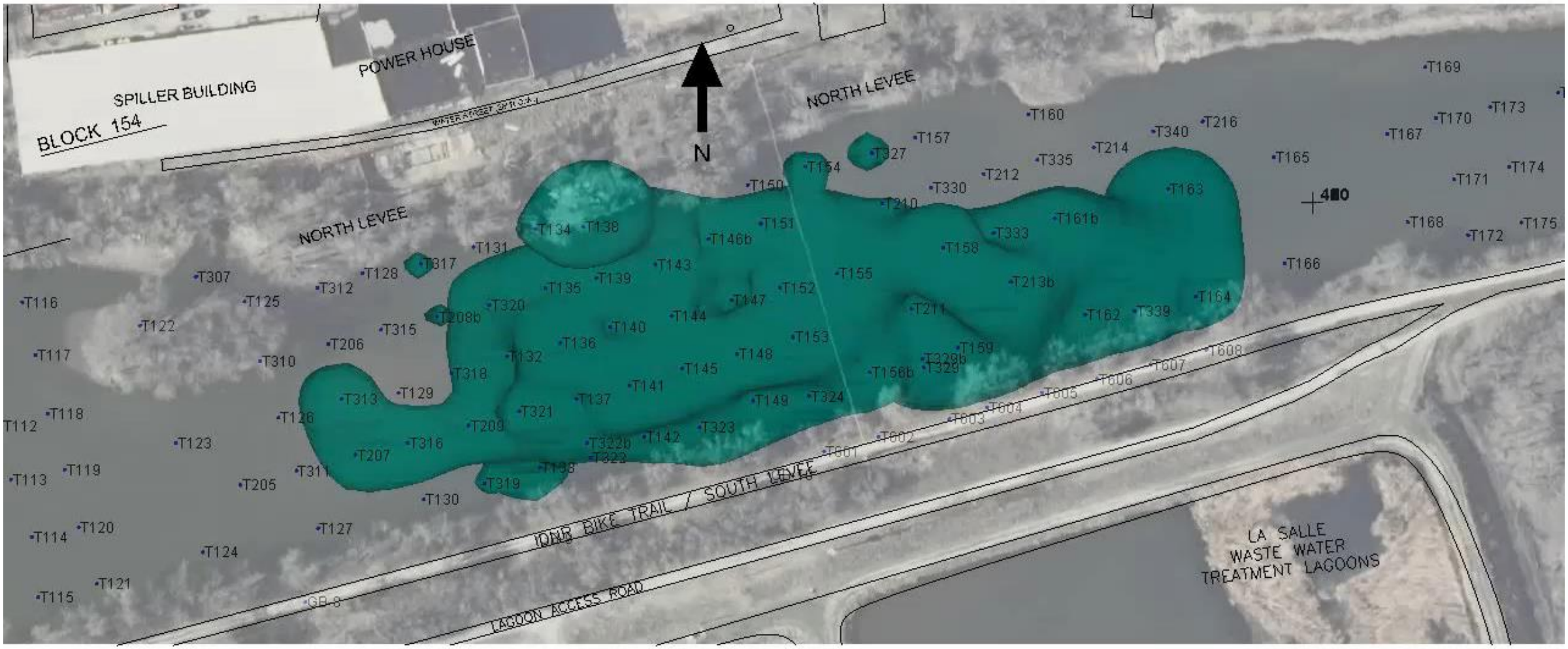
The LaSalle Canal Project – Identifying Issues



The LaSalle Canal Project – Identifying Issues

Site Investigation/Impact Delineation



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The LaSalle Canal Project – Identifying Issues

Multiple Stakeholders & Multiple Stakeholder Interests

- **Ameren –** remove future environmental liability associated with MGP impacts
- **IEPA –** remedial action that results in an acceptable level of risk to ecological & human health
- **IDNR –** enhance the possible use options of the natural resource; minimize negative impacts to the natural resource while remedial action is ongoing
- **City of LaSalle –** enhance options for public & private use of the canal; no impact to City's existing wastewater management system
- **Neighboring Facilities/Property Owners –** no negative impacts to their operations

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PROJECT STAKEHOLDER MANAGEMENT

- Identify stakeholders
- Stakeholder management/communications plan
- Control stakeholder engagement (communications, permitting, formal agreements)

Addressing Multiple Interests Often Increases Complexity of Project/ Project Design, Thereby Increasing Number of Project Risks

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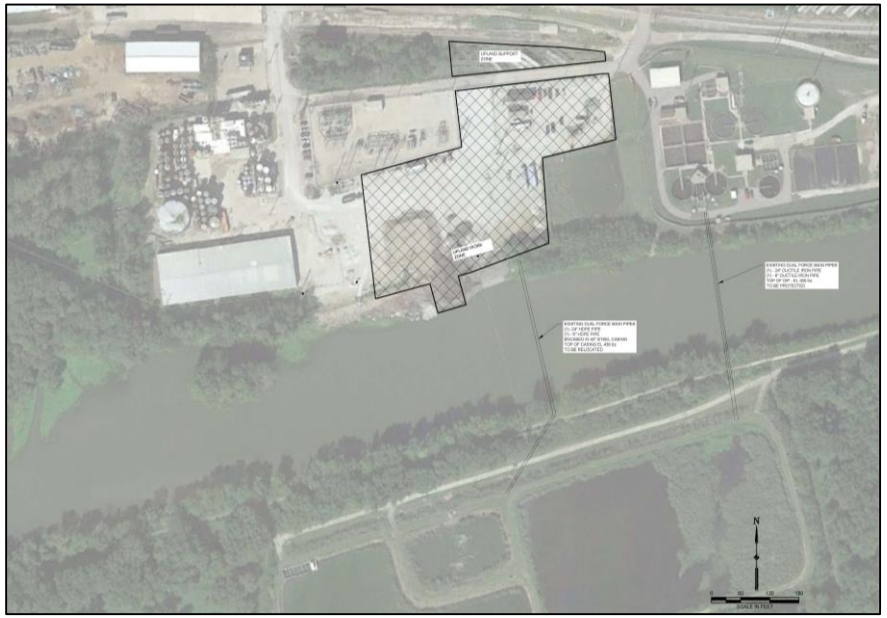
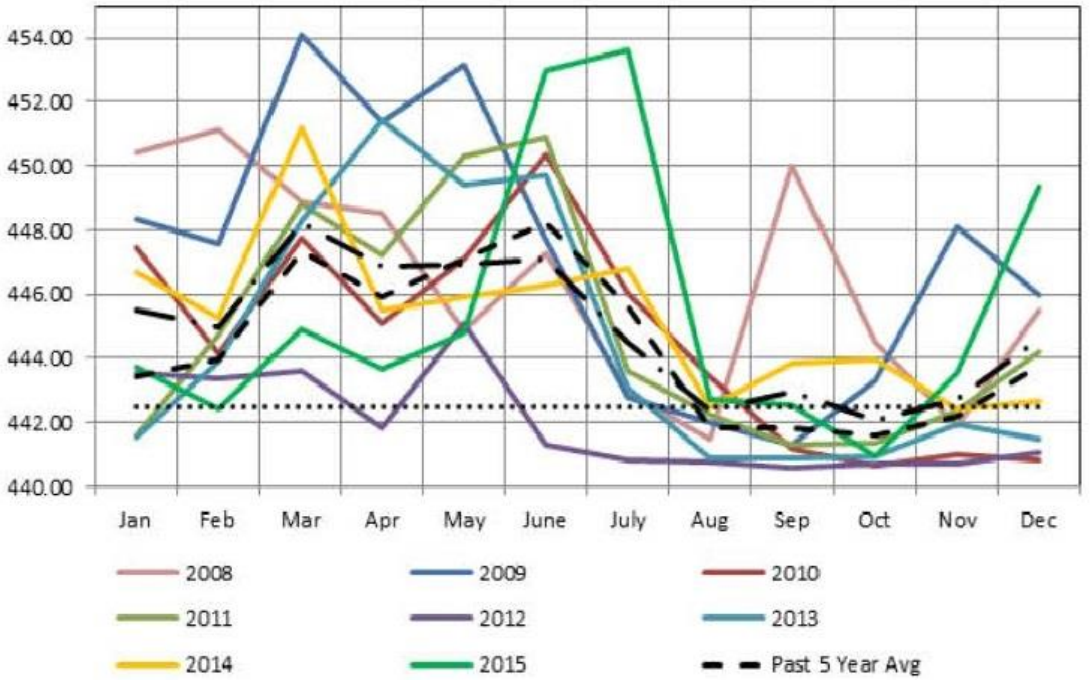
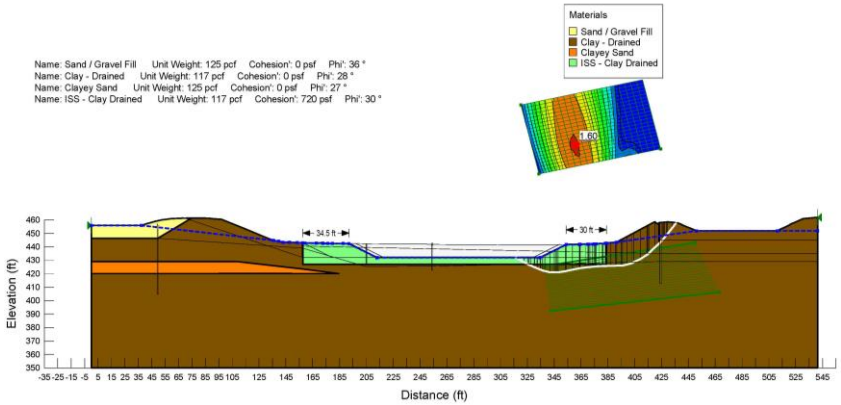
The LaSalle Canal Project – Identifying Issues

- Bank stability
- Overhead & underground utilities
- Significant water level fluctuation
- Constrained support area
- Navigable waterway within canal

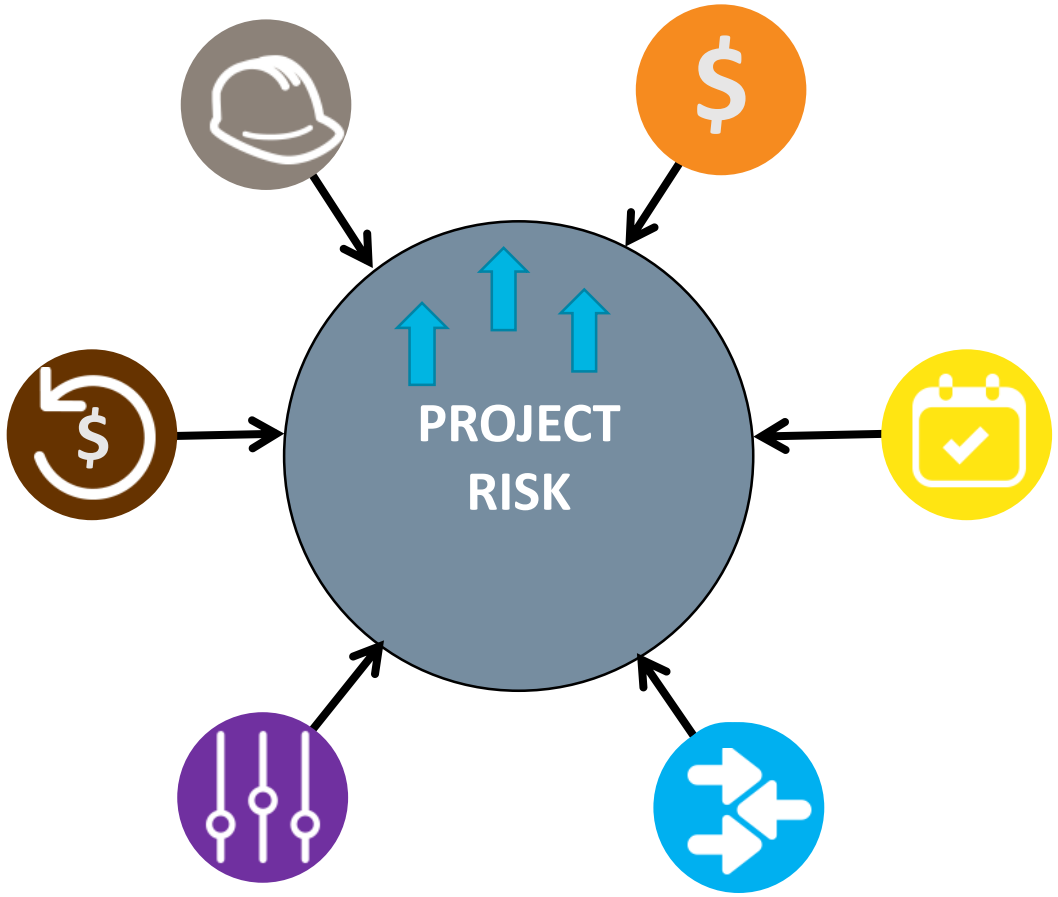






The LaSalle Canal Project – Finding the Solution
(2016-2018)

Now What? What Is The Path to An Ameren Approvable Project?



- Safety
- Remove Health & Ecological Risk
- Competing Stakeholder Interests
- Changing Conditions
- Cost of Delayed Implementation
- Budget Certainty

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The LaSalle Canal Project – Finding the Solution

Initiated an Extensive Remedial Action Alternatives Analysis

Excel Spreadsheet Created to Facilitate Analysis of Various Options

- >10 remedial options with alternative approaches considered
  - Leave all impacted sediment in place & cap
  - Excavate all impacted sediment
  - Solidify all impacted sediment (ex-situ & in-situ options)
  - Utilize various available human health & ecological risk analysis/modeling
  - Combinations of all of the above
  - Etc.
- 26 outcomes evaluated for each remedial option
- Spreadsheet produced a score for seven stakeholder decision areas

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PLANNING PROCESS GROUP

- Those processes performed to establish the total scope of effort
- Define & refine the objectives
- Develop the course of action to attain objectives

The LaSalle Canal Project – Finding the Solution
Alternatives Analysis

Remedial Objective & Method Base	Removal of MGP-Related Impacts AND Engineered Capping		Removal, Stabilization, and Capping
OPTION	**M**	**N**	**O**
Remediation Scenario	Removal of Primary Impacts to 10'. Capping the excavation footprint and Secondary Impacts >22.8 ppm in top 5'	Removal of All Primary Impacts to 10' and 70% from 10-15'. Capping the excavation footprint and Secondary Impacts > 22.8 ppm in top 5'	Removal of Primary Impacts to 10'. Stabilizing the remaining primary impacts and capping Secondary Impacts >22.8 ppm in top 5'
Removal Depth[2]	Shallow	Moderate	Shallow
Impacts Removed	Primary	Primary	Primary
Impacts Capped	Secondary>22.8ppm	Secondary > 22.8ppm	Secondary >22.8ppm

	Engineered Capping				RFP Scope
S	**T**	**U**	**V**	**W**	**X**
Removal of Impacts to Navigable Width and Depth and Capping Pool and Channel and Cap All Secondary Impacts >22.8 ppm in Top 5'	Cap Area(s) of Existing Exposure Risk (Secondary Impacts >22.8ppm) in Top 5'	Remove 2' and Cap Area(s) of Existing Exposure Risk (Secondary Impacts >22.8 ppm) in Top 5'	Cap Entire Area	Remove 2' and Cap Entire Area	Stabilize banks and remove impacts through the middle of the Canal. Benthic cap as restoration cover layer.
Shallow	NA	Shallow	NA	Shallow	Moderate
(Removal not impact-based)	NA	NA	NA	NA	Primary
Secondary >22.8ppm	Seconary >22.8ppm	Secondary >22.8ppm	All	All	Cap not impact based

Stakeholder Requirement Rankings	**Relative Cost**	**8**	**11**	**12**
	Exposure	**13**	**9**	**11**
	Remaining Liability	**13**	**12**	**3**
	Navigability	**14**	**12**	**13**
Overall	**Raw Score**	**48**	**44**	**39**
	Raw Rank	**13**	**11**	**7**
	Cost-Weighted Score	**64**	**66**	**63**
	Cost-Weighted Rank[4]	**7**	**9**	**5**

10	**2**	**4**	**3**	**7**	**14**
14	**20**	**16**	**18**	**15**	**7**
16	**22**	**20**	**21**	**17**	**5**
2	**18**	**17**	**22**	**16**	**6**
42	**62**	**57**	**64**	**55**	**32**
10	**19**	**17**	**20**	**15**	**3**
62	**66**	**65**	**70**	**69**	**60**
4	**9**	**8**	**13**	**11**	**3**

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The LaSalle Canal Project – Finding the Solution

Project Risk Register – Version 1

- **49** project risks identified
- Financial impact of all risks

~$22M

* Engineer's estimate of total project cost = $38M

Risk Management Register

0	Open Red Risks
0	Open Yellow Risks
3	Open Green Risks
1	Risks w/no Response Strategy
2	Closed Risks

Project Name: LaSalle Canal
Project Manager: Dave Palmer
Start Date: 6/19/2017

Plant:
Unit:
Updated On: 6/19/2017
Overall Project Risk Indicator: #VALUE!

Risk Level

Legend: Impact
1 - Negligible
2 - Marginal
3 - Significant
4 - Critical
5 - Catastrophic

Probability
1 - Rare
2 - Unlikely
3 - Possible
4 - Likely
5 - Certain

Item	Project Phase	Risk Status (5)	Risk Category (1,2,3,4,5,6)	Potential Impact (Cause and Effect)	Risk Response Strategy	Triggers (Indicators that the risk will occur)	Estimated Schedule Impact (Days)	Maximum Exposure	Estimated Exposure (Contingency) (6)	Action Owner (4,5)	Start Exposure	End Exposure	Baseline Risk Scoring: Impact: Tech Perf	Schedule	Cost	Safety	Probability	Risk Ranking	Current Risk Score: Impact: Tech Perf	Schedule	Cost	Safety	Probability	Risk Ranking (6)	% of Contingency (6)	Risk Indicator: % of Contingency vs Risk Ranking (6)
								$23,252,111	$6,171,620																	
1	Design	Closed	Regulatory	Stakeholders (i.e., IEPA, IDNR, etc.) don't agree with pre-delineated approach of sediment removal with no confirmation samples	Reevaluate remedial approach to consider confirmation sampling or other alternatives	stakeholder disapproval of pre-delineated approach	90	$250,000	FALSE	Design Consultant	06/30/17	08/31/17		4	3	1	0	0					0	0	0%	0.00
2	Design	Closed	Regulatory	Stakeholders (i.e., IEPA, IDNR, etc.) don't agree to passive remedial approach (i.e. property restrictions) to the east of the remedial area	Reevaluate remedial approach to consider active remediation in eastern area or other alternatives	stakeholder disapproval of eastern area approach	90	$750,000	FALSE	Design Consultant	06/30/17	08/31/17		3	3		0	0					0	0	0%	0.00
3	Design	Open	Regulatory	Approval for MOU and/or RAP delays schedule	Initiate approval process early	failure to receive approval letters by schedule date	45	$10,000	$250	Design Consultant	06/27/17	11/01/17		2	2		3	4		3			1	3	0%	0.00
4	Design	Open	Schedule	Inability to obtain required permits before desired work start dates (currently 3/1/17)	Submit COE permit application no later than 11/1/2017 Submit IDNR permit applications no later than 1/15/18	failure to receive permit correspondence by schedule date	30	$63,000	$6,250	Design Consultant	06/27/17	02/28/17		3	3		2	6		3	3		2	6	0%	0.01
5	Design	Open	Schedule	Quality Liquid Feeds (QLF) denies Ameren use of former Main Site property as a support area during Canal Site remediation, reducing the land available for remedial support	Reevaluate land support requirements and layout. Use additional barges within canal to stage and solidify/dewater dredged sediment.	QLF refuses to sign appropriate access agreement with Ameren	60	$500,000	$52,500	Design Consultant	06/27/17	10/02/17	3	3	3	3	2	6	2	3	3	2	2	6	1%	0.05
7	Design	Accepted	Operational Impact	Changes in sewer force main design exceed existing capacity for pumps	New sump will be required	Design calculations indicate that the proposed design for the sewer force main will exceed the existing pump capacity		$187,000	$159,885	Design Consultant	06/27/17	09/01/17	1	2	2	3	5	10	1	2	2	2	5	10	3%	0.25
8	Design	Accepted	Performance	Water turbidity during dredging operations exceeds allowed limits	Performance based specification requiring turbidity curtains around dredge work area as a contingency measure	Turbidity monitors indicate issue.		$62,500	$1,313	Design Consultant	06/27/17	09/01/17		1	2		5	10		1	1		1	1	0%	0.00
9	Remediation	Open	Performance	Water turbidity during dredging operations exceeds allowed limits following implementation of initial contingency measures	Reduce rate that dredging is occuring	Turbidity monitors indicate issue.				Construction Manager	06/27/17	09/01/17		1	2		5	10		1	1		1	1	#VALUE!	#VALUE!
10	Design	Accepted	Construction	Sediments are not able to pass required stabilization quality controls following ISS	Perform bench scale study using soil/sediment samples from canal to confirm additive type and mix rate to determine material types and mix ratios that will achieve required QC parameters	Insufficient fields at time of ISS result in UCS and hydraulic conductivity values below QC requirement		$11,000	$375	Design Consultant	06/27/17	09/01/17		3	2		5	15		1	1		1	1	0%	0.00

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PMBOK®
IDENTIFY RISKS
- Brainstorming
- Assumptions analysis
- Influence

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PMBOK®
OUTPUT: RISK REGISTER
- List of project risks
- Identified potential responses
- Probability & impact
- Risk categorization

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The LaSalle Canal Project – Finding the Solution

"You Want to Do What?" – Actual Quote from Ameren Leader

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PLAN RISK RESPONSES

- The process of developing options & actions to enhance opportunities & to reduce threats to project objectives

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The LaSalle Canal Project – Finding the Solution

Advantages

- Provides opportunity for regular review, input & buy-in from multiple stakeholders from concept to final stages
- Progressive design with constructability review leads to progressively increasing cost & schedule certainty
- Project risks identified early & often
- Design process considers risk response strategies (e.g., avoid, transfer, mitigate, accept, etc.)
- Contractors have input & responsibility for 95% design package

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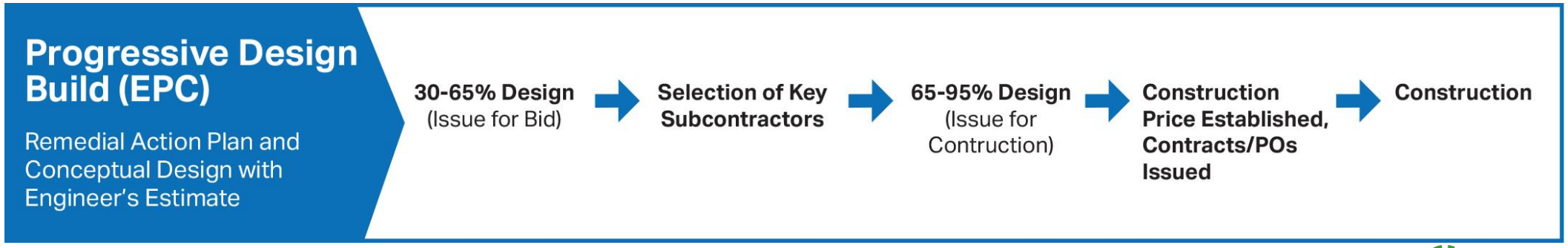
PROJECT MANAGEMENT PROCESSES

- "The application of the project management processes is iterative, & many processes are repeated during the project"
- "The Define Scope process can be highly iterative"
- "The iterative nature of project management means that the processes from any group may be reused throughout the project life cycle"
- An iterative process, because new risks may evolve or become known as the project



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The LaSalle Canal Project – Finding the Solution

First Action . . . Need a Second Alternatives Analysis

- Further evaluate top four options & various available combinations
- Incorporate a cursory evaluation of some key risks identified

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PMBOK®
PROJECT RISK MANAGEMENT
IDENTIFY RISKS
- Brainstorming
- Expert judgement

QUALITATIVE RISK ANALYSIS
- Risk urgency assessment
- Risk categorization

The Outcome . . .

- In-situ sediment stabilization, along with dredging

Remediation Alternative Analysis

Objective	Measure	Weight	Alternative # 1 - Excavate and dispose impacted sediment above the RO			Alternative # 2 - In-situ physical or chemical stabilization/solidification of impacted sediment above the RO			Alternative # 3 - Excavate and dispose impacted sediment above the RO to an elevation of 432'. Place permeable reactive barrier over impacted sediment present below an elevation of 432' that is above the RO.			Alternative # 4 - Excavate and dispose impacted sediment above the RO to an elevation of 432'. Perform ISS of impacted sediment below an elevation of 432' that is above the RO.		
Enhances ecological/recreational value of site		Must		Yes*			No			Yes*			Yes*	
Allows for the possible future use as access to Illinois River or marina		Must		Yes*			No			Yes*			Yes*	
Safety	Adhere to Ameren Rules to Live By and AECOM Life Preserving Principles	Must												
Permanent remedy that reduces long-term risks and O&M requirements		10		10	100		7	70	Surface prep will create a slurry from a water blast that will have to managed. Caustic issues with concrete?	6	60	Manage the cleaning of the pipe for surface preparation	8	80
Minimze impact of canal water level fluctuations on construction schedule		7		3	0		8	56		3	0		6	42
Minimize construction schedule duration	Number of calendar days	8	5 to 6 weeks (two shifts, 7-days)	5	40	300-700 cy/day	8	64	300-700 cy/day	6	48	300-700 cy/day	7	56
		6	Maximum performance is better in tension. Delamination concerns. Humidity, temperature, and moisture affect installation.	10	60	Maximum performance is in tension, not compression. Delamination concerns. Humidity, temperature, and moisture affect installation.	5	30	Less impacts due to temperature and humidty. Shrinkage and delamination concerns.	8	48	Does not require host pipe for structural support. Surface can be wet before	10	60
Maximize ability to leverage a proven solution	Confidence in solution	6	Can carry the railroad load at the damaged section.	10	60	Cannot carry the load at the RR damaged section w/o CFRP.	6	36	Cannot carry the load at the RR damaged section w/o CFRP. Concerns over gunnite cracking/delaminating/ shrinkage.	6	36	Can carry railroad load at damaged section	9	54
Minimize operational interruptions to Material Handling	Fuel supply or bi-product flows (sulfur, slag etc.)	4	5 to 6 weeks. Impacts to track # 4.	7	28	4 to 5 weeks. Impacts to track # 4.	8	32	3.5 weeks. Impacts to track # 4.	10	40	4 weeks. Impacts to track #4	9	36
Maximize ability to withstand future loads (weight above pipe) ash, RR tracks and equipment	Surcharge capacity and live load (trains)	1	Can carry the railroad load at the damaged section.	10	10	Cannot carry the load at the RR damaged section w/o CFRP.	6	4	Cannot carry the load at the RR damaged section w/o CFRP. Concerns over gunnite cracking/delaminating/ shrinkage.	6	4	Can carry railroad load at damaged section	10	10
	Higher weight (not used)	4												
Final Score					432			511			511			600
Rank					4			5			2			1

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The LaSalle Canal Project – Finding the Solution

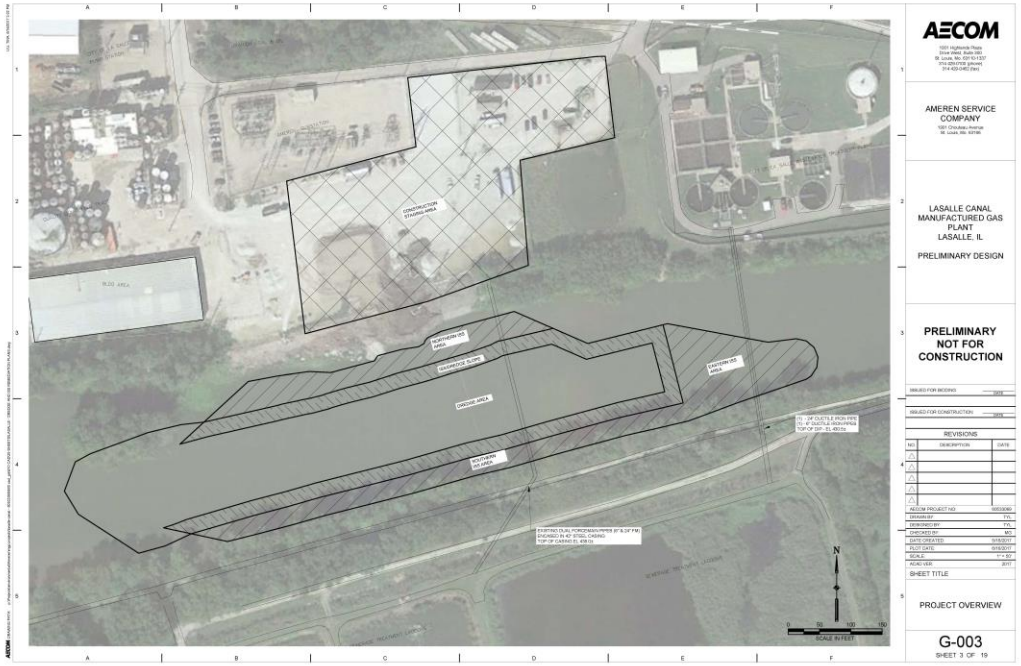
Design Challenges

- ✓ Bank stability
- ✓ Navigable waterway within canal

TBD – overhead & underground utility issues

TBD – significant water level fluctuation

TBD – constrained support area



ISS to Provide for Bank Stability & Concurrently Solidify & Immobilize Contaminated Media

Dredging to Address the Desire for a Navigable Waterway, & Removal of Contaminated Media

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The LaSalle Canal Project – Getting to Approval

Progressive Design Build (EPC)

Remedial Action Plan and Conceptual Design with Engineer's Estimate

30-65% Design (Issue for Bid) → **Selection of Key Subcontractors** → **65-95% Design** (Issue for Contruction) → **Construction Price Established, Contracts/POs Issued** → **Construction**

YOU ARE HERE
May, 2017

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RISK STRATEGIES
- Avoid
- Transfer
- Mitigate
- Accept

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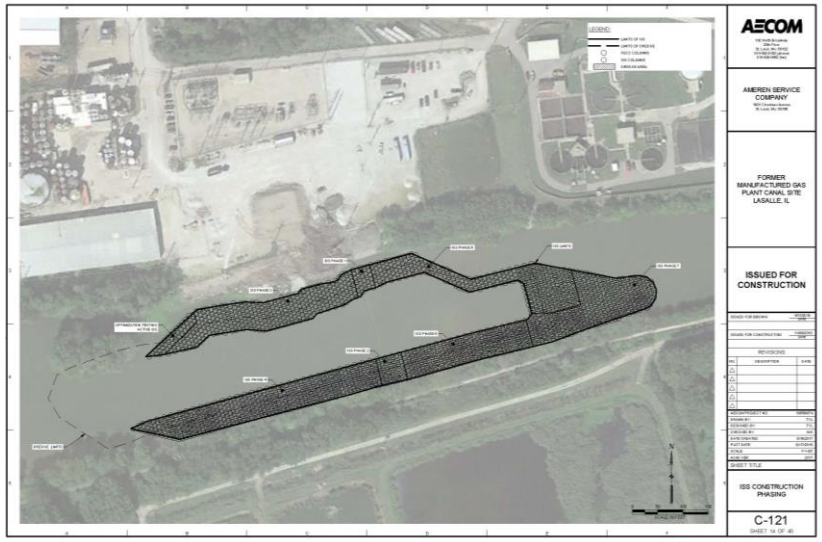
The LaSalle Canal Project – Getting to Approval

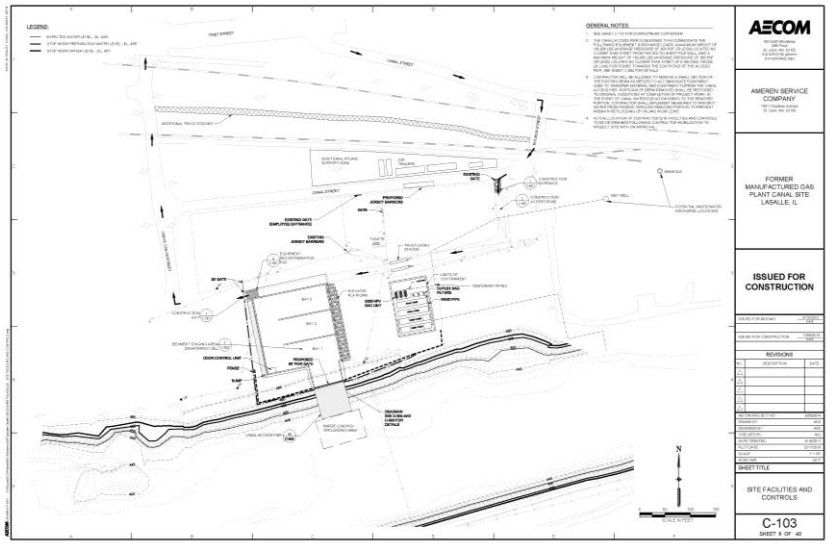
ISS

Bank stability; contaminated media solidification



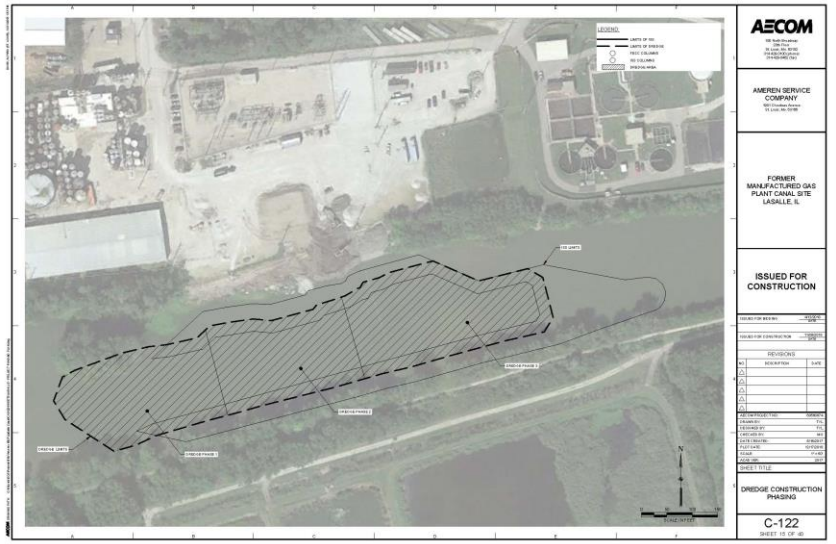
Property access agreements

Work area adjacent to canal



Dredging

Navigable waterway; removal of contaminated media



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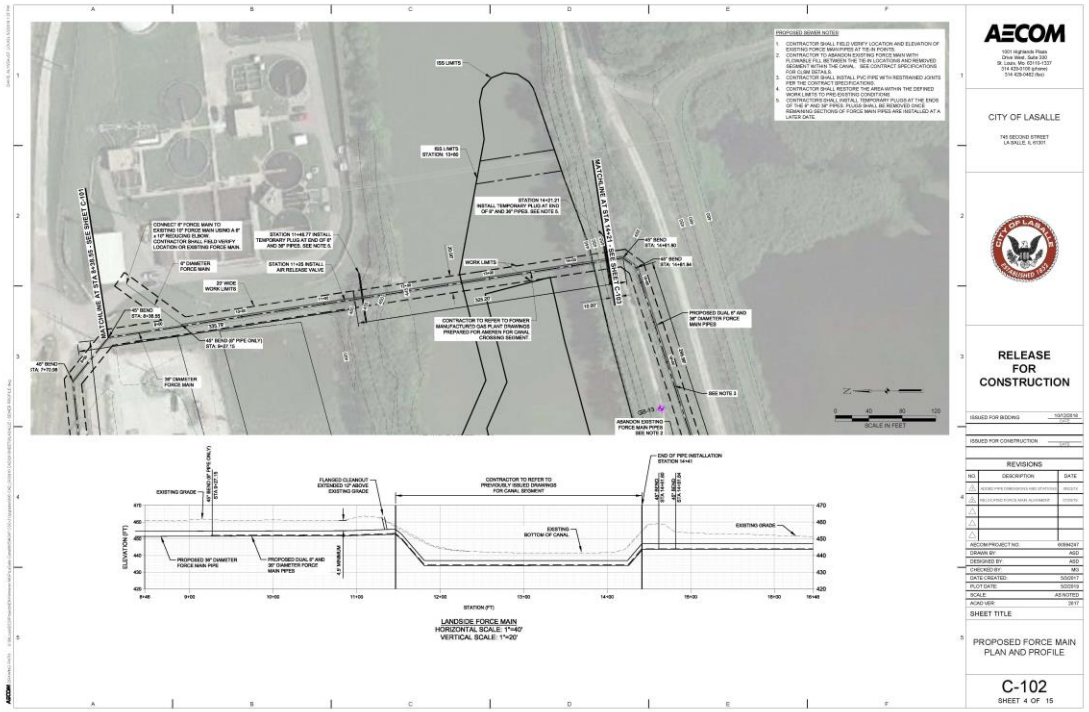
The LaSalle Canal Project – Getting to Approval

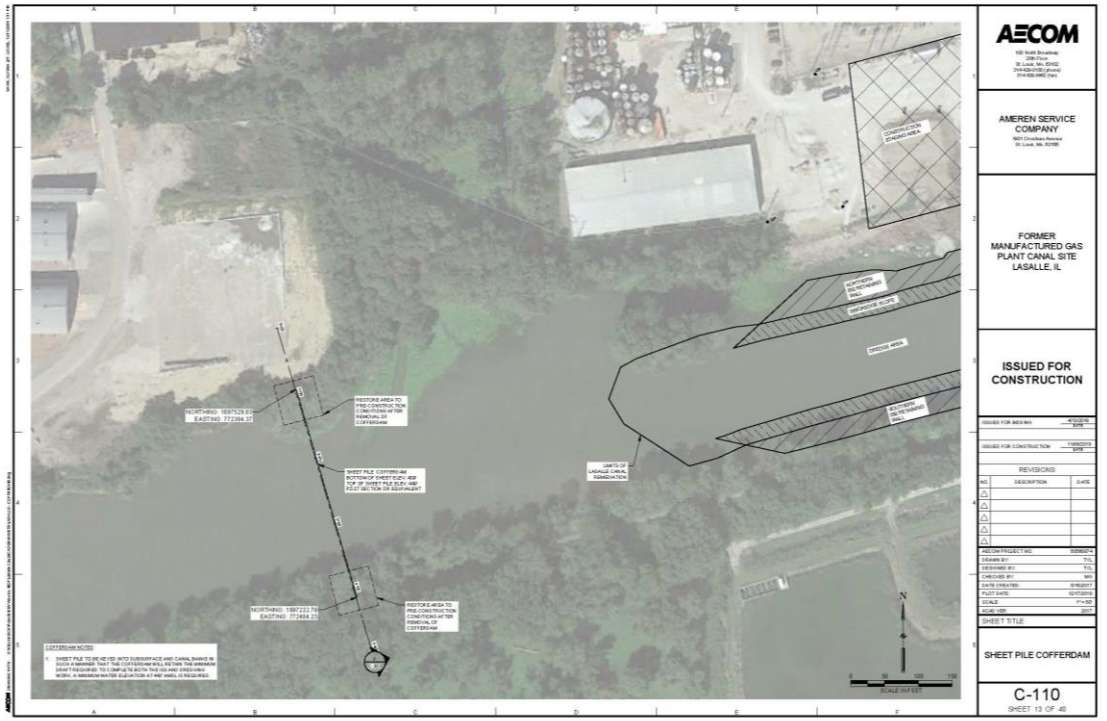
Relocate and upgrade existing force main

Utility located within remediation



Cofferdam

Better control of water level within remediation area



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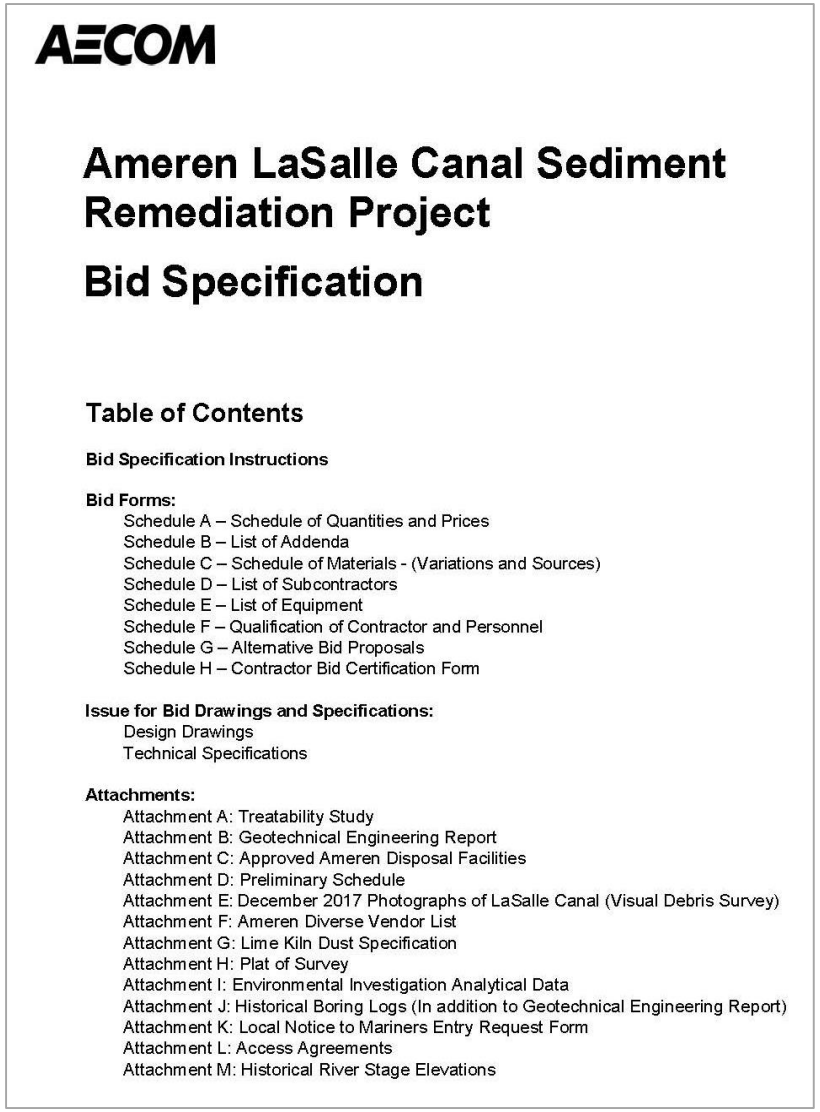
The LaSalle Canal Project – Getting to Approval



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Ameren LaSalle Canal Sediment Remediation Project

Bid Specification

Table of Contents

Contractor Bid Evaluation & Scoring

- 27 separate criteria evaluated
- Evaluated outcome with & without weighting of various critical items
- Performed a separate cost sensitivity analysis

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PMBOK®

ACQUIRE PROJECT TEAM

- Negotiation
- Acquisition
- Multi-criteria decision analysis

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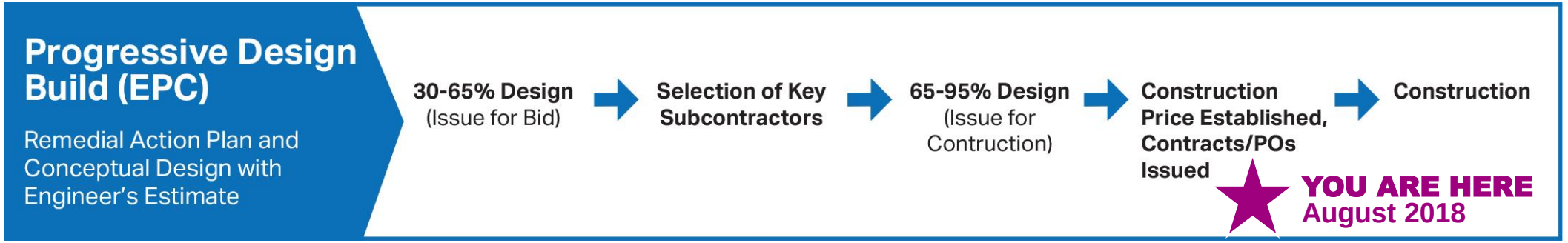
The LaSalle Canal Project – Finding the Solution

"Approved" – Actual Quote from Ameren Leader



RISK

- 49 significant project risks identified
- Resulting in… ~$22M of risk contingency

MITIGATION

- Stakeholder presentations
- Improved design
- Contractor bids
- Contractor selection
- Constructability review with contractor
- Lump sum contract established

RESULT

- 8 risks removed
- 15 risk probabilities reduced
- 16 risk impact reduced
- 10 risks transferred
- 5 new risks identified
- Risked-based contingency of ~$8M

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The LaSalle Canal Project – Managing Risk During Implementation

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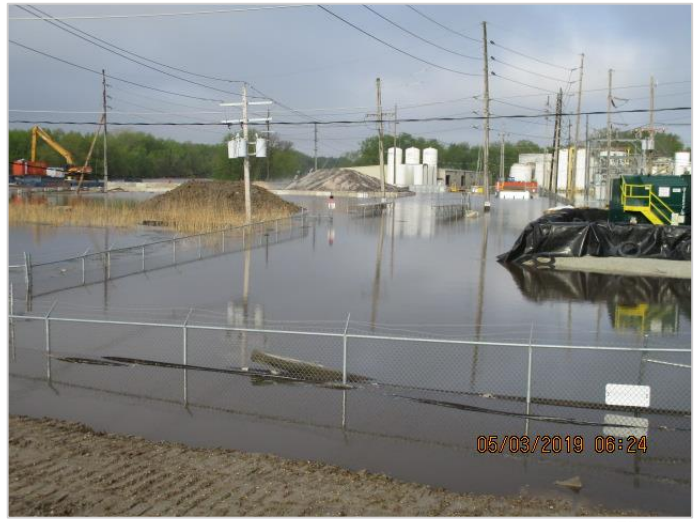

RISK

- Flood of project support area

MITIGATION

- Flood action plan

RESULT

- Risk-based contingency value ~ $504,000
- Contingency used ~ $540,000

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The LaSalle Canal Project – Managing Risk During Implementation

RISK

- Bank failure

MITIGATION

- Geotechnical analysis
- ISS monolith design
- Minimum UCS requirement
- Weekly bank survey

RESULT

- Risk-based contingency value ~ $2,000,000
- Contingency used ~ $0

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The LaSalle Canal Project – Managing Risk During Implementation

RISK

Release/Impact to Illinois River

- Elevated canal water pH – fish kill
- Elevated turbidity
- Free phase coal tar/water sheen

MITIGATION

- Cofferdam
- Moonpool/turbidity curtain
- Buoy monitoring system
- pH adjustment system
- Oil boom/pom poms

RESULT

- Risk-based contingency value ~ $640,000
- Contingency used ~$310,000

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The LaSalle Canal Project – Managing Risk During Implementation

RISK

- Landfill halts/refuses receipt of waste

MITIGATION

- Bid requirement
- Landfill agreement requirement
- Identification of multiple landfill options

RESULT

- Risk-based contingency value = $215,000
- Contingency used = $0

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AECOM
Q & A

Thank You!

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