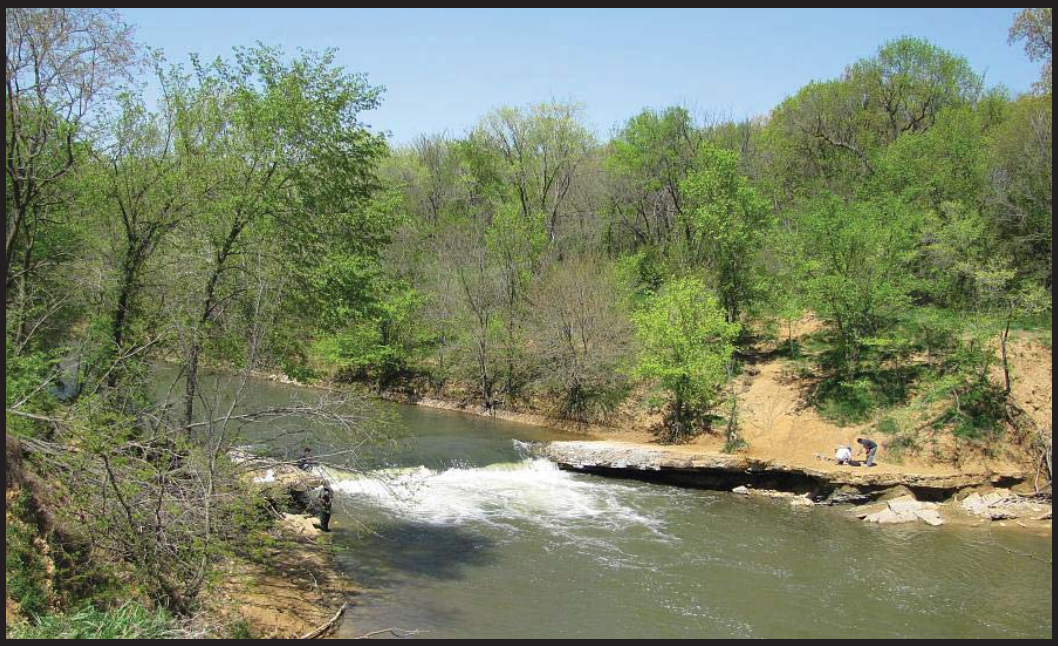
Integrated Coordination for a Successful Outcome.



Integrated team with proven performance and a shared vision for the City of Lawrence.

City of Lawrence

BNR Process Wakarusa Wastewater Treatment Plant R1308

Wastewater Pump Station No. 10, Forcemain and Gravity Interceptor R1309

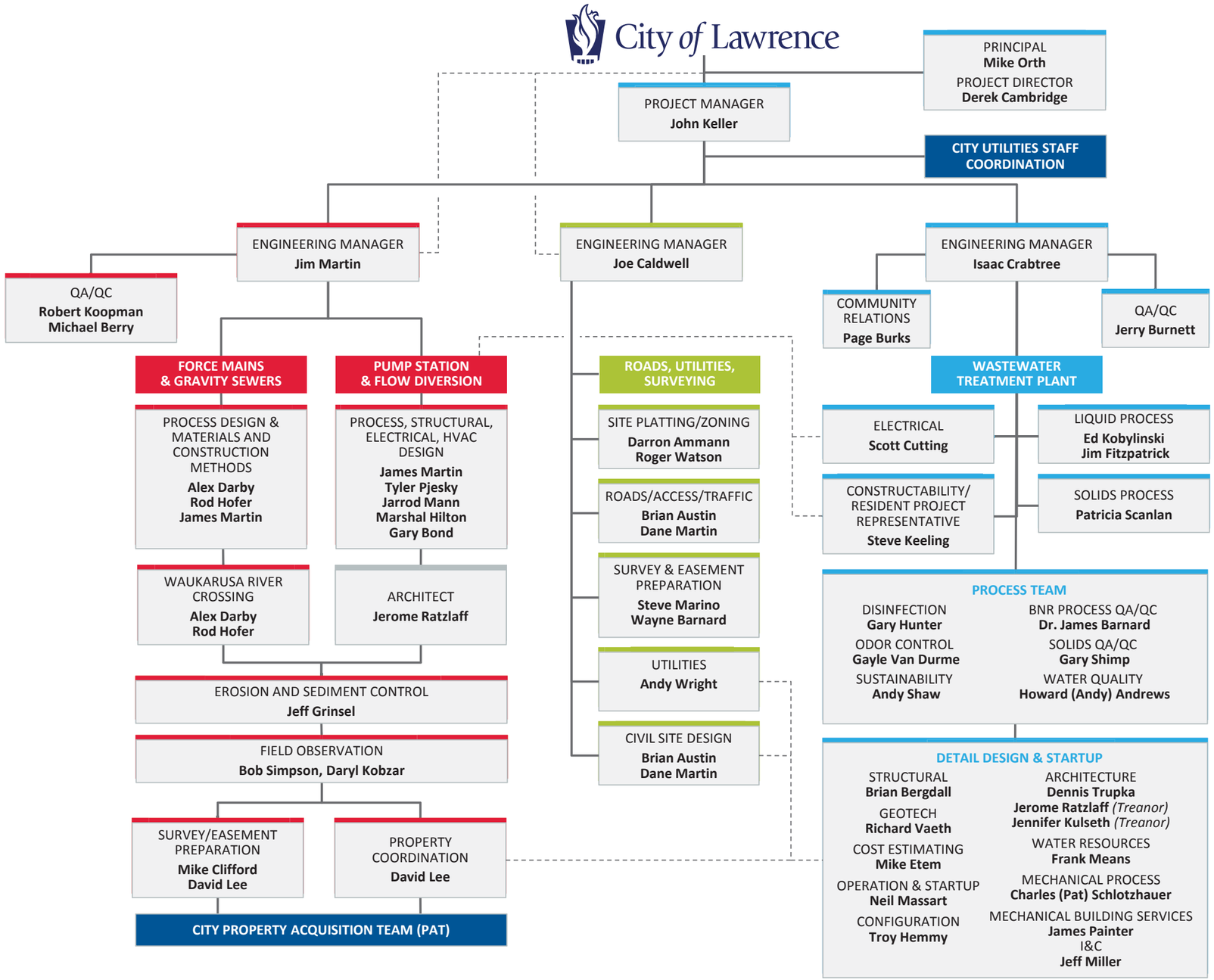
PEC PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

BARTLETT & WEST

TREANOR ARCHITECTS

BLACK & VEATCH Building a world of difference.

Our Team, Integrated Institutional Knowledge, Focus on Your Project Program Goals



TEAM BENEFITS

PEC | Bartlett & West | Treanor | Black & Veatch

Our integrated Team brings *"critical coordination to ensure success for both projects."*

Seamless project delivery for value-based decisions that drive down costs.

Significant BNR experience and adaptive, innovative design to advance the City's future vision.

A Proven Team Assembled to Maximize CORE Competencies and Focus Areas of Responsibility

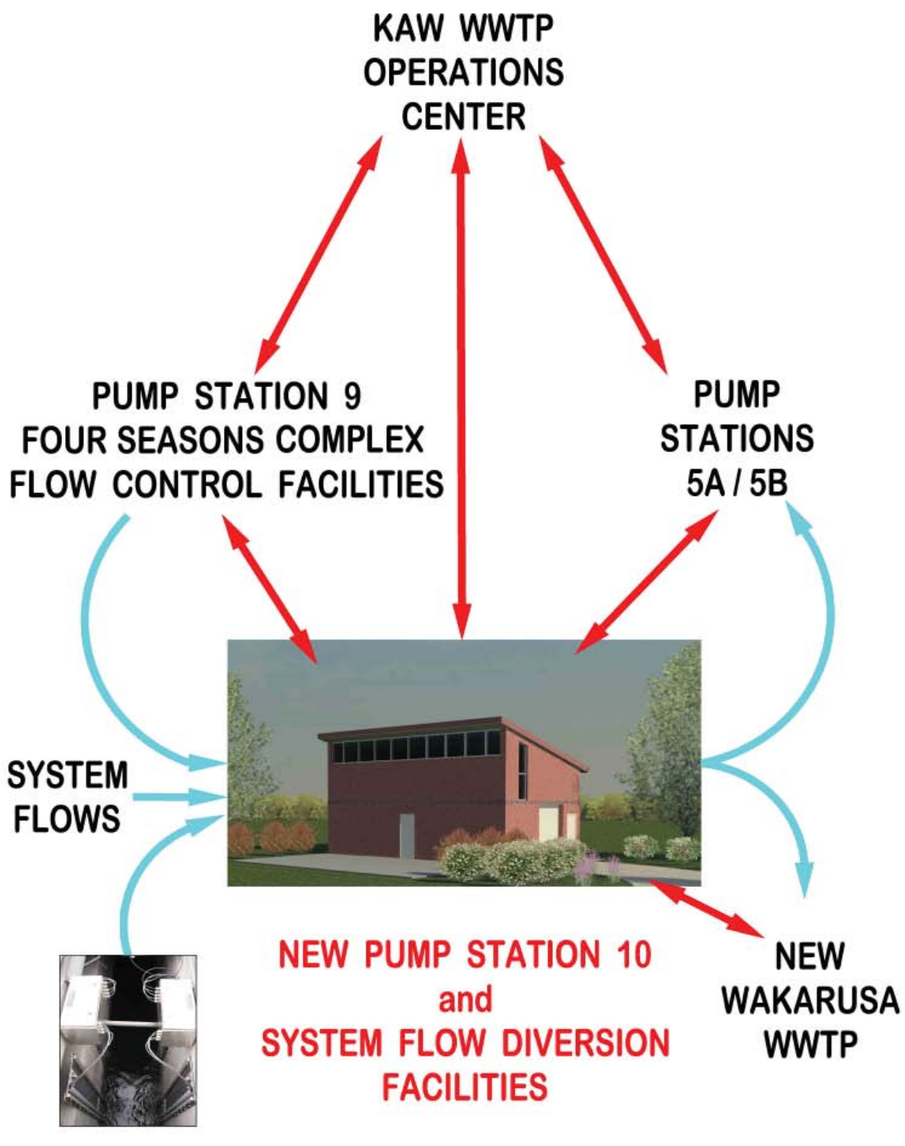
Diverse Expertise	PEC	Bartlett & West	Treanor	Black & Veatch
WWTP, Storage, Wet Weather Treatment		●	●	●
Roads, Utilities, WWTP Civil Site		●		
Pump Station No. 10 and Flow Diversion	●	●	●	
Forcemains and Gravity Interceptors	●	●		

Building on our foundational work with the City of Lawrence, our plan will provide flexibility for efficiency today and growth for the future. An integrated team comprised of specialists to deliver project efficiency.

- PEC engineers have completed numerous City projects integrating existing infrastructure and City staff interaction to optimize function, operations and maintenance.
- Bartlett & West has completed much of the City's road and utility work including utility coordination and brings long-standing relationships and knowledge of the local permitting process to advance your timeline and manage costs.
- Black & Veatch has more experience with BNR facilities in Kansas than any other firm. Our nutrient removal experts will design solutions, combining innovation with tried and true methods to best address your nutrient control challenges.




Pump Station 10, The Heart of the System



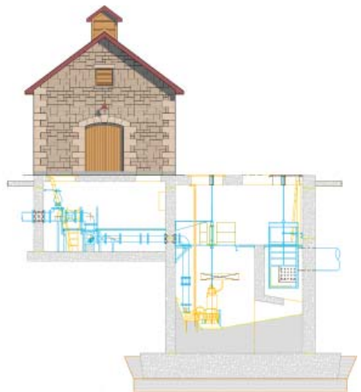
Pump Station 10 — Functional, Reliable, Economical and a Good Neighbor!

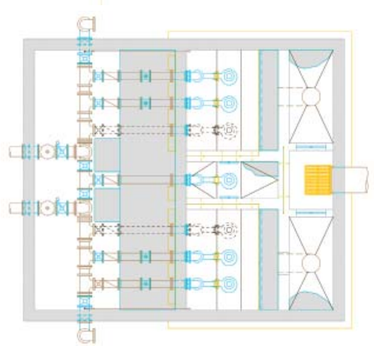
High-Capacity Flow Measurement

- Provide real-time, accurate flow measurement data into and out of the PS 10 site
- Employ multi-beam multi-probe open channel flow measurement along with closed conduit magnetic meters—with operations and maintenance access
- Connect real-time metering data to control center via fiber optic network
- Provide ability for KAW WWTP control center to communicate with PS 10 and Four Seasons to divert/retain dry and wet weather flows on command via gate systems and pumps
- Diversion/flow measurement structures would be accessible, all materials would be corrosion-proof, concrete treated for corrosion, and provided with odor control

Wet and Dry Wells

- Multiple dry weather pumps w/VFDs
- Multiple wet weather pumps w/VFDs
- Influent flow control coordinated with overall control system
- All discharges fitted with magnetic flow meter
- Multi-compartment wet well for different levels of flow diversion and necessary maintenance
- Wet well surface scum removal capability
- Wet well grit removal capability - self cleaning
- Option for large debris removal basket
- Onsite odor control - done before
- Wet well and pump size and configuration critical with respect to treatment plant capabilities
- Protected (corrosion and storm) space for all electrical and MCCs
- Ready access to all pumps, meters, valves and support equipment
- Standby power connections
- Potential use of similar or same size equipment

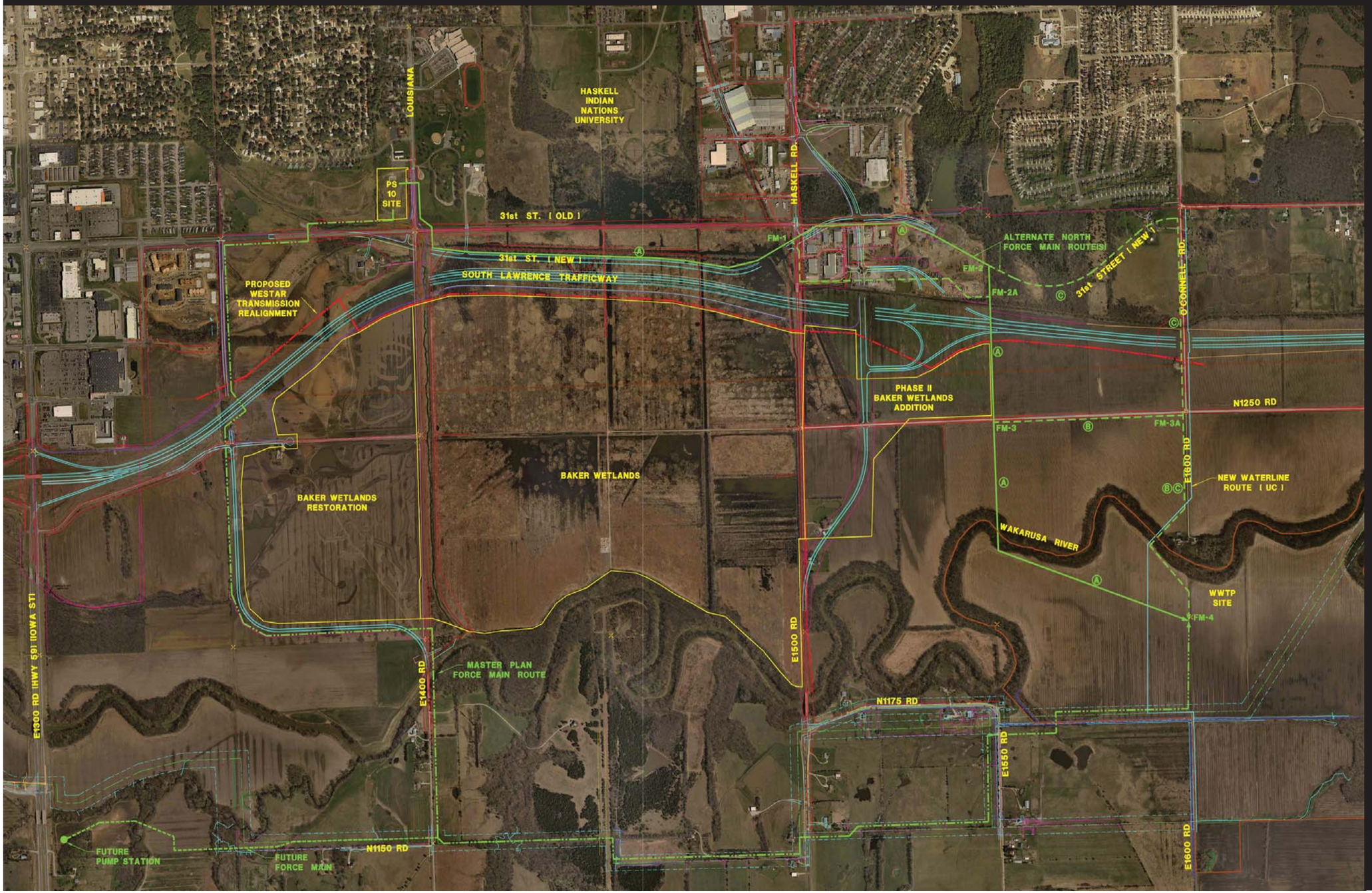




Support Building

- Provide secure containment for electrical and control equipment elements
- Provide double roof system to ensure weather proofing electrical/controls while maintaining building appearance
- Provide concrete containment structure for tornado protection of critical equipment
- Provide hard-wired connections for emergency power from mobile sources
- Provide enclosed, accessible workspace for flow meters, valves, odor control equipment, etc.
- Utilize long-lasting exterior materials
- Ensure public acceptance with neighborhood meeting
- Ensure adjacent landowner acceptance with specific meeting with church congregation
- Work with City staff with respect to access, vandal protection, workspace features, and floor plan

Alternate Forcemain Route May Save $2 Million



CONVEYANCE SOLUTIONS OPTIMIZES ASSETS

PS-10 as a Distribution Point

> Flexible Design to Manage Flows to Both the Kansas River and Wakarusa WWTP's

> Real-time Flow Monitoring

> Good Neighbor Approach to Design

Alternative Forcemain Alignment

> Reduces Length

> Saves $2M

Profile Comparisons Tell the Story

Alternate Route Potential Advantages

1. 40% reduction of force main pipe length (total 22,000 LF @ 11,000 x 2)
2. Reduction of pumping head both due to friction (length) and elevation (terrain)
3. Reduction of pump size (HP) and electrical components
4. Reduction of pump station structure and support elements
5. Reduction of physical disruption along the force main route
6. Provides for greatest length of "easy" construction (approximately 8,000 LF)
7. Reduction of property acquisition and interaction with fewer property owners and potentially makes more use of planned and existing public ROW
8. Special construction needs for wet lands terrain and construction adjacent to new SLT and 31st Street can be accomplished.
9. Significant reduction of overall project construction and operational costs
10. Provides for a direct route for new fiber optic communications connection
11. Provides for a more direct route at reduced cost for recreational trail to WWTP wildlife/wet lands sites and access to Blue Mound area

Alternate Route Potential Cost Savings

Impacts	Master Plan Route	Alternate Route	Potential Savings
Force Main Piping	27,000 LF	16,000 LF	-$2,640,000
Air/Vacuum Structures	27.0000	8.0000	-$360,000
Special Construction	-	6,000 LF	$1,650,000
Pumping Head	187 FT	115 FT	
Pumping HP (Operating)	137 HP	85 HP	-$250,000
Pumping HP (Installed)	150 HP	100 HP	
Power $-20 Years	-	-	-$400,000
Site Electrical	-	-	-$100,000
Structure	-	-	-$200,000
Land Acqusition	-	-	-$200,000
		Total	-$2,500,000

$$ Savings

Reduce Capital Costs, Maintain Future Value, Provides Operational Flexibility

Single BNR Basin Concept

> Reduced Construction Costs
> Avoids Throw-away Facilities
> Standardizes Facilities and Equipment Requirements
> Base Load Train to Reduce Operational Challenges
> One Treatment Train to Meet Permit

The Nutrient Limit Question

> 10 mg/L TN; 1 mg/L TP versus 8 mg/L TN; 1.5 mg/L TP
> TP limits easier to achieve than TN limits

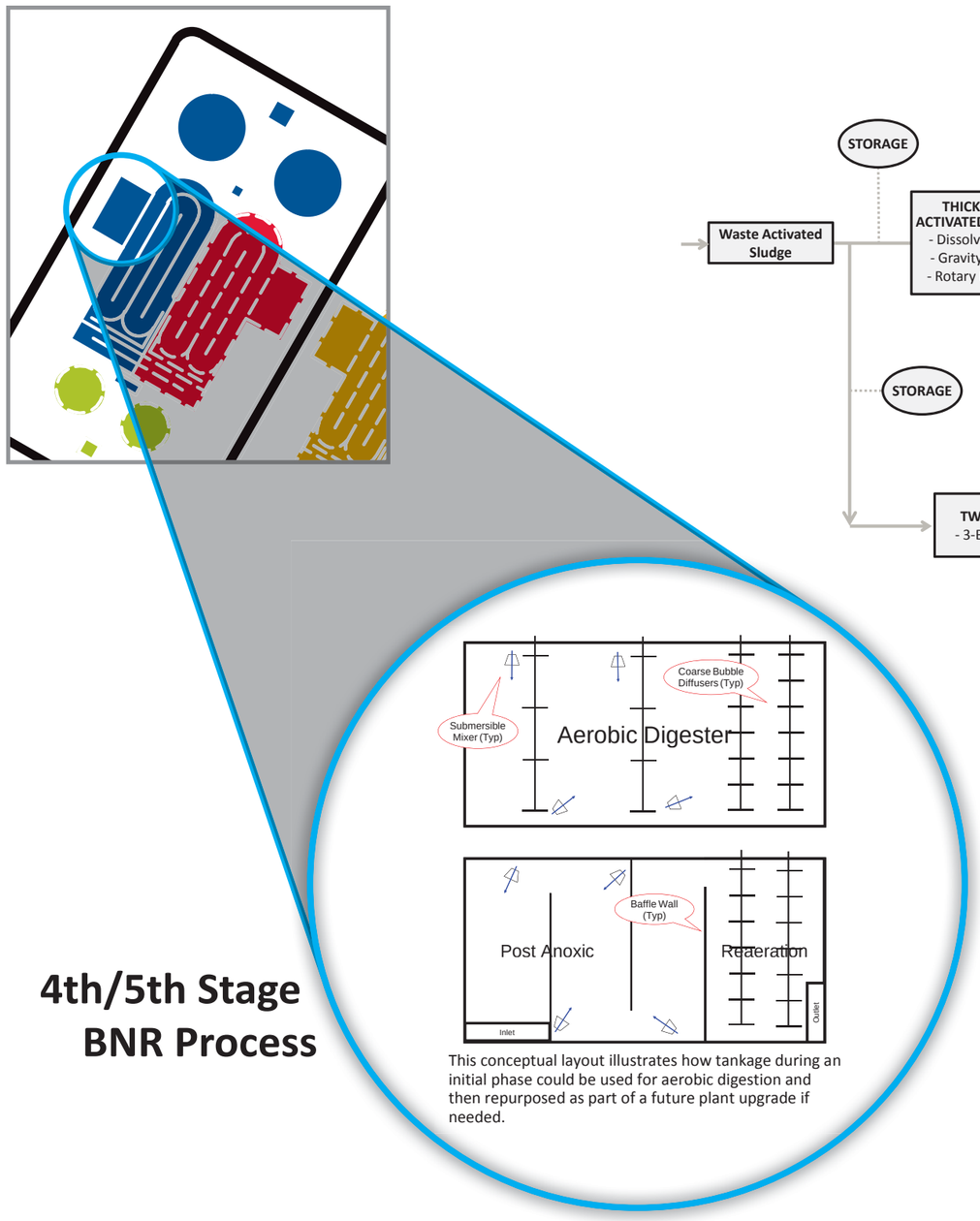
Ditch vs. Basins

> **Ditches:** Longer Sludge Age; More Stable; Easier to Operate-More Forgiving; Can be Re-rated in Future
> **Basins:** High Rate Activated Sludge; Harder to Control; More Easily Upset; Requires More Operator Attention

Lessons Learned

> JCW Blue River Main WWTP – Step feed Approach; Storm Management; Submerge Floc-well
> Rogers Arkansas WWTP – Mixing & Storm Flow Management; Process Automation
> DLS Middle Basin WWTP – Primary Sludge Fermentation; Side Stream Management
> Olathe Cedar Creek WWTP – Mixed Liquor Fermentation

A Phased Approach for Biosolids Treatment Can Provide Flexibility in Project Costs



4th/5th Stage BNR Process

This conceptual layout illustrates how tankage during an initial phase could be used for aerobic digestion and then repurposed as part of a future plant upgrade if needed.

Solids Workshop is needed to develop a long-term Biosolids Plan

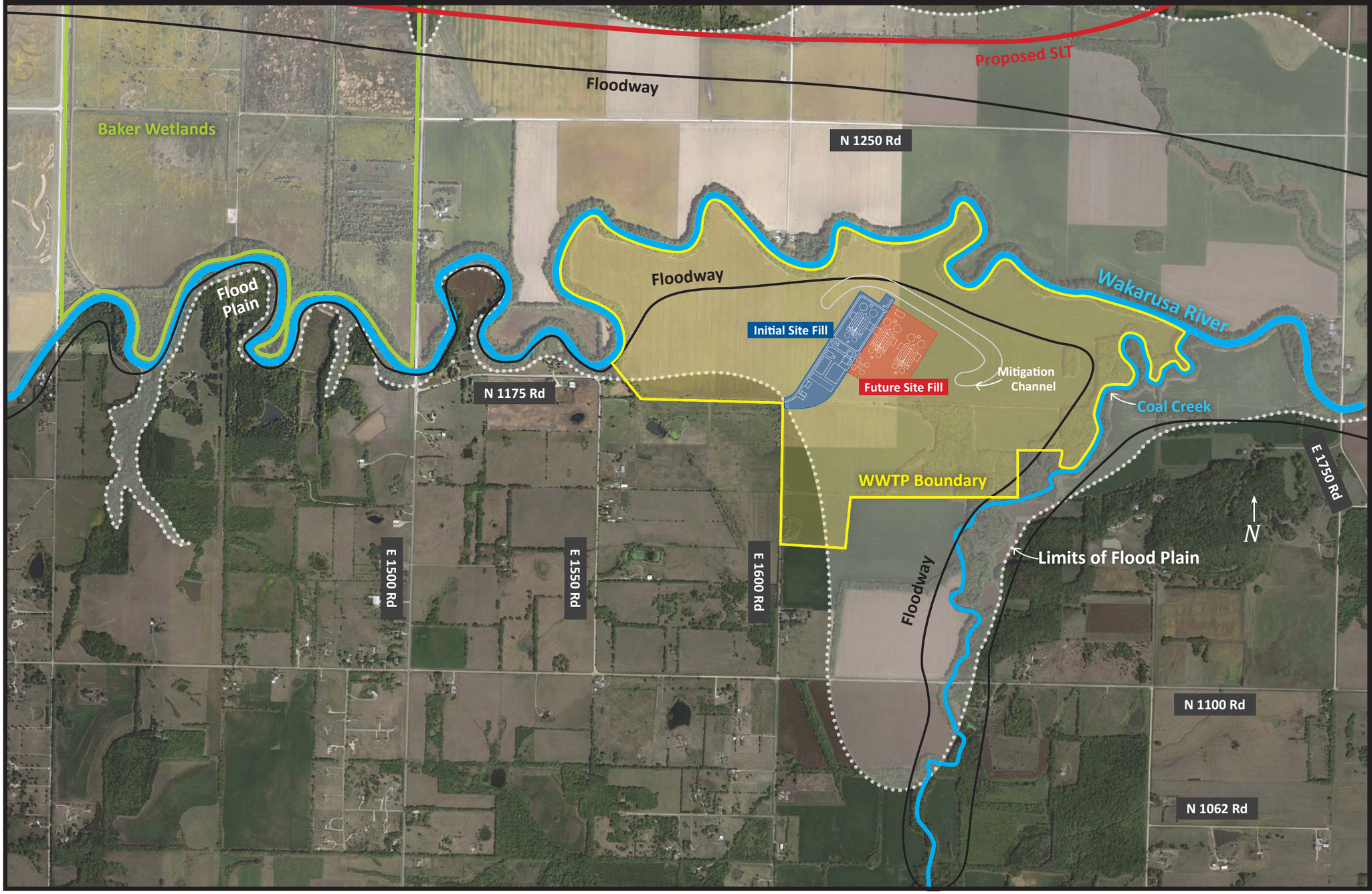
> Minimum Class B; Class A desired

> Keep it simple to minimize staffing requirements

> Mechanically reliable process

> Be conscientious of capital & operating costs

Permitting, Site Fill, Roadway Access — All Important Project Components



Construction of All Facilities Will Require Permitting

> US Army Corp of Engineers – Wakarusa Crossing, Plant, Outfall
> Neighborhood Resources – Building Permit
> Planning – Floodway Fringe
> Kansas Dept of Agriculture – Site Fill and Treatment Plant
> KDHE Storm Water and NPDES
> KDOT – Roadway Crossing/ Tunnel/ Forcemain

Site Fill Permitting Must Be Addressed Up Front:

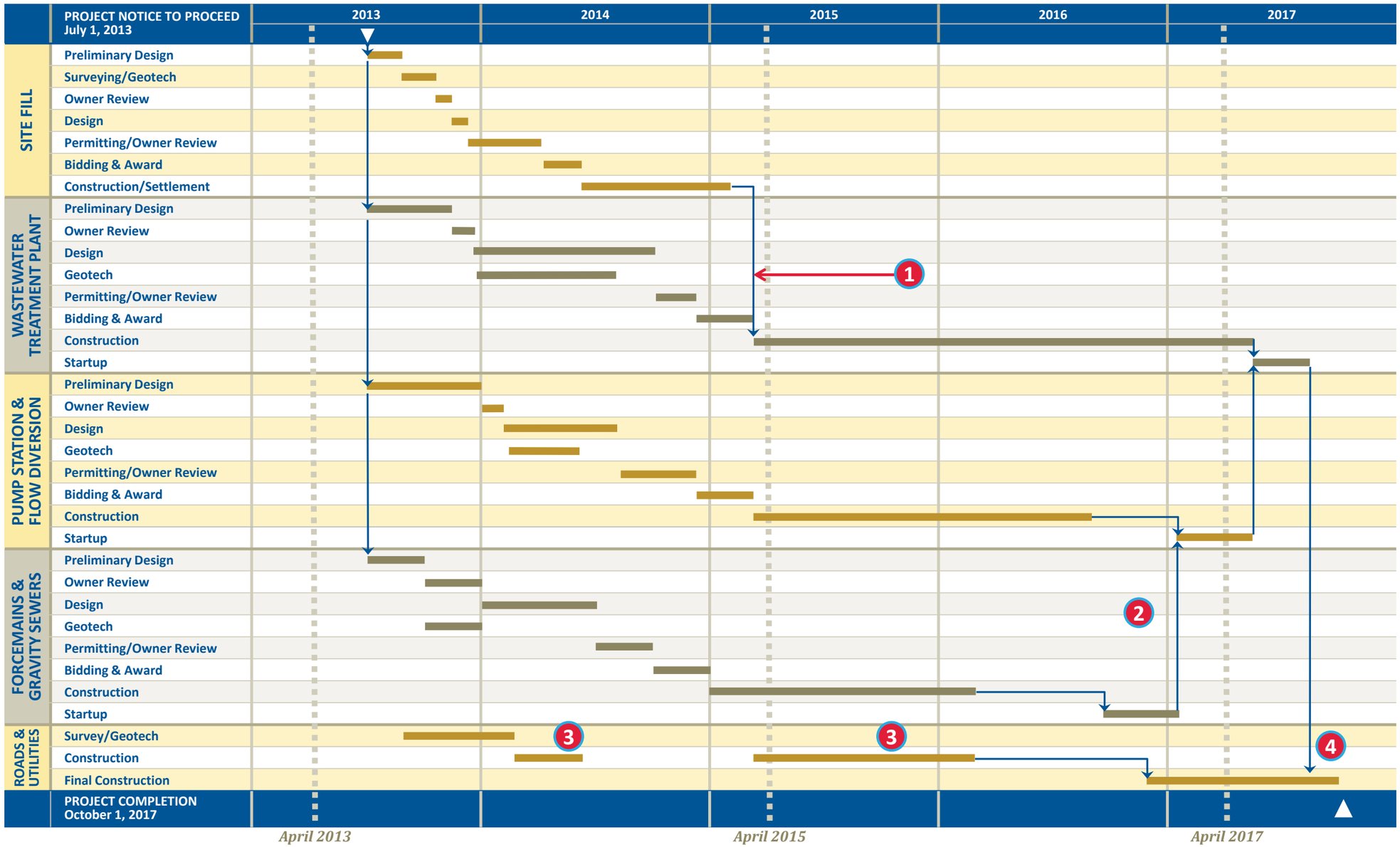
> WWTP to be Protected from 500-year Flood Event and Clinton Dam Emergency Discharges
> Site Fill will be in Flood Plain to Protect WWTP
> "Zero Rise" Condition is Required by City
> Floodway Mitigation will be Required

Site Fill Costs will be Significant:

> Site Protection will Require Over 350,000 Cubic Yards
> Use on Site Borrow Pit – Create Green Initiatives
> Work with KDOT for Borrow Pits
> Can We Obtain the Same Rate for Cu Yd of Material from SLT Contractor

Integrated Schedule for Wakarusa BNR WWTP and Pump Station, Forcemain and Gravity Interceptor

Critical path to complete pre-consolidation prior to facility construction.



1. Consolidation completed before site is ready for WWTP construction.
2. Conveyance facilities completed in advance of WWTP startup.
3. Roads elevated and phased to allow construction progress.
4. Final wear surfaces completed after major truck traffic is finished.

Work Packaging

> Bundle Facilities to Consolidate Design and Engineering Reviews

> Reduces Overhead Expenses for Contractors

> Avoids Tiered Markup

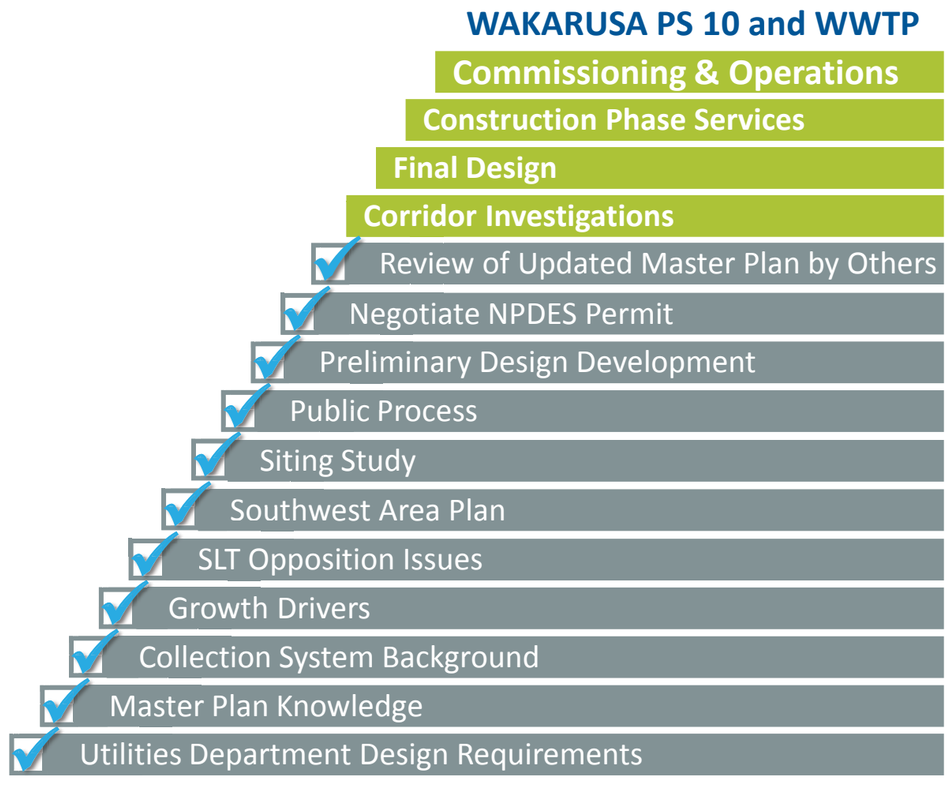
> Consolidated Shop Drawings Effort for City, Contractor and Engineering

Diverse Expertise to Deliver Innovation and Cost Savings

Benefits Our Team Provides the City of Lawrence

- An Integrated Team with Diverse Expertise
- Seamless Project Delivery With Value-Based Decisions to Drive Costs Down
- Our Team is Up to Speed
- Innovative Ideas and Cost Savings Throughout Our Experience

Our Team is Ready to Take the Next Steps



	PEC	Bartlett & West	Black & Veatch
Most Lawrence Collection System Experience	●		
Fully Understands Lawrence's Roadway Requirements		●	
Has Designed, Permitted, Started-up, and Learned Valuable Lessons for Nutrient Plants in Kansas			●
Has More Institutional Knowledge about the Wakarusa Conveyance and Plant Project	●	●	●
Understands Lawrence's Electrical & Control Requirements	●		●
Fully Understands the Permitting Requirements of the City	●	●	●