



Infrastructure Solutions Group LLC

McAlester Hydraulic Analysis Results July 14 2020

Existing Water System



- Infrastructure Solutions Group, LLC was contracted to provide a detailed hydraulic model of McAlester's Transmission and Distribution System
 - Hydraulic Model System Elements

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- Pipe lines from 1" to 30"
 - 1" to 4" 98,000 feet
 - 6" 519,050 feet
 - 8" to 12" 269,650 feet
 - 14" to 18" 46,200 feet
 - 20" to 30" 56,650 feet
 - Total: 989,550 feet (187.5 miles)
 - Estimated Replacement Cost \$100 M
- General residential meter locations and demands
 - 7,365 meters
- General commercial meter locations and demands
 - 1,003 meters

Existing Water System



- Hydraulic Model System Elements (Cont)
 - Rural Water Districts master meter locations and demands
 - 17 Master Meters

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- Water towers elevations and volume with controls
 - Skyline Tower: 1,000,000 gallons
 - Buffalo Tower: 450,000 gallons
 - Seminole Tower: 1,000,000 gallons
 - Industrial Park Tower: 1,000,000 gallons
 - Carl Albert Tower: 750,000 gallons
 - Total Storage Capacity: 4.20 M gallons
- High Service Pumps (Plant)
- Booster Pumps
 - KFC Booster Station
 - Kinkead/Summit Ridge Booster Station
- General Fire Hydrants Locations
 - 915 Hydrants





- Four Conditions where Evaluated
 - Peak Hour
 - Simulates an instantaneous moment in time where usage is 1.0 gallon per minute per meter.
 - Average Day
 - Simulates an extended period of time (typically a time period of 120 hours) where usage is calculated using typical water usage data.
 - Max Day
 - Simulates an extended period of time (24 hours) where usage is calculated to be twice an average day. Max day is representative of a day with maximum water usage for the City and Districts, i.e. a very hot summer day in the middle of August.
 - Fire Flow
 - Simulates Fire Flow available at each Fire Hydrant Model during Peak Conditions while maintaining minimum system pressures.





- <u>Peak Hour</u> simulates an instantaneous moment in time where usage is 1.0 gallon per minute per meter.
 - System pressures must maintain at a minimum of 25 PSI.
 - System pressure should not exceed 2/3 the maximum rating of the pipe for 200 psi pipe it shall not exceed 133 psi.
 - Peak Hour is only pressure requirement from Oklahoma Department Environmental Quality.





- <u>Average Day</u> simulates an extended period of time (typically a time period of 120 hours) where usage is calculated using typical water usage data.
 - System pressures must maintain at a minimum of 25 PSI.
 - System pressure should not exceed 2/3 the maximum rating of the pipe for 200 psi pipe it shall not exceed 133 psi.
 - Investigates how the system functions such as towers, pumps and controls.
 - Typical water usage is 12% of Peak Hour
 - Typical usage patterns







- <u>Max Day</u> simulates an extended period of time
 (24 hours) where usage is calculated to be twice an average day. Max day is representative of a day with maximum water usage for the City and Districts, i.e. a very hot summer day in the middle of August.
 - System pressures must maintain at a minimum of 25 PSI.
 - System pressure should not exceed 2/3 the maximum rating of the pipe for 200 psi pipe it shall not exceed 133 psi.
 - Investigates how the system functions such as towers, pumps and controls.







• Fire Flow Requirements

- 1,000 gallons per minute from each fire hydrant during peak day conditions for Residential Areas
- A minimum of 1,500 gallons per minute from each fire hydrant during peak conditions for Commercial/School Areas.
- System pressures must maintain a minimum of 25 PSI.

Existing System Results



- Conditions
 - 0% Growth

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- Results
 - Peak Day
 - No Pressure Issues
 - Average Day
 - Low Pressures Hardy Springs Road South of Fireside
 - All Towers Cycle Properly
 - Full Tower Capacities not being Utilized
 - Pumps are Properly Sized for Distribution
 - Max Day
 - Low Pressures Hardy Springs Road South of Fireside
 - All Towers Cycle Properly
 - Full Tower Capacities not being Utilized
 - Pumps are Properly Sized for Distribution
 - Fire Flow
 - Volume, Line Size and Spacing Not Met
 - Kinkead/Summit Ridge Booster Pumps are not Sized Properly for Fire Flow

WaterGems Hydraulic Model

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Existing System









- Conditions
 - 0% Growth
- Results
 - Peak Day
 - No Pressure Issues
 - Average Day
 - No Low Pressures Issues
 - All Towers Cycle Properly
 - Full Tower Capacities Utilized
 - Pumps are Properly Sized for Distribution
 - Max Day
 - No Pressures Issues
 - All Towers Cycle Properly
 - Full Tower Capacities Utilized
 - Pumps are Properly Sized for Distribution
 - Fire Flow
 - Volume, Line Size and Spacing Met
 - Kinkead/Summit Ridge Booster Pumps are Sized Properly for Fire Flow

Proposed System Results





Proposed System Results



Operation and Maintenance, Pressure and Fire Flow Issues					
#1 O&M/Pressure - Transmission Improvements Hickory Street (Tower to Electric Ave)	\$ 2,639,850.00				
#2 O&M - Transmission Improvements Ashland Avenue (Tower to North Plum Street)	\$ 2,259,300.00				
#3 O&M/FF - Transmission Improvements Brewer Road (Water Plant Road to Hickory)	\$ 1,762,525.00				
#4 O&M - Transmission Improvements Talawanda Street (Brewer Road to West Pine Street)	\$ 650,000.00				
#5 FF - Distribution Improvements Industrial/Van Buren/Buffalo (High School Connection)	\$ 423,450.00				
#6 O&M - Distribution Improvements Strong Blvd (Chickasaw Ave to Seminole Ave)	\$ 469,775.00				
#7 O&M - KTC Distribution Improvements Phase 1	\$ 769,050.00				
#8 O&M - Distribution Improvements N Main & 3rd St (Krebs Ave to South of Electric Ave)	\$ 1,422,000.00				
#9 O&M - Distribution Improvements 3rd/4th St (South of Electric Ave to Adams Ave)	\$ 1,157,125.00				
#10 O&M - KTC Phase 2/Carl Albert Distribution Improvements	\$ 754,700.00				
#11 O&M - Distribution Improvements Park Avenue (7th Street to 11th Street)	\$ 548,800.00				
#12 O&M/FF - Distribution Improvements S Main Street/Bus69B (Redline Motors)	\$ 299,300.00				
#13 O&M/FF - Distribution Improvements Kinkead (Peaceable Road to Kinkead Road)	\$ 984,500.00				
#14 O&M - Distribution Improvements West St (Electric Ave to Carl Albert Pkwy)	\$ 812,550.00				
#15 O&M - Distribution Improvements Miscellaneous	\$ 949,150.00				
#16 O&M/FF - Distribution Improvements Krebs Ave (7th to Herford Ln)	\$ 1,598,700.00				
#17 O&M - Distribution Improvements Miscellaneous (West Central)	\$ 368,475.00				
#18 O&M - Transmission Improvements Talawanda Lake (Dam to Water Tower)	\$ 2,505,600.00				
#19 FF - Distribution Improvements Miscellaneous Walmart	\$ 2,164,100.00				
#20 O&M - Distribution Improvements Miscellaneous (North Central)	\$ 999,600.00				
#21 FF - Distribution Improvements S. George Nigh Expy (Peacable to Village)	\$ 511,000.00				
#22 FF - Distribution Improvements Larue/Quail/Crooked Oak/Peaceable/Tanglewood	\$ 1,463,900.00				
#23 FF - Distribution Improvements Miscellaneous (Southern)	\$ 1,895,500.00				
#24 FF - Distribution Improvements Taylor Industrial Park	\$ 496,400.00				
#25 FF - Distribution Improvements Kinkead Hills	\$ 1,716,900.00				
#26 FF - Distribution Improvements Highway 69 (Church and Restaurant)	\$ 301,600.00				
Total Cost	\$ 29,923,850.00				

Proposed System Results



Operation and Maintenance, Pressure and Fire Flow Issues	Year 1&2		Year 3&4		Year 5&6	
#1 O&M/Pressure - Transmission Improvements Hickory Street	\$	2,639,850.00	\$	-	\$	
#2 O&M - Transmission Improvements Ashland Avenue	\$	2,259,300.00	\$	-	\$	-
#3 O&M/FF - Transmission Improvements Brewer Road	\$	1,762,525.00	\$	-	\$	-
#4 O&M - Transmission Improvements Talawanda Street	\$	650,000.00	\$	-	\$	
#5 FF - Distribution Improvements Industrial/Van Buren/Buffalo	\$	423,450.00	\$	-	\$	
#6 O&M - Distribution Improvements Strong Blvd	\$	984,500.00	\$	-	\$	-
#7 O&M - KTC Distribution Improvements Phase 1	\$	469,775.00	\$	•	\$	-
#8 O&M - Distribution Improvements N Main & 3rd St	\$	769,050.00	\$	-	\$	-
#9 O&M - Distribution Improvements 3rd/4th St	\$	1,422,000.00	\$	-	\$	-
#10 O&M - KTC Phase 2/Carl Albert Distribution Improvements	\$	1,157,125.00	\$	-	\$	-
#11 O&M - Distribution Improvements Park Avenue	\$	754,700.00	\$	-	\$	-
#12 O&M/FF - Distribution Improvements S Main Street/Bus69B	\$	548,800.00	\$	-	\$	-
#13 O&M/FF - Distribution Improvements Kinkead	\$	299,300.00	\$	-	\$	-
#14 O&M - Distribution Improvements West St	\$	812,550.00	\$	-	\$	-
#15 O&M - Distribution Improvements Miscellaneous	\$	949,150.00	\$	-	\$	-
#16 O&M/FF - Distribution Improvements Krebs Ave	\$	1,598,700.00	\$	-	\$	-
#17 O&M - Distribution Improvements Miscellaneous	\$	368,475.00	\$	-	\$	-
#18 O&M - Transmission Improvements Talawanda Lake	\$	2,505,600.00	\$	-	\$	-
#19 FF - Distribution Improvements Miscellaneous Walmart	\$	-	\$2	2,164,100.00	\$	-
#20 O&M - Distribution Improvements Miscellaneous	\$	-	\$	999,600.00	\$	-
#21 FF - Distribution Improvements S. George Nigh Expy	\$	-	\$	511,000.00	\$	-
#22 FF - Distribution Improvements Southern Area	\$	-	\$ ´	1,463,900.00	\$	-
#23 FF - Distribution Improvements Miscellaneous (Southern)	\$	-	\$ ´	1,895,500.00	\$	-
#24 FF - Distribution Improvements Taylor Industrial Park	\$	-	\$	496,400.00	\$	-
#25 FF - Distribution Improvements Kinkead Hills	\$	-	\$	-	\$1	,716,900.00
#26 FF - Distribution Improvements Highway 69	\$	-	\$	-	\$	301,600.00
Total Cost	\$	20,374,850.00	\$7	7,530,500.00	\$2	,018,500.00

Proposed Projects 1 – 4 (Years 1 & 2)

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Proposed Projects 5 - 11 (Years 1 & 2)

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Proposed Projects 12 – 15 (Years 1 & 2)

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Proposed Projects 16 – 18 (Years 1 & 2)

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Proposed Proposed Projects 19 – 22 (Years 3 & 4)

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Proposed Project 23 (Years 3 & 4)

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INFRASTRUCTURE SOLUTIONS GROUP, LLC Consulting Engineers Proposed Project 24 (Years 3 & 4)





Proposed Projects 25 - 26 (Years 5 & 6)

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Proposed Funding Options



	OWRB DWSRF Loan	Lc	cal Bank Loan	
Loan Annual Interest Rate	2.50%	1.50%		
Loan Period in Years	30	20		
Estimated Number of Customers	8,385	8,385		
Distribution/Transmission Improvemen	nts Year 1&2			
Total Cost of Project	\$ 20,374,850.00	\$	20,374,850.00	
Loan Amount	\$ 21,189,844.00	\$	20,374,850.00	
Loan Monthly Payment	\$ 83,725.50	\$	98,317.90	
Average Cost per Customer/mo.	\$ 9.99	\$	11.73	
Average Cost per Customer/yr.	\$ 119.82	\$	140.71	
Distribution/Transmission Improvemer	nts Year 3&4			
Total Cost of Project	\$ 7,530,500.00	\$	7,530,500.00	
Loan Amount	\$ 7,831,720.00	\$	7,530,500.00	
Loan Monthly Payment	\$ 30,944.76	\$	36,338.08	
Average Cost per Customer/mo.	\$ 3.69	\$	4.33	
Average Cost per Customer/yr.	\$ 44.29	\$	52.00	
Distribution/Transmission Improvemen	nts Year 5&6			
Total Cost of Project	\$ 2,018,500.00	\$	2,018,500.00	
Loan Amount	\$ 2,099,240.00	\$	2,018,500.00	
Loan Monthly Payment	\$ 8,294.54	\$	9,740.18	
Average Cost per Customer/mo.	\$ 0.99	\$	1.16	
Average Cost per Customer/yr.	\$ 11.87	\$	13.94	
Distribution/Transmission Improvemen	nts Years 1-6			
Total Cost of Project	\$ 29,923,850.00	\$	29,923,850.00	
Loan Amount	\$ 31,120,804.00	\$	29,923,850.00	
Loan Monthly Payment	\$ 122,964.80	\$	144,396.16	
Average Cost per Customer/mo.	\$ 14.66	\$	17.22	
Average Cost per Customer/yr.	\$ 175.98	\$	206.65	
Estimated the interest rate to current m	narket.			