Brelje & Race
CONSULTING ENGINEERS

SCOPE OF ENGINEERING SERVICES
for
WATER MODELING & CAPACITY ANALYSES
LAKE COUNTY SPECIAL DISTRICTS (CLIENT)
prepared by
BRELJE & RACE CONSULTING ENGINEERS (CONSULTANT)
November 8, 2024

PROJECT UNDERSTANDING

The primary objective of this project is to prepare hydraulic models for several water systems and use the models for analyzing the piping infrastructure for deficiencies. The deficiencies would be noted with various improvements analyzed using the models until cost-effective solutions are identified. In addition, source capacity and storage volume would be evaluated for each system based on established criteria meeting state requirements for domestic supply and pressure, and adequate fire flow and duration. Lastly, opportunities for consolidation with neighboring water systems will be explored and analyzed.

A report of findings would be presented which includes recommendations for improvements to each system, consolidation opportunities, and cost estimates for any identified capital improvements. The report would be initially presented in draft form for Special Districts' review and comments, followed by preparation of a final report.

The target systems for hydraulic modeling include the following:

- North Lakeport Water – CSA 21 – 1,285 connections
- Kelseyville County WW District – KCWWD3 – 1,267 connections
- Soda Bay Water – CSA 20 – 654 Connections
- Spring Valley Water – CSA 2 - 492 Connections
- Kono Tayee Water – CSA 13 – 141 Connections

Note that the Spring Valley Water system is currently being modeled under separate contract. For the Spring Valley system, it is proposed that only a brief report be prepared to identify any recommended improvements that may not be considered for the pressure zone evaluation currently underway.

Below is an outline description the Scope of Services of the approach and tasks for conducting modeling for each system and preparing a single report which includes the modeling results, recommendations developed from the modeling and other analyses, and budgetary cost estimates for each water system.

SCOPE OF SERVICES

Task 1 – North Lakeport Model (1,285 Connections)

1.01 Base Model Development

Data provided by LCSD will be used to create an accurate computer hydraulic model of the North Lakeport distribution system. The available GIS data will allow creation of a spatially correct system model populated with pipe lengths and diameters, storage tanks, supply sources, and other facilities such as pump stations and fire hydrants.

1.02 Model Boundary Condition Input

Upon completion of the base model, nodal demands data, pump curves, storage tank sizes, and other boundary condition data will need to be determined from production and metering data provided by LCSD and input to the model. Several models for varying demand conditions will be developed, such as current average day demand condition, current maximum day demand condition, and a future maximum day demand condition. Others may also be prepared as needed.

1.03 Hydrant Flow Testing and Model Calibration

Several hydrants within the water system will be selected for flow testing. Brelje & Race staff, along with LCSD or Fire District staff will conduct specialized hydrant flow testing which is necessary for calibrating the base model. Approximately 8 to 10 representative hydrants would be selected for flow testing. Upon completion, the data collected, along with SCADA data for the day the tests were conducted, will be used to accurately calibrate the hydraulic model of the system.

1.04 Model Runs for Identifying Needed System Improvements

The calibrated model will be used to identify system deficiencies, typically using the maximum day demands and local area fire demand conditions. A trial-and-error method will then be used to identify necessary or desired system improvements. Eight to ten model runs are anticipated.

1.05 Capacity Analyses and Draft Report Preparation

A source capacity and storage capacity analysis will be conducted for the water system based on current and anticipated future demands. Future demands will be developed based on available growth statistics or recent trends.

Task 2 – Soda Bay Model (654 Connections)

2.01 Base Model Development

Data provided by LCSD will be used to create an accurate computer hydraulic model of the North Lakeport distribution system. The available GIS data will allow creation of a spatially correct system model populated with pipe lengths and diameters, storage tanks, supply sources, and other facilities such as pump stations and fire hydrants.

2.02 Model Boundary Condition Input

Upon completion of the base model, nodal demands data, pump curves, storage tank sizes, and other boundary condition data will need to be determined from production and metering data provided by LCSD and input to the model. Several models for varying demand conditions will be developed, such as current average day demand condition, current maximum day demand condition, and a future maximum day demand condition. Others may also be prepared as needed.

2.03 Hydrant Flow Testing and Model Calibration

Several hydrants within the water system will be selected for flow testing. Brelje & Race staff, along with LCSD or Fire District staff will conduct specialized hydrant flow testing which is necessary for calibrating the base model. Approximately 4 to 5 representative hydrants would be selected for flow testing. Upon completion, the data collected, along with SCADA data for the day the tests were conducted, will be used to accurately calibrate the hydraulic model of the system.

2.04 Model Runs for Identifying Needed System Improvements

The calibrated model will be used to identify system deficiencies, typically using the maximum day demands and local area fire demand conditions. A trial-and-error method will then be used to identify necessary or desired system improvements. Eight to ten model runs are anticipated.

2.05 Capacity Analyses

A source capacity and storage capacity analysis will be conducted for the water system based on current and anticipated future demands. Future demands will be developed based on available growth statistics or recent trends.

Task 3 – Kelseyville & Finley Model (1,267 Connections)

3.01 Base Model Development

Data provided by LCSD will be used to create an accurate computer hydraulic model of the North Lakeport distribution system. The available GIS data will allow creation of a spatially correct system model populated with pipe lengths and diameters, storage tanks, supply sources, and other facilities such as pump stations and fire hydrants.

3.02 Model Boundary Condition Input

Upon completion of the base model, nodal demands data, pump curves, storage tank sizes, and other boundary condition data will need to be determined from production and metering data provided by LCSD and input to the model. Several models for varying demand conditions will be developed, such as current average day demand condition, current maximum day demand condition, and a future maximum day demand condition. Others may also be prepared as needed.

3.03 Hydrant Flow Testing and Model Calibration

Several hydrants within the water system will be selected for flow testing. Brelje & Race staff, along with LCSD or Fire District staff will conduct specialized hydrant flow testing which is necessary for calibrating the base model. Approximately 8 to 10 representative hydrants would be selected for flow testing. Upon completion, the data collected, along with SCADA data for the day the tests were conducted, will be used to accurately calibrate the hydraulic model of the system.

3.04 Model Runs for Identifying Needed System Improvements

The calibrated model will be used to identify system deficiencies, typically using the maximum day demands and local area fire demand conditions. A trial-and-error method will then be used to identify necessary or desired system improvements. Eight to ten model runs are anticipated.

3.05 Capacity Analyses

A source capacity and storage capacity analysis will be conducted for the water system based on current and anticipated future demands. Future demands will be developed based on available growth statistics or recent trends.

Task 4 – Kono Tayee Model (141 Connections)

4.01 Base Model Development

Data provided by LCSD will be used to create an accurate computer hydraulic model of the North Lakeport distribution system. The available GIS data will allow creation of a spatially correct system model populated with pipe lengths and diameters, storage tanks, supply sources, and other facilities such as pump stations and fire hydrants.

4.02 Model Boundary Condition Input

Upon completion of the base model, nodal demands data, pump curves, storage tank sizes, and other boundary condition data will need to be determined from production and metering data provided by LCSD and input to the model. Several models for varying demand conditions will be developed, such

as current average day demand condition, current maximum day demand condition, and a future maximum day demand condition. Others may also be prepared as needed.

4.03 Hydrant Flow Testing and Model Calibration

Several hydrants within the water system will be selected for flow testing. Brelje & Race staff, along with LCSD or Fire District staff will conduct specialized hydrant flow testing which is necessary for calibrating the base model. Approximately 2 to 3 representative hydrants would be selected for flow testing. Upon completion, the data collected, along with SCADA data for the day the tests were conducted, will be used to accurately calibrate the hydraulic model of the system.

4.04 Model Runs for Identifying Needed System Improvements

The calibrated model will be used to identify system deficiencies, typically using the maximum day demands and local area fire demand conditions. A trial-and-error method will then be used to identify necessary or desired system improvements. Eight to ten model runs are anticipated.

4.05 Capacity Analyses

A source capacity and storage capacity analysis will be conducted for the water system based on current and anticipated future demands. Future demands will be developed based on available growth statistics or recent trends.

Task 5 – Spring Valley Model - Supplement

The base model will have been developed under separate contract which is currently underway. Nodal demands data and other boundary condition data will also have already been input to the existing model. Therefore the tasks for modeling Spring Valley will be slightly different, and should require less effort.

5.01 Model Boundary Condition Input

The previously developed demands data may need minor refinement as the model being developed under separate scope is not intended for detailed or precise modeling work. From the refined model, several new models for varying demand conditions will be developed, such as current average day demand condition, current maximum day demand condition, and a future maximum day demand condition. Others may also be prepared as needed.

5.02 Hydrant Flow Testing and Model Calibration

Several hydrants within the water system will be selected for flow testing. Brelje & Race staff, along with LCSD or Fire District staff will conduct specialized hydrant flow testing which is necessary for calibrating the base model. This will not have been completed for the model yet, and will be needed for modeling accuracy. Approximately 6 to 8 representative hydrants would be selected for flow testing. Upon completion, the data collected, along with SCADA data for the day the tests were conducted, will be used to accurately calibrate the hydraulic model of the system.

5.03 Model Runs for Identifying Needed System Improvements

The calibrated model will be used to identify system deficiencies, typically using the maximum day demands and local area fire demand conditions. A trial-and-error method will then be used to identify necessary or desired system improvements. Note that these improvements may have been partially identified already or may be refinements to the original improvements previously recommended. Perhaps 6 to 8 model runs are anticipated.

5.04 Capacity Analyses

A source capacity analyses will be conducted, but not for storage. (The storage capacity analysis will not be needed as that task will likely have been completed during the pressure zone analyses performed during the separate contract.)

Task 6 – Report Preparation

6.01 Draft Report

The results of the capacity/storage analyses and the modeling results for each of the water systems will be combined into a Draft Report with all recommended water system improvements, separated into chapters for each water system. Additionally, budget-level construction costs will also be prepared in tabular format and included for all recommended improvements. The Draft would be submitted for review and comment to LCSD.

6.02 Final Report Preparation and Supplemental Modeling

Comments received from the Draft Report submission will be incorporated into a final version of the report. It is our experience that some comments will lead to new and updated modeling to address 'what-if' scenarios developed because of questions generated during the review. All 'what-if' scenarios would be analyzed and incorporated as appropriate.

FEES

Our fees for this work will be billed monthly on a time and materials basis per the rates provided and included in our On-Call contract with Lake County Special Districts. The overall budget for completing all tasks likely exceeds the available amount budgeted for Task Order 2 within LCSD's CIP plan. That budget is currently $100,000. It is proposed that the modeling efforts for the first four water systems be initiated and completed. Follow-on services would include Task 5 for Spring Valley after the parallel project currently in progress is completed, followed by Task 6. Tasks 5 & 6 would likely require budget amendments, with budgets better estimated at that time. The Suggested Budgets are as follows:

Task 1 – North Lakeport Model:	$ 29,000
Task 2 – Soda Bay Model:	$ 25,400
Task 3 – Kelseyville & Finley Model:	$ 30,600
Task 4 – Kono Tayee Model:	$ 15,000
Task 5 – Spring Valley Model – Supplement:	$ TBD ($ 15,400 Est)
Task 6 – Report Preparation:	$ TBD ($ 70,000 Est)
Total All Initial Tasks:	$100,000
Estimated Budget for Unfunded Tasks:	$ 85,400

SCHEDULE AND ABILITY TO PERFORM

The modeling tasks would be initiated immediately upon approval of the Task Order No. 2. Note that the spring months around April and May are generally the best time for conducting hydrant flow testing as system flows generally are the closest to the averages.

ASSUMPTIONS AND LIMITATIONS

1. Data necessary for constructing the base models and conducting the initial modeling runs are assumed to be readily available and will be provided by Lake County Special Districts. It is also assumed the fire

flow testing to be conducted will be performed by District staff or Fire Department staff under the direction of Brelje & Race staff.

2. Boundary surveying, record mapping and topographic mapping services are not included. Should the Owner desire definitive survey information other than that which can be provided by direct use of existing documentation, Brelje & Race can provide complete boundary survey and analysis services. Additional fees for these services can be identified following review of existing documentation.

WATER MODELING & CAPACITY ANALYSES

Lake County Special Districts

TASK, WORK HOUR and COST TABULATION

November 8, 2024

TASK		DESCRIPTION	WORKHOURS						
			Senior Principal	Managing Engineer	Senior Engineer	Engineering Technician II	Clerical	Subconsultant ($) Name	
			Jeane	Stetina	Gong	Barnard	Tallman		
1 North Lakeport Model	1.01	Base Model Development (~250 Pipes; 1,285 connections)	3			24			$5,115
	1.02	Model Boundary Condition Input	3			32			$6,555
	1.03	Hydrant Flow Testing (8 to 10)	1		8	8			$3,465
	1.04	Model Calibration	2			24			$4,850
	1.05	Model Runs (8 to 10 assumed)	3			20			$4,395
	1.06	Capacity Analyses	4			20			$4,660
		Subtotal	**16**	**0**	**8**	**128**	**0**	**$0**	**$29,040**
2 Soda Bay Model	2.01	Base Model Development (~125 Pipes; 654 Connections)		3	18				$4,650
	2.02	Model Boundary Condition Input		2	18				$4,420
	2.03	Hydrant Flow Testing (4 to 5)		1	8	8			$3,430
	2.04	Model Calibration		2	16				$3,980
	2.05	Model Runs (8 to 10 assumed)		6	16				$4,900
	2.06	Capacity Analyses		2	16				$3,980
		Subtotal	**0**	**16**	**92**	**8**	**0**	**$0**	**$25,360**
3 Kelseyville & Finley Model	3.01	Base Model Development (~ 200 pipes; 1,267 connections)		3	20				$5,090
	3.02	Model Boundary Condition Input		3	28				$6,850
	3.03	Hydrant Flow Testing (8 to 10)		1	8	8			$3,430
	3.04	Model Calibration		2	20				$4,860
	3.05	Model Runs (8 to 10 assumed)		3	20				$5,090
	3.06	Capacity Analyses		4	20				$5,320
		Subtotal	**0**	**16**	**116**	**8**	**0**	**$0**	**$30,640**
4 Kono Tayee Model	4.01	Base Model Development (~40 pipes; 141 Connections)	1			8			$1,705
	4.02	Model Boundary Condition Input	1			6			$1,345
	4.03	Hydrant Flow Testing (2 to 3)	1		6	6			$2,665
	4.04	Model Calibration	1			12			$2,425
	4.05	Model Runs (6 to 8 assumed)	2			16			$3,410
	4.06	Capacity Analyses	2			16			$3,410
		Subtotal	**8**	**0**	**6**	**64**	**0**	**$0**	**$14,960**
5 Spring Valley Model Supplement	5.01	Hydrant Flow Testing (6 to 8)	1		8	8			$3,465
	5.02	Model Calibration	1		16				$3,785
	5.03	Model Runs (6 to 8 assumed)	2		16				$4,050
	5.04	Capacity Analyses	2		16				$4,050
		Subtotal	**6**	**0**	**56**	**8**	**0**	**$0**	**$15,350**
6 Report Preparation	6.01	Draft Report Preparation	8	24	40	96	8		$34,520
	6.02	Cost Estimates (20 facilities assumed)	8	12	60				$18,080
	6.03	Final Report Preparation and Supplemental Modeling	8	8	20	48	4		$17,400
		Subtotal	**24**	**44**	**120**	**144**	**12**	**$0**	**$70,000**
		Total Hours	54	76	398	360	12	N/A	
		Hourly Rate	$265	$230	$220	$180	$100	N/A	
		Subtotal Cost	$14,310	$17,480	$87,560	$64,800	$1,200	$0	

SUBTOTAL (Tasks 1-4)	$100,000	
SUBTOTAL (Tasks 5-6)	$85,350	(Unfunded Amount)
CONTINGENCY 0%	$0	
REPRO & PLOT	$0	
SUBCONSULTANT MARK-UP 10%	$0	
TOTAL	**$100,000**	(Current Funding)