



2025 WATER UTILITY MASTER PLAN

**CITY OF ROSWELL
NOVEMBER 22, 2024**



November 22, 2024

Louis Najjar, PE
P.O. Box 1838
Roswell, NM 88202

RE: 2025 Water Utility Master Plan

Dear Mr. Najjar and Members of the Selection Committee,

Bohannon Huston, Inc., (BHI) is eager to support the City of Roswell's efforts to develop a Water Utility Master Plan (Master Plan). Most of us here at BHI are native New Mexicans and we all felt for the Roswell community after the 500-year storm flooded the entire city back in October. We understand the damage that storm caused, and we want to stand beside you as you re-build. Developing this Water Utility Master Plan will provide the City with insight into ways to do just that. The BHI team has been strategically assembled to bring a set of highly skilled water system engineering professionals to you who will diligently work to perform the tasks required to develop the new 2025 Master Plan. Below are some of the unique strengths BHI offers the City:

- » **Municipal Mindset:** As a native New Mexican firm, BHI has a vested interest in improving our local communities and we have worked hard to form long-term, professional relationships with the many cities, towns, villages, and counties in the state. We have committed people and resources to become partners with New Mexico communities—places like Roswell—and to earn their trust by working with them through good times and hard times. Providing engineering services for municipalities like the City is a vital part of BHI's business.
- » **Master Planning Expertise:** BHI uses the latest technologies for analyzing water supply and transmission systems. We understand that bad data in results in bad data out. To ensure the accuracy of our models, we incorporate record drawings and operations and maintenance manuals, visit with operational personnel, conduct site visits, verify equipment models and data in the field, and perform calibration tests. We use the modeling software that will best meet both the project's and the client's needs.

As a leading civil engineering, spatial data services, and advanced engineering technology company, we realize that our activities, and our services in general, play an important role in people's daily lives and can make a real contribution to creating long-term value to society at large. This Master Plan will put a plan in place to do just that!

We look forward to working with you on developing this important Master Plan. Please reach out if you have any questions regarding our proposal.

Sincerely,

Todd Burt, PE
Principal-in-Charge
tburt@bhinc.com

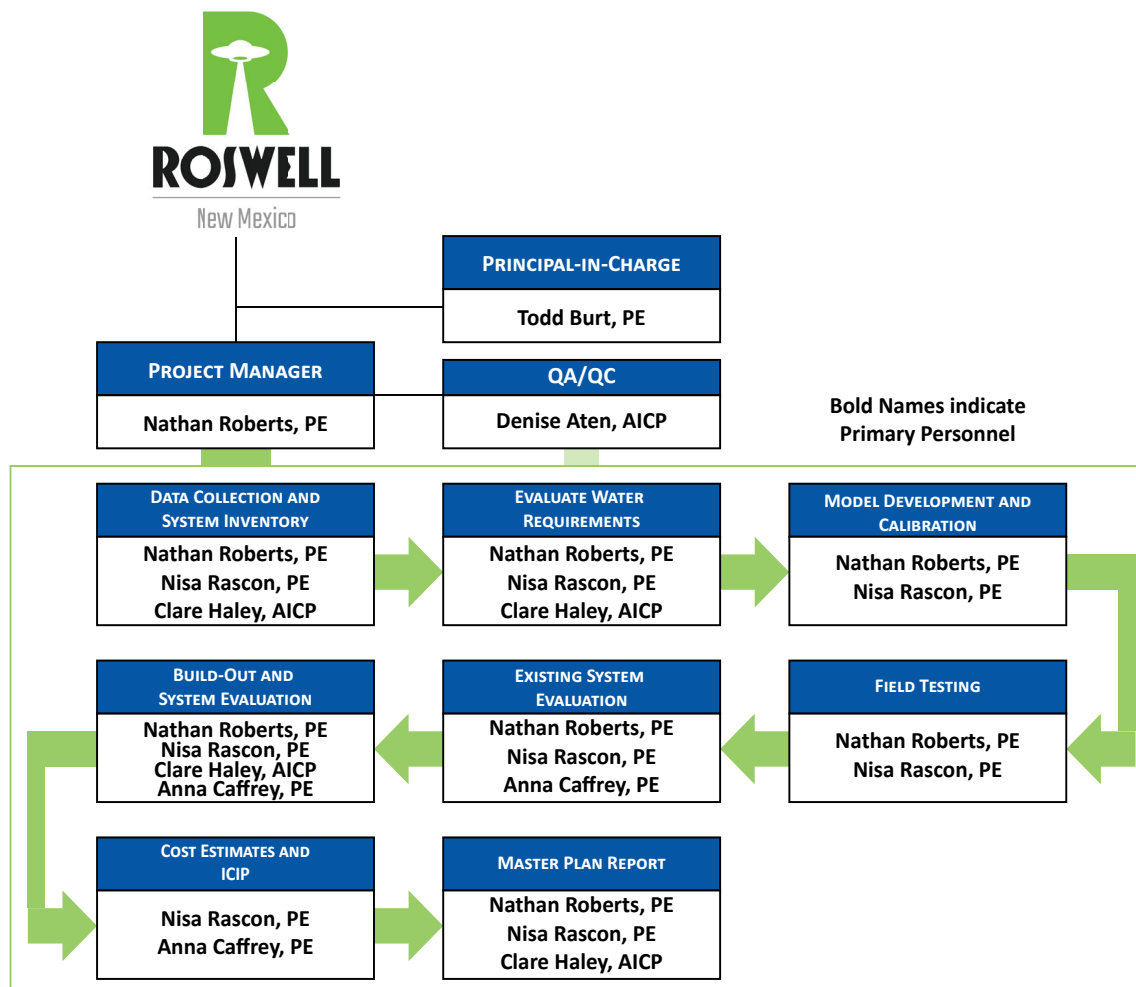
Nathan Roberts, PE
Project Manager
nroberts@bhinc.com

QUALIFICATIONS

Our team below stands ready to provide complete master planning services through a team of experienced professionals and technicians committed to the mutual success of this Master Plan. BHI's project management philosophy begins with an investment in a qualified team of experts with the skills and experience that matches the project requirements. Our work is about solving problems, turning challenges into solutions that fulfill the project requirements, and meeting or exceeding client expectations. Our staff have both the expertise and creativity to devise the right recommendations for this project.

KEY PERSONNEL

For the 2025 Water Utility Master Plan, BHI has compiled an in-house team that has completed similar projects and has a broad base of expertise across water systems. The following team will be led by Nathan Roberts, who is BHI's lead water system modeler and planner. Working under Todd Burt's oversight, Nathan will develop a plan for this master plan that will help the City calibrate your water model using the most recent information as the basis for identifying system deficiencies, solutions, and costs. Nathan will ensure the model demand is spatially accurate (using billing and production data) and collaborate with the City to understand plans for future development, community growth, and system expansion. This way the City will have a solid road map for maintaining your water system while planning for future growth over the next 20 years. Resumes for our primary team members (bold names in the organization chart below) are included on the following pages.





TODD BURT, PE | PRINCIPAL-IN-CHARGE

25 YEARS' EXPERIENCE | NM PE 16654

MS HYDROLOGY, BS ENVIRONMENTAL ENGINEERING

Todd Burt is a BHI Senior Vice President and is the leader of the water and wastewater systems group. He has been involved in many aspects of civil engineering and environmental issues throughout his career. He has a broad perspective that allows him to evaluate and solve potential project issues. His experience is particularly strong in pipeline design, pump station design, and water treatment. He has extensive experience evaluating water systems and providing design guidance and oversight, as well as providing quality review, for numerous pipeline and pump station projects and successfully coordinating with contractors and agencies on complex projects.

Todd's proficiency in hydraulics allows him to understand system operations and provide input to the modeling stages of a project or master plan. This knowledge and intuition allow him to effectively serve in an active role on modeling and master planning projects for which he serves as Principal-in-Charge.

Todd maintains close contact with clients and oftentimes acts as the primary contact for the variety of projects his group works on. He also takes a hands-on approach to being a key part of the team but allows his project managers and engineers to run projects and to work with clients. He expects them to produce quality work on every project. Todd can allocate resources and can resolve issues as they arise on a project. His strong technical background allows him to lead the group and to provide mentorship to all who work with him.

Project Experience:

- » Rio Rancho Water System Master Plan: City of Rio Rancho
- » Mesa del Sol Utility Plan: SC3 International
- » Master Meters Design: City of Santa Fe
- » Metropolitan Detention Center (MDC) Water and Sewer Improvements: Albuquerque Bernalillo County Water Utility Authority
- » Hydraulic Modeling and System Planning: City of Rio Rancho
- » Arroyo del Oso NP Flow Meter Vault: Albuquerque Bernalillo County Water Utility Authority
- » Hyde Park Estates Water Distribution: Santa Fe County
- » Volcano Cliffs Arsenic Treatment Facility and Pump Station Upgrades: CDM Smith
- » AWIA Risk Assessment and ERP: Los Alamos County
- » Master Meter Vault Project: City of Santa Fe
- » Water distribution System Hydraulic Model: City of Aspen
- » Entramosa 60-in Waterline Design Along Frost Road: Roger Cox and Associates
- » Water Model Development: City of Greeley
- » Asset Management Plan: City of Moriarty
- » Hydraulic Profile Updates: Albuquerque Bernalillo County Water Utility Authority
- » Model Calibration/Validation: City of Santa Fe
- » Resiliency Vulnerability Assessment of Critical Facilities – Water Infrastructure: City of Rio Rancho
- » Infrastructure Build Out Plan/Capital Improvement Plan: Santa Fe County
- » Pojoaque Basin Regional Water System (PBRWS) Design/Build Project: CDM Smith
- » Entramosa Water System: Entramosa Water/Wastewater Coop
- » S-1 Southwest Tank Supply Pipeline: City of Santa Fe





NATHAN ROBERTS, PE | PROJECT MANAGER

15 YEARS' EXPERIENCE | NM PE 21847
BS CIVIL ENGINEERING

Nathan Roberts is a BHI Vice President who loves working in the water sector. His expertise includes hydraulic modeling, master planning, design, and construction services. He uses his experience to quickly identify key issues to better understand the big picture and then to develop and coordinate the details with his clients to meet their specific objectives. Nathan's hydraulic modeling experience allows him to efficiently assess the condition of the system and analyze various options to solve problems. This can be identifying a new transmission line alignment to avoid culturally sensitive areas, simplifying booster station operations to make the system more efficient, or strategically placing new storage to optimize water age or pump cycling to balance capital and non-capital improvements.

His big picture understanding, along with his familiarity with hydraulic systems, allows him to communicate clearly with his clients, as well as with other stakeholders and team members. Nathan enjoys bringing things from the digital world into the real world and tangibly solving problems with contractors and understanding how to practically get things built. Additionally, he is skilled in multiple software platforms, including GIS, FME, AutoCAD, and Microsoft, which help streamline processes to better serve BHI clients.

Project Experience:

- » Rio Rancho Water System Master Plan: City of Rio Rancho
- » Mesa del Sol Utility Plan: SC3 International
- » North Non-Potable System Supply Evaluation and Design: Albuquerque Bernalillo County Water Utility Authority
- » Master Meters Design: City of Santa Fe
- » Metropolitan Detention Center (MDC) Water and Sewer Improvements: Albuquerque Bernalillo County Water Utility Authority
- » Hydraulic Modeling and System Planning: City of Rio Rancho
- » Future Paa-Ko Conditions Analysis Alternatives: Entramosa Water/Wastewater Coop
- » Arroyo del Oso NP Flow Meter Vault: Albuquerque Bernalillo County Water Utility Authority
- » Hyde Park Estates Water Distribution: Santa Fe County
- » Volcano Cliffs Arsenic Treatment Facility and Pump Station Upgrades: CDM Smith
- » AWIA Risk Assessment and ERP: Los Alamos County
- » Master Meter Vault Project: City of Santa Fe
- » Water distribution System Hydraulic Model: City of Aspen
- » Entramosa 60-in Waterline Design Along Frost Road: Roger Cox and Associates
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- » Hydraulic Profile Updates: Albuquerque Bernalillo County Water Utility Authority
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- » Resiliency Vulnerability Assessment of Critical Facilities – Water Infrastructure: City of Rio Rancho
- » Infrastructure Build Out Plan/Capital Improvement Plan: Santa Fe County
- » Pojoaque Basin Regional Water System (PBRWS) Design/Build Project: CDM Smith
- » Entramosa Water System: Entramosa Water/Wastewater Coop
- » S-1 Southwest Tank Supply Pipeline: City of Santa Fe
- » Water Quality Hydraulic Model and Study: Denver Water
- » Sunset Hills Water System Preliminary Engineer Report: Pueblo of Isleta
- » Water Master Plan, Model Optimization, and Water Model Update: City of Scottsdale





NISA RASCON, PE | WATER SYSTEMS ENGINEER

7 YEARS' EXPERIENCE | PE NM 26790
BS ENVIRONMENTAL ENGINEERING

Nisa Rascon has experience in water and wastewater system modeling, analysis, and design. She knows how to model complex systems with extensive hydraulic components, balancing them to ensure system functionality and reliability. By focusing on the main hydraulic boundary conditions of a system (such as elevations, piping, pumping, and storage needs), she can optimize solutions that provide adequate system flows and pressures for the present and future conditions.

A couple ways Nisa does this is by ensuring the existing and proposed infrastructure will function properly based on the hydraulic grade, considering system elevations and friction losses through pipe specific to materials and flowrates. She also identifies and incorporates other unique system features that need to be considered for system success, such as user types (commercial, industrial, correctional facilities, etc.) and network connectivity. Additional important components in her analysis include water age to ensure that the water in the system is not susceptible to water quality concerns when reaching customers by providing recommendations to optimize system operation and design for the projected water demands.

Nisa also understands the challenges projects face and has firsthand experience with and knowledge of keeping facilities in operation during improvements, avoiding disrupting processes and maintaining quality requirements. Nisa has worked with clients to prepare reports for justification of funding and to evaluate alternatives to ultimately provide sound recommendations to her clients. She is a valued asset on any project!

Project Experience:

- » Wastewater System and Wastewater Treatment Plant Assessment: Village of Fort Sumner
- » Metropolitan Detention Center (MDC) Water and Sewer Improvements: Albuquerque Bernalillo County Water Utility Authority
- » Water Transport System to Eastern Reservation Area Preliminary Engineering Reports: Pueblo of Laguna
- » Reservoir #1 Upgrades: City of Aztec
- » Hydraulic Modeling and System Planning: City of Rio Rancho
- » Duran Water System Preliminary Engineering Report: Tarrant County
- » Wastewater Treatment Plant Upgrades: Village of Fort Sumner
- » Entramosa 16-inch Waterline Design Along Frost Road: Roger Cox and Associates
- » Tesuque and Bishops Lodge Water Tanks: Santa Fe County
- » Mesa del Sol Lift Station and Force Main Improvements Design Analysis Report: SC3 International
- » Mesa del Sol Public Work Order Infrastructure packages A-B (Water Infrastructure): SC3 International
- » Pojoaque Basin Regional Water System (PBRWS) Design/Build Project: CDM Smith





ANNA CAFFREY, PE | QA/QC

21 YEARS' EXPERIENCE | NM PE 18095, CERTIFIED FLOODPLAIN
MANAGER NM-O5-00145 | BS CIVIL ENGINEERING

Anna Caffrey is an agile engineer who maximizes the efficiencies of design and analysis tools. She has extensive experience in the design of water transmission systems. She provides analysis and design services for large- and small-diameter pipelines as well as other system components. Anna is responsible for leading teams to develop alignments and profiles for pipelines, including horizontal and vertical layouts of the pipeline geometry. She knows how to collect information to obtain a good understanding of existing site conditions, as well as review existing utility information and develop utility potholing plans to define field information critical to the development of plans. Anna's experience also includes closely coordinating with contractors to confirm improvements are built according to plans.

Project Experience:

- » 30th St. and Paseo del Volcan Transmission Line: City of Rio Rancho
- » 35th Ave. Waterline: City of Rio Rancho
- » Corrales Wells 2 and 3: CDM Smith
- » Rio Grande/Candelaria Water Line: Albuquerque Bernalillo County Water Utility Authority
- » Buckman Arsenic Evaluation: CDM Smith
- » Buckman Direct Diversion (BDD) Pipeline Design/Build Project: Jacobs
- » Buckman Parallel Line: City of Santa Fe
- » Carnuel Water System Improvements: Albuquerque Bernalillo County Water Utility Authority
- » City Center Booster Station: City of Rio Rancho
- » College Mesa Water Treatment Plant Auxiliary Finished Water Storage Tank: City of Durango
- » Cordero Mesa Reach 2 Waterline: Bernalillo County
- » Corrales Trunk Sequencing Plan and Master Plan Completion: Price Land and Development Group, Inc.
- » Country Club Dr. Reconstruction and Water Line Replacement: City of Rio Rancho
- » Effluent Reuse Waterline, Ph. 1B: City of Clovis
- » Apache Graben Water Project: Laguna Development Corporation
- » Enchanted Hills Tank 12W: City of Rio Rancho
- » Waterline Replacement Design/Build Project: Kirtland Air Force Base
- » North Canal St. Water Line: City of Carlsbad
- » CBI Potable Waterline Replacement: Public Service Company of New Mexico
- » River Diversion Pipeline to San Juan Generating Station: Public Service Company of New Mexico
- » Pojoaque Basin Regional Water System (PBRWS) Design/Build Project: CDM Smith
- » Reservoir No. 12W: City of Rio Rancho
- » S-1 Southwest Tank Supply Pipeline: City of Santa Fe
- » San Juan Chama Water Transmission Pipeline #3: Albuquerque Bernalillo County Water Utility Authority
- » Vacuum Station 63 Rehab Design: Albuquerque Bernalillo County Water Utility Authority
- » Westside Water System Improvements: Pueblo of Isleta





DENISE ATEN, AICP | PLANNER

30+ YEARS' EXPERIENCE | AICP 023292

MS ENV. PLANNING, BA MATHEMATICS & ECONOMICS

Denise Aten has gained invaluable experience in implementing a variety of infrastructure planning projects for numerous rural and larger communities throughout New Mexico. She brings experience with state and federal agencies and their regulatory requirements, as well as the complexities of NEPA. She also brings extensive experience in leading public involvement activities, coordinating with multiple agencies and stakeholder groups. Denise has direct experience with implementing equitable and diverse outreach programs built from her experience with bi-national, multi-lingual, and multi-cultural initiatives.

Denise was a key team member for Santa Fe County's Infrastructure Build Out Plan/Capital Improvement Plan. On this project, she was responsible for client management, analysis of infrastructure needs, and supporting the development of the capital improvement plan. She also was responsible for applying current planning studies and associated assumptions to define the infrastructure required to support new development through the year 2040. Infrastructure types analyzed included future water, wastewater, roadways, parks and open space, along with the provision of public services. A prioritization plan for implementation was a critical part of the final product.

Project Experience:

- » Regional UFO Skate Complex: City of Roswell
- » Bike-Ped Master Plan: City of Rio Rancho
- » Main Street Wayfinding Signage Design: City of Roswell
- » Infrastructure Build Out Plan/Capital Improvement Plan: City of Santa Fe
- » Acequia Trail Crossing: City of Santa Fe
- » Acequia Train Underpass at St. Francis Drive: The Louis Berger Group
- » NMDOT Cerrillos Road Pedestrian Study: NMDOT
- » Capital Improvements Program (CIP)/Impact Fees Study: Santa Fe County
- » Comprehensive and Asset Management Plans: Grant County
- » Design and Construction Standards Update: Los Alamos County
- » Land Development Standards: City of Gallup
- » Santa Fe River Trail connections and Improvements: The Louis Berger Group, Inc.



EXPERIENCE

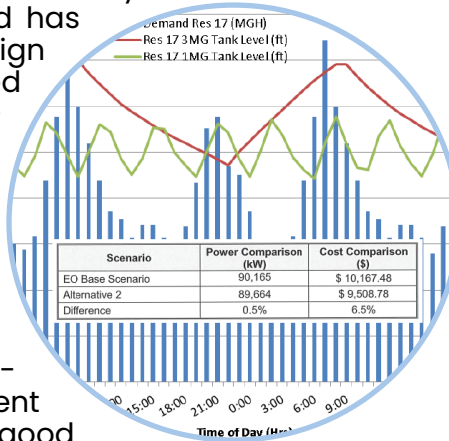
Founded in 1959, BHI is a leading multidisciplinary planning, engineering, spatial data, and advanced technologies firm serving the municipal infrastructure needs of communities throughout New Mexico. Celebrating 65 years of successful service, BHI has grown into a nationally recognized service provider in the areas of civil and structural engineering, traffic and transportation engineering, planning, land surveying, GIS, aerial mapping (photogrammetry and LiDAR), water resources, and utility engineering. Our breadth of collaborative expertise enables us to see project solutions from concept through completion. We have developed a staff of professionals, currently more than 240 strong, within a diverse company structure that allows us to provide our clients with a full range of integrated services. Our firm's management philosophy embraces continuous quality improvement initiatives, direct owner involvement, dedication of resources, principal-level leadership of each primary discipline, team-driven services, and direct client-staff communications.

EXPERIENCE WITH PROJECTS OF SIMILAR SCOPE

The following represents our team's experience performing projects with similar scopes.

ON-CALL AND WATER SYSTEM MASTER PLAN | CITY OF RIO RANCHO

BHI was awarded a Water Systems On-Call contract by the City of Rio Rancho nearly 20 years ago and has been conducting water system planning and design activities for Rio Rancho ever since. BHI developed plans that prioritized system upgrade improvements to satisfy the short-term and long-term service requirements. BHI has continuously updated and maintained the City's hydraulic water model, which we use to analyze changes to system operations, to analyze impacts of proposed development, and for master planning purposes. BHI has completed several master plans for the City over the course of 15 years, evaluating various specific aspects of the City's current and future water system. As a result of being a good steward of the City's hydraulic model, BHI has recently been selected to complete the City's latest Water System Master Plan which was kicked off with the City in July 2024. This continues the strong partnership between BHI and the City.



The following are some of plans we have completed:

Existing Water System Evaluation: BHI was selected to prepare and then validate a water system model that represents the City's current water system. BHI completed the Existing Water System Evaluation, which specifically discussed in detail the work effort and steps involved in developing a validated water system model and the subsequent evaluation of the existing water system performance.

Water Age and Electrical Optimization: BHI conducted a water quality (WQ) analysis of the Rio Rancho water system and an electrical optimization (EO) analysis. The WQ analysis identified locations where water age may present potential concerns and evaluated modifications to system operations to mitigate water quality issues associated with aged water. The EO analysis identified the potential for electrical cost savings by operating pumps during off-peak electric usage hours.

Ultimate Water System Evaluation: Upon completion of the preceding task, BHI was asked to expand the study to include an evaluation of system infrastructure requirements, including new supply sources to support ultimate development of the City to the current city limits. The Existing Water System evaluation considered

generally existing development and used water billing related data as a means of generating spatially accurate system demands. The Ultimate System Water Model addressed water use for future development in terms of use per acre by land use type. This report discussed a very detailed investigation of current system demand by customer land use type, performed by BHI, which resulted in approved water use per acre by land use category. This report also contained a determination of those lands for which water has been committed through various agreements by the City, an estimate of full development water needs, and finally an evaluation of infrastructure required to serve those needs. In addition to identifying the infrastructure requirements, the evaluation provided the location and quantity of additional supply sources needed to satisfy projected peak water use needs.

The most critical water-related boundary condition identified in the evaluation of the ultimate system status and performance is that of supply needed for the City's future customers. This required accurately projecting buildout demands based on the approved water use values and patterns by land use category for vacant and redevelopment parcels within the service area boundary. Additionally, analyzing the likelihood and consequence of a failure helped prioritize the phasing of recommended projects out into the future.

Miscellaneous Model Uses: As a result of maintaining the City hydraulic model, BHI has had the privilege of using it to evaluate regional master plans such as Los Diamantes and Unit 10, as well as countless water availability studies for developments through the system, such as Paseo 550, Moccasin Ridge, and Cuesta al Este. BHI also pioneered using a hydraulic model for ISO audits, allowing municipalities to use a hydraulic model as part of ISO rating rather than requiring fire hydrants to be exercised and tens of thousands of gallons wasted.

NORTH NON-POTABLE WATER SYSTEM ANALYSIS | ALBUQUERQUE BERNALILLO COUNTY WATER UTILITY AUTHORITY

As part of BHI's on-call agreement with the Albuquerque Bernalillo County Water Utility Authority (Water Authority), the Water Authority tasked BHI with reviewing and updating its non-potable hydraulic model and using it to analyze multiple supply scenarios to identify capital improvements to create more redundancy within the system.

The system is typically fed with San Juan Chama Water from the Rio Grande. However, depending on the flows in the Rio Grande, supply to the non-potable system may not be available. To supplement supply, the Water Authority plumbed a couple high arsenic wells into the non-potable system, but these wells are only sufficient to provide redundancy to portions of the system.

BHI updated the model demands based on billing data and spatially associated the demands from meter points to model junctions. BHI also updated diurnal patterns and control points to accurately reflect system operations while working closely with Water Authority staff.

BHI analyzed plumbing more high arsenic wells into the non-potable system and implementing flow control valves at key facilities to allow supply to drop from one pressure zone to a lower pressure zone.

BHI determined flow control valve sizing and flowrates so this system is not dependent on San Juan Chama water to meet customer demand. Additionally, the proposed solution for interconnecting non-potable wells into the system was strategically placed to minimize pipeline length while leveraging the existing well pumps to operate near their original design point.

These improvements are actively being implemented, and BHI is providing construction support.



MODEL DEVELOPMENT, MISCELLANEOUS SYSTEM OPERATIONS AND WATER AVAILABILITY REQUESTS | CITY OF ASPEN

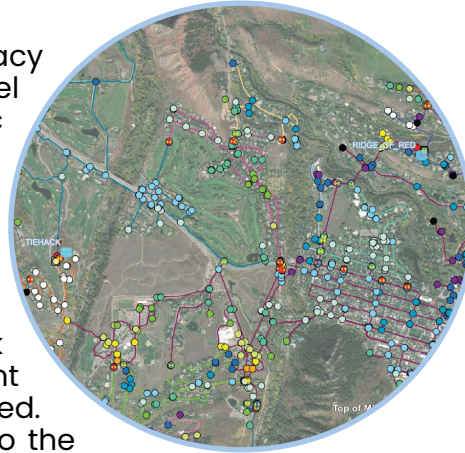
The City of Aspen's water distribution system provides retail service to a population of roughly 7,000 people with four wholesale customers. This unique water distribution system has 15 pumping stations, 22 pressure zones, and 150 miles of pipeline. During an average day, the water treatment plant produces 18 MGD.

BHI was selected in April 2018 to update a legacy water distribution system (WDS) hydraulic model for the City of Aspen. The new WDS hydraulic model was developed in InfoWater software, using GIS elements from the legacy model, facilities data from as-builts, map books, previous master plans and studies, and data gathered from site visits and workshops. Physical topology was expounded upon, elevations updated, valve control settings established, tank levels and controls entered, pump design point curves created, and customer meters geolocated.

A single average day demand was allocated to the model based on monthly meter sales. From this scenario, peaking factors and patterns were used to drive all demand variations.

With completion of the hydraulic model, BHI has had the privilege to continue assisting the City with system analyses for new infrastructure performance and recommended improvements. This includes:

- » **Lumber Yard Development Water Modeling Analysis** was completed analyzing a new multi-use, multistory facility near the airport. BHI analysis included operational adjustments projecting tank storage levels critical to serving the new development without adversely impacting the level of service to existing customers.
- » **Reds Analysis** included three elements related to the operations of the Upper, Lower, and West Reds facilities in the northwest portion of the service area. The analyses included verifying the pipe diameter proposed in Red Mountain Road, calculating the generator sizing requirements at West Reds, and consolidating the Lower Reds Pressure Zone into the West Reds Pressure Zone, along with the capital projects and phasing that would be required.
- » **Willoughby Way Analysis** reviewed the City's ability to realign the 16-inch waterline transferring supply to the West Reds Facility Site. It also reviewed the check valve operations within Willoughby Way to send water west to east within the Gravity Zone toward Rubey Pump Station and Rubey Pump Station's ability to serve West Reds.
- » **Aspen Ski Company Analysis** evaluated snow-making operations and the impacts to the existing system supply availability and facility operations, particularly at the Little Nell Pump Stations and the Highlands Tank and PRV.
- » **Tiehack Valve Vault Review and Design** included a review of another engineer's valve vault design configuration and future operations. The Tiehack Tank is typically served from the Thomas Valve along Hwy 82, and the Tiehack Facility is the main supply to the Buttermilk district and sets the hydraulic grade line for sending water east to the airport. BHI reviewed the original design and provided an alternative concept accepted by the City. BHI was then tasked with the design on the new configuration which has since been constructed.



BHI continues to serve as a water system hydraulic modeling expert for this community. The City considers BHI a key partner in evaluating and providing recommendations to improve its water system performance.

ANTICIPATED APPROACH

WATER UTILITY MASTER PLAN OUTLINE AS DETAILED IN THE RPF

TASK 1: DATA COLLECTION AND SYSTEM INVENTORY

- » Acquisition of Existing System Data
 - › Obtain and review existing maps and inventories
 - › Review recent and planned development
 - › Review chronic problems
 - › Conduct site visits
 - › Compare and update system map
- » Evaluate Water Requirements
 - › Evaluate Existing Water Use Data
 - › Estimate Future Water Requirements

TASK 2: MODEL DEVELOPMENT AND CALIBRATION

- » Build a model of the water distribution system
- » Field Testing Program
 - › Prepare field testing program
 - › Conduct field testing program
- » Workshop #1 with Model Calibration Results

TASK 3: CURRENT SYSTEM EVALUATION

- » Current System Modeling
 - › Water supply facilities
 - › Service levels
 - › Distribution system components
 - › Pumping and storage
 - › Fire hydrant/fire flow assessment
 - › Emergency connections
 - › Water quality issues
- » Develop Current System Improvement Plan
- » Workshop #2 with Current System Analysis

TASK 4: BUILD-OUT SYSTEM MODELING

- » Build-Out System Modeling
- » Develop Build-Out System Improvement Plan
- » Workshop #3 with Build-Out System Evaluation Results

TASK 5: COST ESTIMATES & IMPROVEMENTS PHASING & CRITICAL NEEDS

- » Cost Estimates
- » Improvement Phasing Plan
- » Workshop #4 with Recommended Improvements & Critical Needs

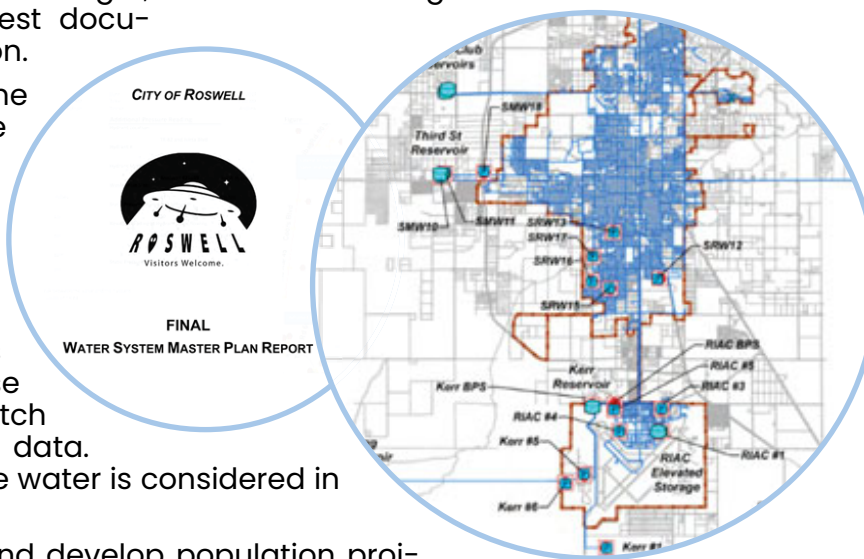
TASK 6: WATER UTILITY MASTER PLAN REPORT

- » Prepare Draft Water Utility Master Plan Report
- » Final Water Utility Master Plan Report

TASK 1: DATA COLLECTION AND SYSTEM INVENTORY

BHI will review and request information provided by the City. Documents anticipated to be examined include the existing model, GIS Mapping and mapbooks, previous master plans, record drawings, billing information, fire hydrant data, and potential field tests during the initial stages of this phase. BHI will keep a log of the data requests and documents received. BHI will prioritize regular communication with the City's Project Manager, who will facilitate gathering the data request documents and information.

To illustrate how some information will be incorporated into the model, BHI anticipates using the billing data to spatially allocate system demands to model junctions and then scaling these demands to match reported production data. This was non-revenue water is considered in the model results.



BHI will also review and develop population projects and review other City planning documents to understand the planned growth of the community. This will help determine future flows and redevelopment areas which could impact existing infrastructure. As noted in the RFP the timelines will include years 2025, 2030, 2040, and buildout. BHI will compare the previous model infrastructure against the latest readily available aerial imagery to determine where new development has already occurred since the last model updates and add the new infrastructure to the model using record drawings.

BHI will also request documentation on line breaks and boil alerts to help determine areas of concerns as well as meet with Roswell to understand where existing trouble spots are to make sure the model reflects the field conditions.

BHI will summarize the documents received and modifications made in a brief technical memorandum (TM), which will document data and how it was processed as it will be the basis of the model. This TM is anticipated to be a chapter in the final Master Plan.

BHI will also complete a site visit to verify all data needs are identified up front to more efficiently complete the infrastructure assessment and identify improvements.

Deliverables:

- › Data request log
- › Final technical memorandum

TASK 2: MODEL DEVELOPMENT AND CALIBRATION

The data provided in Task 1 will be the basis of the hydraulic model. BHI anticipates the model will be loaded using Thiessen polygons incorporating meter points surrounding a model junction.

Under this task, BHI will:

Review all hydraulic model pipes, tanks, reservoirs, and valves and ensure parameters accurately represent existing equivalent GIS layers.

Ensure meter-to-junction assignment is spatially accurate for each pressure zone.

- › BHI will complete this by associating GIS meter points with billing data, then generating Thiessen polygon per pressure zone and assigning all meter points with their billing data to the junction associated with the Thiessen polygon so the model demand is spatially correct.
- › BHI will then scale the demands up to the production data volume to account for any non-revenue water not being accounted for.

Ensure appropriate diurnal patterns for demand are used for at least peak day demand, winter demand, and average day.

Review pipe and junction placement within the model to ensure water network is spatially represented in an accurate manner across the entire city.

BHI will compare the model output to the fire hydrant data provided by the City. By comparing hydrant pressure and flow data to model output data BHI and the City will be able to determine how representative the model is to field conditions. Where large discrepancies are noted, BHI will identify primary and secondary hydrants to develop a field testing program to document static pressures, residual pressures, and flowrates. BHI will also document tank levels and other system set points to recreate field conditions in the model. Additionally, BHI will discuss with the City how hydrant water will be discharged: Will it be acceptable to discharge straight on the ground or into a water truck?

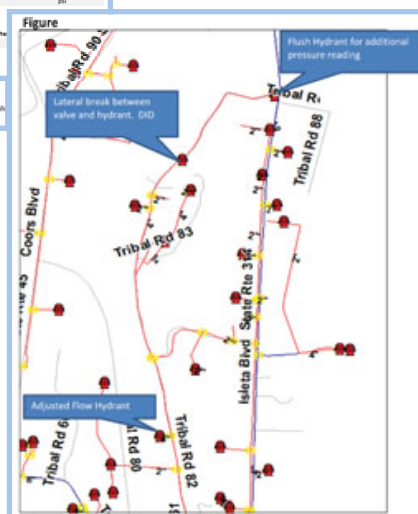
As part of this field testing program, BHI will create data sheets to take into the field to document the site conditions which can then be incorporated into a summary document detailing the field testing program and results.

By obtaining this field information BHI will be able to verify pipe diameters and possibly help identify closed valves.

BHI staff will document the results of this modeling analysis and improvements in a draft technical memorandum and later incorporate in final form into the Report. BHI will hold a workshop with the City to present the findings in a PowerPoint format.

Hydrant Flow Tested Hydrant Location: TR 82 Hydrant ID: 9 Hydrant Model: Kennedy 1 Water Main Size: 2 (2) Static Pressure at Hydrant before: 54 Residual Reading at Hydrant while flowing: 45 Flow Meter Reading: 60 Static Pressure at Hydrant after: 45 Hydrant:	Additional Pressure Reading Hydrant Location: TR 82 and Isleta Blvd Hydrant ID: 7 (2) Hydrant Model: Aradison 421039 Flush Hydrant Static Pressure at Hydrant before: 54 Residual Reading at Hydrant while flowing: 45 Static Pressure at Hydrant after: 45 Hydrant:
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NOTES:
Initial Hydrant identified from testing had a break between the valve and hydrant. DID
new location identified at residence 1,500 feet south of TR 84



Deliverables:

- › Draft technical memorandum
- › Workshop, including PowerPoint Presentation
- › Review meeting minutes
- › Final technical memorandum

TASK 3: CURRENT SYSTEM EVALUATION



Prior to any analysis, BHI will review design, utilization, operation, and reliability criteria (e.g., dedicated transmission system; storage system with distributed facilities sized to meet domestic, fire, equalization, and emergency storage; system redundancy; pipe velocities; system pressures; acceptable head loss; pump cycling frequency; etc.) and will make recommendations for either establishing or changing specific design, operation, and reliability criteria.

These recommendations will be fully documented in a technical memorandum. BHI will detail water system design criteria and methodology that will be used to analyze the water system and identify system deficiencies, plan for system improvements, and plan for system expansion.

The BHI team will define transmission and distribution lines by function and size in the water system and will list and summarize the attributes of all storage facilities, including the geographic area served by each tank.

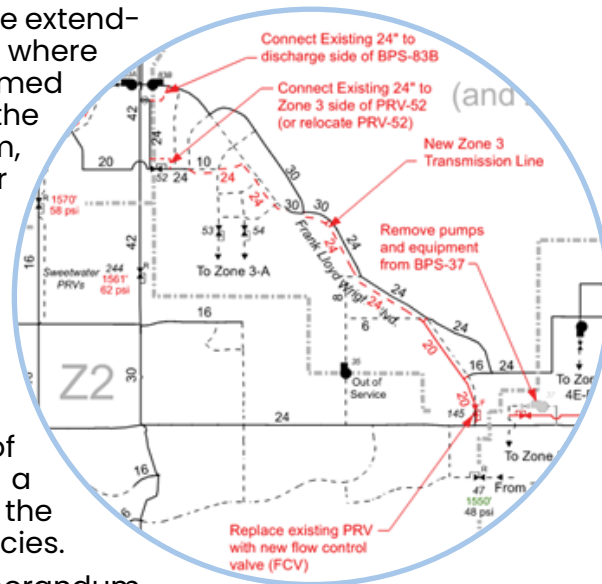
At this point the existing operational controls for wells, booster stations, tank levels, and hydraulic control valve settings should accurately reflect the system operations as a result of the efforts in Task 2. Consequently, BHI will use model output to review tank turnover at the storage facilities, determine the run-times for booster stations and well pumps to determine if there is sufficient storage facilities as well as transfer capacity.

Based on the evaluation criteria BHI will flag deficiencies in the base level of service and develop projects to address these concerns. In addition to extended period simulations for standard operations, BHI will run static model runs to evaluate emergency conditions such as fire flow.

BHI recommends running water age analysis under minimum day demand conditions to qualitatively evaluate water quality. Water quality modeling is more expensive and requires sampling at all supply points and calculating decay rates for each supply point as inputs into the model. A water age analysis can leverage the base extended period simulation model and identify where water takes the longest to be consumed which works under the assumption that the longer the water remains in the system, the more likely there is to be a water quality concern. In addition to capital projects, BHI will review different operational set points to possibly address water age concerns or other concerns noted in the system.

BHI will document where existing deficiencies exist in the current system utilizing model outputs to develop figures of the water system. BHI will also develop a separate model scenario which models the proposed resolutions to existing deficiencies.

BHI will complete a draft technical memorandum summarizing the findings and will present the findings and recommendations in a workshop, where BHI will receive comments from the City and address them in a final technical memorandum.



Deliverables:

- › Draft technical memorandum
- › Workshop, including PowerPoint presentation
- › Workshop minutes
- › Final technical memorandum



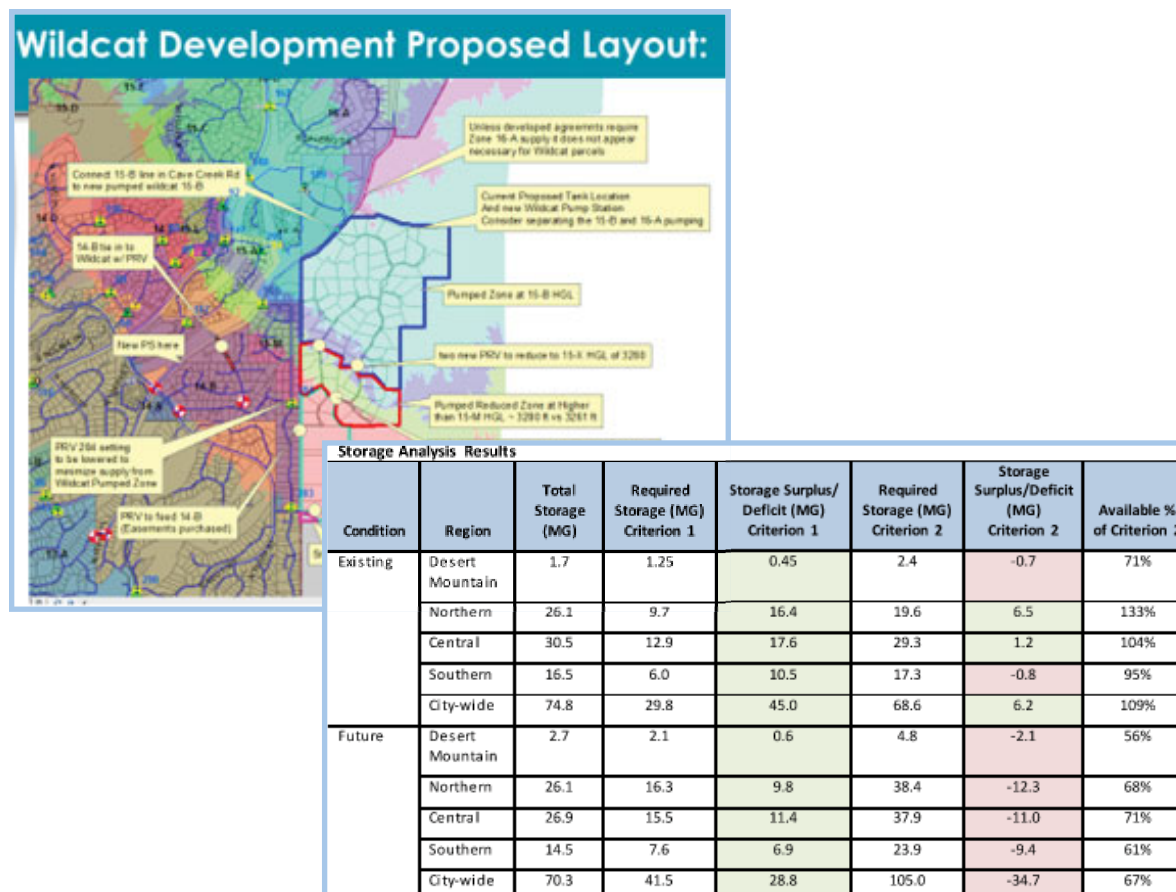
TASK 4: BUILD-OUT SYSTEM EVALUATION

BHI will run an extended period simulation in the City's hydraulic model to determine customer pressures and evaluate pipe velocities, booster station firm capacities, and storage tank volumes for future buildout conditions. This means future pipes and demands activated in the model to represent 2030, 2040, and buildout. Additionally, BHI will assign fire flow to model junctions using land use designations for the fire flow rates.

BHI will document where deficiencies exist in the current system with the larger demand scenario along with properly sizing future infrastructure required to extend service where future developments are expected within the City boundary. The model outputs will be used to develop figures of the water system and proposed infrastructure. BHI will also develop a separate model scenario which models the proposed resolutions for future buildout transmission lines, storage tanks, and booster stations needed for growth as well as address deficiencies additional demand will trigger in the existing infrastructure.

BHI will complete a draft technical memorandum summarizing the findings and complete a review meeting presenting the findings and recommendations.

BHI will receive comments from the Owner and address comments in a final technical memorandum.



Deliverables:

- › Draft technical memorandum
- › Review meeting, including PowerPoint presentation
- › Review meeting minutes
- › Final technical memorandum

TASK 5: COST ESTIMATES AND IMPROVEMENTS PHASING & CRITICAL NEEDS

For all the capital projects BHI will develop a summary sheet which includes type of project, project location, purpose of the project, project elements (i.e. pipe or pump) and a budgetary estimate. BHI will present the projects to the City and verify project priorities.

BHI will also coordinate with the City to understand their capital budget and develop buckets for projects for the 5-, 10- and 15- year intervals.

Critical needs are defined as described in the RFP.

Deliverables:

- › Capital project data sheets, including conceptual cost estimates
- › ICIP phasing periods identifying capital projects
- › Draft chapter

TASK 6: WATER UTILITY MASTER PLAN REPORT

BHI will consolidate the technical memoranda developed in the previous tasks, including the figures and findings presented at the workshops, into the Draft Master Plan for the City to review. Additionally, BHI will develop conceptual cost estimates for the proposed improvements to address deficiencies under existing conditions, future conditions, and infrastructure required for new development.

BHI will submit the Draft Master Plan for the City to review and then schedule a review meeting with the City to obtain comments and discuss proposed improvement phasing to facilitate ICIP planning of needed infrastructure.

BHI will compile meeting minutes and address comments received in a final Water Utility Master Plan Report.



Deliverables:

- › Draft master plan
- › Review meeting & minutes
- › Final master plan

Example report cover



ANTICIPATED TIMELINE

BHI anticipates each phase of this project will take approximately one month each. We believe the completion date set in the RFP of June 30, 2025 is reasonable and can be accomplished.

PROJECT COST

The project cost can be found in the Appendix on the following page.

EXHIBIT B - DESIGN SCOPE FEE

Name of Project: City of Roswell 2025 Water Utility Master Plan

Client: City of Roswell

Principal-in-Charge/ PM, Des. Eng: TAB/NDR Approved by: LJH

inits.

[illegible]

EXHIBIT B - DESIGN SCOPE FEE

Name of Project: City of Roswell 2025 Water Utility Master Plan

Client: City of Roswell

Principal-in-Charge/ PM, Des. Eng: TAB/NDR

Approved by: LJH

inits.

Task / Activity	Engineer 7, PIC	Planner 7	Engineer 6, PE	Engineer 5	Engineer 3	Planner 3	Engineer 2	Engineer Tech 6	Tech Specialist 3	Admin Prof 6	Other Groups	Subconsultant	Other Groups	Reimbursable Expenses	Task Sub-Totals	
															Per-Hrs	Cost
Hourly Rate:	\$ 270	\$ 270	\$ 245	\$ 210	\$ 165	\$ 165	\$ 140	\$ 140	\$ 110	\$ 120						
3.2 Develop Current System Improvement Plan																
3.2 Develop Current System Improvement Plan			16				40									\$ 9,520
3.3 Workshop #2 - Current system Evaluation Results																
Draft Chapter			12				36			12						\$ 9,420
Powerpoint Development			8				8									\$ 3,080
Presentation (in person)			8				8									\$ 3,080
Task 4: Build Out System Evaluation		8	52			24	124			12	\$ -	\$ -	\$ -	\$ -	220	\$ 37,660
4.1 Build Out System Modeling																
4.1 Build Out System Modeling		4	12			8	36									\$ 10,380
4.2 Develop Build-Out System Improvement Plan																
4.2 Develop Build-Out System Improvement Plan			12				36									\$ 7,980
4.3 Workshop #3 - Build Out System Evaluation Results																
Draft Chapter			12				36			12						\$ 9,420
Powerpoint Development		4	8			8	8									\$ 5,480
Presentation (in person)			8			8	8									\$ 4,400
Task 5: Cost Estimates and Improvements Phasing & Critical Needs			68				152			12	\$ -	\$ -	\$ -	\$ -	232	\$ 39,380
5.1 Cost Estimates																
5.1 Cost Estimates			20				60									\$ 13,300
5.2 Improvement Phasing Plan																
5.2 Improvement Phasing Plan			20				40									\$ 10,500
5.3 Workshop #4 - Recommended Improvements and Critical Needs																
Draft Chapter			12				36			12						\$ 9,420
Powerpoint Development			8				8									\$ 3,080
Presentation (in person)			8				8									\$ 3,080
Task 6: Water System Master Plan Report	8	8	28			36	76			32	\$ -	\$ -	\$ -	\$ -	188	\$ 31,600
6.1 Prepare Draft Water System Master Plan Report																
Address comments received from draft chapters			10			20	40									\$ 11,350
6.1 Prepare Draft Water System Master Plan Report	8	8								16						\$ 6,240
6.2 Final Water System Master Plan Report																

EXHIBIT B - DESIGN SCOPE FEE

Name of Project: City of Roswell 2025 Water Utility Master Plan

Client:	City of Roswell
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Principal-in-Charge/ PM, Des. Eng:	TAB/NDR	Approved by:	LJH
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