

City of Seguin
Water Model and Master Plan Update
SCOPE OF SERVICES

PROJECT UNDERSTANDING:

Freese and Nichols, Inc. (FNI) understands that the City of Seguin (City) is seeking assistance to update the City's water system model and water master plan. The intent of the study is to provide an updated water model and develop a prioritized water system capital improvements plan with triggers for major capital improvements. The water service area is defined as the City's current Certificate of Convenience and Necessity (CCN).

A. Population and Water Demand Projections

- A1. Project Kick-Off Meeting: Freese and Nichols, Inc. (FNI) will conduct a project kick-off meeting with at City offices to review scope, project team, data requirements, lines of communication, and project schedule.
- A2. Data Collection and Review: FNI will coordinate with City staff to compile information including GIS files, water consumption data, treatment plant data, pump station information, as-built drawings, pump station layouts, pump curves, storage tank facility layouts, tank volume curves, recently completed water system improvements, and other pertinent data.
- A3. Meet with City Planning Department: FNI will attend one meeting with representatives from the City's Planning Department to identify growth areas and make adjustments to the land use assumptions identified in the City's recent Comprehensive Plan.
- A4. Develop and Distribute Population and Non-residential Growth Projections: Using the City's recent Comprehensive Plan document as a starting point, FNI will work with City staff to develop and document population and non-residential growth projections by pressure zone for existing, 5-year, 10-year, and Buildout conditions. Growth projections will be distributed throughout the service area.
- A5. Review and Evaluate Historical Water Usage Data: FNI will review and evaluate historical water usage including single family residential, multifamily residential, commercial/ industrial and selected large users. FNI will calculate historical per-capita water consumption rates and peaking factors.
- A6. Develop Design Criteria for Water Demand Projections: Based on the review of historical data, FNI will develop design criteria for water demand projections including per-capita consumption rates, non-residential usage factors, non-revenue water, and peaking factors.
- A7. Develop and Distribute Existing Demands: FNI will utilize data from the City's utility billing system database to geocode water meters and allocate existing demands throughout the City. The data will consist of metered consumption fields for each customer account and customer type. Demands will be distributed for average day and maximum day demand conditions.

- A8. Develop and Distribute Water Demand Projections: Utilizing selected design criteria and population and land use projections, FNI will develop projected average day, maximum day, and peak hour demands for existing, 5-year, 10-year, and Buildout conditions. FNI will distribute projected water demands throughout the water service area by pressure zone.
- A9. Develop TM-1 – Population and Water Demand Projections: FNI will prepare a technical memorandum that documents the assumptions and analysis of historical usage data and future population and water demand projections. FNI will submit one (1) electronic file in PDF format of the draft TM-1.
- A10. Progress Meeting #1 - Population and Water Demand Projections: FNI will attend a progress meeting with the City to discuss population and water demand projections.
- A11. Finalize TM-1 – Population and Water Demand Projections: FNI will revise TM-1 to incorporate comments from the City. FNI will submit five (5) hard copies and one (1) electronic file in PDF format of the final TM-1.

B. Water Model Development and Calibration

- B1. Conduct Temporary Pressure Testing: FNI will identify locations for field testing based on model calibration needs and areas of concern from City. Up to ten (10) pressure recorders will be furnished by FNI. Procedures for field testing will be prepared showing proposed location of testing, duration of testing, required SCADA data during testing period, and assistance from water utility department. The City will install and remove the pressure recorders on the designated fire hydrants.
- B2. Water Model Evaluation and Selection Workshop: FNI will conduct a modeling workshop to demonstrate the capabilities of different water modeling software packages showing pros and cons of each software for the City to review and make a selection.
- B3. Construct Water Model: FNI will utilize the CAD file of the water system to build an all-pipes water model in the selected software. Facility data will be input from as-built drawings of treatment, pumping, storage and control valve facilities. The all-pipes model will consist of all lines that are currently in the CAD file plus recently constructed lines that may not appear in the CAD file.
- B4. Obtain and Evaluate SCADA Data: FNI will obtain SCADA data for the temporary field pressure testing period. SCADA data will be used for system operations planning, development of diurnal curves, and to assist in model calibration.
- B5. Develop Diurnal Demand Curves: FNI will utilize the SCADA data and operator logs to develop diurnal curves representing existing 24-hour water usage patterns.
- B6. Conduct EPS Model Calibration: FNI will conduct a 24-hour extended period simulation (EPS) model calibration by adjusting c-factors, peaking factors, diurnal curves, and demand distribution until modeling results match the field pressure measurements and pump/tank

operation. FNI will provide comparison graphs and mapping to document model calibration results.

- B7. Develop TM-2 – Water Model Development and Calibration: FNI will prepare a technical memorandum that documents the assumptions and analysis of the water model construction and calibration. FNI will submit one (1) electronic file in PDF format of the draft TM-2.
- B8. Progress Meeting #2 - Water Model Development and Calibration: FNI will attend a progress meeting with the City to discuss water model development and calibration.
- B9. Finalize TM-2 – Water Model Development and Calibration: FNI will revise TM-2 to incorporate comments from the City. FNI will submit five (5) hard copies and one (1) electronic file in PDF format of the final TM-2.

C. Hydraulic Analyses and System Evaluation

- C1. Perform Modeling of Existing Water System: FNI will conduct EPS modeling of the existing water system for average day and maximum day operating conditions to evaluate tank cycling, system pressures, and deficiencies within the existing water system.
- C2. Conduct Fire Flow Analysis for Existing System: FNI will utilize the water system model to conduct fire flow analysis under existing maximum day demands to identify areas with less than adequate fire flow capacity. Fire flow analysis will be shown using mapping of available fire flows.
- C3. Evaluate Pressure Plane Delineation: FNI will analyze existing and future pressure plane delineation based on modeling results, field testing data and water supply locations. FNI will identify specific areas with low or high pressures under normal operating conditions. FNI will evaluate and recommend modifications to the existing pressure plane boundaries. Mapping will be prepared showing proposed water system pressures throughout City under new pressure plane boundary alternatives vs. existing pressure plane delineation.
- C4. Evaluate TCEQ Capacity Requirements Compliance: FNI will evaluate the system for compliance with the TCEQ Chapter 290 water system capacity requirements. FNI will analyze production capacity, pumping capacity, elevated storage capacity, and total storage capacity by pressure plane to determine if any deficiencies exist.
- C5. Progress Meeting #3 – Existing System Analysis: FNI will attend a progress meeting with the City to discuss the results of the existing water system analysis and to develop design criteria for future system improvements.
- C6. Identify Requirements for System Improvements: FNI will develop target design criteria to be used for identifying system improvements including headloss gradient, minimum and maximum pressures, tank drain/fill rates, and storage volumes.

- C7. Evaluate Pumping, Storage, and Production Capacity for Future Needs: FNI will analyze and develop existing vs. recommended capacity charts for pumping, ground and elevated storage, and water production throughout the city based on criteria developed for system improvements, including minimum TCEQ capacity requirements identified in Chapter 290.
- C8. Utilize Buildout Model to Determine Sizing of Water System Improvements: FNI will utilize the EPS water model under Buildout demand conditions to develop and analyze alternatives to determine sizing of water system transmission, elevated and ground storage, treatment, and pumping facilities needed to serve Buildout demands throughout each pressure zone.
- C9. Progress Meeting #4 – Water System Improvement Alternatives: FNI will attend a progress meeting with the City to discuss the results of the future water system analysis and to present the proposed water system improvements.
- C10. Utilize 5-year and 10-year Water System Model to Determine Phasing of Water System Improvements: FNI will use interim 5-year and 10-year EPS model runs to determine phasing of water system improvements. System improvements will include treatment, transmission, storage, pumping and distribution system related needs. The first five years of the recommended CIP will be phased yearly and the subsequent years will be phased by planning period (10-year and Buildout).

D. Capital Improvement Plan and Master Plan Report

- D1. Develop Capital Improvement Plan (CIP) Costs, Phasing Plan & Mapping: FNI will develop a draft prioritized water system CIP with descriptions, cost estimates for each proposed project, phasing, and large-scale city-wide mapping of projects based upon water system modeling requirements and reliability needs. Costs will be in Year 2014 dollars and will include engineering and contingencies.
- D2. Progress Meeting #5 – Capital Improvements Plan: FNI will attend a progress meeting with City to discuss draft CIP, project phasing, results of prioritization and analyze alternative completion dates as necessary.
- D3. Prepare Draft Water Master Plan Report: FNI will prepare a Draft Water Master Plan Report discussing assumptions, methodologies, and findings for population and water demand projections, field testing and model calibration, existing and future system hydraulic analyses, and recommended capital improvement plans including schedule and costs of improvements. The report will include colored maps showing proposed system improvements.
- D4. Progress Meeting #6 – Draft Water Master Plan Report: FNI will attend a progress meeting with the City to discuss and solicit comments on the Draft Water Master Plan Report.
- D5. Revise and Finalize Water Master Plan Report: FNI will revise the report based on City comments and submit ten (10) final hard copies and one (1) CD with an electronic copy in PDF format of the Final Water Master Plan Report.
- D6. City Council Presentation: FNI will present the Water Master Plan report to City Council. FNI will be available to answer questions and discuss content.

E. Water Model Training & Software Purchase

- E1. Purchase Selected Software: FNI will purchase, on the City's behalf, one floating seat license of the selected water modeling software. A floating seat license consists of a software license installed on a server that can be accessed by multiple users, but is limited to a single user at any one time. Since the actual software that will be selected is unknown at this time, an allowance of \$10,000 is included for this task. The actual software purchase price may differ from this allowance. The first year of annual maintenance is typically included in the initial software cost. Subsequent year annual maintenance costs are not included in this scope of work.
- E2. Prepare Model Training Material: FNI will prepare model training presentation material and load the City's water model on FNI owned computers for use during training. FNI will coordinate with Innovyze to install temporary training licenses for up to six (6) people on FNI owned computers for use in model training.
- E3. Water Model Training Workshop: FNI will conduct two days of training on selected software with the use of the City's water model. The training will include instructions on setting up, running, and modifying the model as well as viewing results.
- E4. Follow-up Coordination: FNI will provide up to sixteen (16) hours of follow-up coordination after the model training to answer questions and provide additional instruction if necessary.

Summary of Deliverables

- TM-1: Population and Water Demand Projections
- TM-2: Water Model Development and Calibration
- Draft Water Master Plan Report
- Final Water Master Plan Report
- Calibrated Water Model
- GIS and electronic project files
- Model Training Manual
- One floating seat software license

Summary of Workshops

- Water Model Evaluation and Selection
- Water Model Training

Summary of Meetings

- Project Kick-off Meeting
- Meeting with Planning Department
- Progress Meeting #1: Population and Water Demand Projections
- Progress Meeting #2: Water Model Development and Calibration
- Progress Meeting #3: Existing System Analysis
- Progress Meeting #4: Water System Improvement Alternatives
- Progress Meeting #5: Capital Improvements Plan
- Progress Meeting #6: Draft Water Master Plan Report

Project Schedule

- Deliver Draft Water Master Plan Report within **9 months** of Notice to Proceed
- Deliver Final Water Master Plan Report within **30 days** of receipt of comments from the City