

Statement of Qualifications



Integrity in Engineering

Welcome to **Garrison Engineering**. We are proud to offer an array of professional services including:

➤ Public and Private Water Systems	➤ Pump Stations, Controls, Tanks, & Processes
➤ Surface Water Treatment	➤ Well Water Treatment
➤ Loan and Grant Assistance	➤ Water System Planning
➤ Springs and Groundwater Under the Influence of Surface Water	➤ Industrial Processes, Boilers, and Controls

Our Mission

- ◆ Provide the highest quality professional engineering services.
- ◆ Bring innovation and value to every project.
- ◆ Be mindful of budgets; both our own and finished construction costs.
- ◆ Foster positive working relationships with the reviewing agencies, subconsultants, contractors, and the community.

About Us

Garrison Engineering Corporation has been in business since 1994. We have completed over 2,000 consulting jobs in the Pacific Northwest and beyond. We are active in the community as members of AWWA, WSGWA, ASHRAE, Rotary, and Toastmasters.

Carl Garrison, PE, is the owner of Garrison Engineering. Carl is a licensed mechanical engineer in Washington, Oregon, California, Idaho, Nevada, Arizona and is approved by NCEES for licensure in other States.

Team Building

Garrison Engineering is committed to teamwork with you and any other consultants or governmental agencies your project requires.

Call on the Garrison Engineering team to help solve your challenging project.



GARRISON ENGINEERING

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REPRESENTATIVE PROJECTS



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Projects: Water Systems

- **Lake Meridian Estates Water System, King Co. WA. 2009-2010.** Garrison engineering evaluated a failed arsenic treatment system and recommended a course of action of how to retain most of the existing equipment, but change the treatment process to effectively remove arsenic from their well water. The designed flow rate is 30 gpm and the process uses ferric chloride co-precipitation for arsenic removal.
- **City of Silver Springs, NV, Arsenic Treatment Plant. 2009-2010.** Garrison Engineering working with Hungerford and Terry, Inc. of NJ provided design responsibility for the treatment of arsenic in the City water supply. The designed flow rate is 1,800 gpm, expandable to 2,400 gpm. The treatment plant included six 9' dia. epoxy coated steel filter vessels (expandable to eight). The design incorporates recycling of the backwash water. Process treatment includes the addition of acid for pH adjustment, ferric chloride, chlorine, and filter aid. Garrison Engineering also coordinated with the local engineering firm Farr West Engineering of Reno, NV to meet the project timeline.
- **City of Beatty, NV, Arsenic Treatment Plant. 2009-2010.** Garrison Engineering working with Hungerford and Terry, Inc. of NJ provided design responsibility for the treatment of arsenic in the City water supply. The designed flow rate is 500 gpm, expandable to 670 gpm. The treatment plant included three 7' dia. epoxy coated steel filter vessels (expandable to four). The design incorporates recycling of the backwash water. Process treatment includes the addition of ferric chloride and chlorine for co-precipitation of iron with arsenic. Garrison Engineering also coordinated with the local engineering firm Farr West Engineering of Reno, NV to meet the project timeline.
- **City of Chino, in Riverside County, State of California - Chino II Desalter Treatment Plant Expansion, 2010.** Garrison Engineering provided engineering services for the expansion of the nitrate treatment plant from 4 mgd to 8 mgd. Garrison Engineering's portion of the project is design responsibility for the large anion exchange water treatment vessels and controls, that were provided to the job by Hungerford and Terry of NJ. Coordination of work is with the local engineering firm Carollo Engineers and general contractor Archer Western Contractors.
- **Hemmi Road Group A Water System, Whatcom County, WA. 2003-Present.** Garrison Engineering designed the conversion of the existing ozone system to an aeration system. The source water has elevated manganese levels and the system changes significantly reduced manganese contamination while increasing the well production from 80 gpm to 120 gpm. Other tasks include pipeline replacements and consulting services. Ongoing work includes re-writing the water system planning documents.



Projects: Water Systems

- **Juniper Beach Water District, Group A, Island County, WA. 2003-Present.** Multiple Projects. Garrison Engineering was selected to be the engineer of record beginning in 2003. Work to date has been a variety of projects funded by the Washington State Revolving Fund low interest loan program as well as a State Grant. They include: consultation on a variety of existing water system issues; design of a 119,000 gallon Mt. Baker silo water storage tank, multi-well level controls and appertances; design of over 3,500 lf of 6" HDPE heat fused water distribution pipe; creation of a well field designation; drilling two new wells and updating Water Rights; take over of nearby small system using grant funding; ongoing discussions to take over nearby Group B water system; design of fire pumps; writing water system plan documents, and other water system related issues as requested.
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- **Hillside Motel, Group A-TNC, Skagit County, WA. 2006-2009.** Garrison Engineering is part of a project team to replace an existing hotel with a three-story hotel. Work includes: land use hearing, research about the existing Water Right dating back to 1905, water system planning, converting from a Group B to a Group A-TNC, design of new system for domestic and fire flow that includes two 211,000 gallon concrete storage tanks.
 - **Seawest Water System, Group A Community, Island County, WA. 2006-2009.** Design and consultation for replacement of the existing iron and manganese filter system, and installation of corrosion control measures. The design includes the use of modern water system controls along with manganese greensand plus media. The system conserves water by only using approximately 0.6% of the filtered water for backwash, while effectively removing iron and manganese. Aerating sprays were also installed in the existing concrete reservoir to increase the pH for corrosion control.
 - **Skymeadows Water System, Group A Community, Island County, WA. 2004-2008.** Design work and consultation to reduce copper corrosion rates of the existing water system. Garrison Engineering worked with the water system first utilizing aeration, and then using phosphate addition to effectively curb copper corrosion rates.
 - **Township 29 Water System, Group A Community, Island County, WA. 2006-Present.** Garrison Engineering designed an arsenic treatment system for the existing 28-lot Group A water system. The design utilized low cost ferric chloride and automatic back washing media filters. The media filters will be using manganese greensand plus for the effective removal of arsenic, iron, and manganese.
 - **Driftwood Heights Group A Water System, Island County, WA. 2006-2007.** Garrison Engineering re-designed the existing system to fill storage tanks in series operation, as well as add chlorination to the system. This project was prompted by intermittent bacterial contamination.
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Projects: Water Systems

- **USDA Darrington Water System & Baker River Water System, WA. 2002-2004.** The project consisted of design and upgrade of 2,372 lineal feet of 12" and 1,024 lineal feet of 8" ductile iron pipe to connect the Town of Darrington water system to the Forest Service water system. The project also replaced Forest Service distribution system to accommodate fire flow.
- **Skagit Speedway Water System, Group A-TNC, Alger, WA. 1999-2005.** Engineering and consulting for a 2-phase project to upgrade and obtain as-built approval for the existing system. Tasks include: preparation of as-builts; hydraulic testing and calculations for system capacity; recommendations for compliance; construction improvement documents and report generation to comply with State Health standards.
- **Fisherman Bay Group A Water System, Lopez Island, WA. 2005-Present.** Garrison Engineering has provided consulting services for a variety of projects that include: Design of a dedicated pipeline from the well sources to the existing storage tanks; re-design of the pipe in and out of the storage tanks from parallel operation to series operation; design of aeration sprays to increase the pH for corrosion control inside of the existing storage tank; and reconfiguration of the level controls for a remote well source to automatically operate during emergencies.
- **Arsenic, Fluoride and Barium Treatment Design, various single family and small public systems, 2002-Present.** Garrison Engineering has designed over 400 small systems for arsenic, fluoride and barium removal. During the process of designing these systems, we have also designed many for removal of secondary contaminants that include, iron, manganese, hydrogen sulfide, hardness, tannins, fine silt, natural gas, and pH adjustment. The various systems are located in Pierce, King, Snohomish, Skagit, Island, Whatcom, Clark, and San Juan Counties of Washington.
- **Brutus Group A Water System, Camano Island, WA. 2005-2007.** Garrison Engineering designed this treatment system to remove arsenic and manganese. The filtration system uses Water Right Sanitizer control heads with manganese greensand plus media. Chlorine and Ferric chloride are used to oxidize and sorb the arsenic to the ferric chloride. The back washing filters then remove the arsenic, ferric chloride, and manganese from the well water. Work also included re-configuring of the system controls for improved pump life.



Projects: Water Systems

- **Howard Miller Steelhead Park, Rockport, WA. Skagit County Parks, Recreation, and Fair Dept. Two projects: Water System, 2001-2002.** Prepared plans and provided engineering support to convert the Park's water supplier from a well source to Skagit County Public Utility District's Rockport Water System. Park Expansion, 1995. Engineering, plans, and specifications of roads, drainage, water, and sewer facilities associated with a proposed park expansion.



- **McHaven Water System, Skagit County, WA. 2005-Present.** Garrison Engineering has aided McHaven in a variety of ways to be one of the first small systems to meet the 2004 Enhanced Surface Water Treatment Rules using bag filters. Garrison Engineering redesigned the existing system, then tested various alum based chemicals and polymers for coagulation prior to filtration. Due to poor filter efficiency, it was decided to use slow sand filters as a pre-filter. The slow sand filters have been so successful that the bag filters are no longer needed. Filtration is monitored by turbidity testing followed by chlorination.



- **Seattle Pacific University, Blakely Island Field Station Water System, WA. 2002-2008.** The surface water source for this Group B water system was Spencer Lake. The scope of work included evaluating various methods for treating lake water, then working with a hydro-geologist to identify a suitable location for a water well. After successfully drilling a source replacement well, Garrison Engineering redesigned the pump house, storage, booster pump and distribution system.

- **South Blakely Maintenance Company (SBMA) Water System, Blakely Island, WA. 2002-Present.** Garrison Engineering has consulted with SBMA to evaluate the various methods of treating lake water to meet the 2004 Enhanced Surface Water Treatment Rules. Evaluation included slow sand filtration, diatomaceous earth filtration, micro-filtration, conventional filtration and direct bag filtration. Garrison Engineering also evaluated the possibility of using two systems to serve the development. One for irrigation out of Spencer Lane and a separate distribution system for drinking water from a well. Design work is on-going to treat all of the water and use a single system with Spencer Lake water as its source..



Spencer Lake on Blakely Island

Projects: Water Systems

- **Glacier Springs Water System, Whatcom County, WA. 1997-2008.** Multiple Projects. Aide the Glacier Springs Property Owners Association in preparation and implementation of a groundwater protection plan and development of a Water System Report. The project includes: consultations on various issues; a Wellhead Protection Report; GWI monitoring and reporting; hydraulic capacity calculations; establishment of a maintenance and operations manual; preparation of plans and specifications to as-built existing system and construct a 50,000 gallon water tank; and plans and specifications for 12,000 lf of 6" HDPE pipe to replace the distribution system.



Carl Garrison of Garrison Engineering evaluates the Glacier Springs collection structure.

- **North Shore Ridge Water System, Whatcom County, WA. 2001-2002.** This very challenging water system had a variety of problems. It was a low flow well with a silt problem in addition to having the rare organism *Vorticella* present in the water. Our scope included consulting with users about the most cost effective way to refurbish the existing well. Well rehabilitation included: sleaving, screening and sand packing to reduce silt, then using liquid carbon dioxide to freeze the well. The freezing sanitized and hydrofractured the well formation, which increased its yield by about 3 gallons per minute.



- **Lake Tye Water System, Skagit County, WA. 2000 - 2003.** Lake Tye has 880 hook-ups and is a Transient, Non-Community Group A water system. Garrison Engineering provided consultation for remediation of bacteriological contamination of the existing water system. As-built information was gathered and coordinated with State and Local Health Departments. Recommendations were made for a system shock chlorination plan. Garrison Engineering was then asked to design a continuous chlorination system and design to replace 1,600 linial feet of pipe with 6" HDPE.



Portions of Lake Tye Water System. Concrete, WA

- **Wildlife Acres Water System, Skagit County, WA. 2003.** Preparation of plans to redesign the pump house. The design included as-builts, use of cycle stop valves, and replacement of one booster pump and pressure tank.



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KEY PERSONNEL RESUMES

Carl Garrison, P.E.**Principal Engineer****Garrison Engineering**

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Phone (360) 707-5656, Fax (360) 707-5858, email: carlg@gecorp.net

**Education**

Bachelor of Science, Mechanical Engineering
California State University, Chico, CA.

Professional Registrations

Mechanical Engineer, States of Washington,
Oregon, Idaho, California, Arizona, Nevada, and
NCEES certified for registration in other States.

Affiliations

AWWA, 2002 - Present

ASHRAE, 1994 - Present

Sedro-Woolley Rotary, 1996-Present

Burlington Toastmasters, 1996-Present

Experience

- Group A and Group B Drinking Water Systems
- Water Treatment Design
- Pumps, Valves, and Piping
- Water System Controls
- Project Management and Design Engineering
- Industrial Waste Water Treatment
- Corrosion Engineering
- AutoCAD
- Boilers, and Boiler Water Treatment
- HVAC, Plumbing & Fire Protection
- Public Speaking, Teaching and Coaching

Garrison Engineering Corporation Burlington, WA. Carl is the owner of Garrison Engineering and is responsible for the company. Staff levels have varied between 4 and 9 employees.

Privately Owned Public Water Systems

Carl has been the lead design engineer for all work by Garrison Engineering. Areas of expertise include hydraulic analysis, water system layout, pumping systems, valve sizing, specialty valves and appurtenances, and many types of water treatment and filtration. In addition to the technical aspects of water systems, Carl has prepared several water system reports for new and expanding Group A and Group B systems. The following is a partial list of water systems Carl has worked on since 1994.

Water System Experience

- 400+ Residential, two party, Group B, and Group A treatment systems to remove arsenic, Many of the systems required treatment for other secondary contaminants.
- 8 fluoride removal treatment systems.

Typical Projects:

- Juniper Beach Water Dist., Group A, Camano Island, WA - multiple projects
- Town of Silver Springs NV, arsenic treatment
- Town of Beatty NV, arsenic treatment
- City of Chino, CA, Nitrate and water softening
- Glacier Springs Water System, Group A, multiple projects.
- Hemmi Road Water Association, Group A, Whatcom County, WA, - multiple projects
- Township 29 Group A Water System, Island Co., WA
- Brutus Group A Water System, Island Co. WA
- Sewest Group A Water System, Island Co. WA
- Fisherman Bay Group A Water System, SJ County, WA
- USDA and Darrington Water System, Group A, Darrington, WA
- Lake Tyee Group A-TNC, Concrete, WA
- Wildlife Acres, Group A, Skagit County, WA
- Prairie Acres Water System, Group A, Prairie, WA
- Beau Lodge, Fox Hollow, & Cougar Ridge, Group B Water Systems, Bow, WA
- Seattle Pacific University, Blakley Island Field Station, Blakley Island, WA
- McHaven Group A water system, surface water treatment, Lake McMurray, WA
- South Blakely Maintenance Association, surface water treatment, Blakely Is., WA.

Public Utilities

Carl has designed and reviewed several water line extensions for short plats, subdivisions, and small systems, in accordance with various local utilities. Designs typically include 8" or 12" ductile iron or HDPE pipe, valves, fittings, air release valves, meter boxes and other appurtenances germane to public water systems.

HVAC, Plumbing, and Fire Protection

In addition to water system work, Carl has been in responsible charge of a variety of HVAC, plumbing and fire protection projects in the pacific NW.

Industrial Water and Waste Water Engineering

Carl's industrial processing experience includes food processing, pumping systems, wells, solids separation and concentration, evaporation, automatic filtration systems, RO and UF filtration. In addition, Carl has designed and managed projects for oil/water separation, sludge pumping, oil skimming, and skid mounted water treatment plants.

Brandon Peters
Garrison Engineering
Project Engineer

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Education

B.S. in Mechanical Engineering Technologies
Central Washington University 2009

Affiliations

Burlington Toastmasters, President, 2008-Present

Experience

Group A and Group B Drinking Water Systems
Pumps, Valves, and Piping
AutoCAD Level I and II
Woodworking– Apprentice Cabinet Maker

Water Treatment Design
Water System Controls
Solidworks 3-D Modeling

Job History

- Garrison Engineering (June 2008-Present) – Project Engineer: Draft existing layouts, design distribution pipelines, calculate flow rates, size pumps, treatment design, coordinate for approval from Washington State DOH, work with WSDOE and WSDOT, and overall water system design.
- Chelan County PUD Internship (June 2006-September 2006) - Water and Waste Water Division: Unidirectional flushing for hydrants, GPS locates for underground septic tanks, calculations of storage reservoir tank fluctuations.
- Vic Peters Cabinets (July 2003-June 2008) - Apprentice Cabinet Maker: Construction and installation of kitchens, bathrooms, vanities, bedroom closets and countertops. Experience includes: milling, sanding, edge-banding, routing, boring, cutting, staining and finishing.

Water Systems

- Lake Meridian Estates Group A Water System, Kent, WA. Design of Arsenic treatment system.
- Juniper Beach Water District, Group A Water System, Island County, WA: Design of pump-house and pipeline for tie in to existing water system, creation of Water System Plan.
- McHaven Inc, Group A Water System, Skagit County, WA: As-built drawings for existing surface water treatment.
- Township 29, Group A Water System, Island County, WA: Pump house design for arsenic treatment and drainage pipeline design.
- Prairie Estates, Group B Water system, Island County, WA: Arsenic treatment design for existing water system.
- Hillside Motel, Group A Water System, Skagit County, WA: Storage tank design and pump sizing for expanding existing system.
- Residential treatment systems to remove arsenic and fluoride.
- Buzzie Lane, Group B Water System, Skagit County, WA: Pump house and pipeline design for 4 lot water system.
- Bertelsen Winery, Group A TNC Water System, Skagit County, WA: Treatment system to remove hardness, manganese, and iron from the well water. Creation of a Water System Plan for a Group B system.
- South Blakely Maintenance Association, San Juan County, WA: Distribution pipe design and treatment for surface water.
- Eagle Valley, Group A Water System, Skagit County, WA: Design disinfection for 51 connection system.
- Fisherman Bay, Group A Water System, San Juan County, WA: Design pump station for pressure increase.

Mechanical and Plumbing Design

- Chateau at Bothell Landing II, Bothell, WA: Review of 5-story building plumbing riser diagrams.
 - Chandler's Square, Drafting and design of the HVAC and plumbing for 3 story 25 unit apartment bldg.
 - Skagit Valley Hospital, Mt Vernon, WA: Review and analyze existing air flows and design filtration equipment.
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Sébastien Boucher
Garrison Engineering
Project Engineer
1997 Park Lane, Burlington, WA 98233
Phone (360) 707-5656, Fax (360) 707-5858, email: Sebastianb@gecorp.net



Education

M.S in Mechanical & Industrial Engineering
ARTS ET METIERS Paris Tech (National Graduate Engineering School)
Paris, France

Affiliations

French American Chamber of Commerce, Toastmasters

Experience

- Management
- HVAC and plumbing design
- Piping and fitting design
- AutoCAD
- Budgeting, cost tracking, and planning
- Sign design, construction, and installation

Job History

- Garrison Engineering (February 2011-Present) HVAC and Plumbing design project engineer. Duties include energy analysis, conceptual design for HVAC and plumbing, municipal pump station design, equipment selection, preparation of plans and specifications. Skills and specific training in AutoCAD, DOE2/Equest energy analysis software, Elite CHVAC, and Washington State Energy Code analysis.
- Signtech (March 2009-September 2010) - Project Engineer: Responsible for the design & manufacture stages of many different customized sign projects. Management of sign designers according to customer requirements, location, visibility & local sign codes & standards. In charge of estimating & contracts writing
- CEGECOM (2009-2010) - Project Engineer: Management of the initial phase of renovation of an occupied office building. Specifications, call for bids & contractors prequalification. Coordination of the temporary relocation of employees
- AXIMA SEITHA GDF SUEZ (2004-2008) HVAC/Plumbing Manager: Successful completion of commercial & healthcare projects in accordance with the required specifications, on-time, on-budget (between \$150,000 & \$350,000) and to the satisfaction of the clients. Management of the project team: Designers & AUTOCAD operators, Field Foremen, Subcontractors & other internal departments (BMS-Automation, Purchasing, Accounting. Assistance in the design of HVAC & Plumbing systems, review of technical documents & equipment selection Participation in the weekly Project Managers and Construction meetings / Daily contacts with clients. Responsible for budget, cost tracking, planning, scheduling, change order quotes and monthly billings.

Mechanical Engineering Project Experience

- Skagit Valley Hospital, Founders Building and MLJ Building. Prepared as-built plan sets for both buildings, plus HVAC and plumbing design modifications for tenant improvements to both buildings.
 - Eight Story office building and 4 floors underground parking, Paris, France. Project included a ground floor restaurant, cafeteria, kitchen and archive rooms. Building had 7 floors with a total of 260,000 sq feet of open space offices and a roof top with HVAC systems. Budget of \$5 millions for HVAC
 - Theatre Renovation, Nimes, France: Creation of a new theater in an existing building and temperature control of an existing conference room. Budget of \$350,000 for HVAC & Plumbing. Temperatures of both rooms controlled by 2 new CIAT multi-bloc air handlers, Trane chillers, and Siemens controls.
 - Cytotoxic Department of the Public Hospital, Montpellier, France: Transformation of an existing office to a clean room. Budget of \$200,000 for HVAC & Plumbing.
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