

ROY COOPER
Governor

ELIZABETH S. BISER
Secretary

RICHARD E. ROGERS, JR.
Director



NORTH CAROLINA
Environmental Quality

January 30, 2024

Old North State Water Company
Attention: Erica Cochran, Developer and Construction Manager
PO Box 10127
Birmingham, Alabama 35202

Re: Engineering Plans and Specifications Approval
Groundwater System
Olivet S/D Potable Water System
Olivet Subdivision
Water System No.: NC4035034
Franklin County
Serial No.: 23-00793

Dear Applicant:

Enclosed please find one copy of the "Application for Approval..." together with one copy of the referenced engineering plans and specifications bearing the Division of Water Resources stamp of approval for the referenced project. These engineering plans and specifications are approved under Division of Water Resources Serial Number 23-00793, dated January 30, 2024. **This approval has the following condition(s):**

1. **Note that for water systems subject to regulation under the North Carolina Utilities Commission, a completed copy of one of the two orders listed under Rule .0307(c)(7)(B) is required to be submitted to our office before Authorization to Construct (ATC) will be issued for this project.**
2. **The water system may discharge the backwash flow from the iron and manganese filtration system as long as the backwash does not exceed the Maximum Contaminant Level (MCL) for radionuclides or arsenic per 15A NCAC 02T Rule .0113.**

Engineering plans and specifications prepared by David Barcal, P.E., call for the installation of Well No. 1 with a 36 gallons per minute (gpm) pumping capacity (36 gpm yield), 445 total dynamic head (TDH), 7.5 horsepower (hp) submersible pump; a manganese treatment/removal system (Model HF221F) with two (2) 21-inch diameter by 62-inch height pressure vessels in parallel with Filter-AG Plus resin producing approximately 432 gallons of backwash water every other week (ground discharged in accordance with 15A NCAC 02T .0113); a radium treatment/removal system with eight (8) 14-inch diameter by 47-inch height pressure vessels with cation exchange resin (ResinTech RSM-50-HP), two sets of four filters in parallel, with the spent resin transported and disposed in accordance with all regulations regarding low level radioactive material by Chase Environmental Group, Inc.; and a sodium hypochlorite feed system for disinfection within the proposed Wellhouse No. 1 along proposed Road 1. At the Well No. 1 site, one 5,400-gallon, ASME-coded, hydropneumatic storage tank with automatic pressure controls will be installed. Plans and specifications also call for the installation of approximately 2,950 feet of 4-inch water main to serve 36 single family homes along proposed Roads 1 and 2 within the Olivet Subdivision, located west of Mt. Olive Church Road at Adler Court in Franklinton, Franklin County.



North Carolina Department of Environmental Quality | Division of Water Resources
512 North Salisbury Street | 1634 Mail Service Center | Raleigh, North Carolina 27699-1634
919.707.9100

Old North State Water Company
 Attention: Erica Cochran, Developer and Construction Manager
 Page 2 of 2
 January 30, 2024

Old North State will perform special non-compliance radium monitoring to ensure that the radium removal system is operating properly and meeting water quality standards. Note the water system may need to perform additional testing and monitoring to ensure that the radium removal system is operating successfully. Operational monitoring for radium removal/treatment system must be included in the O&M Plan per Rule .0307 and special non-compliance radium monitoring results must be made available to our regional office staff upon request.

Hydropneumatic tanks with a capacity greater than 120 gallons must be constructed and stamped in accordance with the American Society of Mechanical Engineers (ASME) Pressure Vessel Code stamped with the ASME "U" symbol stamp and registered with the National Board of Boiler and Pressure Vessel Inspectors. These tanks must be inspected by the Department of Labor, Boiler Safety Bureau after installation but prior to operation. Please call (919) 707-7918 to schedule an inspection.

Please note that in accordance with 15A NCAC 18C .0309(a), no construction, alteration, or expansion of a water system shall be placed into service or made available for human consumption until the Public Water Supply Section has issued Final Approval. Final Approval will be issued and mailed to the applicant upon receipt of both an Engineer's Certification and an Applicant's Certification submitted in accordance with 15A NCAC 18C .0303 (a) and (c).

These plans and specifications in the foregoing application are approved insofar as the protection of public health is concerned as provided in the rules, standards and criteria adopted under the authority of Chapter 130A-317 of the General Statutes. This approval does not constitute a warranty of the design, construction, or future operation of the water system.

One copy of the "Application for Approval..." and a copy of the plans and specifications with a seal of approval from the department are enclosed. One copy of the approved documents in a digital format (CD) is being forwarded to our Raleigh Regional Office. The second CD is being retained in our office.

If the Public Water Supply Section can be of further service, please call (919) 707-9100.

Sincerely,



Rebecca Sadosky, Ph.D., Chief
 Public Water Supply Section
 Division of Water Resources, NCDEQ

RS/AKS

Enclosures: Approval Document

cc: Tresha Price, P.E., Raleigh Regional Office
 Compliance Services Branch
 Franklin County Health Department
 MacConnell & Associates, P.C.



North Carolina Department of Environmental Quality | Division of Water Resources
 512 North Salisbury Street | 1634 Mail Service Center | Raleigh, North Carolina 27699-1634
 919.707.9100

**North Carolina Department of Environmental Quality
Division of Water Resources
Public Water Supply Section**

**Application for Approval
of Engineering Plans and Specifications
For Water Supply Systems**

Applicant	Design Engineer
<p align="center"><u>Old North State Water Company</u> (Name of Board, Council or Owner - the Applicant) <u>Erica Cochran, Developer & Construction Manager</u> (Name and Title of Authorized Official or Representative of the Applicant)</p>	<p align="center"><u>David Barcal, P.E.</u> (Name of Design Engineer of Record) <u>MacConnell & Associates, P.C.</u> (Name of Engineering Firm)</p>
<p align="center"><u>PO Box 10127</u> (Mailing Address)</p>	<p align="center"><u>PO Box 129</u> (Mailing Address)</p>
<p align="center"><u>Birmingham, AL 35202</u> (City, State & ZIP)</p>	<p align="center"><u>Morrisville, NC 27560</u> (City, State & ZIP)</p>
<p align="center"><u>205-326-3698</u> (Phone Number)</p>	<p align="center"><u>919-467-1239</u> (Phone Number)</p>
<p align="center"><u>205-326-6856</u> (FAX Number)</p>	<p align="center"><u>919-319-6510</u> (FAX Number)</p>
<p align="center"><u>ecochran@onswc.com</u> (Email address)</p>	<p align="center"><u>david.barcal@macconnellandassoc.com</u> (Email address)</p>
<p align="center"> (Signature of Authorized Official or Representative of the Applicant)</p>	

Project Name: Olivet Subdivision - Potable Water System
(Name of Project to appear on Public Water Supply Section records and tracking system)

Water system for a development containing 36 single family lots. System includes well, treatment, hydropneumatics tank, well house, distribution system and appurtenances.
(description of project)

Mt Olivet Church Road, Franklinton, NC
(general location of project)

in Franklin County.

Date _____
(for DEQ use only)

Serial No. _____
(for DEQ use only)

Application for Approval of Engineering Plans and Specifications for Water Supply Systems

To: Division of Water Resources, Department of Environmental Quality

The Applicant applies under and in full accord with the provision of NCGS 130A-317, and such other statutes and rules as relate to public water systems. The Authorized Official or Representative of the Applicant represents that he is authorized to act for the Applicant. The Authorized Official or Representative of the Applicant understands and agrees to the following:

- 1. The Applicant shall not award contracts or begin construction without first receiving "Authorization to Construct" from DEQ.
2. The Applicant shall make no change or deviation from the engineering plans and specifications approved by DEQ except as allowed by 15A NCAC 18C .0306 or with the written consent and approval of DEQ.
3. The Applicant shall obtain Final Approval in accordance with 15A NCAC 18C .0306 prior to placing the project (or any portion thereof) into service.
4. Digital (PDF) submittals are true image copy of the original sealed/signed documents.

An authorized representative of the Public Water System (not always the same as the Applicant) is to complete and sign the following WSMP section.

Status of Water System Management Plan (WSMP)

Check one of the following, and if applicable, provide the required information:

- [] The WSMP for the project, as defined in the attached engineering plans and specifications, has not been submitted.
[X] Three copies of the WSMP for the project, as defined in the attached engineering plans and specifications, are submitted with this application.
[] The WSMP that includes this project, as defined in the attached engineering plans and specifications, was previously submitted.

Provide the following:

Public Water System Name: Olivet Subdivision - Potable Water System
Owner Name: Old North State Water Company
Water System No.: 13-01053
Serial Number of Deemed Complete WSMP: TBD

By my signature below, I certify that the previously submitted WSMP contains the information required by 15A NCAC 18C .0307(c) for the project defined in the attached engineering plans and specifications.

Erica Cochran
(Type or print name of authorized representative of Public Water System)
Developer & Construction Manager
(Title of authorized representative of Public Water System)
[Signature]
(Signature of authorized representative of Public Water System)

8/17/23
(Date)

Application for Approval of Engineering Plans and Specifications for Water Supply Systems

In accordance with NCGS 130A-328, the Public Water Supply Section charges a fee for plan review. Any documents submitted for review must be accompanied by a check payable to *DEQ-Public Water Supply Section* before the review will begin.

There is a \$25 fee for returned checks.

The charges for review of plans are shown below. Check one of the following.

- | | | |
|-------------------------------------|---|--------------|
| Distribution System fees | | |
| <input checked="" type="checkbox"/> | Construction of water lines, less than 5000 linear feet | \$150 |
| <input type="checkbox"/> | Construction of water lines, 5000 linear feet or more | \$200 |
| <input type="checkbox"/> | Other construction or alteration to a distribution system | \$ 75 |
| Ground Water System fees | | |
| <input checked="" type="checkbox"/> | Construction of a new ground water system or adding a new well | \$200 |
| <input type="checkbox"/> | Alteration to an existing ground water system | \$100 |
| Surface water system fees | | |
| <input type="checkbox"/> | Construction of a new surface water intake or treatment facility | \$250 |
| <input type="checkbox"/> | Alteration to existing surface water intake or treatment facility | \$150 |
| Other fees | | |
| <input type="checkbox"/> | Water System Management Plan review | \$ 75 |
| <input type="checkbox"/> | Miscellaneous changes or maintenance not covered above | \$ 50 |

Notes:

1. Projects for Tank Rehabilitation use separate "Application for Water Tank Reconditioning Plan Approval."
2. The fee is not refundable if the plans are not approved.
3. Revisions to plans to address the Public Water Supply Section's or other state agency's comments do not incur an additional fee.
4. If one set of plans has multiple related items (such as a new well with construction of water lines) only one fee must be submitted for highest price item. The amounts are not cumulative, except for fees for Water System Management Plans.
5. If the appropriate plan review fee is not received within ten days after the receipt of plans, specifications, and reports for approval, then all plan documents will be recycled. A new set of documents must then be submitted with the appropriate fee for approval.

This approval does not address all applicable laws, rules, standards and criteria, and other approvals and licenses that may be required by the local, state, or federal government.

The Public Water Supply Section has stamped and sealed the official copies of plans and specifications accompanying this application with the serial number of this application _____. Any erasures, additions or alterations of the proposed improvements except those permitted in 15A NCAC 18C .0306 make this approval null and void.

This approval does not constitute a warranty of the design, construction, or future operation of the water system.

Signed: _____
 Robert W. Midgette, P.E.
 Chief, Public Water Supply Section
 Division of Water Resources

Application for Approval of Engineering Plans and Specifications for Water Supply Systems

Other Information and Checklist Page

- Attached is a check for the proper plan review fee amount, in accordance with NCGS 130A-328. See note 4 on page 3.

This submittal includes one paper original with two digital (PDF) CDs of the following items, each item in separate folders:

- This completed "Application for Approval of Engineering Plans and Specifications for Water Supply Systems"
- The sealed plan drawings, separate file in PDF format for each drawing. Cover sheet must include drawings index;
- The project-specific Engineering Report (ER) describing the scope and purpose of the project and addressing each of the items listed in 15A NCAC 18C .0307(b), including the design basis of the project. [15A NCAC 18C .0307(b) (12)];
- Specifications for this project; OR
- The project will use the following system's previously approved standard specifications for waterline extensions:

Name of System: Olivet Subdivision - Potable Water System

Serial Number: TBD

The Serial Numbers for previously approved standard specifications can be found at the following website:

<http://www.ncwater.org/?page=424>

One of the following:

- Attached is a letter signed by an authorized representative of the Public Water System agreeing to serve the project and stating that the system has adequate supply;
- OR
- The Applicant is the Public Water System.

If the project has sought funding (for example, DWSRF loan) list the program and (if available) the application or funding number below:

Program Name	Application or Funding Number, if available

- Yes No Project will be completed with significant expenditure of state moneys, greater than ten million dollars (\$10,000,000) in accordance with G.S. 113A-9 (7a).
- Project will cause substantial, permanent land-disturbing activity of an area greater than 10 acres of public lands in accordance with G.S. 113A-9 (11).

Olivet Subdivision
Potable Water System
Franklin County, North Carolina
Application, Engineer's Report,
and Supporting Information

Project Number: A06902.00

Date of Preparation: July 27, 2023



Engineer's Report Prepared By:

MacConnell & Associates, P.C.
Full-Service Consulting Engineers



Post Office Box 129
Morrisville, North Carolina 27560
Telephone: (919) 467-1239

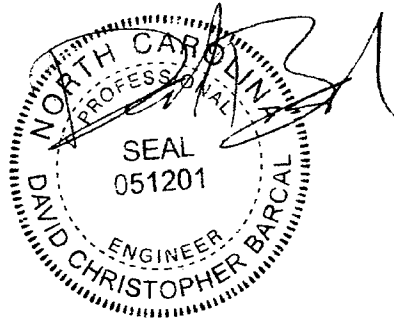
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513
Fax: (919) 319-6510

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- **Equipment**
- **Specifications**

Olivet Subdivision Potable Water System Engineer's Report

Application and Applicant's Certification



MacConnell & Associates, P.C.
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513

P.O. Box 129
Morrisville, North Carolina 27560

Phone: (919) 467-1239

Fax: (919) 319-6510

North Carolina Department of Environmental Quality
Division of Water Resources
Public Water Supply Section

Application for Approval
of Engineering Plans and Specifications
For Water Supply Systems

Applicant	Design Engineer
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Developer & Construction Manager
 (Title of authorized representative of Public Water System)

 (Signature of authorized representative of Public Water System)

 (Date)

Application for Approval of Engineering Plans and Specifications for Water Supply Systems

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- Construction of water lines, 5000 linear feet or more **\$200**
- Other construction or alteration to a distribution system **\$ 75**

Ground Water System fees

- Construction of a new ground water system or adding a new well **\$200**
- Alteration to an existing ground water system **\$100**

Surface water system fees

- Construction of a new surface water intake or treatment facility **\$250**
- Alteration to existing surface water intake or treatment facility **\$150**

Other fees

- Water System Management Plan review **\$ 75**
- Miscellaneous changes or maintenance not covered above **\$ 50**

Notes:

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Robert W. Midgette, P.E.
Chief, Public Water Supply Section
Division of Water Resources

Application for Approval of Engineering Plans and Specifications for Water Supply Systems

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Serial Number: TBD

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<http://www.ncwater.org/?page=424>

One of the following:

- Attached is a letter signed by an authorized representative of the Public Water System agreeing to serve the project and stating that the system has adequate supply;

OR

- The Applicant is the Public Water System.

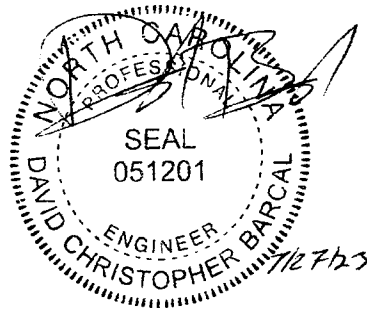
If the project has sought funding (for example, DWSRF loan) list the program and (if available) the application or funding number below:

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- Yes No Project will be completed with significant expenditure of state moneys, greater than ten million dollars (\$10,000,000) in accordance with G.S. 113A-9 (7a).
- Project will cause substantial, permanent land-disturbing activity of an area greater than 10 acres of public lands in accordance with G.S. 113A-9 (11).

Olivet Subdivision Potable Water System Engineer's Report

Engineer's Report



MacConnell & Associates, P.C.
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513

P.O. Box 129
Morrisville, North Carolina 27560

Phone: (919) 467-1239
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501 Cascade Pointe Lane
Suite 103
Cary, NC 27513
www.macconnellandassoc.com

MacCONNELL & Associates, P.C.
"Engineering Today For Tomorrow's Future"

Engineer's Report
July 27, 2023

Permittee: Old North State Water Company
Project: Olivet Subdivision – Potable Water System
Project No.: A06902.00

1. Description of existing water system related to this project:

The site is vacant land and currently has no water system.

2. Identification of the facility to be served by the proposed water system:

Olivet Subdivision is a proposed 36-unit single-family home development located in Franklin County, North Carolina.

3. Name and address of the applicant:

Erica Cochran
Developer & Construction Manager
Old North State Water Company
PO Box 10127 Birmingham, AL 35202
Telephone: 205-326-3698

Email: ecochran@onswc.com

4. Description of the nature of the establishment and of the area to be served by the proposed water system:

The area to be served by the water system is the Olivet Subdivision, a 36 unit single family detached residential development.

5. Description of the future service areas of the public water system for 5, 10, 15, and 20 years:

There are no known future development plans outside of the proposed development.

Olivet Subdivision – Potable Water System
Project Number A06902.00

July 27, 2023

- 6. Consideration of alternative plans for meeting the water supply requirements of the area, including, for new systems, obtaining service from an existing system:

The development is located in Franklin County and there are no plans at this time to provide a municipal source of water to the area.

- 7. Applicants seeking State loan or grant support for the project:

This project is/was privately funded.

- 8. Population records and trends, present and anticipated future water demands, present and future yield of source or sources of water supply, including provisions to supply water to other systems:

There are no plans to expand the development beyond the proposed development. Because the development is new, there are no population or flow records relating to the development. The water system is designed per the current approved development plan and the NCDEQ rules and regulations. There are no provisions to provide water to other systems.

- 9. Character of source or sources of water supply:

Water supply will be provided by one well as per the NCDEQ regulations. One wells has been drilled and tested on the property. The 24-hour draw down tests exhibited the following yields and the design pump rate:

Well	Yield (gpm)	Pump Rate (gpm)
Well No.1:	36 gpm	36 gpm

The characteristics or water quality of the well (laboratory data) is attached. All well water will be disinfected with chlorine solution (as needed). The well was over the standard limit for Radium and Manganese.

- 10. Proposed water treatment processes:

Water from the proposed well will be pumped to the hydropneumatic tank. A metering pump will be interlocked with each pump so that liquid chlorine will be injected into the line prior to the well water entering the tank when the pump is running. The dose of chlorine is adjustable. The water will also pass through a set of water media filters for manganese removal and then a set for radium removal prior to entering the hydropneumatic tank. Water from the hydropneumatic tank will serve the development. A proposed building will be utilized to store treatment equipment, control panels and cover. The manganese filters will have an estimated backwash volume of 640 gallons per week. The radium filters will the

Olivet Subdivision – Potable Water System
Project Number A06902.00

July 27, 2023

replaced and disposed of once the resin life span has been exhausted per manufacture's recommendation. No backwash water will be generated from the radium filters.

11. Purchased water agreement:

Olivet Subdivision will not purchase water.

12. Description of the design basis:

The design basis is to provide high quality potable water for Olivet Subdivision. The design is based on minimum NCDEQ standards and regulations. The system is sized for 36 single family detached residences. The system is sized for residential peak flows per NCDEQ guidelines. The design is also based on Old North State Water Company specifications, some of which exceed the State minimums.

13. Existing system alter or expanding distribution system:

The system is new and therefore it is not being altered or expanded. There are approximately 2,952 LF of 4-inch C900 DR14 PVC pipe.

14. Prioritized list of infrastructure improvements:

Olivet Subdivision is a new development and all water system related facilities which include but are not limited to: wells, treatment, storage conveyance, and other appurtenances are being constructed for the development. Because the system is new, there are no pending water system improvements to be scheduled or prioritized.

EXHIBITS 4 THRU 6

W-1300 SUB 98

**Olivet Subdivision
Potable Water System
Engineer's Report**

Supporting Documents

**MacConnell & Associates, P.C.
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513**

**P.O. Box 129
Morrisville, North Carolina 27560**

**Phone: (919) 467-1239
Fax: (919) 319-6510**

OFFICIAL COPY

Apr 23 2024

ROY COOPER
Governor
ELIZABETH S. BISER
Secretary
S. DANIEL SMITH
Director



February 1, 2022

Olivet 38, LLC.
5000 Falls of Neuse Road #100
Raleigh, NC 27609

Re: Preliminary Well Site Approval
Olivet Subdivision
Water System No.: NC4035034
Franklin County

Dear Sir or Madam:

On January 12, 2022, I met with Matthew Daniels and conducted a preliminary investigation of the proposed well sites listed below. The proposed wells have been assigned Water System Facility (WSF) Identification Numbers and Sampling Point Codes as indicated below.

WSF ID No.	Sampling Point Code	Description of Well Site	Preliminary Latitude and Longitude
W01	RW1	100' radius around the proposed well location at the southwest edge of the lot, at preliminary coordinates.	36.130661, -78.502808
W02	RW2	100' radius around the proposed well location at the northwest edge of the lot, at preliminary coordinates.	36.132128, -78.502507

This letter is provided by the Public Water Supply (PWS) Section, in accordance with Rule .0305(b) of the *Rules Governing Public Water Systems* (15A NCAC 18C), to provide permission to drill wells at the listed sites in order to establish the quality and quantity of water and the suitability of the wells as sources for a public water system.

In addition, this "preliminary well site approval" is to acknowledge that according to the information and documentation provided, we understand that the proposed wells are located on lots so that the area within 100 feet of the wells is owned or controlled by the person supplying the water and that the supplier of water will protect the well lots from



North Carolina Department of Environmental Quality | Division of Water Resources
Raleigh Regional Office | 3800 Barrett Drive | Raleigh, North Carolina 27609
919.791.4200

potential sources of pollution and construct landscape features for drainage and diversion of pollution as required in 15A NCAC 18C .0203(a)(1). In addition, we understand that you have determined that the proposed well locations satisfy the minimum horizontal separation distances specified in 15A NCAC 18C .0203(a)(2) and summarized in the following table:

Distance (in feet)	Potential Source of Pollution
100	<ul style="list-style-type: none"> • From any sanitary sewage disposal system, sewer, or sewer pipe (unless sewer is constructed of water main materials and joints, in which the sewer pipe shall be at least 50 feet from the well. • From buildings, mobile homes, permanent structures, animal houses or lots, cultivated areas to which chemicals are applied. • From surface water. • From a chemical or petroleum fuel underground storage tank with secondary containment. • From any other potential source of pollution not listed in this table.
200	<ul style="list-style-type: none"> • From a subsurface sanitary sewage treatment and disposal system designed for 3,000 or more gallons of wastewater a day, unless your well water source is a confined aquifer.
300	<ul style="list-style-type: none"> • From any cemetery or burial ground.
500	<ul style="list-style-type: none"> • From a septage disposal site. • From a chemical or petroleum fuel underground storage tank without secondary containment. • From the boundary of a ground water contamination area. • From a sanitary landfill or non-permitted non-hazardous solid waste disposal site.
1,000	<ul style="list-style-type: none"> • From a hazardous waste disposal site or in any location which conflicts with the North Carolina Hazardous Waste Management Rules cited in NCAC 13A.

We also understand that the owner will ensure that the lots are graded or sloped so that surface water is diverted away from the wellheads and that the wells shall not have greater than a 1 percent chance of flooding in accordance with 15A NCAC 18C .0203(a)(4).

PWS Section “Authorization to Construct” and “Final Approval”

Subsequent to well drilling and evaluating water quality and quantity (e.g., collecting and analyzing samples and performing a 24-hour well drawdown test) the owner must submit an “Application for Approval of Engineering Plans and Specifications For Water Supply Systems” to document proposed well completion (e.g., selected pump, wellhead and well house details) and associated transmission lines, treatment and/or storage facilities and other critical information about the public water system. In accordance with 15A NCAC 18C .0305(a) no construction shall be undertaken until the PWS Section issues an “Authorization to Construct” letter. In addition, in accordance with 15A NCAC 18C .0309(a) the new wells and all associated treatment, storage or transmission/distributions lines shall not be placed into service until the PWS Section has issued a “Final Approval.” These steps are described in the Engineering Planning and Development Guidance Document



available at
https://files.nc.gov/ncdeq/Water%20Resources/files/pws/planreview/EPD_Guidance_July2019.pdf

Be aware that plans, specifications and reports for the new wells must be certified by a Professional Engineer. Therefore, it is recommended that a Professional Engineer or Licensed Geologist (or their designated representative) experienced in the construction of water supply wells, conduct on-site monitoring of well construction. At a minimum, certain critical phases of well construction such as installation and grouting of casing should be monitored. In many situations it may be necessary to go beyond the minimum requirements in order to protect the public health and ground water resources.

Other Agency Approvals Required

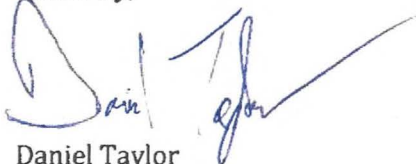
This PWS Section "preliminary well site approval" letter does not address other agency applicable rules and requirements pertaining to well construction and registration.

Local county well construction rules and ordinances may include additional requirements.

Well construction must meet the standards specified in the *Well Construction Standards* (15A NCAC 2C). Be aware that these rules require a permit to be obtained from the Water Quality Regional Operations Section of the Division of Water Resources before the well is constructed if it is anticipated that the new well will be part of a water system with a design capacity of 100,000 gallons per day or greater. In addition, these rules require that wells be constructed by a properly certified well driller. For more information, call 919-707-3668 or go to:

<https://deq.nc.gov/about/divisions/water-resources/water-resources-permits/wastewater-branch/ground-water-protection/well-program#largecapwell>

Sincerely,



Daniel Taylor
Environmental Engineer
Public Water Supply Section
Raleigh Regional Office

Cc: Central Files – Public Water Supply Section
Regional Files – Public Water Supply Section
Matthew Daniels, PE, FLM Engineering
Franklin County Health Department



WELL CONSTRUCTION RECORD (GW-1)

1. Well Contractor Information:

John Boyette

Well Contractor Name

2505-A

NC Well Contractor Certification Number

Boyette Well & Septic, LLC

Company Name

2. Well Construction Permit #: N/A

List all applicable well construction permits (i.e. UIC, County, State, Variance, etc.)

3. Well Use (check well use):

Water Supply Well:	
<input type="checkbox"/> Agricultural	<input checked="" type="checkbox"/> Municipal/Public
<input type="checkbox"/> Geothermal (Heating/Cooling Supply)	<input type="checkbox"/> Residential Water Supply (single)
<input type="checkbox"/> Industrial/Commercial	<input type="checkbox"/> Residential Water Supply (shared)
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Wells > 100,000 GPD
Non-Water Supply Well:	
<input type="checkbox"/> Monitoring	<input type="checkbox"/> Recovery
Injection Well:	
<input type="checkbox"/> Aquifer Recharge	<input type="checkbox"/> Groundwater Remediation
<input type="checkbox"/> Aquifer Storage and Recovery	<input type="checkbox"/> Salinity Barrier
<input type="checkbox"/> Aquifer Test	<input type="checkbox"/> Stormwater Drainage
<input type="checkbox"/> Experimental Technology	<input type="checkbox"/> Subsidence Control
<input type="checkbox"/> Geothermal (Closed Loop)	<input type="checkbox"/> Tracer
<input type="checkbox"/> Geothermal (Heating/Cooling Return)	<input type="checkbox"/> Other (explain under #21 Remarks)

4. Date Well(s) Completed: 3/7/2022 Well ID# Well #1

5a. Well Location:

Olivet 38 LLC

N/A

Facility/Owner Name

Facility ID# (if applicable)

West Of Mt. Olivet Church Rd, Franklinton, NC

Physical Address, City, and Zip

Franklin

1846-76-7982

County

Parcel Identification No. (PIN)

5b. Latitude and longitude in degrees/minutes/seconds or decimal degrees:
(if well field, one lat/long is sufficient)

36.130661 N **-78.502808** W

6. Is(are) the well(s): Permanent or Temporary

7. Is this a repair to an existing well: Yes or No

If this is a repair, fill out known well construction information and explain the nature of the repair under #21 remarks section or on the back of this form.

8. For Geoprobe/DPT or Closed-Loop Geothermal Wells having the same construction, only 1 GW-1 is needed. Indicate TOTAL NUMBER of wells drilled: _____

9. Total well depth below land surface: 262 (ft.)
For multiple wells list all depths if different (example- 3@200' and 2@100')

10. Static water level below top of casing: 29.0 (ft.)
If water level is above casing, use "+"

11. Borehole diameter: 14" to 58.3 6.125" 58.3 to 262" (in.)

12. Well construction method: Air Hammer
(i.e. auger, rotary, cable, direct push, etc.)

FOR WATER SUPPLY WELLS ONLY:

13a. Yield (gpm) 50+ Method of test: Airlift

13b. Disinfection type: N/A Amount: N/A

For Internal Use Only:

14. WATER ZONES						
FROM	TO	DESCRIPTION				
ft.	ft.	See Attached				
ft.	ft.					
15. OUTER CASING (for multi-cased wells) OR LINER (if applicable)						
FROM	TO	DIAMETER	THICKNESS	MATERIAL		
+2	ft.	58.3	ft.	8	in.	Steel
16. INNER CASING OR TUBING (geothermal closed-loop)						
FROM	TO	DIAMETER	THICKNESS	MATERIAL		
ft.	ft.			in.		
ft.	ft.			in.		
17. SCREEN						
FROM	TO	DIAMETER	SLOT SIZE	THICKNESS	MATERIAL	
ft.	ft.		in.			
ft.	ft.		in.			
18. GROUT						
FROM	TO	MATERIAL	EMPLACEMENT METHOD & AMOUNT			
0	ft.	58.3	ft.	Bentonite Grout	Tremmie	
ft.	ft.					
ft.	ft.					
19. SAND/GRAVEL PACK (if applicable)						
FROM	TO	MATERIAL	EMPLACEMENT METHOD			
ft.	ft.					
ft.	ft.					
20. DRILLING LOG (attach additional sheets if necessary)						
FROM	TO	DESCRIPTION (color, hardness, soil/rock type, grain size, etc.)				
ft.	ft.					
ft.	ft.	See Attached				
ft.	ft.					
ft.	ft.					
ft.	ft.					
ft.	ft.					
ft.	ft.					
21. REMARKS						

22. Certification:

John Boyette, Jr.
Signature of Certified Well Contractor

3/28/2022

Date

By signing this form, I hereby certify that the well(s) was (were) constructed in accordance with 15A NCAC 02C.0100 or 15A NCAC 02C.0200 Well Construction Standards and that a copy of this record has been provided to the well owner.

23. Site diagram or additional well details:

You may use the back of this page to provide additional well construction info (add 'See Over' in Remarks Box). You may also attach additional pages if necessary.

24. SUBMITTAL INSTRUCTIONS

Submit this GW-1 within 30 days of well completion per the following:

24a. For All Wells: Original form to Division of Water Resources (DWR), Information Processing Unit, 1617 MSC, Raleigh, NC 27699-1617

24b. For Injection Wells: Copy to DWR, Underground Injection Control (IUC) Program, 1636 MSC, Raleigh, NC 27699-1636

24c. For Water Supply and Open-Loop Geothermal Return Wells: Copy to the county environmental health department of the county where installed

24d. For Water Wells producing over 100,000 GPD: Copy to DWR, CCPCUA Permit Program, 1611 MSC, Raleigh, NC 27699-1611

Boring Log
Well 1 – Mt Olivet Church Rd Property

Olivet 38, LLC

Loc: 36.130661, -78.502808 (approx.)



Geothermal, Environmental,
& Well Drilling

Drilled by: John Boyette Jr., CWD

Logged by: J. Zuncich

Date: 3/7/2022

Depth (ft.)	Description
0 – 20	Orange to light red, sandy clay saprolite with weathered feldspar.
20 – 44	Tannish brown to orange, clayey sand saprolite with rock fragments, relict feldspar, slight schist texture.
44 – 60	Fresh schist encountered, including ultramafic minerals and some feldspar. Installed 8" steel casing to 58.3' bgs.
60 – 180	Ultramafic rock and minerals with minor K feldspar and hornblende. Minor fractures encountered with <2' thickness at 70, 90' and 130'. Fractures with consistent yields between approximately 50 and 80 gpm.
180 – 240	Leucogneiss with K feldspar and light pink quartz pegmatites and minor biotite. Minor fracture encountered at approximately 218' with thickness <2'. Consistent whole-well yields observed between approximately 70 and 100 gpm.
240 – 262	Ultramafic rock with minerals including hornblende. Yield observed between approximately 70 and 110 gpm. Boring terminated at 262 feet below ground surface.

P.O. Box 129
Morrisville, NC 27560

(919) 467-1239



501 Cascade Pointe Lane
Suite 103
Cary, NC 27513
www.macconnellandassoc.com

MacCONNELL & Associates, P.C.

"Engineering Today For Tomorrow's Future"

July 27, 2023

Re: Olivet Subdivision
Potable Water System Application
Project No.: A06902.00

While MacConnell and Associates was not present for the well drilling, after reviewing the well drillers provided information, I believe to the best of my abilities that the well was construction to meet 15A NCAC 2C Standards. MacConnell and Associates attended the 24-hour drawdown and certify that the drawdown test was performed correctly to meet 15A NCAC 2C standards.

If you have any questions, please give me a call at (919) 467-1239.

Thank you and have a great day.

Sincerely,

A handwritten signature in black ink, appearing to read 'D Barcal', written over a horizontal line.

David Barcal, P.E.
Project Manager

W1300,Sub98

EXHIBITS 4 THRU 6

**Olivet Subdivision
Potable Water System
Engineer's Report**

Laboratory Results

**MacConnell & Associates, P.C.
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513**

**P.O. Box 129
Morrisville, North Carolina 27560**

**Phone: (919) 467-1239
Fax: (919) 319-6510**

OFFICIAL COPY

Apr 23 2024



Florida Radiochemistry Services, Inc.

5456 Hoffner Ave., Suite 201 Orlando, FL 32812
 Phone: (407) 382-7733 Fax: (407)-382-7744

RADIOLOGICAL ANALYSIS

Note: All information must be supplied for compliance credit.

WATER SYSTEM ID #: N/A

County: X

Name of Water System: Olivet Subdivision

Sample Type: Entry Point - Single Sample Entry Point - Composite Special/Non-compliance

Mail Results to (system representative):

Bernie Pierce
4701 Yates Mill Pond Road
Raleigh NC, 27606
Phone: (919) 467-8712
Fax:

Collection Data					
Period	Date (MM/DD/YY)	Time (Specify AM or PM)	Loc Code	Sample Location	Collected By
Single or 1st Qtr	04/10/22	08:00 PM	TW1-D01	Well - Well#1	Bernie R. Pierce
2nd Qtr					
3rd Qtr					
4th Qtr					

LABORATORY ID #: 12709

SAMPLE UNSATISFACTORY

RESAMPLE REQUIRED

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LIMIT (RRL)	NOT DETECTED (i.e. < RRL)	QUANTIFIED RESULTS* (pCi/L)	COUNTING ERROR	ALLOWABLE LIMIT
4002	Gross Alpha	900.0	3 pCi/L		13.9	2.8	15 pCi/L
4004	Radon	---	100 pCi/L				N/A
4006	Uranium	---	2 pCi/L				20.1 pCi/L
4010	Combined Radium	N/A	N/A	N/A			5 pCi/L
4020	Radium 226	903.0	1 pCi/L		4.7	0.6	3 pCi/L
4030	Radium 228	Ra-05	1 pCi/L		1.5	0.5	2 pCi/L
4100	Gross Beta	900.0	4 pCi/L		7.2	1.2	50 pCi/L

Note: If result exceeds allowable limit, the laboratory must fax analytical results to the State within 48 hours.

	DATE:	TIME:
ANALYSES BEGUN:	04/19/22	08:45 AM
ANALYSES COMPLETED:	04/26/22	11:05 AM

Laboratory Log #: 2204096-07

Certified By: Mike Naumann

COMMENTS: _____

W1300,Sub98

Environmental Conservation Laboratories, Inc.
 102-A Woodwinds Industrial Court
 Cary, NC 27511
 Ph: (919) 467-3090 Fax: (919) 467-3515



www.encolabs.com

RADIOLOGICAL ANALYSIS

Water Systems ID #: **N/A** County : **x**
 Name of Water System: **Olivet Subdivision -**
 Sample Type: Single Sample - Entry Point Composite Sample - Entry Point Special/Non Compliance
 Location Where Collected: **Well: Well#1**
 Facility ID No.: **D01**
 Sample Point: **TW1**

Mail Results to:
 Bernie Pierce (BE019)
 Attn: Bernie Pierce
 4701 Yates Mill Pond Road
 Raleigh, NC 27606
 Phone #: **(919) 467-8712**
 Fax #:

Collection Data			
Period	Date (MM/DD/YY)	Time (AM or PM)	Collected By
Single or 1st Qtr	04/10/22	8:00 pm	Bernie R. Pierce
2ndQtr			
3rdQtr			
4thQtr			

LABORATORY ID #: 37724

SAMPLE UNSATISFACTORY

RESAMPLE REQUIRED

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LIMIT R.R.L.	NOT DETECTED (i.e. <R.R.L.) (X)	QUANTIFIED RESULTS*	COUNTING ERROR	ALLOWABLE LIMIT
4002	Gross Alpha		3 pCi/L		pCi/L		15 pCi/L
4004	Radon		100 pCi/L		pCi/L		N/A
4006	Uranium	200.8	0.67 pCi/L		7.20 pCi/L	0.0	20.1 pCi/L
4010	Combined Radium		N/A	N/A	pCi/L		5 pCi/L
4020	Radium 226		1 pCi/L		pCi/L		3 pCi/L
4030	Radium 228		1 pCi/L		pCi/L		2 pCi/L
4044	Potassium 40 (Total)		4 pCi/L		pCi/L		N/A
4100	Gross Beta		4 pCi/L		pCi/L		50 pCi/L
4102	Tritium		1000 pCi/L		pCi/L		20000 pCi/L
4172	Strontium 89		10 pCi/L		pCi/L		N/A
4174	Strontium 90		2 pCi/L		pCi/L		8 pCi/L
4264	Iodine 131		1 pCi/L		pCi/L		N/A
4270	Cesium 134		10 pCi/L		pCi/L		N/A

*Note: If result exceeds allowable limit, the laboratory must fax analytical results to the State within 48 hours.

	DATE:	TIME:
ANALYSES BEGUN:	04/18/2022	10:35 am
ANALYSES COMPLETED:	04/19/2022	9:36 am

Laboratory Log #: **CF04562-01**
 COMMENTS:

Certified By: Bill Scott Bill Scott

Environmental Conservation Laboratories, Inc.
 102-A Woodwinds Industrial Court
 Cary, NC 27511
 Ph: (919) 467-3090 Fax: (919) 467-3515



www.encolabs.com

PESTICIDES AND SYNTHETIC ORGANIC CHEMICALS (SOCs) ANALYSIS

WATER SYSTEM ID #: **N/A** County: **x**
 Name of Water System: **Olivet Subdivision**
 Sample Type: Entry Point Special/Non-compliance
 Location Where Collected: **Well: Well#1(SOC) - -**
 Facility ID No.: **D01**
 Sample Point: **TW1**
 Collected By: **Bernie R. Pierce**

Collection Date	Collection Time
04/10/22	08:00 pm

Mail Results to:
 Bernie Pierce (BE019)
 Attn: Bernie Pierce
 4701 Yates Mill Pond Road
 Raleigh, NC 27606

Phone #: **(919) 467-8712**
 Fax #:

LABORATORY ID #: 37724

SAMPLE UNSATISFACTORY

RESAMPLE REQUIRED

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LIMIT (R.R.L.)	NOT DETECTED (i.e < R.R.L.) (X)	QUANTIFIED RESULTS*	ALLOWABLE LIMIT
2005	Endrin	505	0.00001 mg/L	X	mg/L	0.002 mg/L
2010	gamma-BHC	505	0.00002 mg/L	X	mg/L	0.0002 mg/L
2015	Methoxychlor	505	0.0001 mg/L	X	mg/L	0.04 mg/L
2020	Toxaphene	505	0.001 mg/L	X	mg/L	0.003 mg/L
2031	Dalapon	515.4	0.001 mg/L	X	mg/L	0.2 mg/L
2035	Bis(2-ethylhexyl) adipate	525.2	0.0006 mg/L	X	mg/L	0.4 mg/L
2036	Oxamyl	531.1	0.002 mg/L	X	mg/L	0.2 mg/L
2037	Simazine	525.2	0.00007 mg/L	X	mg/L	0.004 mg/L
2039	Bis(2-ethylhexyl)phthalate	525.2	0.00132 mg/L	X	mg/L	0.006 mg/L
2040	Picloram	515.4	0.0001 mg/L	X	mg/L	0.5 mg/L
2041	Dinoseb	515.4	0.0002 mg/L	X	mg/L	0.007 mg/L
2042	Hexachlorocyclopentadiene	505	0.0001 mg/L	X	mg/L	0.05 mg/L

Environmental Conservation Laboratories, Inc.
 102-A Woodwinds Industrial Court
 Cary, NC 27511
 Ph: (919) 467-3090 Fax: (919) 467-3515



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PESTICIDES AND SYNTHETIC ORGANIC CHEMICALS (SOCs) ANALYSIS

(continued)

WATER SYSTEM ID #: **N/A**
 Name of Water System: **Olivet Subdivision**
 Facility ID No.: **D01**
 Sample Point: **TW1**

Collection Date	Collection Time
04/10/22	08:00 pm

LABORATORY ID #: 37724

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LIMIT (R.R.L.)	NOT DETECTED (i.e < R.R.L.) (X)	QUANTIFIED RESULTS*	ALLOWABLE LIMIT
2046	Carbofuran	531.1	0.0009 mg/L	X	mg/L	0.04 mg/L
2050	Atrazine	525.2	0.0001 mg/L	X	mg/L	0.003 mg/L
2051	Alachlor	505	0.0002 mg/L	X	mg/L	0.002 mg/L
2065	Heptachlor	505	0.00004 mg/L	X	mg/L	0.0004 mg/L
2067	Heptachlor epoxide	505	0.00002 mg/L	X	mg/L	0.0002 mg/L
2105	2,4-D	515.4	0.0001 mg/L	X	mg/L	0.07 mg/L
2110	2,4,5-TP (Silvex)	515.4	0.0002 mg/L	X	mg/L	0.05 mg/L
2274	Hexachlorobenzene	505	0.0001 mg/L	X	mg/L	0.001 mg/L
2306	Benzo(a)pyrene	525.2	0.00002 mg/L	X	mg/L	0.0002 mg/L
2326	Pentachlorophenol	515.4	0.00004 mg/L	X	mg/L	0.001 mg/L
2383	PCBs	505	0.0001** mg/L	X	mg/L	0.0005 mg/L
2931	1,2-Dibromo-3-chloropropane	504.1	0.00002 mg/L	X	mg/L	0.0002 mg/L
2946	1,2-Dibromoethane	504.1	0.00001 mg/L	X	mg/L	0.00005 mg/L
2959	Chlordane (tech)	505	0.0002 mg/L	X	mg/L	0.002 mg/L

*Note: If result exceeds allowable limit, the laboratory must fax analytical results to the State within 48 hours.

**Note: R.R.L. (mg/L) for PCB screening are as follows: Aroclor 1016 - 0.00008, Aroclor 1221 - 0.02, Aroclor 1232 - 0.0005, Aroclor 1242 - 0.0003, Aroclor 1248 & 1254 - 0.0001, Aroclor 1260 - 0.0002

	DATE:	TIME:
ANALYSES BEGUN:	04/12/2022	4:30 am
ANALYSES COMPLETED:	04/22/2022	1:14 am

Laboratory Log #: **CF04563-01**
 COMMENTS:

Certified By: Bill Scott Bill Scott

Environmental Conservation Laboratories, Inc.
 102-A Woodwinds Industrial Court
 Cary, NC 27511
 Ph: (919) 467-3090 Fax: (919) 467-3515

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VOLATILE ORGANIC CHEMICAL ANALYSIS (VOCs)

WATER SYSTEM ID #: N/A County: x
 Name of Water System: Olivet Subdivision
 Sample Type: Entry Point Special/Non-compliance
 Location Where Collected: Well: Well#1(VOC) - -
 Facility ID No: D01
 Sample Point: TW1
 Collected By: Bernie Pierce

Collection Date	Collection Time
04/10/22	08:00 pm

Mail Results to:
 Bernie Pierce (BE019)
 Attn: Bernie Pierce
 4701 Yates Mill Pond Road
 Raleigh, NC 27606

Phone #: (919) 467-8712
 Fax #:

LABORATORY ID #: 37724

SAMPLE UNSATISFACTORY

RESAMPLE REQUIRED

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LIMIT (R.R.L.)	NOT DETECTED (i.e < R.R.L.) (X)	QUANTIFIED RESULTS*	ALLOWABLE LIMIT
2378	1,2,4-Trichlorobenzene	524.2	0.0005 mg/L	X	mg/L	0.07 mg/L
2380	cis-1,2-Dichloroethene	524.2	0.0005 mg/L	X	mg/L	0.07 mg/L
2955	Xylenes (total)	524.2	0.0005 mg/L	X	mg/L	10 mg/L
2964	Methylene chloride	524.2	0.0005 mg/L	X	mg/L	0.005 mg/L
2968	1,2-Dichlorobenzene	524.2	0.0005 mg/L	X	mg/L	0.6 mg/L
2969	1,4-Dichlorobenzene	524.2	0.0005 mg/L	X	mg/L	0.075 mg/L
2976	Vinyl chloride	524.2	0.0005 mg/L	X	mg/L	0.002 mg/L
2977	1,1-Dichloroethene	524.2	0.0005 mg/L	X	mg/L	0.007 mg/L
2979	trans-1,2-Dichloroethene	524.2	0.0005 mg/L	X	mg/L	0.1 mg/L
2980	1,2-Dichloroethane	524.2	0.0005 mg/L	X	mg/L	0.005 mg/L
2981	1,1,1-Trichloroethane	524.2	0.0005 mg/L	X	mg/L	0.2 mg/L
2982	Carbon tetrachloride	524.2	0.0005 mg/L	X	mg/L	0.005 mg/L
2983	1,2-Dichloropropane	524.2	0.0005 mg/L	X	mg/L	0.005 mg/L
2984	Trichloroethene	524.2	0.0005 mg/L	X	mg/L	0.005 mg/L
2985	1,1,2-Trichloroethane	524.2	0.0005 mg/L	X	mg/L	0.005 mg/L
2987	Tetrachloroethene	524.2	0.0005 mg/L	X	mg/L	0.005 mg/L
2989	Chlorobenzene	524.2	0.0005 mg/L	X	mg/L	0.1 mg/L
2990	Benzene	524.2	0.0005 mg/L	X	mg/L	0.005 mg/L
2991	Toluene	524.2	0.0005 mg/L		0.0036 mg/L	1 mg/L
2992	Ethylbenzene	524.2	0.0005 mg/L	X	mg/L	0.7 mg/L
2996	Styrene	524.2	0.0005 mg/L	X	mg/L	0.1 mg/L

*Note: If result exceeds allowable limit, the laboratory must fax analytical results to the State within 48 hours.

	DATE:	TIME:
ANALYSES BEGUN:	04/16/2022	1:04 pm
ANALYSES COMPLETED:	04/17/2022	2:11 am

Laboratory Log #: CF04564-01
 COMMENTS:

Certified By: Bill Scott Bill Scott

OFFICIAL COPY Apr 23 2024

Environmental Conservation Laboratories, Inc.
102-A Woodwinds Industrial Court
Cary, NC 27511
Ph: (919) 467-3090 Fax: (919) 467-3515



BACTERIOLOGICAL ANALYSIS

Note: All applicable information must be supplied for compliance credit.

WATER SYSTEM ID #: **N/A** County: **x**

Name of Water System: **Olivet Subdivision** System Type: _____ Water Source: _____

Distribution System - Total Coliform Rule (TCR)

Sample Type: Routine (RT) Repeat (RP) Special/Non-compliance (SP)

Facility ID: **D01** Location Code: **TW1** Location Where Collected: **Well#1**

Sample Point: Routine Original (RTOR) Repeat-Original Tap (RPOR) Repeat-Upstream (RPUP) Repeat-Downstream (RPDN)

Source Water - Ground Water Rule (GWR)

Sample Type: Triggered (RT) Additional/Confirmation (CO) Assessment (RT) Triggered/Distribution Repeat (RT) *

Facility ID: _____ Sample Point: _____ * for systems with a population <= 1000

Collected - BY: **Bernie R. Pierce** DATE: **04/10/22** TIME: **08:00 pm**

Mail Results to (water system representative):

Bernie Pierce (BE019)
Attn: Bernie Pierce
4701 Yates Mill Pond Road
Raleigh, NC 27606
Phone #: (919) 467-8712
Fax #:
Responsible persons email:
brpierce@aquaaamerica.com

Complete for Repeat, Triggered, or Additional/Confirmation Samples:

Previous Positive Laboratory ID Number: _____
Previous Positive Laboratory Log Number: _____
Previous Positive Location Code: _____
Previous Positive Collection Date: _____

Disinfectant Used: - _____

Total Chlorine Residual (chloramines): - _____ mg/L
Free Chlorine Residual (chlorine): - _____ mg/L

LABORATORY ID #: 37724 Repeat Samples Required from Client Resample Required from Client

CONTAM CODE	CONTAMINANT	METHOD CODE	RULE	RESULTS		
				PRESENT ^{1,2}	ABSENT	INVALID CODE
3100	Coliform, Total	9223B	TCR/GWR		X	
3014	Escherichia coli	9223B	TCR/GWR		X	
3002	Enterococci		GWR			
3028	Coliphage		GWR			
3013	Coliform, Fecal		TCR			
3001	Heterotrophic Plate Count					

INVALID CODES:

1	Confluent Growth / No Coliform Growth Found
2	TNTC / No Coliform Growth Found
3	Turbid Culture / No Coliform Growth Found
4	Over 30 Hours Old
5	Improper Sample or Analysis ⁴

¹If fecal, E. coli, enterococci or coliphage is present, lab must fax results to the State on day test is completed. If total coliform bacteria is present, lab must fax results to the State within 24 hours. If HPC is absent, enter a "0" left of the "cfu/mL or MPN" units; if present, enter a whole number. Explain invalid code below in comments.

Analyses Begun - DATE: **04/11/2022** TIME: **4:09 pm** (Date as: mm/dd/yy)
Analyses Completed - DATE: **04/12/2022** TIME: **11:07 am** (Time as: h:mm am/pm)

Laboratory Log #: **CF04565-01**

Certified By: Bill Scott
Bill Scott

COMMENTS:

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ENCO Laboratories

Accurate. Timely. Responsive. Innovative.

102-A Woodwinds Industrial Court

Cary NC, 27511

Phone: 919.467.3090 FAX: 919.467.3515

Tuesday, May 3, 2022
Bernie Pierce (BE019)
Attn: Bernie Pierce
4701 Yates Mill Pond Road
Raleigh, NC 27606

RE: Laboratory Results for
Project Number: [none], Project Name/Desc: New Well Scan-Olivet Subdivision
ENCO Workorder(s): CF04566

Dear Bernie Pierce,

Enclosed is a copy of your laboratory report for test samples received by our laboratory on Monday, April 11, 2022.

Unless otherwise noted in an attached project narrative, all samples were received in acceptable condition and processed in accordance with the referenced methods/procedures. Results for these procedures apply only to the samples as submitted.

The analytical results contained in this report are in compliance with NELAC standards, except as noted in the project narrative if applicable. This report shall not be reproduced except in full, without the written approval of the Laboratory.

This report contains only those analyses performed by Environmental Conservation Laboratories. Unless otherwise noted, all analyses were performed at ENCO Cary. Data from outside organizations will be reported under separate cover.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,

Bill Scott
Project Manager
Enclosure(s)



SAMPLE DETECTION SUMMARY

Client ID: Well#1(IOC) **Lab ID:** CF04566-01

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Iron - Total	0.171		0.0220	0.0500	mg/L	EPA 200.7	
Manganese - Total	0.145		0.00039	0.00100	mg/L	EPA 200.8	

Client ID: Diss-Well#1 **Lab ID:** CF04566-02

Analyte	Results	Flag	MDL	PQL	Units	Method	Notes
Manganese - Dissolved	0.135		0.00150	0.0100	mg/L	EPA 200.7	

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ANALYTICAL RESULTS

Description: Well#1(IOC)	Lab Sample ID: CF04566-01	Received: 04/11/22 11:45
Matrix: Drinking Water	Sampled: 04/10/22 20:00	Work Order: CF04566
Project: New Well Scan-Olivet Subdivision	Sampled By: Bernie Pierce	

Metals by EPA 200 Series Methods

^ - ENCO Cary certified analyte [NCDW 37724]

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Iron [7439-89-6]^	0.171		mg/L	1	0.0220	0.0500	2D19030	EPA 200.7	04/22/22 11:15	JDH	
Manganese [7439-96-5]^	0.145		mg/L	1	0.00039	0.00100	2D13020	EPA 200.8	04/19/22 15:51	JDH	


Description: Diss-Well#1	Lab Sample ID: CF04566-02	Received: 04/11/22 11:45
Matrix: Water	Sampled: 04/10/22 20:00	Work Order: CF04566
Project: New Well Scan-Olivet Subdivision	Sampled By: Bernie Pierce	

Metals (Dissolved) by EPA 200 Series Methods

Analyte [CAS Number]	Results	Flag	Units	DF	MDL	PQL	Batch	Method	Analyzed	By	Notes
Iron [7439-89-6]	< 0.0220		mg/L	1	0.0220	0.0500	2D12003	EPA 200.7	04/18/22 12:56	JDH	
Manganese [7439-96-5]	0.135		mg/L	1	0.00150	0.0100	2D12003	EPA 200.7	04/18/22 12:56	JDH	

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QUALITY CONTROL DATA

Metals by EPA 200 Series Methods - Quality Control

Batch 2D13020 - EPA 200.8

Blank (2D13020-BLK1) Prepared: 04/18/2022 13:26 Analyzed: 04/19/2022 15:02

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Manganese	0.00039	U	0.00100	mg/L							

LCS (2D13020-BS1) Prepared: 04/18/2022 13:26 Analyzed: 04/19/2022 15:04

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Manganese	0.201		0.00100	mg/L	0.200		101	85-115			

Matrix Spike (2D13020-MS1) Prepared: 04/18/2022 13:26 Analyzed: 04/19/2022 15:10

Source: CF02087-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Manganese	0.292		0.00100	mg/L	0.200	0.101	95	70-130			

Matrix Spike Dup (2D13020-MSD1) Prepared: 04/18/2022 13:26 Analyzed: 04/19/2022 15:12

Source: CF02087-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Manganese	0.301		0.00100	mg/L	0.200	0.101	100	70-130	3	10	

Batch 2D19030 - NO PREP Metals

Blank (2D19030-BLK1) Prepared: 04/19/2022 17:14 Analyzed: 04/22/2022 10:26

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Iron	0.0220	U	0.0500	mg/L							

LCS (2D19030-BS1) Prepared: 04/19/2022 17:14 Analyzed: 04/22/2022 10:32

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Iron	1.08		0.0500	mg/L	1.00		108	85-115			

Matrix Spike (2D19030-MS1) Prepared: 04/19/2022 17:14 Analyzed: 04/22/2022 10:40

Source: CF02087-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Iron	1.11		0.0500	mg/L	1.00	0.0222	109	70-130			

Matrix Spike (2D19030-MS2) Prepared: 04/19/2022 17:14 Analyzed: 04/22/2022 10:47

Source: CF02144-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Iron	1.20		0.0500	mg/L	1.00	0.0921	110	70-130			

Matrix Spike Dup (2D19030-MSD1) Prepared: 04/19/2022 17:14 Analyzed: 04/22/2022 10:42

Source: CF02087-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Iron	1.12		0.0500	mg/L	1.00	0.0222	109	70-130	0.1	10	

Metals (Dissolved) by EPA 200 Series Methods - Quality Control

Batch 2D12003 - EPA 3005A



QUALITY CONTROL DATA

Metals (Dissolved) by EPA 200 Series Methods - Quality Control

Batch 2D12003 - EPA 3005A - Continued

Blank (2D12003-BLK1)

Prepared: 04/12/2022 04:09 Analyzed: 04/18/2022 10:58

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Iron	0.0220	U	0.0500	mg/L							
Manganese	0.00150	U	0.0100	mg/L							

Blank (2D12003-BLK2)

Prepared: 04/12/2022 04:09 Analyzed: 04/18/2022 11:01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Iron	0.0220	U	0.0500	mg/L							
Manganese	0.00150	U	0.0100	mg/L							

LCS (2D12003-BS1)

Prepared: 04/12/2022 04:09 Analyzed: 04/18/2022 11:06

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Iron	1.01		0.0500	mg/L	1.00		101	85-115			
Manganese	0.193		0.0100	mg/L	0.200		97	85-115			

Matrix Spike (2D12003-MS1)

Prepared: 04/12/2022 04:09 Analyzed: 04/18/2022 11:14

Source: CF03665-08

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Iron	2.33		0.0500	mg/L	1.00	1.31	101	70-130			
Manganese	0.506		0.0100	mg/L	0.200	0.303	101	70-130			

Matrix Spike (2D12003-MS2)

Prepared: 04/12/2022 04:09 Analyzed: 04/18/2022 11:27

Source: CF05097-01

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Iron	1.05		0.0500	mg/L	1.00	0.0521	100	70-130			
Manganese	0.196		0.0100	mg/L	0.200	0.00168	97	70-130			

Matrix Spike Dup (2D12003-MSD1)

Prepared: 04/12/2022 04:09 Analyzed: 04/18/2022 11:17

Source: CF03665-08

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Iron	2.38		0.0500	mg/L	1.00	1.31	107	70-130	2	30	
Manganese	0.519		0.0100	mg/L	0.200	0.303	108	70-130	2	30	

Post Spike (2D12003-PS1)

Prepared: 04/12/2022 04:09 Analyzed: 04/18/2022 11:20

Source: CF03665-08

Analyte	Result	Flag	PQL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Iron	2.39		0.0500	mg/L	1.00	1.31	108	80-120			
Manganese	0.506		0.0100	mg/L	0.200	0.303	101	80-120			

**FLAGS/NOTES AND DEFINITIONS**

- B** The analyte was detected in the associated method blank.
- D** The sample was analyzed at dilution.
- J** The reported value is between the laboratory method detection limit (MDL) and the laboratory method reporting limit (MRL), adjusted for actual sample preparation data and moisture content, where applicable.
- U** The analyte was analyzed for but not detected to the level shown, adjusted for actual sample preparation data and moisture content, where applicable.
- E** The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
- MRL** Method Reporting Limit. The MRL is roughly equivalent to the practical quantitation limit (PQL) and is based on the low point of the calibration curve, when applicable, sample preparation factor, dilution factor, and, in the case of soil samples, moisture content.
- PQL** PQL: Practical Quantitation Limit. The PQL presented is the laboratory MRL.
- N** The analysis indicates the presence of an analyte for which there is presumptive evidence (85% or greater confidence) to make a "tentative identification".
- P** Greater than 25% concentration difference was observed between the primary and secondary GC column. The lower concentration is reported.
- [CALC]** Calculated analyte - MDL/MRL reported to the highest reporting limit of the component analyses.

Environmental Conservation Labs, Inc.
102-A Woodwinds Industrial Ct, Cary, NC 27511
Tel: 919-467-3090 Fax: 919-467-3515



Bernie Pierce (BE019)

Printed: 3/31/2022 11:09:15 AM

SAMPLE KIT SUMMARY

NEW WELL INORGANIC CHEMICAL ANALYSIS (IOCs)

W1300,Sub98

Water System : Avocet
Water System ID : 40-92-107

County : Wake



Well ID : Well#1(IOC)
Sample Point : TW1

Facility ID No. : D01

Collected By: *Bernie Pierce*
Collection Date/Time: *4-10-22 9:00 PM*

Sample Type : Entry Point
 Special/Non-compliance

Analyses

Lab Number: CF04566-01

Acidity NCDW144	Alkalinity NCDW142	Antimony Total NCDW170
Arsenic Total NCDW170	Barium Total NCDW170	Beryllium Total NCDW170
Cadmium Total NCDW170	Calcium Total NCDW169	Chromium Total NCDW170
Color NCDW129	Copper Total NCDW170	Cyanide Total NCDW150
Fluoride NCDW120	Hardness NCDW169	Iron Total NCDW169
Lead Total NCDW170	Magnesium Total NCDW169	Manganese Total NCDW170
Mercury Total NCDW119	Nickel Total NCDW170	Nitrite NCDW163
Nitrite NCDW163	NOX NCDW163	NOX NCDW163
pH NCDW135	Selenium Total NCDW170	Silver Total NCDW170
Sodium Total NCDW169	Sulfate NCDW120	TDS NCDW139
Thallium Total NCDW170	Turbidity NCDW001	Zinc Total NCDW170

Containers

- 1 - 250mLP+AscAcid+NaOH
- 1 - 250mLP+HNO3
- 1 - 40mLV
- 1 - 40mLV+H2SO4
- 2 - 500mLP

Temp / 6 C

Sampling Instructions:

Preparing to Sample

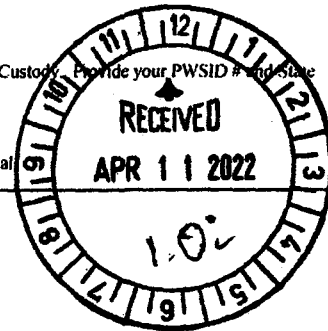
- Reference the provided Chain-of-Custody or Bottle Summary for a list of bottles provided.
- Unpack the bottles to prepare for sampling. If you have more than one sampling point, the bottles needed for each discrete sampling point are segregated into individual bags. Do not mix bottles between samples
- If shipping back to the lab, plan to collect samples in the late afternoon just prior to the pick-up time for your overnight carrier. This will allow the laboratory to complete all tests within specified holding times. All samples should be submitted to the lab ASAP within 24 hours after collection.
- Check with the laboratory in advance if you plan to submit samples on a Saturday

Filling the Sample Bottles

- If you are sampling from a faucet with an aerator, it must be removed prior to collection.
- Flush the coldwater sampling line for a minimum of 10 minutes. Slow the stream prior to sampling.
- Do NOT open the bottles until you are ready to fill them. Avoid debris/dust touching in the cap or bottle.
- Record the sampling date, time, site, and name of sampler on both the bottle labels and the enclosed Chain-of-Custody. Provide your PWSID # and state reporting requirements for compliance samples.
- Follow any required test-specific sampling instructions as follows:

Preservation

- Cyanide: Fill 250mL bottle with sample to within 1/2 inch of top; add entire contents of provided 1:1 NaOH vial



Comments:

Samples Collected By (Print and Sign)

Relinquish Date / Time

Received By (Lab)

Receipt Date : Time

Please review the above information related to your sample site. This information will be used to generate your state compliance forms. In the event that corrections are necessary, please make accordingly and we will update our system upon receipt.

Sample Preservation Verification
ENCO Cary

W1300,Sub98



Work Order: CF04566
 Client: Bernie Pierce (BE019)
 Logged In: 11-Apr-22 11:57
 Preservation Check Performed By: SH

Project: New Well Scan-Oliver Subdivision
 Project #: [none]
 Logged By: Rachel Ann Yonish
 Date/Time: 4/11/22 1200

CF04566-01

Cont	Type	Pres (pH) Requirement	pH Checked / In Control	pH Adjusted	Date/Time Adjusted	Reagent Used/Comments
A	250mLP+AscAcid+NaOH	>12	Y / N / NA	Y / N / NA		
B	250mLP+HNO3	<2	Y / N / NA	Y / N / NA		
D	40mLV+H2SO4	<2	Y / N / NA	Y / N / NA		

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	Reagent Name	ID
1		
2		

	Reagent Name	ID
3		
4		

	Reagent Name	ID
5		
6		

pH Strip ID: PH Strips C2A0640

C:\elmnt\Print\wko_preservationcheck.rpt

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 Cary, NC 27511
 Ph: (919) 467-3090 Fax: (919) 467-3515



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NEW WELL INORGANIC CHEMICAL ANALYSIS

WATER SYSTEM ID #: **N/A** County: **x**
 Name of Water System: **Olivet Subdivision**
 Sample Type: Entry Point Special/Non-compliance
 Location Where Collected: **Well: Well#1(IOC) - -**
 Facility ID No.: **D01**
 Sample Point: **TW1**
 Collected By: **Bernie Pierce**
 Mail Results to:
 Bernie Pierce (BE019)
 Attn: Bernie Pierce
 4701 Yates Mill Pond Road
 Raleigh, NC 27606
 Phone #: **(919) 467-8712**
 Fax #:

Collection Date	Collection Time
04/10/22	08:00 pm

LABORATORY ID #: 37724

SAMPLE UNSATISFACTORY

RESAMPLE REQUIRED

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LIMIT (R.R.L.)	NOT DETECTED (i.e < R.R.L.) (X)	QUANTIFIED RESULTS*	ALLOWABLE LIMIT
0100	Turbidity	180.1	0.1 ntu		0.23 ntu	N/A
1005	Arsenic	200.8	0.005 mg/L	X	mg/L	0.01 mg/L
1010	Barium	200.8	0.4 mg/L	X	mg/L	2 mg/L
1015	Cadmium	200.8	0.001 mg/L	X	mg/L	0.005 mg/L
1016	Calcium	200.7	1 mg/L		41.4 mg/L	N/A
1017	Chloride	300.0	5 mg/L	X	mg/L	250 mg/L
1020	Chromium	200.8	0.02 mg/L	X	mg/L	0.1 mg/L
1022	Copper	200.8	0.05 mg/L	X	mg/L	1.3 mg/L
1024	Cyanide (total)	335.4	0.05 mg/L	X	mg/L	0.2 mg/L
1025	Fluoride	300.0	0.1 mg/L		0.26 mg/L	4 mg/L
1028	Iron	200.7	0.06 mg/L		0.171 mg/L	0.3 mg/L
1030	Lead	200.8	0.003 mg/L	X	mg/L	0.015 mg/L
1031	Magnesium	200.7	1 mg/L		9.49 mg/L	N/A
1032	Manganese	200.8	0.01 mg/L		0.145 mg/L	0.05 mg/L
1035	Mercury	245.1	0.0004 mg/L	X	mg/L	0.002 mg/L
1036	Nickel	200.8	0.1 mg/L	X	mg/L	N/A
1040	Nitrate as N	4500NO3-F	1 mg/L	X	mg/L	10 mg/L
1041	Nitrite as N	4500NO3-F	0.1 mg/L	X	mg/L	1 mg/L
1045	Selenium	200.8	0.01 mg/L	X	mg/L	0.05 mg/L
1050	Silver	200.7	0.05 mg/L	X	mg/L	0.1 mg/L
1052	Sodium	200.7	1 mg/L		13.1 mg/L	N/A
1055	Sulfate as SO4	300.0	5 mg/L		15 mg/L	250 mg/L
1068	Acidity (as CaCO3)	2310 B	1 mg/L	X	mg/L	N/A
1074	Antimony	200.8	0.003 mg/L	X	mg/L	0.006 mg/L
1075	Beryllium	200.8	0.002 mg/L	X	mg/L	0.004 mg/L
1085	Thallium	200.8	0.001 mg/L	X	mg/L	0.002 mg/L
1095	Zinc	200.8	1 mg/L	X	mg/L	5 mg/L
1905	Color	2120B	5 units	X	units	15 units
1915	Hardness	2340B	1 mg/L		142 mg/L	N/A
1925	pH	4500H-B	N/A	N/A	7.8 units	N/A

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NEW WELL INORGANIC CHEMICAL ANALYSIS

(continued)

WATER SYSTEM ID #: N/A
 Name of Water System: Olivet Subdivision
 Facility ID No.: D01
 Sample Point: TW1

Collection Date	Collection Time
04/10/22	08:00 pm

LABORATORY ID #: 37724

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LIMIT (R.R.L.)	NOT DETECTED (i.e < R.R.L.) (X)	QUANTIFIED RESULTS	ALLOWABLE LIMIT*
1927	Total Alkalinity as CaCO3	2320B	1 mg/L		140 mg/L	N/A
1930	Total Dissolved Solids	2540C	10 mg/L		200 mg/L	500 mg/L

*Note: Concentrations for Lead and Copper are action levels not MCLs.

	DATE:	TIME:
ANALYSES BEGUN:	04/12/2022	3:03 pm
ANALYSES COMPLETED:	04/22/2022	5:39 pm

Laboratory Log #: CF04566-01
 COMMENTS:

Certified By: Bill Scott Bill Scott

Environmental Conservation Laboratories, Inc.
 102-A Woodwinds Industrial Court
 Cary, NC 27511
 Ph: (919) 467-3090 Fax: (919) 467-3515



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CORROSIVITY ANALYSIS

WATER SYSTEM ID #: **N/A** County: **x**
 Name of Water System: **Olivet Subdivision**
 Sample Type: Entry Point Special/Non-compliance
 Location Where Collected: **Well: Well#1(IOC) - -**
 Location Code: **TW1**
 Collected By: **Bernie Pierce**

Collection Date	Collection Time
04/10/22	08:00 pm

Mail Results to:
 Bernie Pierce (BE019)
 Attn: Bernie Pierce
 4701 Yates Mill Pond Road
 Raleigh, NC 27606

Phone #: **(919) 467-8712**
 Fax #:

LABORATORY ID #: 37724

SAMPLE UNSATISFACTORY

RESAMPLE REQUIRED

CONTAM CODE	CONTAMINANT	METHOD CODE	REQUIRED REPORTING LIMIT (R.R.L.)	NOT DETECTED (i.e < R.R.L.) (X)	QUANTIFIED RESULTS*	ALLOWABLE LIMIT
1910	Langelier Index		N/A	N/A	0.12	N/A
1919	Calcium Hardness	2340B	N/A	N/A	100 mg/L	N/A
1925	pH	4500H-B	N/A	N/A	7.8 units	6.5-8.5 units
1927	Total Alkalinity as CaCO3	2320B	1 mg/L		140 mg/L	N/A
1930	Total Dissolved Solids	2540C	10 mg/L		200 mg/L	500 mg/L
1996	Water Temperature	2550	N/A	N/A	16 deg C	N/A

*Note: Concentrations for Lead and Copper are action levels not MCLs.

	DATE:	TIME:
ANALYSES BEGUN:	04/10/2022	8:00 pm
ANALYSES COMPLETED:	04/27/2022	10:51 am

Laboratory Log #: **CF04566-01**
 COMMENTS:

Certified By: Bill Scott Bill Scott

**Olivet Subdivision
Potable Water System
Engineer's Report**

Twenty-Four Hour Drawdown Test

**MacConnell & Associates, P.C.
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513**

**P.O. Box 129
Morrisville, North Carolina 27560**

Phone: (919) 467-1239

Fax: (919) 319-6510

W1300,Sub98

WELL PUMPING TEST REPORT (FIELD FORM)

PERSON(S)PERFORMING TEST: BERNIE PIERCE 2716-A

WELL LOCATION: (NEAREST TOWN) FRANKLINTON COUNTY: FRANKLIN
 SUBDIVISION: OLIVET WELL # 1 USE: DOMESTIC ()
 OWNER: OLIVET 38 LLC PUBLIC (X)
 CO ORDINACES: 36.130661 INDUSTRIAL ()
-78.50281 IRRIGATION ()
 DRILLING CONTRACTOR: BOYETTE WELL & SEPTIC OTHER ()

CASING THREADED CASING NON-THREADED

WELL DEPTH: 262 FT. CASING DEPTH 58.3 FT. DIA 8
 STATIC LEVEL: 34.4 FT. () ABOVE (X) BELOW TOP OF CASING DATE MEASURED 4 10 22
 CASING IS 2.5 FEET X ABOVE BELOW GROUND LEVEL GROUTED?

TEST PUMP: MAKE - GRUNDFC MODEL# - 85S100 HORSEPOWER - 10 PH 3
 SERIAL # PIPE SIZE 2 WIRE SIZE 4 WIRE LENGTH 340
 PUMP CAPACITY - 85 GPM @ 210 'TDH INTAKE DEPTH - 210 FEET

FLOW MEASURE DEVICE 1.5" SENSUS T2

CHLORINATION: TYPE - HTH AMOUNT- 1 #

PUMP STARTED: DATE - 4 10 22 TIME- 8:00 AM

PUMP STOPPED: DATE - 4 11 22 TIME- 8:00 AM

PUMPING WATER LEVEL: 193.8 FT AT 36 GPM

SITE CONDITION/GRADING: DRY ONLY FOR ACCESS

TIME	WATER LEVEL	PUMPING RATE	HEAD	TURBIDITY	COMMENTS
8:00 AM	76 PSI 34.4 FT.	112 GPM	32	CLEAR	
8:05	70 PSI 48.3 FT.	112 GPM			
8:10	66 PSI 57.5 FT.	109 GPM			
8:15	63.5 PSI 63.3 FT.	108 GPM			
8:20	61.5 PSI 67.9 FT.	107 GPM			
8:25	59 PSI 73.7 FT.	106 GPM			
8:30	58 PSI 76 FT.	104 GPM			
8:35	58 PSI 76 FT.	104 GPM			
8:40	57 PSI 78.3 FT.	103 GPM			FE .4 HARD 171 PH 8 MN .25
8:45	56 PSI 80.6 FT.	101 GPM			
8:50	55.75PSI 81.2 FT.	101 GPM			
8:55	55 PSI 82.9 FT.	100 GPM			
9:00	54.5 PSI 84.1 FT.	100 GPM			
9:10	53.5 PSI 86.4 FT.	101 GPM			
9:20	53 PSI 87.5 FT.	101 GPM			
	PSI FT.	GPM			
	PSI FT.	GPM			

WELL PUMPING TEST REPORT

	PSI	FT.	GPM			
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WELL PUMPING TEST REPORT

LBS.	FT.	LBS.	FT.	LBS.	FT.	LBS.	FT.	LBS.	FT.
2	4.62	47	108.57	87	200.97	132	304.92	177	408.87
3	6.93	48	110.88	88	203.28	133	307.23	178	411.18
4	9.24	49	113.19	89	205.59	134	309.54	179	413.49
5	11.55	50	115.50	90	207.90	135	311.85	180	415.80
6	13.86	51	117.81	91	210.21	136	314.16	181	418.11
7	16.17	52	120.12	92	212.52	137	316.47	182	420.42
8	18.48	53	122.43	93	214.83	138	318.78	183	422.73
9	20.79	54	124.74	94	217.14	139	321.09	184	425.04
10	23.10	55	127.05	95	219.45	140	323.40	185	427.35
11	25.41	56	129.36	96	221.76	141	325.71	186	429.66
12	27.72	57	131.67	97	224.07	142	328.02	187	431.97
13	30.03	58	133.98	98	226.38	143	330.33	188	434.28
14	32.34	59	136.29	99	228.69	144	332.64	189	436.59
15	34.65	60	138.60	100	231.00	145	334.95	190	438.90
16	36.96	61	140.91	101	233.31	146	337.26	191	441.21
17	39.27	62	143.22	102	235.62	147	339.57	192	443.52
18	41.58	63	145.53	103	237.93	148	341.88	193	445.83
19	43.89	64	147.84	104	240.24	149	344.19	194	448.14
20	46.20	65	150.15	105	242.55	150	346.50	195	450.45
21	48.51	66	152.46	106	244.86	151	348.81	196	452.76
22	50.82	67	154.77	107	247.17	152	351.12	197	455.07
23	53.13	68	157.08	108	249.48	153	353.43	198	457.38
24	55.44	69	159.39	109	251.79	154	355.74	199	459.69
25	57.75	70	161.70	110	254.10	155	358.05	200	462.00
26	60.06	71	164.01	111	256.41	156	360.36	201	464.31
27	62.37	72	166.32	112	258.72	157	362.67	202	466.62
28	64.68	73	168.63	113	261.03	158	364.98	203	468.93
29	66.99	74	170.94	114	263.34	159	367.29	204	471.24
30	69.30	75	173.25	115	265.65	160	369.60	205	473.55
31	71.61	76	175.56	116	267.96	161	371.91	206	475.86
32	73.92	77	177.87	117	270.27	162	374.22	207	478.17
33	76.23	78	180.18	118	272.58	163	376.53	208	480.48
34	78.54	79	182.49	119	274.89	164	378.84	209	482.79
35	80.85	80	184.80	120	277.20	165	381.15	210	485.10
36	83.16	81	187.11	121	279.51	166	383.46	211	487.41
37	85.47	77	177.87	122	281.82	167	385.77	212	489.72
38	87.78	78	180.18	123	284.13	168	388.08	213	492.03
39	90.09	79	182.49	124	286.44	169	390.39	214	494.34
40	92.40	80	184.80	125	288.75	170	392.70	215	496.65
41	94.71	81	187.11	126	291.06	171	395.01	216	498.96
42	97.02	82	189.42	127	293.37	172	397.32	217	501.27
43	99.33	83	191.73	128	295.68	173	399.63	218	503.58
44	101.64	84	194.04	129	297.99	174	401.94	219	505.89
45	103.95	85	196.35	130	300.30	175	404.25	220	508.20
46	106.26	86	198.66	131	302.61	176	406.56	221	510.51

W1300,Sub98

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Olivet Subdivision Potable Water System Engineer's Report

OFFICIAL COPY

Apr 23 2024

Calculations



MacConnell & Associates, P.C.
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513

P.O. Box 129
Morrisville, North Carolina 27560

Phone: (919) 467-1239
Fax: (919) 319-6510

Olivet Subdivision - Potable Water System
Durham County, North Carolina
Project No.: A06902.00
Date: June 29, 2023

Design of Hydropneumatic Tank

Given:	Notes
Number of residential connections	36 Single Family
Peak Demand (Residential Graph - 15-NCAC 18C .0802):	80 gpm
Well No. 1:	
Yield from 24 Hour Drawdown Test (GPM):	36.0
Proposed Pump Rate (GPM):	36.0
Total Pump Capacity (GPM):	36.0
Required Effective Volume (Gallons):	880.0 (Peak Demand - Pump Capacity) x 20 Min.
Total Tank Volume (Gallons):	3520.0 Using 60-40 PSI Cycle with Air Recharge Required Effective Volume/0.25
Total Tank Volume Provided (Gallons)	5400.0

Olivet Subdivision - Potable Water System
Franklin County, North Carolina
Project No.: A06902.00
Date: June 29, 2023

Design of Chlorine Feed Pump Sizing:

Given:

Flow Rate of Well 1 36 GPM

Concentration of Iron Well 1 0.171 ppm

Concentration of Hydrogen Sulfide (as Sulfate) Well 1 1 ppm

Recommended Dosing Rate

1 ppm of chlorine per 1 ppm of Iron

3 ppm of chlorine per 1 ppm of Hydrogen Sulfide

1 ppm of chlorine residual

Total Chlorine dosing required 4.2 ppm

Assume 12.5% Chlorine Solution 125000 ppm

Chlorine Feed Pump Rate: 0.9 GPD

(Pump Rate x Required Dosage x 720/Solution Strength)*

30-Day Chlorine Storage 25.9 Gallons

Storage Provided 55.0 Gallons

***Assume 12-hour of Pump Time**

Olivet Subdivision
 Potable Water System
 Franklin County, North Carolina
 Project No.: A06902.00
 Date: June 29, 2023

Designed by: DCB
 Checked by: GSM

From Hydro - Lot 30

Notes:

1. Check for pressure loss to end of development
2. Use peak flow as basis and use groups of several lots for simplicity. However, use total segment flow to farthest point.
3. Assume HydroTank set at 75 - 95 psi.
4. Requires Min. 30 psi at service meter.

Determine Static Head		
Start Elev.	373.00	feet
End Elev. =	447.50	feet
	-74.50	feet
Static Head=	74.50	feet

Note: Elev. At Surface Except for Tank & End.

Segment: 1 (Hydro - Ints. Road 3)		
Hazen Williams "C" Factor		
C =	140	
Total Connections:		
Units =	36	
Peak Flow by NCDEQ Reg. Graph.		
Q =	80	GPM

Determine Losses in the Force Main (HI + Hf)
Determine Equivalent Length of Force Main

	Size (in.)	Length (Ft.)	Number	Eq. Length	Size (in.)	Size (in.)
					4" C900 DR14	N/A
					Eq. Length Sch. 40	Eq. Length Sch. 40
Water Line	4" C900 DR14	1040	1	1525	1525	0
Gate Valve	4" C900 DR14		3	12	36	0
90 Degree Elbow	4" C900 DR14		2	12	24	0
Tee	4" C900 DR14		2	25	50	0
			0	0	0	0
			0	0	0	0
			0	0	0	0

Note: Above includes installed service connection to permitted facility.

	Total Eq. Length (feet) =	1635.00	0.00
	$HI + Hf = 0.2083 * (100/c)^{1.85} * (Q^{1.85}/d^{4.87}) * (Eq. Length/100) =$	6.51	0.00
	Total Head Loss (HI + Hf) =	6.51	Feet

Determine Static Head		
Start Elev.	447.50	feet
End Elev.(High point) =	458.00	feet
	-10.50	feet
Static Head=	10.50	feet

Note: Elev. At Surface Except for Tank & End.

Segment: 2 (Ints. Road 3 - Lot 30)		
Hazen Williams "C" Factor		
C =	140	
Total Connections:		
Units =	17	
Peak Flow by NCDEQ Reg. Graph.		
Q =	38	GPM

Determine Losses in the Force Main (Hl + Hf)
Determine Equivalent Length of Force Main

	Size (in.)	Length (Ft.)	Number	Eq. Length	Size (in.)	Size (in.)
					4" C900 DR14	N/A
	Size (in.)	Length (Ft.)	Number	Eq. Length	Eq. Length Sch. 40	Eq. Length Sch. 40
Water Line	4" C900 DR14	955	1	955	955	0
Gate Valve	4" C900 DR14		2	12	24	0
45 Degree Elbow	4" C900 DR14		4	6	24	0
Tee	4" C900 DR14		1	25	25	0
			0	0	0	0
			0	0	0	0
			0	0	0	0

Note: Above includes installed service connection to permitted facility.

	Total Eq. Length (feet) =	1028.00	0.00
	$Hl + Hf = 0.2083 * (100/c)^{1.85} * (Q^{1.85}/d^{4.87}) * (Eq. Length/100) =$	1.02	0.00
	Total Head Loss (Hl + Hf) =	1.02	Feet

Segment Head (Feet)	Static Head (Feet)	Frictional Head (Feet)	Total Head (Feet)
1	74.50	6.51	81.01
2	10.50	1.02	11.52
Total	85.00	7.54	92.54 Feet
Convert to PSI	36.84	3.27	40.11 PSI

Tank operates at 75 -95 psi. Therefore 75 psi - 40.11 psi = 34.89 psi.
 34.89 is greater than 30 psi design checks.

Water Supply Well #1 Design
Olivet Subdivision - Potable Water System
Water Supply Well #1
Franklin County, North Carolina
Date: July 12, 2023

Designed by: DCB
 Checked by: GSM

Total Dynamic Head:

Determine Static Head		
Tank Pressure (95psi)	219.45	feet
Filter Head Loss	13.9	feet
Tank Elevation = 373.00 feet		
Well Head Elev. =	371.00	feet
	2.00	feet
Water Elev. - Well Hd. 193.80 feet		
Total Static Head=	429.15	feet

Note: 1 psi = 2.31 feet

Hazen Williams "C" Factor		
C =	120	
Pump Design Flow		
Well Yield.		
Q ₁ =	36	GPM
Well Pipe Diameter		
d ₁ =	2.067	inches
v ₁ =	3.4	ft/s

Determine Losses in the Water Line (HI + Hf)

Determine Equivalent Length of Water Line

	Size (in.)	Length (Ft.)	Number	Eq. Length	Size (in.)	Size (in.)	Size (in.)	Size (in.)	
					1-1/2" Galv.	2" Galv.	3" Galv.		
Water Line	2" Galv.	243.80	1	243.8	0	243.8	0	0	
Check Valve/Meter	2" Galv.		2	15	0	30	0	0	
Gate/Ball Valve	2" Galv.		2	1.5	0	3	0	0	
Standard Tee	2" Galv.		7	12	0	84	0	0	
90 Degree Elbow/Tee	2" Galv.		8	13	0	104	0	0	
2" x 3" Red.	2" Galv.		0	6	0	0	0	0	
<i>Note: Above includes installed service connection to permitted facility.</i>					Total Eq. Length (feet) =	0.00	464.80	0.00	0.00
$HI + Hf = 0.2083 * (100/c) ^ 1.85 * (Q^{1.85}/d^{4.87}) * (Eq. Length/100) =$					0.00	15.98	0.00	0.00	
Total Head Loss (HI + Hf) =					15.98	Feet			

Total Dynamic Head = Static + HI + Hf = 445.13 feet

Pump Curve Data
 Pump: Grundfos 35S75-22

Develop System Curve

Use flow rates above and below for the design flow rate. The flow rates will be used to calculate the total dynamic head at each flow rate. These combinations of flow vs. head will be used to plot a curve against a known pump curve.

System Curve Data

Flow Rate (Q)	TDH (feet)	Static Head	
		(Feet)	HI + Hf (Feet)
0	429.15	429.15	0.00
5	429.56	429.15	0.41
10	430.64	429.15	1.49
15	432.31	429.15	3.16
20	434.54	429.15	5.39
25	437.29	429.15	8.14
30	440.55	429.15	11.40
35	444.32	429.15	15.17
40	448.56	429.15	19.41
45	453.29	429.15	24.14
50	458.49	429.15	29.34

Olivet Subdivision Potable Water System Engineer's Report

Equipment



MacConnell & Associates, P.C.
501 Cascade Pointe Lane, Suite 103
Cary, North Carolina 27513

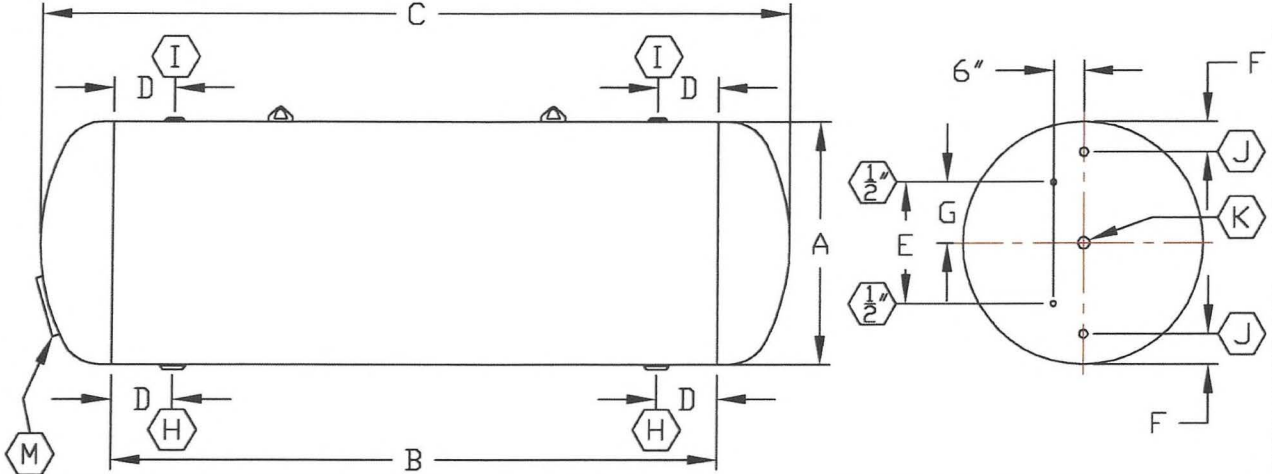
P.O. Box 129
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Phone: (919) 467-1239
Fax: (919) 319-6510



DIXIE TANK COMPANY

Ph: (904) 781-9500 Fax: (904) 781-8992 (800) 847-941
ASME CODE SPECIFICATION SHEET
NSF EPOXY LINED - 100 PSIG



CAPACITY (GALLON)	DIMENSIONS IN INCHES												WEIGHT
	A	B	C	D	E	F	G	H	I	J	K	M	
533	42	72	97	6	24	4	12	2	2	1	1.25	12x16	1037
594	36	120	141	6	24	6	12	2	2	1	1.25	12x16	1123
965	42	144	169	6	24	6	12	3	2	1	1.25	12x16	1711
1096	48	120	149	6	24	6	12	3	2	1	1.25	12x16	1797
1169	54	96	128	6	24	6	12	3	2	1	1.25	12x16	1875
1276	48	144	173	6	24	6	12	3	2	1	1.25	12x16	2050
1407	54	120	152	6	24	6	12	4	2	1	1.25	12x16	2160
1468	60	96	131	6	24	6	12	4	2	1	1.25	12x16	2140
1558	48	180	209	6	24	6	12	4	2	1	1.25	12x16	2442
1660	48	192	221	6	24	6	12	4	2	1	1.25	12x16	2564
1762	60	120	155	6	24	6	12	4	2	1	1.25	12x16	2460
2036	48	240	269	6	24	6	12	4	2	1	1.25	12x16	3084
2121	54	192	224	12	24	6	12	4	2	1	1.25	12x16	3030
2184	72	96	136	12	24	6	12	4	2	1	1.25	12x16	3055
2359	54	216	248	12	24	6	12	4	2	1	1.25	12x16	3320
2597	54	240	272	12	24	6	12	4	2	1	1.25	12x16	3608
2608	72	120	160	12	24	6	12	4	2	1	1.25	12x16	3545
2643	60	192	227	12	24	6	12	4	2	1	1.25	12x16	3420
2937	60	216	251	12	24	6	12	4	2	1	1.25	12x16	3740
3031	72	144	185	12	24	6	12	4	2	1	1.25	12x16	4119
3231	60	240	275	12	24	6	12	4	2	1	1.25	12x16	4065
3877	72	192	233	12	24	6	12	4	2	1	1.25	12x16	4982
4300	72	216	257	12	24	6	12	4	2	1	1.25	12x16	5471
4723	72	240	281	12	24	6	12	4	2	1	1.25	12x16	5962
5569	72	288	329	12	24	6	12	4	2	1	1.25	12x16	6906
5640	96	144	197	12	24	6	12	4	2	1	1.25	12x16	5389
5992	72	312	353	12	24	6	12	4	2	1	1.25	12x16	7396
6415	72	336	377	12	24	6	12	4	2	1	1.25	12x16	7890
6768	96	180	233	12	24	6	12	4	2	1	1.25	12x16	8091
6838	72	360	401	12	24	6	12	4	2	1	1.25	12x16	8377
7144	96	192	245	12	24	6	12	4	2	1	1.25	12x16	8456
7260	72	384	424	12	24	6	12	4	2	1	1.25	12x16	8832
7896	96	216	269	12	24	6	12	4	2	1	1.25	12x16	9235
8648	96	240	293	12	24	6	12	4	2	1	1.25	12x16	10025
9024	96	252	305	12	24	6	12	4	2	1	1.25	12x16	10381
10152	96	288	341	12	24	6	12	4	2	1	1.25	12x16	11525
11656	96	336	389	12	24	6	12	4	2	1	1.25	12x16	13084
12408	96	360	413	12	24	6	12	2	2	1	1.25	12x16	13863
15040	96	444	497	12	24	6	12	2	2	1	1.25	12x16	16531
15070	108	340	398	12	24	6	12	2	2	1	1.25	12x16	14890

ALL DIMENSIONS ARE FOR REFERENCE ONLY AND ARE SUBJECT TO CHANGE WITHOUT NOTICE

AIR RITE

W1300,Sub98

EXHIBITS 4 THRU 6

**... the answer to
an efficient, complete, aircharging system
for Hydropneumatic Tanks!**

Distinctive Features Include:

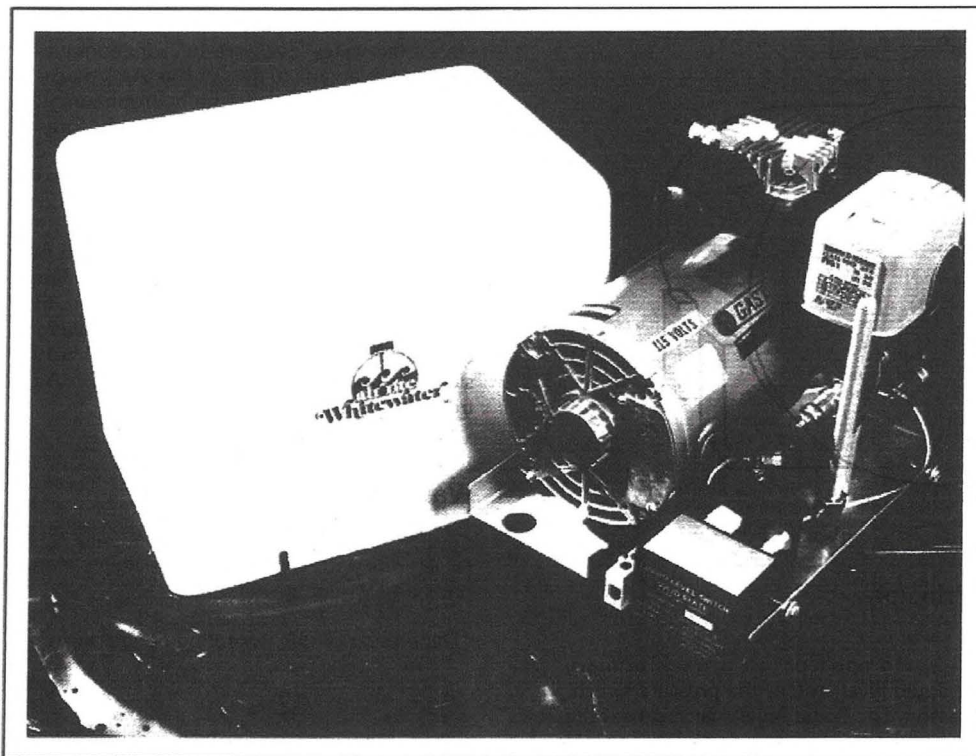
Dual Voltage

Solid State Liquid Level Switch

Long Life Oil-less Compressor - Adjustable Pressure Switch

Fast Simple Installation - One Year Warranty

**Backed by technical advice
from our trained management staff**



Whitewater MFG. Co., P.O. Box 148, Whitewater, WI 53190 (262) 473-3100 FAX (262) 473-4324

Easy to install, maintenance free...

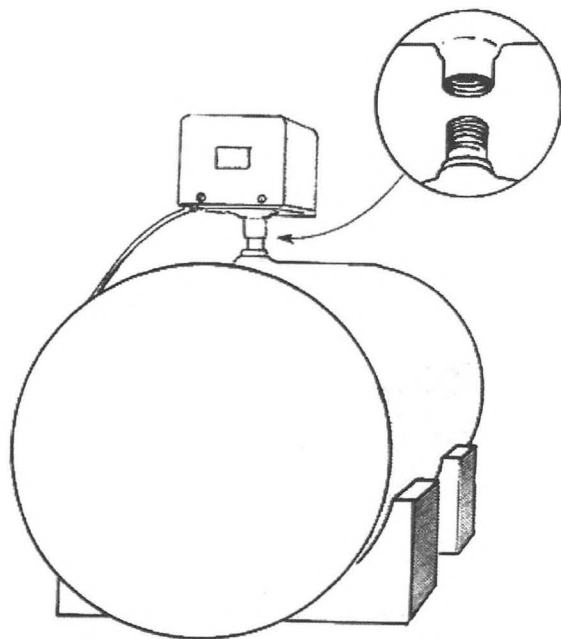
W1300,Sub98

EXHIBITS 4 THRU 6

Important Features . . .

The Air Rite Air Volume Control is a completely self contained air charging system. The control has only three basic components: an oil-less air compressor, an encapsulated solid state liquid level switch (with isolated electrode circuit and time delay), and a pressure switch. All of the components are enclosed in a fiberglass cover rendering the entire unit weather-proof. This patented design makes it possible to install the control in a fraction of the time that it takes to install an air volume control system utilizing a separate air compressor. Water containing minerals creates no special problem for the control because the only contact with the water is via the stainless steel corrosion resistant electrode. The control requires very little maintenance, providing years of trouble-free service.

the tank from the controls base. At the same time the pressure switch monitors the air pressure in the tank. If the water level begins to rise above the electrode and the air pressure in the tank is below the setting on the pressure switch the compressor will begin to pump air into the tank. The compressor will continue to pump air until an adequate air pressure is reached or until the water level falls below the electrode. A time delay in the liquid level switch prevents waves in the tank from causing rapid cycling of the compressor. Since the air in the tank is lost rather slowly by absorption into the water, the control is continuously monitoring the air charge in the tank and the optimum air charge is maintained. Continual monitoring of tank pressure is very important because pressure changes result from both air to water absorption and changing water levels.



Advantages over other types of Air Charging Systems . . .

Experienced water supply system designers agree that no type of air volume control is better than a motor driven air compressor controlled by an electrode that senses the water level in a hydropneumatic tank. One obvious advantage to the Air Rite Air Volume Control is that it attaches directly to the hydropneumatic tank. No need to worry about long cumbersome pressure hoses or electrode wires. The patented Air Rite design provides a complete motor driven air compressor (good for approx. 4000 working hours)* integrated in an air volume control system all in one easy to install enclosure. No additional parts are needed other than a 2" pipe nipple and an electrical supply line. Lastly, the controls are completely protected from the elements -rain, hail, snow, ice, or wind - that may be encountered by a hydropneumatic tank. Any pump installer or maintenance man can install an Air Rite Control in minutes.

Operating Principle . . .

The control is composed of three primary elements: the liquid level switch, the pressure switch, and the compressor. The liquid level switch senses the water level in the tank via the electrode suspended into

Warranty . . .

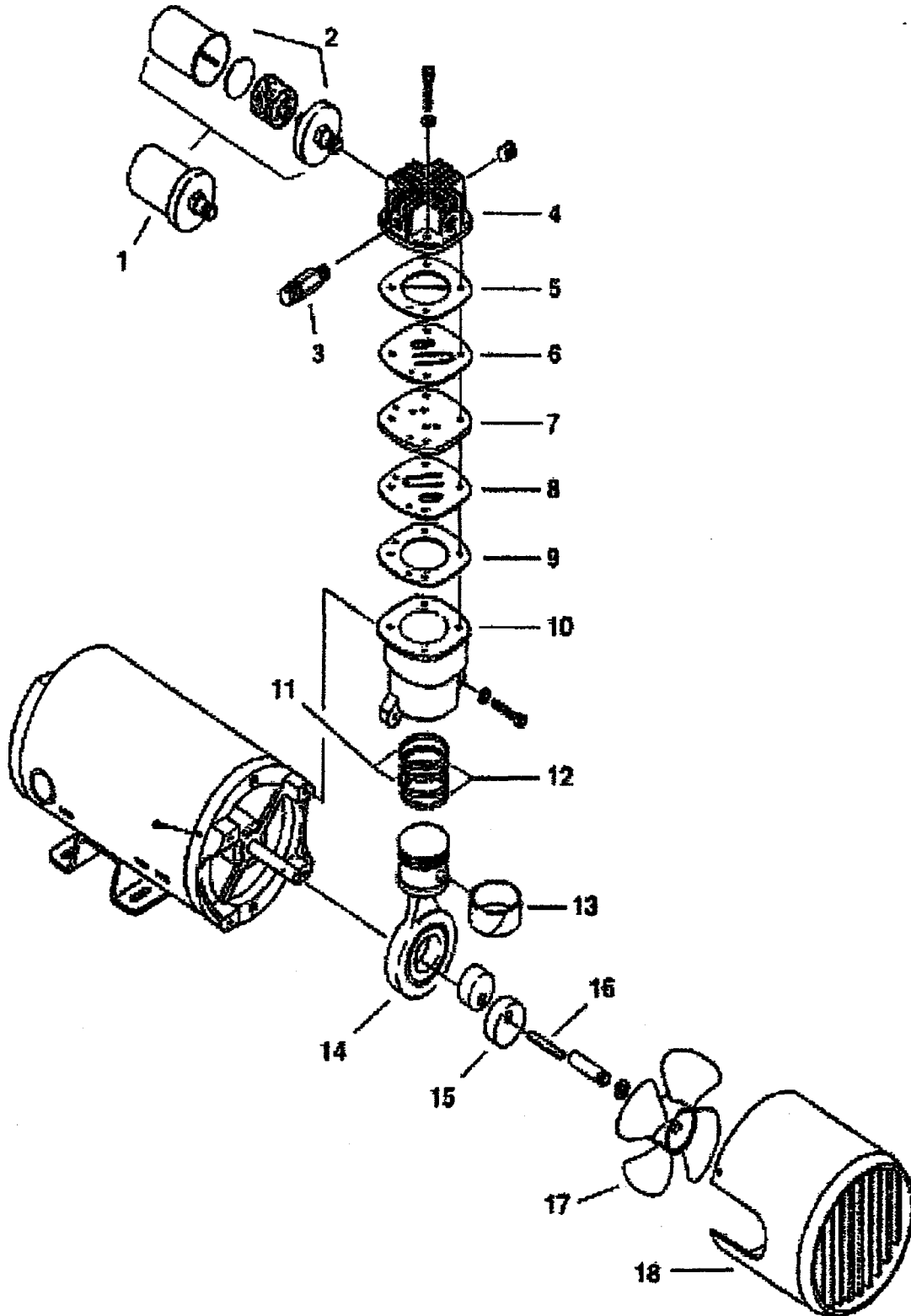
All Air Rite parts carry a one year limited warranty on all parts and workmanship.

*Depending on the operating conditions of your unit.

EXPLODED PRODUCT VIEW – MODEL 1HAB

W1300,Sub98

EXHIBITS 4 THRU 6



Air receiver loses pressure:

1. Check for system leaks through pipes, fittings and seals.
2. Inspect the check valve to see if it is allowing air pressure to leak back into unit.
3. Pressure pumps will have bubbles around head assembly during operation. Stop operating the pump for a few minutes and check for air leaks at pump.
4. Vacuum systems should have the check valve removed and inspected for dirt buildup. It may be necessary to need an AV460 filter installed prior to tank to eliminate contaminants.

A leak is located at the unit:

1. Vent all pressure from inside the air receiver until gauge reads 0 PSI.
2. Inspect check valve for dirt buildup, wear and proper operation.
3. Replace check valve if necessary.

PARTS & ORDERING INFORMATION

Please reference the exploded view on the opposite page for the following model and parts table.

1HAA / 1HAB SERIES

REF	DESCRIPTION	QTY	1HAA	1HAB	1HAE	1LAA	1VAF	2HAN	2LAF	3HEB	3HEE	3LEM
1	INLET FILTER ASSEMBLY	1	B300A	B300A	B300A	B300A	B300A	B300A	B300F	B300F	B300F	B300F
2 ☉	FELT	1	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A	B344A
3	SAFETY VALVE	1	AS100E	AS100G	AS100G	AS100C	--	AS100G	AS100C	AS100G	AS100G	AS100C
4	CYLINDER HEAD	1	AF508	AF508	AF508	AF508	AF508	AF508	AF508	AH691	AH691	AH691
5 ☉	HEAD GASKET	1	AF518	AF518	AF518	AF518	AF518	AF518	AF518	AF520A	AF520A	AF520A
6 ☉	OUTLET VALVE	1	AF531	AF531	AF531	AF531	AF531	AF531	AF531	AF545	AF545	AF545
7	PLATE VALVE	1	AF529	AF529	AF529	AF529	AF529	AF529	AF529	AK779	AK779	AK779
8 ☉	INLET VALVE	1	AF530	AF530	AF530	AF530	AF530	AF530	AF530	AF544	AF544	AF544
9 ☉	CYLINDER GASKET	1	AF519A	AF519A	AF519A	AF519A	AF519A	AF519A	AF519A	AF521	AF521	AF521
10	CYLINDER	1	AF510	AF510	AF510	AF510	AF510	AF510	AF510	AF509	AF509	AF509
11 ☉	PISTON RING	2	AF527	AF527	AF527	AF527	AF527	AF527	AF527	AF541	AF541	AF541
12 ☉	PISTON SEAL	2	AF526	AF526	AF526	AF526	AF526	AF526	AF526	AF540	AF540	AF540
13 ☉	RIDER RING	1	AF594	AF594	AF594	AF594	AF594	AF594	AF594	AF595	AF595	AF595
14	PISTON ROD ASSEMBLY	1	AF590A	AF590B	AF590E	AF590A	AF590F	AF590H	AF590F	AK893B	AK893E	AK893M
15	COUNTER WEIGHT	1	AF517A	AF517B	AF517E	AF517A	AF517D	AF517C	AF517D	AT780B	AK780E	AK780A
16	FLAT KEY	1	AF524	AF524	AF524	AF524	AF524	AF524	AF524	AB136	AB136	AB136
17	FAN	1	AF533	AF533	AF533	AF533	AF533	AF547	AF547	AF547	AF547	AF547
18	SHROUD	1	AF534	AF534	AF534	AF534	AF534	AF534	AF534	AT343	AT343	AT343
***	TANK ASSEMBLY	1	--	AF599	--	AF599A-1	--	AF599	--	--	--	--
***	SERVICE KIT	1	K264	K264	K264	K264	K264	K264	K264	K514A	K514A	K514A

Model 1HAB shown.

*** Item not shown.

☉ Denotes parts included in the Service Kit.

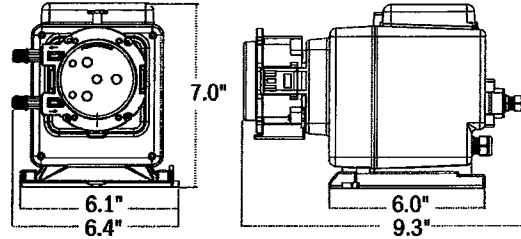
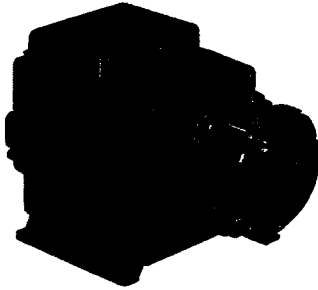
Parts listed are for stock models. For specific OEM models, please consult the factory.

When corresponding or ordering parts, please give complete model and serial numbers.

W1300,Sub98

S10P SPECIFICATIONS

STENNER PUMPS



SHIPPING WEIGHT 9 lbs (3.7 kg)

FEATURES

- Activated by a water meter, control valve, flow switch or any control equipment that responds to flow
- Accepts a dry contact or 12-24 VAC/VDC signal and runs at a set time, speed or flow rate output based on operating mode selected
- Steady solution distribution with 10 PPG mode and 10 PPG dry contact water meter
- Leak detect feature with dedicated output relay
- Built-in pulse signal repeater
- Accepts input from a fluid level device
- Totally enclosed housing
Pump head requires no valves, allows for easy maintenance
- Self-priming and does not lose prime or vapor lock
- Tube replacement without tools
- cULus for indoor/outdoor use
- IAPMO listed, conforms to NSF/ANSI 61 & 372

SPECIFICATION

- Flow Rate Output Control** Six button control panel with LCD display
- Reproducibility** ±2%
- Maximum Working Pressure** 100 psi (6.9 bar)
- Maximum Operating Temperature** 104°F (40°C)
- Maximum Altitude** 6562 ft. (2000 m)
- Maximum Suction Lift** 25 ft (7.6 m) vertical lift, based on water
- Motor Type** Brushless DC motor
- Shaft rpm (average maximum)** 45
- Duty Cycle** Continuous
- Maximum Viscosity** 1500 Centipoise
- Motor Voltage (Amp Draw)** 120V 60Hz 1PH (0.6)
- Power Cord Type** 120V 60Hz SJTOWA
- Power Cord Plug End** 120V 60Hz 5-15P
- Power Cord Length** 6 ft (1.8 m)
- Classification** Indoor/Outdoor

MATERIALS OF CONSTRUCTION

- All Housings** Polycarbonate
- Pump Tube & Check Valve Duckbill** Santoprene® (FDA approved)
- Pump Head Rollers** Polyethylene
- Roller Bushings** Oil impregnated bronze
- Suction/Discharge Tubing, Ferrules** Polyethylene (FDA approved)
- Tube Fittings, Injection Fittings** PVC or Polypropylene (both NSF listed)
- Connecting Nuts** PVC or Polypropylene (both NSF listed)
- Suction Line Strainer and Cap** PVC or Polypropylene (both NSF listed); ceramic weight
- All Fasteners** Stainless steel
- Pump Head Latches** Polypropylene
- Leak Detect Components** Hastelloy®

NOTE: Refer to the chemical guide for material compatibility. Santoprene® is a registered trademark of Exxon Mobil Corporation. Hastelloy® is a registered trademark of Haynes International, Inc.

ACCESSORIES

- 3 Connecting nuts 1/4"
- 1 Duckbill check valve
- 3 Ferrules 1/4" or 6 mm Europe
- 1 Weighted suction line strainer 1/4" or 6 mm Europe
- 1 20' Roll suction/discharge tubing 1/4" white, UV black or 6 mm white Europe
- 1 Additional pump tube
- 2 Additional Latches
- 1 Mounting bracket
- 1 Manual

100 psi (6.9 bar) maximum FLOW RATE OUTPUTS

Item Number Prefix	Pump Tube	Turndown Ratio	Turndown @ 10 PPG	Gallons per Day	Gallons per Hour	Ounces per Hour	Ounces per Minute	Liters per Day	Liters per Hour	Milliliters per Hour	Milliliters per Minute
S3P01	1	10:1	4:1	5.0	0.21	27.0	0.44	19.0	0.79	789.0	13.0
S3P02	2	10:1	4:1	17.0	0.71	91.0	1.51	64.0	2.68	2681.0	45.0
S3P06	6	10:1	4:1	30.0	1.25	160.0	2.67	114.0	4.73	4732.0	79.0

Approximate Maximum Outputs @ 50/60Hz

NOTICE: The information within this chart is solely intended for use as a guide. The output data is an approximation based on pumping water under a controlled testing environment. Many variables can affect the output of the pump. Stenner Pump Company recommends that all metering pumps undergo field calibration by means of analytical testing to confirm their outputs. The information contained in this flyer is not intended for specific application purposes. Stenner Pump Company reserves the right to make changes to prices, products, and specifications at any time without prior notice.

WATER GUARD, INC

1903 HERRING AVENUE
POST OFFICE BOX 2226
WILSON, NC 27894

W1300,Sub98

(800) 872-7665
(252) 237-5205
FAX: (252) 237-7028

TECHNICAL BULLETIN ~ SODIUM HYPOCHLORITE

SODIUM HYPOCHLORITE SOLUTION is a greenish-yellow liquid weighing approximately 10 lbs. per gallon with a specific gravity of 1.20. This product is commonly known as INDUSTRIAL BLEACH to distinguish it from the more common household bleach. The difference is the strength of the available chlorine. Household bleach has 5.25% available chlorine while Industrial Bleach has available chlorine of 12.5%. The trade percentage of Industrial Bleach is 15% available chlorine. The difference in percentage is because there is 15% available chlorine *by volume* and 12.5% available chlorine *by weight*.

Sodium Hypochlorite replaces many other forms of chlorine because of the ease of use and relatively safe handling and storage requirements. There is a trend by many municipalities to convert gas chlorine systems to liquid systems because of the hazards associated with gas chlorine use. Sodium Hypochlorite is fed into a system with a relatively inexpensive chemical feed pump. It requires no mixing and can be used directly from the shipping container or a bulk storage tank.

REGISTRATIONS**U.S. Environmental Protection Agency:**

Classified as a pesticide when used for disinfection. Subject to provisions of the Federal Insecticide, Fungicide, and Rodenticide Act. *EPA Registration Number: 49927-04*

U.S. Department of Agriculture:

Approved for food plant use where chemical may come in contact with food & food preparation areas.

National Sanitation Foundation:

Water Guard's Sodium Hypochlorite is NSF/ANSI 60 approved for use in drinking water systems for disinfection and oxidation purposes. The maximum use limit must not exceed 84mg/L.

State Registrations:

Registered for sale in the states of North Carolina, Virginia, and South Carolina.

STORAGE & HANDLING

The most important detriment of Sodium Hypochlorite is the limited shelf life of the material. All Sodium Hypochlorite Solutions will decompose. The major factors affecting stability are the solution's pH, its concentration, temperature, exposure to light and exposure to organic and metallic impurities.

With all these variable elements affecting the shelf life of the products, Water Guard wants to insure the purest and most stable Sodium Hypochlorite available to its Customers. We recommend purchasing no more Sodium Hypochlorite than can be consumed in 5 weeks or less. The product should be stored in clean containers, in coolest available environment out of direct sunlight. Proper planning and knowledge of the chemical properties can ensure maximizing the advantages of Sodium Hypochlorite Solution.

Anyone handling the material should always wear appropriate safety gear and should read and understand the Material Safety Data Sheet for the product. Never should this product be mixed directly with any other chemical. For further questions regarding the storage and handling of Sodium Hypochlorite, contact a Water Guard customer representative.

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TECHNICAL BULLETIN ~ SODIUM HYPOCHLORITE**CALCULATION FOR USE**

The amount of Sodium Hypochlorite (Industrial Bleach) needed is based on the amount of chlorine desired in the system to be treated. There is 1.25 lbs. of pure chlorine in a gallon of Industrial Bleach. One gallon of Industrial Bleach is 120,000 gallons of water will yield approximately 1.25 parts per million (ppm) of chlorine. The following formulas are used to calculate the amount of chlorine in water:

$$\text{Pounds of pure chlorine} = (\text{ppm}) \times (\text{million gallons system water}) \times (8.34)$$

For Example:

If you want 5 ppm of chlorine in 500,000 gallons of water
 you need to add 20.85 pounds of pure chlorine.

$$(5) \times (.5) \times (8.34) = 20.85$$

Note: To calculate the amount of water in million gallons, move the decimal point 6 places to the left. 500,000 is 0.5 million gallons after moving the decimal point 6 places to the left. 500 gallons is 0.0005 million gallons.

Relating this calculation to Sodium Hypochlorite, you will need 16.68 gallons of Sodium Hypochlorite to yield 20.85 pounds of pure chlorine.

$$20.85 \text{ lbs. of pure chlorine} \div 1.25 \text{ lbs. of pure chlorine / gallon} = 16.68 \text{ gallons}$$

Using this same basic formula you can determine what the ppm will be from the addition of a certain amount of chlorine in a system:

$$\text{ppm} = (\text{lbs. of pure chlorine}) \div (\text{million gallons of water}) \times (8.34)$$

For Example:

If 12 pounds of pure chlorine is added to 750,000 gallons of system water
 there will be 1.92 ppm of chlorine in the water system.

$$(12) \times (0.75) \times (8.34) = 1.92 \text{ ppm}$$

Note: In terms of Sodium Hypochlorite, 9.6 gallons of Industrial Bleach will yield 12 pounds of pure chlorine. (12 ÷ by 1.25 lbs./gallon)

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TECHNICAL BULLETIN ~ SODIUM HYPOCHLORITE**DECOMPOSITION OF SODIUM HYPOCHLORITE**

Sodium Hypochlorite is unstable and has a limited shelf life. The chemical will decompose and the available chlorine will decrease over time. Several factors affect the rate of decomposition. The major factors affecting stability are the solution's pH, its concentration, temperature, exposure to light and exposure to organic and metallic impurities.

Water Guard's Sodium Hypochlorite is made with the minimum of impurities. Our product is the most stable material available but care should be taken to reduce the possibility of decomposition during storage at your facility. We recommend that you do not purchase any more product than you can consume in five weeks or less.

Even under ideal conditions, the amount of available chlorine will decrease over time. The Chlorine Institute has developed a formula for estimating the concentration of material stored at 80 F with an original available chlorine concentration of 13%:

NUMBER OF DAYS	AVAILABLE CHLORINE CONCENTRATION
0	13.00 %
30	10.95 %
45	10.05 %
60	9.23 %
75	8.47 %

THE EFFECT OF DECOMPOSITION ON THE COST OF CHLORINE

As the available chlorine in the Sodium Hypochlorite decreases, the cost per pound of the available chlorine increases. The following chart is the percentage increase in cost over time:

NUMBER OF DAYS	PERCENT INCREASE IN COST OF AVAILABLE CHLORINE
0	0.00 %
30	18.50 %
45	28.80 %
60	40.70 %
75	53.60 %

As an example, if you purchase Sodium Hypochlorite for \$2.00 per gallon, the cost of the available chlorine is \$1.49 (10.3 lbs. per gallon x 13.00% = 1.339 lbs. of chlorine. \$2.00 per gallon/1.339 lbs. = \$1.49) If the Bleach is stored for 45 days the percent decomposes to 10.05%. The cost of the available chlorine will increase to \$1.92 per pound. To get the same amount of Chlorine you originally had, you need 1.29 gallons of this lower strength Bleach. In effect, the cost of the Bleach will have increased from \$2.00 per gallon to \$2.58 per gallon based on the increased gallons needed for the same amount of Chlorine. This is an increase of 29%. It truly pays to have a reliable and timely delivery schedule for this product.

DI Exchange Tanks, Heads and Fittings



Clack™ ®

DI Exchange Tanks W1300, Sub98

DI Exchange Tanks are now available from 8" through 14" in diameter, along with 36 x 72 Jumbo DI Tank. All tanks are natural in color.

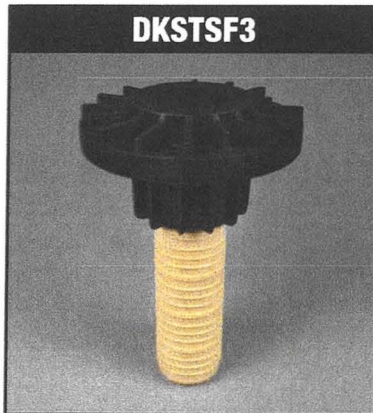
DI Exchange Tanks are equipped with either a heavy duty rubber base or plastic base and rubber bumper. See chart below for tank and base options. The protection bumper wraps over the dome/ side wall transition providing superior dome protection during handling. The polyethylene (HDPE)

ORDER NUMBER	TANK SIZE	VOLUME			TOP OPENING	BASE	QTY/ CTN
		CU. FT.	GALLONS	LITERS			
C60844N62E01DI	8 x 44	1.13	8.48	32.10	2.5"-NPSM	Plastic	1
C60844N52E01DI	8 x 44	1.13	8.48	32.10	2.5"-NPSM	Rubber	1
C60942N62E01DI	9 x 42	1.35	10.09	38.20	2.5"-NPSM	Plastic	1
C60942N52E01DI	9 x 42	1.35	10.09	38.20	2.5"-NPSM	Rubber	1
C61040N62E01DI	10 x 40	1.59	11.86	44.90	2.5"-NPSM	Plastic	1
C61040N52E01DI	10 x 40	1.59	11.86	44.90	2.5"-NPSM	Rubber	1
C61252N52E77DI	12 x 52	3.43	25.63	97.00	4.5"-8 Buttress	Rubber	1
C61447N52E77DI	14 x 47	3.64	27.21	103.00	4.5"-8 Buttress	Rubber	1

All above tanks include Rubber Bumper Band

ORDER NUMBER	TANK SIZE	VOLUME			TOP & BOTTOM OPENING	BASE	QTY/ CTN
		CU. FT.	GALLONS	LITERS			
C63672NP[----] [Inches of clearance at bottom of tank]	36 x 72	34.28	256.27	970	6" Flange	Pipe	1

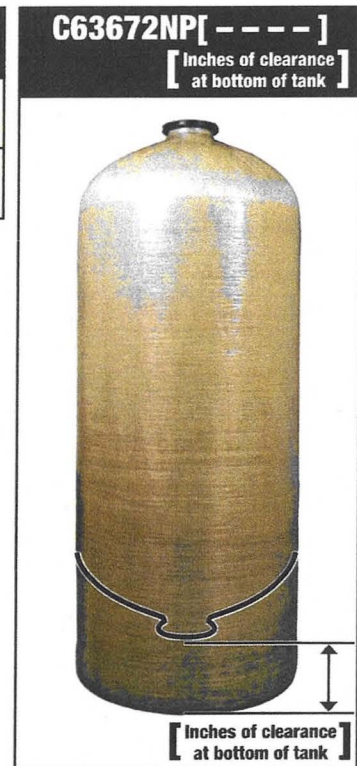
ORDER NUMBER	DESCRIPTION	QTY/ CTN
DKSTSF3	DKSTSF3 KSH Distributor Assembly 3" FNPT	1
DKSHL36FBM3T	BMHL 36 KSH Distributor Assembly Flange Bottom Mount 3" FNPT Thread	1



DKSTSF3 KSH Distributor Assembly 3" FNPT (6" Flange x 3" FNPT x 3" FNPT Adapter Included)



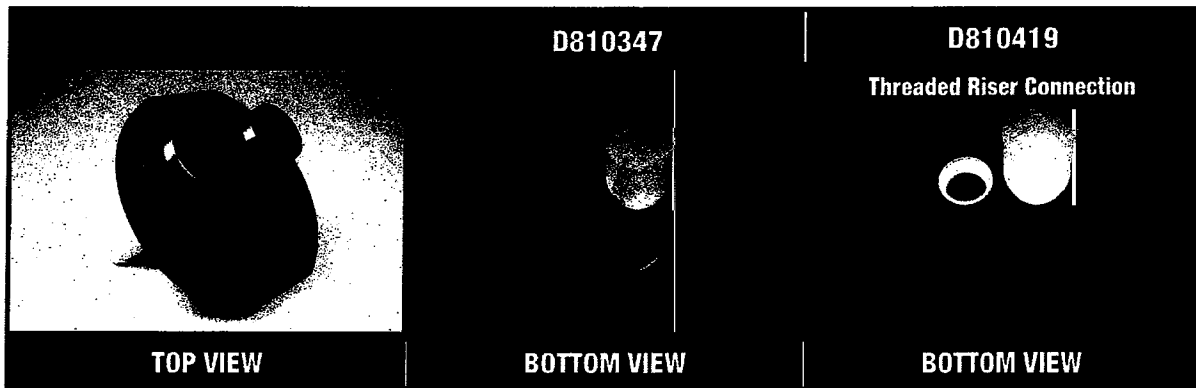
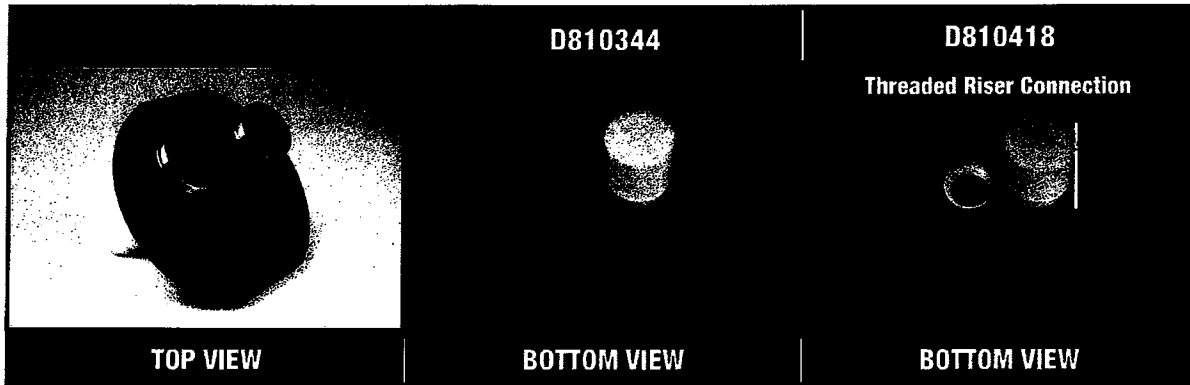
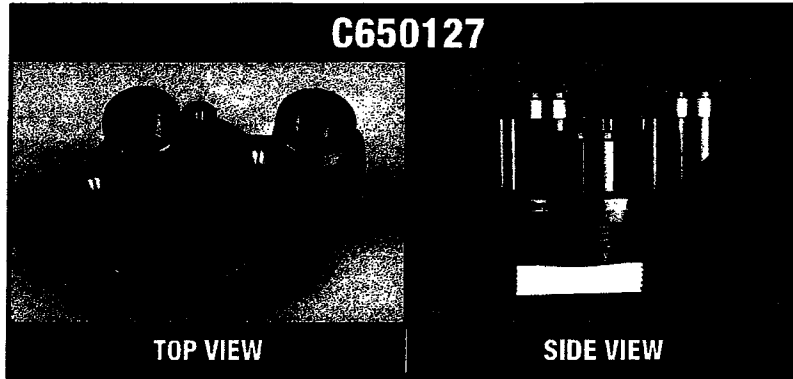
BMHL 36 KSH Distributor Assembly Flange Bottom Mount 3" FNPT Thread



36 x 72 Jumbo Tank

DI In/Out Heads with Upper Distributors

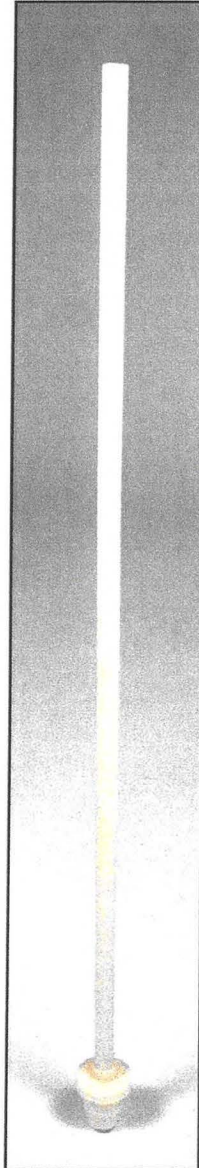
(All In/Out Connections include Stainless Steel Reinforcing rings)



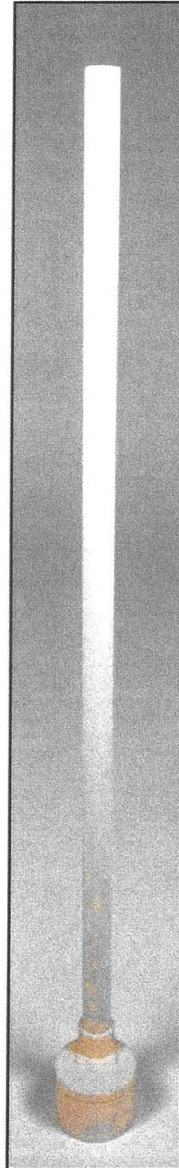
ORDER NUMBER	DESCRIPTION	FILL PORT	RISER PIPE SIZE	RISER CONNECTION	TANK OPENING
C650127	DI Head 2.5 NPSM 3/4" In x 3/4" Out	3/4" w/ Plug	0.84" OD	O-ring	2.5"
D810344	DI Head 4.5 Buttress 1" In x 1" Out x 1" Fill Port	1" No Plug	1.320" OD	O-ring	4.5"
D810418	DI Head 4.5 Buttress 1" In x 1" Out x 1" Fill Port	1" No Plug	1.320" OD	Threaded	4.5"
D810347	DI Head 4.5 Buttress 1" In x 1" Out x 1-3/4" Fill Port	1-3/4" w/Plug	1.320" OD	O-ring	4.5"
D810419	DI Head 4.5 Buttress 1" In x 1" Out x 1-3/4" Fill Port	1-3/4" w/Plug	1.320" OD	Threaded	4.5"

DI Distributor Assemblies

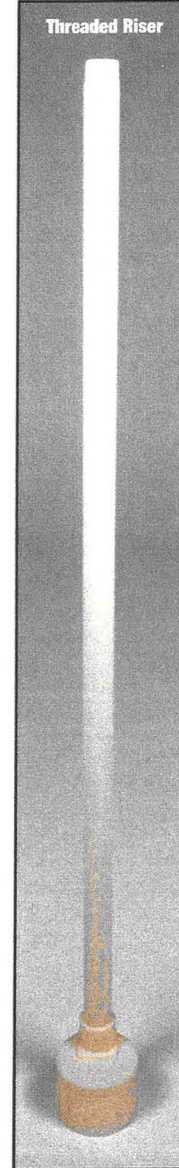
D884-[XXXX]WC
[TANK SIZE]



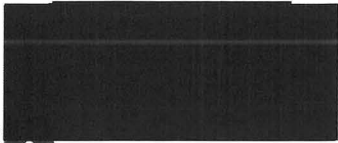
D81320-[XXXX]WC
[TANK SIZE]



D81320THD-[XXXX]WC
[TANK SIZE]



ORDER NUMBER	DESCRIPTION	TANK SIZE
D884-0844WC	931-0844WC DI Distributor Assembly 0.84"	8x44
D884-0942WC	931-0942WC DI Distributor Assembly 0.84"	9x42
D884-1040WC	931-1040WC DI Distributor Assembly 0.84"	10x40
D81320-1252WC	960-1252WC DI Distributor Assembly 1.320"	12x52
D81320THD-1252WC	960-1252WC DI Distributor Assembly Threaded 1.320"	12x52
D81320-1447WC	960-1447WC DI Distributor Assembly 1.320"	14x47
D81320THD-1447WC	960-1447WC DI Distributor Assembly Threaded 1.320"	14x47



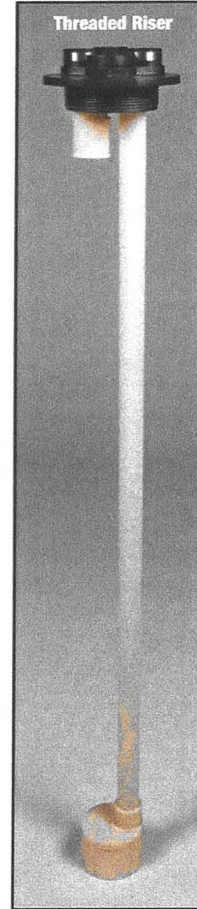
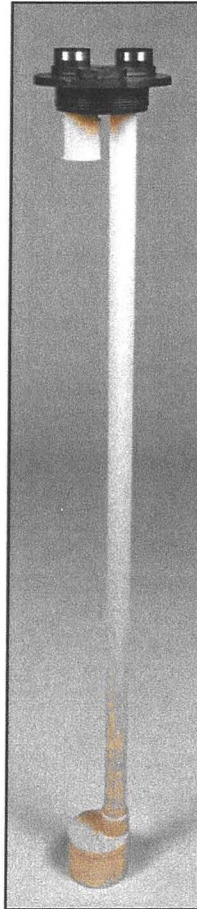
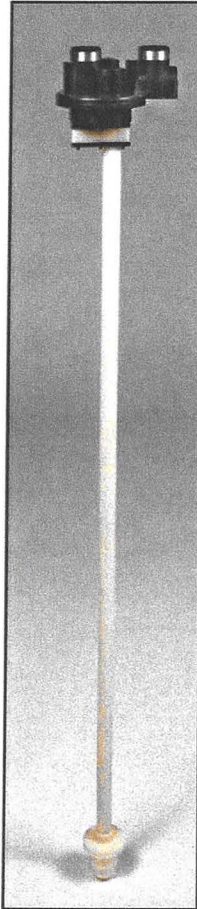
DI In/Out Heads with Distributor Assemblies

OFFICIAL COPY

**D850127-[XXXX]WC
[TANK SIZE]**

**D810344-[XXXX]WC
D810347-[XXXX]WC
[TANK SIZE]**

**D810418-[XXXX]WC
D810419-[XXXX]WC
[TANK SIZE]**




Apr 23 2024

ORDER NUMBER	DESCRIPTION	FILL PORT	RISER CONNECTION	TANK OPENING	TANK SIZE
D850127-0844WC	DI Head 3/4"x3/4" Assembly w/Riser	3/4" w/Plug	O-ring	2.5"	8x44
D850127-0942WC	DI Head 3/4"x3/4" Assembly w/Riser	3/4" w/Plug	O-ring	2.5"	9x42
D850127-1040WC	DI Head 3/4"x3/4" Assembly w/Riser	3/4" w/Plug	O-ring	2.5"	10x40
D810344-1252WC	DI Head 1"x1"x1" Assembly w/Riser	1" No Plug	O-ring	4.5"	12x52
D810418-1252WC	DI Head 1"x1"x1" Assembly w/ Threaded Riser	1" No Plug	Threaded	4.5"	12x52
D810347-1252WC	DI Head 1"x1"x1-3/4" Assembly w/Riser	1-3/4" w/Plug	O-ring	4.5"	12x52
D810419-1252WC	DI Head 1"x1"x1-3/4" Assembly w/ Threaded Riser	1-3/4" w/Plug	Threaded	4.5"	12x52
D810344-1447WC	DI Head 1"x1"x1" Assembly w/Riser	1" No Plug	O-ring	4.5"	14x47
D810418-1447WC	DI Head 1"x1"x1" Assembly w/ Threaded Riser	1" No Plug	Threaded	4.5"	14x47
D810347-1447WC	DI Head 1"x1"x1-3/4" Assembly w/Riser	1-3/4" w/Plug	O-ring	4.5"	14x47
D810419-1447WC	DI Head 1"x1"x1-3/4" Assembly w/ Threaded Riser	1-3/4" w/Plug	Threaded	4.5"	14x47

DI Quick Disconnect Kits

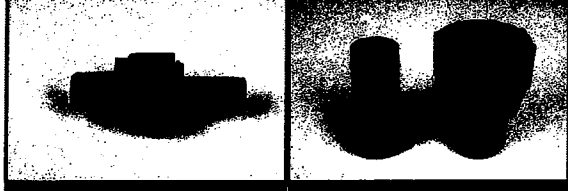
C650138



ASSEMBLED **UNASSEMBLED**

Quick Disconnect Kit w/3/4" Male Adapter and Union Hose Barb

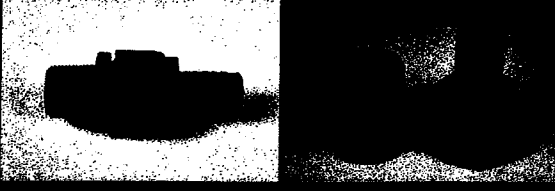
C650142



ASSEMBLED **UNASSEMBLED**

Quick Disconnect Kit w/3/4" Hose Barb and Union Male Adapter

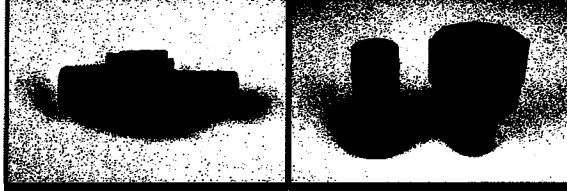
C650136



ASSEMBLED **UNASSEMBLED**

Quick Disconnect Kit w/1" Male Adapter and Union Hose Barb

C650140

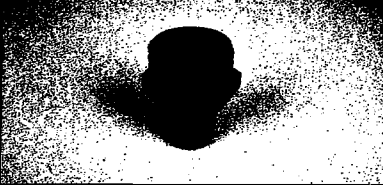


ASSEMBLED **UNASSEMBLED**

Quick Disconnect Kit w/1" Hose Barb and Union Male Adapter

DI Quick Disconnect Fittings

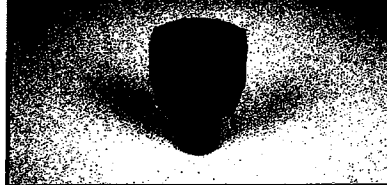
C6MA75 - 3/4" Male Adapter
C6MA100 - 1" Male Adapter




C6HB75 - 3/4" Hose Barb
C6HB100 - 1" Hose Barb



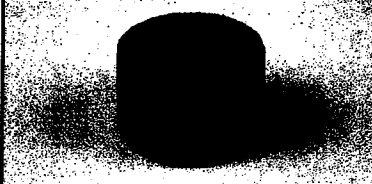
C6UMA75 - 3/4" Union Male Adapter
C6UMA100 - 1" Union Male Adapter



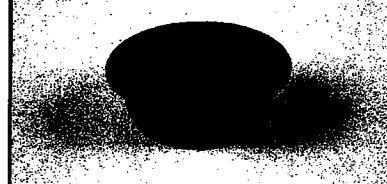
C6UHB75 - 3/4" Union Hose Barb
C6UHB100 - 1" Union Hose Barb



C6CAP-MA - Dust Cap for Male Adapter



C6PLUG-UN - Dust Plug for Union





Corporate Headquarters

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Phone: (608) 846-3010

FAX: (800) 755-3010

FAX: (608) 846-2586

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West Coast Distribution Center

14067 Stage Rd., Santa Fe Springs, CA 90670

Phone: (562) 407-1702

FAX: (562) 407-1704

**DI Exchange Tanks, Heads and Fittings are Manufactured by:
Wave Cyber Co., Ltd.**

DI Exchange Tanks

DI Exchange Tanks are now available from 8" through 14" in diameter, along with 36 x 72 Jumbo DI Tank. All tanks are natural in color.


DI Exchange Tanks are equipped with either a heavy duty rubber base or plastic base and rubber bumper. See chart below for tank and base options. The protection bumper wraps over the dome/side wall transition providing superior dome protection during handling. The polyethylene (HDPE) liner is surface treated to ensure complete adhesion of the resin/glass matrix with the HDPE liner. The liner is also wound with an extra helical winding layer to provide a robust construction for protection against frequent loading and unloading of the tank during transportation. Is a perfect tank selection for portable DI application.

ORDER NUMBER	TANK SIZE	VOLUME			TOP OPENING	BASE	QTY/CTN
		CU. FT.	GALLONS	LITERS			
C60844N62E01DI	8 x 44	1.13	8.48	32.10	2.5"-NPSM	Plastic	1
C60844N52E01DI	8 x 44	1.13	8.48	32.10	2.5"-NPSM	Rubber	1
C60942N62E01DI	9 x 42	1.35	10.09	38.20	2.5"-NPSM	Plastic	1
C60942N52E01DI	9 x 42	1.35	10.09	38.20	2.5"-NPSM	Rubber	1
C61040N62E01DI	10 x 40	1.59	11.86	44.90	2.5"-NPSM	Plastic	1
C61040N52E01DI	10 x 40	1.59	11.86	44.90	2.5"-NPSM	Rubber	1
C61252N52E77DI	12 x 52	3.43	25.63	97.00	4.5"-8 Buttress	Rubber	1
C61447N52E77DI	14 x 47	3.64	27.21	103.00	4.5"-8 Buttress	Rubber	1

All above tanks include Rubber Bumper Band

ORDER NUMBER	TANK SIZE	VOLUME			TOP & BOTTOM OPENING	BASE	QTY/CTN
		CU. FT.	GALLONS	LITERS			
C63657NP[-----]	36 x 57	28.76	215.1	814	6" Flange	Pipe	1
C63672NP[-----]	36 x 72	34.28	256.27	970	6" Flange	Pipe	1
C64263NP[-----]	42 x 63	45.0	336.6	1274	6" Flange	Pipe	1
C64272NP[-----]	42 x 72	52.8	394.7	1494	6" Flange	Pipe	1

[Inches of clearance at bottom of tank]



C63657NP[-----]
C63672NP[-----]
C64263NP[-----]
C64272NP[-----]

[Inches of clearance at bottom of tank]

36 x 57 Jumbo Tank
 36 x 72 Jumbo Tank
 42 x 63 Jumbo Tank
 42 x 72 Jumbo Tank

[Inches of clearance at bottom of tank]



Design Specifications
 Flow Rate at 10 gpm/ft² 62 gpm
 Nominal Clean-Bed Pressure Drop 4.0 psid
 Pressure Range 35 – 125 psig
 Temperature Range 35 – 120° F
 Total Suspended Solids ≤ 30 mg/L

System Components
 Media Vessel (qty) Size (2) 24" x 65"
 Media Vessel Construction Wrapped Polyethylene
 Empty Bed Volume 13.4 ft³
 Media Type Macrolite® RX
 Media Volume (per tank) 5 ft³
 Under Bedding Weight (per tank) 250 pounds
 Total Bed Depth 19"
 Free Board 31"
 Riser Tube 2.0" PVC
 Upper Distributor 0.012" Slots, Engineered Plastic Material
 Lower Distributor 0.012" Slots, Polyethylene Hub and Laterals
 Backwash Control 7-Day Controller
 Backwash Type Countercurrent
 Unfiltered Water By-pass During Backwash No
 Water Used for Backwash Filtered Water

Connections
 Inlet / Outlet Connections E-Clip Adapter
 Drain Connection E-Clip Adapter
 Power, Valve None
 Power, Control Box 12 VDC

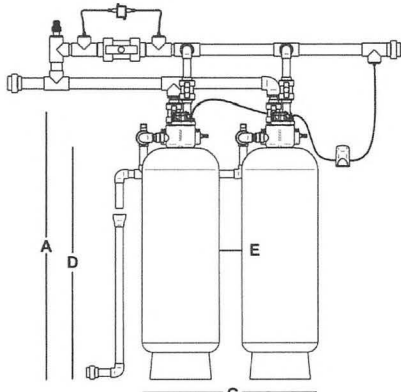
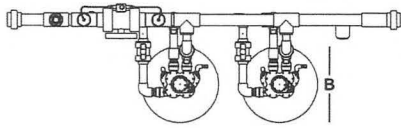
Part Numbers
 System (quantity) (2) H12280
 Controls See Smart Start Controller Data Sheet

Backwash Specifications (per tank)
 Sequence Flow Time Volume
 Backwash 25 gpm 12 minutes 300 gallons
 Settle N/A 1.5 minutes N/A
 Purge 25 gpm 4 minutes 100 gallons
 Total N/A 17.5 minutes 409 gallons

Dimensions and Weight
 System
 Overall Height (A) 78.0"
 Overall Depth (B) 24"
 Overall Width (C) 52"
 Tank Height (D) 66.5"
 Inter-Tank Spacing (E) 4"
 Shipping Weight 1,429 pounds
 Operating Weight 2,233 pounds

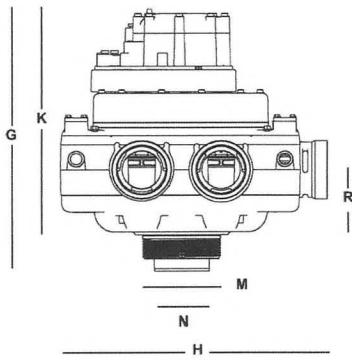
EXHIBITS 4 THRU 6
 W1300Sub98

HF 224m OD Macrolite® Filter

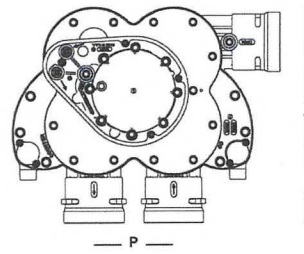
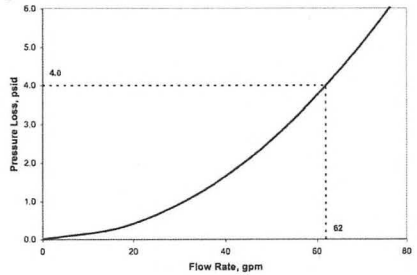


Valve

Overall Height	(G)	13.25"
Overall Width	(H)	14"
Overall Depth	(J)	11"
Installed Height	(K)	11.5"
Tank Thread	(M)	4-8 UN
Riser Tube (OD)	(N)	2.8"
Inlet/Outlet Centerline	(P)	4.06"
Inlet/Outlet/Drain Center Installed Height	(R)	3.34"
Valve Weight		14.3 pounds



System Flow Performance



 **HYDRUS HF 224m OD Macrolite® Filter****Operating Profile**

The filter shall remove suspended solids to a nominal rating of 5 micron. Ceramic based non-consumable media shall be used for the filtration process. The system shall provide filtered water through the use of a multiplex configuration. System backwashes shall be initiated based on the time of day. The programmable timer shall allow backwashes to be programmed over a 7-day period.

Backwash Control Valve

The backwash control valve shall be top mounted (top of media tank), and manufactured from non-corrosive materials. Control valve shall not weight more than 15 lbs. Control valve shall operate using a minimum outlet pressure of 25 psi. Pressure shall be used to drive all valve functions. Control valve shall incorporate three operational cycles including; service, backwash, and purge. Service cycle shall operate in a downflow direction. The backwash cycle shall be upflow and purge shall be downflow. Control valve shall contain a backwash flow control.

Media Tanks

The tanks shall be designed for a maximum working pressure of 125 psi and hydrostatically tested at 300 psi. Tanks shall be made of polypropylene and reinforced with a fiberglass wrapping. Tank shall have a 4" threaded top opening. Tank shall be NSF approved. Upper diffuser system shall be of a slot design. Lower distribution system shall be of hub and lateral design. Distribution system shall provide even distribution of backwash water and the collection of processed water.

Filtering Media

Each system shall use ceramic based filter media capability of operating in an average service flow of 10 gpm per square foot of media. The media shall be solid and of a proper particle size, 40-70 mesh. Backwash shall produce a minimum of 50% bed expansion at a nominal flow rate of 8 gpm per square foot of media.

PRODUCT SPECIFICATION SHEET

W1300Sub98

RSM-50-HP

HYBRID

**RADIUM SELECTIVE
HYBRID STRONG BASE ANION
SODIUM FORM**

ResinTech RSM-50-HP is a sodium form macroporous highly cross-linked hybrid strong acid cation resin. It is WQAGold Seal Certified for use in potable water applications. Barium sulfate is monoatomically dispersed into the polymer resulting in a very long throughput capacity for radium on a one-time basis. RSM-50-HP is intended for radium removal from otherwise potable waters that contain modest concentrations of sulfate and neutral pH.

APPLICATIONS

- Radium Removal



C US

TYPICAL PROPERTIES & PHYSICAL CHARACTERISTICS

Polymer Matrix	Styrenic Macroporous
Ionic Form	Sodium
Functional Group	Barium Sulfate Hybrid / Sulfonic Acid
Physical Form	Spherical Beads
Particle Size	16 to 50 US Mesh (297 - 1190µm)
% < 50 mesh (300µm)	< 1%
Minimum Sphericity	90%
Uniformity Coefficient	1.6
Reversible Swelling	Na to Ca 3% to 5%
Temp Limit	250°F (121°C)
Capacity (meq/mL)	1.8
Moisture Retention	30% to 45%
Shipping Weight	54 - 56 lbs/ft ³ (865 - 897 g/L)
Color	Tan to Brown

CERTIFICATIONS

WQA Gold Seal*

PACKAGING OPTIONS

- 500 ml samples
- 1 ft³ bags
- 1 ft³ boxes
- 1 ft³ drums
- 7 ft³ drums
- 42 ft³ supersacks

* NSF/ANSI CAN 61: Drinking Water System Components - Health Effects

Revision 1.1
ResinTech, Inc.®



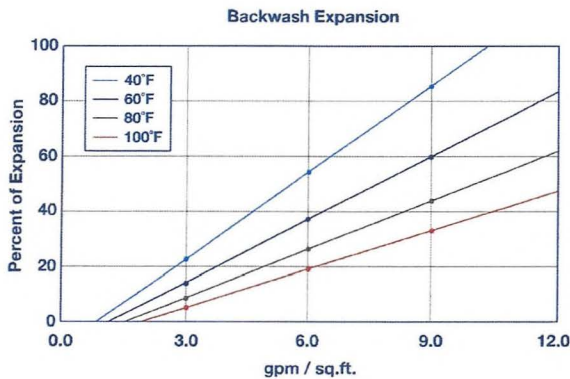
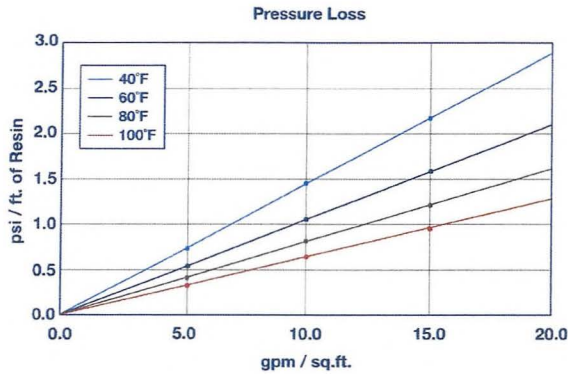
INNOVATIONS IN ION EXCHANGE

PRODUCT TECHNICAL DATA

W1300Sub98

RSM-50-HP
HYBRID

**RADIUM SELECTIVE
HYBRID STRONG BASE ANION
SODIUM FORM**



RADIUM REMOVAL

ResinTech RSM-50 HP is a specially prepared potable water grade sodium form cation exchanger with barium sulfate precipitated inside the gel phase and in the pores of the polymer. RSM-50-HP acts as a hybrid combining ion exchange and adsorbent properties. Radium ions in water are preferentially exchanged. Once inside RSM-50-HP, radium replaces barium in the barium sulfate precipitant and barium is released back onto the ion exchange groups. The hybrid properties give RSM-50-HP greatly increased life for radium removal over ordinary cation exchangers.

TYPICAL SYSTEM CONFIGURATIONS

Municipal systems may be provided with single or multiple tank systems as needed to provide the necessary flow rate. Residential systems that are infrequently monitored should include two tanks in series so that monitoring for radiation can be performed in between the worker tank and the polisher tank. In either case, it is suggested the radium removal tanks should be followed by a carbon filter to capture any radon produced as the radium adsorbed by the ResinTech RSM-50-HP continues to decay. Radium removal systems can become substantially radioactive during use. Care must be taken to limit the treatment life of the resin to ensure that radioactivity levels do not exceed thresholds for safe handling and disposal of the spent media. Spent resins and tanks should be disposed of safely according to applicable state and federal regulations.

Note: Pre-filtration for suspended solids removal is usually advisable ahead of the ResinTech RSM-50-HP system. Ion exchange resins are good filtration medias and suspended solids present in the feed water will likely be trapped within the resin bed. RSM-50-HP remains in service for months or years without regeneration, thus even a low level of suspended solids can accumulate in the resin bed over time.

SUGGESTED OPERATING CONDITIONS

Maximum continuous temperature	212°F
Sodium form	212°F
Minimum bed depth	24 inches
Backwash expansion	25 to 50 percent
Maximum pressure loss	25 psi
Operating pH range	4 to 10 SU
Service flow rate	1 to 10 gpm/cu.ft.

Application Note: Certain waters with influent sulfate concentrations of less than 20 ppm have been found to cause barium to leach out the resin above the current maximum contaminant level (MCL) of 2 ppm. For these waters, a special version of RSM-50-HP is required to minimize this leaching. Please consult the ResinTech sales or technical support team for additional information.

Note: These guidelines describe average low risk operating conditions. They are not intended to be absolute minimums or maximums. For operation outside these guidelines, contact ResinTech Technical Support

Revision 1.1
ResinTech, Inc.®



Clack Filter-Ag Plus® is a clinoptilolite natural media with a large surface area and microporous structure, which can be used as a highly efficient filter media for the reduction of suspended matter.

Filter-Ag Plus®

ADVANTAGES

- Deep bed filtration results in superior water quality and reduces the load on downstream equipment.
- High sediment removal capacity results in longer filter runs, with a substantial savings in backwash water and time out of service.
- High service flow rates result in lower equipment costs and a savings in space.
- Reduced shipping cost due to lighter weight/cu.ft.
- Replacement of multimedia with Filter-Ag Plus in existing installations may increase filter capacity.
- Filter-Ag Plus is an all-natural, environmentally safe product.

PHYSICAL PROPERTIES

- Color: White to off white
- Dry Bulk Density: 50 lbs/cu.ft
- Specific Gravity: 2.2 g/cc
- Mesh Size: 14x30
- Effective Size: 0.55mm
- Uniformity Coefficient: 1.8
- Hardness: 4-5 (Mohs Scale)

CONDITIONS FOR OPERATION

- Water pH: Wide range
- Max. Water Temp.: 140°F/60°C
- Bed Depth: 24"-48" (36" for optimal filtration)
- Freeboard: 50% of bed depth
- Backwash Flow Rate: 14-18 gpm/sq.ft.
- Backwash Bed Expansion: 30-40% of bed depth
- Service Flow Rate: 12-20 gpm/sq.ft.
- Influent water quality and effluent requirements may affect operating parameters
- A gravel support bed is required
- Allow bed to saturate before initial backwash

Clack Filter-Ag Plus is a unique natural ore called clinoptilolite that has many outstanding advantages over common granular filter sands and multimedia used for suspended solids reduction. Viewed under an electron scanning microscope, the granules reveal an angular shape, rough surface and microporous void spaces as small as 3 microns. This creates a surface area over 100 times greater than silica sand. The angularity of the granules and the tapered internal pore spaces allow for reduction of dirt, silt and organic matter suspended in water by bridging, straining and adhesion. The rough surface and internal porosity provide a high surface area for efficient reduction of suspended matter. Utilizing deep bed filtration can typically reduce suspended solids down to the 5 micron or less range. Filter-Ag Plus' structure typically creates less pressure loss through the filter and allows deeper sediment penetration into the bed for higher sediment loading and longer filter runs. The deep bed filtration capacity of Filter-Ag Plus prevents a rapid buildup of head loss and blinding problems that are associated with typical sand filters. The longer filter run times reduce backwash frequency, which provides conservation of water. This ideal combination of particle shape, texture and porosity make it a good choice where quality water filtration and

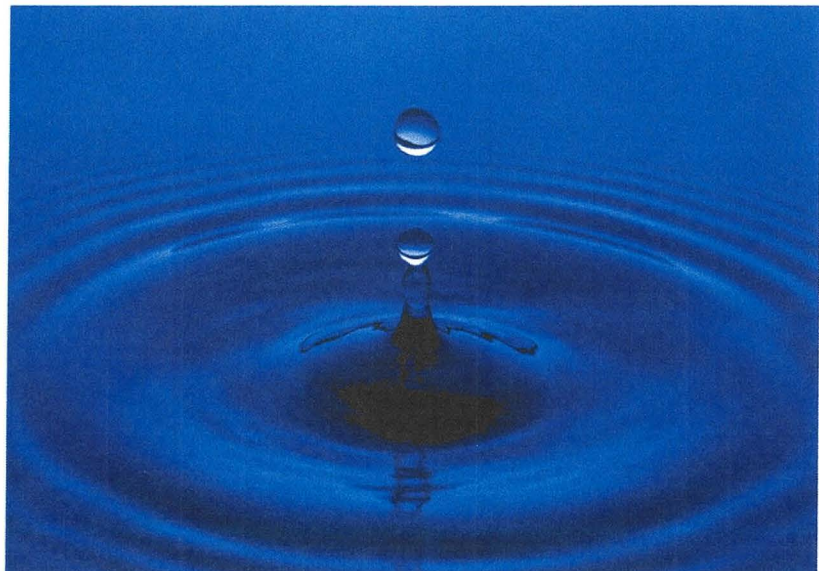
water conservation are important.

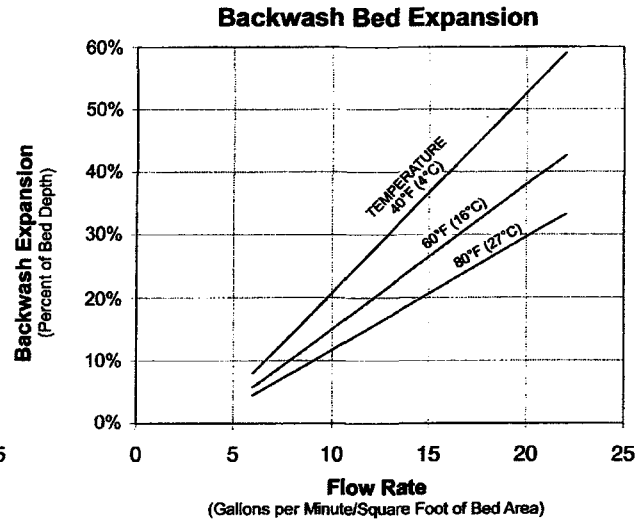
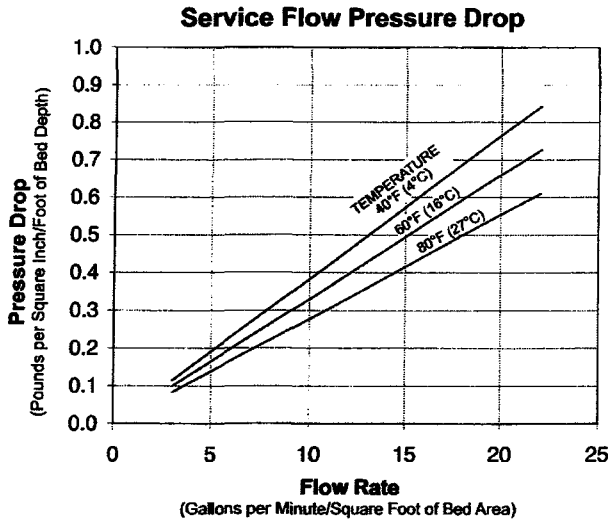
Substantial savings can be realized when designing a system using Clack Filter-Ag Plus. Its low pressure drop, high service flow rates and high bed loadings combined with lower backwash frequency allow economy in equipment downsizing and reduced pumping requirements. Its low density also saves on handling expense and shipping costs.

Clack Filter-Ag Plus can be applied to systems designed for either pressure or gravity flow. Because of its unique physical characteristics, Filter-Ag Plus can be used to replace multimedia (graded density) filter designs.

Air scour is possible and helpful when there is heavy loading in the bed. It has to be done minimally in order to prevent too much bed lift and/or advanced attrition.

An air scour of 1 to 2 cfm/ft² at backwash rates of 15 to 20 gpm/ft² would be sufficient. The pressure required would be static head pressure plus the psi necessary to deliver 1 to 2 cfm/ft². Bed expansion should be observed to ensure that media is not being discharged in the back wash water. A one minute air scour at the beginning of the backwash cycle should be sufficient. Prolonged air scour may cause stratification of the smaller media to the top of the bed which could affect future head loss.





Certified to NSF/ANSI Standard 61

ORDER INFORMATION

Part No.	Description	Cu. Ft./Bag	Wt./Cu. Ft.*	Bags/Pallet	Weight/Pallet	Pallet Dimensions
A8023	Filter-Ag Plus®	1	50 lbs.	40	2050 lbs.	40" x 48" x 44"

*Weight per cubic foot is approximate.

The information and recommendations in this publication are based on data we believe to be reliable. They are offered in good faith, but do not imply any warranty or performance guarantee, as conditions and methods of use of our products are beyond our control. As such, Clack makes no express or implied warranties of any kind with respect to this product, including but not limited to any implied warranty of merchantability or fitness for a particular purpose. We recommend that the user determine whether the products and the information given are appropriate, and the suitability and performance of our products are appropriate, by testing with its own equipment. Specifications are subject to change without notice.

The information and recommendations given in this publication should not be understood as recommending the use of our products in violation of any patent or as a license to use any patents of the Clack Corporation.

The filter medias listed in this brochure do not remove or kill bacteria. Do not use with water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system.

Clack will not be liable under any circumstance for consequential or incidental damages, including but not limited to, lost profits resulting from the use of our products.

CALIFORNIA PROPOSITION 65 WARNING: This product contains crystalline silica which is known to the State of California to cause cancer and other substances which are known to the State of California to cause cancer, birth defects and reproductive harm.



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Clack Corporation

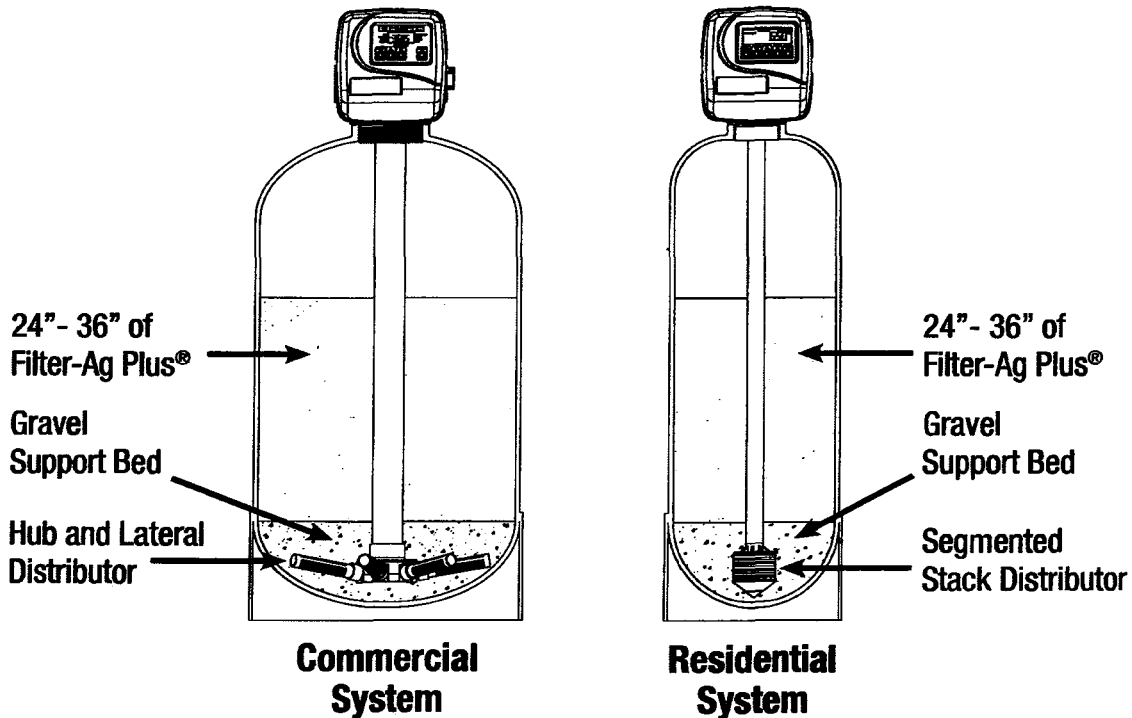
4462 DURAFORM LANE • WINDSOR, WISCONSIN 53598-9716 USA
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Form No. 2718 • 4/28/2015

Filter-Ag Plus®

ENHANCED PERFORMANCE FILTRATION MEDIA

Installation Recommendations



Before putting Filter-Ag Plus® filter into service follow these recommended instructions or contact the original equipment supplier

Slowly fill tank with filter valve in the backwash position until water flows to drain.

Backwash at 15 to 20 gpm/sq.ft. for 5 minutes.

Let material settle for 5 minutes.

Repeat backwash and settle steps for a total of 3 times.

Put the filter to service.

Important Note: For best results allow Filter-Ag Plus® to sit submerged in water for a minimum of 12 hours prior to following the above procedure and prior to putting the filter to service. A gravel support bed is required.

PROJECT: _____	UNIT TAG: _____	QUANTITY: _____
REPRESENTATIVE: _____	TYPE OF SERVICE: _____	DATE: _____
ENGINEER: _____	SUBMITTED BY: _____	DATE: _____
CONTRACTOR: _____	APPROVED BY: _____	DATE: _____
	ORDER NO.: _____	DATE: _____

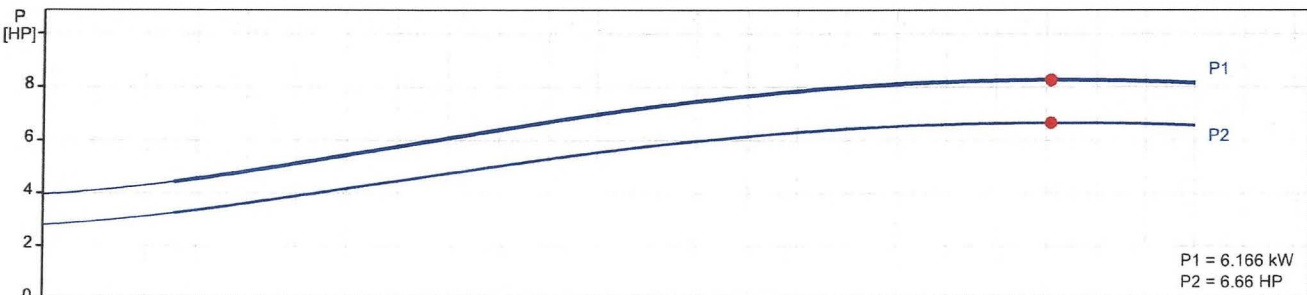
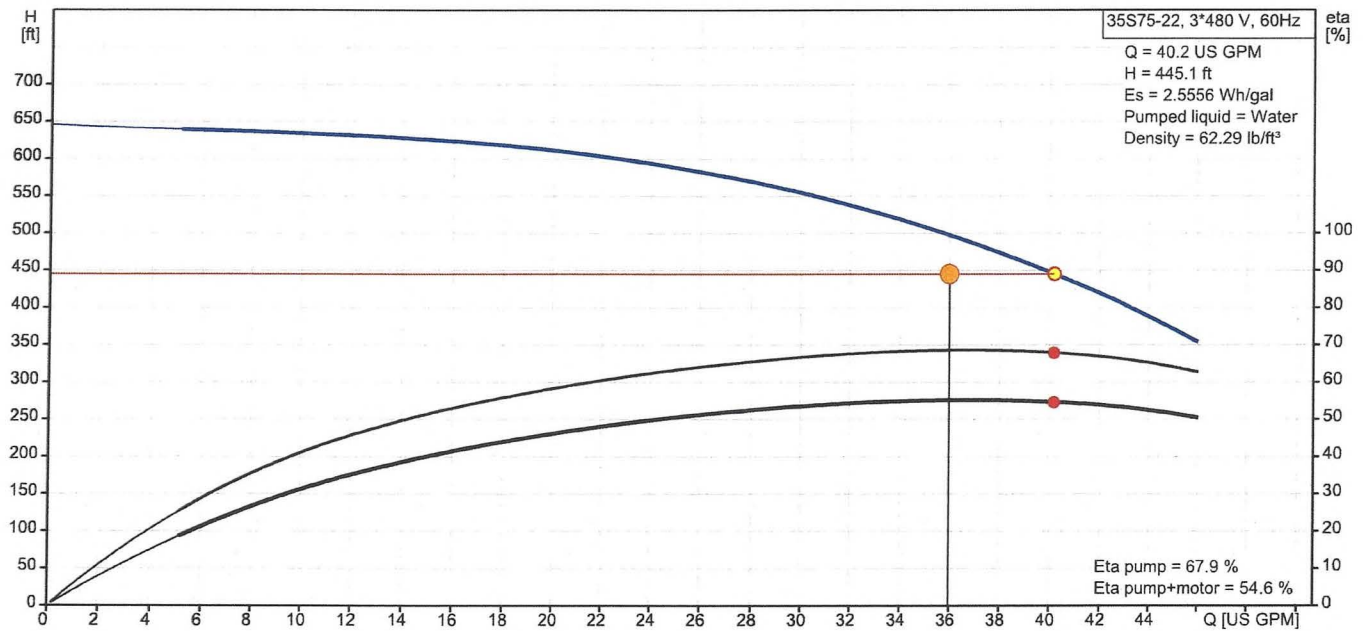


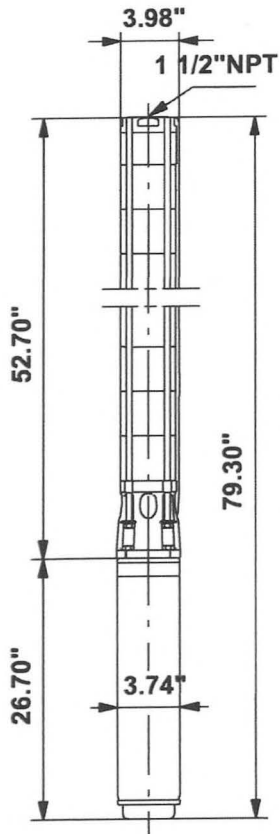
35S75-22

Submersible pumps in stainless steel. EN 1.4301 (AISI 304). EN 1.4401 (AISI 316). EN 1.4539 (AISI 904L). Typical application: Ground water, Irrigation, Mining, Fountain, Off-shore etc.

Note! Product picture may differ from actual product

Conditions of Service		Pump Data		Motor Data	
Flow:	40.2 US GPM	Approvals:	CE,EAC,CSA	Rated power - P2:	7.5 HP
Head:	445.1 ft	Product number:	98924564	Rated voltage:	440-460 V
Efficiency:	54.6 %			Mains frequency:	60 Hz
Liquid:	Water			Enclosure class:	IP68
				Insulation class:	F
				Motor protection:	NONE
				Thermal protection:	external
				Motor type:	MS4000





Materials:

Impeller: Stainless steel

Impeller: AISI 304

Impeller: EN 1.4301

Motor: Stainless steel

Motor: DIN W.-Nr. 1.4301

Motor: AISI 304



Company name:

W1300Sub98

Created by:

EXHIBITS 4 THRU 6

Phone:

Date:

19/07/2023

Qty. Description

1

35S75-22



Note! Product picture may differ from actual product

Product No.: 98924564

Multi-stage submersible pump for raw water supply, groundwater lowering and pressure boosting. The pump is suitable for pumping clean, thin, non-aggressive liquids without solid particles or fibres.

The motor is a 3-phase motor with sand shield, liquid-lubricated bearings and pressure equalizing diaphragm.

Liquid:

Pumped liquid: Water
Maximum liquid temperature: 104 °F

Technical:

Pump speed on which pump data are based: 3450 rpm
Actual calculated flow: 40.2 US GPM
Resulting head of the pump: 445.1 ft
Actual impeller diameter: 2.88 in
Shaft seal for motor: HM/CER
Approvals: CE, EAC, CSA
Curve tolerance: ISO9906:2012 3B
Motor version: T40

Materials:

Pump: Stainless steel
EN 1.4301
AISI 304
Impeller: Stainless steel
EN 1.4301
AISI 304
Motor: Stainless steel
DIN W.-Nr. 1.4301
AISI 304

Installation:

Maximum ambient pressure: 870.23 psi
Pump outlet: 1 1/2"NPT
Motor diameter: 4 inch

Electrical data:

Motor type: MS4000
Rated power - P2: 7.5 HP
Mains frequency: 60 Hz
Rated voltage: 3 x 440-460 V
Service factor: 1.15
Rated current: 12.8-12.6 A
Starting current: 570-620 %
Cos phi - power factor: 0.87-0.82
Rated speed: 3440-3460 rpm
Enclosure class (IEC 34-5): IP68
Insulation class (IEC 85): F
Built-in temp. transmitter: yes
Motor No: 96405814
Windings: Enamelled

Others:



Company name:

W1300Sub98

Created by:

Phone:

EXHIBITS 4 THRU 6

Date:

19/07/2023

Qty. Description

1	DOE Pump Energy Index CL:	0.87
	ErP status:	EuP Standalone/Prod.
	Net weight:	95 lb
	Gross weight:	170 lb
	Shipping volume:	9.32 ft ³
	Country of origin:	US
	Custom tariff no.:	8413.70.2004

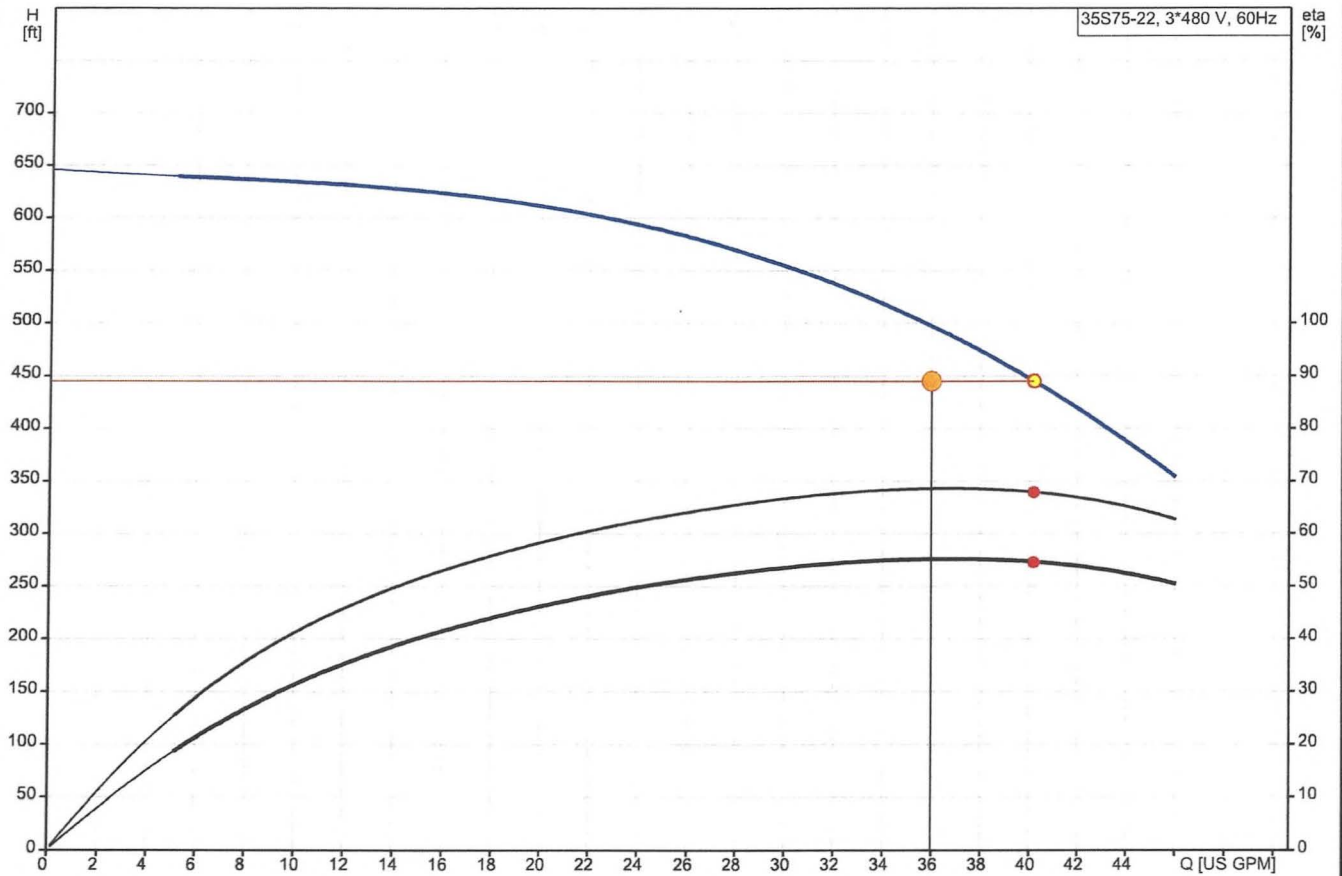


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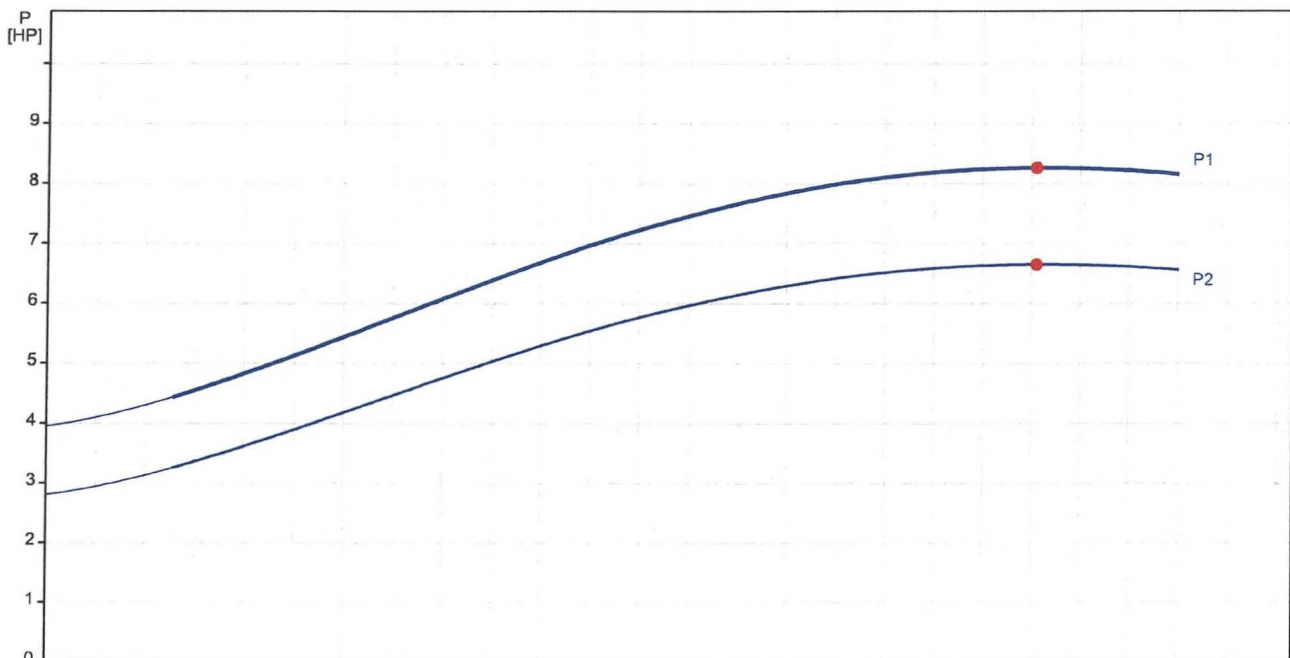
W1300Sub98
EXHIBITS 4 THRU 6

Date: 19/07/2023

98924564 35S75-22 60 Hz



Q = 40.2 US GPM H = 445.1 ft
Es = 2.5556 Wh/gal Pumped liquid = Water
Density = 62.29 lb/ft³ Eta pump = 67.9 %
Eta pump+motor = 54.6 %



P1 = 6.166 kW
P2 = 6.66 HP



Company name:

Created by:

Phone:

Date:

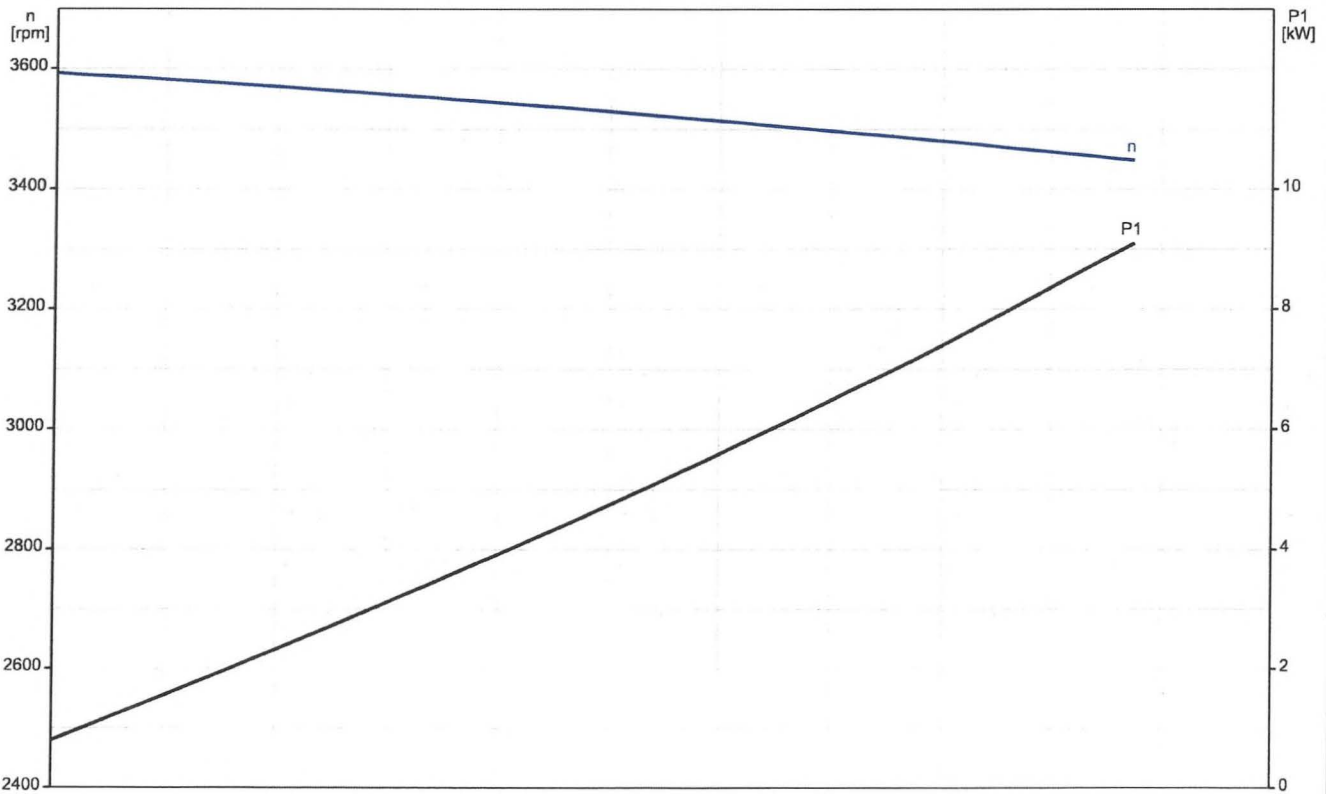
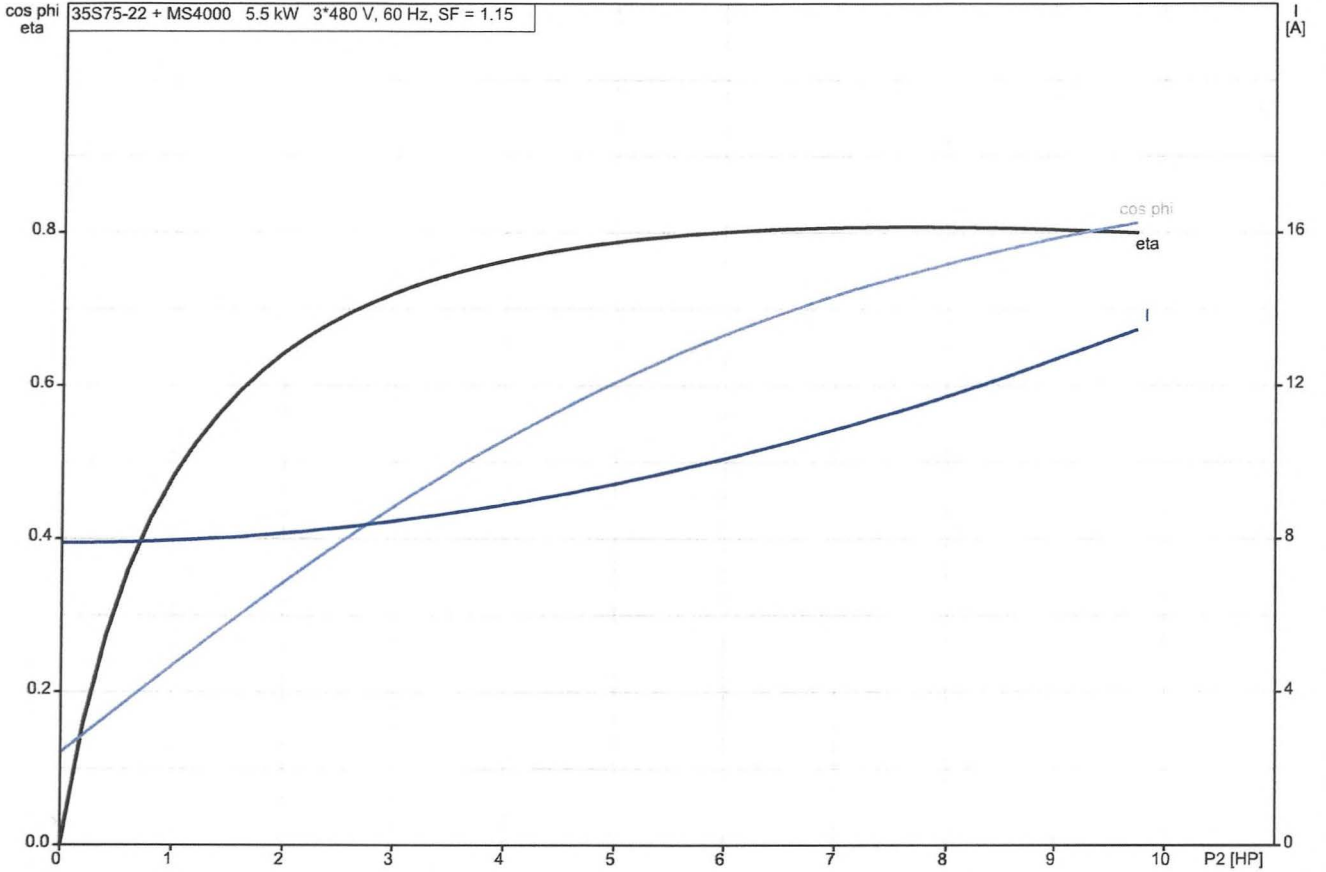
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EXHIBITS 4 THRU 6

19/07/2023

98924564 35S75-22 60 Hz

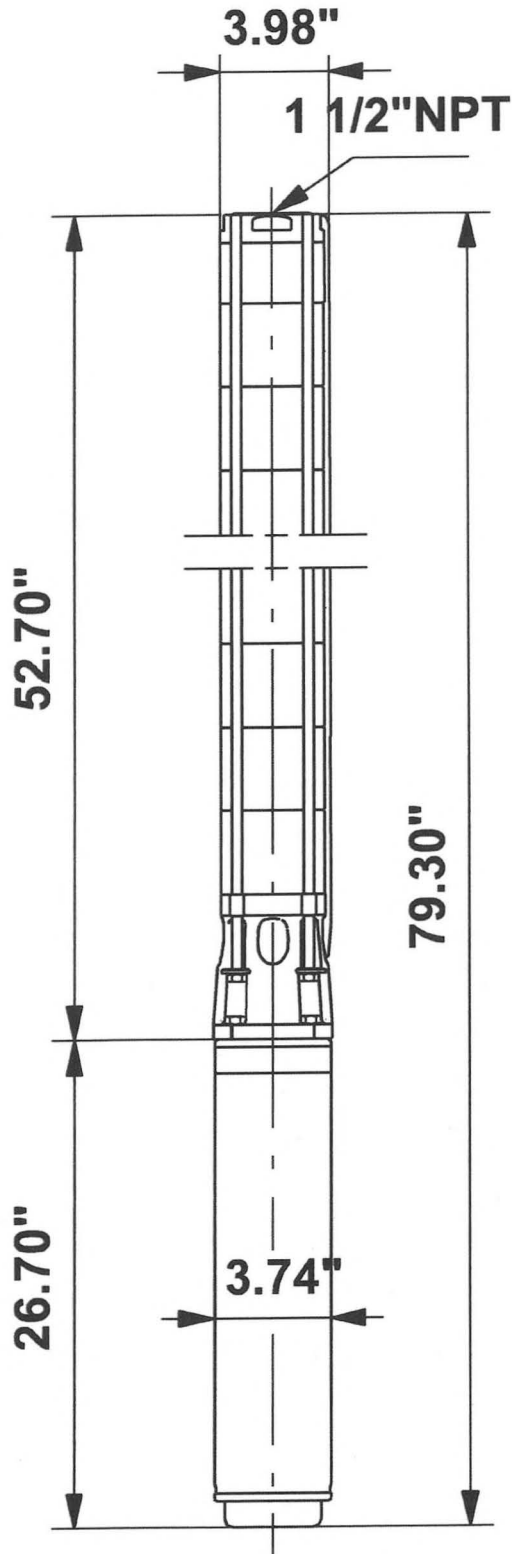
35S75-22 + MS4000 5.5 kW 3*480 V, 60 Hz, SF = 1.15



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Apr 23 2024

98924564 35S75-22 60 Hz



Note! All units are in [in] unless others are stated.
Disclaimer: This simplified dimensional drawing does not show all details.



Company name:
Created by:
Phone:

W1300Sub98
EXHIBITS 4 THRU 6

Date: 19/07/2023

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Apr 23 2024

98924564 35S75-22 60 Hz

Input

Size by Pump design
Journey Sizing
Pump design Submersible groundwater pumps

General

Select application Groundwater supply
Installation type Borehole
Installation Borehole installation, closed tank
Flow 36 US GPM
Head 445.1 ft
Evaluation criterion System price
Prefer fast delivery No

Your requirements

Variable speed Yes
Enclosure class IP20
Control mode Constant pressure, speed control
Allow fixed speed Yes
Max. water temperature 50 °F
Allowed flow oversize 30 %
Allowed flow undersize 5 %
No of duty points 1

Edit load profile

Load profile Full load
Operating days per year 365 d
Operation hours per day (low tariff) 10 h

Configuration

Pump material GG 0.6025 or 1.4301 (AISI 304)
Motor selection Grundfos standard motor

Operational conditions

Frequency 60 Hz
Phase 1 or 3
Voltage 1 x 120 or 3 x 480 V
Starting method 3 phase Direct on line
Energy price (high tariff) 0.16 USD/kWh
Energy price (medium tariff) 0.11 USD/kWh
Energy price (low tariff) 0.05 USD/kWh
Increase of energy price 6 %
CO2 emission intensity 0.489 kg/kWh
Calculation period 10 years

Life cycle cost

Do you want to make a comparison? No comparison
How detailed do you want your life cycle cost analysis? Simple LCC analysis

Pump A

Hit list settings

Include cheapest solution Yes
Max. hits per product group 5
Max. hits total 20

Load Profile

	1
Flow (%)	100
Flow (US gpm)	36
Head (%)	100
Head (ft)	445.1
P1 (kW)	5.822
Eta total (%)	51.8
Time (h/a)	3650
Energy consumption (kWh/Year)	21250
Quantity	1

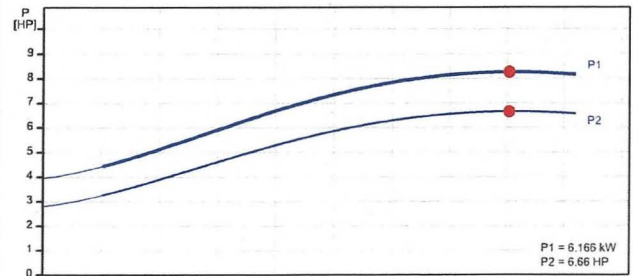
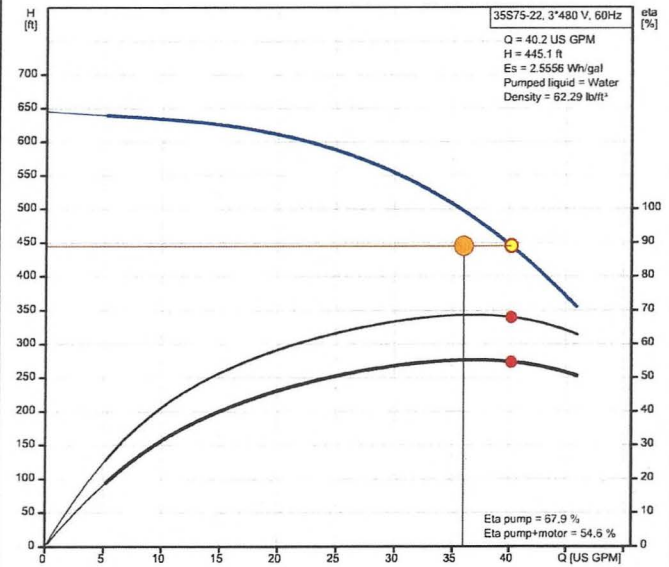
Sizing result

Type 35S75-22
Tank 204 l
Quantity * Motor 1 * 7.38 HP ,

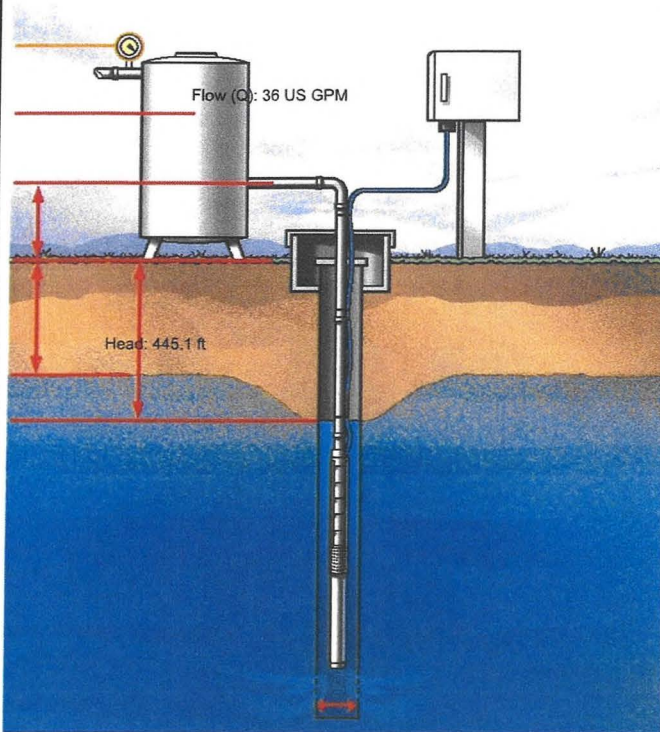
Flow 40.2 US GPM (+12%)
H total 445.1 ft
Power P1 6.166 kW
Power P2 required in the duty point 6.66 HP
Current (rated) 12.6 A
Current (actual) 10.6 A
Cos phi (actual) 0.70
Eta pump 67.9 %
Eta motor 80.5 %
Eta total 54.6 % =Eta pump * Eta motor
Flow total 7884785 US gal/year
Max.pressure 207.55 psi =during operation in the load profile

Spec. energy consumption 2.6953 kWh/1000 gal
4.55 kWh/gal/ft
Energy consumption 21250 kWh/Year
CO2 emission: 22900 lb/Year
Price On request
Life cycle cost 21058 \$ /10Years

Cable losses are not included !



Installation and Input



Sizing Results

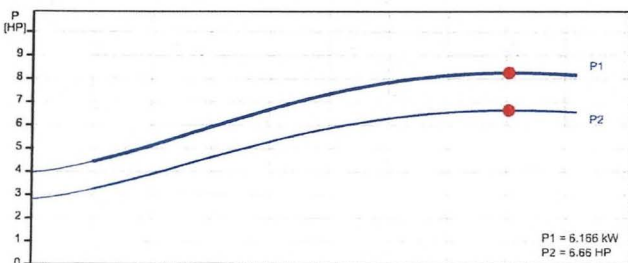
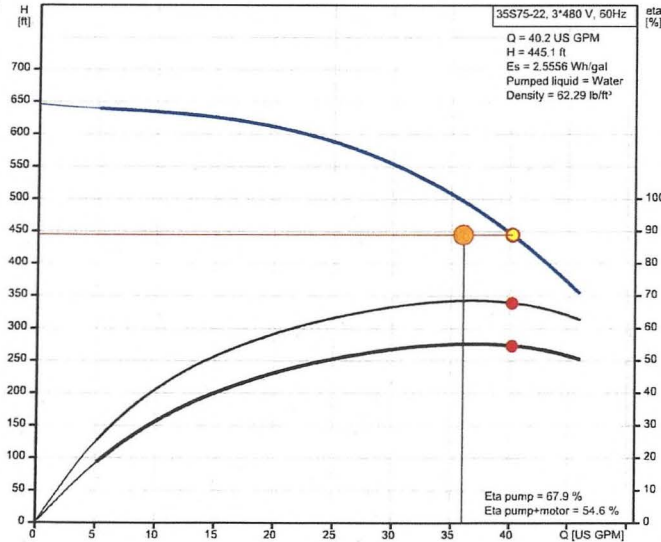
Product number:	98924564
Type:	35S75-22
Flow:	40.2 US GPM (7884785)
H total:	445.1 ft
Power P1:	6.166 kW
Power P2 required in the duty point:	6.66 HP
Eta pump:	67.9 %
Eta motor:	80.5 %
Eta total:	54.6 %
Energy consumption:	21250 kWh/Year
Spec. energy consumption:	2.6953 kWh/1000 gal (4.55 kWh/gal/ft)
Motor type:	MS4000
Phase:	3
Voltage:	440-460
Frequency:	60 Hz
Current (rated):	12.6 A
Current (actual):	10.6 A
Cos phi (actual):	0.70

Cable losses are not included !

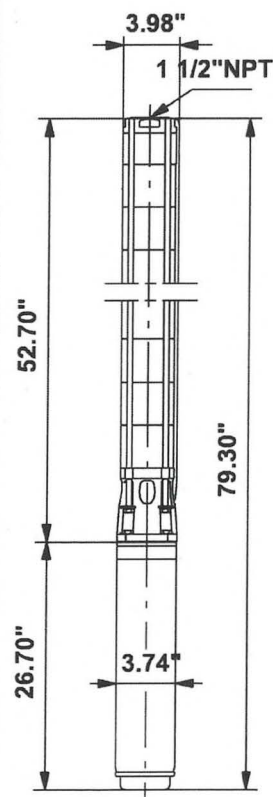
Load profile

Load profile	1
Flow (%)	100
Flow (US gpm)	36
Head (%)	100
Head (ft)	445.1
P1 (kW)	5.822
Eta total (%)	51.8
Time (h/a)	3650
Energy consumption (kWh/Year)	21250
Quantity	1

Pump Curve



Dimensional Drawing

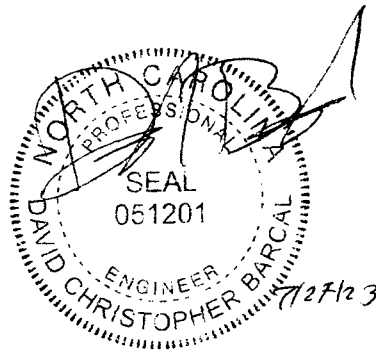


Olivet Subdivision Potable Water System Engineer's Report

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Apr 23 2024

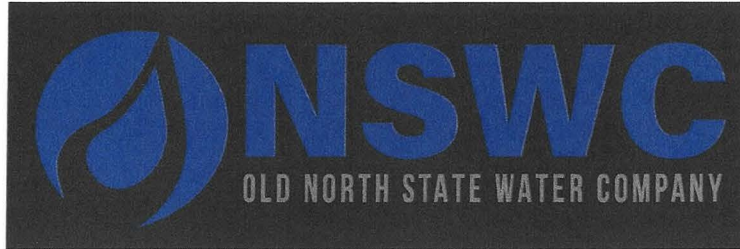
Specifications



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**OLD NORTH STATE WATER
COMPANY**

**TECHNICAL SPECIFICATIONS
FOR**

WATER MAINS

REVISED: JANUARY 29, 2009

Old North State Water Company

TECHNICAL SPECIFICATIONS FOR WATER MAINS

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SECTION W-1**POLICIES AND PROCEDURES****1. GENERAL PROVISIONS:**

A. The specifications herein are to be used by the Developers Design Engineer in the preparation of construction documents for the construction of potable water systems to be owned, operated and maintained by Old North State Water Company, LLC, herein after called Owner.

B. These specifications do not include Design Criteria required to determine the size, location, capacity, or other parameters for water mains and appurtenances. The Developers Design Engineer is advised to meet with the Owner or his designated representative prior to design to discuss and determine specific design criteria pertinent to the project.

C. Construction documents prepared by the Developers Design Engineer must be reviewed with and approved by the Owner prior to commencement of any construction. Construction documents shall be in conformance with generally accepted engineering practice, the specifications herein, and the design criteria as set forth by the Owner.

D. Construction shall be executed in accordance with the construction documents prepared by the Developers Design Engineer and as approved by the Owner. The Contractor shall be experienced in water system construction, properly licensed in the governing state, and be approved by the Owner. Any deviation from the approved construction documents must receive approval from the Design Engineer and the Owner prior to execution of the work. The Owner reserves the right to request changes to the work during construction where conditions require.

E. Prior to final acceptance of the constructed project, all required tests, inspections, as-built drawings, certifications and/or warranties must be accepted and approved by the Owner, and any agency or entity having jurisdiction over the project.

F. All construction activities are to be performed in compliance with any applicable permitting requirements and safety standards required by the Contractor to perform the work. The Contractor must comply with all Federal, State and local safety rules and regulations, including those of the Occupational Safety and Health Administration (OSHA). The Owner will not inspect for compliance with safety regulation, and disclaims any responsibility to ensure the safety of workers.

G. These Specifications are subject to change, and interested parties are advised to check with Old North State Water Company in the event there are any questions concerning the status of this document. Any updates to these Specifications will be made available by Old North State Water Company.

SECTION W-2**CONSTRUCTION SPECIFICATIONS FOR WATER MAINS****1. DESCRIPTION OF WORK TO BE DONE:**

A. This project consists of the installation of potable water systems. The Contractor will be responsible for the furnishing and placing of all materials required and shown on the construction documents. The Contractor shall comply with all applicable regulations of Federal, State or local Authorities.

B. The Contractor shall perform all excavation for the pipe lines; protect all existing utilities or other underground structures (water, gas, telephone, storm drains, etc.). The Contractor shall be responsible for the safety of all employees while on the job and for maintaining traffic safety along the roads and streets.

C. All work shall be done with equipment large enough for the job and with adequate number of personnel to complete the project on schedule.

D. The Contractor shall complete the project expeditiously, do all the clean up necessary and satisfy all conditions of any requirements by Federal, State or local Authorities

2. INSPECTION:

A. All materials, pipe, valves, embedment items, concrete, etc., shall be subject to site inspection at all times. Any materials found defective in anyway prior to unloading shall be removed from the project immediately.

B. Any material determined to be defective in transit will be removed from the job site. If claims are to be filed the Engineer will aid the Contractor in making such determination and claim.

C. At any time during the progress of the job that materials to be permanently installed in the project are found faulty in any way, they shall be tagged by the Engineer and removed immediately from the project site.

3. UNLOADING OF PIPE:

A. All pipe shall be unloaded by a method approved by the manufacturer. The pipe shall be unloaded in "pipe units" along the pipe route and out of the way of traffic and off private property. After the unloading the Contractor shall be responsible for all materials until permanently installed into the project and accepted by the Owner and Engineer.

B. DO NOT USE CHAINS OR SINGLE CABLES TO UNLOAD PIPE.

4. **UNLOADING VALVES, HYDRANTS, MISCELLANEOUS ITEMS:**

A. Unload all valves, hydrants, rubber rings, lubricants, fittings, etc., in a central area designated by the Engineer for the Contractor and distributed to the work area as needed.

5. **PREPARATION OF THE SITE:**

A. Prior to beginning excavation, the Contractor and representative of Owner (inspector for the Engineer) shall make a visual survey of the pipe line route and make written notes and or photographs of possible controversial areas where conflicts might occur in interpreting the requirements "*replaced to the same condition prior to the project*".

B. The Contractor shall complete all of the clearing and grubbing required to have sufficient room to construct and excavate the ditch for the pipe placement.

6. **EXCAVATION AND PREPARATION OF TRENCHES THE MINIMUM DEPTH TO THE TOP OF THE PIPE SHALL BE 36":**

A. General: The trench shall be dug to the alignment and depth required and far enough in advance of pipe crews, so as not to delay or interfere with pipe laying. The bottom of the trench shall be smooth and drained so that work can be done safely and efficiently. Excavation shall include undercutting for embedment material when required by the Engineer.

B. Pipe Foundation: The bottom of the ditch shall be prepared so that the entire length of the pipe is on sound material. The bed soil of the pipe shall have no sharp rocks or gravel larger than 1 2/3" diameter and shall contain no roots or humus material unsuitable for pipe foundation.

When the material in the bottom of the trench is not suitable for pipe bed a one foot depth of embedment material (as specified) shall be placed in the trench bottom.

C. Braced and Sheeted Trenches: Whenever necessary to prevent caving, excavations in gravel, sandy soil or other unstable material shall be adequately sheeted and braced. Where, in the opinion of the Engineer, sheeting is required to protect adjacent paving, structures, or other property, sheeting shall be used when ordered by the Engineer. Where sheeting and bracing are used, the trench width shall be increased accordingly. Trench sheeting shall remain in place until the pipe has been laid, tested for defects and repaired if necessary, and the earth around it compacted to a depth of 2 feet over the top of the pipe.

7. **CARE OF SURFACE MATERIAL FOR RE-USE:**

A. If local conditions permit their re-use, all surface materials suitable for re-use in restoring the surface shall be kept separate from the general excavation materials, and reused.

1. Manner of Piling Excavated Material: All excavated material shall be piled in manner that will not endanger the work and will avoid obstructing sidewalks and

driveways. Gutters shall be kept clear or other satisfactory provisions made for street drainage. Also, storm drains shall be kept clean.

2. **Trenching by Machine or by Hand:** The use of trench digging machinery will be permitted except in places where operation of same will cause damage to trees, buildings or existing structures above or below ground; in which case hand methods shall be employed.

3. **Barricades, Guards and Safety Provisions:** To protect persons from injury, and to avoid property damage, adequate barricades, construction signs, torches, lanterns and guards, as required, shall be placed and maintained during the progress of the construction work and until it is safe for traffic to use the trenched highway. Rules and regulations of the local authorities requesting safety provisions shall be observed.

4. **Traffic and Utility Controls:** Excavation for pipe laying operations shall be conducted in a manner to cause the least interruption to traffic. Where traffic must cross open trenches, the Contractor shall provide suitable bridges at street intersections and driveways. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, fire or police call boxes, or other utility controls shall be left unobstructed and accessible during the construction period.

5. **Flow of Drains and Sewers Maintained:** Adequate provisions shall be made for the flow of sewers, drains and water courses encountered during construction, and the structures which may have been disturbed shall be satisfactorily restored upon completion of the work.

6. **Property Protection:** Trees, fences, poles and other property shall be protected unless their removal is authorized; and any property damaged shall be satisfactorily restored by the Contractor. Where mailboxes must be removed for laying the pipe, the mailbox shall be temporarily set to permit the delivery of mail. Immediately upon backfilling and cleanup all mailboxes shall be permanently set at the location and to the condition as found before disturbing.

7. **Interruption of Water Service:** No valve or other control on the existing system shall be operated for any purpose by the Contractor without approval by the Engineer, and all consumers affected by such operation shall be notified by the Contractor at least one hour before the operation and advised of the probably time when the service is to be restored.

8. **Removing Pavement:** The Contractor shall remove pavement as necessary for installing the new pipe lines and appurtenances and for making connections to existing pipe lines. Pavement shall be cut back from the top edges of ditch lines for a distance of at least nine inches on each side of the ditch to allow for solid bearing edges for pavement to be replaced.

a) **Marking:** Before removing any pavement, the pavement shall be marked for cuts. Neatly paralleling pipe lines and existing street lines. Asphalt pavement shall be broken along the marked cuts by use of jack hammer or other suitable tool. Concrete pavement shall be scored to a depth of

approximately 1 1/2" along the marked cuts. Scoring shall be done by use of a rotary saw, after which the pavement may be broken below the scoring by use of jack hammer or other suitable material.

- b) Machine Pulling: No pavement shall be machine pulled until completely broken and separated along the marked cuts.
- c) c. Damage to Adjacent Pavement: The pavement adjacent to pipe line trenches must not be disturbed or damaged due to any cause such as caving ditch banks, indiscriminate use of construction machinery, etc. The Contractor shall remove the damaged pavement and shall replace at this own expense.

8. **UNDERCROSSING OF CONSTRUCTED HIGHWAYS AND COUNTY ROADS:**

A. Where shown on the construction documents, the Contractor shall construct an undercrossing, details of which have been approved by the Federal, State or local Authorities having jurisdiction. The work done shall not create a hazard, produce interruption of traffic or required additional maintenance by Highway Department forces.

B. The Contractor will be responsible for applying and obtaining all required permits to complete the work as well as for complying with all conditions of the permits.

C. Access pits, head and tail ditches shall be protected by sheeting and bracing as required to provide safe working conditions.

1. Casing Pipe

- a) As a general rule, the locations and approximate lengths of the encasements are indicated on the construction documents for the information of bidders, but the precise locations, length of the encasement will be specified in the permit issued by the Railroad or Highway Department involved.
- b) The casing pipe shall be new and made of steel in accordance with API 5L standard weight line pipe and be provided with continuous welded joints. The casing pipe shall be jacked through a hole of the proper size that has been previously bored for the purpose, or be installed by excavating and installing liner plates as the hole is advanced. It may be installed by the continuous boring and jacking method.
- c) The wall thickness of the steel casing pipe shall be 0.25" for all sizes 20" and smaller, 0.375 for sizes 24" through 36".
- d) The contractor shall provide all casing spacers and end seals required for conventional bores. The casing spacers shall be of the polyethylene type and the end seals shall be of the slip on type.
- e) Casing installation shall be by boring and jacking. Suitable equipment shall be employed to provide a mechanically augured bore followed immediately with the casing pipe. No water can be used at any time during the work and

the casing will maintain a firm continuous contact with the surrounding earth.

- f) The minimum cover of the casing shall be as shown on the permit drawings.

9. LAYING PIPE, FITTINGS AND APPURTENANCES IN PREPARED DITCH:

- A. Only pipe with approved elastomeric gasket joints may be used.
- B. Gaskets, O-rings, and other products used for joining pipes, setting meters or valves, or other appurtenances which will expose the material to water shall not be made of natural rubber or any other material which will support microbial growth.
- C. Only lubricants recommended by pipe manufacturers may be used.
- D. Lubricants shall not support microbial growth.
- E. All pipe shall be laid to and maintain at required lines and grades shown on the construction documents. Fittings, valves, air vents, and hydrants shall be installed at required location with valves and hydrants plumb.

10. HANDLING PIPE AND ACCESSORIES INTO TRENCH:

- A. Proper implements, tools and facilities shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipe, fittings, valves, and hydrants shall be carefully lowered into the trench, piece by piece, by means of a derrick, ropes or other suitable tools and equipment, in such a manner as to prevent damage to pipe or pipe coating. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

11. HAMMER TEST:

- A. Before lowering and while suspended, the pipe shall be inspected for defects and rung with a light hammer to detect cracks. Any defective, damaged or unsound pipe shall be rejected.

12. PIPE KEPT CLEAN:

- A. All foreign matter or dirt shall be removed from the inside before it is lowered into its position in the trench, and it shall be kept clean by approved means during and after laying.

13. LAYING THE PIPE:

- A. The spigot shall be centered in the bell, the pipe shoved into position, and brought into the alignment; it shall be secured there with earth carefully tamped under and one each side of it, excepting at the bell holes. Care shall be taken to prevent dirt from entering the joint space.

14. **PREVENTING TRENCH WATER FROM ENTERING PIPE:**
- A. At times when pipe laying is not in progress, the open ends of pipe shall be closed by approved means, and no trench water shall be permitted to enter the pipe.
15. **CUTTING PIPE:**
- A. Cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe.
16. **BELL ENDS TO FACE DIRECTION OF LAYING:**
- A. Unless otherwise directed, pipe shall be laid with bell ends facing in the direction of laying; and for lines on an appreciable slope, bells shall, at the discretion of the Engineer, face upgrade.
17. **PERMISSIBLE DEFLECTION AT JOINT:**
- A. Wherever necessary to deflect pipe from a straight line; either in the vertical or horizontal plane, to avoid obstructions, to plumb stem, or where long radius curves are permitted, the degree of deflection shall be approved by the Engineer.
18. **UNSUITABLE CONDITIONS FOR LAYING PIPE:**
- A. No pipe shall be laid in water, or when the trench conditions or weather is unsuitable for such work, except by permission of the Engineer.
19. **PIPE JOINTS:**
- A. Mechanical Joints: All fittings, valves and accessories shall be installed as recommended by the pipe manufacturer. Bolts on M. J. fittings shall be tightened with a torque wrench set a maximum of 50 ft. lbs. The pipe manufacturer shall furnish special PVC insets for all mechanical fittings. The Contractor shall be responsible for placing the inserts as directed.
- B. Valve Boxes
1. Cast iron boxes shall be firmly supported and maintained centered and plumb over the wrench nut of the gate valve, with box flush with the surface of the finished pavement or at such other level as may be directed.
 2. All valve boxes shall have a concrete collar poured around them near the surface as detailed. This collar will be installed whether or not the box is in a road or easement.
 3. At the time of installation the valve box shall be suitably marked by referenced points and aid points recorded and placed on the "As-Built" drawings.

C. **Back Siphonage to be Prevented:** Drainage branches or blow offs shall not be connected to any sewer or submerged in any stream or be installed in any other manner that will permit back siphonage into the distribution system.

20. SETTING HYDRANTS (FIRE OR FLUSH):

A. **General Location:** Hydrants shall be located in a manner to provide complete accessibility, and in such manner that the possibility of damage from vehicles or injury to pedestrians will be minimized. Unless otherwise directed, the setting of any hydrant shall conform to the following:

B. **Location Re-Curb Lines:** When placed behind curb, the hydrant barrel shall be set so that no portion of the pumper or hose nozzle cap will be less than 18 inches nor more than 30 inches from the gutter face of the curb, or less than 30 feet from the curb line intersection of any street; if set between streets, the hydrants shall be placed in the manner designated by the Engineer.

C. **Location Re-Sidewalk:** When set in the lawn space between the curb and the sidewalk, or between the sidewalk and the property line, no portion of the hydrant or nozzle cap shall be within 12 inches of the sidewalk.

D. **Position of Nozzle:** All hydrants shall stand plumb, and shall have their nozzles parallel with or at right angles to the curb with the pumper nozzle pointing normal to the curb except that hydrants having hose nozzles at an angle of 45 degrees shall be set normal to the curb. They shall conform to the established grade, with nozzle at least 12 inches above ground.

E. **Connection to Main:** Each hydrant shall be connected to main pipe as shown on the Detail Sheet of the construction documents.

F. **Drainage at Hydrant:** Whenever hydrants are set in impervious soil, a drainage pit 2 feet in diameter and 2 feet deep shall be excavated below each hydrant and filled compactly with coarse gravel or broken stone mixed with coarse sand, under and around the bowl of the hydrant and to a level 6 inches above the waste opening. No hydrant drainage pit shall be connected to a sewer.

G. **Anchorage for Hydrant:** The bowl of each hydrant shall be well braced against a concrete thrust block and shall be tied to the pipe with mechanical joint retainer glands. In no case shall the waste opening of the fire hydrant be obstructed from free drainage. Gravel shall be installed around hydrant weep hole as specified on detail sheet in construction documents.

H. **Cleaning:** Hydrants shall be thoroughly cleaned of dirt or foreign matter before setting.

I. **Plugging Dead Ends:** Standard plugs shall be inserted into the bells of all dead ends of pipes, tees, or crosses, and spigot ends shall be capped. Plugs or caps shall be jointed to the pipe or fittings in the appropriate manner.

21. ANCHORAGE OF BENDS, TEES AND PLUGS:

A. Limiting Pipe Diameter and Degree of Bend: Reaction or thrust backing shall be applied on all pipe lines 4 inches in diameter or larger at all tees, plugs, caps, and at bends deflecting 22 1/2 degrees or more.

B. Materials for Reaction Backing

1. Reaction or thrust backing shall be of concrete of a mix not leaner than 1 cement, 2 1/2 sand, 5 stone, have compressive strength of not less than 2,500 psi. Backing shall be placed between solid ground and the fitting to be anchored; shall be that required by the Engineer. The backing shall, unless otherwise directed, be so placed that the pipe and fitting joints will be accessible for repairs. No extra payment will be made for this material, but shall be included in the unit price bid for the various size pipe.

2. Reaction backing shall be poured against undisturbed soil and minimum areas of reaction backing in contact with undisturbed soil shall be as follows:

3" pipe:	0.50 S.F.	(9" X 9")	12" pipe:	6.75 S.F.	(32" X 32")
4" pipe:	0.75 S.F.	(11" X 11")	14" pipe:	9.25 S.F.	(36" X 36")
6" pipe:	1.75 S.F.	(16" X 16")	16" pipe:	12.00 S.F.	(42" X 42")
8" pipe:	3.00 S.F.	(21" X 21")	18" pipe:	15.25 S.F.	(48" X 48")
10" pipe:	4.75 S.F.	(26" X 26")	20" pipe:	19.00 S.F.	(52" X 52")

C. Metal Harness: Metal harness of tie rods and pipe clamps of adequate strength to prevent movement, or other suitable means may be used instead of concrete backing, as directed or approved by the Engineer. Steel rods and clamps shall be galvanized, or otherwise rustproof treated, or shall be painted as directed or approved by the Engineer.

22. HYDROSTATIC TEST:

A. Pressure during Test: After the pipe has been laid and partially backfilled as specified, all newly laid pipe, or any valved section of it, shall be subjected to hydrostatic pressure of a minimum of 150 psi or 1.5 times the working pressure of the pipe, whichever is greater.

B. Duration of Pressure Test: The duration of each pressure test shall be at least 6 hours or until the line has been completely inspected for visible leaks.

C. Procedure

1. A pipeline or segment thereof that has not been bacteriologically certified shall not be physically connected to any water main or segment of any water system in active service during the hydrostatic testing process.

2. Each section of pipe shall be slowly filled with water and the specified test pressure, measured at the highest point elevation, shall be applied by means of a pump connected to the pipe in a satisfactory manner. The pump, pipe connection,

gauges and all necessary apparatus shall be furnished by the Contractor. All pressure tests shall be conducted using a certified and accurate recording pressure gauge furnished by the Contractor which shall indicate pressure versus time of test. The recorded test chart shall also indicate the date of the test, the segment of the system which is being tested, and the total leakage experienced for the duration of the test. Charts from these tests shall be furnished to the Owner and Engineer and retained by the Engineer through the one year warranty period. Prior to acceptance, the section of water main being tested shall be "pumped up" to the specified test pressure and the amount of water required to reach this test pressure shall be measured.

D. **Expelling Air Before Test:** Before applying the specified test pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made, if necessary, at points of highest elevation, and afterwards tightly plugged.

E. **Permissible Leakage:** Suitable means shall be provided by the Contractor for determining the quality of water lost by leakage under normal operating pressure. No pipe installation will be acceptable until or unless this leakage (evaluated on a pressure basis of 150 psi) is less than 10 U.S. gallons per 24 hours per mile of pipe per inch nominal diameter of pipe. All visible leakage shall be repaired regardless of the quantity of leakage.

F. **Variation from Permissible Leakage:** Should any test of combined section of pipe laid disclose leakage per mile of pipe greater than that specified, or if individual sections show leakage greater than the specified limit, the Contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance.

G. **Leakage Defined:** Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section of it, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.

H. **Time for Making Test**

1. Pipe may be subjected to hydrostatic pressure, inspected, and tested for leakage at any convenient time after partial completion of backfill.
2. The Contractor shall be required to pressure test the entire system (or a portion thereof) on two separate occasions as follows:
3. The system shall be tested to 150 psi as specified herein before any service taps are made to the system.
4. After successfully testing the system the service taps shall be made under system pressure and service connections to the curb stop completed. Service taps to dry mains will not be permitted.
5. After service taps have been made the Contractor shall again test the system to 150 psi as specified herein. The recorder test chart requirements shall be applicable to this final test only.

23. **BACKFILL:**

A. Backfill

1. Backfill material shall be free from rocks or boulders and shall be deposited in the trench simultaneously on both side of the pipe for the full width of the trench in 4 inch layers to an elevation of at least 6 inches above the top of the barrels of the pipe, leaving the joints exposed for examination during the pressure test as previously specified. Material shall be dry enough to compact to the equivalent density of the surrounding earth. If too dry, the backfill material shall be dampened. Backfill containing broken pavement shall not be used.

2. Backfill material and pipe bedding material shall be select sand clay borrow material or other materials as authorized by the Engineer. In place material removed from trench shall be disposed of by the Contractor. Should local material be acceptable material as determined by the Engineer, it may be used in lieu of borrow material.

3. Backfill shall be in 4 inch layers, tamped with hand tamps to 8 inches above the top of the pipe. The remainder of the trench shall be backfilled to 6 inch layers and tamped with a mechanical tamp unless otherwise authorized by the Engineer.

24. **RE-PAVING:**

A. Any paved streets cut by these operations shall be re-paved in a workmanlike manner and restored to their original condition as shown or specified. The paving shall be of material at least equal to that removed and shall be laid in accordance with the specifications covering the type of paving. Where paved streets are cut, shell or gravel shall be provided immediately following backfill, and such crossing shall be maintained until repaved. The cost of furnishing the shell or gravel and maintaining the ditches shall be borne by the Contractor and included in the price bid for laying pipe. When flexible pavement is replaced, a 6 inch black bituminous base shall be laid for the top width of trench 1 1/4 inches below the finish grade of the existing pavement. After the base has been set, the remaining 1 1/4 inches shall be paved with a bituminous surfacing of the same type as that removed. Prior to replacing the pavement, a coat of 0.05 gallons per square yard of cut back asphalt shall be applied. Where concrete or other types of pavement are removed they shall be replaced with the same type and thickness as that removed. Just prior to repaving, edges shall be squared and cut to a string line so that the patch will present a neat appearance.

B. Where pipe is placed the length of an existing paved street, paving shall be done the full width of the street.

25. **CHLORINATION OF COMPLETED PIPE LINE:**

A. Before placing into service all new water distribution systems, or extensions to existing systems, or a valved section of such extension or any replacement in the existing water distribution system shall be chlorinated.

B. Any of the following methods of procedures shall be followed, subject to approval of the Engineer:

1. Liquid Chlorine gas-water mixture
2. Direct chlorine feed
3. Calcium Hypochlorite and water mixture

C. Preliminary Flushing: Prior to chlorination, all dirt, foreign matter shall be removed by a thorough flushing through the hydrants, or by other approved means. Each valve section of newly laid pipe shall be flushed independently. This shall be done after the pressure test is completed. Each pipe section shall be flushed with a rate of flow through the pipe to create a velocity of 2.5 feet per sec., minimum.

D. Liquid Chlorine: A chlorine gas-water mixture shall be applied by means of a solution-fed chlorinating device, or if approved by the Engineer, the gas shall be fed directly from a chlorine cylinder equipped with proper devices for regulating the rate of flow and effective diffusion of gas within the pipe. (Chlorination with the gas-water mixture is preferred to direct feed.)

E. Point of Application: The preferable point of application of the chlorinating agent shall be at the beginning of the pipe line extension, or any valved section of it, and through a corporation stop inserted in the horizontal axis of the newly laid pipe. The water injector for delivering the gas-water mixture into the pipe shall be supplied from a tap on the pressure side of the gate valve controlling the flow into the pipe line extension. In a new system, application may be at the pumping station, or the elevated tank, or the standpipe, or the reservoir if available. If a supply of water is not available, the Contractor shall haul the water by tank truck or other approved means. All water used for testing or chlorinating shall be approved by the Engineer. No additional payment will be made to the Contractor for hauling water.

F. Rate of Application: Water from the existing distribution system or other source of supply shall be controlled to flow very slowly into the newly laid pipe line during the application of chlorine. The rate of chlorine gas-water mixture flow shall be in such proportions to the rate of water entering the pipe that the chlorine dose applied to the water entering the newly laid pipe shall be at least 40 to 50 ppm.

G. Back Pressure Prevented: Back pressure, causing a reversal of flow in the pipe being treated, shall be prevented.

H. Retention Period: Treated water shall be retained in the pipe long enough to destroy all non-spore-forming bacteria. This period shall be at least 24 hours and preferably longer as may be directed. After the chlorine treated water has been retained for the required time, the chlorine residual at pipe extremities and at other representative points shall be at least 25 ppm.

I. Chlorinating Valves and Hydrants: In the process of chlorinating newly laid water pipe, all valves or other appurtenances shall be operated while the pipe line is filled with the chlorinating agent.

J. Final Flushing and Test: Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipe line at its extremities until the replacement water throughout its length shall, upon test, both chemically and bacteriologically, prove

equal to the water quality served the public, and approved by the Public Health Authority having jurisdiction. The Contractor will supply the appropriate bacteriological sampling bottles and will collect samples. The Contractor will transport the samples to a certified local testing laboratory of the Contractor's choice. The test results shall be reported to the Contractor, Owner and Engineer.

K. Repetition of Procedure: Should the initial treatment prove ineffective, the chlorination procedure shall be repeated until confirmed test shows that water sampled from the newly laid pipe conforms to the requirement of CHLORINATION OF COMPLETED PIPE LINE.

L. Calcium Hypochlorite

1. On approval of the Engineer, a mixture of calcium hypochlorite of chlorine content and water may be substituted as an alternative for liquid chlorine.
2. Calcium Hypochlorite (comparable to commercial products known as "Perchloron:, and Maxochlor") and water shall consist of 5 percent of powder and 95 percent of water by weight.
3. This calcium hypochlorite and water mixture, first made into a paste and then thinned to a slurry, shall be injected or pumped into the newly laid pipe under conditions heretofore specified for liquid chlorine application, after preliminary flushing.
4. Provisions for final flushing, testing, and approval under this alternative shall be the same as those described previously.

M. Procedure when Cutting into Existing Pipe Lines: Unless the Engineer shall direct otherwise, cuts made in existing pipe lines for the insertion of valves, fittings, repairs, or for any other purpose shall be chlorinated by shaking a quantity of the powder, predetermined by the Engineer, into the pipe on each side of the cut-in. After slowly filling the section and reversing the flow, the chlorinated water shall be retained for several hours, then flushed until no odor of chlorine can be detected in the waste water, or preferable until a check shall have been made for residual chlorine as provided for herein.

N. Resumption of Service: After satisfactory chlorination by any of these alternative procedures, the consumers may be served from the newly laid pipe line or the service may be resumed on existing pipe line.

O. House Services: After the distribution mains have been laid, tested, and chlorinated as hereinbefore specified, all house services shall be installed as directed by the Engineer. All corporation stops and service lines that are not connected to other pipe and meters shall have the ends plugged in an approved manner to prevent water and dirt from entering the fitting or pipe. (House services will be installed only when called for on the construction documents or under the direction of the Engineer.) **Main taps for service connections shall be made under pressure after successfully testing the system. Service taps to dry mains will not be permitted.**

P. Service crossings under paved surfaces, especially State Highway, shall be jacked or dry bored.

26. **CLEAN UP:**

A. Where these operations are on City, State, County, or private property, the job shall be kept clean at all times. Loose dirt shall not be allowed to clog ditches or cover sidewalks. Soft clay or other undesirable material removed from the trenches shall be removed from the streets, sidewalks, or ditches. The Engineer reserves the right to demand that the Contractor's forces be diverted to this clean-up at any time the Engineer rules that condition of streets, sidewalks or private property warrants such diversion.

27. **GRASSING:**

A. All scarred areas shall be fertilized and seeded per State Highway Department Specifications. Seeding shall be done after all trenches are adequately compacted and level, and clean-up has been completed. A stand of grass will be required before acceptance. All scarred areas subject to erosion shall be similarly seeded.

28. **MAINTENANCE OF SURFACES:**

A. Maintenance: Following the certification of completion by the Engineer the Contractor shall maintain the surface of the unpaved trenches, adjacent curbs, sidewalks, gutters, shrubbery, fences, sod, and other surface disturbed for a period of 3 months thereafter, and shall maintain and repave areas (if paved by the Contractor) and adjacent curbs, gutters, and sidewalks for one year after said certifications. All material and labor required for the maintenance of the surface and adjacent structures shall be supplied by the Contractor and the work shall be done in a manner satisfactory to the Engineer.

B. Ingress and Egress: In areas where there is limited access to residences, businesses, public and private buildings, and other facilities, the Contractor shall plan his work to afford access to property abutting the Work at all times except when absolutely necessary including providing immediate backfill of pipe, shells, for temporary surfacing, and adequate signing and flagmen to control and direct traffic.

29. **EROSION CONTROL:**

A. Scope: These Specifications shall govern the erosion control requirements for site/grading work.

B. Materials: Materials of this Section shall be as specified herein.

C. Erosion and Property Control: Any existing sod or grass removed shall be replaced with new sod as specified therein.

1. Flow of Drains and Sewer Maintained: Adequate provisions shall be made for the flow of sewers, drains and water courses encountered during construction, and the lines and structures which may have been disturbed shall be immediately restored to their original condition at the expense of the Installer.

2. **Property Protection:** Trees, grass, fences, signboards, poles and all other property shall be protected unless their removal is authorized; and any property damage shall be satisfactorily restored by the Installer and at the expense of the Installer.

3. **Erosion:** The Installer shall at all times take necessary precautions to prevent erosion or transportation of soil due to natural or induced water flows. Spoil banks and soil stockpiles shall be contained to prevent transportation of soil by run-off waters.

30. EROSION CONTROL NETTING:

A. Erosion control netting shall be utilized in location where specifically required by the Owner/Engineer and installed in accordance with the Federal, State or local Authority having jurisdiction.

31. SILT FENCE:

A. Silt fences shall be constructed at locations approved by the Owner/Engineer and installed in accordance with the Federal, State or local Authority having jurisdiction.

32. HAY BALES:

A. Hay bales shall be native hay or any other approved material. The bales shall be securely anchored by the use of stakes and wire or other approved method.

33. EXCESS MATERIAL:

A. After backfilling, excess material shall be removed and disposed of by the Contractor off the site.

END OF CONSTRUCTION SPECIFICATIONS FOR WATER MAINS

SECTION W-3**MATERIAL SPECIFICATIONS FOR WATER MAINS****1. DUCTILE IRON PIPE:**

A. Ductile iron pipe shall be used on all projects unless otherwise directed or approved by the Owner. Minimum size of main shall be 8-inches unless approved by Owner. Ductile iron pipe shall be Pressure Class 250 (minimum thickness class 51) and shall be manufactured and marked in accordance with AWWA C151. Unless otherwise noted in the construction documents, the pipe shall have a single gasket push on joints manufactured in accordance with AWWA C111, and interior cement mortar lining manufactured in accordance with AWWA C104, and an exterior asphaltic coating of not less than 1 mil thickness. Flanged pipe shall conform to AWWA C115. Accepted manufacturers are American Cast Iron Pipe (ACIPCO), U.S. Pipe and Foundry or approved equal.

2. PVC PIPE:

A. PVC pipe, where approved by the Owner, shall be ASTM D 2241, SDR 21 (aka Class 200 pipe). PVC pipe shall be supplied in 20 foot lengths unless otherwise specified, shall be furnished with integral bell and spigot push on joints and shall be blue in color. Gaskets shall be locked in. The pipe and the coupling must both be manufactured by the same company. Minimum Class 200 pipe shall conform to SDR 21 unless otherwise noted in the construction documents.

B. The pipe shall comply with ASTM D1784 for PVC compounds, ASTM D 2241 Product Standard 22 for PVC pipe, and ASTM D-3139 and F-477 for gaskets and joints. PVC pipe shall be SDR 21 Class 200.

3. RESTRAINED JOINTS:

A. Where restrained joint pipe and fittings are required, flexible push on restrained joint ductile iron pipe and fittings shall be used. All restrained joints shall be suitable for a 350 psig working pressure. Ductile iron locking segments, inserted through slots in the bell face, shall provide a positive axial lock between the bell interior and a retainer weldment on the spigot end of the pipe.

B. Restrained joints shall be US TR-Flex, American Flex Ring, or other approved equal.

C. Mechanical joint retainer glands shall be Series 1100 Megalug as manufactured by EBBA Iron.

D. Single seal gasket push-on type joints shall conform to the requirements of ANSI A21.11 and shall be Tyton, Super Bell Tite, or Altite.

4. CASING PIPE:

A. Where water mains are to be installed under railroad tracks and in some cases where they are to be installed under paved highways, they shall be laid inside a casing pipe of the size specified in the construction documents. As a general rule, the locations and approximate lengths of the encasements are indicated on the construction documents for the information of bidders, but the precise locations, length of the encasement will be specified in the permit issued by the Railroad or Highway Department involved.

B. The casing pipe shall be new and made of steel in accordance with API 5L standard weight line pipe and be provided with continuous welded joints. The casing pipe shall be jacked through a hole of the proper size that has been previously bored for the purpose, or be installed by excavating and installing liner plates as the hole is advanced. It may be installed by the continuous boring and jacking method.

C. The wall thickness of the steel casing pipe shall be 0.25" for all sizes 20" and smaller, 0.375 for sizes 24" through 36". The pipe shall be epoxy coated.

D. The contractor shall provide all casing spacers and end seals required for conventional bores. The casing spacers shall be of the polyethylene type and the end seals shall be of the slip on type.

5. FITTINGS:

A. Ductile iron fittings with retainer glands shall be provided. Ductile iron fittings shall be rated for 350 psi working pressure. Fittings shall be manufactured in accordance with AWWA C153 and provided with mechanical joints. All fittings shall be provided with a thin cement lining in accordance with AWWA C104.

B. All fittings shall be wrapped in 6 mil polyethylene encasement extending 6" beyond connection in accordance with AWWA C105.

C. Thrust restraints shall be 2500 psi concrete poured in place against undisturbed soil unless otherwise approved by the engineer.

6. VALVES:

A. All valves shall be furnished with a valve box and shall be furnished with a concrete collar. The use of a valve-nut-in-valve-box centering device is encouraged.

B. Valves for use with ductile iron pipe shall have mechanical joint end connections unless otherwise shown.

C. Gate valves shall be iron body, brass mounted, epoxy coated interior and exterior, and be of the resilient seat type. Gate valves shall have a non-rising stem, "O ring" stem seal, a square operating nut (2") and shall open by turning counterclockwise. Gate valves thru 12" diameter shall be manufactured in accordance with AWWA C509. Gate valves 12" and smaller shall be suitable for a working pressure of 250 psig and shall be tested to 400 psig.

D. Gate valves 16" and 20" shall be suitable for a working pressure of 200 psig. These large valves shall be mounted with vertical stems and shall have sufficient bury to accommodate the vertical mounting. These requirements are applicable to tapping valves. Gate valves shall be Mueller or Clow.

E. Butterfly valves shall be manufactured and tested in accordance with AWWA C504, Class 150B. Butterfly valves shall be provided with operators suitable for underground service that meet all AWWA standards.

F. Where the contract involves extensions to an existing system the Contractor shall verify the direction of opening of existing valves and if this is opposite to the direction specified herein he shall confer with the Owner and the Engineer regarding the direction of opening to be provided on the valves furnished under this contract.

G. Tapping valves and sleeves may be of the mechanical joint or hub end type, Mueller H-615 and H-667, or approved equal. Tapping valves shall be non-rising stem. Working pressure for 2"-12" valves shall be 200 psi with 400 psi test pressure. For valves greater than 12", the working pressure shall be 150 psi with test pressure of 300 psi. Valves and sleeves shall be cast tapping sleeves and valves shall be air tested for duration of 5 minute and 50 psi.

H. Air Release Valves (ARV) shall be manually operated and shall consist of a 2" corporation stop at the main, 2" type K copper tubing to a 2" curb stop housed in a standard meter box set at the nearest right-of-way line. ARVs shall be field located at high points in the water main as directed by the Engineer.

7. **VALVE BOXES:**

A. Valve boxes shall be made of cast iron and be of the two piece adjustable heavy roadway type. They shall have an inside diameter not less than 5 1/4" and be of the screwed type. They shall be provided with a cast iron cover on which the word "WATER" is embossed and shall be suitable for installation on mains laid at the depths specified elsewhere in these specifications.

B. Valve boxes shall be set vertically over the valve and centered about the operating nut. The use of a valve-nut-in-valve-box centering device is encouraged. The cover of the box shall be flush with the street or ground surface unless otherwise directed by the Engineer. Backfill shall be carefully tamped around the box to prevent it from being moved out of position. The bottom flared edge of the box shall not rest directly on the valves or pipe. A concrete block shall be installed under the box. Where the standard depth valve box is not high enough to make the cover flush with the ground surface the Contractor shall provide and install, without additional compensation, valve box riser sections of the required length to achieve this result.

C. After the valve box has been set correctly, a square or round concrete collar shall be poured around the top of the valve box. The concrete shall be neatly formed to 18" square or diameter, poured 4" thick with the surface finished parallel to the surrounding ground surfaces. The concrete shall be Class C 2500 pound mix.

8. **FIRE HYDRANTS:**

A. Fire hydrants shall be manufactured in accordance with AWWA C502. The main valve shall open against the water pressure and all operating threads shall be isolated from the water. Hydrants shall be Mueller Super Centurion 200, or approved equal.

B. Hydrants shall have a main valve opening of not less than 5 ¼", two 2 ½" hose connections and one 4 ½" pumper connection. Hydrants shall be provided with a permanent lubricating device and "O-ring" packing seals. Hydrants shall open by turning counterclockwise. Operating nuts shall be of the National Standard pentagon type, 1 ½" point to flat. Hydrants shall be provided with a 6" mechanical joint shoe and shall be equipped with a retainer gland follower.

C. Fire hydrants shall be sized to connect with pipelines laid with a minimum cover of 36". In cases where the standard length of hydrant is not sufficient to leave a distance of at least 18" between the ground surface and the bottom of the lowest connection, the Contractor shall provide and install an extension section of the proper length.

D. Hose and pumper connections shall be furnished with Underwriters National Standard threads in the case of hydrants to be installed in new systems. Hydrants furnished for extensions to existing systems shall be furnished with threading similar to the existing hydrants except in cases where an effort at standardization of the use of National Standard threading is being made. In these cases, the Contractor and his material supplier are required to investigate the existing conditions and to furnish hydrants equipped with the direction of opening and the type of threads desired by the Owner. Where the contract covers a new water works system, two operating wrenches and a main valve assembly wrench shall be furnished with the hydrants. These items shall be delivered to the Owner.

E. Hydrants shall be set perfectly plumb, using a spirit level on two sides of the barrel. The gravel shall be placed around the base to permit drainage from the waste opening.

F. Fire hydrants shall be factory painted in the color chosen by the Owner.

G. All fire hydrants shall be equipped with a 6" isolation gate valve. The lead pipe to the hydrants shall be 6"-diameter PC 250 ductile iron.

9. **BLOW-OFF HYDRANTS:**

A. Blow-off Hydrants shall be Dry Barrel Type Hydrants. The Main valve shall be open against water pressure and all operating threads shall be isolated from the water. Post Type Hydrants shall be Mueller 2 1/8" Post Type Hydrant.

B. Blow-off Hydrants shall have a main valve opening of not less than 2¼", with one 2½" hose connection. Hydrants shall be provided with a permanent lubricating device and "O-ring" packing seals. Hydrants shall open by turning counterclockwise. Operating nuts shall be of the National Standard pentagon type, 1½" point to flat.

Hydrants shall be provided with a 3" mechanical joint shoe and shall be equipped with a retainer gland follower.

C. Blow-off Hydrants shall be sized to connect with pipelines laid with a minimum cover of 36". In cases where the standard length of Post Type Hydrant is not sufficient to leave a distance of at least 16" between the ground surface and the bottom of the lowest connection, the Contractor shall provide and install an extension section of the proper length. Flush Type Hydrants shall be furnished with a high strength cast iron box and cover. The location of the Flush Type Hydrants shall be marked with a water valve marker.

D. Hose connections shall be furnished with Underwriters National Standard threads in the case of hydrants to be installed in new systems. Hydrants furnished for extensions to existing systems shall be furnished by threading similar to the existing hydrants except in cases where an effort at standardization of the use of National Standard threading is being made. In these cases, the Contractor and his material supplier are required to investigate the existing conditions and to furnish hydrants equipped with the direction of opening and the type of threads desired by the Owner.

E. The hydrant lead to post type hydrants shall be made with ductile iron pipe extending from the cast iron anchoring tee installed in the main to the hydrant show regardless of the type of pipe used in the construction of the main to which the hydrant is connected.

F. Mechanical joint shoe on flush type hydrants shall be connected to one section of ductile iron pipe regardless of the type of pipe used in construction of the main to which the hydrant is connected.

G. Hydrants shall be perfectly plumb on the precast slab, using a spirit level on two sides of the barrel. Gravel shall be placed around the base to permit drainage from the waste opening.

10. **FLUSH ASSEMBLY:**

A. Flushing

1. All water mains shall be flushed to remove all sand and other foreign matter. The velocity of the flushing water shall be at least 4-feet per second. Flushing shall be terminated at the direction of the Engineer. The Contractor shall dispose of the flushing water without causing a nuisance or property damage. No line flushing will be performed without prior notice to and approval from the Engineer.

B. Cleaning

1. Prior to pressure and leakage testing, the interior of each main shall be cleaned of accumulation of sand and other foreign matter by pressure or hand methods. Hand cleaning methods may consist of shoveling the material and pressure cleaning with a water hose. Care shall be exercised in cleaning to prevent damage to the pipe lining.

C. Flush assemblies shall be placed at locations as shown on the construction documents or directed by the Engineer. Flush assemblies are placed to facilitate the flushing of mains that are eight-inches in diameter and larger, said flushing that requires high flows to create a velocity in the water main at 4.0 feet per second.

D. The assembly shall consist of a main size by 6" "hydrant" tee at the main, a six-inch gate valve, fittings and size of pipe to construct the assembly as detailed on the construction documents.

E. A 48" by 48", minimum, concrete slab shall be constructed to prevent wash-outs when a main is flushed.

11. **SERVICE CONNECTIONS AND SERVICE RECONNECTIONS:**

A. The new pipe under this project will be constructed in areas now served by small diameter pipe. The services connected to these small diameter mains shall be reconnected to the new mains. The in-place small diameter mains shall be abandoned.

B. Corporation stops shall be ¾" size unless otherwise noted and shall comply with AWWA C800-66, Mueller H-15008, or approved equal. Corporation stops shall be compatible with type of service pipe specified.

C. Curb stops shall be Mueller Curb Ball Stop ¾"(B-24350 R) w/quarter turn check and lockwing or Ford equivalent B-43-232 WSNQ.

D. Ductile Iron water lines are to be Direct Tapped and equipped with ¾" H-15008 Mueller corporation stop or Ford F-1000-3Q corporation stop. Where PVC mains are approved by the Owner, service saddles shall be used to connect services to PVC mains. The saddles shall be JCM #402-0663x07CC Epoxy coated or Electro Galvanized steel straps for CL200 SDR21 PVC O.D.

E. Meters shall conform to AWWA C700-90, shall be a first line meter and shall have a hermetically sealed and magnetically driven register. All meters shall be manufactured and assembled in the United States, shall be provided with all bronze case, and shall be of the positive displacement type. Each meter shall be provided with a leak detector separate from the sweep hand, and shall be calibrated in gallons unless otherwise noted in the Special Specifications.

F. Meters shall be manufactured by Elster with ALL BRONZE cases or approved equal unless otherwise specified in the Special Specifications. Meters should also include a Meter Interface Unit for Automatic Meter Reading system.

G. Backflow preventors shall be ¾" Mueller H14242 dual check valve, rated for 150 psig, or other approved equal, as required by the latest STATE regulations.

H. Meter boxes shall be approximately 12"x17"x12" deep, rectangular in shape, complete with plastic top and metal hinged reading lid. The plastic shall be of the fiber reinforced polyolefin type. The box and cover shall be Carson Brooks Model 1220-12.

1. Carson Brooks Jumbo - CB 1220-12B HDPE(Base) Color; Black
2. CB 1220-6B, HDPE(Lid) Color; Black, PVC w/c.i.rdr attached via steel roll pin
 - I. Water meters shall be located as indicated on the construction documents.
 - J. Service pipe used in making service connections and service transfers will be paid for separately on a unit price basis and is not included in the price of the service connection assembly.
 - K. When the service pipe is connected to ductile iron pipe 3" and larger, the connection at the main shall consist of a 3/4" tap in the main and a corporation cock. When connected to mains smaller than 3", the connection at the main shall consist of a 3/4" hole drilled in the main, a single strap service clamp and a corporation cock.
 - L. Where taps larger than 1" diameter are to be installed on ductile iron pipe, a split tapping sleeve or tapping saddle shall be provided and a disc shall be cut from the pipe wall by a special tapping machine.
 - M. When copper or plastic service tubing is used, it may be connected directly to the corporation cock.
 - N. The tap or drilled hole in the main shall be made at an angle of not more than 30 degrees to the horizontal in order to keep service pipe adjacent to the main at the required depth.
 - O. The curb stop shall be installed inside the meter box immediately adjacent to the inlet side of the meter and under general conditions the box shall be set with the top flush with the ground surface.
 - P. Where service taps are installed on ductile iron pipe, the price bid shall include wrapping the brass corporation stop and not less than three feet of connected copper service tubing with two wraps of Tapecoat dielectric insulating type to prevent corrosion.
 - Q. When the furnishing of a meter larger than 1" is called for in the construction documents, it shall include a cutoff valve with handwheel of the same size as the meter inlet, and a meter box, Carson Brooks, or equal. The box shall be 15" by 20" and equipped with a rectangular hinged reading lid set in the cover.

12. SERVICE PIPE:

- A. The service pipe to be used shall be Copper, Type K.
- B. Copper tubing shall conform to Federal Specifications WW-T-799, Type K. Unless otherwise noted in the construction documents, service pipe shall be 3/4" in diameter. The cost of fittings shall be included in the price of the pipe.
- C. Service pipe shall be laid with a cover not less than 24", and the requirements for trenching and backfilling shall be the same as specified for mains. Where the service

pipe crosses a paved street or sidewalk it shall be laid by means of pushing or boring. The cutting of pavements or sidewalks will not be permitted. The requirement for a cover of 24" over the pipe shall be maintained under side ditches and at the high point of the curve in the pipe where it connects to the main. On Highway rights-of-way the minimum cover shall be as specified by the Highway Department but in no case less than 36".

13. VALVE MARKERS:

A. Pipeline Markers - shall be installed on the pipeline alignment at a maximum of five hundred (500) foot intervals and shall be as manufactured by Carsonite.

1. CRM 306208 Stake (Blue) with
2. CFA. 400301U Curv-Flex Anchor (attached; with a CW-112 Decal (Caution: Water Pipeline) 101-P Decal(Inscription: "Old North State Water Company 968-6323") attached.

B. Valve Markers - shall be installed adjacent to all valves and shall be as manufactured by Carsonite.

1. CRM 306201 (White) with CFA 400301U Curv-Flex Anchor attached with a CWV 116 Decal (Caution: Water Valve) 101-P Decal (Inscription: "Old North State Water Company 968-6323") attached.

14. FLANGES:

A. Flanges shall conform to the dimensions shown in Table 10.14 of AWWA C110, and shall be adequate for a working pressure of 250 pounds. The bolt circle and bolt holes of these flanges shall match those of the Class 125 flanges shown in ANSI B161. Gaskets shall be of 1/8" thick rubber. Machine bolts shall be of high strength steel and shall have hexagon heads and nuts.

15. CONSTRUCTION EQUIPMENT:

A. The Contractor shall be responsible for any damage done to paved surfaces or lawns, whether at the site of the work or when moving the equipment from one place to another.

16. SAFETY PRECAUTIONS:

A. During the prosecution of this contract the Contractor shall at all time employ all necessary safety precautions to ensure the complete protection of both lives and property of his own forces as well as those of the general public. Flagmen shall be placed along public streets and highways as work is being installed along them and the necessary warning barricades and blinking lights shall be set out each night to clearly mark the areas under construction.

B. All ditches shall be shored and braced where necessary and the excavated material shall be kept a safe distance away from the ditch. Safety precautions instituted

along State Highway rights-of-way shall conform to the requirements as may be deemed necessary will also be provided by the Contractor.

C. The Contractor, and he alone, shall be solely responsible for the adoption of all necessary safety standards and precautions, and for the implementation institution, maintenance, supervisions of and payment for all devices and arrangements required to carry out the requirements of such standards. He shall hold and save harmless the Owner, the Engineer, or any employees thereof against all actions or suits filed in connection with any accidents or damage to property caused by inadequate or insufficient safety precautions being placed in effect by him to ensure the complete safety of all construction, inspection or supervisory forces employed around the project, or of the general public.

17. PERMITS:

A. The Contractor is responsible for applying and obtaining all permits for all Federal, State or local Authority having jurisdiction. All conditions of the permit must be met.

18. MILL CERTIFICATES:

A. When required by the Owner, mill certificates showing the results of hydrostatic pressure tests made on all types of pipe as required by the manufacturer's specifications shall be furnished.

19. EXCAVATION AND TRENCHING:

A. Trenches for the mains shall be excavated in the locations indicated on the construction documents or as directed by the Engineer. All trees, telephone and power line poles along the line of the work must be protected, and at night a sufficient number of barricades and lights to prevent accidents shall be provided. Where mains are laid between the curb and sidewalk or in other places where shrubbery and grass lawns are encountered the Contractor shall carefully remove and replace the shrubbery and cut the grass sod in sections, laying it to the side and replacing it after the compacted trench has been backfilled.

B. In general, the excavated material shall be kept clear of the sidewalks except where unusual conditions prevent this being done. Unless otherwise approved by the Engineer, all pipe shall be installed under driveways by boring and jacking, but where the driveway is cut it shall be backfilled as soon as the pipe is laid. No driveway shall remain inaccessible at the end of the day's work and all street crossings shall be backfilled and opened to traffic before work is stopped for the night.

C. On paved streets, wherever possible, the mains will be located between the curb and the sidewalk, and in all cases the mains will be located as to keep cutting and replacing pavement to a minimum.

D. The width of the trenches shall be in accordance with the manufacturer's recommended installations procedures. The depth of the trenches shall be such that all pipe will have a cover of at least 36".

E. Unless approved by the Engineer, all trenches shall be closed at the end of the workday.

F. All signs shall be re-erected in a manner satisfactory to the Engineer at the end of each workday. Signs shall be permanently re-installed back to the original condition at the end of the project.

G. All travel-ways shall be kept clean of mud, dust, dirt, or other debris. This requires a daily cleaning of travelways to the extent that dust is not a nuisance and roadways do not become hazardous.

20. INSTALLING PIPE:

A. All pipe shall be laid in accordance with procedures outlined by the Ductile Iron Pipe Research Association or Uni-Bell PVC Pipe Association. A copy of these procedures shall be kept by the Contractor on the job site at all times that pipe laying operations are occurring.

B. Before the pipe is lowered into place, the bottom of the trench shall be uniformly graded so that the pipe will have a bearing on earth for its full length. Where the excavation is in rock or other hard material, sufficient loose earth shall be shoveled into the trench to form a bed for the pipe. Each section of pipe shall be carefully examined for defects and the inside cleaned with a swab to remove all dirt and mud before it is installed.

C. At each joint shall be excavated a hole sufficient large to receive the bell or coupling so that the pipe barrel will rest uniformly in its bed of loose earth. Where pipe equipped with joints of the push on type utilizing a rubber ring is used, the bell shall be wiped clean before the ring is fitted into position, following which the spigot shall be coated with a thin film of lubricant, if so required by the manufacturer, and then pushed home.

D. On iron pipe equipped with mechanical type joints, before the section of pipe is pushed home the bell into which it fits shall be wiped clean, the end of the pipe being placed shall be wiped with a soapy water solution and the cast iron gland and rubber ring slipped on. After the section of pipe is in its final position, the rubber ring and gland shall be slid up to the joint, bolts inserted and the nuts tightened uniformly so that the bolts, particularly on the under side, shall be provided. In the case of pipe smaller than 4" in diameter being laid in a wet or muddy ditch bottom, the Contractor will be permitted to joint not more than 100 feet together on the ditch bank provided that the pipe is then carefully lowered into position with one man at each joint to preserve the alignment.

E. Where pipe laying is suspended at the lunch hour, at night, during inclement weather or at any other time, the open end of the pipeline shall be provided with a plug in order to prevent the entrance of dirt, mud and animals.

F. All fittings installed in the mains and the ends of all dead end lines shall be restrained by pouring a concrete block as shown on the drawings at the point where it will resist the pressure. Thrust blocks will be sized in accordance with the Design &

Construction or Thrust Restraint Design for DUCTILE IRON PIPE published by Ductile Iron Pipe Research Association.

21. **INSTALLING APPURTENANCES:**

A. Valves, fittings, hydrants and other appurtenances shall be placed in the locations shown on the construction documents or in the manner designated by the Engineer. Any omission of these appurtenances shall be corrected by the Contractor without additional cost to the Owner. All valves and hydrants shall be carefully examined to see that the working parts are in good order and that no grit or dirt is present in the valve seats before they are placed in position.

B. Over each valve less than 16" in size shall be placed a valve box, and over valves 16" and larger shall be provided a valve box both for the main valve and the bypass valve. Valve boxes shall be set concentrically around the valve operating nut and the top of the box shall be level with the ground surface.

22. **GRAVEL ROADS:**

A. Surfaces of all gravel roads where water lines are laid shall be brought back to their original condition on the same day they are disturbed. If necessary, additional base material as specified in the construction documents shall be spread, smoothed and compacted to the satisfaction of the Engineer.

23. **SERVICE TRANSFERS (RECONNECTIONS):**

A. Where an item for service transfer or service reconnections is provided in the construction documents, the Contractor will be required to make a tap in the new main, insert a corporation cock in the case of ductile iron main or set a tapping saddle in the case of PVC main, install sufficient service pipe to reach the existing service tubing as shown by the construction documents, furnish reconnect brass and all materials as specified herein.

B. When the new main has been hydrostatically tested, flushed and successfully chlorinated the new service pipe shall be flushed and chlorinated with water from the new main. The service shall be disconnected from the main to be abandoned and the new service tubing shall be connected to the existing tubing serving the in-place meter.

24. **SURFACE OBSTRUCTIONS:**

A. Each building, wall, fence, pole, bridge, railroad, driveway or other property or improvement encountered is to be carefully protected from all injury, and in the event that any of the foregoing are damaged or removed during the progress of the work the same shall be repaired or replaced within a reasonable time, and before final acceptance of the work shall be returned to as good condition as before the work started. Special care must be exercised in trenching under or near railroads in order to avoid or minimize delays and the danger of injury resulting therefrom, and the Contractor must use care in all phases of the construction work, for he will be held liable for damages caused by carelessness.

25. SUBSURFACE OBSTRUCTIONS:

A. In excavating, backfilling and laying pipe care must be taken not to remove, disturb or injure any water or sewer pipes or other conduits or structures. If necessary, the Contractor, at his own expense, shall sling, shore up and maintain such structures in operation. Before final acceptance of the work, he shall return all such structures to as good condition as before the work started.

B. When necessary, the Contractor shall give sufficient notice to the interested utility of his intention to remove or disturb any pipes, conduits, etc., and shall abide by their regulations governing such work. In the event that any subsurface structure becomes broken or damaged in the prosecution of the work, the Contractor shall immediately notify the proper authorities, and shall be responsible for all damage to persons or property caused by such breaks. Failure of the Contractor to promptly notify the affected authorities shall make him liable for any needless loss or for interference with the normal operation of the utility.

C. When pipes or conduits are broken during the progress of the work, the Contractor shall repair them at once at his own expense, or if required by the utility involved, shall pay the utility the proper charges for having such repairs made by the utility's own forces. Delays, such as would result in buildings being without service overnight or for a needlessly long period during the day, will not be tolerated, and the Owner reserves the right to make repairs at the Contractor's expense without prior notice. Should it become necessary to move the position of pipe, conduit or structure it will be done by the Contractor in strict accordance with the instructions given by the Engineer or utility involved.

D. The Owner or the Engineer will not be liable for any claim made by the Contractor based on underground obstructions being different than that indicated in these contract documents or construction documents. Where ordered by the Engineer, the Contractor shall uncover subsurface obstructions in advance of construction so that the method of avoiding them may be determined before pipe laying reaches the obstruction. Furthermore, the Contractor shall notify all utility companies involved of his intention to excavate in the locations specified and request that any underground cables be located in advance of construction work.

26. DEWATERING:

A. Water in Excavation: Water shall not be allowed in the trenches while the pipes are being laid and/or tested. The Contractor shall not open more trench than the available pumping facilities are able to dewater to the satisfaction of the Engineer. The Contractor shall assume responsibility for disposing of all water so as not to injure or interfere with the normal drainage of the territory in which he is working. In no case shall the pipelines being installed be used as drains for such water, and the ends of the pipe shall be kept properly and adequately blocked during construction by the use of approved stoppers and not by improvised equipment. All necessary precautions shall be taken to prevent the entrance of mud, sand, or other obstructing matter into the pipelines. If on completion of the Work any such material has entered the pipelines, it must be cleaned as directed by the Engineer so that the entire system will be left clean and unobstructed.

B. The Contractor shall, at all times during construction, provide and maintain ample means and devices with which to promptly remove and properly dispose of all water entering the excavation or other parts of the work and shall keep said excavation and work dry until the structures to be built therein are completed, or until the Engineers direct the Contractor to discontinue de-watering operations. Wherever judged necessary by the Engineer, the Contractor shall employ well points to insure a dry excavation.

C. The trench shall be so drained that workmen can work safely and efficiently therein. The Contractor shall dispose of the water from the work in a suitable manner without damage to adjacent property owners. It is essential that the discharge from trench pumps be led to natural drainage channels.

27. ROCK EXCAVATION:

A. Rock is defined as hard material which cannot be removed by conventional excavating equipment, including a tracked excavator.

B. Where rock is encountered in trenches, the excavation shall be carried to a depth of six inches below the barrel of the pipe; and the excavation shall be backfilled with approved firmly compacted bedding material.

C. The volume of rock paid for will be that from the bottom of the trench, at the elevations specified, or from the bottom of the rock if it lies above the bottom of the trench, to the top of the rock, the form being a prism with vertical sides, and the maximum width of the prism shall not exceed the external diameter of the pipe plus 18 inches. In no case shall any rock be left nearer than 6 inches from the outside of the pipe.

D. Where rock is encountered the Contractor shall "mattress" the trench during blasting operations and shall use all precautions necessary to protect adjacent property against damage resulting from his operations. Rock excavation in proximity to other pipes or structures shall be conducted with the utmost care to prevent damage to the existing structures, and any such damage caused shall be promptly repaired by the Contractor at his expense. Blasting operations shall not be conducted within 24 feet of installed pipe; and rock excavation shall be completed at least 24 feet ahead of pipe laying.

E. The Contractor shall be fully responsible for the protection of lines and property from any harm or damage as would result from exposure to the construction work. The Contractor shall, in all his acts and work, comply with the safety and health regulations referred to hereinabove and with all local ordinances and regulations pertaining to the work. The area of the work shall be isolated by warning signs and barricades; guards shall be stationed to prevent entry into the area; and efficient and adequate signal system shall be employed to give warning before blasting; and it shall be the responsibility of the Contractor to determine that the area is clear before the signal to fire is given. The handling, storing, loading, and firing of explosives shall be performed only by workmen experienced in blasting work. The Contractor hereby agrees to indemnify and save harmless the Owner and the Engineer against all claims, damages, and expense arising from or caused by, in any manner whatsoever, the handling, storage, or use of explosives on the work, or by any blasting on the work.

28. BLASTING:

A. The Contractor or his insurer shall perform pre-blast surveys of all structures within 500 feet of the blasting areas to document and photograph the pre-existing conditions.

B. The Contractor shall employ the services of a registered Professional Engineer with the applicable state with a minimum of five years experience in pipeline construction to design and approve all blasting procedures used in the removal of rock. All primary and secondary blasting shall be monitored by a registered blasting consultant to conduct daily blast noise, vibration and overpressure surveys during the progress of blasting operations. These surveys will be delivered to the Engineer daily.

C. The Contractor is responsible for adhering to all conditions of any Federal, State or local Authority having jurisdiction. Required permits are of the Contractor's responsibility to apply for and obtain. All conditions of the permits must be met.

D. The Contractor is reminded that he has sole and complete responsibility for the conditions on, in, or near the jobsite, including safety of all persons and property during performance of the work.

E. The required duty of the Engineer to conduct construction review of the Contractor's performance does not, and is not intended to, include review of the adequacy of the Contractor's safety measures in, on, or near the construction site.

F. The observation of safety provisions of applicable laws and local building and construction codes shall be the responsibility of the Contractor. The blasting consultant shall be present and supervise all blasting design, loading and shot firing at all times.

29. PIPELINES UNDER PAVEMENT:

A. Where mains are to be laid under paved streets or parking lots, and the installation of casing pipe or the use of cast iron pipe inserted in a bored hole is not required or specified, the Contractor will be permitted to cut and replace this pavement. In the event that subsurface operations result in injury or damage to the pavement, the necessary repairs shall be made by the Contractor at no additional cost to the Owner. In the event of the pavement on either side of the pipeline trench cracking or otherwise becoming disturbed or broken due to the Contractor's operations he shall repair or replace same at his own expense and without additional compensation.

B. Paving replacement shall conform to the construction documents. No paving replacement shall be installed without first notifying the Owner at least eight hours in advance so his representative may be present while the work is performed.

C. All backfill under areas where paving will be replaced shall be mechanically tamped to the following densities as defined by AASHTO T-99 Standard Proctor Density:

Backfill around pipe	- 95%
Remaining Subgrade	- 95%
Select Base Material	-100%

30. PIPELINES UNDER SIDEWALK:

A. Where pipelines are to be laid underneath pave sidewalks, the Contractor will be required to install them by means of a boring machine, auger or other suitable apparatus wherever possible, and where it becomes necessary to cut and replace the sidewalk it shall be replaced as soon as practicable after the trench has been backfilled and tamped. The replaced surface shall be 12 inches wider than the width of the trench, the excess width being equally distributed on both sides.

B. The Contractor will receive no additional compensation for laying pipe or fittings under sidewalks.

31. CONNECTIONS TO EXISTING MAINS:

A. Where "cut in" connection is indicated on the construction documents or directed by the Engineer, the Contractor shall connect the new mains to, and install valves in, the existing mains. These connections will normally be made in the afternoon, but where required to do so the Contractor shall be prepared to make them at night. Before any existing mains are cut the Contractor will work out a plan of procedure with the Owner, so that all customers who will be without water during the process will be notified and the valves to be closed will be located and uncovered.

B. The Contractor will not be permitted to cut the existing main until he has everything ready to make the connection. The Contractor shall be fully and properly equipped to do the work entirely with his own resources and under no conditions shall he place himself in the position of having to borrow any material, equipment or labor from the Owner. Failure to have everything in readiness to the satisfaction of the Owner may result in a postponement of the connection.

C. Where indicated on the construction documents, tapping sleeve and valves shall be used to make the connection. Where used, the tapping sleeve and valve shall be subjected to an air pressure test of 240 psi for 30 minutes or as directed by the Engineer.

32. PRESSURE TESTING:

A. After the mains and appurtenances have been installed, they shall be subjected to a hydrostatic pressure test. The pressure shall be applied by a motor driven test pump and an accurate recording pressure gauge shall be provided at a suitable point on the main. The test shall be conducted at 150% of the working pressure or the rated pressure of the pipe, whichever is greater. The test pressure shall be applied for not less than three hours on uncovered pipe and for not less than eight hours on covered pipe. The test pressure must be maintained at a constant pressure and continuously recorded by a chart recorder on a chart not less than 8" in diameter.

B. The allowable leakage for water mains shall be measured in gallons per hour per one thousand feet of pipe. Allowable leakage shall not exceed the following formula:

$$L = \frac{SD\sqrt{P}}{133,200} \quad \text{when} \quad \begin{array}{l} L = \text{Allowable Leakage, GPH} \\ S = \text{Length of Pipeline Section, LF} \end{array}$$

D = Diameter of Pipe (Nominal), Inches
P = Average Test Pressure, psig

C. The following leakage rates per 1,000 linear feet of typical pipe sizes shall not exceed the following values: Water shall be supplied to the main during the test period as required to maintain the test pressure as specified. The quantity used, which shall be compared to the above allowable quantity, shall be measured by pumping from a calibrated container. A 5/8-inch meter installed on the suction side of the pump may be used to measure the leakage for large mains when approved by the Engineer.

Pipe Diameter (D) Inches	Allowable Leakage (L) Gal/Hr.	Pipe Diameter (D) Inches	Allowable Leakage (L) Gal/Hr.
3	0.28	14	1.29
4	0.37	16	1.47
6	0.55	18	1.66
8	0.74	20	1.84
10	0.92	24	2.21
12	1.10	30	2.76

D. The Contractor shall be responsible for maintaining accurate records of each pressure test. The date, time, length of line tested, a recording of the test pressure, the times and amounts of make up water required, and a comparison of actual leakage versus allowable shall be compiled in a neat and organized format, certified by the inspector for the Owner, and delivered to the Engineer in triplicate. All pressure testing must be witnessed by the Engineer or the Owner and recorded by a continuous automatic chart recorder.

E. The Contractor shall leave a hydrant nozzle or other connection open when the pressure is first applied in order to exhaust air from the line. If no connection near the high point of the section being tested is available, he shall tap the main and install a corporation cock through which to exhaust the air.

F. All breaks, leaks or defects in the main appurtenances, dripping valve glands and hydrant gaskets shall be repaired, following which the test pressure shall be again applied. If the pressure gauge then remains steady the Contractor will notify the Engineer that the main is ready for inspection. The Contractor shall make the preliminary test and repair all defects before requesting an inspection by the Engineer.

G. In cases where the Contractor has elected to backfill the main prior to testing, it shall be his responsibility to fulfill the test requirements even if it becomes necessary to uncover any or all of the pipe in order to find the cause of a leak or other defect. Where practicable the mains shall be tested in sections not exceeding 1,500 feet in length.

33. DISINFECTION:

A. After the pipelines, valves, fittings and appurtenances have been installed and tested, they shall be disinfected in accordance with the method set forth in the latest edition of AWWA C651, and all applicable Federal, State or local regulations.

B. This procedure involves a preliminary flushing of the mains at a velocity of at least 4.0 feet per second, pumping a 50 ppm chlorine solution into the main through a corporation cock, filling the main slowly, allowing the chlorinated water to stand for 24 hours and then flushing out the main until the heavily chlorinated water has been discharged and a chlorine residual of no more than 0.2 ppm has been achieved.

C. The cost of disinfecting the mains shall be included in the price bid, and the Contractor shall provide all required equipment and the chlorinating agent. He shall also make a tap in the main at the beginning of each section to be tested and shall provide the necessary corporation cocks. The responsibility of ensuring satisfactory bacteriological samples shall be the Contractor's and he shall if necessary repeat the disinfection procedure until satisfactory results are obtained.

D. When cross connections to existing mains have been made, there is a tendency for contaminated water to gather in the main between the cross or tee and the valve on the existing main. When the new main is flushed to remove the heavily chlorinated water the valves on the cross mains shall be partly opened to allow the pressure from the distribution system to force out any contaminated water that might have gathered in these sections of the mains.

E. Water samples shall be taken by the Contractor in the presence of the Engineer or Owner. All bacterial testing shall be performed at a certified laboratory approved by the authority having jurisdiction.

34. CONNECTION TO EXISTING SYSTEM:

A. All connections to existing mains shall be made after complete disinfection of the proposed system and shall be made under the direction of the Owner. Valves separating the mains being installed from existing mains shall be operated by or under the direction of the Owner's representative. The cost of the work in making the connections shall be paid for by the Contractor.

B. In the event the proposed main is to be connected to a main which has one or more active services between the point of connection and the first existing line valve, a temporary plug or cap shall be installed on the new main until the pressure tests and disinfecting are completed. Upon satisfactory completion, the cap or plug shall be removed from both mains and the connection made with pipe which has been swabbed out with a solution of chlorine and water. The connection shall be made as swiftly as possible and any water in the ditch shall be kept below the level of the pipe. The pipeline shall then be placed in service by the Owner's personnel.

35. BACKFILLING AND CLEANUP:

A. All backfill under areas where paving will be replaced shall be mechanically tamped to the following densities as defined by AASHTO T-99 Standard Proctor Density:

Backfill around pipe	- 95%
Remaining Subgrade	- 95%
Clay gravel base 4" thick	-100%

B. After the pipe has been installed and tested, the trench shall be immediately backfilled. However, the Contractor may backfill the trenches prior to testing if he so desires but in this case he will comply with the requirements for testing the mains as specified elsewhere. Where pavement or sidewalk has not been cut to lay the pipe the backfill shall be tamped around and over the pipe to a depth of 12 inches over the top of the pipe. The remaining earth may be filled in and neatly mounded over the trench. Where the pavement or sidewalk has been cut to lay the pipe the backfill shall be thoroughly tamped in six inch layers for the full depth of the trench.

C. Where the trench is excavated in rock or other hard material which remains in lumps or pieces after being excavated, dry earth shall be provided and tamped around and over the pipe to a height of 12" above the top of the pipe. No large chunks or fragments of rock shall be placed into the backfill of the ditch.

D. In places where the trench has been excavated along the side of a paved street not provided with curb and gutter or where construction operations or the weather have spread the excavated material over the surfaces of unpaved streets, the Contractor shall employ a heavy duty motor grader to clean out the side ditches, shape the shoulders and restore the smoothness of the street surface to as good a condition as existed before the work was started. In the even that excavations on the shoulders of streets indicate that washouts or collapse of the shoulder are liable to occur, the backfill shall be carefully tamped and any earth washed out prior to the date of final acceptance shall be replaced. The use of mechanical equipment for this work does not remove from the Contractor the obligation to employ hand labor for the final dressing up.

E. Before final acceptance of the work all surfaces shall be returned to as good condition as before the work started.

F. All excavated material shall be cleared from adjacent street surfaces, gutters, sidewalks, parkways, railroads, grass plots, etc., using hand labor where necessary to achieve a satisfactory result, and the whole left in a tidy and acceptable condition.

G. The Contractor shall at all times keep the backfilled trenches, particularly those across the streets and driveways, filled to grade, and shall make a daily inspection to see that those needing additional fill are attended to. He shall maintain them in a good and safe condition and will be held responsible for any connection up to the date of final acceptance of the work by the Owner.

H. Where mains are laid across State or County highways or City streets and the pavement has been cut to make the installation, the Contractor shall backfill the section under the pavement with an acceptable backfill and tamped in 6" layers for the entire depth of the trench to the densities specified above.

36. INSPECTION OF VALVES:

A. After all work has been completed the Contractor shall make a careful inspection of all valves, either previously existing or new, which have been opened or closed during the course of the work, to make sure that all valves that should be opened are open and vice versa. No valve shall be opened or closed without the consent of the Owner.

B. At the same time all valve boxes shall be inspected to make sure that they are still plumb, centered over the operating nut, at the correct elevation and the cover in position. The use of a valve-nut-in –valve-box centering device is encouraged.

END OF MATERIAL SPECIFICATIONS FOR WATER MAINS

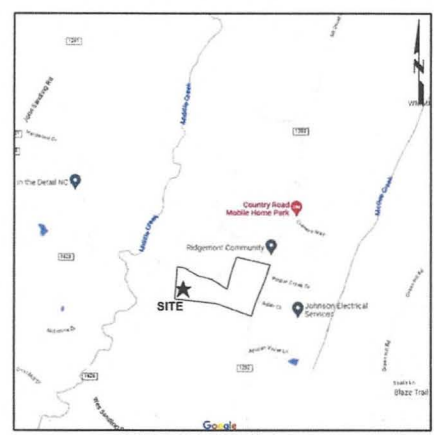
W-1300 SUB 98
EXHIBITS 4 THRU 6

W1300Sub8

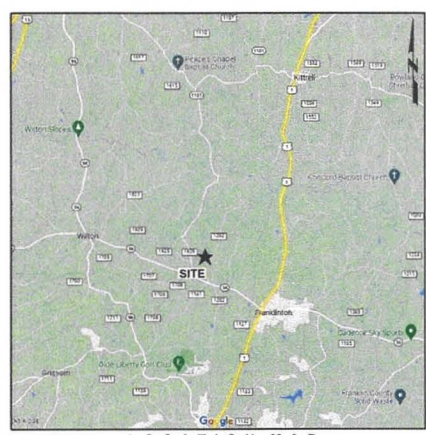
GREENPOINTE, LLC OLIVET SUBDIVISION POTABLE WATER SYSTEM

FRANKLIN COUNTY, NC

PROJECT No. A06902.00



VICINITY MAP



LOCATION MAP

SCHEDULE OF DRAWINGS:

- COVER SHEET
- C-101 OVERALL SITE LAYOUT & GENERAL NOTES
- C-102 PROPOSED WELL LOCATION
- D-101 DETAILS 1 OF 3
- D-102 DETAILS 2 OF 3
- D-103 DETAILS 3 OF 3
- S-101 STRUCTURAL DETAILS
- E-101 ELECTRICAL DETAILS



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PROJECT MANAGEMENT



ELECTRICAL

COMPANY # 2283

JULY 28, 2023

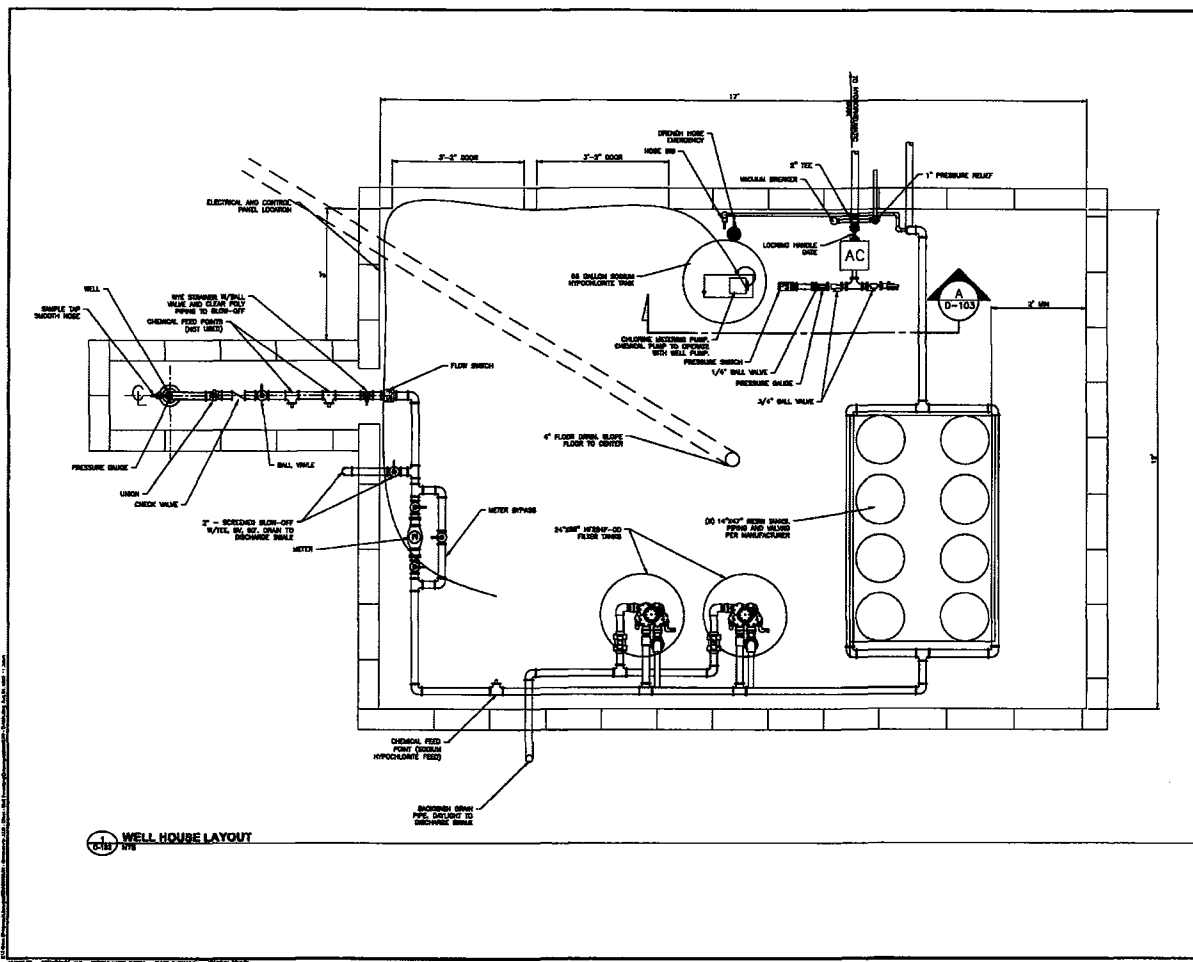
NO.	DATE	REVISIONS	SHEET

GREENPOINT, LLC - POTABLE WATER SYSTEM - CIVIL ENGINEERING - FRANKLIN COUNTY

GREENPOINT, LLC - POTABLE WATER SYSTEM - CIVIL ENGINEERING - FRANKLIN COUNTY

W-1300 SUB 98
EXHIBITS 4 THRU 6

W1300A.008



NOTES

1. SEE G-101 FOR ALL GENERAL NOTES.
2. ALL DIMENSIONS SHALL BE AS SHOWN UNLESS OTHERWISE NOTED.

REVISIONS	
NO.	DESCRIPTION

PROJECT MANAGER: **SM** PROJECT CHECKER: **SM**
 DRAWN BY: **SM** CHECKED BY: **SM**
 DATE: **JULY 28, 2013**

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OLIVET SUBDIVISION
POTABLE WATER SYSTEM PLAN

FRANKLIN COUNTY, NC

DETAILS 2 OF 3

PROJECT NUMBER: A08802.00	DRAWING NUMBER: D-102
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WELL HOUSE LAYOUT

W-1300 SUB 98
EXHIBITS 4 THRU 6

WELL HOUSE EQUIPMENT

1. FOR READY WELLS, WELL HEAD AS SHOWN ON DETAIL WILL BE REPLACED WITH PIPING FROM ACTUAL WELL HEAD LOCATION.

2. CHEMICAL FEED PUMP ASSEMBLY SHALL INCLUDE FOOT VALVE, NORMAN PRESSURE RELIEF VALVE, AND BYPASS SOURCE AND RELIEF VALVES.

3. MATERIALS SHALL BE COMPATIBLE WITH CHEMICAL.

4. FLOOR SHALL BE SLOPED TO FLOOR DRAIN.

5. PROVIDE BOTTLE EYE WASH STATION INSIDE WELL HOUSE.

6. PROVIDE DRAIN BENCH PLATFORM UNDER CHEMICAL STORAGE DRAINAGE CAPACITY OF 60 GALLONS.

7. PROPOSED CHEMICALS MUST BE AHA/NSF 60 COMPLIANT.

8. ALL CHEMICAL FEED EQUIPMENT IN CONTACT WITH POTABLE WATER MUST BE AHA/NSF #1 COMPLIANT.

WELL HOUSE FOUNDATION

1. EDGE OF CONCRETE SLAB TO BE SLOPED AND SERRATED 6" ABOVE DRAIN.

2. DRAIN TYPE OR MATERIALS REQUIRED AT MANHOLE/PIPE INTERFACES.

3. FOR READY WELLS, WELL HEAD AS SHOWN ON DETAIL WILL BE REPLACED WITH PIPING FROM ACTUAL WELL HEAD LOCATION.

AIR COMPRESSOR PIPING

NOTES

- SEE D-101 FOR ALL GENERAL NOTES.
- ALL DIMENSIONS MUST BE AHA/NSF 60 APPROVED.

REV.	DATE	DESCRIPTION

PROJECT MANAGER: []
 DESIGN BY: []
 CHECKED BY: []
 DATE: JULY 26, 2023

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 1500 W. HARRISVILLE ROAD, SUITE 100
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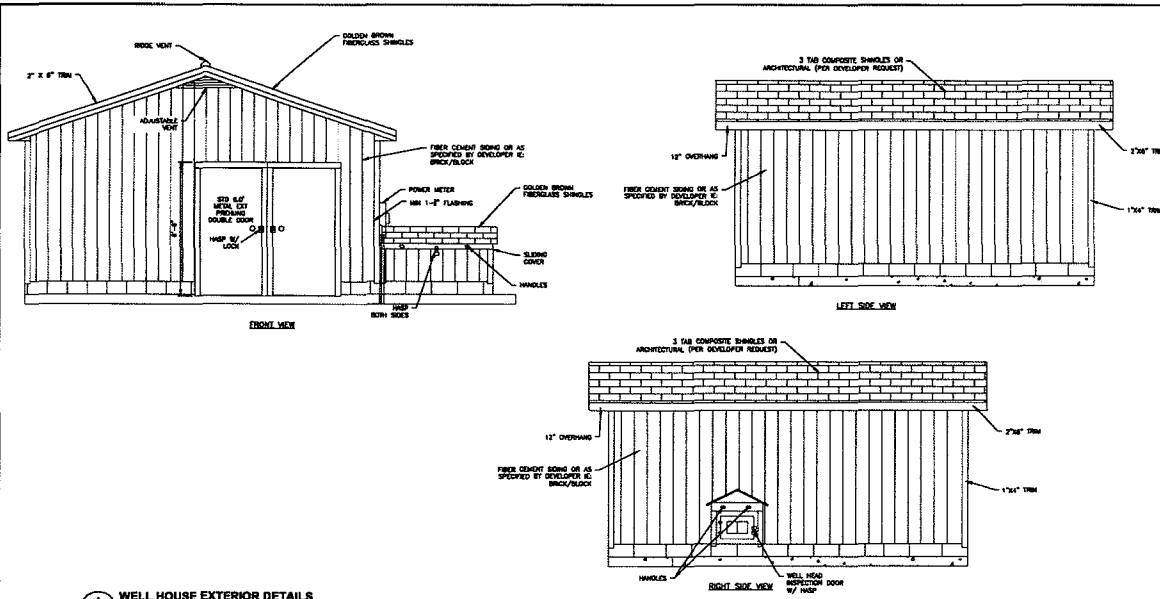
OLIVET SUBDIVISION
POTABLE WATER SYSTEM PLAN
FRANKLIN COUNTY, NC

DETAILS 3 OF 3

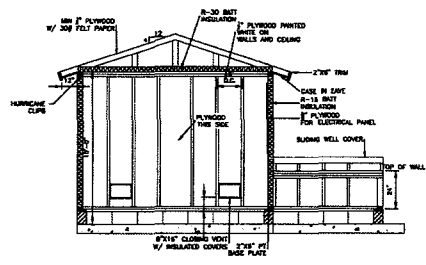
PROJECT NUMBER: A06902.00 DRAWING NUMBER: D-103

W-1300 SUB 98
EXHIBITS 4 THRU 6

W13025.008



1 WELL HOUSE EXTERIOR DETAILS



2 WELL HOUSE FRAMING DETAILS

- NOTES:
1. PROVIDE R-12 BATT INSULATION ON WALLS AND R-30 BATT INSULATION IN CEILING.
 2. CEILING JOIST SHALL BE 8 FEET ABOVE FINISHED FLOOR.
 3. BUILDING CAN BE CONSTRUCTED OF BLOCK WITH OWNER'S CONSENT.
 4. CONTRACT PER N.C.S.C. FOR WIND LOAD OF 140 MPH.

NOTES

1. SEE C-101 FOR ALL GENERAL NOTES.

REVISIONS	
NO.	DESCRIPTION

PROJECT MANAGER: JRM PROJECT ENGINEER: JRM
 DRAWN BY: JRM CHECKED BY: JRM
 DATE: JULY 26, 2023

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OLIVET SUBDIVISION
POTABLE WATER SYSTEM PLAN
FRANKLIN COUNTY, NC

STRUCTURAL DETAILS

PROJECT NUMBER: A06902.00 DRAWING NUMBER: S-101

