



LAKE WHATCOM WATER & SEWER DISTRICT

1220 Lakeway Drive
Bellingham, WA, 98229

(360) 734-9224
Fax 738-8250

MEMORANDUM

Date: July 5, 2022

RE: Virtual Meeting Attendance

For the foreseeable future, Lake Whatcom Water & Sewer District's Board of Commissioners will be attending regular meetings by phone/video conference. Per Governor Inslee's [Proclamation No. 20-28.3](#), the District will provide access to interested public via phone/internet utilizing the GoToMeeting platform.

Attending a Meeting

If you would like to attend the July 13, 2022 regular board meeting, access details can be found below. In this evolving climate, we are committed to doing everything possible to provide opportunity for public comment as well as promote health and safety. As such, **the District requests that if possible, public submit comments in written form by noon the day before a scheduled meeting** for inclusion in the meeting discussion. This is *not a requirement* for making a public comment, but is helpful to the staff and commissioners for planning purposes.

July 13, 2022 Regular Board Meeting

Wed, July 13, 2022 6:30 PM – 8:30 PM (PST)

Join the meeting from your computer, tablet or smartphone.

<https://meet.goto.com/771971373>

You can also dial in using your phone.

United States: [+1 \(669\) 224-3412](tel:+16692243412)

Access Code: 771-971-373

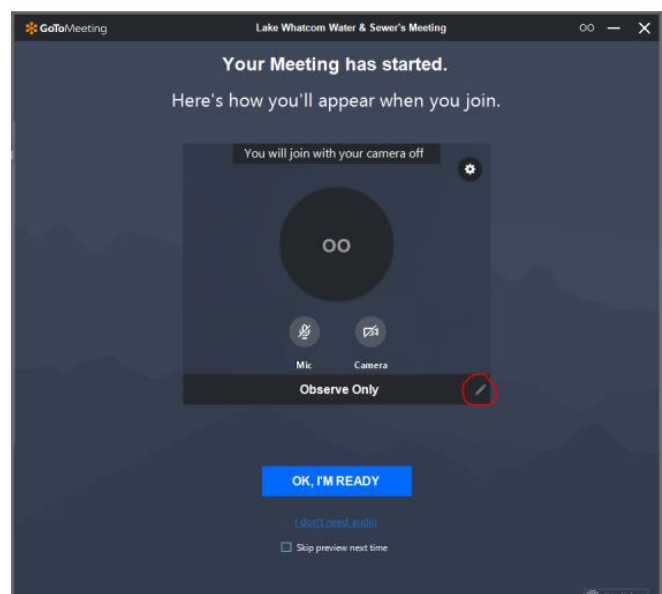
New to GoToMeeting? Get the app now and be ready when the meeting starts:

<https://meet.goto.com/install>

Attending as an Observer only

If you wish to observe a meeting, but do not plan to speak or appear on video during the meeting, you may attend anonymously.

When you click the link to log in to the meeting, a black box will appear like the one pictured below. Click the pencil icon (circled) and change your name to "Observe Only." Also make sure that your microphone and camera icon are grey and not green. You will be muted by the meeting administrator and will not be included in the roll call.



We appreciate your understanding and patience during these uncertain times.

If you have any questions, please contact Administrative Assistant

Rachael Hope at rachael.hope@lwwsd.org or 360-734-9224.

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LAKE WHATCOM WATER AND SEWER DISTRICT

1220 Lakeway Drive
Bellingham, WA 98229

REGULAR MEETING OF THE BOARD OF COMMISSIONERS

AGENDA

July 13, 2022


6:30 p.m. – Regular Session

1. CALL TO ORDER
2. ROLL CALL
3. CONFIRMATION OF COMPLIANCE WITH REMOTE MEETING ATTENDANCE PROTOCOLS
4. PUBLIC COMMENT OPPORTUNITY
At this time, members of the public may address the Board of Commissioners. Please state your name prior to making comments.
5. ADDITIONS, DELETIONS, OR CHANGES TO THE AGENDA
6. CONSENT AGENDA
7. SPECIFIC ITEMS OF BUSINESS
 - A. Resolution No. 884—Establishing a Biennial Budget Adoption Process
 - B. Lakewood Lane Right-of-Way Vacation Petition
 - C. Lake Whatcom Boulevard Sewer Interceptor Cure-In-Place-Pipe Project Closeout
 - D. Division 7 Reservoir Replacement Project Presentation
 - E. Lakewood/Rocky Ridge Sewer Pump Station Improvement Project Presentation
8. OTHER BUSINESS
9. STAFF REPORTS
 - A. General Manager
10. PUBLIC COMMENT OPPORTUNITY
11. ADJOURNMENT



**AGENDA
BILL
Item 6**

Consent Agenda

DATE SUBMITTED:	June 28, 2022	MEETING DATE:	June 29, 2022
TO: BOARD OF COMMISSIONERS	FROM: Rachael Hope		
GENERAL MANAGER APPROVAL			
ATTACHED DOCUMENTS	1. See below		
TYPE OF ACTION REQUESTED	RESOLUTION <input type="checkbox"/>	FORMAL ACTION/ MOTION <input checked="" type="checkbox"/>	INFORMATIONAL /OTHER <input type="checkbox"/>

****TO BE UPDATED 07.13.2022****

BACKGROUND / EXPLANATION OF IMPACT

- Payroll for Pay Period #14 (06/25/2022 through 07/08/2022) total to be added
- Payroll Benefits for Pay Period #14 total to be added
- Accounts Payable Vouchers total to be added

FISCAL IMPACT

Fiscal impact is as indicated in the payroll/benefits/accounts payable quantities defined above. All costs are within the Board-approved 2022 Budget.

RECOMMENDED BOARD ACTION

Staff recommends the Board approve the Consent Agenda.

PROPOSED MOTION


A recommended motion is:

"I move to approve the Consent Agenda as presented."



**AGENDA
BILL
Item 7.A**

**Resolution No. 884—Establishing
a Biennial Budget Adoption Process**

DATE SUBMITTED:	July 5, 2022	MEETING DATE:	July 13, 2022
TO: BOARD OF COMMISSIONERS	FROM: Jennifer Signs, Finance Manager		
GENERAL MANAGER APPROVAL			
ATTACHED DOCUMENTS	1. Resolution No. 884		
TYPE OF ACTION REQUESTED	RESOLUTION <input checked="checked" type="checkbox"/>	FORMAL ACTION/ MOTION <input type="checkbox"/>	INFORMATIONAL /OTHER <input type="checkbox"/>

BACKGROUND / EXPLANATION OF IMPACT

The Lake Whatcom Water and Sewer District (District) operates as a special purpose district authorized under [Title 57 Revise Code of Washington](#) (RCW). Title 57 “authorizes water and sewer district to establish operating and capital improvement policies.”

However, because the statute does not specify budgetary requirements, water and/or sewer districts may (but are not required to) adopt budget policies as a fiscal management tool (which would be considered a best practice). While some water and/or sewer districts do not adopt formal budgets, most do. For those that do, common forms include annual and biennial budgets.

Resolution No. 767, adopted by the Board of Commissioners on November 24, 2010, set District policy for the annual development and adoption of budgets. This policy is codified in Section 2.2.1 of the District Administrative Code (The General Manager shall develop an operating and capital improvement budget annually for both the water and sewer systems). Since its implementation, the annual budget process has proven to be an effective means of managing the District’s finances. That said, as a water and sewer district, the District’s primary functions are the operation of its water and sewer utilities. With an effective six-year capital improvement program and forecastable revenues and expenditures, conversion to a biennial budget process would be relatively seamless and could create long-term workload efficiencies.

The concept of a two-year budget is relatively straightforward. Rather than a twelve-month window during which the funds can be committed to accomplish the purpose and goals of the district, a biennium provides for a twenty-four-month window. During the regular Board meeting of the District on June 29, 2022, staff presented a memo to the Board to highlight some of the pros and cons in making the transition to a biennial budget beginning with the 2023-2024 fiscal years of the District. The Board considered the benefits of converting to a biennial budget adoption process and directed staff to proceed in

transitioning the District to a biennial budget adoption process from an annual budget adoption process. Under this direction, staff has developed Resolution No. 884 “Establishing a Biennial Budget Adoption Process” to revise the District’s Administrative Code Section 2.2 “Operating & Capital Budget and Expenditure Policies” and Section 2.3 “Capital Improvement Plan Policy” to allow for the transition to a biennial budget adoption process.

FISCAL IMPACT

None

APPLICABLE EFFECTIVE UTILITY MANAGEMENT ATTRIBUTE(S)

Operational Optimization

Financial Viability

RECOMMENDED BOARD ACTION

Staff recommends that the Board adopt Resolution No. 884.

PROPOSED MOTION

Recommended motion is:

“I move to adopt Resolution No. 884 as presented.”

**LAKE WHATCOM WATER AND SEWER DISTRICT
RESOLUTION NO. 884**

A Resolution of the Board of Commissioners
Establishing a Biennial Budget Adoption Process

WHEREAS, the Lake Whatcom Water and Sewer District ("District") is a special purpose district located in Washington State authorized under Title 57 Revised Code of Washington ("RCW"); and

WHEREAS, Title 57 RCW authorizes water and sewer districts to establish operating and capital improvement policies; and

WHEREAS, the District Board of Commissioners ("Board") previously determined it in the best interest of the District to establish an annual operating and capital improvement budget via adoption of Resolution No. 767, codified within Sections 2.2 and 2.3 of the District's Administrative Code; and

WHEREAS, the District has since annually adopted operating and capital improvement budgets for the subsequent calendar year; and

WHEREAS, the Board has considered the benefits of converting to a biennial budget adoption process, which include but are not limited to an overall optimization of staff workload in budget development, greater flexibility in administration of multi-year capital improvement projects, and creation of a longer budgetary planning perspective;

NOW, THEREFORE, BE IT RESOLVED by the Board of Commissioners of the Lake Whatcom Water and Sewer District, Whatcom County, Washington as follows:

Section 1. Section 2.2, Operating & Capital Budget and Expenditure Policies, of the District Administrative Code is repealed and replaced with the following.

The Revised Code of Washington Title 57 authorizes water and sewer districts to establish operating and capital improvement policies. From time to time it is necessary for the District's General Manager to procure goods and services on short notice without advance approval or authorization from the District's Board of Commissioners. The General Manager may do so only if it is deemed to be in the best interest of the District and its ratepayers, subject to the following limitations:

1. The General Manager shall develop an operating and capital improvement budget biennially for both the water and sewer systems. The biennial budget shall provide for the forecasting of revenues and expenditures for the following two fiscal years. The biennial fiscal period shall start on January 1 of an odd-numbered year and end on December 31 of the following even-numbered year. The budget shall be presented to the Board of Commissioners for review and approval prior to the end of December in advance of the next biennium.

2. The General Manager shall be responsible for administration of the District's approved operating and capital budgets.
3. The Finance Manager/Treasurer shall establish appropriate controls to monitor expenditures and the implementation of the adopted budgets.
4. The General Manager and Finance Manager/Treasurer shall develop a monthly budget report and shall present such report to the Board of Commissioners at their second regular monthly meeting. A more detailed quarterly financial report will be presented in place of the monthly report in January, April, July and October of each year.
5. The General Manager is authorized to execute contracts on behalf of the District whenever the amount of the contract is \$50,000.00 or less, provided that the funds for the contract are included in the then-current budget.
6. The General Manager is authorized to approve change orders to District contracts when the amount of the proposed change order is \$50,000.00 or less, provided that funds for the contract are included in the then-current budget.
7. Following execution of a contract or change order as referenced in Sections 2.2(5) and 2.2(6) above by the General Manager, said contract or change order shall be included within the Consent Agenda for approval by the Board at the next regular meeting of the Board. The Board shall, so long as consistent with this Resolution, take action at such meeting to review and ratify the contract or change order. [Resolution Nos. 767, 861, 884]

Section 2. Section 2.3, Capital and Improvement Plan Policy, of the District Administrative Code is repealed and replaced with the following.

The District has established as a primary fiscal responsibility the preservation, maintenance and future improvement of the District's capital facilities, equipment, and assets. Proper planning and implementation of sound capital policies and programs assist the District in avoiding fiscal emergencies and unplanned capital costs in the future.

1. A comprehensive multi-year Capital Improvement Plan for the District's water and sewer facilities is updated biennially. All projects included in the Capital Improvement Plan shall be consistent with the District's Water and Sewer Comprehensive Plans.
2. The Board will review on a biennial basis and establish criteria against which capital proposals should be measured. Included among the factors which will be considered for priority ranking are the following:
 - Projects which will have a positive impact on the operating budget through reduced costs or increased revenues.
 - Projects which are scheduled in the Capital Improvement Plan.
 - Projects which can be realistically accomplished during the year that they are scheduled.
 - Projects that implement previous Board-approved reports and strategies.

- Renewal and replacement schedule projects.
3. Proposed capital projects should include cost estimates that are complete, reliable and attainable. Project cost estimates for the Capital Improvement Plan shall be based upon a thorough analysis of the project and are expected to be as reliable as the level of detail known about the project.
 4. Financial analysis of funding sources will be conducted for all proposed capital improvement projects, in addition to listing the total project costs.
 5. The biennial capital budget shall include only those projects which can reasonably be accomplished in the timeframe indicated.
 6. The District will project its equipment needs and will update these projections biennially. From this projection, a maintenance and replacement schedule will be developed and followed. The intent of the maintenance program shall be to maintain all assets at an adequate level in order to protect the District's capital investment and to minimize future maintenance and replacement costs; customer's expected level of service and the protection of Lake Whatcom should also be considered.
 7. Although the District will generally finance projects on a "pay-as-you-go" basis, the Board may conclude that the most equitable way of funding a project that benefits the entire community will be debt financing in order to provide capital improvements or services in a timely manner.
 8. New private community development including residential and commercial projects shall pay for its fair share of the capital improvements that are necessary to serve the development in the form of general facilities charges (GFCs).
 9. Project proposals should indicate the project's impact on the operating budget including, but not limited to, long-term maintenance costs necessary to support the improvement.
 10. Capital projects that are not completed during the fiscal biennium shall be re-budgeted to be carried over to the next fiscal biennium. All re-budgeted capital projects should be so noted in the adopted Capital Budget.
 11. Capital projects will not be budgeted unless there are reasonable expectations that revenues will be available to pay for them and subsequently fund their operations and services associated therewith.
 12. Projects that involve intergovernmental cooperation in planning and funding should be established by an agreement that sets forth the basic responsibilities of the parties involved.
 13. A comprehensive inventory of all capital assets shall be conducted and maintained to include estimates of actual value, replacement cost and remaining useful life.

14. Capital projects shall be financed to the greatest extent possible through user fees when direct benefit to users results from the construction of the project.
15. In conjunction with establishing or planning its capital program, the District maintains a six-year capital financing plan that supports execution of that program and is capable of sustaining long-term District capital requirements. The capital program incorporates system expansion, upgrades and improvements, and system repair and replacement. The intention is to establish an integrated capital funding strategy.
16. Comprehensive Plans for the District are completed or updated every six years as required by Chapter 57.16 RCW and applicable state regulations, using a 20-year planning horizon. For budgeting purposes, the District maintains a capital projects schedule, the Capital Improvement Plan of at least six years in duration and consistent with the comprehensive long-range plans for the system. The schedule will include the project description, estimated year of construction and total estimated cost. During the periodic rate study review various funding sources are identified as well as estimated capital fund balances, in an effort to identify a potential funding shortfall.
17. The District works to pursue a reasonable capital improvement program through careful balance of pay-as-you-go capital projects and debt financing.
18. District GFC revenue is revenue received from new customers connecting to the water and sewer systems and on expanded development(s). The District reviews and adjusts, if appropriate, the GFC as needed.
19. The District utilizes revenue bonds and applicable state and federal loans and grants to assist in capital funding whenever necessary. Each capital project that may be funded by a loan is evaluated within the context of the District's capital improvement program and the capital budget. Alternative financing sources are always considered. The District will not issue or accept long-term debt to finance current operations.
[Resolution Nos. 826, 861, 884]

Section 3. Any resolutions or parts of resolutions in conflict herewith are hereby repealed insofar as they conflict with the provisions of this Resolution.

Section 4. If any section, subsection, sentence, clause or phrase of this Resolution is for any reason held to be invalid or unconstitutional, such decision shall not affect the validity of the remaining portions of this Resolution. The Board of Commissioners hereby declare that it would have passed this Resolution and each section, subsection, sentence, clause and phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses or phrases has been declared invalid or unconstitutional, and if, for any reason, this Resolution should be declared invalid or unconstitutional, then the original resolution or resolutions shall be in full force and effect.

Section 5. This resolution shall be effective immediately.

ADOPTED by the Board of Commissioners of Lake Whatcom Water and Sewer District, Whatcom County, Washington, at a regular meeting thereof, on the 13th day of July, 2022.

Laura Abele, President, Board of Commissioners

Attest:

Rachael Hope, Recording Secretary


Approved as to form:

Robert Carmichael, Attorney for the District



**AGENDA
BILL
Item 7.B**

**Lakewood Lane Right-of-Way
Vacation Petition**

DATE SUBMITTED:	July 6, 2022	MEETING DATE:	July 13, 2022
TO: BOARD OF COMMISSIONERS	FROM: Justin Clary, General Manager		
GENERAL MANAGER APPROVAL			
ATTACHED DOCUMENTS	1. none		
TYPE OF ACTION REQUESTED	RESOLUTION <input type="checkbox"/>	FORMAL ACTION/ MOTION <input checked="" type="checkbox"/>	INFORMATIONAL /OTHER <input type="checkbox"/>

BACKGROUND / EXPLANATION OF IMPACT

With the Board's approval during its regularly scheduled March 9, 2022 meeting, DISH Wireless LLC initiated land use permitting processes with Whatcom County for the construction of a wireless communication facility on District-owned property located at 1010 Lakeview Street (Whatcom County Parcel No. 380334 411334 0000).

In its review of DISH's application, Whatcom County Planning and Development Services has issued a Notice of Additional Requirements (NOAR). One of the additional requirements is associated with the proposed facility location relative to property boundaries. In accordance with Whatcom County Code (WCC) 20.13.092(6), the setback from adjacent property lines for the proposed facility should be at least "...a distance equal to the height of the wireless communications support structure..." However, the 135-foot-tall facility is proposed 124-feet from the property line to the east. The applicant has requested a special exception under WCC 20.13.110(1), citing moving the facility the required 135-feet from the eastern property line would result in removal of mature trees that will be used for facility screening and additional fill (earthwork) in the watershed.

East of the District's property lies a 60-foot-wide Whatcom County right-of-way reserved for the future extension of Lakewood Lane. In the NOAR, the Whatcom County Public Works Department states that it does not support the setback reduction from its right-of-way, regardless of the unlikelihood of extension of Lakewood Lane adjacent to the District's property. The NOAR proposes that a possible solution could be to have the District, as the adjoining property owner, pursue formal vacation of the 30-foot half-width of the Lakewood Lane right-of-way (DISH is unable to make the application for vacation itself; the applicant must be the adjoining property owner). DISH has requested that the District consider pursuing the vacation. The following figure has been prepared to orient the Board with the proposed request.



Right-of-Way (looking north)



Right-of-Way (looking south)

FISCAL IMPACT

Per WCC 12.20.030, the petition would require payment of an application fee (\$300), appraisal fee (\$200), a processing fee (\$162), and a recording fee (\$128) per the Whatcom County Unified Fee Schedule. Note that the appraisal fee may be refunded if no appraisal is conducted, and up to 30 percent of the application fee may be refunded if the vacation is granted pursuant to the Territorial Land Act of 1890. The District would also be responsible to pay for the appraised value of the right-of-way (WCC 12.20.060.C), which is unknown at this time.

APPLICABLE EFFECTIVE UTILITY MANAGEMENT ATTRIBUTE(S)

none

RECOMMENDED BOARD ACTION

Staff recommends that the Board not pursue the requested right-of-way vacation.

PROPOSED MOTION

If the Board wishes to pursue right-of-way vacation, a recommended motion is:


“I move to authorize the general manager to prepare and submit a petition to Whatcom County for vacation of one-half width of the Lakewood Lane right-of-way located adjacent to District-owned property at 1010 Lakeview Street.”

If the Board does not wish to pursue the requested right-of-way vacation, no action is necessary.



**AGENDA
BILL
Item 7.C**

**2022 Lake Whatcom Boulevard
Sewer CIPP Project
Public Works Contract Close Out**

DATE SUBMITTED:	June 22, 2022	MEETING DATE:	June 29, 2022
TO: BOARD OF COMMISSIONERS	FROM: Bill Hunter, District Engineer / Assistant General Manager		
GENERAL MANAGER APPROVAL			
ATTACHED DOCUMENTS	none		
TYPE OF ACTION REQUESTED	RESOLUTION <input type="checkbox"/>	FORMAL ACTION/ MOTION <input checked="" type="checkbox"/>	INFORMATIONAL /OTHER <input type="checkbox"/>

BACKGROUND / EXPLANATION OF IMPACT

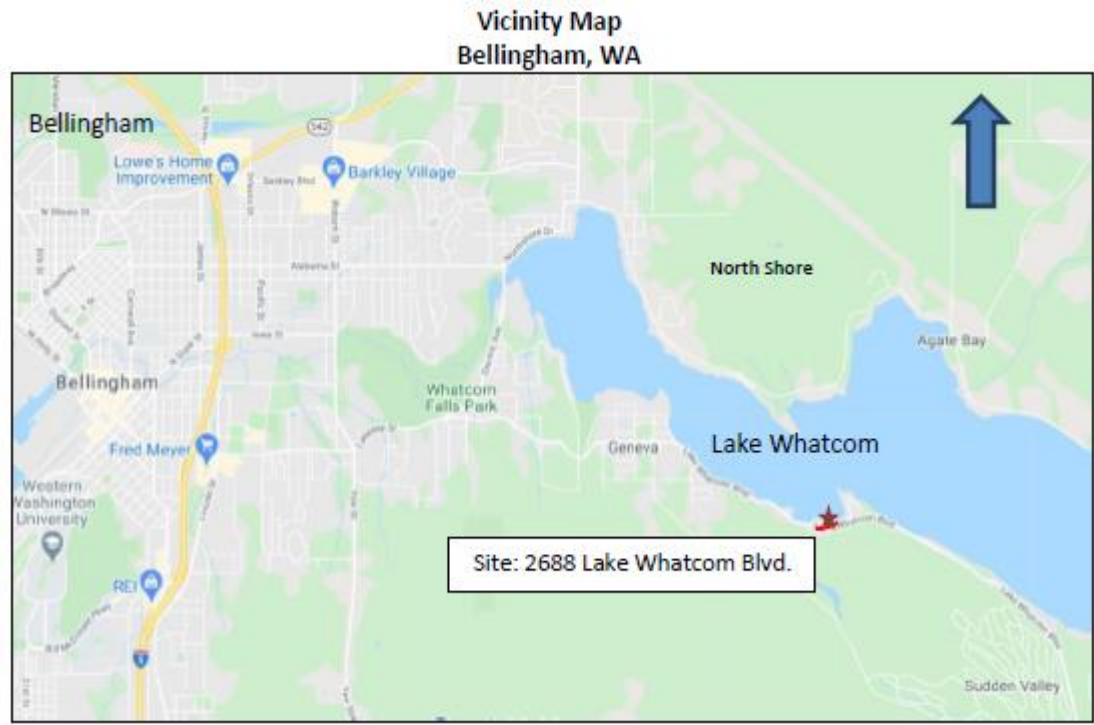
This project is the second of a series of projects to systematically rehabilitate degraded gravity pipe segments along the Lake Whatcom Boulevard Sewer Interceptor to improve flow capacity.

In the Fall of 2020 Wilson Engineering completed a hydraulic analysis that prioritized segments for rehabilitation, ranking them from the greatest positive impact to the least impact, on improving hydraulic capacity. The segments are located along Lake Whatcom Boulevard just west of Strawberry Point.

The 2022 scope of work includes rehabilitation of 697 feet of 10-inch diameter sanitary sewer pipe, traffic control, and sewage bypass pumping.

The District awarded the construction contract to Insta-Pipe, Inc. on March 30, 2022. The contractor completed all work and contract requirements. Staff recommends accepting the project as complete and closing out the public works contract.

Below are map exhibits that show locations of completed work.



Rehabilitated Pipe Segments – 697 feet (Solid Black Lines)



FISCAL IMPACT

The contractor completed the work for the original contract amount of \$89,103.04 (including 8.6% sales tax). No change orders were issued for the project.

APPLICABLE EFFECTIVE UTILITY MANAGEMENT ATTRIBUTE(S)

Operational Optimization

Infrastructure Strategy and Performance

RECOMMENDED BOARD ACTION

Staff recommends accepting the project as complete and closing out the public works contract.

PROPOSED MOTION


Recommended motion is:

“I move to accept the 2022 Lake Whatcom Boulevard Sewer CIPP Project public works contract performed by Insta-Pipe, Inc. as complete and authorize staff to close out the public work contract.”



**AGENDA
BILL
Item 7.D**

**Division 7 Reservoir
Replacement Project
Briefing #2**

DATE SUBMITTED:	June 30, 2022	MEETING DATE:	July 13, 2022
TO: BOARD OF COMMISSIONERS	FROM: Bill Hunter, Assist. GM/District Engineer		
GENERAL MANAGER APPROVAL			
ATTACHED DOCUMENTS	1. Pre-Application Meeting Information Submitted to Whatcom County		
TYPE OF ACTION REQUESTED	RESOLUTION <input type="checkbox"/>	FORMAL ACTION/ MOTION <input checked="" type="checkbox"/>	INFORMATIONAL /OTHER <input type="checkbox"/>

BACKGROUND / EXPLANATION OF IMPACT

The project replaces the existing 1-million gallon welded-steel Division 7 Reservoir that was constructed in 1970 with two reservoirs that meet current seismic design standards and that are sized for full community build-out. The project also implements an earthquake early warning system (ShakeAlert®) to automatically isolate a portion of the stored volume from rapid depletion due to water main breaks following a major earthquake. The project is located on Camp Firwood property near the top of the hill above Swallow Circle in Sudden Valley.

Visit the project website (located here: <https://lwwsd.org/projects/division-7-reservoir-replacement/>) for additional details and information.

County permit applications are in development. A pre-application meeting application will be submitted to Whatcom County by late June / early July. The pre-application meeting is anticipated to be scheduled in July, with the goal of permit application submittal following shortly after.

To date, the District has engaged the following stakeholders:

- Operations and maintenance field staff
- Engineering department staff
- District management team
- Board of Commissioners
- South Whatcom Fire Authority
- District customers are invited to a project informational meeting at the Sudden Valley Barn (8 Barn View Dr, Bellingham, WA 98229) scheduled for Tuesday, July 12, 2022 between 6:30 and 8:30 pm. Properties within 1000-feet of the project site received invitation letters in the mail. The meeting has also been advertised in the

Sudden Valley weekly email newsletter, Sudden Valley website, District website, District Facebook, and Bellingham Herald.

Stakeholder engagement has been done in advance of submitting for Whatcom County permits, which will include a Conditional Use Permit and Variances. The permitting process will involve a formal public hearing in front of the Hearing Examiner.

Wilson Engineering and District staff will provide a project briefing on predesign and tank sizing efforts completed to date, update on project progress, upcoming milestones, comments collected during the July 12 informational meeting, and recommend a reservoir volume size.

FISCAL IMPACT

The project is funded by a Hazard Mitigation Grant that shares costs between FEMA (75%), Washington State Emergency Management Division (12.5%), and the District (12.5%). The current grant funding allocations are:

FEMA	\$1,710,750
Washington State Emergency Management Division	\$285,125
<u>District (local match)</u>	<u>\$285,125</u>
Total	\$2,281,000

** Note that grant funding has been split into two phases. Phase 1 includes \$0.45M for design and permitting, and Phase 2 includes \$1.83M for construction.*

The current total project cost estimate is \$2.4 million, which is \$119,000 (5.2%) over the grant funding plan. According to the Hazard Mitigation Grant Coordinator for this project, there is a process to request additional funding, but it is unknown whether it would be approved. District staff plans to submit a request for additional funding once the project design has been developed for Whatcom County permit submittal. At that point the project scope will be well defined to prepare a refined cost estimate.

APPLICABLE EFFECTIVE UTILITY MANAGEMENT ATTRIBUTE(S)

Infrastructure Strategy and Performance
Community Sustainability

RECOMMENDED BOARD ACTION

Provide direction on whether to proceed with the recommended reservoir volume or identify additional information/alternatives needed for further consideration.

The design consultant, Wilson Engineering LLC, and the District’s General Manager, District Engineer, and Operations and Maintenance Manager recommend a total tank volume size of 475,800 gallons that will provide for full community build-out. The recommendation follows significant coordination with District operations and maintenance staff, treatment plant operator, distribution system testing, developing and testing control logic at the Sudden Valley Water Treatment plant, simulation analyses of treatment plant and reservoir levels using real events such as water main breaks and maximum day demands, as well as coordination with South Whatcom Fire Authority.

The proposed volume is 13.5% (55,416 gallons) larger than the volume determined utilizing guidelines established by Washington State Department of Health's Water System Design Manual, Whatcom County Coordinated Water System Plan, and the District's Comprehensive Water Plan. The proposed volume is at the most efficient unit price point in terms of \$/gallon for the site. Anything larger triggers stormwater management thresholds that add significant costs for detention and treatment facilities. Anything smaller does not take advantage of the relatively low unit price cost of \$/gallon.

PROPOSED MOTION

Recommended motion is:

"I move to proceed with Division 7 Reservoir Replacement project design and permitting that includes two proposed reservoirs totaling 475,800 gallons as presented."



Pre-Application Meeting Packet

Purpose of a Pre-Application Meeting

The purpose of a pre-application meeting is to provide a prospective development applicant consultation and input regarding allowed uses, Development Standards, and process applicable to a proposal prior to formal application submittal.

Who attends the Meeting?

Depending upon the proposal and its physical location, staff representatives from Planning and Development Services Current Planning, Natural Resources, Building Services, Fire Marshal's Office, and Health; Public Works Engineering and/or Flood; WSDOT; a neighboring City; and your Fire District may also attend the meeting. If you choose, your representatives may include a delegated agent, engineer, natural resources consultant, architect, surveyor, and/or other specialists.

What will the Meeting cover?

- Likely required permits and/or approvals, and fees
- Typical project review timelines
- Overview of likely applicable regulations
- Potential regulatory conflicts
- Known site constraints
- Anticipated code changes
- Answers to applicant's questions

What happens after the Meeting?

After the meeting staff will prepare site-specific submittal requirements and provide them to the applicant either by e-mail or mail, usually within fourteen (14) days of the meeting. These comments will act as a checklist during application intake. If the scope of work changes, or if a permit is not submitted within one (1) year, the County requires a new pre-application meeting.

How do I apply for a Meeting?

- 1) Check with the Whatcom County Planning and Development Services (PDS) office to determine whether or not a pre-application meeting is required for your proposal by calling (360) 778-5900 or by emailing pds@whatcomcounty.us.
- 2) You may submit your completed **Pre-Application Meeting Request** form to Whatcom County digitally via email by sending all application materials to epermits@co.whatcom.wa.us. Once the application has been received a planner will be assigned and you will be contacted with the project number and applicable fees. If you are unable to submit digitally, please call (360) 778-5900 in order to arrange a mail submittal. We generally hold Pre-Application Meetings on Thursday mornings. We may apply some fees associated with the Pre-Application Meeting to the cost of the actual application if you submit a complete application within one year of the Pre-Application Meeting date.

Pre-Application Intake Checklist

To initiate a pre-application meeting, please provide the following to Planning and Development Services.

- ☐ [Pre-Application Fees](#) – To pay for your permit or application you will receive an email from staff with the permit balance due. Once you have received this information you can pay for your permit by the following options:
- Credit or Debit Card. Call 360-778-5900 to arrange payment. (there is a 2.35% transaction fee on credit cards, \$1.00 for debit cards.) Please have your permit number ready for the cashier.
 - Mail a check payable to Whatcom County Planning to 5280 Northwest Drive, Bellingham WA 98226. (please include your permit number on the check)

Required Documents

- ☒ Completed *Pre-Application Meeting Request* packet.
- ☒ *Project Narrative* including intended uses, hours of operation, variances or waivers requested, proposed water supply and sewage disposal method, and if the project is a residential subdivision indicate whether the lot(s) will be eligible for an accessory dwelling unit.
- ☒ *Site Plan(s)/Map(s)* that reflect the following for all property subject to the proposed development:
- Applicant's name, address, and phone number
 - Preparation date
 - North arrow
 - Common engineering scale (1" = 20" or larger)
 - Affected parcel(s) boundaries with dimensions shown
 - Approximate locations of natural features, including bodies of water, regulated watershed boundaries, natural drainage areas, critical areas, ordinary high water mark (OHWM), base flood elevation, and buffers
 - Locations and widths of any existing and proposed easements and rights-of-way for ingress/egress, drainage, and utilities
 - Locations and widths of any existing and proposed roadways and driveways
 - Locations and square footage of any existing and proposed structures
 - Locations of any existing fire hydrants within, plus 600 feet beyond, the property
 - Locations of any existing and proposed sanitation and potable water facilities
 - For all subdivisions, existing and proposed net and gross lot size(s) to determine minimum lot size and density requirements as required by the Zoning Ordinance
 - Locations of any existing and proposed impervious surfaces per the Preliminary Stormwater Information Section (page 5)
 - Proposed phasing (if applicable)

Optional Documents

- ☐ List of additional responsible parties or representatives, including agent, contractor, engineer, design professional, etc.

As Applicable to the Proposed Development

- ☒ *Critical Areas Report*, including wetland delineation if available, **Geotechnical Report**
- ☒ On the *Site Plan(s)/Map(s)*, show locations, square footages, heights, and uses of all existing and proposed spaces, floors, and structures. Include decks, retaining walls, and rockeries that are 30" in height or greater
- ☐ List all proposed occupancy classifications, floor areas, number of stories, building heights, construction type(s) and fire sprinkler/alarm information
- N/A**

WHATCOM COUNTY

Planning & Development Services
5280 Northwest Drive
Bellingham, WA 98226-9097
360-778-5900, TTY 800-833-6384
360-778-5901 Fax

**Mark Personius, AICP**

Director

Pre-Application Meeting Request**Pre-Application Meeting is for the following development applications:**

- | | |
|--|---|
| <input type="checkbox"/> Administrative Approval Permit | <input checked="" type="checkbox"/> Conditional Use Permit |
| <input checked="" type="checkbox"/> Commercial Building Permit | <input checked="" type="checkbox"/> Land Disturbance Permit |
| <input type="checkbox"/> Shoreline Permit | <input type="checkbox"/> Any Land Subdivision |
| <input checked="" type="checkbox"/> Variance | <input type="checkbox"/> Delineation Review |
| <input type="checkbox"/> Other | |

Case # (PDS) _____ Parcel Size 80.98 acresTax Parcel Number(s) 370408 490372 0000 (Property ID 33801)Project Address 1740 Lake Whatcom Blvd**Applicant**Name Lake Whatcom Water and Sewer District Phone 3607349224Address 1220 Lakeway Dr. City BellinghamState WA Zip 98229 Email bill.hunter@lwwsd.org**Property Owner**Name The Firs Bible & Missionary Conference Phone 3607336840Address 4605 Cable St City BellinghamState WA Zip 98229 Email dougw@thefirs.org**Agent (if, applicable)**Name N/A Phone _____

Address _____ City _____

State _____ Zip _____ Email _____

NOTE: Pre-application review does not constitute acceptance of an application by the County nor does it vest an application. Future review of your formal application may require changes, alterations, or additional information to clarify the details of your proposal and design.

Proposed Land Disturbance Information:

Any filling, grading, or clearing within 300 feet of critical areas requires review and approval by Whatcom County prior to commencing any project work. Any filling or grading in excess of 50 cubic yards requires a land disturbance permit or development application. Answer all questions completely and as accurately as possible.

Is the project within 300 feet of a critical area? ☒ Yes ☐ No ☐ Unknown GHA 1A, Geotechnical Report attached.

Will the project require clearing of vegetation? ☒ Yes ☐ No

If yes, how much circle (acre, sq. ft.) 0.38 acre

Will the project require surface disturbance? ☒ Yes ☐ No

If yes: How much excavation? (cubic yards (square feet / 27)) 3,200 cubic yards

How much fill? (cubic yards (square feet / 27)) 3,200 CY will be reused on site

Will the project require removal or cutting of trees? ☒ Yes ☐ No

If yes: Acre(s) of cutting/removal 0.34 acres

Selling Timber? ☒ Yes ☐ No The project will deliver logs to property owner on site storage location. It is our understanding the property owner will eventually sell the timber.

Do you have Forest Practice Approval (FPA) ☐ Yes ☒ No If Yes, FPA# _____

Building Information (if applicable): N/A

<input type="checkbox"/> Residential or Multi-Family	Number of Dwelling Units:
<input type="checkbox"/> Commercial	Square Footage:
<input type="checkbox"/> Other Use Type	Square Footage:
Occupancy Classifications:	
Construction Type:	
Building Height (if new/increased):	
Floor Area Existing:	Floor Area New:
Fire Sprinkler Existing <input type="checkbox"/> Yes <input type="checkbox"/> No	Proposed <input type="checkbox"/> Yes <input type="checkbox"/> No
Fire Alarm Existing <input type="checkbox"/> Yes <input type="checkbox"/> No	Proposed <input type="checkbox"/> Yes <input type="checkbox"/> No

Estimated Preliminary Traffic Information:

Complete all blank spaces in the following table, or, alternatively, submit a separate narrative describing estimated traffic as a result of the proposed development in terms of passenger vehicle and truck trip numbers that also includes estimated hours of operation and expected peak traffic times:

A	B	C	D
Traffic Generation Category	Total Existing	Once the proposed project is complete, the total will be	Net Change (+ or -); Subtract Column B from Column C
Number of Employees	0	0	0
Number of Customers/Clients per day	0	0	0
Number of Deliveries (UPS, US mail, parts, services trips, etc.)	1	1	0
Number of Single Family Residences	0	0	0
Number of Apartments or Accessory Dwelling Units	0	0	0

Preliminary Stormwater Information:

- ☒ Complete all blank spaces in the following table for all property subject to the proposed development: **Project property within survey boundary, see attached Site Maps/Exhibits.**

A		B	C	D
Surface Type		Area, square feet (NOTE: 43,560 square feet = 1 acre)		
		Total Existing	Once the proposed project is complete, the total will be	Net Change (+ or -); Subtract Column B from Column C
Native Vegetation ⁽¹⁾		56,690	55,007	-1,683
Pasture		0	0	0
Landscaping		321	321	0
Roofs ⁽²⁾	Conventional	3,931	1,609	-2,322
	Green	0	0	0
Sidewalks, trails, paths		0	1,211 *	1,211
Porches, decks		0	0	0
Roads, driveways, parking lots	Impervious	14,540	17,334	2,794
	Pervious	0	0	0
Grand Total		⁽³⁾ 75,482	⁽³⁾ 75,482	⁽⁴⁾ 0
* This includes "exposed rock (cut areas)" & "retaining wall" non-traffic impervious areas (Site Plan sheet 4/5).		⁽³⁾ The two "Grand Total" values above should be the same, unless you are constructing a roof, porch, or deck over an existing hard surface or over native vegetation, pasture, or landscaping.		⁽⁴⁾ Unless the "Grand Total" values in Columns B and C are different, the Grand Total value above will be 0.

Table Notes:

- (1) "Native Vegetation" is comprised of plant species, other than noxious weeds, that are indigenous to the coastal region of the Pacific Northwest and that reasonably could have been expected to naturally occur on the site. Examples include trees such as Douglas fir, Western Hemlock, Western Red Cedar, Alder, Big-leaf Maple, and Vine Maple; shrubs such as willow, elderberry, salmonberry, and salal; and herbaceous plants such as sword fern, foam flower, and fireweed. Native vegetation can exist naturally and can also exist as a result of deliberate planting actions.
- (2) New untreated metal roofs qualify as pollution generating impervious surface areas. If that area is equal to or greater than 5,000 square feet, it will require stormwater treatment.

- ☒ Show and label all the above surface areas on your Site Plan submission, including any existing stormwater management and/or drainage related facilities.

☒ Site Soil Type: Nati Loam, 30 to 60 percent slopes

☐ Do you have stormwater management and/or drainage facilities as-built drawings for the project site? ☐ Yes ☒ No.

☐ Does a Master Drainage or Stormwater Management Plan apply to your project site? ☐ Yes ☐ No ☒ Unknown

(Optional) Questions for Staff – attach additional pages if necessary:

I/we BILL HUNTER hereby certify that the above statements and the information contained in any papers or plans submitted herewith are true and accurate to the best of my knowledge.

Bill Hunter
Signature of Applicant/Owner

6/29/2022
Date

DISTRICT ENGINEER/ASSISTANT
GENERAL MANAGER

Memo

To: Whatcom County Planning and Development Services
From: Wilson Engineering, Lake Whatcom Water and Sewer District
Date: June 29, 2022
Re: Lake Whatcom Water & Sewer District
Division 7 Reservoir Seismic Upgrade and Shake Alert Implementation Project

PROJECT NARRATIVE

Overview

This Division 7 Reservoir Seismic Upgrade Project is being developed by Lake Whatcom Water and Sewer District (The District). The site currently includes a 1-million-gallon steel water storage reservoir. The existing reservoir was determined to have seismic structural deficiencies. The existing 1 MG steel reservoir will be demolished once the new proposed reservoirs are online and in service; demolition and site restoration is part of this project scope. The Division 7 Reservoir Seismic Upgrade Project will construct two (2) each of 237,900-gallon concrete water reservoirs located approximately 350-ft to the northeast from the existing reservoir. Access to the site will utilize existing access roads already being used to access the existing reservoir and will be limited to regular operations and maintenance which is expected to occur once per week.

Project Site Location, Topography and Soil

The site is located in the 80.98-acre parcel owned by The Firs Bible & Missionary Conference on the southwest shores of Lake Whatcom. A smaller ~84,000 square foot area of the parcel was surveyed near the top of a hill adjacent to Sudden Valley Division 7. The site is surrounded generally to the North, East, and South by undeveloped forest. Directly adjacent to the west are lots 121, 124, 125, and 128 of Sudden Valley Division 7. The existing Sudden Valley Division 7 Water Reservoir is located at the Southwest end of the surveyed area.

The site is a couple hundred feet to the southwest from the crest of the hill at an approximate elevation of 700 ft above sea level. The site slopes down on all sides except the northeast with more gradual slopes roughly oriented to the southwest.

Underlying a variable thickness of Nati Loam Soil, the geomorphology of the site is Chuckanut Sandstone. The soil supports mature forest comprised of mostly Douglas fir and Western Red Cedar. The understory is mainly sword fern with other minimal native shrubbery.

Current Conditions

Access to the site is through Camp Firwood via a gravel road that connects to Lake Whatcom Boulevard. Within the surveyed boundary of the property is the existing gravel road, an existing 1-million-gallon steel storage tank, an asphalt road that is part of Sudden Valley Community Association, and the remainder is forest. There is a cell tower that was recently (2018) constructed uphill of the proposed reservoir site to the northeast, outside of the reservoir site survey limits.

Plan for Project Development

Logging, clearing, and excavation of the site will be minimized and restricted to only the 5-ft clearing limits buffer beyond the 21-ft wide access road around the proposed water storage reservoirs, an access driveway, any cut or fill areas, and utility trenching. Additional selective tree removal (leaving stumps) will occur in areas immediately adjacent the storage reservoir pad and access area to remove larger (approx. >12-in DBH) trees that could blow down and damage the new storage reservoirs. Minimal, if any, smaller trees are expected to be removed in the storm drain dispersion trench area. Water and sewer utility installations are expected to result in no tree removal. No new roads will be constructed.

Underlying sandstone will need to be excavated to achieve the necessary elevation for the site. Two (2) each of 32-ft diameter, 45-ft tall, concrete water reservoirs will be cast in place. A 21-ft wide gravel access road at an elevation of approximately 694-ft will provide vehicle and trailer access around both of the reservoirs. On the northeast outer curve of the access road will be a retaining wall no higher than 4-ft constructed out gravity blocks or rockery. The retaining wall will limit the area of the hillside needed to be cut away to achieve the site elevation.

Excavated material will be used onsite as much as possible. Any excess excavated material not used for the project, or wanted and delivered to the property owner for their use, will be hauled off site by the contractor. Imported structural fill (crushed rock/gravel) will be required for fill below the storage reservoir concrete slab foundation. It is anticipated that excavated sandstone will be processed/crushed on site to achieve a well graded crushed surfacing material to be used for fill around the reservoir foundations and as the resurfacing material for the gravel access road. Excavated topsoil from the site will be stockpiled on site and reused as topsoil for areas to be restored with native vegetation. Other excavated material will be reused on site as general fill where needed, including the restoration of the existing reservoir pad site.

As noted above, the new concrete water reservoirs will be 45-ft tall and will require a variance for the maximum height above the 35-ft height limit allowed by code (WCC 20.36.400).

Utilities and Access

All access and utilities will be located in a specific easement. Easement negotiations with the property owner for the new site are currently in progress.

Water

A 12-inch water main will connect the proposed water storage reservoirs to the existing water line connecting to the existing water storage reservoir. The water main installations will also include valving and other appurtenances.

Sanitary Wastewater

There is no sanitary wastewater from the project. However, the overflow and drain of the water storage reservoirs will be conveyed by gravity via 8-inch pipe to the existing sanitary wastewater line located in paved access road from nearby Swallow Circle in Sudden Valley Division 7 to the existing water reservoir. Four (4) new manholes are planned to be installed between the proposed site and the connection with the existing infrastructure. It is anticipated that the sanitary sewer will have capacity for the maximum expected short-term emergency overflow discharge. If future hydraulic analysis indicates that the sewer does not have capacity, other alternatives will be evaluated including but not limited to flow splitting flows in excess of sewer capacity to the storm drain dispersion system.

Stormwater

Stormwater management from impervious surfaces including the tanks, driveway, and site will be collected via catch basins, treated if necessary, and conveyed under the existing gravel access road to a 100-ft long dispersion trench that follows the contours of the local topography. The existing gravel access road currently uses sheet flow and full dispersion to the northwest to manage stormwater.

Power and Communications

Underground electric power and communications (telephone) lines are currently on site. Electric power is supplied via buried wires by Puget Sound Energy and communication is supplied by CenturyLink and/or Comcast via buried cable. Electrical service and controls will be provided from the existing reservoir site to the new reservoir site. Electrical and control panel(s) will be located at the new reservoir site. Telemetry communications will utilize a cellular modem.

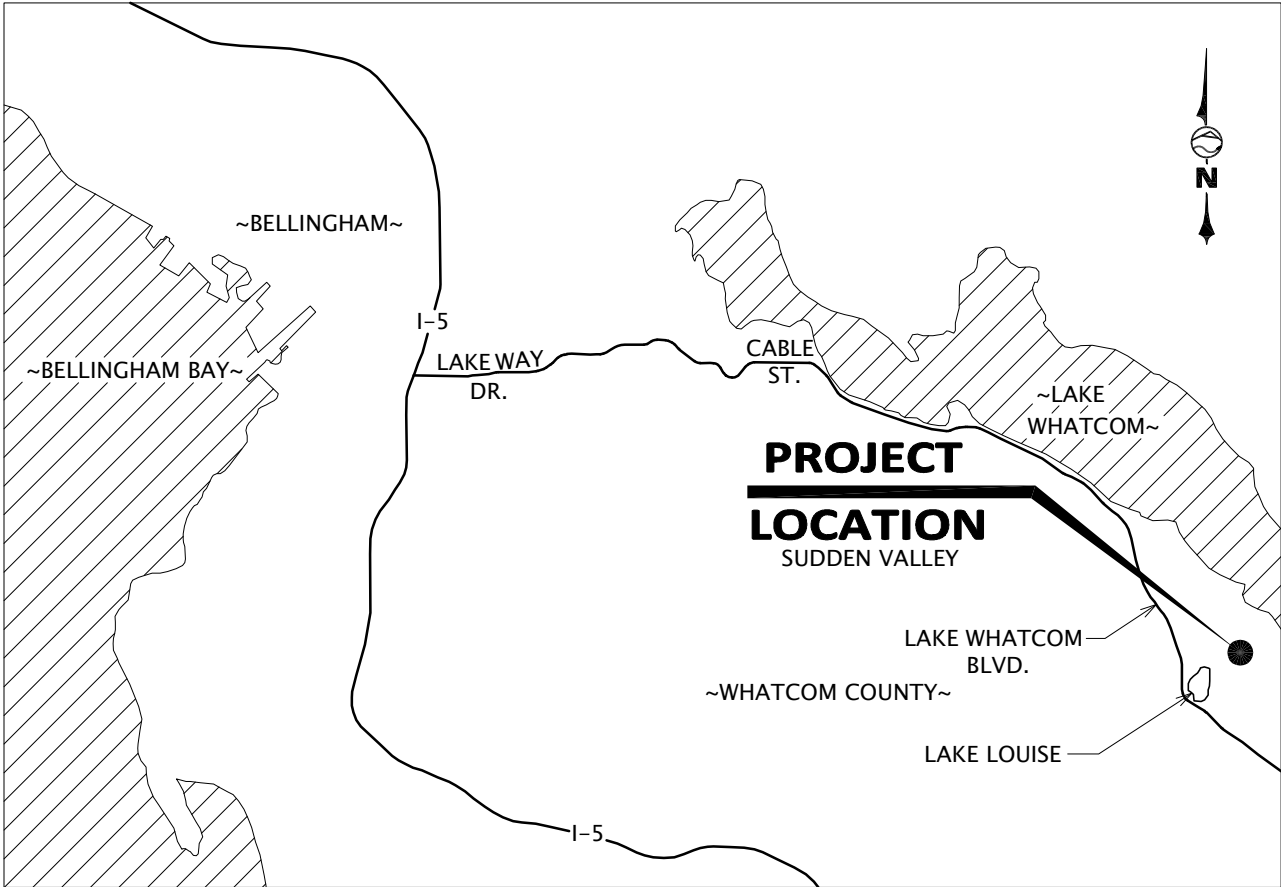
Vehicle Access

District operations and maintenance vehicles will access the site through the Camp Firwood property. There is approximately 5,000-ft of gravel road between the access gate on Lake Whatcom Boulevard and the proposed site of the water storage reservoirs. The roads were improved in the last several years to support the construction of a communication tower at the top of hill a couple hundred feet to the northeast of the proposed reservoir site. No changes to the access roads are proposed. A 20-ft wide (minimum) driveway will connect the site to the existing adjacent gravel road.

LAKE WHATCOM WATER & SEWER DISTRICT

DIVISION 7 RESERVOIR SEISMIC UPGRADE AND SHAKE ALERT IMPLEMENTATION

VICINITY MAP - NOT TO SCALE



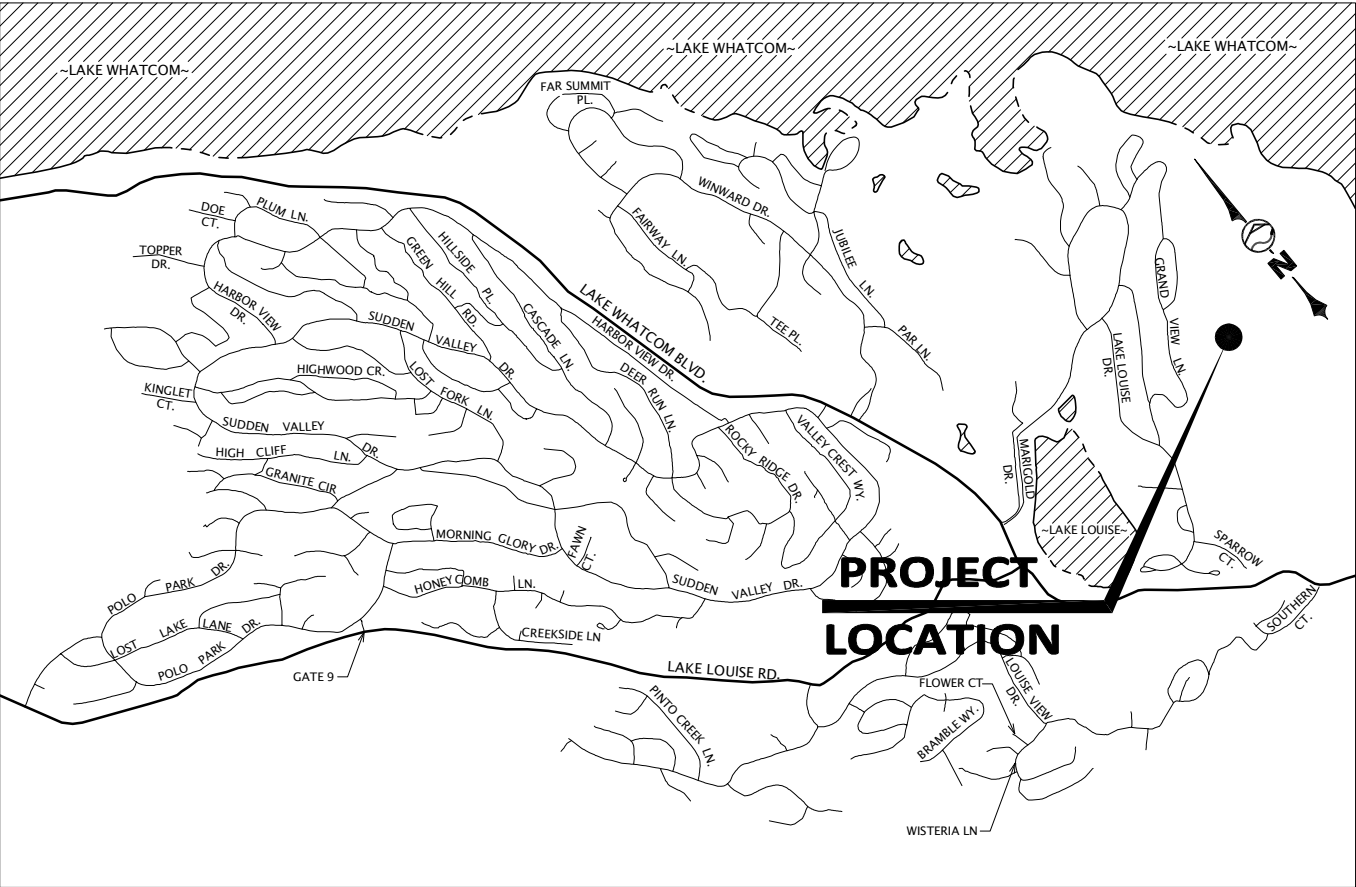
LOCATION MAP - NOT TO SCALE

CIVIL ENGINEER
WILSON ENGINEERING, LLC
805 DUPONT STREET, BELLINGHAM, WA 98225
CURT SCHOENFELDER, PE
CSCHOENFELDER@WILSONENGINEERING.COM
PHONE 360-733-6100 x 1233

SURVEYOR
WILSON ENGINEERING, LLC
805 DUPONT STREET, BELLINGHAM, WA 98225
PAUL DARROW, PLS
PDARROW@WILSONENGINEERING.COM
PHONE 360-734-9224 x 1243

APPLICANT / PROJECT OWNER
LAKE WHATCOM WATER & SEWER DISTRICT
1220 LAKEWAY DRIVE, BELLINGHAM, WA 98229
BILL HUNTER, PE
BILL.HUNTER@LWWSO.COM
PHONE 360-734-9224

LOCATION MAP - NOT TO SCALE



PRELIMINARY



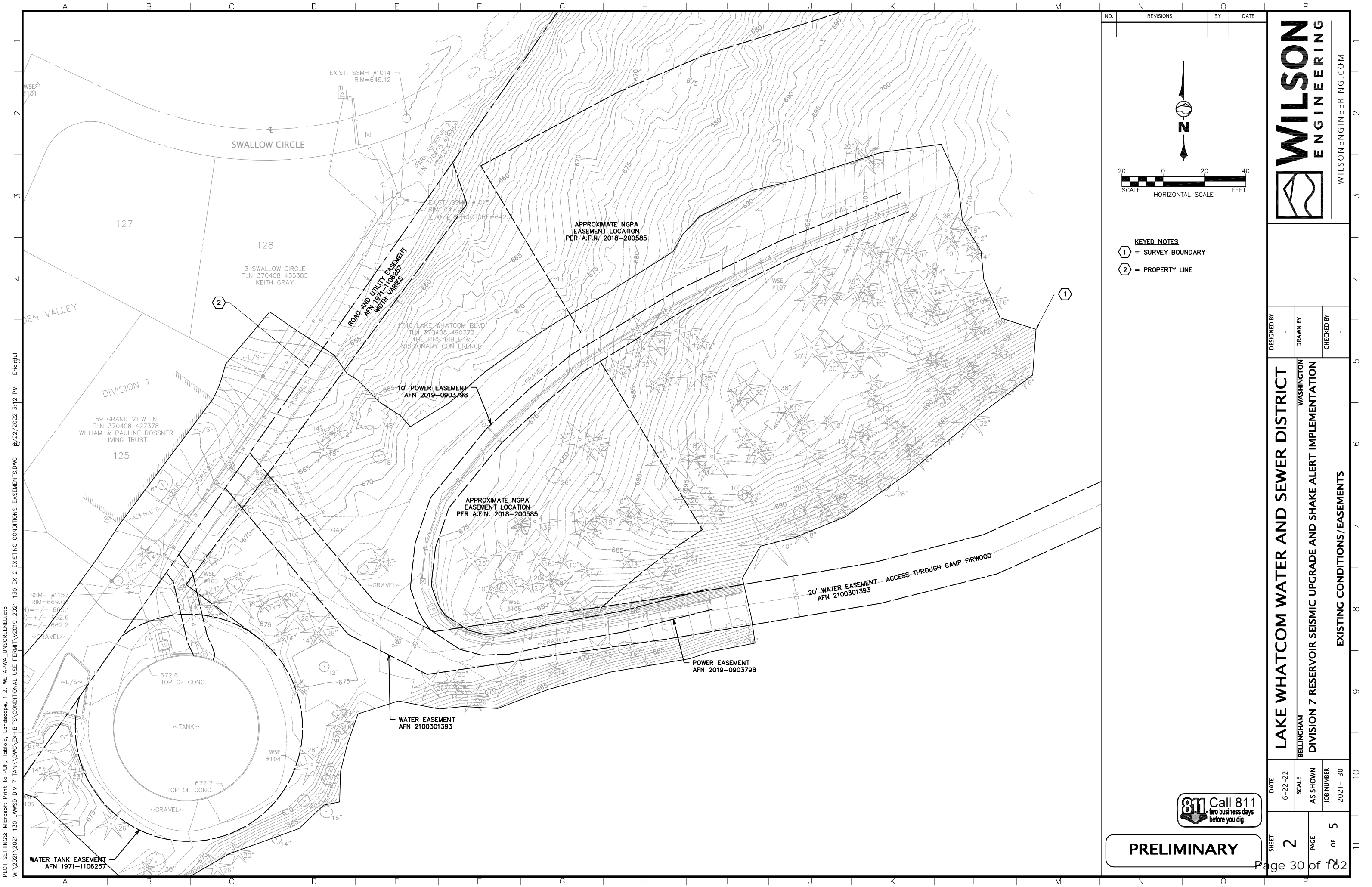
LAKE WHATCOM WATER AND SEWER DISTRICT

DIVISION 7 RESERVOIR SEISMIC UPGRADE AND SHAKE ALERT IMPLEMENTATION

VICINITY MAP

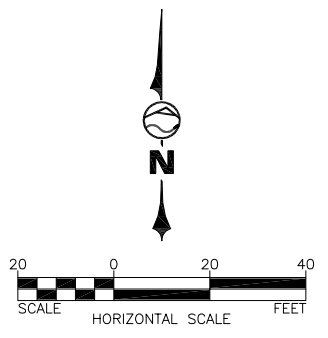
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NO.	REVISIONS	BY	DATE



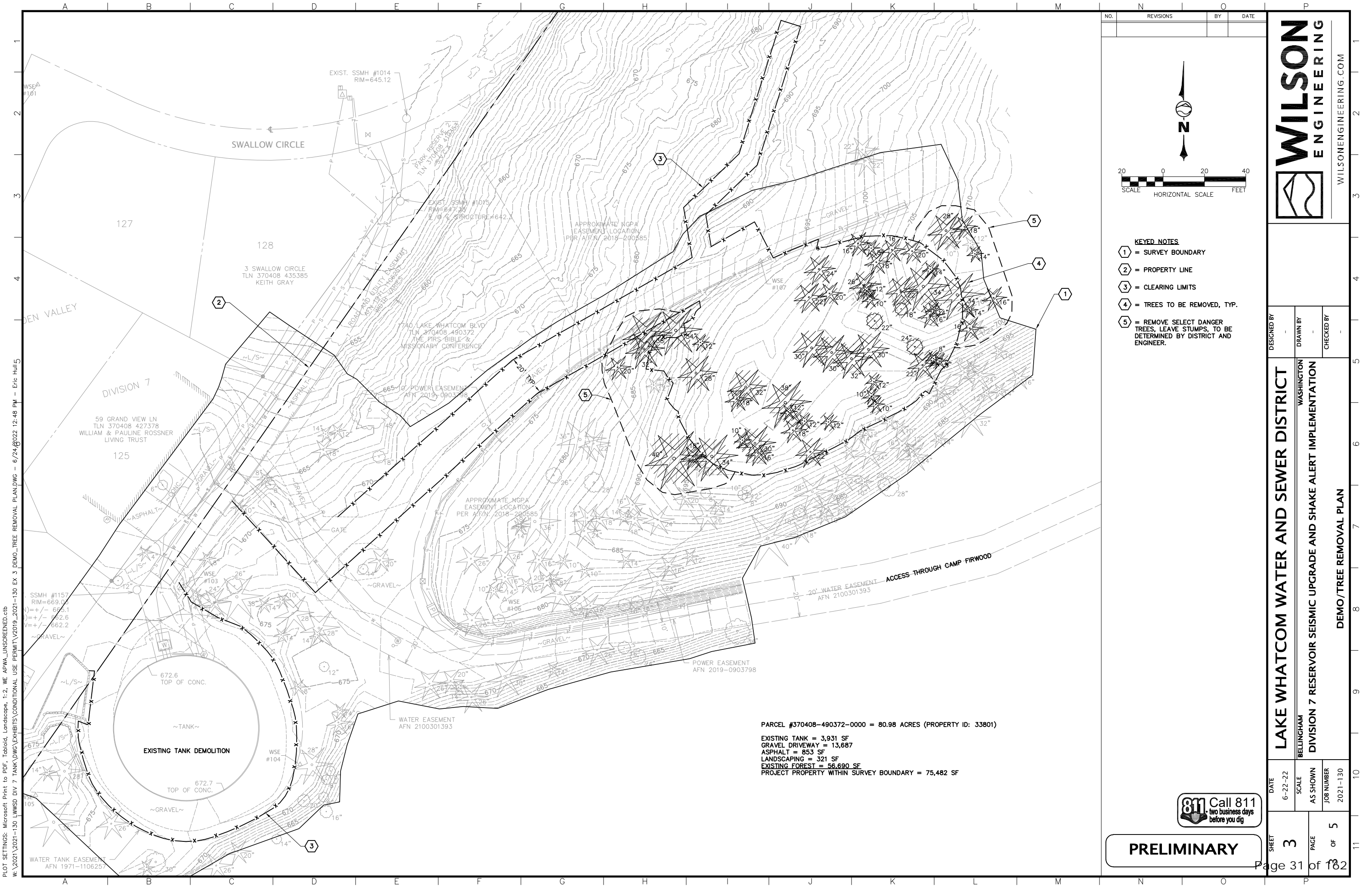
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ENGINEERING

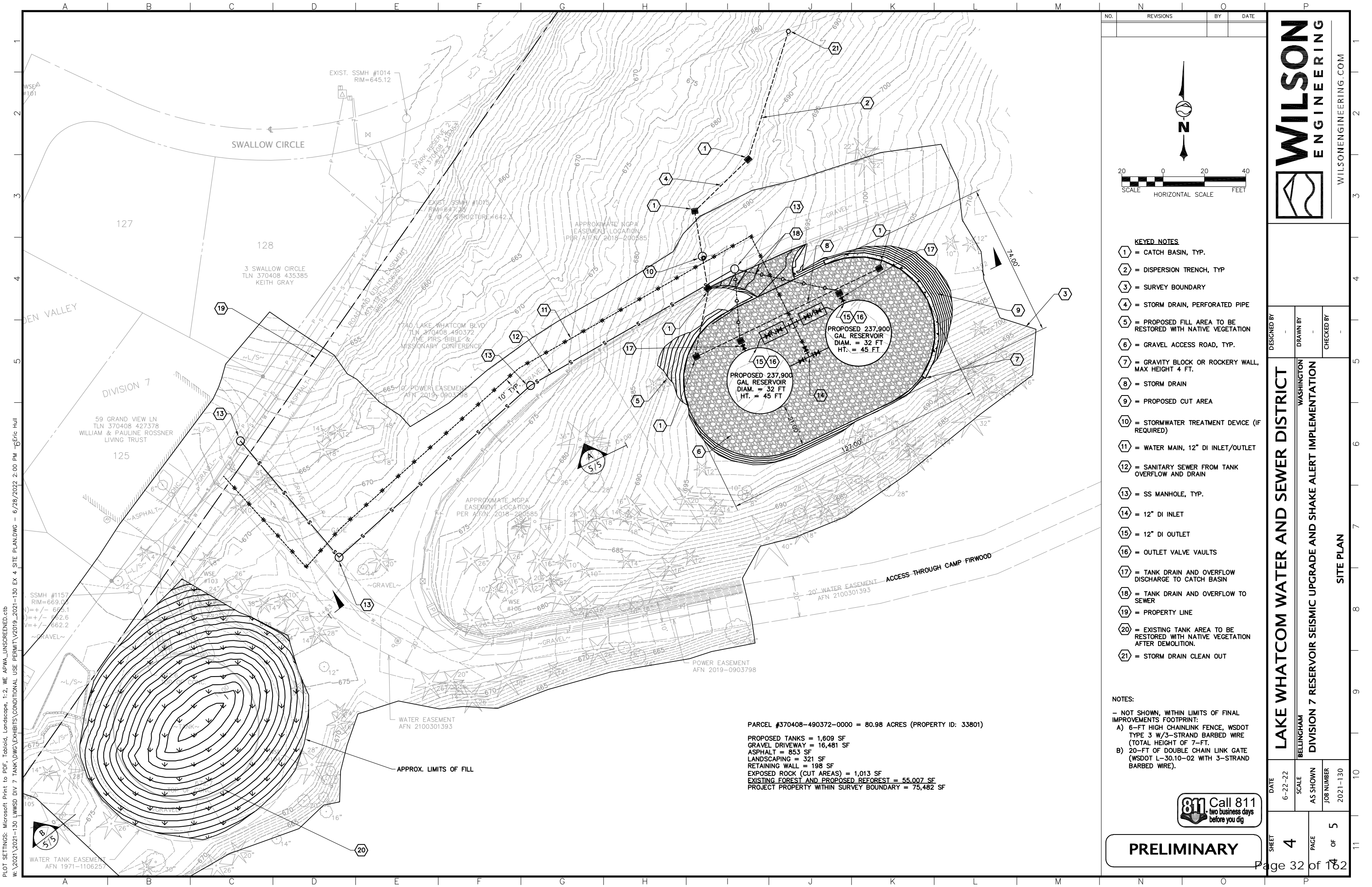
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DESIGNED BY	-
DRAWN BY	-
CHECKED BY	-

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DIVISION 7 RESERVOIR SEISMIC UPGRADE AND SHAKE ALERT IMPLEMENTATION	
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two business days
before you dig





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NO.	REVISIONS	BY	DATE

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SCALE HORIZONTAL SCALE FEET

- KEYED NOTES**
- 1 = CATCH BASIN, TYP.
 - 2 = DISPERSION TRENCH, TYP.
 - 3 = SURVEY BOUNDARY
 - 4 = STORM DRAIN, PERFORATED PIPE
 - 5 = PROPOSED FILL AREA TO BE RESTORED WITH NATIVE VEGETATION
 - 6 = GRAVEL ACCESS ROAD, TYP.
 - 7 = GRAVITY BLOCK OR ROCKERY WALL, MAX HEIGHT 4 FT.
 - 8 = STORM DRAIN
 - 9 = PROPOSED CUT AREA
 - 10 = STORMWATER TREATMENT DEVICE (IF REQUIRED)
 - 11 = WATER MAIN, 12" DI INLET/OUTLET
 - 12 = SANITARY SEWER FROM TANK OVERFLOW AND DRAIN
 - 13 = SS MANHOLE, TYP.
 - 14 = 12" DI INLET
 - 15 = 12" DI OUTLET
 - 16 = OUTLET VALVE VAULTS
 - 17 = TANK DRAIN AND OVERFLOW DISCHARGE TO CATCH BASIN
 - 18 = TANK DRAIN AND OVERFLOW TO SEWER
 - 19 = PROPERTY LINE
 - 20 = EXISTING TANK AREA TO BE RESTORED WITH NATIVE VEGETATION AFTER DEMOLITION.
 - 21 = STORM DRAIN CLEAN OUT

NOTES:

- NOT SHOWN, WITHIN LIMITS OF FINAL IMPROVEMENTS FOOTPRINT:
 - A) 6-FT HIGH CHAINLINK FENCE, WSDOT TYPE 3 W/3-STRAND BARBED WIRE (TOTAL HEIGHT OF 7-FT.
 - B) 20-FT OF DOUBLE CHAIN LINK GATE (WSDOT L-30.10-02 WITH 3-STRAND BARBED WIRE).

PARCEL #370408-490372-0000 = 80.98 ACRES (PROPERTY ID: 33801)

PROPOSED TANKS = 1,609 SF
GRAVEL DRIVEWAY = 16,481 SF
ASPHALT = 853 SF
LANDSCAPING = 321 SF
RETAINING WALL = 198 SF
EXPOSED ROCK (CUT AREAS) = 1,013 SF
EXISTING FOREST AND PROPOSED REFOREST = 55,007 SF
PROJECT PROPERTY WITHIN SURVEY BOUNDARY = 75,482 SF

811 Call 811
two business days before you dig

PRELIMINARY

WILSON ENGINEERING
WILSONENGINEERING.COM

DESIGNED BY	DRAWN BY	CHECKED BY
-	-	-

LAKE WHATCOM WATER AND SEWER DISTRICT
DIVISION 7 RESERVOIR SEISMIC UPGRADE AND SHAKE ALERT IMPLEMENTATION

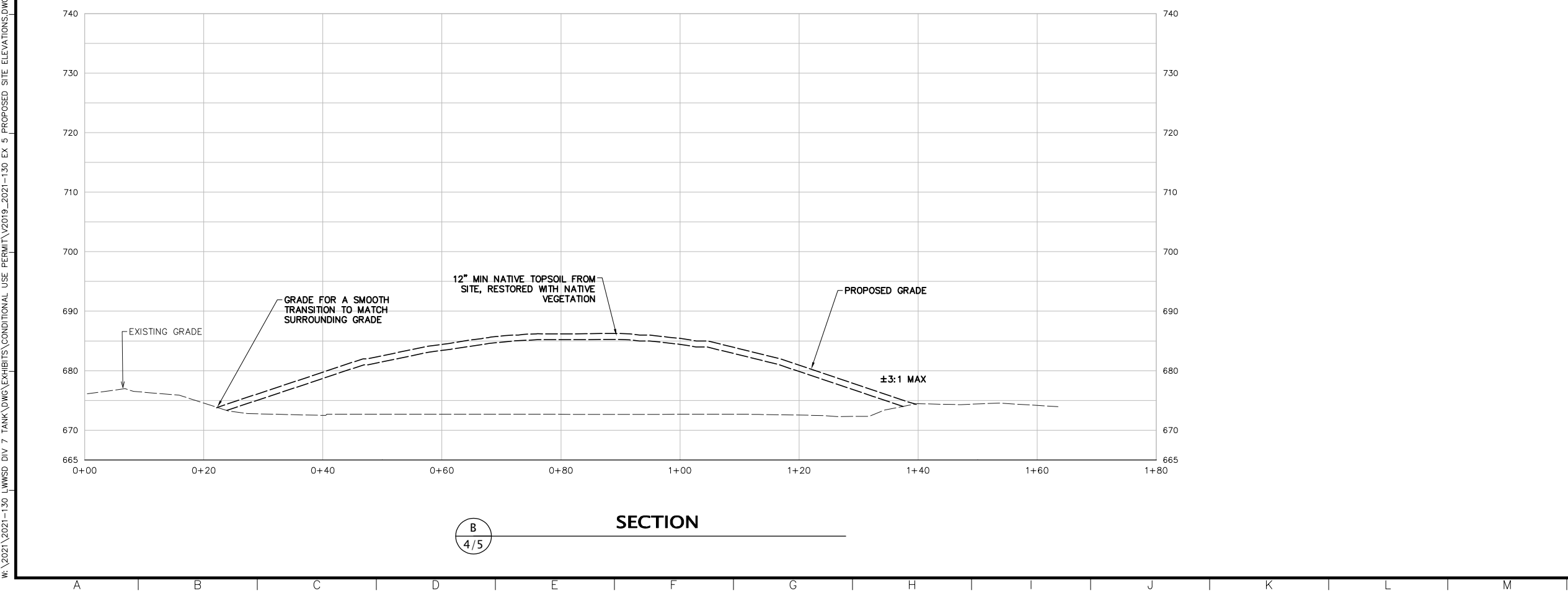
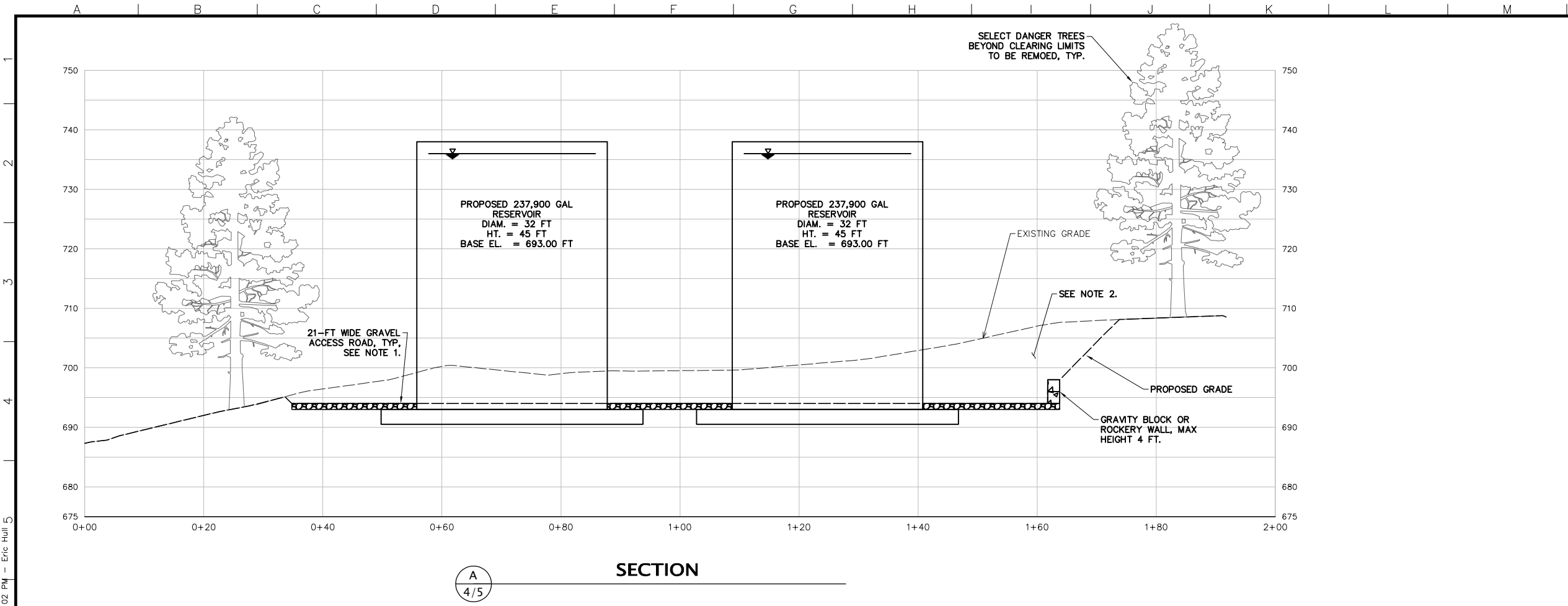
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SHEET 4 OF 5

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NO.		REVISIONS		BY		DATE	

NOTES:

- CRUSHED GRAVEL SURFACING MATERIAL EITHER IMPORTED CSBC PER WSDOT 9-03.9(3), OR PROCESSED/CRUSHED SANDSTONE ROCK EXCAVATED FROM SITE.
- EXCAVATED MATERIAL WILL BE STOCKPILED AND USED AS FILL ON SITE AS MUCH AS POSSIBLE. ANY EXCESS MATERIAL WILL BE HAULED OFFSITE BY THE CONTRACTOR.

PRELIMINARY

WILSON
ENGINEERING
WILSONENGINEERING.COM

DESIGNED BY		DRAWN BY		CHECKED BY	

LAKE WHATCOM WATER AND SEWER DISTRICT

BELLINGHAM WASHINGTON

DIVISION 7 RESERVOIR SEISMIC UPGRADE AND SHAKE ALERT IMPLEMENTATION

PROPOSED SITE ELEVATIONS

DATE	SCALE	AS SHOWN	JOB NUMBER
6-22-22			2021-130

SHEET	PAGE	OF
5		5

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Geotechnical Engineering Services

Lake Whatcom Water and Sewer District
Division 7 Reservoir Seismic Upgrade
Bellingham, Washington

for

Wilson Engineering, LLC

June, 30, 2022



GEOENGINEERS 
Earth Science + Technology

Geotechnical Engineering Services

Lake Whatcom Water and Sewer District
Division 7 Reservoir Seismic Upgrade
Bellingham, Washington

for

Wilson Engineering, LLC

June, 30, 2022



554 West Bakerview Road
Bellingham, Washington 98226
360.647.1510

Geotechnical Engineering Services
Lake Whatcom Water and Sewer District
Division 7 Reservoir Seismic Upgrade
Bellingham, Washington

File No. 0430-014-00

June, 30, 2022

Prepared for:

Wilson Engineering, LLC
805 Dupont Street, Suite 7
Bellingham, Washington 98225

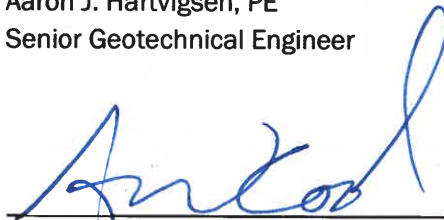
Attention: Curt Schoenfelder, PE

Prepared by:

GeoEngineers, Inc.
554 West Bakerview Road
Bellingham, Washington 98226
360.647.1510



Aaron J. Hartvigsen, PE
Senior Geotechnical Engineer



Sean W. Cool, PE
Associate

AF2:AJH:SWC:leh

One electronic copy and one hard copy submitted

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

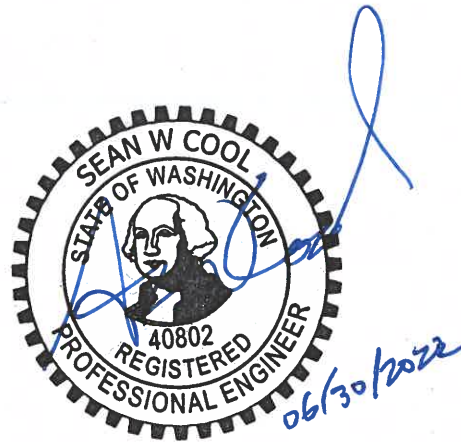


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Figure 1. Vicinity Map

Figure 2. Site and Exploration Plan

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Appendix A. Field Explorations and Laboratory Testing

Figure A-1. Key to Exploration Logs

Figures A-2 through A-6. Logs of Explorations

Appendix B. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our geotechnical engineering services for the proposed Division 7 Reservoir Seismic Upgrade project for the Lake Whatcom Water and Sewer District (LWWSD) to be located in the Sudden Valley area of Bellingham, Washington. The site is shown relative to surrounding physical features in the Vicinity Map, Figure 1, and the Site and Exploration Plan, Figure 2.

Our services were completed in general accordance with our scope and fee estimate dated November 15, 2021. Our specific scope of services included:

- Reviewing existing geotechnical information and available references for the site and project vicinity;
- Completing test pits to characterize the subsurface conditions at the site;
- Completing a geologic reconnaissance of the steep slope to evaluate site conditions that could affect slope stability and tank design;
- Completing laboratory testing on selected soil samples obtained from the explorations;
- Completing geotechnical analyses as necessary to support the project; and
- Preparing this geotechnical engineering report.

2.0 PROJECT DESCRIPTION

Our understanding of the project is based on discussions with Wilson Engineering, LLC. The site is located on an undeveloped hilltop area northeast of the existing water tank southeast of Swallow Circle in the Sudden Valley neighborhood of Bellingham, Washington.

The proposed project consists of constructing two new cast-in-place concrete water tanks with Mt. Baker Silo water reservoirs (237,900 gallons, each). It is our understanding that the anticipated tank dimensions are approximately 32 feet in diameter and approximately 45 feet tall with a base elevation of 693 feet. As currently envisioned, the proposed tanks will be located on a ridgetop area, northeast of the existing tank. Site grades across the proposed tank footprints vary by approximately 5 feet, with a steep slope to the south. Due to the variation in topography across the site, excavation into sandstone bedrock will be necessary to create a level pad and uniform bearing surface for the new structures.

3.0 SITE CONDITIONS

3.1. Surface Conditions

The site is surrounded by Camp Firwood property. The proposed tank site is currently undeveloped. Vegetation at the site consists of small to large evergreen and deciduous trees with associated understory vegetation. A gravel access road runs north of the project site. The current access road was recently reinforced during construction of a cell phone tower located northeast of the site. The existing water tank is located southwest of the new tank site.

3.2. Geology

We reviewed a U. S. Geologic (USGS) map for the project area, “Geologic Map of the Bellingham 1:100,000 Quadrangle, Washington” by T.J. Lapen (2000). The area is mapped as Chuckanut Formation bedrock.

The Chuckanut Formation consists of sandstone, conglomerate, shale, and coal. The shale locally contains fossils including leaves, palm fronds, and whole tree trunks. These deposits originated as alluvial flood plain deposits. The sandstone is variable in weathering, orientation, and rock quality. The sandstone is relatively hard and strong where unweathered. The formation has been heavily folded by tectonic forces, and then partially eroded and weathered from glacial activity. The site is mapped with bedding dipping 25 degrees to the southeast. In the local vicinity, the Chuckanut Formation is sometimes overlain by a mantle of undifferentiated glacial soils.

3.3. Subsurface Explorations and Laboratory Testing

Subsurface soil and groundwater conditions were evaluated on February 17, 2022 by excavating five test pits. The test pits were completed to depths ranging from 4½ to 7 feet below the ground surface (bgs) using a tracked excavator. The approximate locations of the explorations are shown in Figure 2. Details of the field exploration program and the test pit logs are presented in Appendix A. Details of the laboratory testing program are also presented in Appendix A.

3.4. Subsurface Conditions

The general soil profile at the site consists of topsoil and weathered horizon overlying weathered bedrock “residuum” overlying competent unweathered bedrock.

- A layer of forest duff/topsoil was encountered at the ground surface in each of the test pits extending to approximately 6 to 12 inches bgs.
- Underlying the topsoil layer, a weathered horizon was encountered consisting of rust brown loose silty sand to medium stiff sandy silt.
- Weathered bedrock residuum was encountered in our explorations underlying the weathered horizon. The residuum is a soil-like, decomposed weathered bedrock, and typically consisted of medium dense brown silty fine to coarse sand with sandstone fragments and extended to depths of 2 to 6 feet bgs.
- Competent, relatively unweathered bedrock was encountered in all of our test pits. The bedrock encountered consisted of brown sandstone. The upper surface of the bedrock was able to be excavated and could be penetrated up to 18 inches at the bottom of the test pit with the available equipment.

3.5. Groundwater Conditions

Groundwater seepage was not encountered within the depth of our test pits. Perched groundwater seepage can occur within the weathered horizon and/or weathered bedrock material overlying the lower permeability rock surface. Groundwater conditions should be expected to vary as a function of season, precipitation, and other factors.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1. Summary of Geotechnical Considerations

We conclude that construction of the proposed water storage tanks can be successfully completed from a geotechnical perspective provided the considerations presented in this report are incorporated into the project planning and design. A summary of the primary geotechnical considerations is provided below. The summary is presented for introductory purposes only and should be used in conjunction with the complete recommendations presented in this report.

- The proposed water storage tanks may be supported on shallow foundations. Shallow foundation for the water storage tanks supported on the weathered/unweathered hard sandstone bedrock or compacted bedrock residuum or structural fill extending to these layers in accordance with our recommendations can be designed using an allowable bearing pressure of 4,000 pounds per square foot (psf).
- The site grading is planned to be accomplished by cutting/leveling off the top of the hillside.
- The site is expected to require export or stockpiling excavated soil/bedrock. On-site silty soils are very susceptible to disturbance during wet conditions. We do not recommend on-site soils for use as structural fill below the proposed water storage tanks. If construction occurs during wet weather, the contractor will need to protect the soil stockpiles from rainfall. If soil stockpiles become wetter than the optimum moisture content, it may be necessary to export the soil off site and bring in drier material.
- If a significant quantity of rock excavation will be required. The rock could be processed/crushed and reused as structural fill for access road or other site grading requirements.
- The site is underlain at shallow depths by sandstone bedrock which has very low permeability. Infiltration is not considered feasible, and dispersion is recommended for stormwater management.
- Excavation for pipeline installation and tank foundation through zones of perched groundwater will create seepage zones that will be subject to sloughing and erosion. Mitigation could include interceptor trenches with sumps and pumps, erosion protection with geotextile fabric and rock, or other measures.

These and other geotechnical considerations are discussed further, and recommendations pertaining to the geotechnical aspects of the project are presented in the following sections of this report.

4.2. Geologic Hazards

The Whatcom County Critical Areas Ordinance (CAO) defines requirements for evaluation of geologic hazards including landslide, seismic, alluvial fan, erosion, volcanic, tsunami and mine hazards. The slope nearest to the south of the proposed tank locations is inclined at approximately 2.5H:1V (22 degrees, 40 percent), exceeds 10 feet of vertical relief. Therefore, the slope meets the CAO definition of a potential landslide hazard area. However, there is an exception in Whatcom County Code (WCC) 16.16.310 C.1.a.xii “any area with a slope of 40 percent or steeper with a vertical relief of 10 or more feet except areas composed of competent bedrock or properly engineered slopes designed and approved by a geotechnical engineer licensed in the state of Washington and experienced with the site.”

We evaluated the slope while onsite and did not observe any significant evidence of localized or global instability. The site is mapped as bedrock which was confirmed in our explorations. Additionally, the proposed site modifications will not alter the site in a manner that would increase geologic hazard at the

site or adjacent properties. The site does not meet the CAO definition for seismic, alluvial fan, erosion, volcanic, tsunami or mine hazards. In our opinion, no additional evaluation of geologic hazards is necessary at this site.

4.3. Seismic Design Considerations

4.3.1. General Seismicity

The site is located within the Puget Sound region, which is seismically active. Seismicity in this region is attributed primarily to the interaction between the Pacific, Juan de Fuca and North American plates. The Juan de Fuca plate is subducting beneath the North American plate. It is thought that the resulting deformation and breakup of the Juan de Fuca plate might account for the deep focus earthquakes in the region. Hundreds of earthquakes have been recorded in the Puget Sound area. In recent history, four of these earthquakes were large events: (1) in 1946, a Richter magnitude 7.2 earthquake occurred in the Vancouver Island, British Columbia area; (2) in 1949, a Richter magnitude 7.1 earthquake occurred in the Olympia area; (3) in 1965, a Richter magnitude 6.5 earthquake occurred between Seattle and Tacoma; and (4) in 2001, a Richter magnitude 6.8 earthquake occurred near Olympia.

Research has concluded that historical large magnitude subduction-related earthquake activity has occurred along the Washington and Oregon coasts. Evidence suggests several large magnitude earthquakes (Richter magnitude 8 to 9) have occurred in the last 1,500 years, the most recent of which occurred about 300 years ago. Local design practice in Puget Sound and local building codes consider the local seismic conditions including local known faults in the design of structures.

4.3.2. Surface Fault Rupture

The closest active fault identified by the USGS online fault and fold database is the north-west trending Birch Bay fault, located approximately 14 miles to the northwest. It does not appear that there are faults crossing the proposed tank site. Because the site is outside of mapped fault areas, and no other known active faults have been mapped in the project area, it is our opinion that the potential for surface fault rupture is low.

4.3.3. Liquefaction Potential

Liquefaction is a phenomenon where soils experience a rapid loss of internal strength as a consequence of strong ground shaking. Ground settlement, lateral spreading and/or sand boils may result from soil liquefaction. Structures supported on liquefied soils could suffer foundation settlement or lateral movement that could be severely damaging to the structures.

Conditions favorable to liquefaction occur in loose to medium dense, clean to moderately silty sand that is below the groundwater level. Based on our evaluation of the subsurface conditions at this site and our recommendations, the facilities will be founded on hard rock which is not at risk of liquefaction. Therefore, no mitigation strategies are necessary in our opinion.

4.3.4. 2018 IBC and AWWA Seismic Design Information

If structural elements for the proposed improvements will be designed utilizing the 2018 International Building Code (IBC), we recommend the project site be classified as Site Class C. The design parameters for the 2018 IBC are summarized in Table 1. These values are based on an earthquake event that has a 2 percent probability of exceedance in a 50-year period (2,475-year return period).

TABLE 1. SPECTRAL RESPONSE ACCELERATIONS (SRAs)

(SRA) and Site Coefficients	Short Period	1 Second Period
Mapped SRA	$S_s = 0.966$	$S_1 = 0.341$
Site Coefficients	$F_a = 1.2$	$F_v = 1.5$
Max. Considered Earthquake SRA	$S_{MS} = 1.16$	$S_{M1} = 0.511$
Design SRA	$S_{DS} = 0.773$	$S_{D1} = 0.341$

Note: Soil Profile Type C Description: Very Dense Soil and Soft Rock Profile (N>50)

In addition to the seismic design parameters defined by the 2018 IBC, the American Water Works Association (AWWA) defines a “Seismic Use Group” and “Seismic Importance Factor, I_E ” that are assigned to the water tank based on its intended use and expected performance. As defined by AWWA D110-04, “Seismic Use Group III shall be used for tanks that provide direct service to facilities that are deemed essential for post-earthquake recovery and essential to life, health, and safety of the public, including post-earthquake fire suppression.” Accordingly, a Seismic Importance Factor, I_E of 1.5 is appropriate. The design earthquake motion or maximum considered earthquake (MCE) ground motion is also defined by an event with a 2 percent probability of exceedance within a 50-year period; which for the tank site corresponds to a Magnitude 6.78 design-level earthquake with a peak horizontal ground acceleration (PGA) of 0.43g generated from a source approximately 25 miles from the site.

4.4. Shallow Foundations

We anticipate that the new water storage tank will be constructed on a mat foundation designed by Baker Silo, LLC. The proposed tank should be supported on shallow foundations bearing on undisturbed dense, unweathered sandstone bedrock, compacted bedrock residuum or structural fill extending to these soils/rock as described below. Our recommendations for foundation design are presented in the following sections.

4.4.1. Footing Design and Subgrade Preparation

The mat foundation for the new water storage tanks should be designed using an allowable soil bearing value of 4,000 psf for footings bearing directly on undisturbed, unweathered sandstone or compacted bedrock residuum or structural fill extending to these layers. Because of the potential variable nature of sandstone bedrock surface, a mixed bearing condition of bedrock and/or weathered bedrock or bedrock residuum may occur. To provide a more uniform bearing condition and avoid hard spots, we recommend a minimum of 12-inches of structural fill below the foundation where bedrock is encountered during foundation preparation.

This allowable soil bearing value applies to the total of dead and long-term live loads and may be increased by up to one-third for wind or seismic loads. We recommend that the tanks be founded a minimum of 18-inches below site grades for frost protection.

If soft areas are present at the footing subgrade elevation, the soft areas should be removed and replaced with compacted structural fill at the direction of the Geotechnical Engineer. In such instances, the zone of structural fill should extend laterally beyond the footing edges a horizontal distance at least equal to the thickness of the fill and a minimum of 1 foot beyond the edge of foundation.

4.4.2. Foundation Setback from Slope

The slope to the south does not meet a landslide hazard based on our review. However, we recommend a minimum set back of 10 feet from the crest of this slope for any part of the proposed water tank foundations.

4.4.3. Settlement

Provided all loose soil is removed and the subgrade is prepared as recommended in the “Earthwork” section of this report, we estimate the total settlement of shallow foundations resulting from static loading of the water storage tank structure will be on the order of $\frac{1}{2}$ to $\frac{3}{4}$ inch. Differential settlement across the width of the tanks would be expected to be half this amount or less than about $\frac{1}{4}$ inch in 50 feet. The settlements are expected to occur rapidly, essentially as loads are applied. These settlement estimates assume that all footings are founded on limited thickness of compacted crushed rock overlying bedrock.

4.4.4. Lateral Resistance

Lateral foundation loads can be resisted by a combination of friction between the base of the foundation and the supporting soil, and by the passive lateral resistance of the soil surrounding the embedded portions of the footings. A coefficient of friction between concrete and crushed rock foundation soil of 0.45 and a passive lateral resistance of 300 pounds per cubic foot (pcf, triangular distribution) may be used. The friction coefficient and passive lateral resistance are allowable values and include a factor of safety of 1.5 or greater.

4.4.5. Footing Drainage

Although not encountered in our test pit explorations, perched groundwater may be encountered at the site. Perched ground water is usually encountered where less permeable materials are found over the denser soil layers or bedrock. It is also common to encounter groundwater at the bedrock interface or within bedrock fractures.

Standard of practice would be to include a perimeter footing drain around the uphill portion of the water storage tank to capture perched groundwater. A footing drain could be included as an option and potentially deleted based on conditions observed during construction. Any perimeter or underslab drainage system pipes should be routed to an appropriate discharge point. Appropriate clean-outs for drain pipe maintenance should be installed. A larger-diameter pipe will allow for easier maintenance of drain systems.

4.5. Stormwater Considerations

Final site grades should be sloped to drain away from proposed structures. The on-site soils encountered at relatively shallow depth are considered relatively impermeable. The site does not meet feasibility criteria for infiltration per the Stormwater Management Manual for Western Washington. Surface water will likely be handled by means of dispersion. Based on the undeveloped area surrounding the site, we anticipate that dispersion will generally mimic existing conditions.

4.6. Gravity Wall Considerations

A retaining wall is proposed to reduce the footprint of the proposed cut slope along the eastern portion of the site. At this time the cut slope is shown for planning purposes at 1H:1V (horizontal to vertical) with a 4 foot exposed wall at the toe. Based on the observed site conditions, the cut is expected to extend through soil overburden and into the underlying bedrock and wall height and backslope gradient may be adjusted

for final design and conditions encountered in the field. Gravity walls are well suited site to retain the proposed cut, either to retain soil, as facing for rock cuts, or to provide catchment for potential rockfall in steepened cuts. The final wall geometry and gravity structure type has not been selected. We recommend that the gravity wall be designed based on the following parameters and design considerations.

4.6.1. Soil Properties

The design parameters summarized in Table 2 should be used for design of the proposed gravity block wall. The soil strength parameters reflect the assumption that the base of the wall will be within competent sandstone bedrock. Wall backfill should consist of imported crushed rock compacted to at least 90 percent of the maximum dry density (MDD) obtained using ASTM International (ASTM) D 1557.

TABLE 2. GRAVITY BLOCK WALL DESIGN PARAMETERS

Soil Properties	Retained Soil (Crushed Rock)	Foundation Bearing Soil
Unit Weight (pcf)	125	135
Friction Angle (deg)	36	40
Cohesion (psf)	0	0

4.6.2. Leveling Pad

We recommend that the base row of the wall blocks be supported on compacted crushed gravel leveling pad conforming to Section 9.03-9(3) (crushed surfacing top course or base course) of the current Washington State Department of Transportation (WSDOT) Standard Specifications with minimum thickness of 3 inches. The leveling pad should be compacted to 95 percent of the MDD as determined by ASTM D 1557 (Modified Proctor) test procedure.

4.6.3. Wall Drainage

For purposes of internal wall design, the groundwater level was assumed to be below the base of the wall and that the wall backfill consists of crushed rock that also serves as the drainage layer behind the wall. A suitable specification for backfill/drainage is WSDOT Standard Specification 9-03.9(2) Permeable Ballast, although other gradations of clear crushed rock may be suitable.

4.6.4. Wall Embedment

We recommend that the wall toe be embedded below the grade in front of the wall based on anticipated wall height and slope height. For planning purposes, we recommend a minimum of 6-inches for walls up to 6 feet high, or that embedment necessary based on stability requirements (e.g., sliding resistance).

4.6.5. Earthquake Loads

We recommend that the seismic loading be designed in accordance with the 2018 IBC. The 2018 IBC references the 2016 version of *Minimum Design Loads for Buildings and Other Structures* (American Society of Civil Engineers [ASCE] 7-16). Based on ASCE 7-16, the site modified PGA expected at the site from an earthquake with a 2 percent probability of exceedance in 50 years is approximately 0.41g. We recommend the internal stability of the wall be analyzed using a horizontal seismic coefficient of 0.2g.

4.6.6. Performance Limit Values

The performance limit values presented in Table 3 should be used as minimum safety factors for design of the gravity block wall.

TABLE 3. PERFORMANCE LIMIT VALUES

Criteria	Minimum Static Safety Factor	Minimum Seismic Safety Factor
Sliding	1.5	1.125
Overturning Stability	1.5	1.125
Bearing Capacity	2	1.5

4.6.7. Surcharge Loading

Surcharge loading should be considered behind the gravity wall due to the slope above. We do not anticipate construction equipment or traffic loading above the gravity wall.

4.7. Earthwork Considerations

4.7.1. Erosion and Sedimentation Control

Potential sources or causes of erosion and sedimentation depend upon construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type, construction sequencing and weather. The project impact on erosion-prone areas can be reduced by implementing an erosion and sedimentation control plan. The plan should be designed in accordance with applicable city and/or county standards. The plan should incorporate basic planning principles including:

- Scheduling grading and construction to reduce soil exposure;
- Retaining existing vegetation whenever feasible;
- Revegetating or mulching denuded areas;
- Directing runoff away from denuded areas;
- Minimizing the length and steepness of slopes with exposed soils;
- Decreasing runoff velocities;
- Confining sediment to the project site; and
- Inspecting and maintaining control measures frequently.

We recommend that graded and disturbed soil slopes be tracked in place with the equipment running perpendicular to the slope contours so that the track marks provide a texture to help resist erosion and channeling. Some sloughing and raveling of slopes with exposed or disturbed soil/rock should be expected.

Temporary erosion protection should be used and maintained in areas with exposed or disturbed soils to help reduce the potential for erosion and reduce transport of sediment to adjacent areas. Temporary erosion protection should include the construction of a silt fence around the perimeter of the work area prior to the commencement of grading activities. Permanent erosion protection should be provided by re-establishing vegetation using hydroseeding and/or landscape planting.

Until the permanent erosion protection is established, and the site is stabilized, site monitoring should be performed by qualified personnel to evaluate the effectiveness of the erosion control measures and repair and/or modify them as appropriate. Provisions for modifications to the erosion control system based on monitoring observations should be included in the erosion and sedimentation control plan.

4.7.2. General Excavation

Topsoil, weathered silty soils, and sedimentary bedrock residuum and unweathered rock were observed in the explorations. We anticipate that these soils can be excavated with conventional excavation equipment, such as trackhoes or dozers although the hard unweathered rock will be difficult to excavate any significant depth. Larger horsepower excavators, or dozers with ripping teeth will be more efficient for the bedrock.

4.7.3. Rock Excavation

The sedimentary rock encountered at depths between 2½ and 6 feet bgs in test pits in the tank footprints is expected to extend the full depth of excavation. Based on observation of test pit excavation with an 85-series excavator, we anticipate that much of the upper surface of the rock is rippable. However, we recommend that the contractor be prepared to use a hydraulic ram to accomplish the proposed rock excavation if harder surfaces are encountered or more than 3 feet of excavation is required into the bedrock.

4.7.4. Clearing and Grubbing

Trees, brush and other vegetation, including topsoil with roots, should be stripped and removed from areas where structural fill will be placed. The stripped material should be placed in landscaping areas or taken off-site for disposal. Existing voids or new depressions created during site preparation should be cleaned of loose soil or vegetation and backfilled with structural fill.

4.7.5. Subgrade Preparation

GeoEngineers recommends that all subgrade surfaces be evaluated for suitability by a qualified geotechnical engineer or their representative. The tank subgrade should consist of sandstone bedrock. Any disturbed material should be removed, by hand if necessary. We do anticipate that a drainage and leveling layer consisting of crushed rock will be placed across the tank footprint. Proof-rolling is not necessary for bedrock subgrade areas. Soft zones noted during probing should be excavated and replaced with compacted structural fill. In the water tank footing area, a maximum of 2 feet overexcavation and crushed rock backfill is allowed based on using the high allowable bearing pressure discussed in this report. If deeper overexcavation is required, we recommend backfill with CDF.

4.7.6. Structural Fill Materials

4.7.6.1. GENERAL

Materials placed to support foundations and roadways or placed for drainage, are classified as structural fill for the purpose of this report. Structural fill material quality varies depending upon its use as described below:

1. At a minimum, structural fill should meet the criteria for common borrow as described in Section 9-03.14(3) of the WSDOT Standard Specifications. Common borrow will be suitable for use as structural fill in areas outside of the tank footprint and during dry weather conditions only. If structural

fill is placed during wet weather, the structural fill should consist of gravel borrow as described in Section 9-03.14(1) of the WSDOT Standard Specifications.

2. Structural fill placed below the water tank should consist of crushed surfacing base course in accordance with Section 9-03.9(3) of the WSDOT Standard Specifications, or other engineer approved crushed rock material. The upper 12 inches may be capillary break material as described below. Structural fill below foundation elements should extend out beyond the edge of the foundation a minimum of 1 foot and at a 1H:1V.
3. Structural fill placed to surround collector pipe (drain rock) and placed behind below grade walls should meet the criteria for gravel backfill for drains as described in Section 9-03.12(4) of the WSDOT Standard Specifications.
4. Structural fill placed as capillary break should be a clean crushed rock with a maximum particle size of 1½ inches, with negligible sand and silt (less than 3 percent).

4.7.6.2. ON-SITE SOILS

The upper 6 to 12 inches across the site generally contains a significant quantity of roots and organics and will not be suitable for reuse as structural fill. Below the topsoil/forest duff, most of the on-site soils have a high silt content and will be suitable for reuse as common borrow for the pipeline portion of the project only during dry weather and if screened for oversize material. If construction occurs during wet weather, the contractor will need to protect the soil stockpiles from rainfall. If soil stockpiles become wetter than the optimum moisture content, it may be necessary to export the soils off site and bring in drier material. On-site soils are not suitable for use as structural fill below the proposed water tank.

4.7.6.3. REUSE OF EXCAVATED SANDSTONE

Site grading will produce a quantity of excavated rock, which is desired to be reused onsite for fill and grading. It is proposed that the fill outside of the tank footprint consist of reused onsite rock placed and compacted with a 2H:1V finished slope configuration. We conclude that up to a 2H:1V fill embankment consisting of reused onsite rock can be constructed in a manner that is statically and seismically stable and adequate for fill embankment construction and driveway support with the recommendations below.

We recommend that onsite rock be processed so that 95 percent of the material has a maximum particle size of 12-inches. It is critical that only nominal soil is present in the fill matrix for a rock fill to allow rock to rock contact. We recommend that soil overburden be handled and compacted separately in accordance with the recommendations for soil below.

Onsite rock fill consisting of 12-inch minus material with nominal soil material should be placed in loose lifts less than 18 inches in thickness. The fill should be thoroughly compacted with a vibratory drum roller in accordance WSDOT Standard Specification 2-03.3(14)A Rock Embankment Construction which defines roller size and number of passes.

For fill on existing slopes 2H:1V and steeper, the face of each terrace for keying new fill to existing shall be a minimum of 1 foot wide and a maximum of 5 feet tall. The horizontal surfaces of the benches should be graded to a 0.05 percent slope to provide drainage. These are described in more detail in WSDOT Standard Specification 2-03.3(14) Embankment Construction.

4.7.6.4. FILL PLACEMENT AND COMPACTION CRITERIA

Structural fill should be mechanically compacted to a firm, non-yielding condition and the specified density. Structural fill should be placed in loose lifts not exceeding 10 inches in thickness, or lesser thickness as required to achieve the specified compaction. Each lift should be conditioned to the proper moisture content and compacted to the specified density before placing subsequent lifts. Structural fill should be compacted to the following criteria:

1. Structural fill placed behind below-grade walls should be compacted to 90 to 92 percent of the MDD as determined by ASTM D1557. Care should be taken when compacting fill near the face of below-grade walls to avoid over-compaction and overstressing the walls.
2. Structural fill placed outside of the tank structure footprint should be compacted to 90 percent of the MDD (ASTM D1557), except that the upper 2 feet of fill below final subgrade should be compacted to 95 percent of the MDD.
3. Structural fill placed below foundations including all structural fill below the tank foundations should be compacted to 95 percent of the MDD (ASTM D1557).
4. Any crushed rock placed below the footings to the water tank should be compacted to at least 98 percent of the MDD (ASTM D 1557) because of the 6,000 psf design pressure.

We recommend that the Geotechnical Engineer be present during proof-rolling and/or probing of the exposed subgrade and pavement subgrade soils, and placement of structural fill. The Geotechnical Engineer should evaluate the adequacy of the subgrade soils and identify areas needing further work, perform in-place moisture-density tests in the fill to evaluate if the work is being done in accordance with the compaction specifications, and advise on any modifications to procedure which may be appropriate for the prevailing conditions.

4.7.7. Temporary Slopes

The weathered horizon/weathered rock overburden and weathered glacial till soils encountered at the site are classified as Type C soil in accordance with the provisions of Title 296-155 WAC (Washington Administrative Code), Part N, "Excavation, Trenching, and Shoring." We recommend that temporary slopes in excess of 4 feet in height in these soils be inclined no steeper than 1½H:1V or supported by suitable shoring. The unweathered glacial till and weathered rock may be classified as "Type A" and inclined no steeper than ¾H:1V. Flatter slopes may be necessary if localized sloughing occurs. For open cuts at the site, we recommend that:

- No traffic, construction equipment, stockpiles or building supplies be allowed at the top of cut slopes within a distance of at least 5 feet from the top of the cut.
- Exposed soil along the slope be protected from surface erosion using waterproof tarps or plastic sheeting.
- Construction activities be scheduled so that the length of time the temporary cut is left open is kept as short as possible.
- Erosion control measures be implemented as appropriate such that runoff from the site is reduced to the extent practical.
- Surface water be diverted away from the excavation.
- The general condition of the slopes be observed periodically by a geotechnical engineer to confirm adequate stability.

Since the contractor has control of the construction operations, the contractor should be made responsible for the stability of cut slopes, as well as the safety of the excavations. All shoring and temporary slopes must conform to applicable local, state and federal safety regulations. Steeper slopes in the dense glacial till or rock can be used with approval by the geotechnical engineer, but usually require some monitoring for confirmation of soil types and slope stability.

4.7.8. Permanent Slopes

We recommend that permanent cut and fill slopes in soil be constructed no steeper than 2H:1V. To achieve uniform compaction, we recommend that fill slopes where required be overbuilt slightly and subsequently cut back to expose properly compacted fill.

For permanent rock cut slope excavation, we recommend that a 1H:1V cut slope be made in the weathered rock, and a 0.5H:1V cut slope be made in the hard rock. Actual conditions during excavation may require some field-based adjustments.

To reduce erosion, newly constructed soil slopes should be planted or hydroseeded shortly after completion of grading. Until the vegetation is established, some sloughing and raveling of the slopes should be expected. This may require localized repairs and reseeded. Temporary covering, such as clear heavy plastic sheeting, jute fabric, loose straw or excelsior matting should be used to protect the slopes during periods of rainfall. Even at these permanent slope inclinations in dense glacial soils and rock, areas of localized seepage could result in formation of rills or sloughing and erosion until permanent vegetation can be established.

The existing bedrock layer is considered relatively impermeable. Therefore, it is difficult to get topsoil and vegetation to maintain on even 2H:1V slopes. Sometimes it is helpful to include a rolled erosion control product (erosion control blanket) that is attached with heavy duty anchors.

4.7.1. Temporary Dewatering and Drainage Considerations

The contractor should anticipate shallow perched groundwater conditions will develop and seepage may enter excavations depending on the time of year construction takes place, especially in the winter and spring months. However, we expect this seepage water can be handled by digging interceptor trenches in the excavations and pumping from sumps. The seepage water, if not intercepted and removed from the excavations, will make it difficult to place and compact structural fill and may destabilize cut slopes. It may be necessary to stabilize seepage zones in cut slopes with geotextile fabric and rock or other measures to reduce sloughing and erosion.

All driveway and landscaped areas should be graded so surface drainage is directed away from the site structures to appropriate catch basins. Water collected in roof downspout lines must not discharge into or be routed to the perforated pipes intended for footing or wall drainage.

4.7.2. Weather Considerations

Most of the native soils contain a significant percentage of fines (silt and clay) and are moisture sensitive. When the moisture content of these soils is significantly above the optimum moisture content, these soils become muddy and unstable. During wet weather, operation of equipment on these soils will be difficult and it will be difficult to meet the required compaction criteria. Additionally, disturbance of the near surface soils should be expected if earthwork is completed during periods of wet weather.

The wet weather season generally begins in October and continues through May in the Puget Sound region; however, periods of wet weather may occur during any month of the year. The optimum earthwork period for these types of soils is typically June through September. If wet weather earthwork is unavoidable, we recommend that:

- Stockpiles of on-site soils that will be used as structural fill during wet weather be covered with plastic sheeting to protect them from rain.
- If on-site soils cannot be moisture conditioned to meet compaction requirements during wet weather, imported gravel borrow should be used as discussed previously.
- The ground surface in and around the work area be sloped so that surface water is directed away from the work area. The ground surface should be graded such that areas of ponded water do not develop. Measures should be taken by the contractor to prevent surface water from collecting in excavations and trenches. Measures should be implemented to remove surface water from the work area.

5.0 LIMITATIONS

We have prepared this report for the exclusive use of the Lake Whatcom Water and Sewer District and Wilson Engineering, LLC for the proposed Division 7 Reservoir Seismic Upgrade project. Our report and interpretations should not be construed as a warranty of the subsurface conditions.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Please refer to Appendix B titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.

6.0 REFERENCES

American Water Works Association. “Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks.” ANSI/AWWA D110-13, Dec 1, 2013.

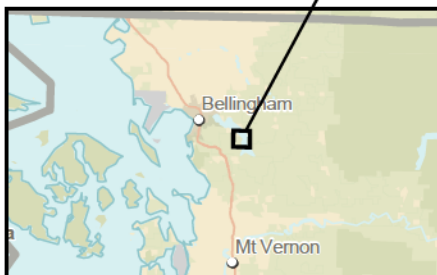
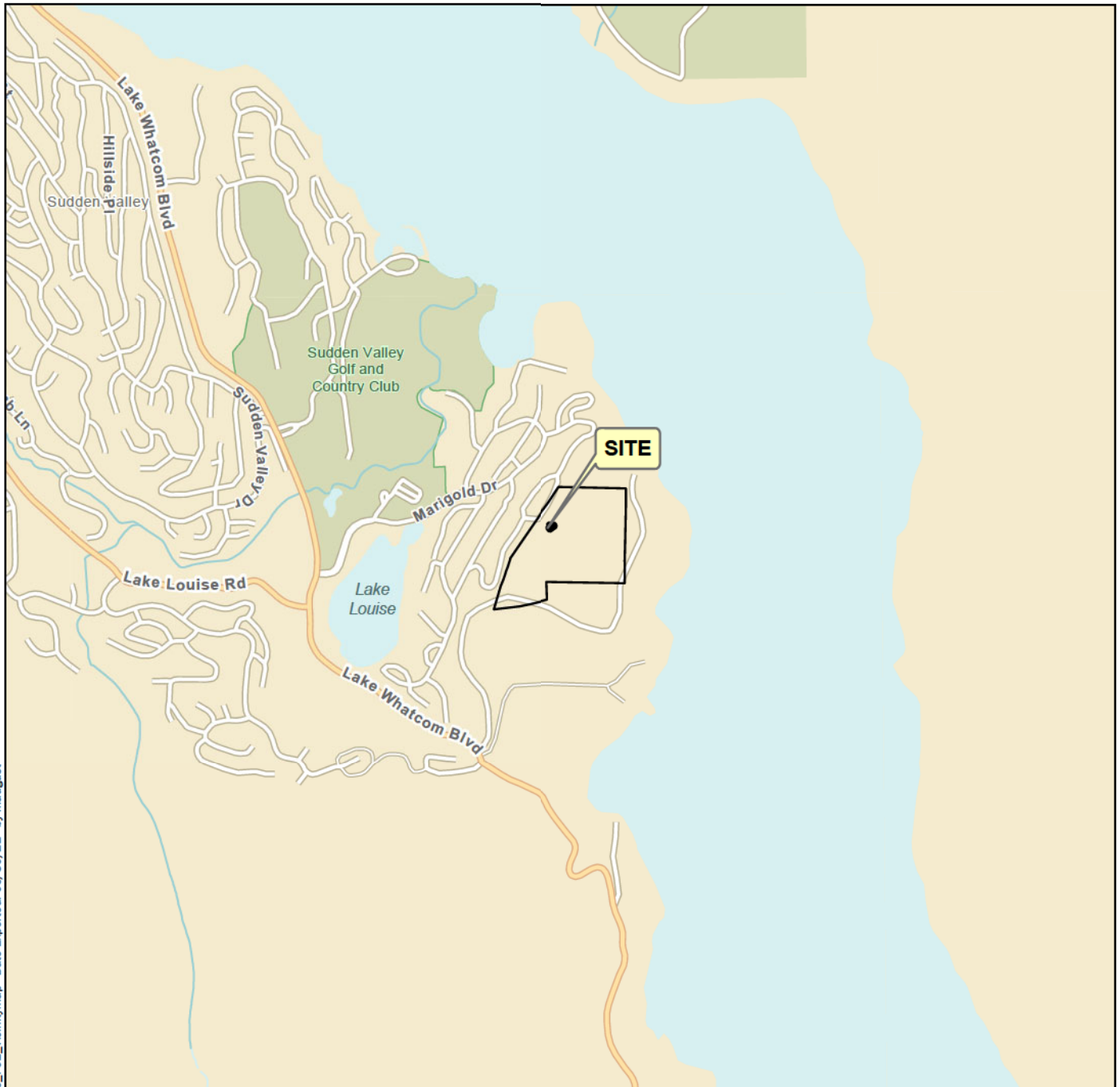
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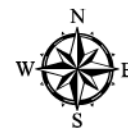


Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: ESRI

Projection: NAD 1983 UTM Zone 10N



2,000 0 2,000
Feet

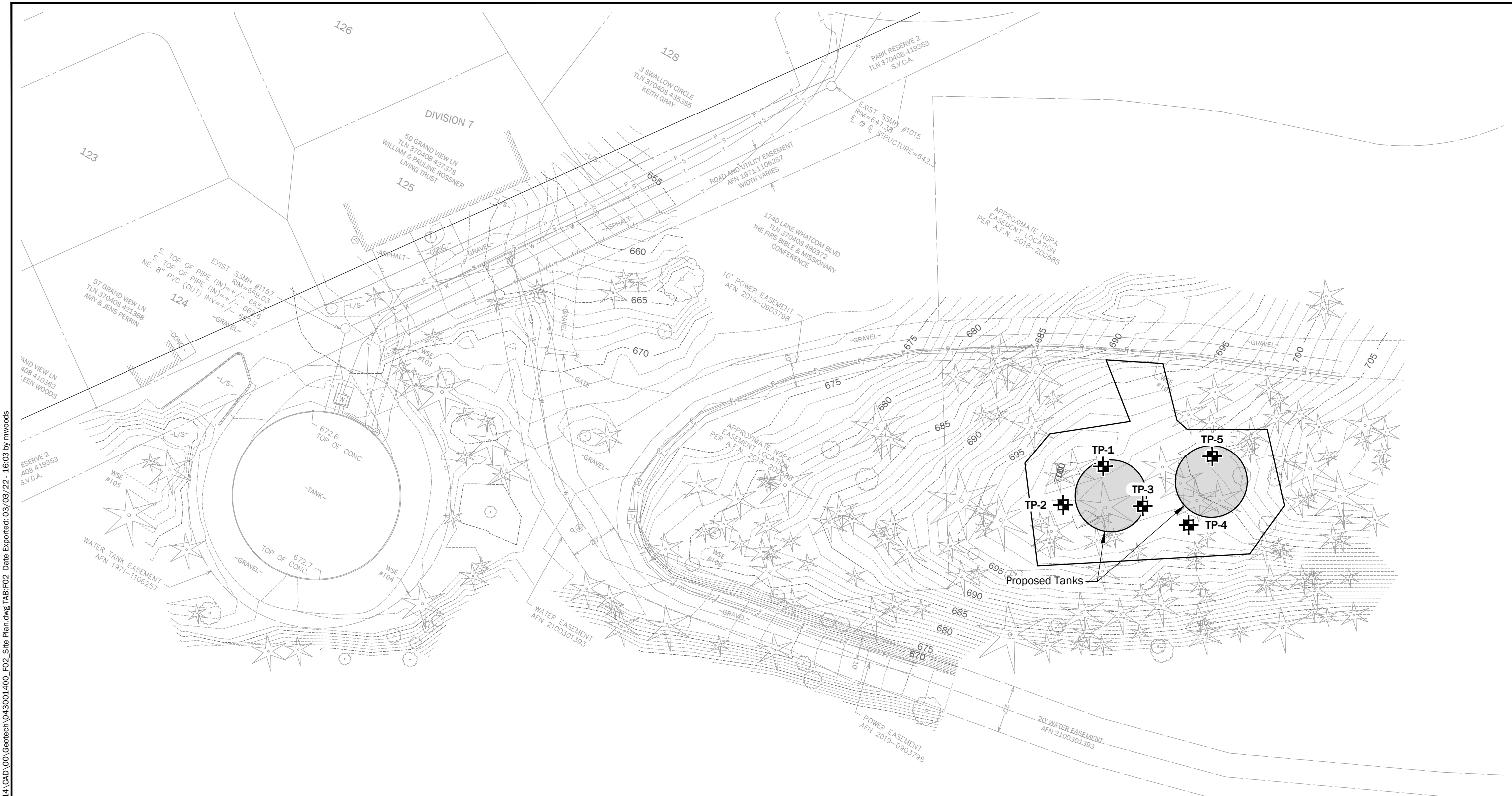
Vicinity Map

LWWS Division 7 Reservoir Seismic Upgrade
Bellingham, Washington



Figure 1

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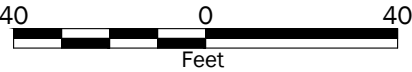


Legend

TP-1  Test Pit by GeoEngineers, Inc., 2022

- Notes:**
1. The locations of all features shown are approximate.
 2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Background from Wilson Engineering dated 8/16/21.
Projection: NAD83 Washington State Planes, North Zone, US Foot



Site and Exploration Plan	
LWWSD Division 7 Reservoir Seismic Upgrade Bellingham, Washington	
	Figure 2

APPENDIX A

Field Explorations and Laboratory Testing

APPENDIX A

FIELD EXPLORATIONS AND LABORATORY TESTING

Field Explorations

Subsurface soil and groundwater conditions at the site were evaluated with an exploration program of test pits. Five test pits (TP-1 through TP-5) were completed on February 17, 2022 to depths ranging from 4½ to 7 feet below the ground surface (bgs) with a tracked excavator operated by RAM Construction. The explorations were located in the field by measuring from existing features so should be considered approximate.

Disturbed soil samples were generally obtained from the sides of the test pits and the bucket of the excavator. The samples were placed in plastic bags to maintain the moisture content and transported back to our laboratory for analysis and testing. The test pits were backfilled with the excavated material upon completion and tamped with the excavator bucket.

The explorations were continuously monitored by a geologist from our firm who examined and classified the soils encountered, obtained representative soil samples, observed groundwater conditions, and prepared a detailed log of each exploration. Soils encountered were classified visually in general accordance with ASTM international (ASTM) D-2488-90, which is described in Figure A-1. An explanation of the symbols for the test pits is also shown in Figure A-1.

The logs of the test pits are presented in Figures A-2 through A-6. The exploration logs are based on our interpretation of the field and laboratory data and indicate the various types of soils/rock encountered. It also indicates the depths at which these soils/rock or their characteristics change, although the change might actually be gradual. If the change occurred between samples, it was interpreted.

Laboratory Testing

Soil samples obtained from the explorations were transported to our laboratory and examined to confirm or modify field classifications, as well as to evaluate index properties of the soil samples. Representative samples were selected for laboratory testing consisting of moisture content determination and grain size distribution. The tests were performed in general accordance with ASTM test methods or other applicable procedures.

Percent Passing U.S. No. 200 Sieve

Selected samples were “washed” through the U.S. No. 200 mesh sieve to determine the relative percentages of coarse- and fine-grained particles in the soil. The percent passing value represents the percentage by weight of the sample finer than the U.S. No. 200 sieve. These tests were conducted to verify field descriptions and to determine the fines content for analysis purposes. The tests were conducted in general accordance with ASTM D 1140, and the results are shown in the exploration logs at the respective sample depths.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES	
	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND
			SM	SILTY SANDS, SAND - SILT MIXTURES	
			SC	CLAYEY SANDS, SAND - CLAY MIXTURES	
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

	2.4-inch I.D. split barrel / Dames & Moore (D&M)
	Standard Penetration Test (SPT)
	Shelby tube
	Piston
	Direct-Push
	Bulk or grab
	Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS		TYPICAL DESCRIPTIONS
GRAPH	LETTER	
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact



Measured groundwater level in exploration, well, or piezometer



Measured free product in well or piezometer

Graphic Log Contact



Distinct contact between soil strata



Approximate contact between soil strata

Material Description Contact



Contact between geologic units



Contact between soil of the same geologic unit

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PL	Point lead test
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
UU	Unconsolidated undrained triaxial compression
VS	Vane shear

Sheen Classification





NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

Key to Exploration Logs



Figure A-1

Date Excavated	2/17/2022	Total Depth (ft)	4.5	Logged By	AF2	Excavator	Hitachi 85 Tracked Excavator	Groundwater not observed
				Checked By	AJH	Equipment	Hitachi 85 Tracked Excavator	Caving not observed
Surface Elevation (ft)	699	Easting (X)	1282035	Coordinate System	WA State Plane North			
Vertical Datum	NAVD88	Northing (Y)	627833	Horizontal Datum	NAD83 (feet)			

Elevation (feet)	Depth (feet)	SAMPLE		Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
698	1	1			Duff	Dark brown silty fine to coarse sand with gravel and organic matter (roots, needles, pine cones) (forest duff/topsoil)			
		2			ML	Rust-brown sandy silt with gravel (medium dense, moist) (weathered horizon)			
697	2	3			SM	Light brown with iron staining silty fine to coarse sand (medium dense, moist) (bedrock residuum)	21	28	
696	3	4			Sandstone	Brown sandstone bedrock (hard, moist) (Chuckanut formation)			
695	4								

Test pit terminated at approximately 4½ feet due to practical refusal on bedrock

Notes: See Figure A-1 for explanation of symbols.

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot. Coordinates Data Source: Horizontal approximated based on Aerial Imagery. Vertical approximated based on Topographic Survey.

Log of Test Pit TP-1



Project: LWWSD Division 7 Reservoir Seismic Upgrade
Project Location: Bellingham, Washington
Project Number: 0430-014-00

Figure A-2
Page 6 of 12

Date Excavated	2/17/2022	Total Depth (ft)	4.5	Logged By	AF2	Excavator		Groundwater not observed
				Checked By	AJH	Equipment	Hitachi 85 Tracked Excavator	Caving not observed
Surface Elevation (ft)	699	Easting (X)	1282029	Coordinate System	WA State Plane North			
Vertical Datum	NAVD88	Northing (Y)	627811	Horizontal Datum	NAD83 (feet)			

Elevation (feet)	Depth (feet)	SAMPLE		Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
698	1	1			Duff	Dark brown silty fine to coarse sand with gravel and organic matter (roots, needles) (loose, moist) (forest duff/topsoil)			
697	2	2			SM/ML	Light brown to rust-brown silty fine to medium sand to sandy silt (medium dense/stiff, moist) (weathered horizon)			
696	3	3			SM	Light brown silty fine to coarse sand with sandstone fragments (hard, dry to moist) (bedrock residuum)			
695	4	4			Sandstone	Brown sandstone bedrock (hard, moist) (Chuckanut formation)			

Test pit terminated at approximately 4½ feet due to practical refusal on bedrock

Notes: See Figure A-1 for explanation of symbols.

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on Topographic Survey. Vertical approximated based on Topographic Survey.

Log of Test Pit TP-2



Project: LWWSD Division 7 Reservoir Seismic Upgrade
Project Location: Bellingham, Washington
Project Number: 0430-014-00

Figure A-3
Sheet 1 of 2
Page 63 of 102

Date Excavated	2/17/2022	Total Depth (ft)	5	Logged By	AF2	Excavator	Hitachi 85 Tracked Excavator	Groundwater not observed
				Checked By	AJH	Equipment	Hitachi 85 Tracked Excavator	Caving not observed
Surface Elevation (ft)	699	Easting (X)	1282058	Coordinate System	WA State Plane North			
Vertical Datum	NAVD88	Northing (Y)	627826	Horizontal Datum	NAD83 (feet)			

Elevation (feet)	Depth (feet)	SAMPLE		Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
698	1	1			Duff	Dark brown silty fine to coarse sand with gravel and organic matter (roots, needles) (loose, moist) (forest duff/topsoil)			
697	2	2			SM	Rust-brown silty fine to mediums and with occasional gravel (loose to medium dense, moist) (weathered horizon)			
696	3	3	%F		SM	Light brown with iron staining silty fine to medium sand with sandstone fragments (medium dense, moist) (bedrock residuum)	15	25	
695	4	4			Sandstone	Brown weathered sandstone bedrock (Chuckanut formation)			
694	5				Sandstone	Brown sandstone bedrock (hard, moist)			

Test pit terminated at approximately 4½ feet due to practical refusal on bedrock

Notes: See Figure A-1 for explanation of symbols.

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on Topographic Survey. Vertical approximated based on Topographic Survey.

Log of Test Pit TP-3



Project: LWWS Division 7 Reservoir Seismic Upgrade
Project Location: Bellingham, Washington
Project Number: 0430-014-00

Figure A-4
Sheet 1 of 2
Page 62 of 162

Date Excavated	2/17/2022	Total Depth (ft)	7	Logged By	AF2	Excavator		Groundwater not observed
				Checked By	AJH	Equipment	Hitachi 85 Tracked Excavator	Caving not observed
Surface Elevation (ft)	699	Easting (X)	1282079	Coordinate System	WA State Plane North			
Vertical Datum	NAVD88	Northing (Y)	627829	Horizontal Datum	NAD83 (feet)			

Elevation (feet)	Depth (feet)	SAMPLE		Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
698	1	1			Duff	Dark brown silty fine to coarse sand with gravel and organic matter (roots, needles, wood) (forest duff/topsoil)			
697	2	2			SM/ML	Rust-brown silty fine to coarse sand with gravel to sandy silt with rootlets (loose to medium dense/medium stiff, moist) (weathered horizon)			
696	3	3			SPSM	Light brown fine to coarse sand with silt, gravel, occasional cobbles and siltstone fragments (medium dense, moist) (bedrock residuum)			
695	4								
694	5	4	%F				13	13	
693	6								
692	7	5			Sandstone	Light brown sandstone (hard, moist) (Chuckanut formation)			

Notes: See Figure A-1 for explanation of symbols.

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on Topographic Survey. Vertical approximated based on Topographic Survey.

Log of Test Pit TP-4



Project: LWWSD Division 7 Reservoir Seismic Upgrade
Project Location: Bellingham, Washington
Project Number: 0430-014-00

Figure A-5
Sheet 1 of 2
Page 63 of 162

Date Excavated	2/17/2022	Total Depth (ft)	4.5	Logged By	AF2	Excavator		Groundwater not observed
				Checked By	AJH	Equipment	Hitachi 85 Tracked Excavator	Caving not observed
Surface Elevation (ft)	701	Easting (X)	1282073	Coordinate System	WA State Plane North			
Vertical Datum	NAVD88	Northing (Y)	627859	Horizontal Datum	NAD83 (feet)			

Elevation (feet)	Depth (feet)	SAMPLE		Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
		Testing Sample	Sample Name Testing						
700	1	1			Duff	Dark brown silty fine to coarse sand with gravel and organic matter (forest duff/topsoil) (loose, moist)			
699	2	2			SM	Brown with iron staining and rust-brown silty fine to medium sand with gravel and rootlets (loose, moist) (weathered horizon)			
698	3	3			SM	Light brown silty fine to coarse sand with gravel, occasional cobbles and occasional roots (loose to medium dense, moist) (bedrock residuum)			
697	4	4			Sandstone	Brown sandstone (hard, moist) (Chuckanut formation)			

Notes: See Figure A-1 for explanation of symbols.

The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on Topographic Survey. Vertical approximated based on Topographic Survey.

Log of Test Pit TP-5



Project: LWWSD Division 7 Reservoir Seismic Upgrade
Project Location: Bellingham, Washington
Project Number: 0430-014-00

Figure A-6
Sheet 1 of 12
Page 64 of 162

APPENDIX B

Report Limitations and Guidelines for Use

APPENDIX B

REPORT LIMITATIONS AND GUIDELINES FOR USE¹

This appendix provides information to help you manage your risks with respect to the use of this report.

Geotechnical Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for the exclusive use of Lake Whatcom Water and Sewer District and their authorized agents. This report may be made available to other members of the design team. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geotechnical or geologic study is unique, each geotechnical engineering or geologic report is unique, prepared solely for the specific client and project site. Our report is prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geotechnical practices in this area at the time this report was prepared. This report should not be applied for any purpose or project except the one originally contemplated.

A Geotechnical Engineering or Geologic Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the proposed Lake Whatcom Water and Sewer District Division 7 Reservoir Seismic Upgrade project in Bellingham, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- Not prepared for you,
- Not prepared for your project,
- Not prepared for the specific site explored, or
- Completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- The function of the proposed structure;
- Elevation, configuration, location, orientation or weight of the proposed structure;
- Composition of the design team; or
- Project ownership.

¹ Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Subsurface Conditions Can Change

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying a report to determine if it remains applicable.

Most Geotechnical and Geologic Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Geotechnical Engineering Report Recommendations are Not Final

Do not over-rely on the preliminary construction recommendations included in this report. These recommendations are not final, because they were developed principally from GeoEngineers' professional judgment and opinion. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for this report's recommendations if we do not perform construction observation.

Sufficient monitoring, testing and consultation by GeoEngineers should be provided during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions.

A Geotechnical Engineering or Geologic Report Could be Subject to Misinterpretation

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having GeoEngineers confer with appropriate members of the design team after submitting the report. Also retain GeoEngineers to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having GeoEngineers participate in pre-bid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Give Contractors a Complete Report and Guidance

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

Contractors are Responsible for Site Safety on Their Own Construction Projects

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and to adjacent properties.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Environmental Reports Should Not be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants


GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of biological pollutants. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detecting, assessing, preventing or abating of biological pollutants and no conclusions or inferences should be drawn regarding biological pollutants, as they may relate to this project. The term "biological pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

If Client desires these specialized services, they should be obtained from a consultant who offers services in this specialized field.



**AGENDA
BILL
Item 7.E**

**Rocky Ridge and Lakewood
Sewer Pump Stations
Improvements Project
Briefing**

DATE SUBMITTED:	June 28, 2022	MEETING DATE:	July 13, 2022
TO: BOARD OF COMMISSIONERS	FROM: Bill Hunter, District Engineer / Assistant General Manager		
GENERAL MANAGER APPROVAL			
ATTACHED DOCUMENTS	1. RH2 Engineering – Draft Predesign Report		
TYPE OF ACTION REQUESTED	RESOLUTION <input type="checkbox"/>	FORMAL ACTION/ MOTION <input checked="" type="checkbox"/>	INFORMATIONAL /OTHER <input type="checkbox"/>

BACKGROUND / EXPLANATION OF IMPACT

As part of Lake Whatcom Water and Sewer District's long-term capital improvement plan, the Rocky Ridge and Lakewood Sewer Pump Stations, constructed in the late 1970's, are scheduled for renewal or replacement. Both stations are located on the south shoreline of Lake Whatcom between Sudden Valley and Geneva. Physical access to these stations is very challenging due to steep slopes and no public or private access roads, each station serves a small number of residences, and some sections of gravity sewer mains and manholes are located below the ordinary high-water mark of the lake.

On November 24, 2021 the Board authorized RH2 Engineering to begin Phase 1, Predesign. Phase 1 includes an alternatives analysis intended to take a step back, look at the big picture, and consider a broad range of options to find the best long-term solution that provides the most economical approach in terms of both initial capital cost as well as long term operation and maintenance of wastewater collection infrastructure. Phase 1 also includes an initial topographic survey, gathering of pump and electrical information, predesign report, 30% design plans, and Whatcom County shorelines permitting.

RH2 Engineering and District staff have been coordinating closely collecting data, reviewing historical SCADA information, and meeting with operations and maintenance staff. RH2 Engineering will present the Draft Predesign Report that analyzed four alternatives.

The anticipated schedule is to complete predesign summer 2022; and permitting by end of 2022. Future Phase 2, Design and Bidding, is planned for completion spring 2023. Future Phase 3, Construction, is planned to occur summer 2023.

FISCAL IMPACT

The draft predesign report recommends either of two alternatives, Alternative #1 or Alternative #2. Alternative #1 is a Smith & Loveless dry prime pump station with an

estimated total project cost of \$1.5 million. Alternative #2 is a Gorman Rupp belt driven pump station with an estimated total project cost of \$1.2 million.

The District’s Budget and System Reinvestment Plan includes:

Phase 1 Predesign and Permitting	\$176,085
Phase 2 Design & Bidding	\$92,700
Phase 3 Construction	\$920,000
Total	\$1,188,785

The Engineering News Record Construction Cost Index rose 8.2% from June 2021 to June 2022. In contrast, the District’s Water & Sewer Utility Rate Study completed by FCS Group in February 2022 assumed a 3.00% construction cost inflation based on recent performance at the time of the analysis.

The District’s adopted sewer rates for the next five years assume \$10M in new debt in 2026 specifically to help fund the District’s portion of the Post Point Resource Recovery project. All other sewer projects, including Rocky Ridge and Lakewood Sewer Pump Stations are funded by sewer rates and general facilities charges.

Construction costs at the time of bidding and construction next year (Spring 2023) may be much higher if inflation continues at current levels. The District will need to prioritize projects and delay others to maintain adopted sewer rates through 2026 that have annual adjustments of 3.75%. Staff plans to update capital project estimates and project schedules to fit expenditures within rate study recommended system reinvestment funding as part of the 2023 budget process.

APPLICABLE EFFECTIVE UTILITY MANAGEMENT ATTRIBUTE(S)

Infrastructure Strategy and Performance
Community Sustainability

RECOMMENDED BOARD ACTION

Provide direction on whether to proceed with the recommended alternative(s) by preparing and submitting permit applications to Whatcom County; or provide additional information or explore additional alternatives.

PROPOSED MOTION

Recommended motion is:

“I move to proceed with the recommended Alternatives #1 and #2 as presented in the Draft Predesign Report, which are both top-mounted pump stations by competing manufacturers.”



ROCKY RIDGE AND LAKEWOOD SEWER PUMP STATIONS PREDESIGN REPORT

*Prepared for Lake Whatcom Water and Sewer
District*

July 2022

LWWSD 21.0130



Prepared by:
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Lake Whatcom Water and Sewer District

Rocky Ridge And Lakewood Sewer Pump Stations

Predesign Report

July 2022

Prepared by RH2 Engineering, Inc.

Prepared for Lake Whatcom Water and Sewer District

Note: This Preliminary Design Report was completed under the direct supervision of the following Licensed Professional Engineers registered in the State of Washington.

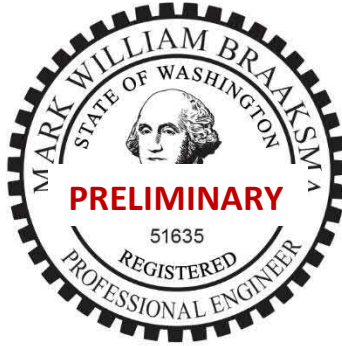
Sincerely,

RH2 ENGINEERING, INC.



Project Engineer

Signed: 07/XX/2022



Electrical Engineer

Signed: 07/XX/2022



Project Manager

Signed: 07/XX/2022

Lake Whatcom Water and Sewer District

Rocky Ridge And Lakewood Sewer Pump Stations

Predesign Report

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Lake Whatcom Water and Sewer District

Rocky Ridge And Lakewood Sewer Pump Stations

Predesign Report

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Lake Whatcom Water and Sewer District

Rocky Ridge And Lakewood Sewer Pump Stations

Predesign Report

Executive Summary

The Rocky Ridge and Lakewood Sewer Pump Stations (RR and LW PSs), which are part of Lake Whatcom Water and Sewer District's (District) sewer infrastructure, are in need of rehabilitation. The RR and LW PSs have been identified as part of the District's long-term plan to replace all pump stations greater than 40 years old. These stations are beginning to approach the end of their lifespan and the maintenance frequency has increased.

Data from the District's supervisory control and data acquisition (SCADA) system was analyzed monthly from 2015 to 2021 and hourly between January 1, 2021 and December 31, 2021, to determine historical flow rates for the RR and LW PSs. The maximum historic peak daily flow rate of 38 gallons per minute (gpm) was seen during a 48-hour period on November 22, and 23, 2021. This was a historic storm and flood event. Average daily flows for the year-long study period were 2 gpm. Build-out projections for the flow rates will not vary significantly as Rocky Ridge has only five undeveloped lots that will not add significant flows.

Both stations service small sewer basins with similar hydraulics (100 gpm pumps ranging in discharge head of 70 to 85 feet). Both stations utilize 230 Volt, 3-phase power drops. Each pump station contains two pumps ranging from 10 to 15 horsepower each. Both stations will have their power runs replaced as repairs in the past 40 years have required splicing and may be damaged. The power drops themselves will be reused to save cost. **Alternatives 1** through **3** will include a meter placed near Lake Whatcom Boulevard to reduce lake front disturbance.

Four alternatives were reviewed to replace the Rocky Ridge and Lakewood Pump Stations.

- **Alternative 1** – Smith & Loveless dry prime pump station with custom control panel meeting District standard requirements. This is basically a like-for-like replacement of the existing station with improvements to controls and monitoring. The cost for this alternative is estimated at \$1.5 million.
- **Alternative 2** – Gorman Rupp belt drive pump station with custom control panel meeting District standard requirements. This is like **Alternative 1** with a different pump station manufacturer. The cost for this alternative is estimated at \$1.2 million.
- **Alternative 3** – Flygt submersible pump station with custom control panel meeting District standard requirements. This alternative is similar to what was done at the District's Par, Strawberry Point, and Boulevard Pump Stations. The cost for this alternative is estimated at \$1.4 million.
- **Alternative 4** – E-One individual home grinder pumps with 2-inch force mains connecting to existing force main or gravity sewer routed to the nearest existing piping from each home. The E-One pumps are semi-positive displacement (pump to the same pressure within a narrow flow range) pumps with a grinder head at the pump intake to

reduce clogging potential. Rocky Ridge would include 12 pump stations. Lakewood would include 7 pump stations. Future pumps and force mains would be required with new development. The cost for this alternative is estimated at \$1.6 million.

RH2 Engineering, Inc., (RH2) recommends, in concurrence with District staff, **Alternative 1 or 2** for the rehabilitation of the RR and LW PSs, which are summarized as follows:

- Pumps: Two 10 to 15 horsepower (hp) Smith & Loveless or Gorman Rupp top-mounted packaged pump stations with an adjacent pedestal-mounted custom control panel.
- Meter: Place a meter in Lake Whatcom Boulevard to measure flows from each station away from the shoreline.
- Generator: Provide plug in connections and a manual transfer switch at the power drops on Lake Whatcom Boulevard.
- Electrical: House electrical/telemetry controls and panels in pedestal-mounted enclosures near the wet well. Power drops will not be rebuilt, but service lines will be replaced from the power drop down to the pump stations.
- Force Main: Connect the discharge of the pump stations to the existing force main. This will maintain a scour velocity of approximately 5 feet per second to maintain the force main and keep solids from building up or settling at low points. A future project in the next 40 or more years is anticipated to be the lining of the gravity sewer mains and force mains.

Total Preliminary Project Cost

A preliminary total project cost estimate for the chosen alternative is \$1.2 to \$1.5 million. Alternative 1 may come down in cost as happened during bidding of the Edgewater and Dellesta projects. Bidding competition will help keep costs down. The evaluation of various alternatives for the RR and LW PSs varied from \$1.2 million to \$1.6 million in total project costs, with add ons ranging from of \$130,000 to \$180,000 to improve access. The add ons were not chosen at this time but can be pursued in design or added later as needed.

Chapter 1 – Introduction

Background

The Lake Whatcom Water and Sewer District (District) serves the area around Lake Whatcom. The District owns, operates, and maintains approximately 367,000 linear feet (lf) (70 miles) of gravity sewer pipe, 77,000 lf of force main pipe, and 28 sewer pump stations. As part of the District's long-term plan, the Rocky Ridge and Lakewood Sewer Pump Stations are both due for replacement. This Predesign Report (Report) addresses the rehabilitation of the Rocky Ridge and Lakewood Sewer Pump Stations (RR and LW PSs).

This Report includes an alternatives analysis to replace the RR and LW PSs. RH2 Engineering, Inc., (RH2) prepared a review of existing and future conditions, summarized alternatives to consider, prepared preliminary construction and project cost estimates, and evaluated alternatives based on RH2 and District preferences. The District's chosen alternative is described in the **Conclusion** and **Executive Summary** sections.

The RR and LW PSs are situated in the Lake Whatcom watershed along the south side of the lake within easements and/or on private property. Both stations are Smith & Loveless (S&L) wet well mounted, dry prime pump stations housed within a hinged fiberglass cover. Apart from the cover there are a couple of electrical components onsite. The stations were constructed in the late 1970s, and the pumps, motors, valves, electrical controls, and telemetry system have reached the end of their design life.

The RR and LW PSs are located east of the Boulevard Pump Station and west of the Airport Pump Station. The Rocky Ridge PS is accessed via Woodcliff Lane and a trail down to the station. The Lakewood PS is accessed from a private driveway and access/maintenance easement and a trail on Western Washington University (WWU) land to the site.

Each station is relatively small, consisting of duplicate pumps with flow capacities of 100 gallons per minute (gpm) and significant discharge head to pump south and up to Lake Whatcom Boulevard, which is approximately 70 feet higher than the shoreline locations of the pump stations. The power services to both stations are currently 230 Volt, 3-phase power.

The project will require Whatcom County Shoreline Substantial Development, Variance, and Conditional Use Permits. Regardless of the alternative chosen, there will be minor expansion of the existing footprints due to pump control and telemetry panel replacements to meet District standards. Refer to the **Permitting Information** section in this chapter for details.

The focus of the predesign study is to find the most economic and low maintenance replacement option. Due to their remote locations, careful consideration is necessary, as getting equipment and parts to the site will be costly, both for construction and long-term maintenance. During construction, shipment of materials will likely require a barge and offloading by crane or excavator on the barge.

The District desired to review existing conditions and formulate a rehabilitation plan. To accomplish this, conditions were assessed, a survey of the basins was completed by aerial drone, alternatives were reviewed, and a preferred alternative was chosen.

Once chosen, design will progress to 30 percent to complete shoreline permitting. Final design will then be completed, with construction scheduled for summer of 2023 or potentially 2024. Construction may be delayed due to District budgets and material and labor availability due to the COVID pandemic.

Rocky Ridge

The Rocky Ridge Sewage Basin (RRSB) receives sewage from 12 properties along the lake, encompassing approximately 11 acres. **Figure 1-1** shows the RRSB. The basin has five unbuilt lots and the new pump station will be designed with this in mind. The sewage is pumped and transported via the existing 4-inch ductile iron force main to a manhole in Lake Whatcom Boulevard that flows west (down Lake) to the Boulevard Pump Station. Boulevard Pump Station pumps west to a hill at Strawberry Point where it flows by gravity towards the Cable Street Pump Station where it is again pumped into the City of Bellingham's system at Flynn Street and Electric Avenue.

Lakewood

The Lakewood Sewage Basin (LWSB) receives sewage from 7 properties along the lake, encompassing approximately 4 acres. **Figure 1-2** shows the LWSB. The basin is fully built out with no further growth expected. The sewage is pumped and transported via the existing 4-inch ductile iron force main to a manhole south of Lake Whatcom Boulevard that flows east (up Lake) to the Airport Pump Station. The Airport Pump Station pumps west to the same hill at Strawberry Point as described in the **Rocky Ridge** section above, combining with Rocky Ridge's sewage.

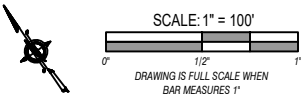
NOTE: FOR PARCELS WITH MISSING OR INCOMPLETE SIDE SEWER AS-BUILT INFORMATION, THE SEWER CONNECTION LINE HAS BEEN ASSUMED AND DRAWN DENOTED WITH "UNK SS"

PRELIMINARY



FIGURE 1-1: ROCKY RIDGE SEWER BASIN

SEWER PUMP STATION IMPROVEMENTS



NOTE: FOR PARCELS WITH MISSING OR INCOMPLETE SIDE SEWER AS-BUILT INFORMATION, THE SEWER CONNECTION LINE HAS BEEN ASSUMED AND DRAWN DENOTED WITH "UNK SS"

PRELIMINARY

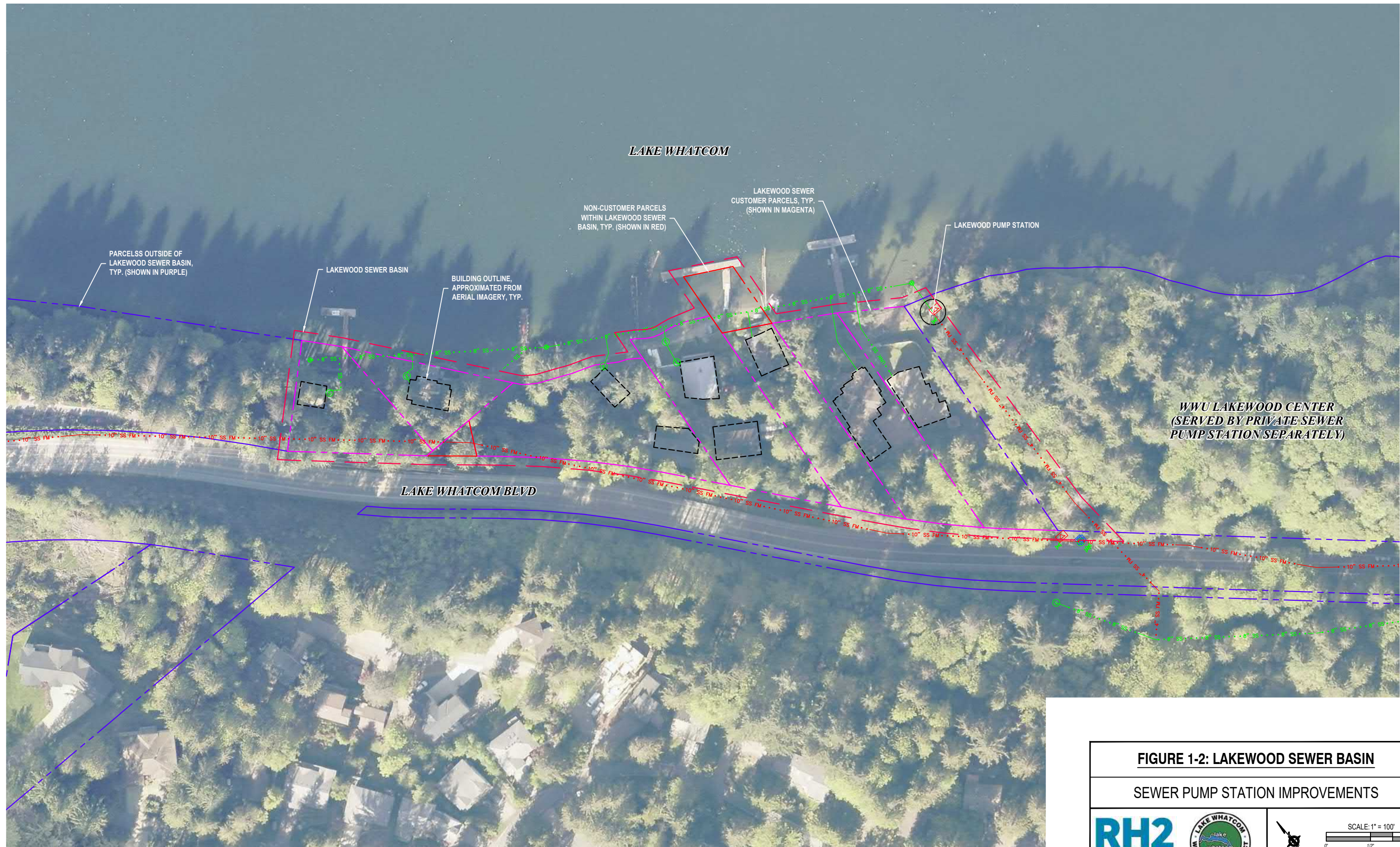
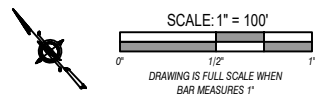


FIGURE 1-2: LAKEWOOD SEWER BASIN

SEWER PUMP STATION IMPROVEMENTS



Permitting Information

Due to the RR and LW PSs location within 100 feet of Lake Whatcom, the pump stations will require Shoreline Variance and Conditional Use Permits. It is important to note that expansion of the existing structures and impervious areas also will require Shoreline Substantial Development Permits. Accommodating a functional, maintainable, and accessible system within the existing footprint and in the sewage basin may require some compromises if a shoreline exemption is pursued. The pump stations are bordered on the north side by the lake. During design, a detailed temporary erosion and sediment control plan will be incorporated to protect the lake. In addition, the RR and LW PSs are on private property. If a structure over 200 square feet and/or a retaining wall 4 feet high or higher is required, a building permit will be needed.

The chosen alternative includes a slight expansion of footprint for the electrical panels. Because the locations are right on the shoreline, Whatcom County will review any expansion as requiring a Shoreline Substantial Development Permit.

State Environmental Policy Act (SEPA) permitting will be completed by the District's SEPA official. Projects with more than 500 square feet of disturbance or more than 50 cubic yards of excavation must be completed between June 1st and September 30th to comply with Whatcom County's watershed construction window.

Any project in the Lake Whatcom Watershed Overlay District will require the preparation of a Construction Stormwater Pollution Prevention Plan. The projects are anticipated to create less than 501 square feet of impervious surfaces excluding the add on options and the installation of new power services. The new power services would be classified as exempt from stormwater management as they involve the installation of below-grade cabling and wiring (direct burial or conduit encased). The add-ons for improving access to each of the pump stations would require additional stormwater permitting and the preparation of a full stormwater site plan report. These add ons also would require mitigation in addition to the above-referenced permitting items.

Chapter 2 – Flow Monitoring

Estimation of Future Sewer Flows

The RRSB has 12 built parcels and 5 vacant parcels. As a result, the rehabilitation of the RR PS will account for residential units being constructed on all parcels able to be developed. Currently, 70 percent of the basin is developed. To determine flows from these additional parcels, equivalent residential units (ERUs) are applied, which is a standard unit of measure equal to what one single-family residence sends to the sewer system per day averaged for a year. Peaking factors for peak day and peak hour are applied and compared to historical pump run times to verify flows.

The existing zoning and the sewer basin development history make it straightforward to predict the future basin flow. Upon analyzing recorded data provided by the District, as well as pump drawdown testing discussed in the **Pump Testing** section of this Report, existing flow rates and developments were utilized to develop future flow assumptions. The flow rate of existing ERUs per parcel was then applied to future parcels.

The LWSB is fully developed with seven parcels. This basin is not expected to expand as it is surrounded by Lake Whatcom, the Airport Sewage Basin, and the WWU Sewage Basin.

Infiltration and Inflow

The association between peak storm events and peak flows within the RRSB and LWSB indicate that infiltration and inflow (I&I) does not pose an extreme issue for the pump stations. The analysis was based on several factors, including daily pump run data provided by the District, the basin's developed parcels, and historical precipitation values provided by the District and verified through a nearby weather station. The US Environmental Protection Agency (EPA) thresholds for wet weather and dry weather flows were used as a guide in determining if excessive infiltration and inflow posed an issue to the pump stations. The infiltration criterion was based on gallons per person per day (gppd). To determine this value, the average of the peak 7- to 14-day event during which there was no precipitation was divided by the population served. Assuming that there were 2.59 people per household (from the District's *2020 Comprehensive Sewer Plan*), the total population was determined for the basin. The results shown in **Table 2.1** indicate that the RR and LW PSs are below the thresholds for both infiltration and inflow and do not require further study at this time. Excessive I&I is considered to be gppd flow above EPA thresholds of 120 gppd in dry weather periods and 275 gppd in wet weather periods.

Table 2.1

RR and LW PSs I&I Analysis

	Dry Flow		Wet Flow	
	gpd	gppd	gpd	gppd
Rocky Ridge	832	27	6,045	194
Lakewood	722	40	4,538	250
EPA Thresholds		120		275

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Force Main

The force mains from the RR and LW PSs rises in elevation by approximately 70 feet along their approximate 350 lf and 500 lf horizontal length, respectively, to the connection points and the transition to gravity in and near Lake Whatcom Boulevard. The force main pipe for both stations is labelled ductile iron (DI) pipe, and this was confirmed by maintenance staff and checked in the wet well of each station.

With average flow rates at full buildout estimated at 2 gallons per minute (gpm) for each station, the 4-inch force main is oversized. The 4-inch force main is generally a standard minimum diameter, balancing the need for a non-clog system and flows at 100 gpm to scour the main. The District would like construction of the replacement system to utilize the least cost method. The existing 4-inch force mains could be sliplined with 2-inch high-density polyethylene (HDPE) force main to allow for smaller pumps. This will increase the risk of a possible clog (although grinder pumps will allow a maximum 1-inch sphere into the main). A 2-inch force main will be scoured with a velocity of 5 feet per second with a 50 gpm pump.

The existing force main may need to be excavated at sharp bends to get the 2-inch main sliplined. The force main was placed in steep, poorly accessible, and rocky terrain that will be expensive to replace and/or slipline.

With the force main having no known failures, slightly larger pumps (100 gpm rated vs. 50 gpm rated) appear to be more cost effective compared to smaller pumps and a replaced or sliplined force main.

The exception is where new main is needed for **Alternative 4** (as shown on **Figures 4-4** and **4-5**) where individual pump stations and 2-inch force mains connect to the existing forcemain. This abandons the gravity collection system but adds significant force main, pumps, and controls to maintain.

The District has inspected the gravity and force mains and found a belly at the west end of the Lakewood gravity sewer near the last service. No short-term improvements are planned for its pipe system. In the next 20 to 60 years the pipe will need rehabilitation. Due to access, steep slopes and shoreline proximity, cured-in-place pipe (CIPP) rehabilitation and/or sliplining of smaller diameter pipe should be considered. The cost for these improvements was estimated in **Table 2.2** and is based on CIPP, which is likely costlier but should be compared again before pursuing the rehabilitation.

Table 2.2
CIPP Future Project Cost

Alternative	Description	Rocky Ridge Construction Cost	Lakewood Construction Cost	Design Engineering	Construction Oversight	Total Project Cost
Future Project	Rehab Pipe	\$316,000	\$227,000	\$98,000	\$44,000	\$685,000

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Pump Testing

Pump data provided by the District's supervisory control and data acquisition (SCADA) equipment only accounted for pump on/off times. To determine actual flow rates, field testing, in the form of drawdown testing, was completed. Field testing was completed on January 19, 2022. The testing is volumetric based and determines actual flow rates using the relationship of volume changes over time in the wet well taking into consideration inflow from homes, visible leaks in the wet well, and observed flow into the wet well from full to semi-full gravity sewer inlets. Utilizing this data produced the flow rates shown in **Table 2.3**.

Table 2.3

Pump Flow

Pump Station	Pump 1 Flow	Pump 2 Flow	Pump Design (Flow and TDH)	
Unit	gpm	gpm	gpm	feet
Rocky Ridge	140	122	100	70
Lakewood	67	104	100	85

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Currently, the Rocky Ridge pumps average run times were 31 minutes per day in 2021. The Lakewood pumps average run times were approximately 18 minutes per day in 2021.

Historic and Projected Flow Rates

Flows from pump run data were compared with possible growth within the Rocky Ridge sewer basin. All undeveloped lots within the basin were assumed to be developed based on GIS data made available by the District. **Figure 1-1** shows the RRSB and the developed and undeveloped lots.

Average daily demand (ADD) was estimated using a value of 180 gallons per day (gpd) per ERU for the RRSB as outlined in the District's *2020 Sewer Comprehensive Plan*. From the ADD, the peak daily demand (PDD) was approximated through the use of the District's ADD to PDD factor of 3. Lastly, the peak hourly flow (PHF) was calculated using a PHF of 4 since the basin has less than 500 ERUs. The existing 12 developed parcels and the future developed parcels result in a total of 17 parcels and the flows established in **Table 2.4**. The pump run data is from the District's SCADA system pump run times and the pump flow rates discussed in the **Pump Testing** section. Note the Pump Run Data Raw column shows the flows into the pump stations based on run times during the historic flooding event that occurred in November 2021.

The LWSB will not expand and is fully developed so future flows will be similar to existing flows.

Table 2.4

RR and LW PS Existing and Design Flow

<i>Flow in gpm</i> <i>Rocky Ridge</i>	Comprehensive Plan				Pump Run Data and Peak Factors			Pump Run Data Raw	
	Parcels	ADD	PDD	PHF	ADD	PDD	PHF	ADD	PDD
Existing Developed Parcels	12	1.5	4.5	18.0	2.1	6.4	25.6	2.1	37.7
Undeveloped Parcels	5	0.6	1.9	7.5					
Total	17	2.1	6.4	25.5	3.0	9.1	36.3		
<i>Lakewood</i>	Parcels	ADD	PDD	PHF	ADD	PDD	PHF	ADD	PDD
Total	7	0.9	2.6	10.5	1.0	3.1	12.5	1.0	38.1

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Total Discharge Head (TDH) was calculated based on the known length of the force main of approximately 350 and 500 feet for Rocky Ridge and Lakewood, respectively. The inside diameter of 4 inches for the DI pipe, a “C” factor of 130, and any headlosses through known fittings were checked and confirmed to match the design flow and TDH of the existing pumps as stated on construction records provided by the District.

There is a correlation between storm events and peak flows. This is not significant, as described in the **Infiltration and Inflow** section. The correlation is due to improvements in infiltration and inflow reductions to the existing sewer infrastructure, including manhole lid seals, pipe repairs, and manhole and wet well grouting and sealing. Maintenance staff are concerned about a portion of the gravity collection system at Lakewood that is *in* Lake Whatcom. Refer to **Photos 1** and **2** showing the manhole at typical lake level and during the flooding event in November 2021.



***Photo 1 (Normal Lake Level) and 2 (Flood Level). Lakewood Manhole in Lake Whatcom.
November 2021.***

Maintaining 5 feet per second in the force main is advised for centrifugal pumps. It is less important for semi-positive displacement pumps because flow volume is near constant and pressure will increase to push out any solid buildup out of the pipeline.

Chapter 3 – Construction Considerations

Access

Rocky Ridge

Rocky Ridge is located on private property with no easement for its location or access to the site. Based on conversations with District staff and neighbors, access was originally from the property southeast of the pump station when the property was undeveloped. The property owner submitted plans to build, which notified the District that access would be restricted. The District sued to maintain access but lost the suit. This resulted in the access available today which is directly down from Woodcliff Lane. In the 1980s, Woodcliff Lane was a thru road but a landslide caused it to become two dead-ends. This creates difficulty with access to the site and how the power drop runs from Lake Whatcom Boulevard via the west dead end and how the best access by automobile is via the east dead end.

It is advised that any improvements be completed after obtaining an access easement and permanent easement for the facility. Costs for this effort are not included in the construction cost estimate in this Report. The District will pursue easements on its own during the predesign and design process.

District staff advised providing an elevated walkway/stairway with a lift or equipment funicular from an old, graded road (just below Woodcliff Lane) that is now grass covered down to the station. At the station, District staff advised a raised area surrounding the wet well with a landing area of approximately 100 square feet. The cost for this work was accounted for separately. Because of the cost and permitting complexity, it will not be pursued at this time. If desired, permitting will require mitigation on or offsite to build this improvement.

Lakewood

Lakewood is located between a private residence and the Lakewood facility owned by WWU. The District has access and permanent easements for the facility. The easement is a strip of unimproved land below a driveway 20 feet wide. The driveway itself is also in the easement. The unimproved strip of land is very steep with no vehicle access. District staff requested an access road to reach the station if possible. The cost for this improvement was separated from the general pump station improvements and could be added to the design. If desired, permitting will require mitigation on or offsite to build this improvement. The grade down to the station would be approximately 18 percent, which may prove difficult to negotiate with District service trucks, especially with a run out leading to the lake.

Power Utility Service Entrance

Puget Sound Energy (PSE) was approached to provide costs for a new power service entrance to each station matching District standards, which is 480, Volt 3-phase. Costs range from \$40,000 to \$60,000 per station. The existing power services are 230 Volt 3-phase. The existing services are large enough to handle the pump variations for **Alternatives 1** through **3**, and pump suppliers can provide the pump stations with either 230 or 480 Volt motors.

The existing power services do not appear to be across private property, therefore, upgrades by PSE to meet modern easement requirements do not appear to be in conflict. PSE will need to maintain the existing power service with no additional cost to the District if it is to be reused with the improvements. RH2 recommends reusing the existing power services at both stations.

Lakewood In Lake Components

The majority of the gravity collection system for the Lakewood Pump Station is in Lake Whatcom. This includes an epoxy-coated manhole and approximately 600 feet of 8-inch gravity sewer pipe. The construction records show the gravity line on the shore approximately 5 feet from the lake. After the pipe was installed, the City of Bellingham built the Lake Whatcom dam which raised the lake approximately 5 feet. Staff would like to move any sewer components in the lake out of the lake but realize the construction cost, permitting, and easement effort to be costly (**Photos 1 and 2**).

Temporary Pumping

During construction, a temporary pumping system will be located in the upstream manholes or in the existing wet well. The LW PS already has a bypass connection to the force main that was installed for emergency preparedness. The bypass pump port is located south of the wet well. There are three alternative temporary pumping systems to consider:

1. The contractor provides and operates the temporary sewage pumps. The discharge from the pump would be routed via hose to the bypass connection system;
2. The contractor purchases a trailer-mounted sewage pump as part of the construction contract. The contractor operates and maintains the pump for temporary pumping. Upon completion of construction, the trailer-mounted sewage pump is delivered to the District for future projects and/or maintenance; or
3. Specific to **Alternative 4**, no temporary pumping would be needed as adequate storage is available to complete force main tie ins as individual pumps would connect to the existing force main until the wet well itself no longer receives sewage.

The preferred alternative for the Smith & Loveless or Gorman Rupp replacement pump station requires downtime for approximately 2 weeks. This downtime will include SCADA system upgrades and the replacement of the existing pump station. During this time, the wet well does not need to be fully rehabilitated if infiltration is observed to be negligible. If the District does not need to bypass the wet well, considerable cost savings can be realized. LW PS will be fairly easy to pump out of the last manhole, but this manhole is in the lake. RR PS has two inlets into the wet well so a “wet well in a wet well” concept is likely needed for temporary pumping.

The “wet well in a wet well” concept would include a pump in a vertical large diameter pipe set inside the wet well and connected to the gravity inlets. This allows access to rehabilitate the wet well with no sewage in contact with the existing concrete walls, chamfer, and floor.

Buoyancy Control

The existing RR and LW PS wet wells are 6-foot-diameter concrete cylinders per onsite review and construction records. The wet well floor, walls, chamfer, and pump station lid weight will need to be compared to the buoyant forces, assuming groundwater is at or near the surface of the lake. A buoyancy control plan will be necessary by the contractor to ensure the wet well will not float at any point throughout the construction process. This is particularly important if the chamfer in the wet well needs to be removed. Typically, this has been accommodated by placing ecology blocks on top of the wet well walls.

Minimizing Lake View Blockage

From past experience with residents neighboring District facilities, a primary concern tends to be lake view blockage; therefore, the District wants to minimize this issue. Ideas include reducing or not utilizing an awning. In addition, reducing heights of electrical panels may also reduce view blockage of the lake.

During design, Whatcom County comments and additional comments from the neighbors may fine tune the location of the electrical panels, balancing the wants and needs of the neighbors and the permitting authority.

Force Main Modification

As discussed in the **Chapter 2 – Flow Monitoring, Force Main** section, the force main could be rehabilitated by CIPP or sliplined with smaller diameter pipe for **Alternatives 1** through **3**. **Alternative 4** would include 2-inch force mains from each house to a common force main, which would require rehabilitation long term. The cost of sliplining or replacing the 4-inch force main is high and unnecessary at this time. A future project cost associated with the force main is discussed in the **Force Main** section.

RH2 recommends reuse of the existing 4-inch force mains as much as possible as no known repairs have been completed and the piping is most likely capable of at least another 50 years of use.

Upon completion of the projects, if reduced flows below approximately 10 percent of calculations are seen, the force main outlets should be inspected as tubercles could be present. These tubercles can be augered out with special cutting machines to increase flow capacity.

Chapter 4 – Alternatives

“Outside the Box” Alternatives

Directional Drill Between Stations

The two stations are about 2,400 feet apart. A directional drill in sandstone over this distance on a shoreline will be nearly impossible to place in a straight line for gravity flow to the other station to eliminate the need for one of the stations. In addition, the variability in rock quality will cause frack outs of the drilling fluid that will most likely get into the lake. While the drilling fluid is inert, Whatcom County will require mitigation for containing any frack outs, and the frack outs will be difficult to locate and then contain. The Country Club directional drill project cost was about \$400,000 and was approximately one third the distance. In addition, the cost of getting the equipment to the shoreline, price escalation due to COVID, inflation, material shortages, and labor scarcity, and easements for more than 19 properties and this pipe alone is estimated at \$1.5 million; therefore, it was not considered further.

Pneumatic Pump Stations

If installed, Pneumatic pumps would introduce a new type of system that the District would have to maintain and buy parts for. Air compressors in general are higher maintenance than a small sewage pump. Power costs to run the compressors will be higher than a sewage pump due to pipe lengths and friction losses in the air pipe and sewage pipe. Seattle had “air ejector” pneumatic pump stations (<https://www.youtube.com/watch?v=8ROffOxypno>) and City of Seattle staff disliked them. Seattle has phased them out. The air compressors were difficult to maintain.

RH2 also is concerned the addition of air to the cast iron (CI) force mains would cause tubercle growth, as seen at the outlet of the Cable Street force main in 2009. The end of the Cable Street force main was augured out to remove tubercles as this reduced capacity. Tubercles grow where the pipe sees mixing of sewage and air, causing bacterial growth and resulting in ferrous oxide deposition (tubercles). They are not easy to remove. Therefore, this type of pump station was not considered further.

Pump Selection

A variety of pump manufacturers were evaluated for this pump station, including Smith and S&L, Gorman Rupp, Flygt, and E-One. The current S&L package system installed at the RR and LW PS has been reliable with minimal maintenance over the past 40 years and no major shut downs. This maintenance history makes S&L a strong choice for the replacement pumps. S&L standard designs and controls are cost effective but customization of the controls drives cost up. Edgewater and Dellesta PSs were replaced with S&L systems but adding a Gorman Rupp equivalent would reduce costs by about \$50,000 per station per discussion with local contractors.

- **Alternative 1:** S&L packaged station, top mount type, electrical, and control in dog house with one panel on a pedestal. Reference **Figure 4-1** for a schematic layout of this alternative.
- **Alternative 2:** Gorman Rupp belt drive pumps, electrical, and control in dog house with one panel on a pedestal. Reference **Figure 4-2** for a schematic layout of this alternative.
- **Alternative 3:** Flygt N-impeller submersible pumps, electrical, control in pedestal-mounted panels. Reference **Figure 4-3** for a schematic layout of this alternative.
- **Alternative 4:** E-one grinder/semi-positive displacement pumps at each household. Install 2-inch force main to connect to the existing force main. Reference **Figures 4-4** and **4-5** for schematic layout for this alternative for Rocky Ridge and Lakewood sewer basins, respectively.

After reviewing the pump information with District staff, S&L or Gorman Rupp are preferred for the RR and LW PSs for the following reasons:

1. Less footprint for the check valve vault outside of the wet well footprint.
2. Lower capital cost.
3. Low maintenance cost.
4. Less downtime to swap out pump stations.
5. Less disruption to property, less conflict with neighbors, and less mitigation cost.

Pump Requirements

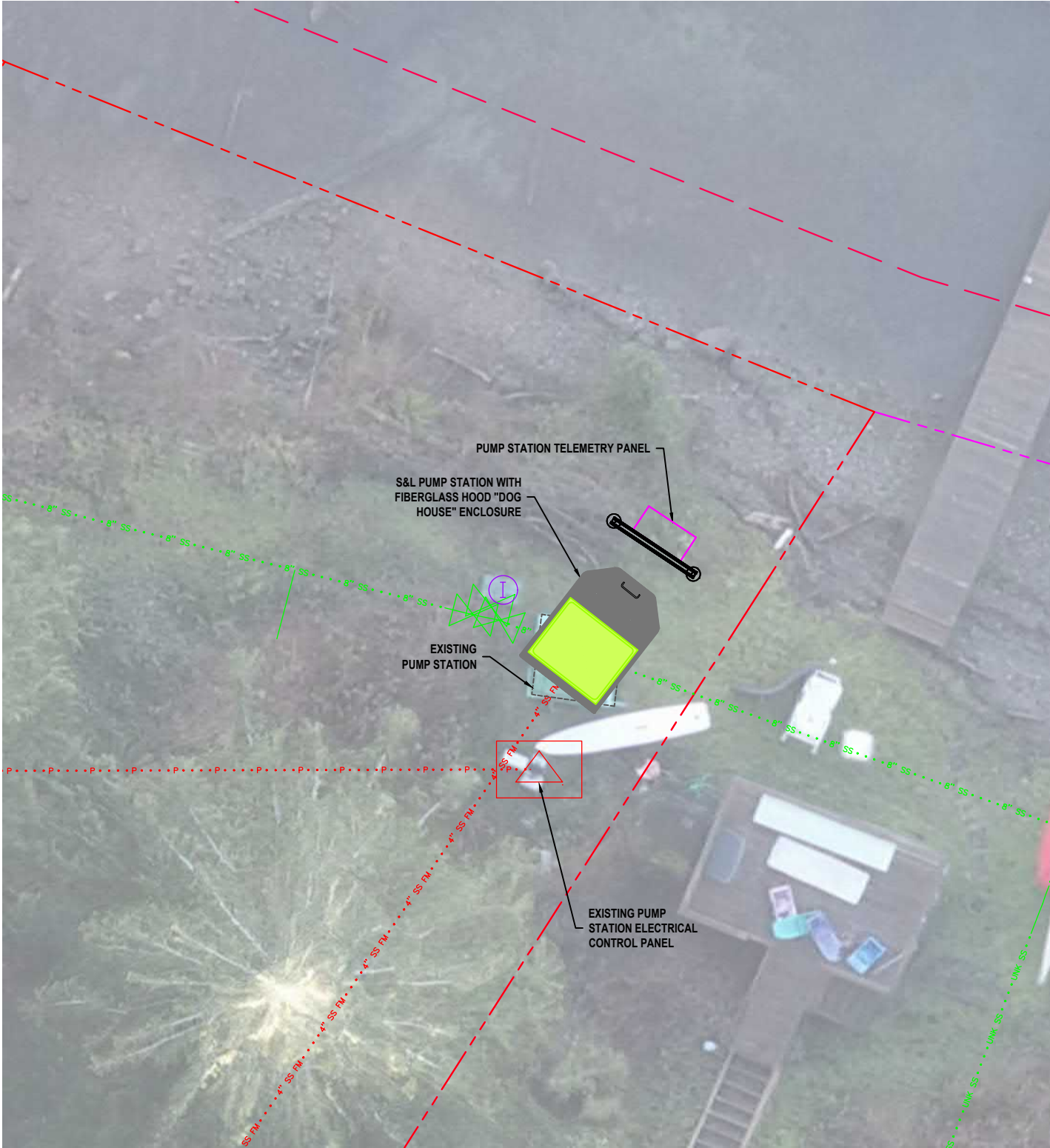
- Flow: 100 gpm for **Alternatives 1, 2, and 3**.
- Flow: **Alternative 4** E-One pumps will be about 7 gpm per household.
- TDH: 70 feet at Rocky Ridge; 85 feet at Lakewood.

Pump Station Mechanical

Four mechanical alternatives are being provided for consideration by the District. **Alternatives 1 and 2** include a pump station set above the wet well with check valves and a pump control panel set above the wet well (S&L and Gorman Rupp). **Alternative 3** is based on the use of submersible pumps with ball check valves set beside it (Flygt).

Alternative 4 is a reconfiguration of the collection system with semi-positive displacement grinder pumps (E-One) provided to each household with 2-inch-diameter forcemain connected to the existing 4-inch forcemain or Sudden Valley forcemain.

To reduce footprint expansion near the Lake, a meter vault for each station will be installed at the end of the force mains in Lake Whatcom Boulevard. This will reduce costs by not requiring mitigation for the footprint expansion adjacent to Lake Whatcom. The meter also will be more accessible.



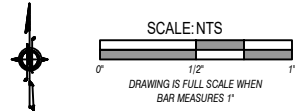
ROCKY RIDGE SEWER PUMP STATION
1" = 10'



LAKEWOOD SEWER PUMP STATION
1" = 10'

FIGURE 4-1: S&L PUMP STATION DESIGN

SEWER PUMP STATION IMPROVEMENTS



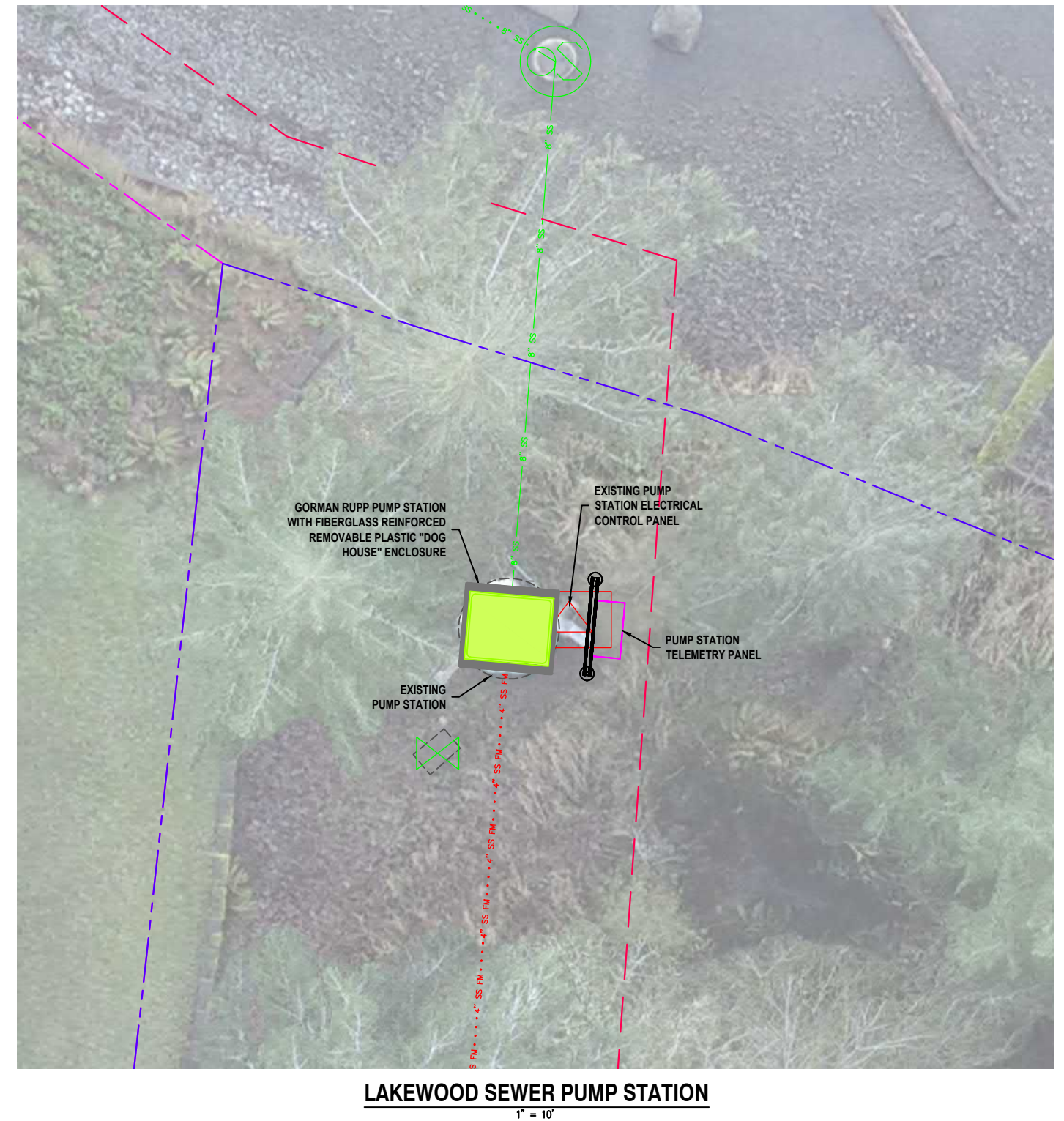
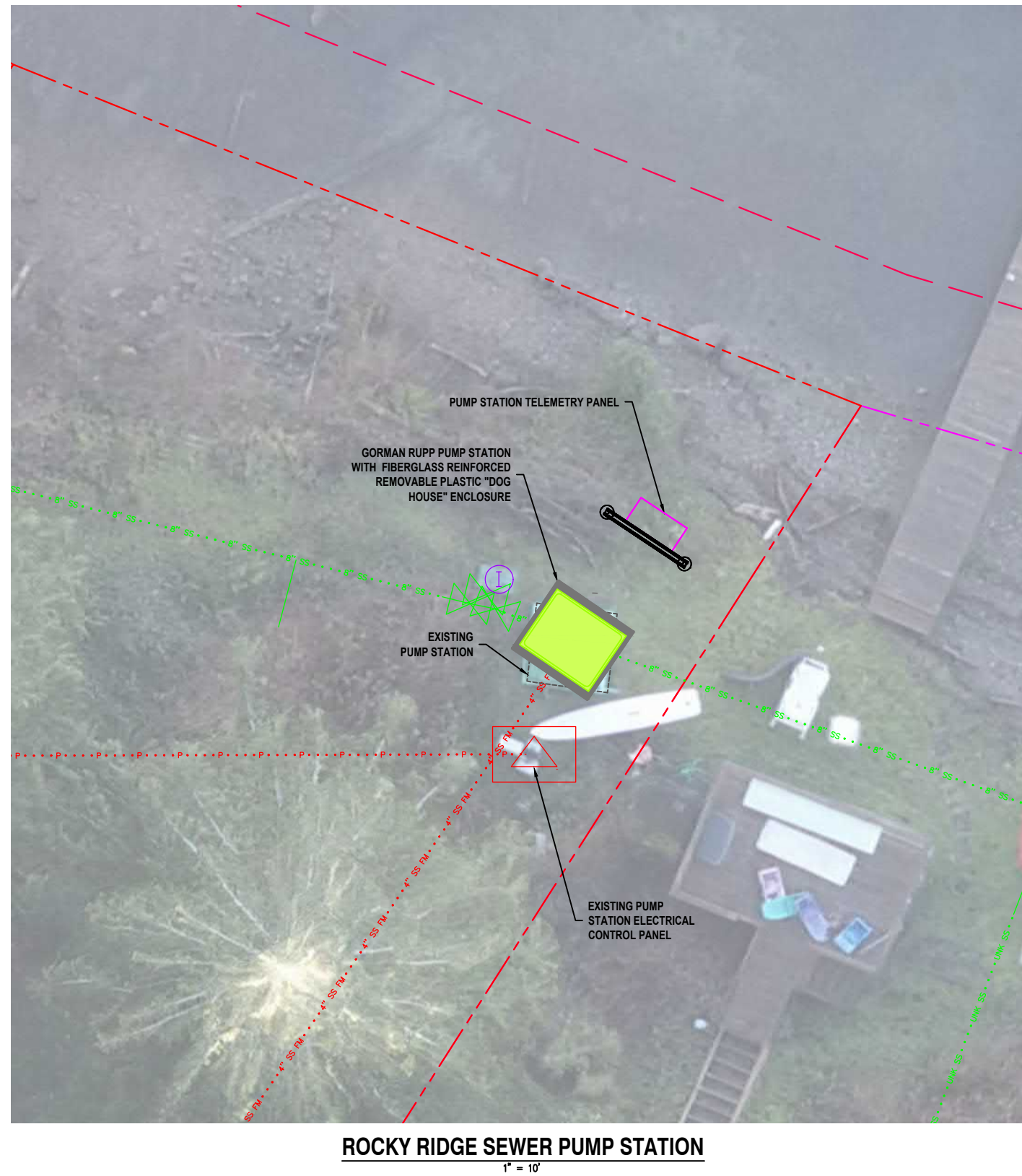
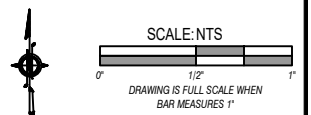
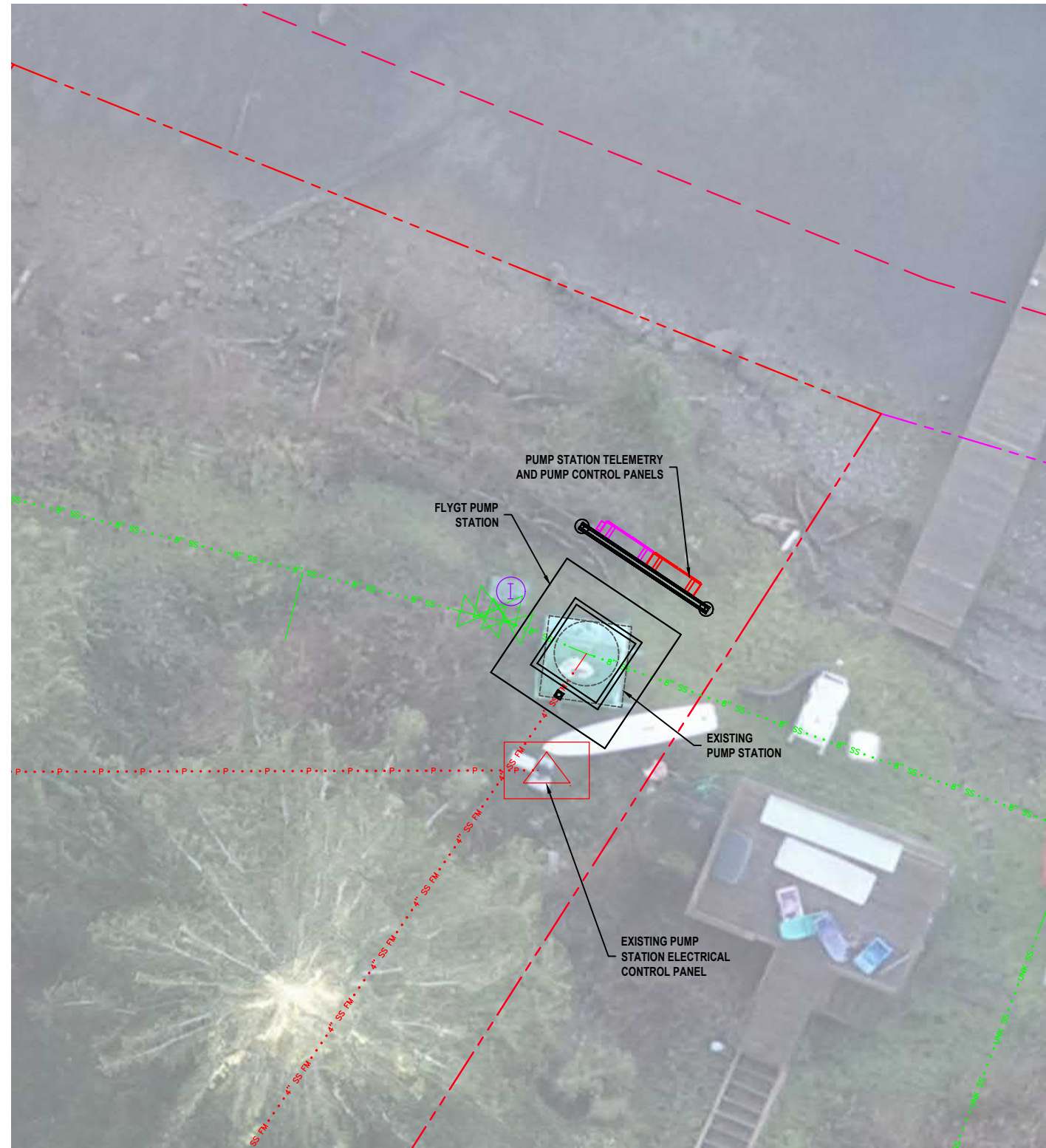


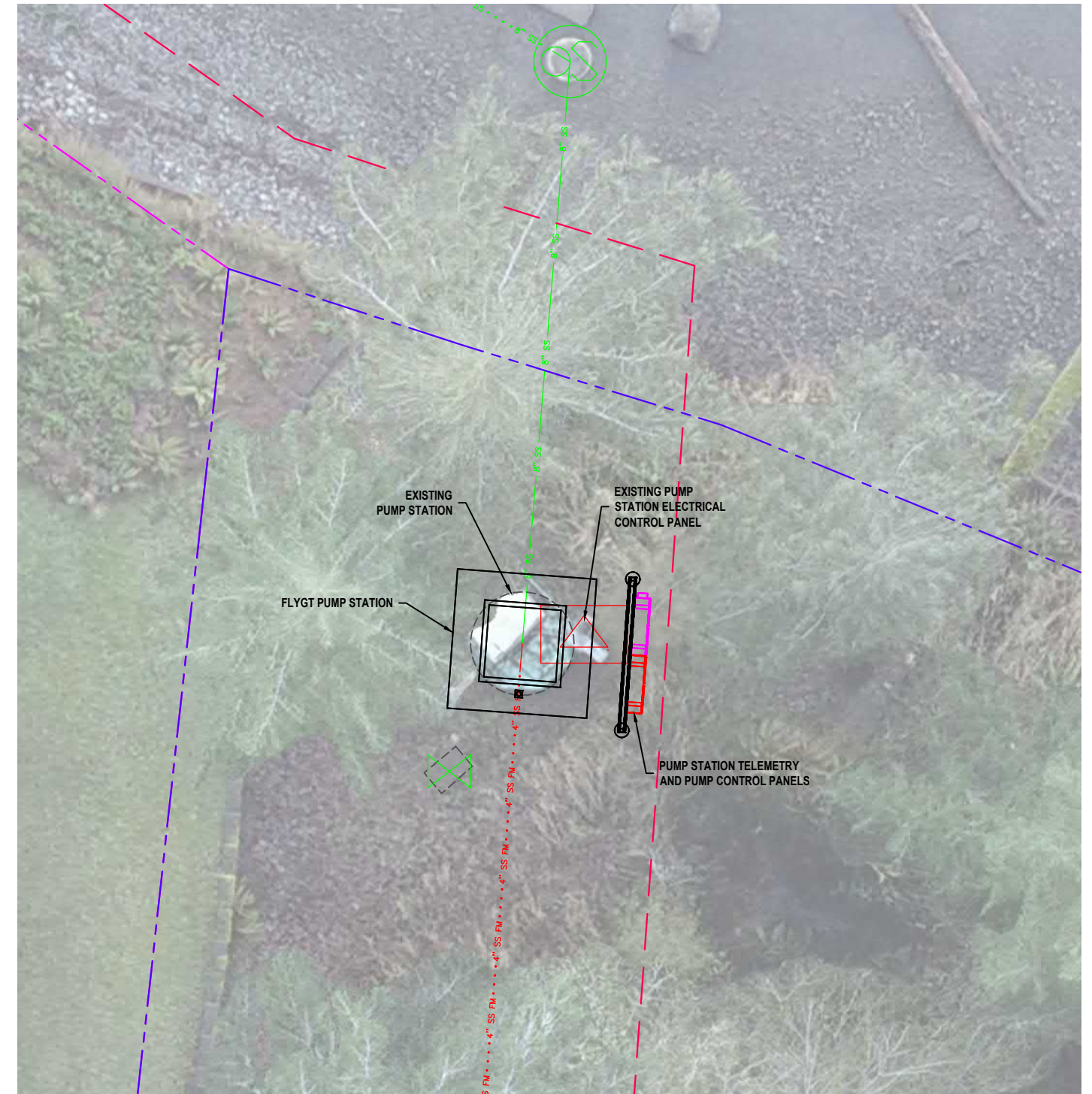
FIGURE 4-2: GORMAN RUPP PUMP STATION DESIGN

SEWER PUMP STATION IMPROVEMENTS





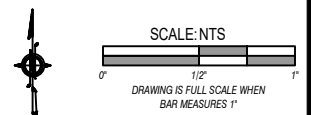
ROCKY RIDGE SEWER PUMP STATION



LAKEWOOD SEWER PUMP STATION
1" = 10'




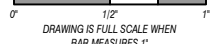
FIGURE 4-3: FLYGT PUMP STATION DESIGN

SEWER PUMP STATION IMPROVEMENTS



LAKE WHATCOM



FIGURE 4-4: E-ONE PUMP STATION DESIGN	
ROCKY RIDGE SEWER BASIN	
SEWER PUMP STATION IMPROVEMENTS	
	
	
SCALE: 1" = 100'	
	
DRAWING IS FULL SCALE WHEN BAR MEASURES 1"	
PLOT DATE: 6/21/2022	
Page 96 of 162	
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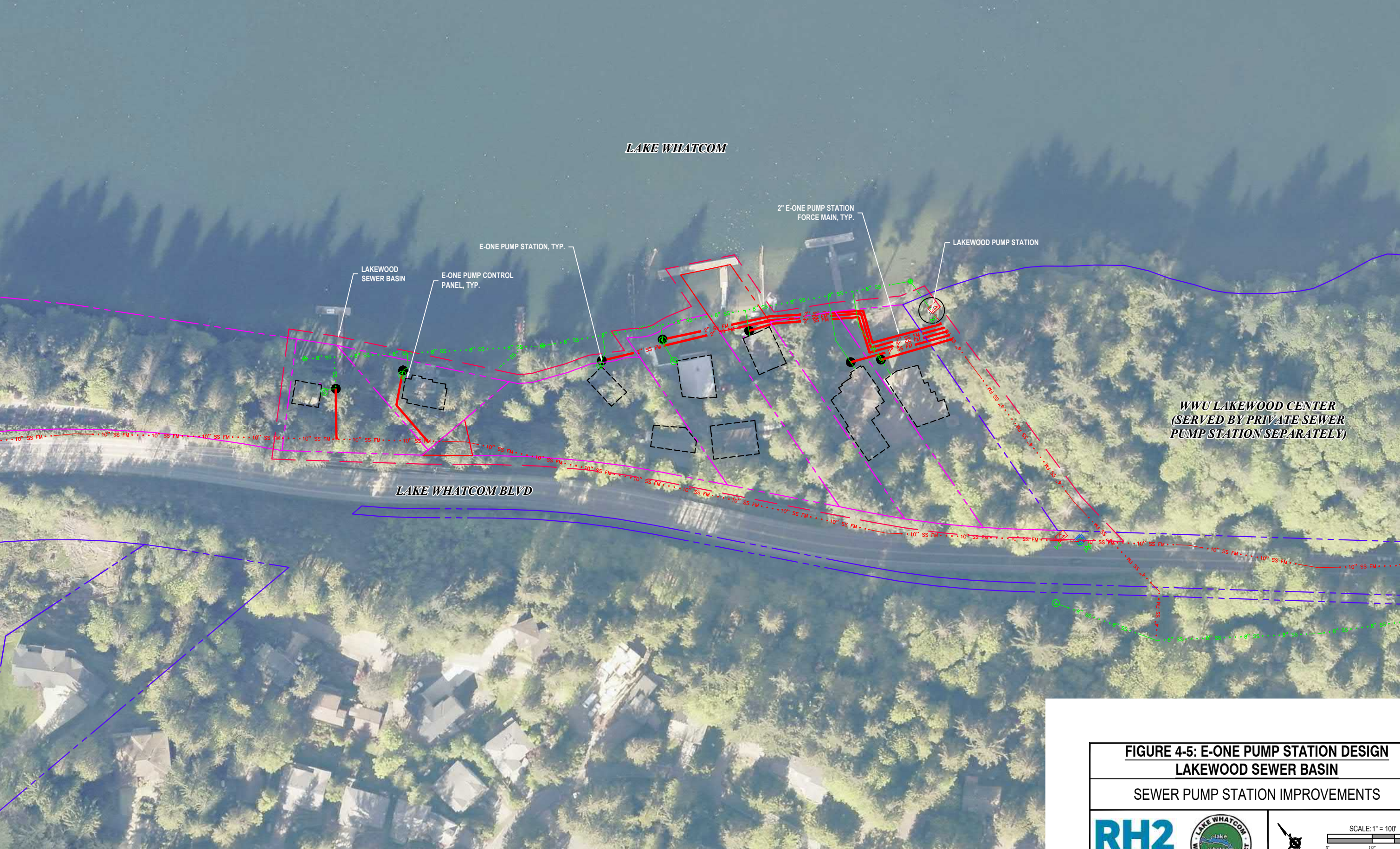


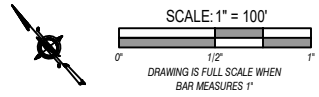


FIGURE 4-5: E-ONE PUMP STATION DESIGN	
LAKWOOD SEWER BASIN	
SEWER PUMP STATION IMPROVEMENTS	
	
	
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Pump Station Electrical

The existing power supply at the RR and LW PSs is a 230 Volt, 3-phase power. The District prefers that the voltage at the pump station be upgraded to 480 Volt, 3-phase but will accept a replacement power conduit and conductor reusing the existing power service of the same voltage.

A new secondary power service connection will need to be installed between the transformers and the pump station. The proposed electrical service size required to operate the proposed pump motors and other miscellaneous equipment is approximately 50 Amps for **Alternatives 1, 2, and 3**. The connected electrical load consists of two pump motors and a single phase distribution panel.

For **Alternative 4**, E-One pumps will be connected to homeowner power drops, and the power drop to the existing stations would be removed and/or abandoned.

The preferred electrical equipment to be installed for the pump station is specified in the following sections. The pump station equipment will be powered through the use of a combination of a custom telemetry and pump control panel and a single phase distribution panel with a pump manufacturer supplied pump control panel. The lighting panel will power all lights, receptacles, and miscellaneous devices at the facility operating at 120-volt, single phase, including ventilation and the telemetry control panel.

Common Telemetry and Control System Work

Alternatives 1 through 3

A proposed Remote Telemetry Unit (RTU) will be installed at the RR and LW PSs for providing automatic control of the pumps. RH2 recommends the District install an Allen-Bradley CompactLogix programmable logic controller (PLC) in the proposed RTU to maintain consistency with the District's other recently installed PLCs.

The RTU will also include an Allen-Bradley touch screen operator interface that will be compatible with the District's other telemetry equipment. The touch screen operator interface will give the operator full access to all setpoints, local controls, and alarm information.

The RTU also will have the ability to communicate to the operator interface and pump control panel via an Ethernet network. The Ethernet switch in the RTU will include a fiber hub for connecting a future fiber optic network. The RTU will have an Uninterruptible Power Supply (UPS) to assist with power conditioning and isolation. The RTU also will have a Direct Current (DC) battery backup in case of a total Alternating Current (AC) power failure. Communication to the District's Master Telemetry Unit (MTU) will be via a direct-leased telephone line connection similar to the District's other RTUs. The RTU will be designed per the District's previously developed telemetry panel construction standards.

RH2 will perform all work associated with programming the proposed RTU, and the District will perform all work associated with programming the Human Machine Interface (HMI) computer.

Instrumentation at the RR and LW PSs will include:

- A radar level transducer for monitoring the wet well level;
- A back-up wet well float system in case of level transducer failure (provided by pump manufacturer);
- A low float disable switch for cleaning the wet well;
- A non-labeled intrusion disable switch;
- Intrusion switches on panels, if any;
- A magnetic flow meter (further details are discussed later in this section); and
- Pressure transmitter on discharge (force main) piping.

The level transducer will be specified as an Endress + Hauser. It is similar to a General Electric (GE) PTX (Druck) level transducer but rated for Class 1, Division 1 hazardous locations such as the wet well. GE no longer produces a Druck-type transducer that is rated for such locations.

The District has standardized on Toshiba and Endress + Hauser magnetic flow meters. The Ethernet/IP integration of Endress + Hauser would only be of use to the District if the District wants to use a higher-level Rockwell PLC such as a CompactLogix L2 series. The Micrologix 1400 PLC that the District standardized on does not have Ad-on Profiles (AOP) capabilities. AOP is Allen-Bradley terminology for how equipment and instrumentation is integrated into their software via Ethernet communications. An Allen-Bradley variable frequency drive (VFD) or Ethernet/IP device such as the Endress + Hauser flow meter requires an AOP software package to be loaded directly into the PLC programming software for communications purposes. When you load the AOP into the programming software, all of the input/output (I/O) and configuration settings are automatically loaded into the PLC programming software, making setup and commissioning of the device quick and efficient.

Alternative 4

E-One has a standard control panel that would be mounted to a pedestal or the side of each home at or adjacent to each pump station. It would have an alarm light and audible alarm. This is the most common system. It is controlled from a float system and would alarm at high level.

E-One provides a higher level of control with its “Sentry Advisor” panel. This panel adds a cellular communication system to alarm the homeowner and District. The cost of this system adds \$440 per pump station and a \$100 annual fee to maintain the cellular network by E-One. Because 99 percent of E-One’s systems do not utilize this ad on, it was assumed the District would not require it. It could be provided based on District or homeowner preference.

Panel Placement

Alternatives 1 and 2 will have pump control panels housed inside a pump supplier dog house. A telemetry panel will be on a pedestal outside the dog house to connect to the District control system. **Alternative 3** would have two exterior panels; one for pump control backup, and one for primary pump control and telemetry as no dog house would be provided.

Alternative 4 panels were described previously.

Smith & Loveless

RH2 recommends utilizing the Everlast Series 1000 level control system from S&L. A telemetry panel would connect to S&L's float control system to operate the pumps off level control provided by a radar controller. The float control would be a backup placed at the extreme limits outside of the radar unit. This will separate the S&L system from the District's custom controls simply and cleanly.

Gorman Rupp

The Gorman Rupp controls will be virtually the same as the S&L controls.

Flygt

RH2 recommends utilizing the standard Flygt pump control system. A telemetry panel would connect to Flygt's float control system as a backup. This is virtually identical to the S&L control system.

E-One

Controls will be monitored periodically by the District, and homeowners can alert the District if an alarm light or sound is observed.

Electrical Equipment Details

Alternatives 1 through 3

The preferred electrical equipment to be installed at the RR and LW PSs will consist of the following.

- A pump control panel with across-the-line start for operating pumps.
- A 240/120 Volt, single phase step-down transformer located separately in its own enclosure.
- A 240/120 Volt, single phase lighting distribution panel located separately in its own enclosure.
- A 3-phase surge protective device located in its own enclosure.
- Digital power meter located in the pump control panel.
- Phase loss protection and monitoring located in the pump control panel.
- Main service disconnect switch.
- A heater.
- Outdoor fluorescent or LED lighting on electrical equipment cover and inside telemetry panel.
- Telemetry panel.
- Generator pig tail connection with a manual transfer switch located at the power drop on Lake Whatcom Boulevard.

Alternative 4

The preferred electrical equipment to be installed at each home will include:

- A pump control panel; and
- A 240/120 Volt, single phase circuit connected to each home.

Total Project Capital Costs

There are many sub-alternatives within each component of the RR and LW PSs, alternatives including pump selection, panel placement and integration, and public vs. private pumping system. To analyze the alternatives, two approaches are taken. One approach is the least capital cost to construct a functioning station. The second approach is the preferred choices as identified by District staff. The final recommendation is a subjective weighing of the cost differences between these alternatives to determine if the preferred alternative is worth the additional cost.

The total project costs, including construction, mitigation if any, engineering, and construction oversight are summarized in **Table 4.1. Appendix A** contains the preliminary cost estimates for **Alternatives 1, 2, 3, and 4**. Costs for easements are not included in the estimates as they are difficult to estimate particularly for waterfront property that may not be buildable. The District should pursue permanent easements for the sites including where the power service and forcemain are located.

A comparison of sliplining 2-inch force main vs. reusing 4-inch force main with larger pumps is included, proving the larger pump and reuse of the 4-inch force main is less expensive.

District staff add ons and the rehabilitation of piping are provided as standalone costs that could be added to **Alternatives 1 through 3** as subjectively needed. Mitigation costs (at a 2:1 disturbance ratio) are estimated for these add ons. The add ons include an elevated walkway to RR with a 100 square foot landing raised around the wet well, and a graded gravel driveway and associated stormwater control at LW.

Table 4.1
Project Capital Costs

Alternative	Description	Rocky Ridge	Lakewood	Design Engineering	Construction Oversight	Total Project Cost
		Construction Cost	Construction Cost			
Alternative 1	S&L	\$596,000	\$563,000	\$209,000	\$93,000	\$1,459,000
Alternative 2	Gorman Rupp	\$507,000	\$475,000	\$177,000	\$79,000	\$1,237,000
Alternative 3	Flygt Submersible	\$554,000	\$528,000	\$195,000	\$87,000	\$1,363,000
Alternative 4	E-One Grinder	\$808,000	\$491,000	\$234,000	\$104,000	\$1,636,000
Add On	Stairway and Landing	\$110,000		\$20,000	\$9,000	\$138,000
Add On	Driveway		\$140,000	\$26,000	\$12,000	\$177,000
Future Project	Rehab Pipe	\$316,000	\$227,000	\$98,000	\$44,000	\$685,000

J:\Data\LWWSD\21-0310\15 Predesign\Report\Appendices\Appendix A RR and LW Predesign Cost Estimates.xls, Summary Tab

Alternative 4 costs do not include access easements, permanent easements, or costs for coordination with homeowners. The terrain in each basin will be difficult to work in to trench 18 inches down to place 2-inch force main. The District may choose to add water supply to these homes as most are on their own lake draw system. This may provide a carrot for consent

to do the work and obtain easements at reduced or no cost. Due to the subjective nature of property value and the coordination required, this alternative is not preferred.

Maintenance Costs

When first conceived by District Staff, **Alternative 4**, E-One pump stations, staff assumed capital costs would be paid for by the District and donated to homeowners and homeowners would take over the improvements and maintain them. Washington State Department of Ecology has rules generally requiring sewage collection systems to be maintained by a public entity. Therefore the maintenance of the E-one pump stations would be completed by the District.

RH2 reviewed maintenance costs provided by District staff and estimated costs based on previous experience for replacement of electrical and mechanical equipment for pump stations similar to RR and LW. RH2 then gathered information from Correct Equipment to compare maintenance costs of the **Alternative 4** E-One pump station alternative.

Costs were reviewed for an assumed life span of 40 years as like now. The costs are summarized in **Table 4.2**.

Table 4.2
Maintenance Costs

<i>Alternative</i>	Description	Rocky Ridge	Lakewood	Total Maintenance Cost
		Maintenance Costs	Maintenance Costs	
Alternative 1-3	2 Pump Stations	\$125,000	\$125,000	\$250,000
Alternative 4*	17 E-one Stations	\$392,000	\$232,000	\$624,000

*Assumes no costs for undeveloped lots - difficult to Develop

Alternative 4, E-One pumps were assumed to last 20 years. One percent replacement per year for electrical panels was assumed for E-one panels. For **Alternatives 1 through 3**, major equipment was assumed to last 40 years but routine maintenance was assumed, including impeller replacement, vacuum prime replacement, and periodic inspections and cleaning.

From **Table 4.2**, it is obvious that having 17 pump stations versus 2 would increase maintenance costs. In addition, the E-One control panels are less robust than the more industrial and protected control equipment the District has standardized on. **Alternative 4** is not preferred due to its high maintenance cost.

Chapter 5 – Conclusion

There are many factors to consider in choosing the best alternative. Operations and maintenance are major factors, including cleaning wet wells, controlling odors, and monitoring pump operation. Some of these factors are subjective and dependent on District preference. The pump selections are clearly defined based on the need for low maintenance, non-clog pumps.

Total preliminary project costs were analyzed for the least cost alternative and the preferred alternative to determine the subjective justification for the increase in cost to obtain a station that better fits the needs and wants of the District. The project cost range was determined to be \$1.3 million to \$1.7 million. Justifications, described as follows, for the least cost alternative are separated by pumps and electrical housing. The cost difference between the least cost alternative and the highest cost alternative is approximately 30 percent (**Appendix A**). With District staff approval and public approval the project can proceed to design.

Pumps

Alternative 1 or 2, the S&L or Gorman Rupp top-mounted pump station is preferred for the following reasons:

1. This alternative is among the lowest capital cost.
2. The footprint of the pump station minimizes expansion onsite adjacent to Lake Whatcom, which is a critical area.

Mechanical

The pump station will house the pumps, check valves and pump control panel. District staff prefer ball check valves as they are reliable and close drip tight. Ball check valves are possible with the Gorman Rupp pump station. S&L will provide “rapid-jack” check valves that the District finds acceptable. The flow meter will be placed uphill of the pump station to minimize footprint expansion near the lake and provide better accessibility.

Electrical Housing

The electrical equipment will be placed on a pedestal adjacent to the wet well.

Appendix A

Cost Estimates

PRELIMINARY

Lake Whatcom Water and Sewer District
Edgewater and Dellesta Sewer Pump Stations Improvements
Final Construction Cost Estimate

Rocky Ridge and Lakewood Sewer Pump Station Improvements
Lake Whatcom Water and Sewer District

-2/1/23 Bid Opening

Alternative 1

Description - S&L Pump Station	Quantity	Unit	Unit Price	Total Cost
Schedule A - Rocky Ridge Sewer Pump Station Improvements				
1A Mobilization/Demobilization	1	LS	\$28,035	\$29,000
2A Civil and Mechanical Sewer Pump Station Improvements	1	LS	\$225,654	\$226,000
3A Electrical Sewer Pump Station Improvements	1	LS	\$158,450	\$159,000
4A Force Main	1	LS	\$5,417	\$6,000
5A Trench Safety and Shoring	1	LS	\$550	\$1,000
6A Unscheduled Excavation	25	CY	\$1,500	\$1,500
7A Unscheduled Backfill	50	Ton	\$2,000	\$2,000
8A Miscellaneous Owner-Directed Work	1	LS	\$3,000	\$3,000
9A On-Site Owner Training	1	LS	\$1,000	\$1,000
10A Construction Records	1	LS	\$1,000	\$1,000
Subtotal Construction Costs				\$429,500
Sales Tax				\$36,937
Contingency				\$128,850
Total Construction Costs with Tax				\$595,287

Schedule B - Lakewood Sewer Pump Station Improvements				
1B Mobilization/Demobilization	1	LS	\$26,502	\$27,000
2B Sewer Pump Station Improvements	1	LS	\$223,588	\$224,000
3B Electrical Sewer Pump Station Improvements	1	LS	\$139,550	\$140,000
4B Force Main	1	LS	\$5,417	\$5,500
5B Trench Safety and Shoring	1	LS	\$550	\$600
6B Unscheduled Excavation	25	CY	\$1,500	\$1,500
7B Unscheduled Backfill	50	Ton	\$2,000	\$2,000
8B Miscellaneous Owner-Directed Work	1	LS	\$3,000	\$3,000
9B On-Site Owner Training	1	LS	\$1,000	\$1,000
10B Construction Records	1	LS	\$1,000	\$1,000
Subtotal Construction Costs				\$405,600
Sales Tax				\$34,882
Contingency				\$121,680
Total Construction Costs with Tax				\$562,162

PRELIMINARY

Lake Whatcom Water and Sewer District
Edgewater and Dellesta Sewer Pump Stations Improvements
Final Construction Cost Estimate

Rocky Ridge and Lakewood Sewer Pump Station Improvements Lake Whatcom Water and Sewer District

~2/1/23 Bid Opening

Alternative 2

Description - Gorman Rupp	Quantity	Unit	Unit Price	Total Cost
Schedule A - Rocky Ridge Sewer Pump Station Improvements				
1A Mobilization/Demobilization	1	LS	\$23,905	\$24,000
2A Civil and Mechanical Sewer Pump Station Improvements	1	LS	\$166,904	\$167,000
3A Electrical Sewer Pump Station Improvements	1	LS	\$158,450	\$159,000
4A Force Main	1	LS	\$5,417	\$6,000
5A Trench Safety and Shoring	1	LS	\$550	\$1,000
6A Unscheduled Excavation	25	CY	\$1,500	\$1,500
7A Unscheduled Backfill	50	Ton	\$2,000	\$2,000
8A Miscellaneous Owner-Directed Work	1	LS	\$3,000	\$3,000
9A On-Site Owner Training	1	LS	\$1,000	\$1,000
10A Construction Records	1	LS	\$1,000	\$1,000
Subtotal Construction Costs				\$365,500
Sales Tax				\$31,433
Contingency				\$109,650
Total Construction Costs with Tax				\$506,583

Schedule B - Lakewood Sewer Pump Station Improvements				
1B Mobilization/Demobilization	1	LS	\$22,372	\$23,000
2B Sewer Pump Station Improvements	1	LS	\$164,838	\$165,000
3B Electrical Sewer Pump Station Improvements	1	LS	\$139,550	\$140,000
4B Force Main	1	LS	\$5,417	\$5,500
5B Trench Safety and Shoring	1	LS	\$550	\$600
6B Unscheduled Excavation	25	CY	\$1,500	\$1,500
7B Unscheduled Backfill	50	Ton	\$2,000	\$2,000
8B Miscellaneous Owner-Directed Work	1	LS	\$3,000	\$3,000
9B On-Site Owner Training	1	LS	\$1,000	\$1,000
10B Construction Records	1	LS	\$1,000	\$1,000
Subtotal Construction Costs				\$342,600
Sales Tax				\$29,464
Contingency				\$102,780
Total Construction Costs with Tax				\$474,844

PRELIMINARY

Lake Whatcom Water and Sewer District
Edgewater and Dellesta Sewer Pump Stations Improvements
Final Construction Cost Estimate

Rocky Ridge and Lakewood Sewer Pump Station Improvements Lake Whatcom Water and Sewer District

-2/1/23 Bid Opening

Alternative 3

Description - Flygt Pump Station	Quantity	Unit	Unit Price	Total Cost
Schedule A - Rocky Ridge Sewer Pump Station Improvements				
1A Mobilization/Demobilization	1	LS	\$26,075	\$27,000
2A Civil and Mechanical Sewer Pump Station Improvements	1	LS	\$169,032	\$170,000
3A Electrical Sewer Pump Station Improvements	1	LS	\$185,450	\$186,000
4A Force Main	1	LS	\$6,751	\$7,000
5A Trench Safety and Shoring	1	LS	\$550	\$1,000
6A Unscheduled Excavation	25	CY	\$1,500	\$1,500
7A Unscheduled Backfill	50	Ton	\$2,000	\$2,000
8A Miscellaneous Owner-Directed Work	1	LS	\$3,000	\$3,000
9A On-Site Owner Training	1	LS	\$1,000	\$1,000
10A Construction Records	1	LS	\$1,000	\$1,000
Subtotal Construction Costs				\$399,500
Sales Tax				\$34,357
Contingency				\$119,850
Total Construction Costs with Tax				\$553,707

Schedule B - Lakewood Sewer Pump Station Improvements				
1B Mobilization/Demobilization	1	LS	\$24,892	\$25,000
2B Sewer Pump Station Improvements	1	LS	\$173,389	\$174,000
3B Electrical Sewer Pump Station Improvements	1	LS	\$166,550	\$167,000
4B Force Main	1	LS	\$5,417	\$5,500
5B Trench Safety and Shoring	1	LS	\$550	\$600
6B Unscheduled Excavation	25	CY	\$1,500	\$1,500
7B Unscheduled Backfill	50	Ton	\$2,000	\$2,000
8B Miscellaneous Owner-Directed Work	1	LS	\$3,000	\$3,000
9B On-Site Owner Training	1	LS	\$1,000	\$1,000
10B Construction Records	1	LS	\$1,000	\$1,000
Subtotal Construction Costs				\$380,600
Sales Tax				\$32,732
Contingency				\$114,180
Total Construction Costs with Tax				\$527,512

PRELIMINARY

Lake Whatcom Water and Sewer District
Edgewater and Dellesta Sewer Pump Stations Improvements
Final Construction Cost Estimate

Rocky Ridge and Lakewood Sewer Pump Station Improvements
Lake Whatcom Water and Sewer District

~2/1/23 Bid Opening

Alternative 4

Description - E-One	Quantity	Unit	Unit Price	Total Cost
Schedule A - Rocky Ridge Sewer Pump Station Improvements				
1A Mobilization/Demobilization	1	LS	\$38,045	\$39,000
2A Civil and Mechanical Sewer Pump Station Improvements	1	LS	\$251,185	\$252,000
3A Electrical Sewer Pump Station Improvements	1	LS	\$97,200	\$98,000
4A Force Main	1	LS	\$183,641	\$184,000
5A Trench Safety and Shoring	1	LS	\$550	\$1,000
6A Unscheduled Excavation	25	CY	\$1,500	\$1,500
7A Unscheduled Backfill	50	Ton	\$2,000	\$2,000
8A Miscellaneous Owner-Directed Work	1	LS	\$3,000	\$3,000
9A On-Site Owner Training	1	LS	\$1,000	\$1,000
10A Construction Records	1	LS	\$1,000	\$1,000
Subtotal Construction Costs				\$582,500
Sales Tax				\$50,095
Contingency				\$174,750
Total Construction Costs with Tax				\$807,345

Schedule B - Lakewood Sewer Pump Station Improvements				
1B Mobilization/Demobilization	1	LS	\$23,093	\$24,000
2B Sewer Pump Station Improvements	1	LS	\$162,866	\$163,000
3B Electrical Sewer Pump Station Improvements	1	LS	\$56,700	\$57,000
4B Force Main	1	LS	\$100,748	\$100,800
5B Trench Safety and Shoring	1	LS	\$550	\$600
6B Unscheduled Excavation	25	CY	\$1,500	\$1,500
7B Unscheduled Backfill	50	Ton	\$2,000	\$2,000
8B Miscellaneous Owner-Directed Work	1	LS	\$3,000	\$3,000
9B On-Site Owner Training	1	LS	\$1,000	\$1,000
10B Construction Records	1	LS	\$1,000	\$1,000
Subtotal Construction Costs				\$353,900
Sales Tax				\$30,435
Contingency				\$106,170
Total Construction Costs with Tax				\$490,505

PRELIMINARY

Lake Whatcom Water and Sewer District
Edgewater and Dellesta Sewer Pump Stations Improvements
Final Construction Cost Estimate

Rocky Ridge and Lakewood Sewer Pump Station Improvements
Lake Whatcom Water and Sewer District

~2/1/23 Bid Opening

Description - Add Ons and Future Projects	Quantity	Unit	Unit Price	Total Cost
Schedule A - Rocky Ridge Stairway and Platform				
11A Mobilization/Demobilization	1	LS	\$5,530	\$6,000
12A Elevated Stairway	1	LS	\$44,967	\$45,000
13A Raised Platform	1	LS	\$27,743	\$28,000
14A Mitigation	1	LS	\$5,683	\$6,000
Subtotal Construction Costs				\$79,000
Sales Tax				\$6,715
Contingency				\$23,700
Total Construction Costs with Tax				\$109,415

Schedule B - Lakewood Driveway				
11B Mobilization/Demobilization	1	LS	\$6,580	\$7,000
12B Driveway to PS	1	LS	\$48,312	\$49,000
13B Mitigation	1	LS	\$44,990	\$45,000
Subtotal Construction Costs				\$101,000
Sales Tax				\$8,585
Contingency				\$30,300
Total Construction Costs with Tax				\$139,885

Future Pipe Rehabilitation				
11B Mobilization/Demobilization	1	LS	\$25,620	\$26,000
5A Rocky Ridge - Pipe Cured In Place Improvements	1	LS	\$212,245	\$213,000
5B Lakewood - Pipe Cured In Place Improvements	1	LS	\$152,845	\$153,000
Subtotal Construction Costs				\$392,000
Sales Tax				\$33,320
Contingency				\$117,600
Total Construction Costs with Tax				\$542,920

PRELIMINARY

Rocky Ridge and Lakewood Sewer Pump Station Improvements Lake Whatcom Water and Sewer District

~2/1/23 Bid Opening

Maintenance Costs for 40 Years

1 Pump Station Times per Year Cost

		Crew	Hours	Miles	Misc Parts	Cost Per	Total Cost
Visits	12	1	2			\$80	\$1,920
Truck	12	1		9		\$0.58	\$63
Power	12.5	hp	48		9.321	kw	\$49
Routine Maintenance	2	2	2			\$80	\$640
Parts	0.1	2	2		\$4,000	\$80	\$432
Per Year	1						\$3,104
Years of Use	40						\$125,000
Number of Stations	2						\$250,000

Actual Costs 3/17/2022

Rich Munson \$ Spent Bill Start Date Today \$/Year 40 Years

Rocky Ridge	\$3,266	12/16/2019	6/8/2022	\$1,317	\$52,689
Lakewood	\$3,044			\$1,228	\$49,108
					\$50,898

Rocky Ridge E-One Times per Year Cost

		Crew	Hours	Miles	Misc Parts	Cost Per	Total Cost
Visits	1	1	2			\$80	\$160
Truck	1	1		9		\$0.58	\$5
Power	0	hp	0		9.321	kw	\$0
Routine Maintenance	12	2	2			\$80	\$3,840
Parts	12	2	2		\$162	\$80	\$5,782
Per Year	1						\$9,787
Years of Use	40						\$392,000

Lakewood E-One Times per Year Cost

		Crew	Hours	Miles	Misc Parts	Cost Per	Total Cost
Visits	1	1	2			\$80	\$160
Truck	1	1		9		\$0.58	\$5
Power	0	hp	0		9.321	kw	\$0
Routine Maintenance	7	2	2			\$80	\$2,240
Parts	7	2	2		\$162	\$80	\$3,373
Per Year	1						\$5,778
Years of Use	40						\$232,000

PRELIMINARY

Rocky Ridge and Lakewood Sewer Pump Station Improvements Lake Whatcom Water and Sewer District

~2/1/23 Bid Opening

Capital Costs (not rounded)		Rocky Ridge	Lakewood			
Alternative	Description	Construction Cost	Construction Cost	Design Engineering	Construction Oversight	Total Project Cost
Alternative 1	S&L	\$595,287	\$562,162	\$208,341	\$92,596	\$1,458,385
Alternative 2	Gorman Rupp	\$506,583	\$474,844	\$176,657	\$78,514	\$1,236,598
Alternative 3	Flygt Submersible	\$553,707	\$527,512	\$194,619	\$86,497	\$1,362,335
Alternative 4	E-One Grinder	\$807,345	\$490,505	\$233,613	\$103,828	\$1,635,292
Add On	Stairway and Landing	\$109,415		\$19,695	\$8,753	\$137,863
Add On	Driveway		\$139,885	\$25,179	\$11,191	\$176,255
Future Project	Rehab Pipe	\$315,962	\$226,958	\$97,726	\$43,434	\$684,079

Capital Costs (rounded)		Rocky Ridge	Lakewood			
Alternative	Description	Construction Cost	Construction Cost	Design Engineering	Construction Oversight	Total Project Cost
Alternative 1	S&L	\$596,000	\$563,000	\$209,000	\$93,000	\$1,459,000
Alternative 2	Gorman Rupp	\$507,000	\$475,000	\$177,000	\$79,000	\$1,237,000
Alternative 3	Flygt Submersible	\$554,000	\$528,000	\$195,000	\$87,000	\$1,363,000
Alternative 4	E-One Grinder	\$808,000	\$491,000	\$234,000	\$104,000	\$1,636,000
Add On	Stairway and Landing	\$110,000		\$20,000	\$9,000	\$138,000
Add On	Driveway		\$140,000	\$26,000	\$12,000	\$177,000
Future Project	Rehab Pipe	\$316,000	\$227,000	\$98,000	\$44,000	\$685,000

Maintenance Costs in 40 Years		Rocky Ridge	Lakewood		
Alternative	Description	Maintenance Costs	Maintenance Costs	Total Maintenance Cost	
Alternative 1-3	2 Pump Stations	\$125,000	\$125,000	\$250,000	
Alternative 4*	17 E-one Stations	\$392,000	\$232,000	\$624,000	

*Assumes no costs for undeveloped lots - difficult to Develop

Future Project Costs		Rocky Ridge	Lakewood			
Alternative	Description	Construction Cost	Construction Cost	Design Engineering	Construction Oversight	Total Project Cost
Future Project	Rehab Pipe	\$316,000	\$227,000	\$98,000	\$44,000	\$685,000

Appendix B

Pump Alternatives

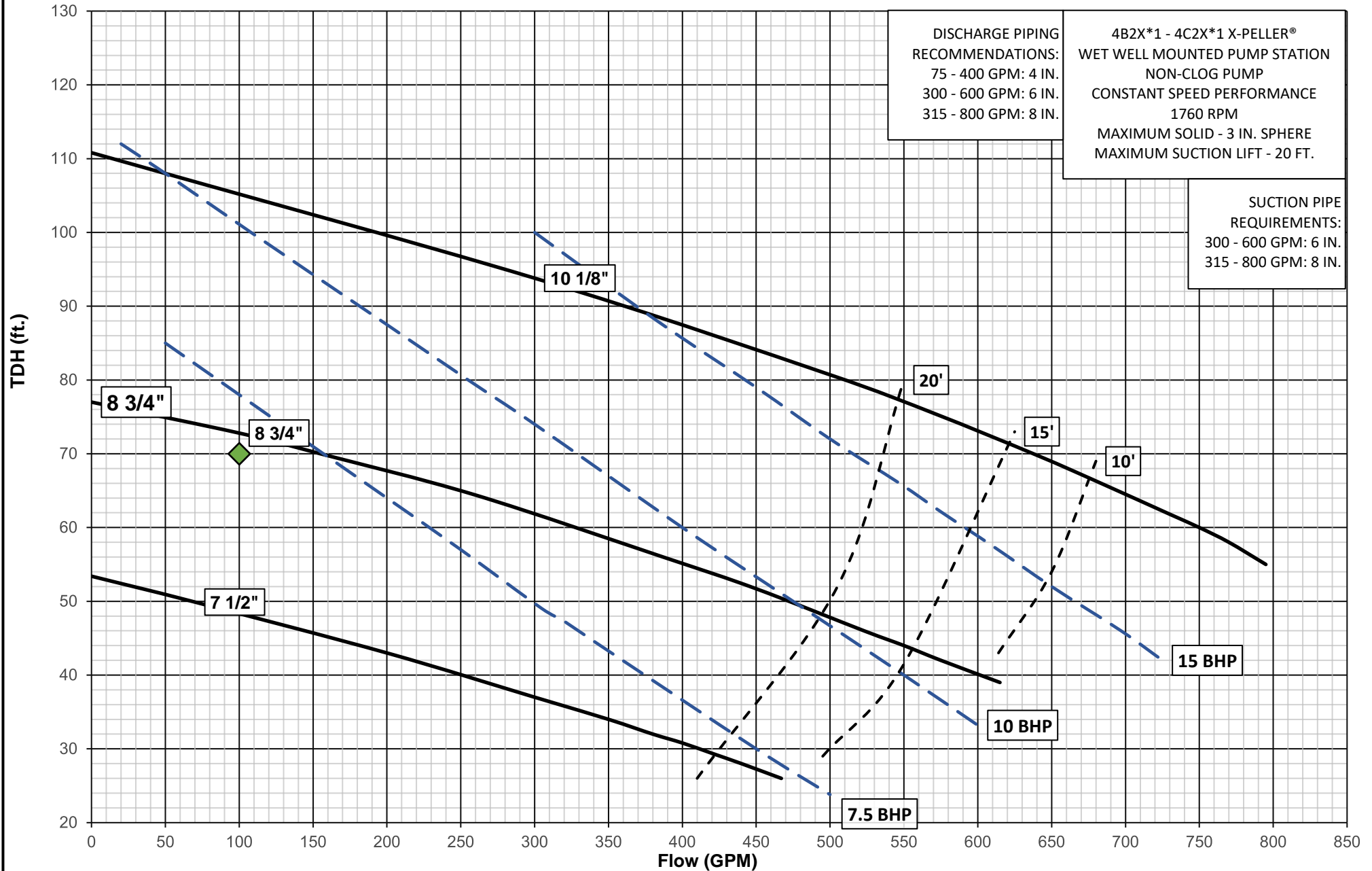
Smith & Loveless

Pump Curve

PRELIMINARY



Smith & Loveless Inc.



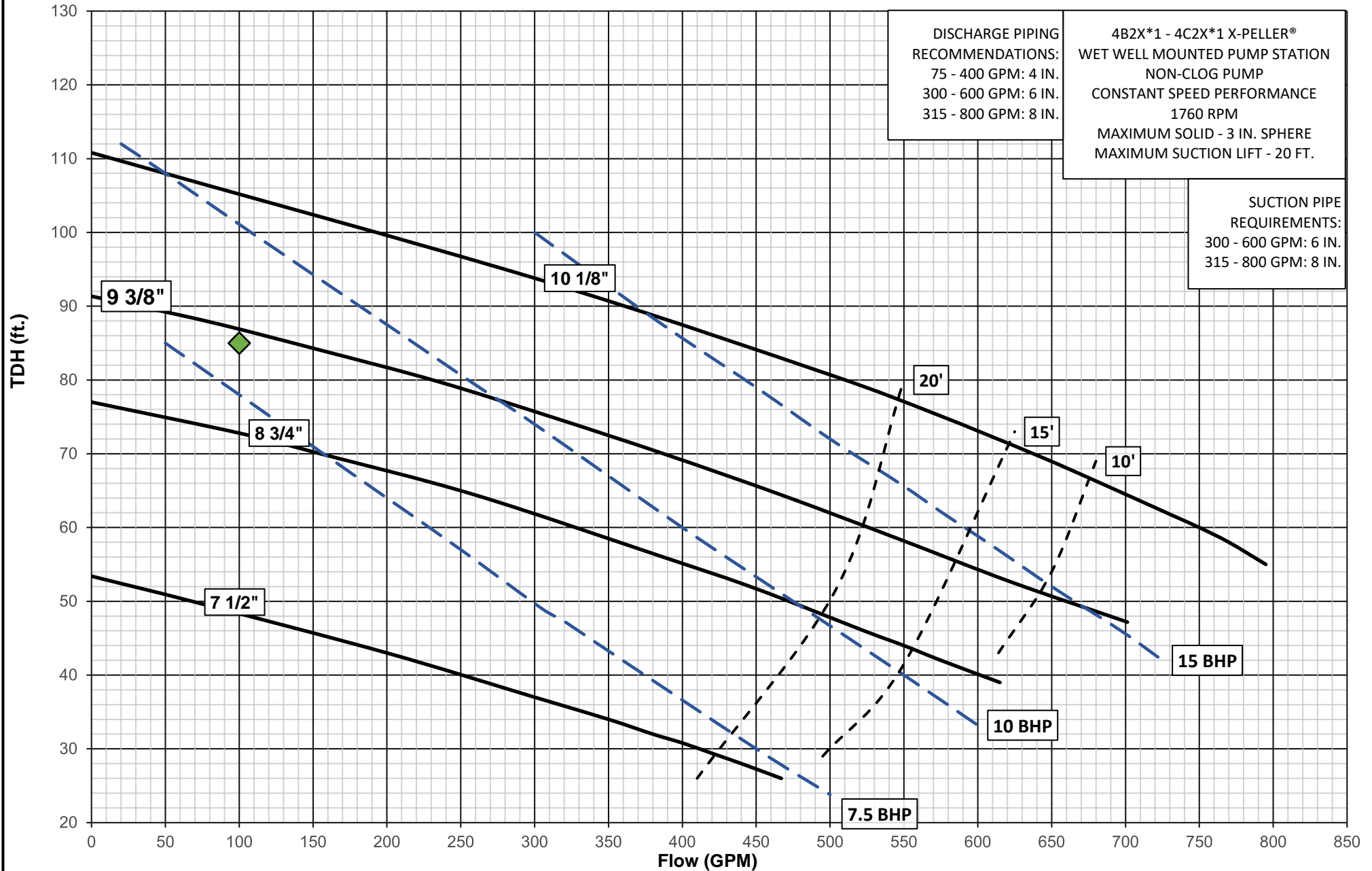
Location:	Lake Whatcom	Design Point:	100 GPM @ 70 ft.	Pump Model:	4B2X*1, 1760 RPM
Project Name:	Rocky Ridge	Impeller Trim:	8 - 3/4 Inches	HP & Efficiency:	10 HP & 25.8%

Pump Curve

PRELIMINARY

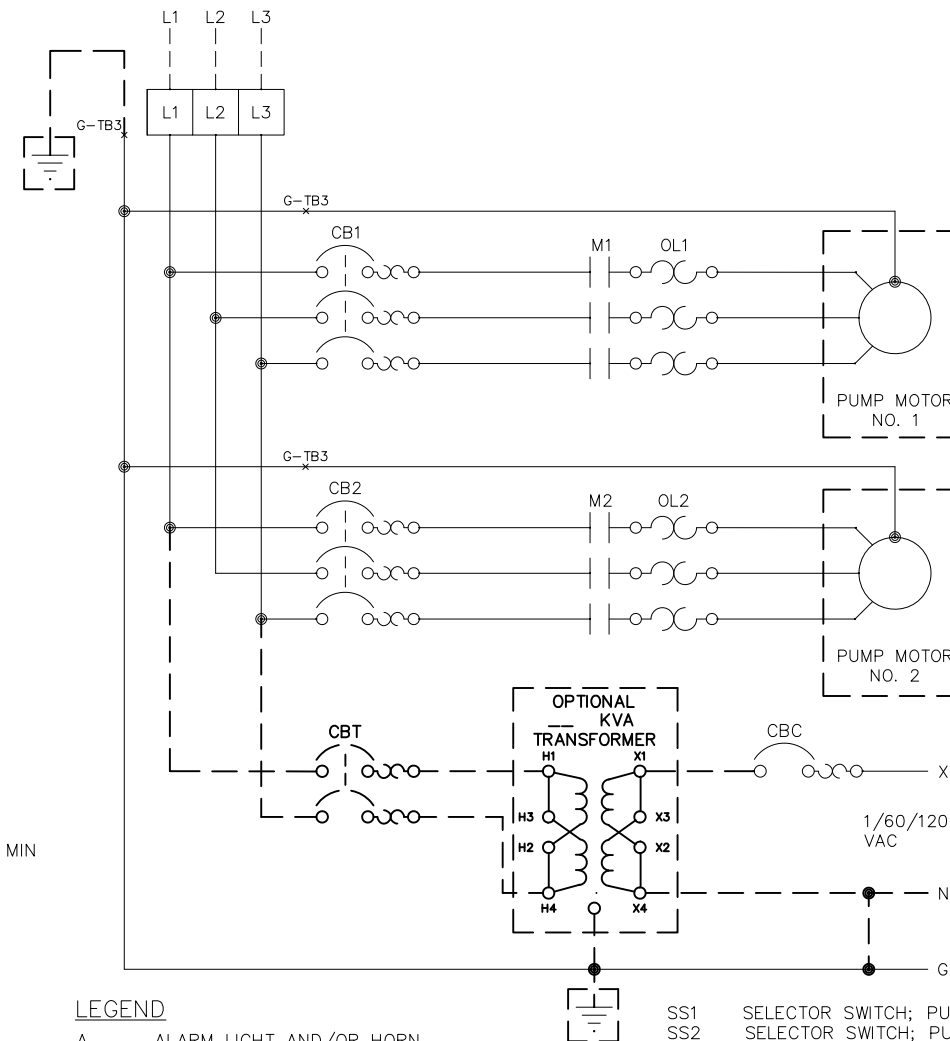
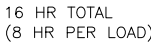


Smith & Loveless Inc.



Location:	Lake Whatcom	Design Point:	100 GPM @ 85 ft.	Pump Model:	4B2X*1, 1760 RPM
Project Name:	Lakewood	Impeller Trim:	9 - 3/8 Inches	HP & Efficiency:	10 HP & 26.3%

208/230/460 VOLT 3 PHASE
60 HERTZ SUPPLY



A	ALARM LIGHT AND/OR HORN
AL	PUMP ALTERNATOR
ALR	ALTERNATOR CONTROL RELAY
CB1	CIRCUIT BREAKER; MOTOR NO.1
CB2	CIRCUIT BREAKER; MOTOR NO.2
CB3	CIRCUIT BREAKER; AUXILIARY EQUIPMENT
CB4	CIRCUIT BREAKER; VACUUM PUMP NO.1
CB5	CIRCUIT BREAKER; VACUUM PUMP NO.2
CB6	CIRCUIT BREAKER; CONTROL
CBC	CIRCUIT BREAKER; MAIN CONTROL
CBT	CIRCUIT BREAKER; TRANSFORMER (OPT.)
CVL51	CHECK VALVE LIMIT SWITCH; PUMP NO.1
CVL52	CHECK VALVE LIMIT SWITCH; PUMP NO.2
FN	FAN
FS/HL	FLOAT SWITCH; HIGH LEVEL ON
FS/HWA	FLOAT SWITCH; HIGH WET WELL ALARM
FS/LL	FLOAT SWITCH; LOW LEVEL ON
FS/LWA	FLOAT SWITCH; LOW WET WELL ALARM (OPT.)
FS/OFF	FLOAT SWITCH; PUMPS OFF
GF1	GROUND FAULT INTERRUPT
HTR	HEATER; STATION
M1	MOTOR STARTER NO.1
M2	MOTOR STARTER NO.2
MS1	MANUAL SWITCH; PUMP ALTERNATOR
MS3	MANUAL SWITCH; WET WELL VENTILATOR (OPT.)
OL1	OVERLOAD RELAY; MOTOR STARTER NO.1
OL2	OVERLOAD RELAY; MOTOR STARTER NO.2
RT1	RUNNING (ELAPSED) TIME METER; PUMP NO.1
RT2	RUNNING (ELAPSED) TIME METER; PUMP NO.2

SS1	SELECTOR SWITCH; PUMP NO.1 HAND-OFF-AUTO
SS2	SELECTOR SWITCH; PUMP NO.2 HAND-OFF-AUTO
SS3	SELECTOR SWITCH; ON-DEMAND CONSTANT PRIME
SSM1	SONIC START MODULE; PUMP NO.1
SSM2	SONIC START MODULE; PUMP NO.2
ST1	SONIC START SENSOR; PUMP NO.1
ST2	SONIC START SENSOR; PUMP NO.2
SV1	SOLENOID VALVE NO.1
SV2	SOLENOID VALVE NO.2
T1	HEATER THERMOSTAT
T2	FAN THERMOSTAT
TD1	TIME DELAY; SV NO.1 DELAY (2 SEC)
TD2	TIME DELAY; SV NO.2 DELAY (2 SEC)
TD7	TIME DELAY; PUMP NO.1 PUMP/PRIME FAILURE
TD8	TIME DELAY; PUMP NO.2 PUMP/PRIME FAILURE
VC1	CONTROL RELAY; PRIMING SYSTEM NO.1
VC2	CONTROL RELAY; PRIMING SYSTEM NO.2
VP1	VACUUM PUMP NO.1
VP2	VACUUM PUMP NO.2
WV	WET WELL VENTILATOR


TERMINAL BLOCK CONNECTION
(DENOTES CONDUCTOR ENTERING
OR LEAVING ENCLOSURE.)

—x—

DASHED ITEMS SIGNIFY OPTIONAL EQUIPMENT
OR FIELD CONNECTIONS

ITEMS INSIDE RECTANGULAR BOXES DRAWN WITH
DASHED LINES ARE OUTSIDE OF THE CONTROL PANEL.

87B886/A

			DRAWN BY: CS		DATE: 5/27/2015	ALLOWABLE TOLERANCES		FOR			
			CHECKED BY: RAG		DATE: 5/27/2015	FRACTIONS —		EVERLAST™ 1000/2000 WWMPs RELAY LOGIC WIRING DIAGRAM			
			APPROVED BY: WGF		DATE: 5/29/2015	DECIMALS —					
A N2021-156 10/2021			KN RAO		SCALE: CODE: ANGLES NTS — —						
LET	ECN NO	DATE	BY APPV'D				SIZE		U/M	EA	WT.
							FILE NAME 87B886A.dwg				PLOT SCALE
ORIGINAL ISSUE N2015-22			© Smith & Loveless, Inc. 2021				SERIAL NO		DWG NO 87B886	REV A	
<p>RECIPIENT AGREES THE INFORMATION ON THIS DRAWING AND THE EQUIPMENT DEPICTED HEREIN IS CONFIDENTIAL, PROPRIETARY AND PROTECTED UNDER UNITED STATES AND FOREIGN INTELLECTUAL PROPERTY LAWS AND IS OWNED BY SMITH & LOVELESS, INC. UNLESS SPECIFIC WRITTEN CONSENT IS GIVEN BY SMITH & LOVELESS, INC., YOU MAY NOT COPY, REPRODUCE, TRANSMIT, DISPLAY, DISTRIBUTE, ALTER, OR OTHERWISE USE IN WHOLE OR IN PART ANY INFORMATION ON THIS DRAWING OR THE EQUIPMENT DEPICTED HEREIN, OR PERMIT SUCH ACTIONS TO BE TAKEN BY A THIRD PARTY. SMITH & LOVELESS, INC. TRANSFERS NO RIGHTS IN THIS DRAWING OR THE INFORMATION AND EQUIPMENT DEPICTED HEREIN.</p>											
<div> Smith & Loveless, Inc.</div>											

Gorman Rupp



Granich Engineered Products, Inc
1313 South 96th Street
Seattle, WA 98108
Phone: 866-859-2940
Fax: 206-315-2939
Website: www.granich.com

Quote

To:	Dan Burwell	Fax:	
From:	Dakota Bartles	Date:	2/9/2022
Re:	Gorman Rupp 6x6 Station	Pages:	

We are pleased to offer the following equipment for your consideration:

(1)- Gorman Rupp 6 X 6 above ground lift station with duplex Super T Series 2" x 2 " self-priming non clog sewage pumps, v-belt driven by 5 HP, 1750 rpm, 3/60/460 ODP motors. Station piping includes individual suction lines, individual swing check valves, a 3-way plug valve and individual automatic air release valves. Station Controls will be housed in a NEMA 1 SS enclosure with Primary Submersible Transducer with Independent (Redundant) Floats. (2 provided).

The entire pump station is plumbed, wired and factory tested and U.L. Labeled. Includes 5 year warranty.

Estimated Conditions of service – 100 GPM @ 50-60' TDH.

In addition, the station shall include the following optional features and equipment:

1. Station Heater
2. Station Insulation
3. Pump Drain Kit
4. External Alarm Light -115 VAC (shipped loose for field mounting by contractor)
5. Check Valve, Plug Valve, Automatic Air Release Valve
6. Gauge Kits (Suction and Discharge Gauges)
7. Factory Representative present for Start-up and Operator Training
8. Submittals & O&M Manuals. (Four copies of each)

Price:.....\$68,500.00

PRELIMINARY

Prices are FOB Factory with FFA to job site.

Please allow 6-8 weeks for submittals and approximately 10-12 weeks ARO.

Please call me if you have any questions or need additional information.

Regards,
Dakota Bartles
Granich Engineered Products, Inc

6X6 LIFT STATION INFORMATION SHEET

ABOVE-GROUND LIFT STATION



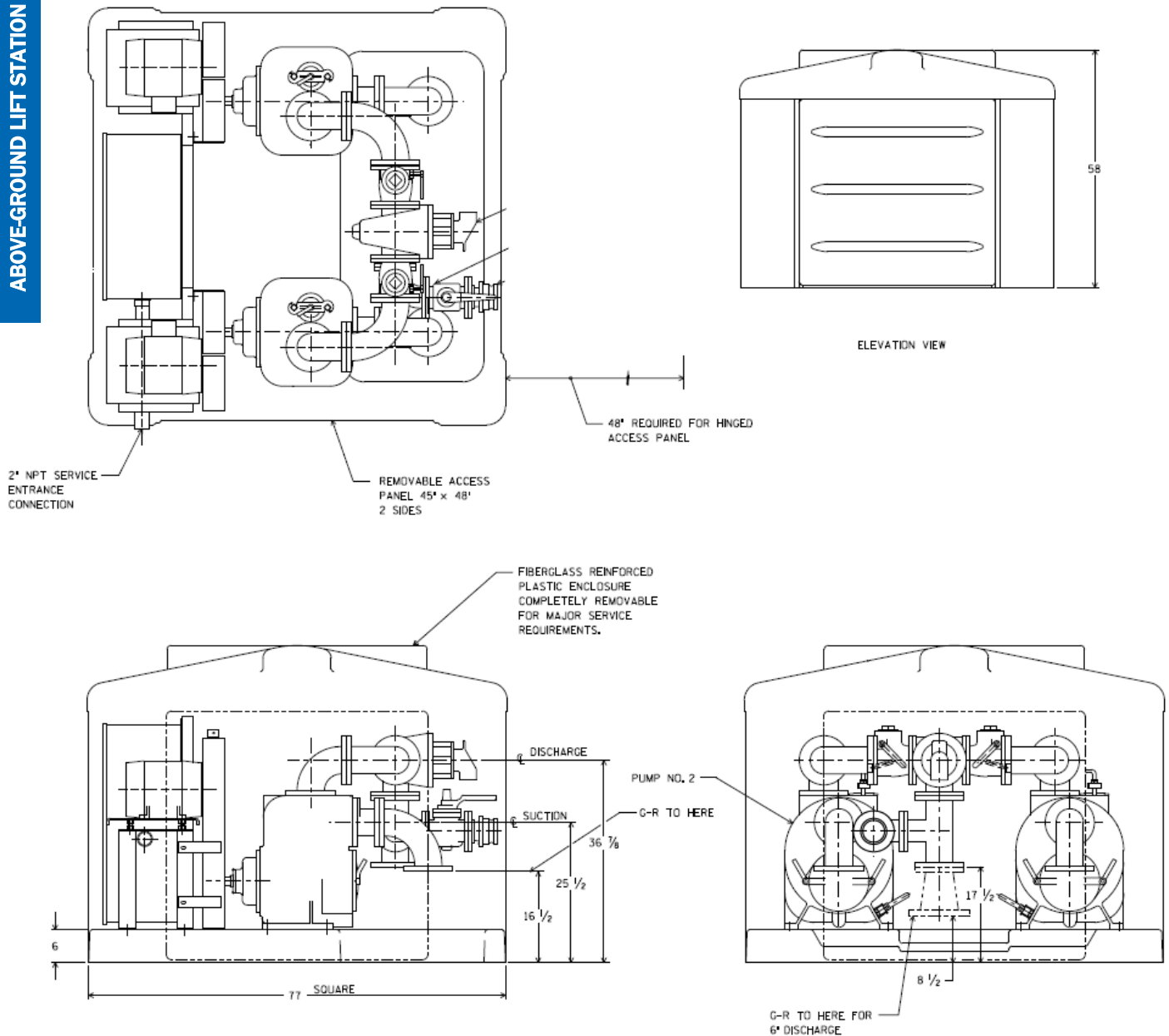
Standard Mechanical and Electrical

Station Type	6 X 6 Duplex Pumps
Station Specs	<ul style="list-style-type: none"> • Max Capacity 1300 GPM (82.0 lps) • Max Head: 150' (45.7 m) • Max Solids 3" (76.2 mm) • Max Temperature 160 °F (71 °C) • Assembled and tested in Gorman Rupp's USA Facilities
Pump Specs	<ul style="list-style-type: none"> • Super T Series® 2" (50 mm), 3" (75 mm), 4" (100 mm), 6 (150 mm) • Ultra V Series® 3" (75 mm), 4" (100 mm), 6 (150 mm)
Pump Motor	<ul style="list-style-type: none"> • Voltage: 200 V 3P, 230 V 1P, 230 V 3P, 460 V 3P • Cycles: 60 hz • Horsepower: 2 HP to 25 HP
Station Piping	<ul style="list-style-type: none"> • Individual suction spools • Individual swing check valves • 3-way plug valve w/duplex pumps • Individual automatic air release valves • Station ships fully assembled and wired. Pumps, piping, controls and fiberglass enclosure mounted on a common steel base.
Enclosure	<ul style="list-style-type: none"> • Enclosure: Low-silhouette, fiberglass construction • Variety of vinyl wraps available • Removable or hinged door panel for easy pump and control access • Resists corrosion, mildew, fungus, mold and UV rays
Control Panel Assembly	<ul style="list-style-type: none"> • InteGRinex® Liquid Level controls designed to handle basic pump station requirements • NEMA Rated Automatic controls to operate pump and warning systems • Available U.L. and C.S.A. listings • Fully customized control panels available • NEMA Rated Control Enclosures



The Pump People®

6X6 SAMPLE OUTLINE DRAWING

ABOVE-GROUND LIFT STATION


Note: Drawing is a general layout of a lift station, for drawings specific to your application please contact your Gorman-Rupp Distributor.



GORMAN-RUPP PUMPS
P.O. BOX 1217
MANSFIELD, OHIO 44901-1217 | USA
TEL: 419.755.1011 | FAX: 419.755.1251

GRPUMPS.COM



The Pump People®

Product information is subject to change; consult factory for details. All images are for illustrative purposes only. Actual product may vary from printed representation.
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Self Priming Centrifugal Pump

Super
T SERIES

VARIOUS PATENTS APPLY

Model T2D60S-B

Size 2" x 2"



PUMP SPECIFICATIONS

Size: 2" x 2" (51 mm x 51 mm) NPT - Female.

Casing: Gray Iron 30.

Maximum Operating Pressure 102 psi (703 kPa).*

Semi-Open Type, Two Vane Impeller: Ductile Iron 65-45-12.

Handles 3/4" (19,1 mm) Diameter Spherical Solids.

Impeller Shaft: Alloy Steel 4150.

Shaft Sleeve: Alloy Steel 4130.

Replaceable Wear Plate: Carbon Steel ASTM A36.

Removable Back Cover Plate: Gray Iron 30.

Removable Inspection Cover Plate: Gray Iron 30; 3.2 lbs. (1,45 kg.).

Flap Valve: Neoprene w/Nylon and Steel Reinforcing.

Seal Plate: Gray Iron 30.

Bearing Housing: Gray Iron 30.

Radial Bearings: Open Single Row Ball.

Thrust Bearings: Open Double Row Ball.

Bearing and Seal Cavity Lubrication: SAE 30 Non-Detergent Oil.

Flanges: Gray Iron 30.

Gaskets: Buna-N w/Compressed Synthetic Fibers, Vegetable Fiber, PTFE, Cork and Rubber.

O-Rings: Buna-N, Fluorocarbon (DuPont Viton® or Equivalent).

Hardware: Standard Plated Steel.

Brass Pressure Relief Valve.

Bearing and Seal Cavity Oil Level Sight Gauges.

Optional Equipment: Automatic Air Release Valve. Metal Bellows

Seal. 120V/240V Casing Heater. High Pump Temperature

Shutdown Kit. Gray Iron 30 Suction and Discharge Spool Flanges:

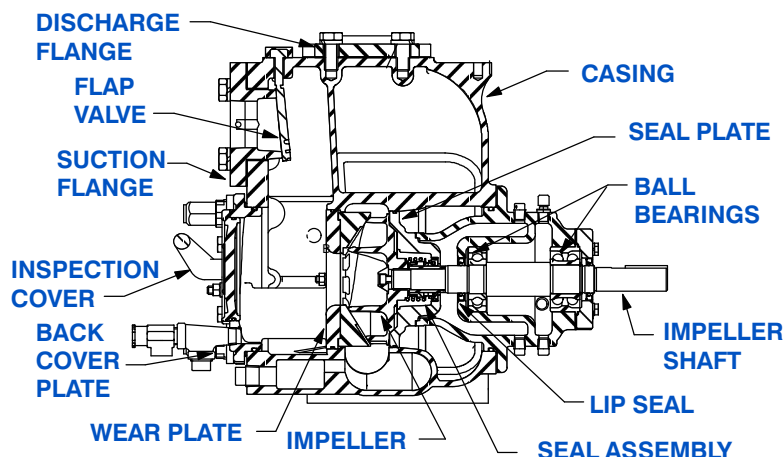
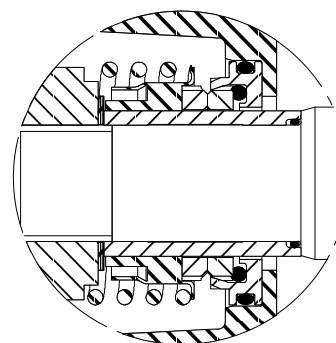
2" ASA (**Specify Model T2D60S-B /F**).

50 mm DIN 2527 (PN 16) (**Specify Model T2D60S-B /FM**).

**Consult Factory for Applications Exceeding Maximum Pressure and/or Temperature Indicated.*



Shown with Optional Suction & Discharge Spool Flanges (Available in ASA or DIN Standard Sizes).



SEAL DETAIL

Mechanical, Oil-Lubricated, Double Floating, Self-Aligning. Silicon Carbide Rotating and Stationary Faces. Stainless Steel 316 Stationary Seat. Fluorocarbon Elastomers (DuPont Viton® or Equivalent). Stainless Steel 18-8 Cage and Spring. Maximum Temperature of Liquid Pumped, 160°F (71°C).*



GORMAN-RUPP PUMPS

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Specifications Subject to Change Without Notice

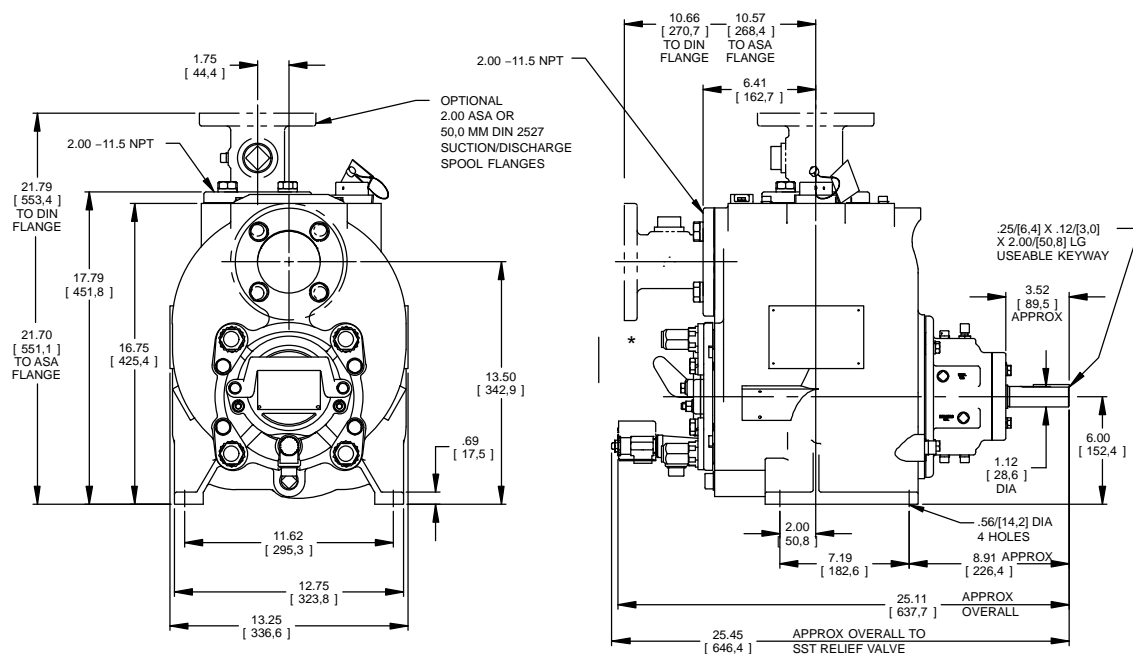
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Specification Data

SECTION 55, PAGE 1941

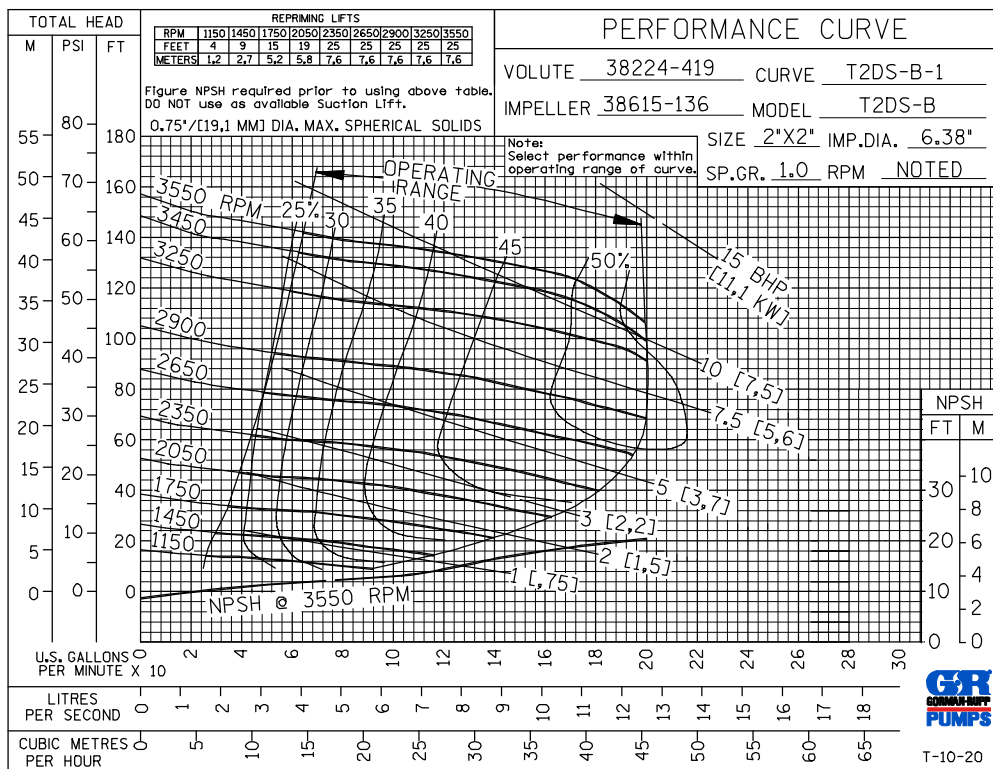
APPROXIMATE
DIMENSIONS and WEIGHTS

NET WEIGHT: 242 LBS. (110 KG.)*
SHIPPING WEIGHT: 254 LBS. (115 KG.)*
EXPORT CRATE: 6.4 CU. FT. (0,18 CU. M.)
*ADD 8 LBS. (3,6 KG.) W/EACH SPOOL FLANGE



* 18.00/[457,2] RECOMMENDED FOR REMOVAL OF BACK COVER PLATE
T2CSC-B - 8.50/[215,9] REQUIRED FOR REMOVAL OF BACK COVER PLATE
T2DS-B / T2ESC-B - 9.50 / [241,3] REQUIRED FOR REMOVAL OF BACK COVER PLATE

T2CSC-B
T2DS-B
T2ESC-B



GORMAN-RUPP PUMPS

www.grpumps.com

Specifications Subject to Change Without Notice

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C D S W



Discharge Check Valves

4" and 6"



LEFT HAND CHECK VALVE SHOWN

SPECIFICATIONS

Valve Body: Gray Iron No. 30.

Valve Arm: 316 Stainless Steel.

Wetted Hardware: 303/304 Stainless Steel.

Valve Weight: Gray Iron No. 30.

Flap Valve: Nitrile.

O-Rings: Buna-N.

DESCRIPTION

Available in 4" or 6" (102 mm or 152 mm) Sizes for Left Hand (LH) or Right Hand (RH) Piping Installations. Valves are Weighted and Spring-Loaded to Ensure Positive Closure. Full Body Design Allows for Passage of 3" (76,2 mm) Diameter Solids.

Solid Cast Iron Body and Simple Design Provide Dependable Service and Easy Maintenance. Access Cover Allows Servicing of all Internal Parts Without Removing Check Valve From System Piping.

Check Valve Assemblies Include a Stainless Steel Seat and Spring.

Mounting Hardware Not Included.

Size	Part Number	
	Left Hand	Right Hand
4" (102 mm)	46421-214	46421-215
6" (152 mm)	46421-416	46421-417



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

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PRELIMINARY

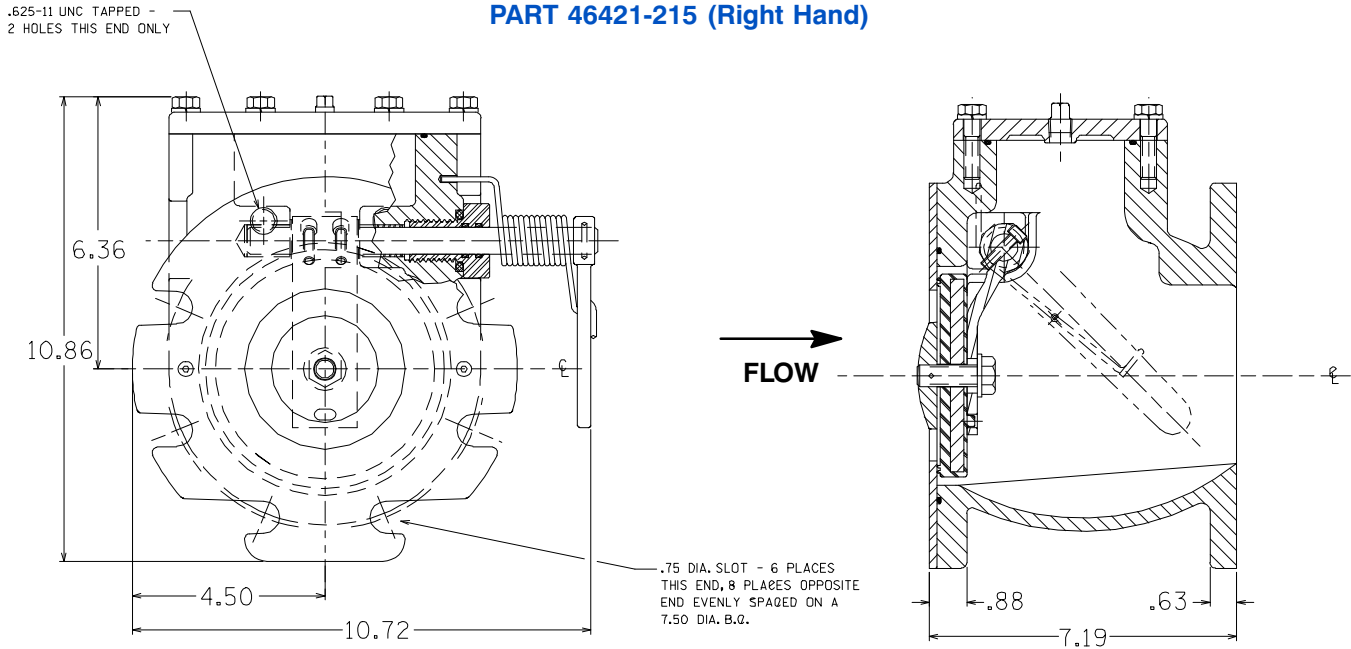
Specification Data

APPROXIMATE
DIMENSIONS and WEIGHTS

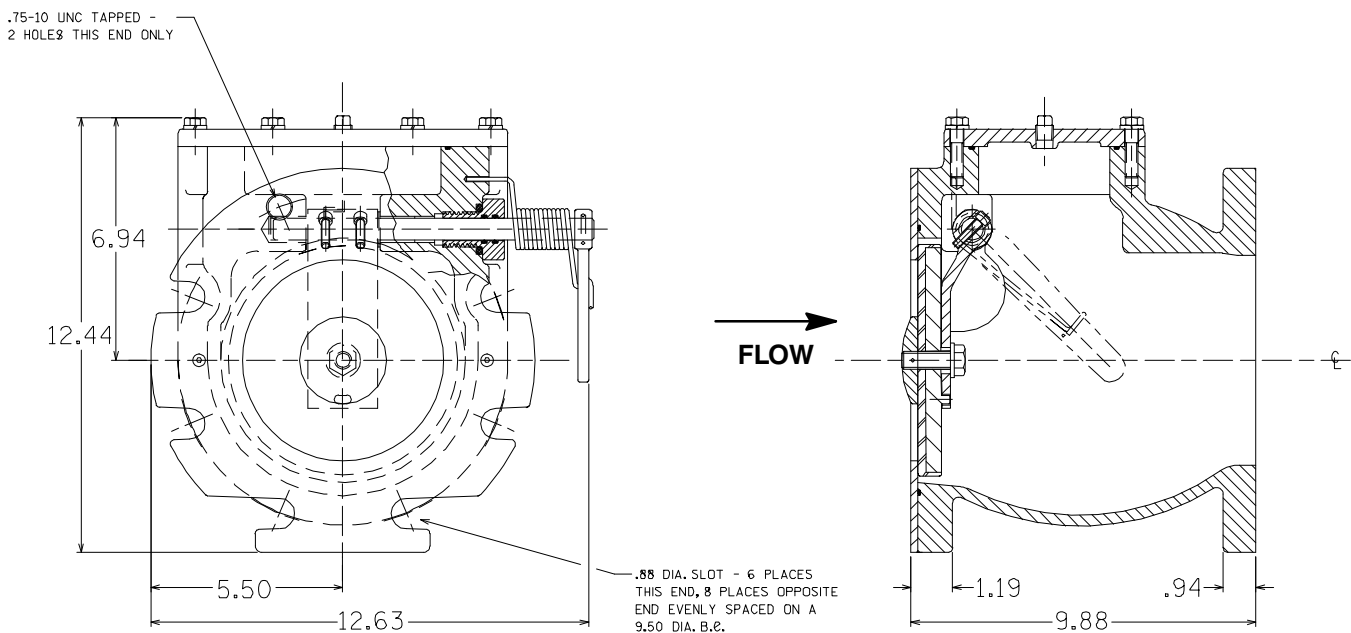
NET WEIGHT: 4" (102 mm) 47 LBS. (21,3 KG.)
NET WEIGHT: 6" (152 mm) 78 LBS. (35,4 KG.)

SECTION 10, PAGE 1300

4" (102 mm) VALVE ASSEMBLY PART 46421-214 (Left Hand) PART 46421-215 (Right Hand)



6" (152 mm) VALVE ASSEMBLY PART 46421-416 (Left Hand) PART 46421-417 (Right Hand)



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

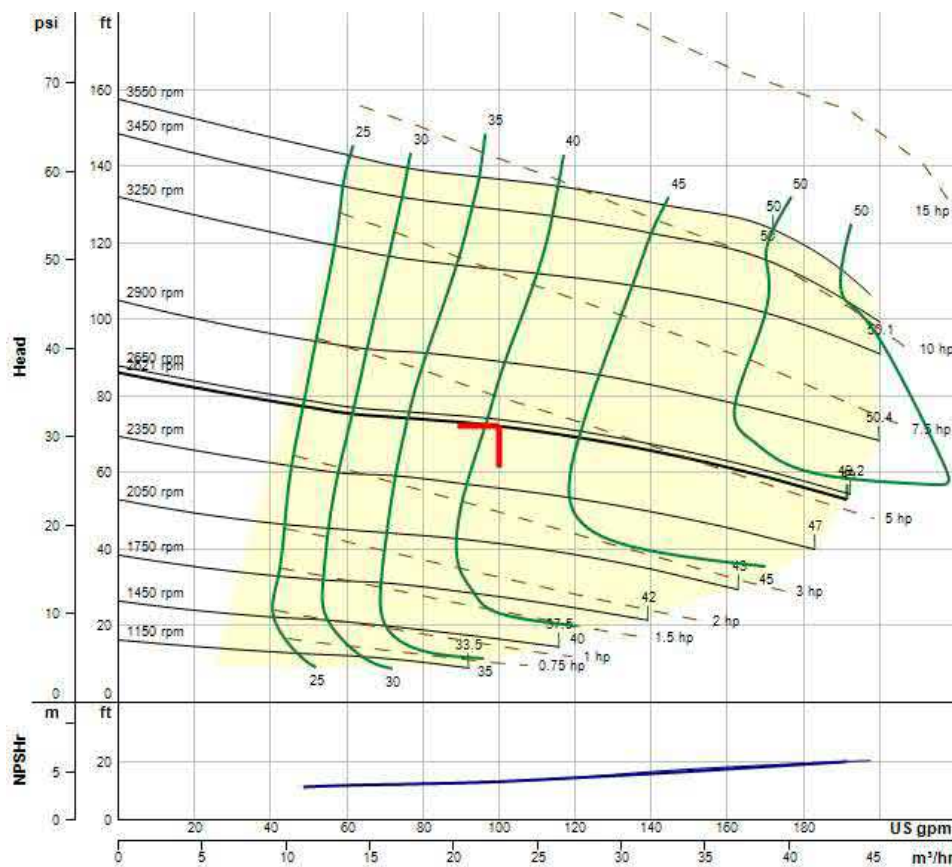
GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

Specifications Subject to Change Without Notice

Printed in U.S.A.

T2D60S-B Self Priming

Suction	2" (50 mm)
Discharge	2" (50 mm)
Solids Handling	0.75" (19 mm)
Casing	Cast Iron
Impeller/Rotor	Ductile Iron
Seal Material	Silicon Carbide
Flange	NPT
Drive Type	Basic
Unit Weight	N/A



Curve Info

Type	T-SERIES
Curve	T2DS-B-1
Impeller	38615-136
Speed	2621 rpm
Diameter	6.38 in

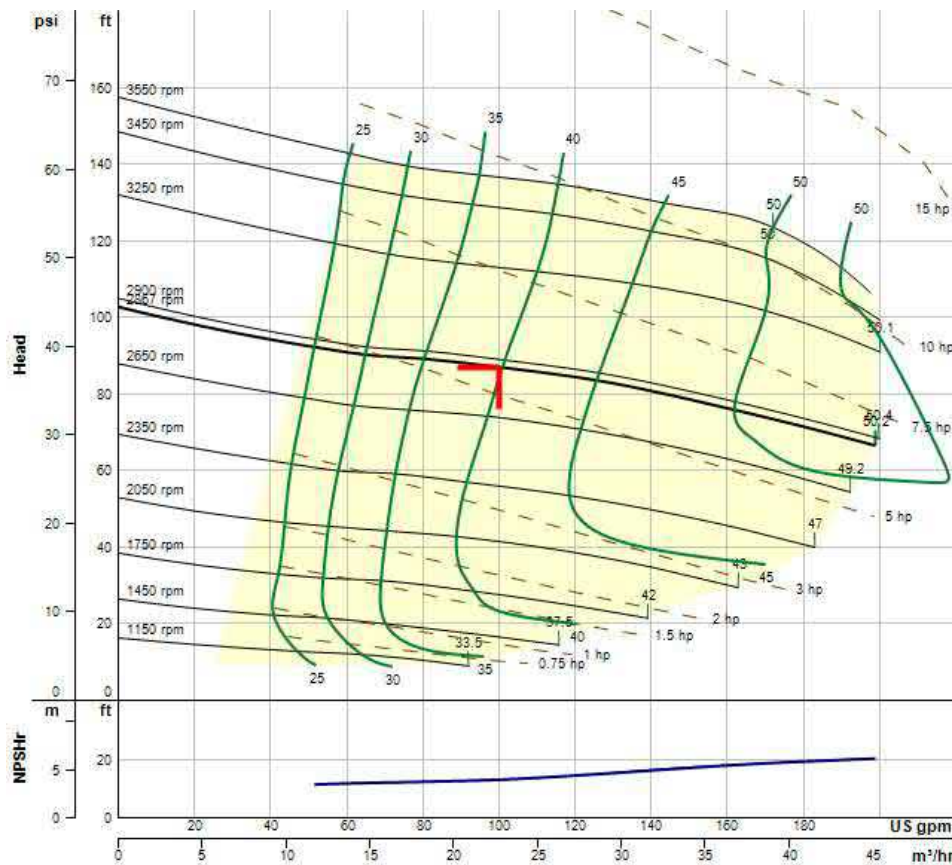
Data Point

Flow	100	US gpm
Head	72	ft
NPSHr	13.1	ft
Efficiency	41	%
Power	4.46	hp

This curve is provided for preliminary selection only. Please consult factory before making final pump or motor selections. Not NSF certified.

T2D60S-B Self Priming

Suction	2" (50 mm)
Discharge	2" (50 mm)
Solids Handling	0.75" (19 mm)
Casing	Cast Iron
Impeller/Rotor	Ductile Iron
Seal Material	Silicon Carbide
Flange	NPT
Drive Type	Basic
Unit Weight	N/A



Curve Info

Type	T-SERIES
Curve	T2DS-B-1
Impeller	38615-136
Speed	2867 rpm
Diameter	6.38 in

Data Point

Flow	100	US gpm
Head	87	ft
NPSHr	13.1	ft
Efficiency	40	%
Power	5.52	hp

This curve is provided for preliminary selection only. Please consult factory before making final pump or motor selections. Not NSF certified.

Flygt



PRELIMINARY

16120 Woodinville-Redmond Road NE, Suite 3
Woodinville, WA 98072 Phone: (425) 486-9499

2501 Columbia Way Suite 300
Vancouver, WA 98661 Phone: (360) 694-9175

1/28/2022

Quote #: 37742 - 0

To: RH2 - Bellingham
Attn: Dan Burwell
Email: dburwell@rh2.com
Phone: (360) 684-1548

Project Name: Rocky Ridge and Lakewood Pump Station Retrofit

The following is Whitney Equipment Company's proposal for equipment we can furnish for the above referenced project. A detailed list of the equipment and services included in this proposal is shown in the following Scope of Supply. Only items listed in the Scope of Supply are included in this proposal. This proposal is valid for 30 days from the date listed above. Please contact us to verify pricing and availability beyond 30 days as pricing and availability may vary. The conditions of sale associated with this proposal are attached.

Engineering calculations and design services are included only when specifically listed in the Scope of Supply. Field or startup services are not included unless specifically listed in the Scope of Supply. If additional field or onsite assistance is needed beyond what is included in the Scope of Supply, it can be supplied at a rate of \$165.00/hour at the job site, plus travel time and expense. Unless specifically listed in the following Scope of Supply, we do not include haulage, unloading including provision of lifting equipment, permits, bonds, insurance, installation, sales or use taxes or duties of any kind, power, chemicals, water, concrete, grout, anchor bolts, controls, wire, conduit, lights, fans, piping, valves, fittings, drains, meters, gauges, signs, safety equipment, labor, tools, field paint, lubricants, or any other items not listed as included.

Prices are firm for 30 days. Purchaser must also pay any costs incurred for additional field or onsite assistance no later than 30 days after receipt of an invoice for field or onsite services from Whitney Equipment Company.

The equipment will be coated with the manufacturers' standard preparation and coatings unless special coatings are listed in the Scope of Supply. Equipment will be prepared for shipment per the manufacturers' standard packing procedure. The purchaser is responsible for receiving all items including promptly inspecting for damage, noting damages, and filing for all missing or damaged items in a timely manner. Freight shall be standard ground or ocean freight unless otherwise listed. The purchaser is responsible for proper storage and handling of the equipment per the manufacturer's recommendations prior to installation to ensure warranty coverage. Warranty coverage shall be manufacturer's standard warranty unless specifically listed in the Scope of Supply.

This job is being handled by Sydney Schumacher, phone 425-375-3436. Please call if you need further information or prices.

PRELIMINARY
SCOPE OF SUPPLY

Quantity	Product / Description	Price per Unit	Total Price
2 each	Rocky Ridge 4" FM: Flygt NP 3085 SH3-255 Rated at 100gpm @70'TDH Including 3phase/230V/4hp FM Rated Motor, Hard Iron Adaptive N Impeller, Fluid and Leakage Sensor, and 50ft of Standard Power Cable.	\$9,361.00	\$18,722.00
2 each	NP 3085 Standard Accessories Including 3" Discharge Elbow, 2" 304 Upper Guide Bar Bracket, 2" 304 Guide Rails, Lifting Assembly, Cable Holder, Grip Eye, Safety Hooks, and Cable Grips.	\$2,310.00	\$4,620.00
2 each	Rocky Ridge 2" FM: Flygt MP 3069 HT3-255 Rated at 45gpm @87'TDH Including 3phase/230V/3.8hp FM Rated Motor, Fluid and Leakage Sensor, and 30ft of Standard Power Cable.	\$3,734.50	\$7,469.00
2 each	MP 3069 Standard Accessories Including 2" Discharge Elbow, P Install Kit (Including Sliding Bracket, 3/4" 304 Upper Guide Bar Bracket, and Anchor Bolts), 3/4" 304 Guide Rails, Lifting Assembly, Cable Holder, Grip Eye, Safety Hooks, and Cable Grips.	\$1,155.00	\$2,310.00
2 each	Lakewood 4" FM: Flygt NP 3102 SH3-256 Rated at 100gpm @85'TDH Including 3phase/230V/7.2hp FM Rated Premium Efficient Motor, Hard Iron Adaptive N Impeller, Fluid and Leakage Sensor, and 50ft of Standard Power Cable.	\$11,220.00	\$22,440.00
2 each	NP 3102 Standard Accessories Including 3" Discharge Elbow, 2" 304 Upper Guide Bar Bracket, 2" 304 Guide Rails, Lifting Assembly, Cable Holder, Grip Eye, Safety Hooks, and Cable Grips.	\$2,310.00	\$4,620.00
2 each	Lakewood 2" FM: Flygt MP 3102 HT3-267 Rated at 45gpm @110'TDH Including 3phase/230V/3.8hp FM Rated Motor, Fluid and Leakage Sensor, and 30ft of Standard Power Cable.	\$8,800.00	\$17,600.00
2 each	MP 3102 Standard Accessories Including 1 1/2" Discharge Elbow, 3/4" 304 Upper Guide Bar Bracket, 3/4" 304 Guide Rails, Lifting Assembly, Cable Holder, Grip Eye, Safety Hooks, and Cable Grips.	\$1,182.50	\$2,365.00

PRELIMINARY

1 each	Stacon Duplex Control Panel (For Either 4" or 2" FM Option) Including NEMA 4X Enclosure, Four 40ft Anchor Scientific Floats, Auto Dialer (connected to the existing phone), and Timer (for Odor Control).	\$10,220.00	\$10,220.00
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Lead Times: 12-16 Weeks

Freight Terms: FOB Factory, prepaid and added to invoice. Freight will depend on the option selected.

Note: This is a budget-level quote and numbers should be used for planning purposes. The cost will likely be less come time for purchase. We recommend using an eccentric reducer to connect to discharge pipe for the 3" and 1 ½" elbows.

Sales tax is not included unless specified.

Payment Terms: Net 30

Sincerely,
Sydney Schumacher,

PRELIMINARY

Purchaser's Signature: By signing below, I certify that I am an authorized representative with the authority to enter into contracts on behalf of the company identified below, and that I accept the terms included with this proposal.

Signature

Date

Print Name and Title

BILL TO

SHIP TO

Company or Organization Bill To

Company or Organization Ship To

Bill To Address

Ship To Address

City/State/Zip

City/State/Zip

Billing Contact Name

Shipping Contact Name

Billing Contact Email

Shipping Contact Email

Billing Contact Phone Number

Shipping Contact Phone Number

PO # if applicable _____

If using a Purchase Order:

Make PO out to

Whitney Equipment Company Inc

16120 Woodinville Redmond Rd NE #3

Woodinville, WA 98072

Email: sales@weci.com

PRELIMINARY

WHITNEY EQUIPMENT CO., INC. WOODINVILLE, WA STANDARD CONDITIONS OF SALE

These are Whitney Equipment Co., Inc., the Seller, Standard Terms and Conditions and the basis of our offer to the Buyer, unless specifically altered in writing as permitted herein. Any changes may affect the quoted price. These Standard Terms and Conditions and the bid quote, purchase order, or other order form to which they are attached (the "Bid Quote") form a contract between Buyer and Seller for the sale of products described in the Bid Quote (the "Contract").

ACCEPTANCE: Submission of this Contract to Buyer constitutes Seller's offer to the Buyer and on acceptance becomes a binding contract on the terms set forth herein. Buyer's acceptance is expressly limited to the terms of this Contract. Seller rejects all terms included in any response by the Buyer to this Contract that are in conflict with, inconsistent with, or in addition to the terms and conditions contained herein. But if a conflict arises between the terms of a purchase order first issued by Buyer and the terms of this Contract, the terms of this Contract shall take precedence.

ENTIRE AGREEMENT: The Contract comprises the entire agreement between the Buyer and the Seller, and supersedes all prior or contemporaneous understandings, agreements, negotiations, representations and warranties, and communications, both written and oral. This Contract prevails over any terms and conditions of purchase provided by Buyer, regardless of whether or when the Buyer has submitted its purchase order or such terms. In addition, implied terms and conditions from the Buyer's contracts with other entities are not valid or enforceable with respect to this Contract. Fulfillment of the Buyer's order does not constitute acceptance of any of Buyer's terms and conditions and does not serve to modify or amend this Contract.

GOVERNING LAWS: Seller will comply with all laws applicable to Seller during sale of the products. Buyer will comply with all laws applicable to Buyer during operation or use of the products. The laws of the State of Washington shall govern the validity, interpretation, and enforcement of any order of which these provisions are a part, without giving effect to any rules governing the conflict of laws. Assignment may be made only with written consent of both parties. Buyer shall be liable to the Seller for any attorney's fees and costs incurred by Seller in enforcing any of its rights hereunder. Unless otherwise specified, any reference to Buyer's order is for identification only.

JURISDICTION AND VENUE: Any legal suit, action or proceeding arising out of relating to this Contract shall be commenced in federal or state court located King County, Washington and Seller and Buyer (i) irrevocably submit to the exclusive jurisdiction and venue of any such court in any such suit, action or proceeding and (ii) irrevocably waive (to the extent permitted by applicable law) any objection which they now or hereafter may have to the laying of venue of any such action or proceeding brought in any of the foregoing courts in and of the State of Washington, and any objection on the ground that any such action or proceeding in any such court has been brought in an inconvenient forum.

ATTORNEYS FEES AND EXPERT COSTS: The prevailing party in any legal suit, action, or proceeding arising out of relating to the Contract shall be awarded its reasonable attorneys' fees and experts costs.

WARRANTY:

THE SELLER MAKES NO WARRANTIES ON ANY PRODUCTS OR SERVICES PROVIDED UNDER THIS CONTRACT, INCLUDING ANY (A) WARRANTY OF MERCHANTABILITY, (B) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, OR (C) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY, WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE. BUT THE BUYER SHALL RECEIVE WARRANTIES, IF ANY, PROVIDED BY THE MANUFACTURER OF THE PRODUCTS SOLD UNDER THIS CONTRACT. THE SELLER IS EXPRESSLY EXCLUDED FROM ANY WARRANTY AND ALL CHARGES, FOR LABOR, INSTALLATION, REMOVAL, REPAIR, REINSTALLATION, SHIPPING, UTILITIES, EQUIPMENT RENTAL, OTHER REQUIRED MATERIALS, OR ANY OTHER ITEMS. THE PARTIES AGREE THAT THE BUYER'S SOLE AND EXCLUSIVE REMEDIES SHALL BE AGAINST THE PRODUCT MANUFACTURER AS PROVIDED HEREIN. THE BUYER AGREES THAT NO OTHER REMEDY (INCLUDING, BUT NOT LIMITED TO, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR LOST PROFITS, LOST SALES, DOWNTIME, OPERATING OR MAINTENANCE COSTS, INJURY TO PERSONS OR PROPERTY, OR ANY OTHER SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL LOSS) SHALL BE AVAILABLE TO BUYER. BUYER SHALL FOLLOW ALL STORAGE, OPERATION, AND MAINTENANCE PROCEDURES SPECIFIED BY THE MANUFACTURER FOR WARRANTY COVERAGE, FAILURE TO FOLLOW THESE PROCEDURES INCLUDING DOCUMENTATION MAY RESULT IN LOSS OF WARRANTY COVERAGE.

TAXES: Seller does not include any Federal, State, City, County, or other sales, custom duties, or taxes such as sales, use, excise, retailer's, occupation or similar taxes and fees, in the Contract Price unless otherwise explicitly stated in writing. Any taxes not included in the Bid Quote will be added to the Contract Price. In lieu of paying such taxes to the Seller, the Buyer may furnish the Seller with a Tax Exemption Certificate or other legal and appropriate taxing authorities at any time.

PAYMENT TERMS: All quotations or proposals are in US Dollars unless explicitly stated otherwise in writing. Seller shall submit invoices for payment to Buyer for percentages of the Contract Price as described in Bid Quote. Buyer must pay all invoices submitted by Seller no later than 30 days after the date of the invoice. The shipment is delayed by the Buyer, date of readiness for shipment shall be deemed the date of shipment for payment purposes. The Seller may require advance payment or a certificate of deposit, or may otherwise modify credit terms, should the Buyer's credit standing not meet the Seller's requirements. A service charge of 2.5% per month on the unpaid balance will be charged on all overdue monies payable. Buyer shall not assign or transfer their contract or any interest in it, or monies payable under it, without the written consent of Seller and any assignment made without such consent shall be null and void. Buyer agrees to pay all collection costs and costs of suit, including reasonable attorney fees, in the event Seller institutes collection action for overdue account. Seller expressly reserves all available lien rights in connection with any transaction between the parties. Unless explicitly agreed upon in writing, retainage against the contract amount is not allowed. The Seller reserves the right to repossess all equipment that is not paid for in full per this Contract's payment terms.

CREDIT CARD PAYMENTS: All credit card payments will require an additional 2% surcharge in addition to the Contract Price listed in the Contract. All credit card payments over \$5000.00 require written pre-approval by the Seller prior to processing; approval is not guaranteed.

CREDIT: Buyer is required to provide all necessary credit information to Seller with each order, including bank reference, bonding company, or other necessary information with complete names, addresses, phone numbers, personal references, and account and bond numbers. The Seller will determine, in its sole discretion, what is acceptable and what credit rating is required for the Seller to allow a purchase on credit.

PRICE: The prices specified are in U.S. currency, payable free of all expense to the Seller for collection charges.

STARTUP PAYMENTS: If startup services are included in this Contract, the pre-agreed upon payment amount shall be due when startup is complete. If startup is delayed more than 90 days after equipment delivery, payment for startup shall be due 90 days after equipment delivery prior to the startup occurring. Delaying in paying this portion of the contract is subject to the PAYMENT TERMS above.

SHIPMENTS AND DELIVERY: Delivery and shipping times are Seller's best estimate and do not include product approval time or order processing time. Seller is not liable for any damages, fees, costs, expenses or penalties arising from (1) loss of or damage to product in transit or (2) delays in shipping or delivery of the product, including all delays caused by an accident; riots; insurrections; national emergency; labor disputes of every kind however caused; embargoes; non-delivery by suppliers; delays of carriers or postal authorities; or governmental restrictions, prohibitions, or requirements. Seller may, in its sole discretion, without liability or penalty, make partial shipments of products to Buyer. Each shipment will constitute

Whitney Equipment Company, Inc.

PRELIMINARY

a separate sale, and Buyer shall pay for the units shipped whether such shipment is in whole or partial fulfillment of Buyer's order. Cost of handling and freight is only included when it is explicitly listed in this Contract.

NON-DELIVERY: The quantity of any installment of products as recorded by Seller on dispatch from Seller's place of business is conclusive evidence of the quantity received by Buyer on delivery unless Buyer can provide conclusive evidence proving the contrary. Any liability of Seller for non-delivery of the products shall be limited to replacing the products within a reasonable time or adjusting the invoice respecting such products to reflect the actual quantity delivered.

APPROVALS: Buyer is responsible for obtaining approval on products from project owners and engineers. The Seller represents only those products are as described in this Contract. The Seller does not warrant that the products described will be approved or otherwise satisfactory to project owners or engineers, or that products meet project specifications. Seller does not guarantee compliance with any codes or laws unless explicitly stated in this Contract. Performance of the overall system that incorporates the products is not guaranteed.

OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970 – Seller does not warrant or represent that any of Seller's products by themselves or in a system or with other equipment will conform to or comply with the provisions of the Occupational Safety and Health Act of 1970 and the standards and regulations issued thereunder, or any other federal, state, or local law or regulation of the same or similar nature.

LIMITATION OF LIABILITY - NEITHER SELLER, NOR ITS SUPPLIERS SHALL BE LIABLE, WHETHER IN CONTRACT, WARRANTY, FAILURE OF A REMEDY TO ACHIEVE ITS INTENDED OR ESSENTIAL PURPOSES, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY, INDEMNITY OR ANY OTHER LEGAL THEORY, FOR LOSS OF USE, REVENUE OR PROFIT, OR FOR COSTS OF CAPITAL OR OF SUBSTITUTE USE OR PERFORMANCE, OR FOR INDIRECT, SPECIAL, LIQUIDATED, INCIDENTAL OR CONSEQUENTIAL DAMAGES, OR FOR ANY OTHER LOSS OR COST OF A SIMILAR TYPE, OR FOR CLAIMS BY BUYER FOR DAMAGES OF BUYER'S CUSTOMERS. SELLER'S AGGREGATE LIABILITY ARISING OUT OF OR RELATING TO THIS CONTRACT SHALL NOT EXCEED THE CONTRACT PRICE, PROVIDED HOWEVER, IF THE BID QUOTE INCLUDES FIELD OR STARTUP SERVICE, SELLER'S LIABILITY FOR SAID SERVICES SHALL BE LIMITED TO THE VALUE OF THE SERVICES. BUYER AND SELLER AGREE THAT THE EXCLUSIONS AND LIMITATIONS SET FORTH IN THIS ARTICLE ARE SEPARATE AND INDEPENDENT FROM ANY REMEDIES WHICH BUYER MAY HAVE HEREUNDER AND SHALL BE GIVEN FULL FORCE AND EFFECT REGARDLESS OF WHETHER ANY OR ALL SUCH REMEDIES SHALL BE DEEMED TO HAVE FAILED OF THEIR ESSENTIAL PURPOSE.

STORAGE – If for any reason Buyer fails to accept products that have been delivered by Seller, or if Seller is unable to deliver the products because Buyer has not provided appropriate instructions, documents, licenses, or authorizations, then Seller may place the products in storage at Buyer's cost and expense, which includes the cost of storage, shipping fees, insurance, and other incidental expenses. The Buyer carries risk of loss for products in storage.

TITLE - Title to the products and risk of loss or damage passes to Buyer upon delivery of the products at the Point of Delivery listed in the Bid Quote. As collateral security for the payment of the Contract Price for the products, Buyer hereby grants to Seller a lien on and security interest in and to all of the right, title and interest of Buyer in, to, and under the products, wherever located, and whether now existing or hereafter arising or acquired from time to time, and in all accessions thereto and replacements or modifications thereof, as well as all proceeds (including insurance proceeds) of the foregoing. The security interest granted under this provision constitutes a purchase money security interest under the Washington Uniform Commercial Code. Buyer agrees to perform all additional acts necessary to perfect and maintain said security interest.

INSURANCE: Buyer shall, at its own expense, purchase, maintain and carry adequate insurance for the products to protect against loss or damage from any external cause, including losses from fire, wind, water, or other causes. Insurance coverage must be maintained with insurance companies legally authorized to do business where said products are located in an amount at least equal to the value of said products until the products are accepted and paid for in full. Upon Seller's request, Buyer shall provide Seller with a certificate of insurance from Buyer's insurer evidencing the insurance coverage that is satisfactory to Seller. The certificate of insurance must name Seller as an additional insured. In no case does the Contract Price, even if inclusive of freight, cover the cost of insurance beyond the Point of Delivery specified in the Bid Quote]

CANCELLATION: The Buyer may cancel its order only upon written notice, and in turn will make payment to Seller of reasonable cancellation charges specified by Seller.

ORAL STATEMENTS: The Seller's personnel may have made oral statements about the products described in this Contract during the sales process. Such statements do not constitute warranties or guarantees and shall not be relied on by the Buyer. The entire contract is embodied in this writing. This writing constitutes the final expression of the parties' agreement, and it is a complete and exclusive statement of the terms of that agreement.

CHANGES: Seller reserve the right to make changes and to substitute other material as needed to make shipments and fulfill orders under this Contract.

ERRORS: Seller reserves the right to correct clerical or stenographic errors or omissions.

STATUTE OF LIMITATIONS - To the extent permitted by applicable law, any lawsuit for breach of contract, including breach of warranty, arising out of the transactions covered by this order, must be commenced by the Buyer not later than twelve (12) months from the delivery of Seller's Products or the last day Seller performed any services, whichever is earlier.

INSPECTION: Buyer shall inspect Seller's Products upon receipt, and if Buyer's inspection reveals any defects in the Products, Buyer shall notify the Seller within three (3) days after receipt of the Products of any claim Buyer might have concerning such defects in the Products discovered by Buyer. Buyer's failure to notify Seller within such a three (3) day period shall constitute a waiver by Buyer of all claims covering such defects in the Products. It is the Buyer's responsibility to inspect for shipping damage upon delivery and to initiate a damage claim with the freight carrier. Damage occurring in-transit by the freight carrier must be claimed by the Buyer and is not the Seller's responsibility.

NOT INCLUDED: Seller does not include any item not specifically listed as included. References to specifications and drawings in the Scope of Supply section of the Bid Quote does not indicate that all items in those documents are included in the Scope of Supply. Unless clearly included in this Contract, engineering and design services are not included in this Contract.

FREIGHT: Prices quoted are F.O.B. point of manufacture and do not include freight unless specifically listed as included. Title passed to the Buyer at the Point of Delivery listed in the Bid Quote and all freight claims are the responsibility of the Buyer.

BACKCHARGES will not be accepted unless approved by Seller, in writing, before any work is done.

DELAYS: Price and terms and conditions are subject to revision if manufacture is not released at time of order placement or drawings for approval are not returned within 30 days from receipt by customer, or manufacture is released and subsequently held or delayed by the customer for more than 30 days, or customer requests longer than quoted shipment. If Seller suffers delay in performance due to any cause beyond its control, including but not limited to act of God, war, pandemic, act or failure to act of government, act or omission of Buyer, fire, flood, strike or labor troubles, sabotage, or delay in obtaining from others suitable services, materials, components, equipment or transportation, the time of performance shall be extended a period of time equal to the period of the delay and its consequences. Seller will give Buyer notice in writing within a reasonable time after the Seller becomes aware of any such delay.

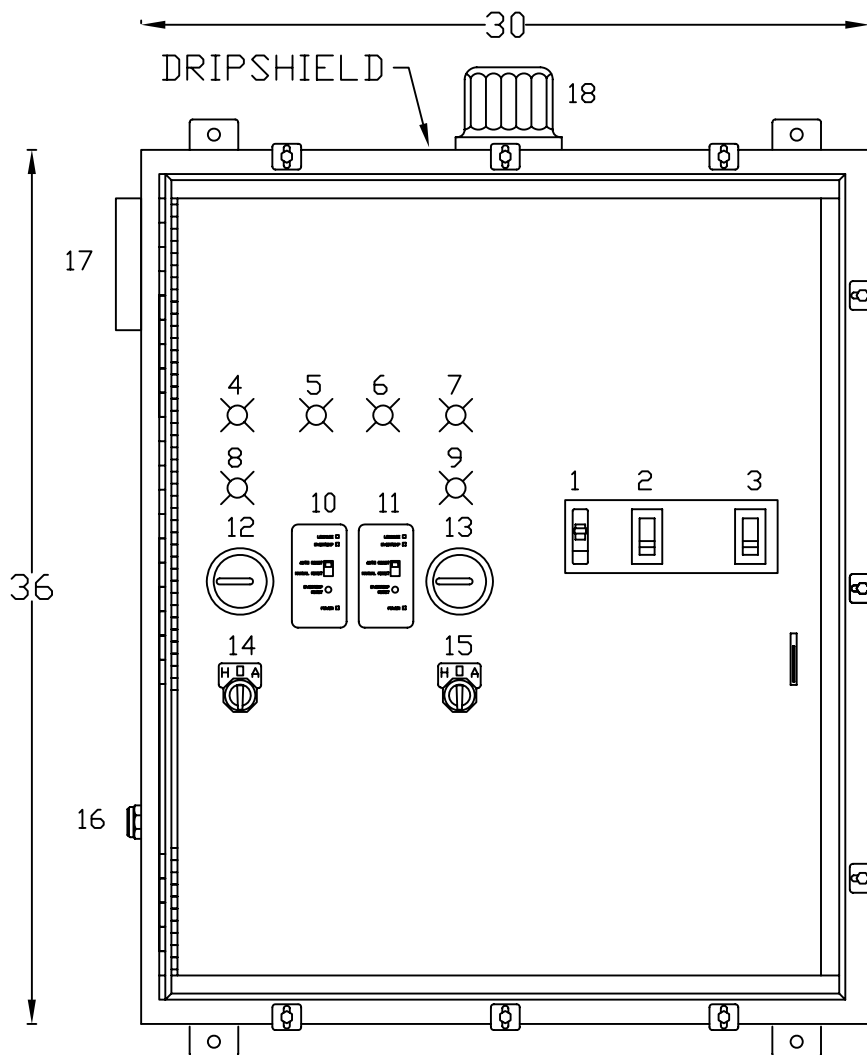
PRELIMINARY

DECOMPOSITION AND WEAR: Decomposition by chemical action and wear caused by the presence of abrasive materials shall not constitute defects.

BUYER DATA - Timely performance is contingent upon the Buyer supplying to the Seller, when needed, all required technical information, including drawing and submittal approval, and all required commercial documentation. The Buyer shall also supply and complete all shipping delivery information, pre-delivery checklists, and pre-startup checklists in a timely manner or the overall schedule of the project may be impacted at no cost to the Seller regardless of any potential agreed upon damages.

BUYER SUPPLIED COMPONENTS - Buyer acknowledges that the products purchased by Buyer under this Contract may contain products supplied by the Buyer or supplied by a third party at the Buyer's direction ("Buyer Supplied Components"). Buyer Supplied Components are not covered by any warranty or guarantee in this Contract. For the avoidance of doubt, Seller makes no representations or warranties with respect to any Buyer Supplied Components. Seller disclaims any liability arising from Buyer Supplied Components delivered late, damaged, defective, or nonconforming. In no event shall Seller be liable for consequential, indirect, incidental, special, exemplary, punitive damages, or lost profits, arising out of or relating to late delivery of or defective Buyer Supplied Components. Subject to the terms and conditions of this Contract, Buyer shall indemnify, defend and hold harmless Seller and its representatives/officers, directors, employees, agents, affiliates, successors and permitted assigns ("Indemnified Party") against any and all losses, damages, liabilities, deficiencies, claims, actions, judgments, settlements, interest, awards, penalties, fines, costs, or expenses of whatever kind, including attorney and expert fees, fees and costs of enforcing any right to indemnification under this Contract, and the cost of pursuing any insurance providers, incurred by Indemnified Party in a final judgment relating to any third-party claims arising from defective Buyer Supplied Components.

PRELIMINARY



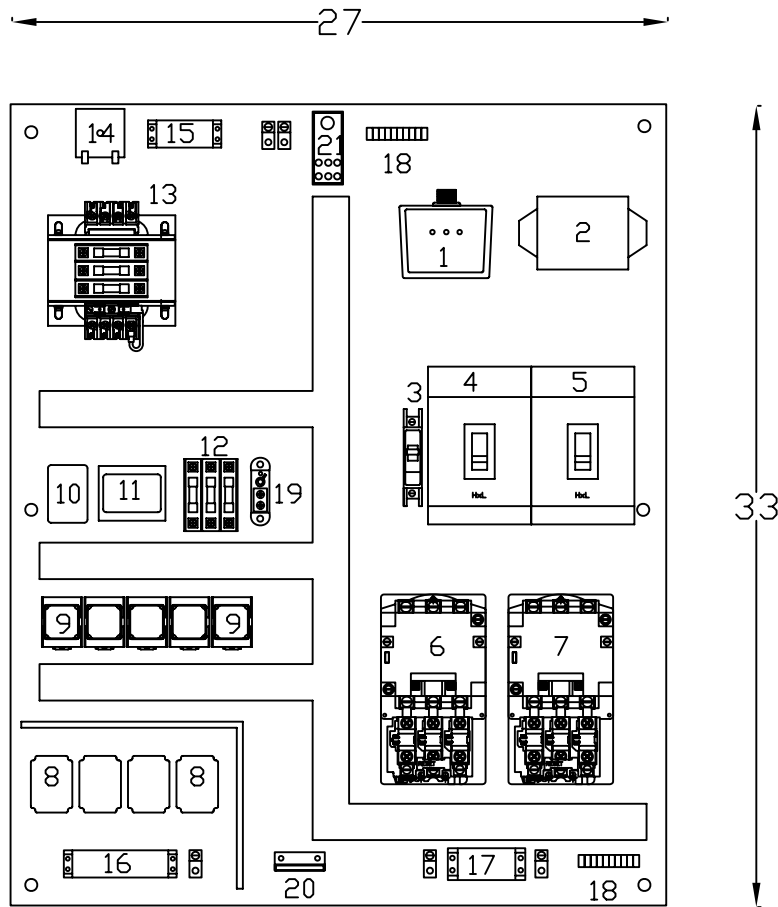
OUTER DOOR HAS BEEN REMOVED FOR CLARITY

- 1 - CCB CONTROL CIRCUIT BREAKER
- 2 - MB1 MOTOR BREAKER 1
- 3 - MB2 MOTOR BREAKER 2
- 4 - PL1 OFF LEVEL
- 5 - PL2 LEAD LEVEL
- 6 - PL3 LAG LEVEL
- 7 - PL4 HIGH LEVEL
- 8 - RL1 RUN LIGHT 1
- 9 - RL2 RUN LIGHT 2
- 10 - MC1 MINI CAS 1
- 11 - MC2 MINICAS 2
- 12 - ETM1 ELAPSED TIME METER 1
- 13 - ETM2 ELAPSED TIME METER 2
- 14 - HOA HAND-OFF-AUTO SWITCH PUMP 1
- 15 - HOA HAND-OFF-AUTO SWITCH PUMP 2
- 16 - ASB ALARM SILENCE BUTTON
- 17 - AH ALARM HORN
- 18 - AL ALARM LIGHT

INTRINSIC RAPID RELEASE	
QUOTE NO.	DATE
BBABAB	11/07/2006
DRAWN BY	REVISION
B.A.S.	

BBABAB	ITT-FLYGT CORP. TRUMBULL, CT 06611
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LAYOUT MAY VARY

- 1 - TVSS SURGE ARRESTOR
- 2 - TB POWER TERMINAL BLOCK
- 3 - CCB CONTROL CIRCUIT BREAKER
- 4 - MB1 MOTOR BREAKER 1
- 5 - MB2 MOTOR BREAKER 2
- 6 - MS1 MOTOR STARTER 1
- 7 - MS2 MOTOR STARTER 2
- 8 - ISR1-4 INTRINSICALLY SAFE RELAY 1-4
- 9 - R1-5 RELAY 1-5
- 10 - ALT ALTERNATOR
- 11 - PM PHASE MONITOR
- 12 - FUSE BLOCKS
- 13 - CPT CONTROL POWER TRANSFORMER
- 14 - FL FLASHER
- 15 - TSA TERMINAL STRIP A
- 16 - TSB TERMINAL STRIP B
- 17 - TSC TERMINAL STRIP C
- 18 - GB GROUND BUS BAR
- 19 - TH THERMOSTAT
- 20 - HT HEATER
- 21 - NB NEUTRAL BLOCK

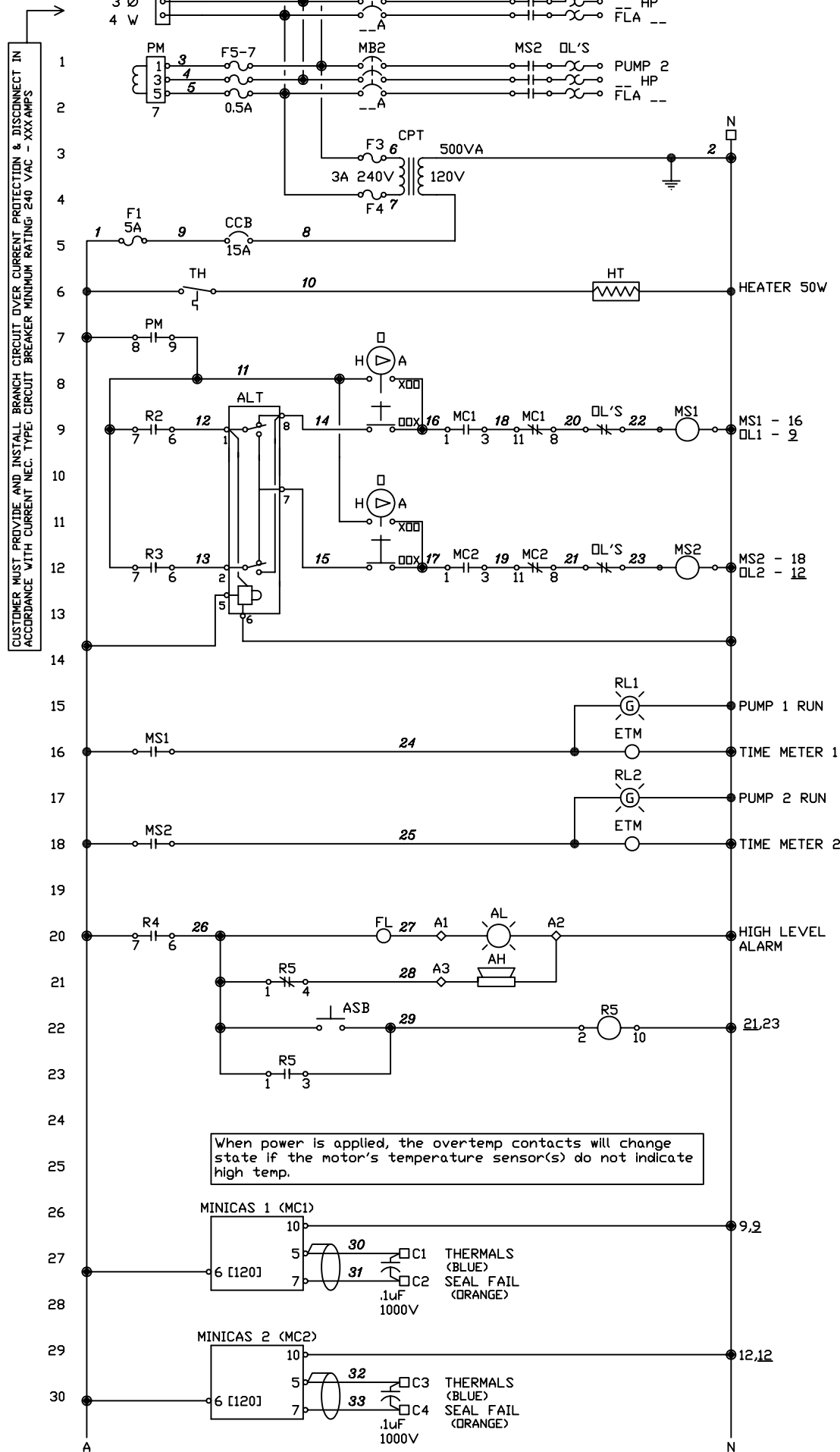
INTRINSIC RAPID RELEASE			
QUOTE NO.	DATE	DRAWN BY	REVISION
BBABAB	11/07/2006	B.A.S.	

BBABAB

ITT-FLYGT
ITT-FLYGT CORP.
TRUMBULL, CT 06611

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PRELIMINARY



INTRINSIC RAPID RELEASE

QUOTE NO. DATE DRAWN BY REVISION

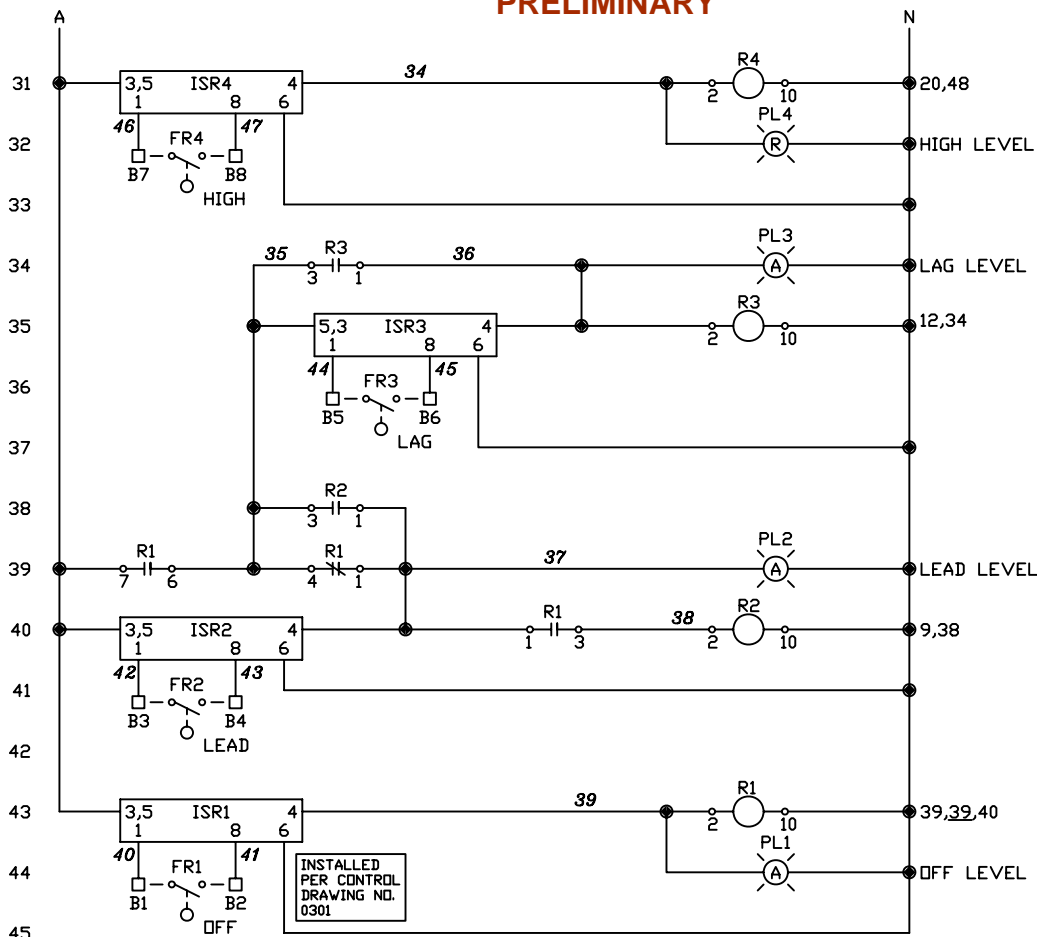
BBABAB 6/04/2009 B.A.S.

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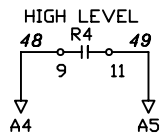
ITT-FLYGT CORP.
TRUMBULL, CT 06611

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PRELIMINARY



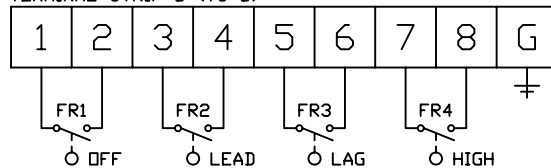
LAST WIRE #49



THE CIRCUIT WIRING IN THE HAZARDOUS AREA MUST NOT EXCEED 1000 FEET BASED ON CABLE WITH 60pF/FT CAPACITANCE AND 0.2uH/FT INDUCTANCE

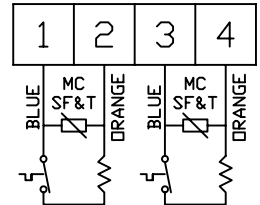
Intrinsically safe wiring terminals
'Install in accordance with Article 504 of the National Electrical Code.'

TERMINAL STRIP B (TS-B)



Nonintrinsically safe wiring terminals

TERMINAL STRIP C (TS-C)



FLYGT PUMPS LEAD COLOR CODE

L1 (PHASE A)	RED
L2 (PHASE B)	WHITE
L3 (PHASE C)	BLACK
GROUND/EARTH	GREEN W/ YELLOW
GROUND CHECK	YELLOW
(MC PIN 5-)	BLUE
(MC PIN 7+)	ORANGE

CUSTOMER
JOB NAME
ENCLOSURE UL TYPE RATING: UL TYPE 1
VOLTAGE 240V PHASE 3 HZ 60
H.P. #1 #2 #3 X #4 X
F.L.A. X X
TOTAL F.L.A.
SERIAL # R09- DATE: 6/1/05
SCCR: 5KA SYMMETRICAL RMS, 240V MAX.
MANUFACTURED BY:
STA CON INC 2525 S. DBT APOPKA FL 32703

INTRINSIC RAPID RELEASE
QUOTE NO. DATE DRAWN BY REVISION
BBABAB 6/04/2009 B.A.S.

BBABAB
ITT-FLYGT CORP.
TRUMBULL, CT 06611
ITT-FLYGT

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NP 3085 SH 3~ Adaptive 255

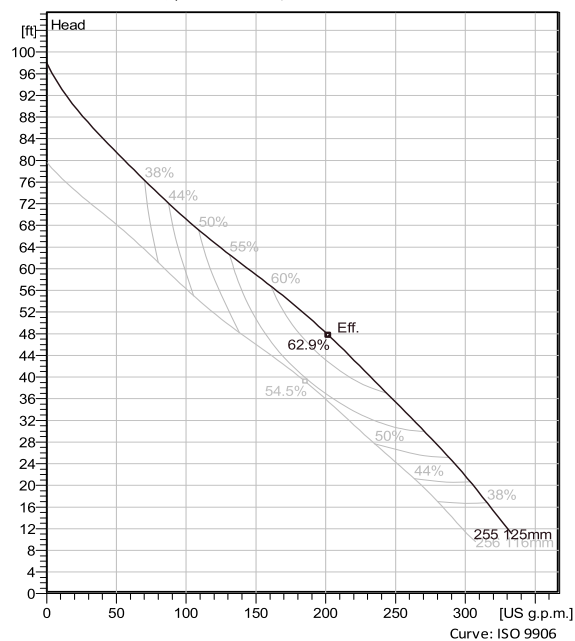
Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.



Technical specification



Curves according to: Water, pure Water, pure [100%], 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Configuration

Motor number N3085.070 15-09-2AL-W 4hp	Installation type P - Semi permanent, Wet
Impeller diameter 125 mm	Discharge diameter 3 inch

Pump information

Impeller diameter 125 mm
Discharge diameter 3 inch
Inlet diameter 80 mm
Maximum operating speed 3445 rpm
Number of blades 2

Max. fluid temperature
40 °C

Materials

Impeller Hard-Iron™
Stator housing material Grey cast iron

Project	Created by Sydney Schumacher
Block	Created on 1/27/2022 Last update 1/27/2022

NP 3085 SH 3~ Adaptive 255

Technical specification



Motor - General

Motor number N3085.070 15-09-2AL-W 4hp	Phases 3~	Rated speed 3445 rpm	Rated power 4 hp
ATEX approved FM	Number of poles 2	Rated current 9.9 A	Stator variant 12
Frequency 60 Hz	Rated voltage 230 V	Insulation class H	Type of Duty S1
Version code 070			

Motor - Technical

Power factor - 1/1 Load 0.92	Motor efficiency - 1/1 Load 82.2 %	Total moment of inertia 0.0066 kg m ²	Starts per hour max. 30
Power factor - 3/4 Load 0.90	Motor efficiency - 3/4 Load 84.0 %	Starting current, direct starting 62 A	
Power factor - 1/2 Load 0.84	Motor efficiency - 1/2 Load 83.8 %	Starting current, star-delta 20.7 A	

Project
Block

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Created on 1/27/2022 **Last update** 1/27/2022

NP 3085 SH 3~ Adaptive 255

Performance curve

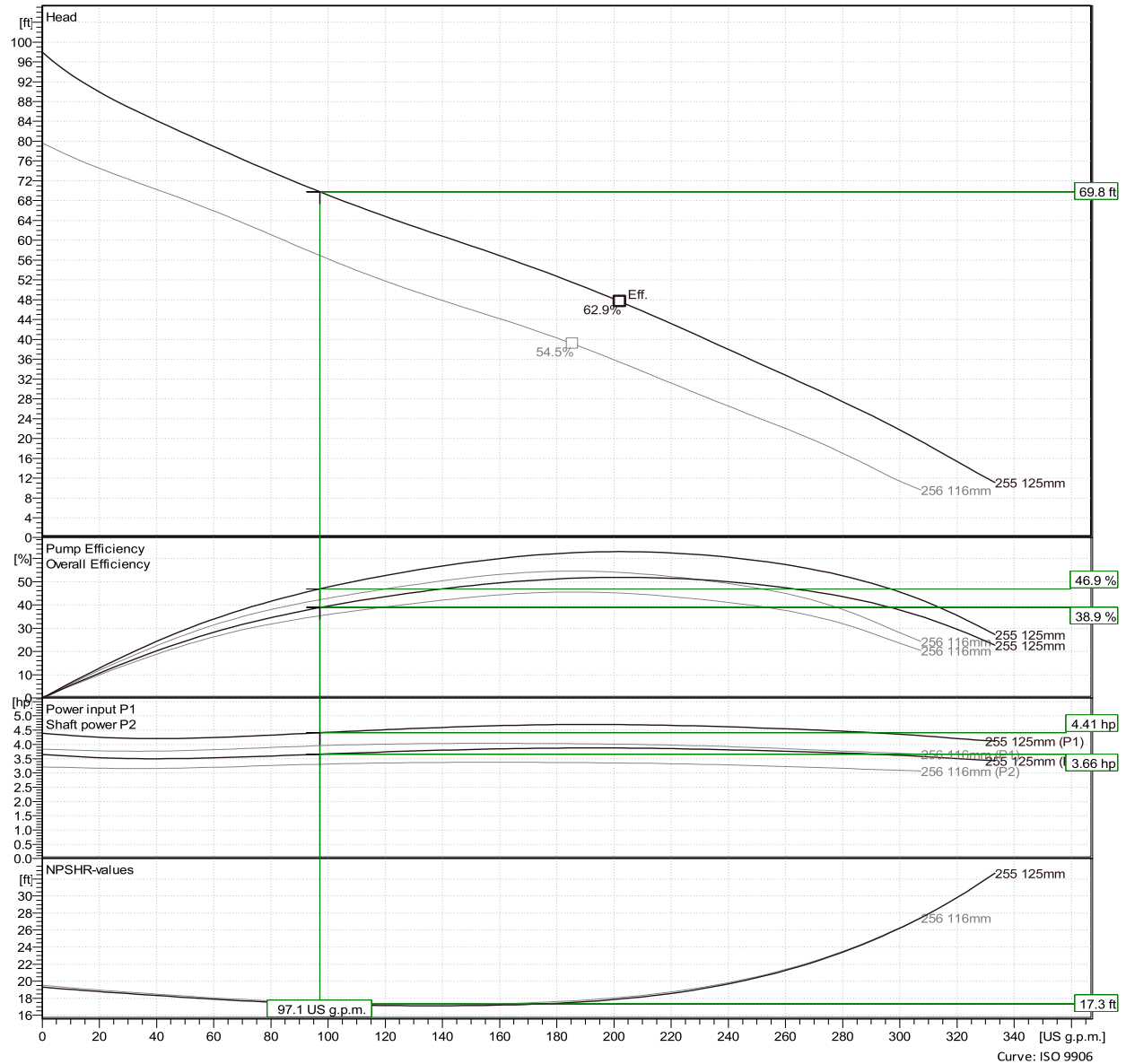


Duty point

Flow
97.1 US g.p.m.

Head
69.8 ft

Curves according to: Water, pure / Water, pure [100%], 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Project
Block

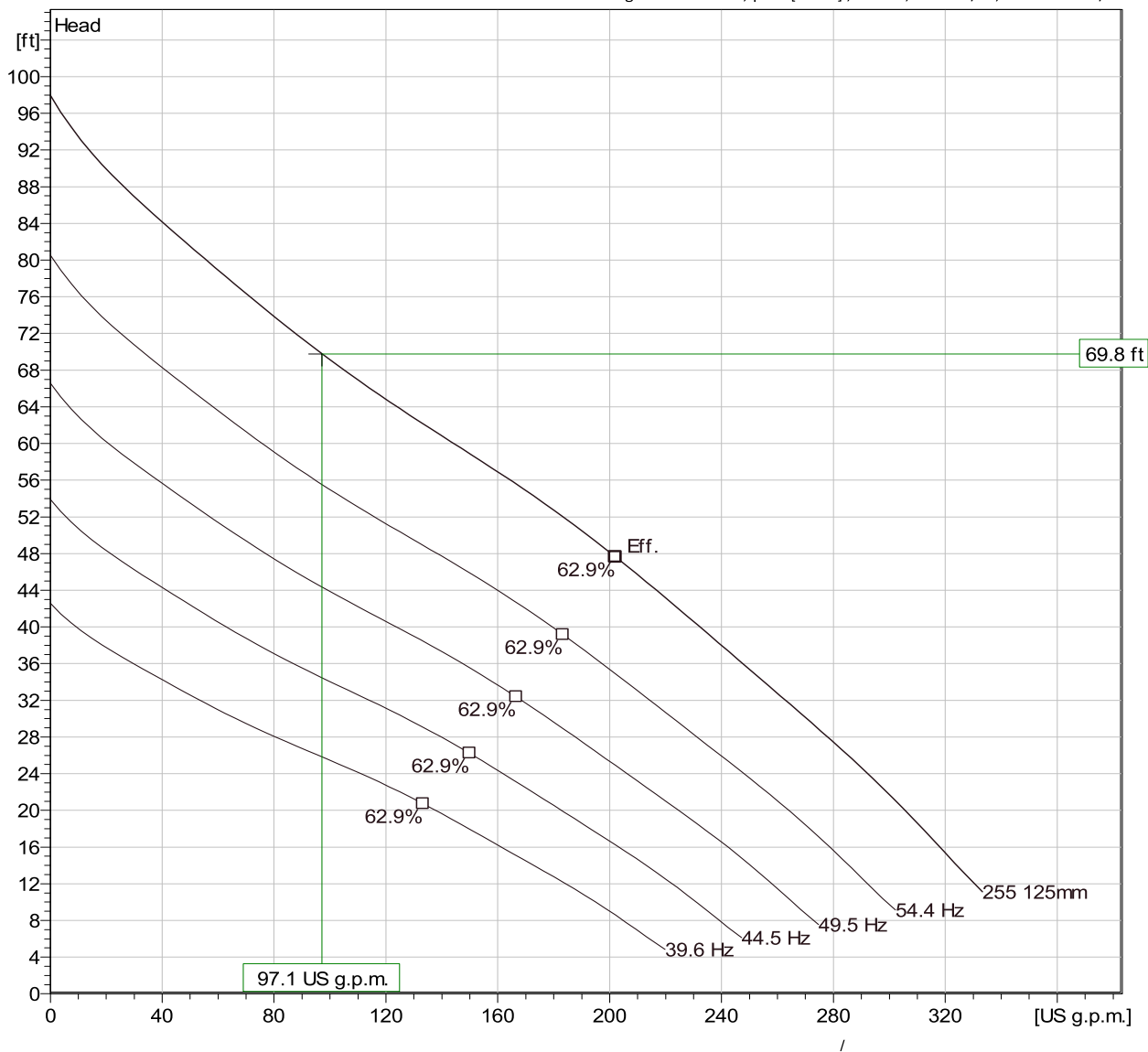
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NP 3085 SH 3~ Adaptive 255

Duty Analysis



Curves according to: Water, pure [100%] ; 39.2°F; 62.42lb/ft³; 1.6891E-5ft²/s



Operating characteristics

Pumps / Systems	Flow US g.p.m.	Head ft	Shaft power hp	Flow US g.p.m.	Head ft	Shaft power hp	Hydr.eff.	Spec. Energy kWh/US MG	NPSHre ft
1	97.1	69.8	3.66	97.1	69.8	3.66	46.9 %	564	17.3

Project
Block

Created by Sydney Schumacher
Created on 1/27/2022

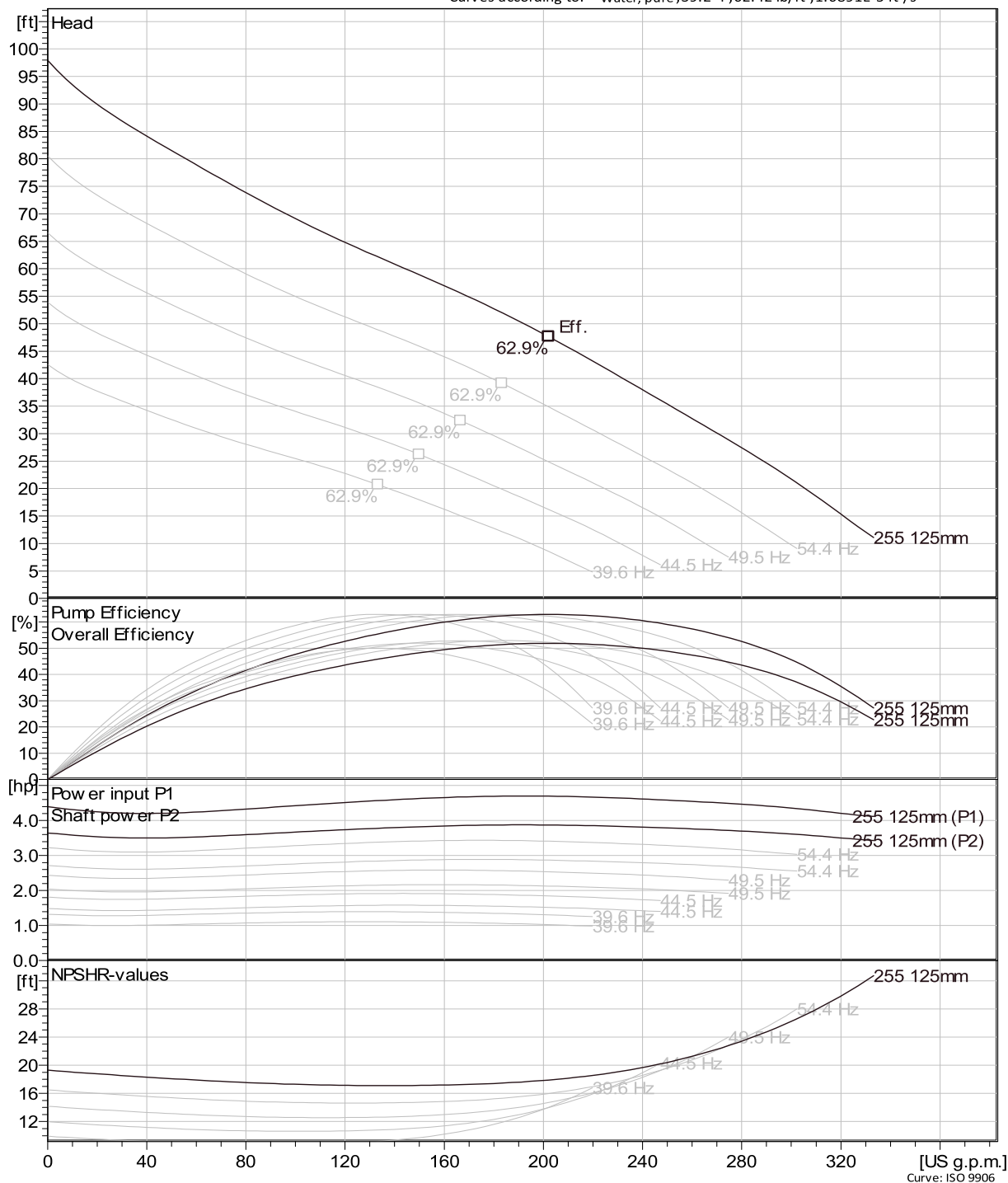
Last update 1/27/2022

NP 3085 SH 3~ Adaptive 255

VFD Curve



Curves according to: Water, pure, 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s

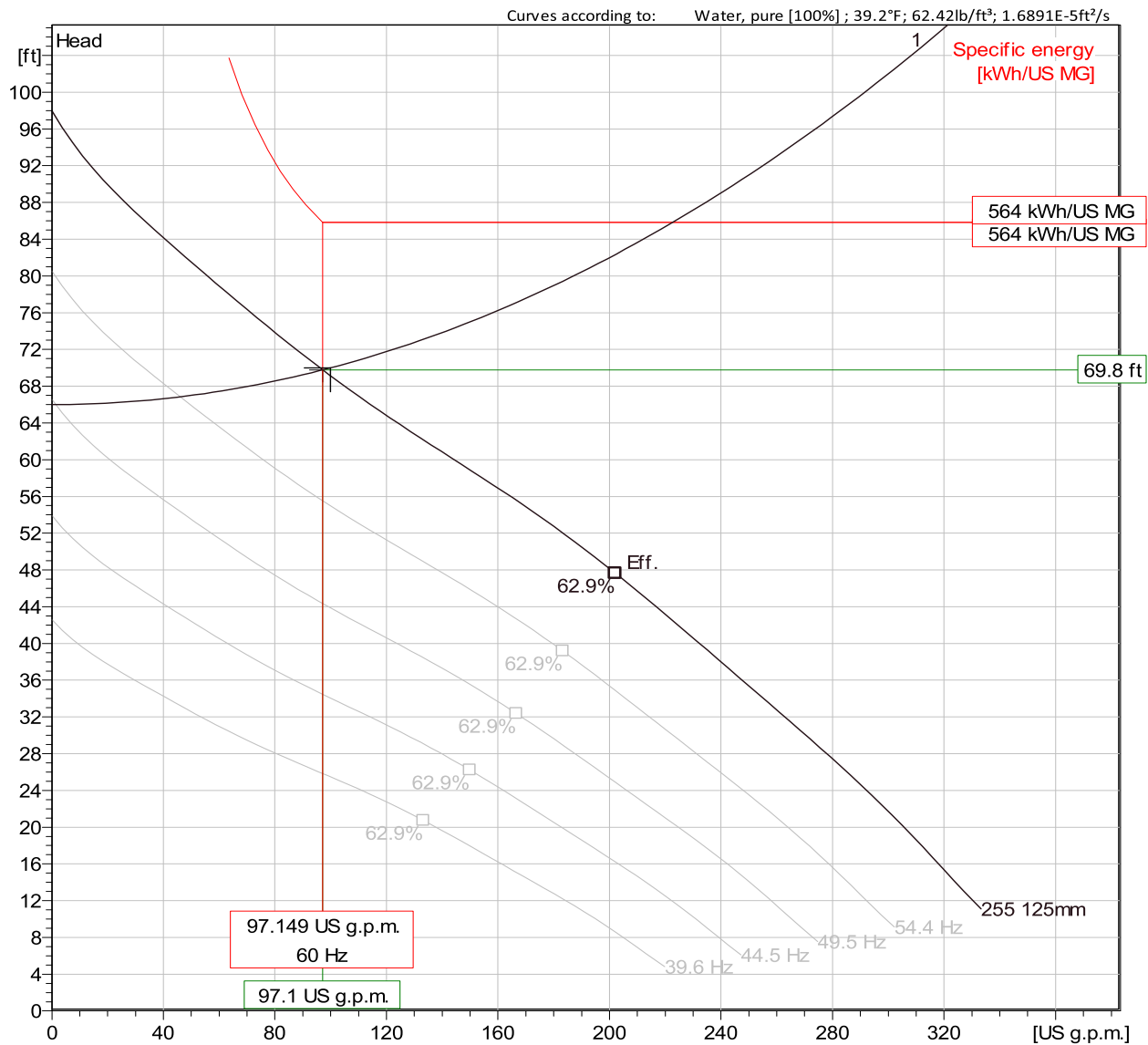


Project
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Created on 1/27/2022 Last update 1/27/2022

NP 3085 SH 3~ Adaptive 255

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow US g.p.m.	Head ft	Shaft power hp	Flow US g.p.m.	Head ft	Shaft power hp	Hydr. eff.	Specific energy kWh/US MG	NPSHr ft
1	60 Hz	97.1	69.8	3.66	97.1	69.8	3.66	46.9 %	564	17.3
1	54.4 Hz	44.4	66.8	2.59	44.4	66.8	2.59	28.9 %	862	15.4
1	49.5 Hz	0.38	66	2.02	0.38	66	2.02	0.315 %	78900	14.1
1	44.5 Hz									

Project
Block

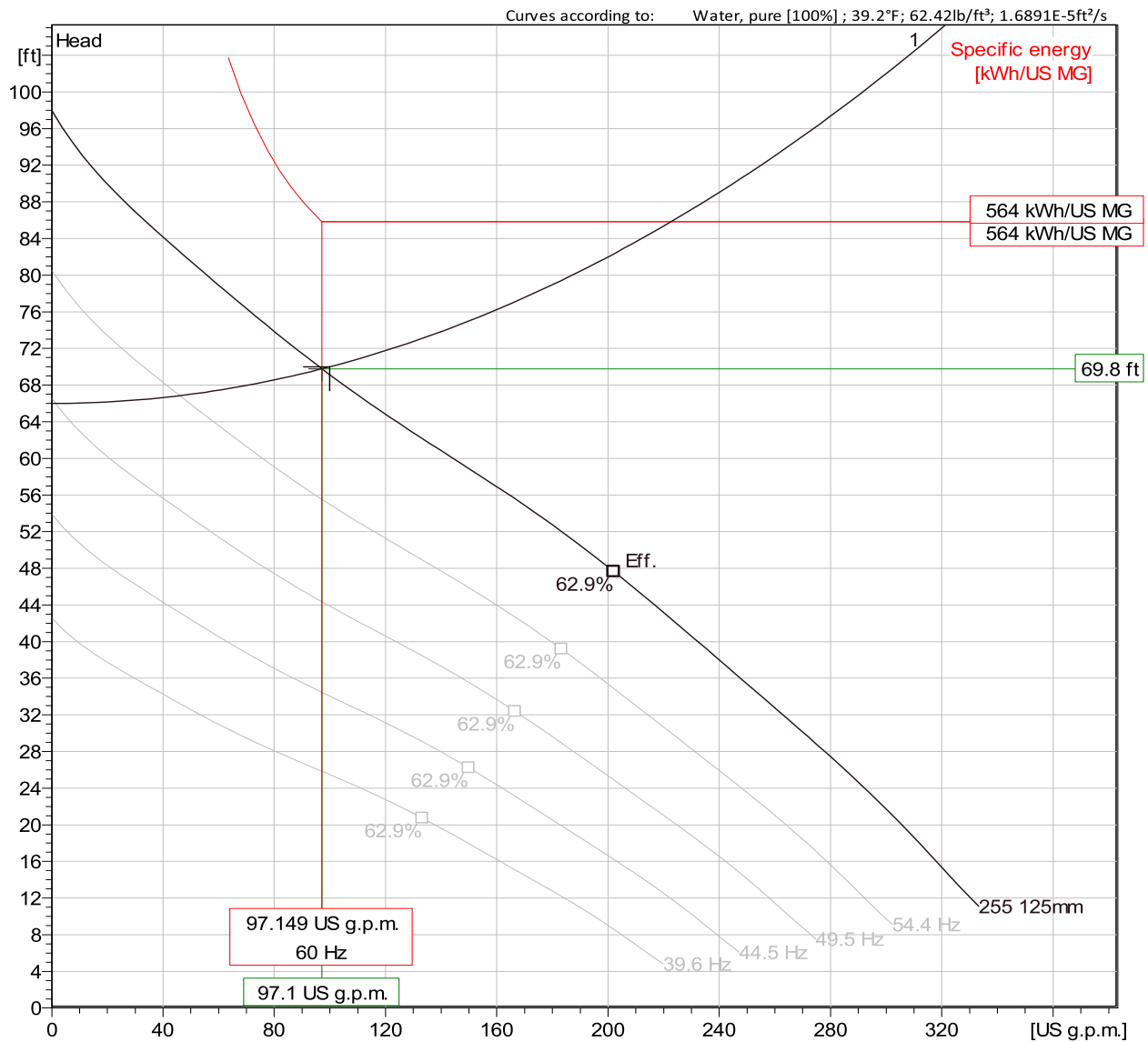
Created by Sydney Schumacher
Created on 1/27/2022

Last update

1/27/2022

NP 3085 SH 3~ Adaptive 255

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr. eff.	Specific energy	NPSHre
		US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	ft
1	39.6 Hz									

Project
Block

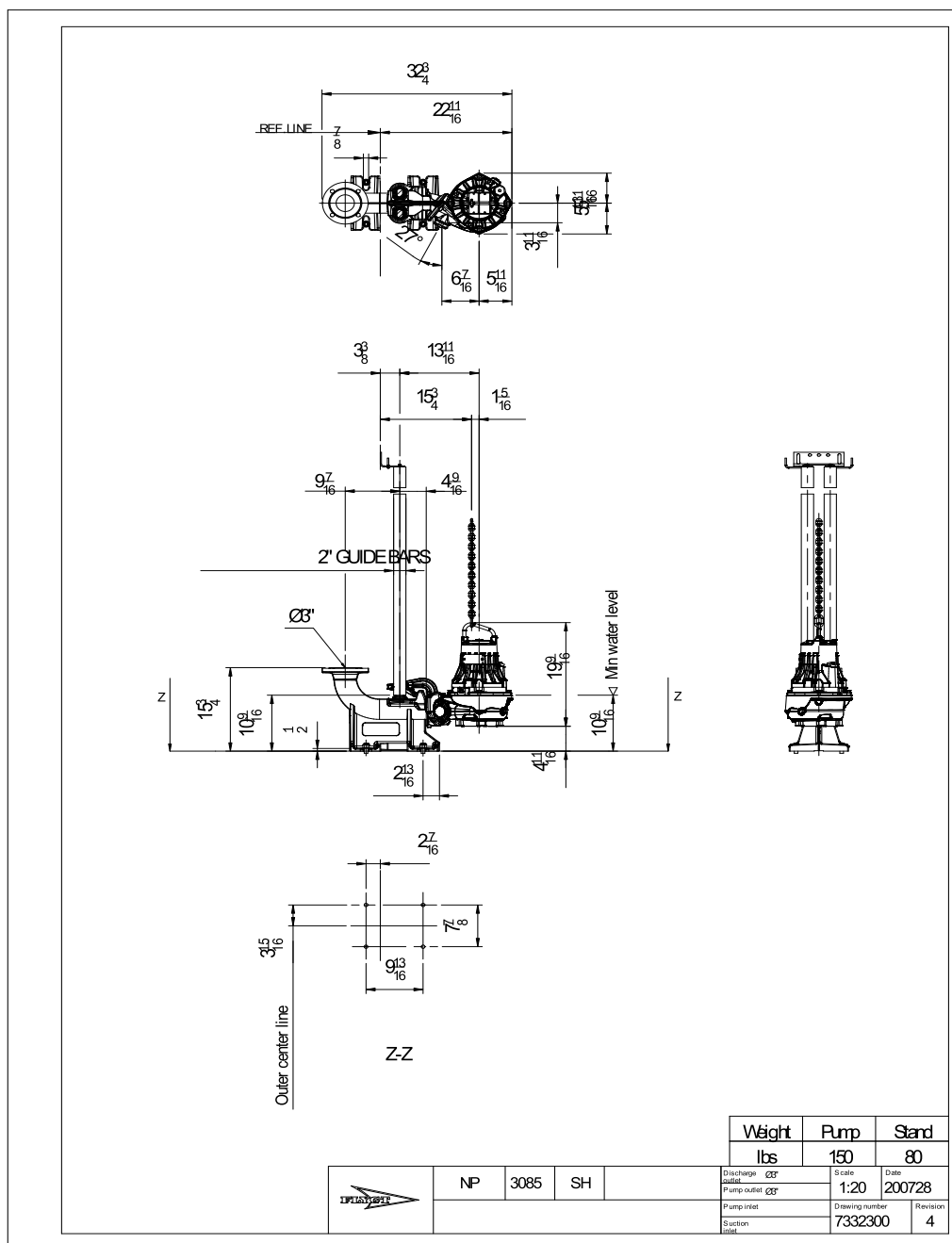
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Created on 1/27/2022

Last update

1/27/2022

NP 3085 SH 3~ Adaptive 255

Dimensional drawing



Project
Block

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Created on 1/27/2022 Last update 1/27/2022

NP 3102 SH 3~ Adaptive 256

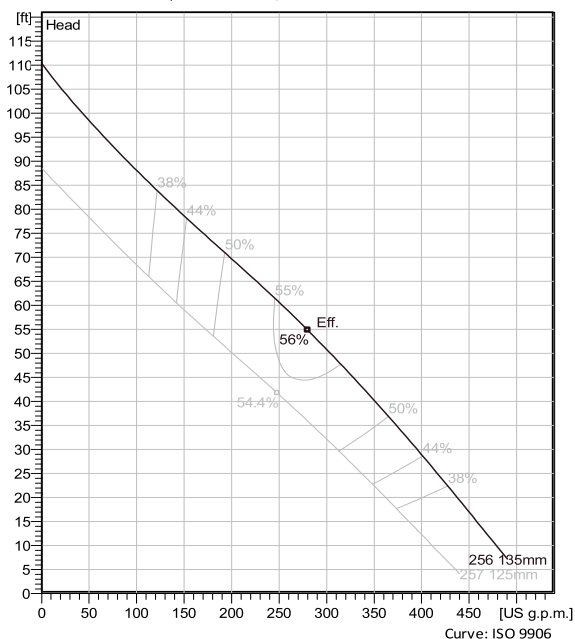
Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.



Technical specification



Curves according to: Water, pure Water, pure [100%], 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Configuration

Motor number N3102.930 18-10-2AS-W IE3 7.2hp	Installation type P - Semi permanent, Wet
Impeller diameter 135 mm	Discharge diameter 3 inch

Pump information

Impeller diameter 135 mm
Discharge diameter 3 inch
Inlet diameter 100 mm
Maximum operating speed 3600 rpm
Number of blades 2

Max. fluid temperature
40 °C

Materials

Impeller Hard-Iron™
Stator housing material Grey cast iron

Project	Created by Sydney Schumacher
Block	Created on 1/27/2022 Last update 1/27/2022

NP 3102 SH 3~ Adaptive 256

Technical specification



Motor - General

Motor number N3102.930 18-10-2AS-W IE3 7.2hp	Phases 3~	Rated speed 3600 rpm	Rated power 7.2 hp
ATEX approved FM	Number of poles 2	Rated current 17 A	Stator variant 66
Frequency 60 Hz	Rated voltage 230 V	Insulation class H	Type of Duty S1
Version code 930			

Motor - Technical

Power factor - 1/1 Load 0.87	Motor efficiency - 1/1 Load 89.8 %	Total moment of inertia 0.0107 kg m ²	Starts per hour max. 30
Power factor - 3/4 Load 0.83	Motor efficiency - 3/4 Load 90.0 %	Starting current, direct starting 144 A	
Power factor - 1/2 Load 0.74	Motor efficiency - 1/2 Load 88.0 %	Starting current, star-delta 48 A	

Project
Block

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NP 3102 SH 3~ Adaptive 256

Performance curve

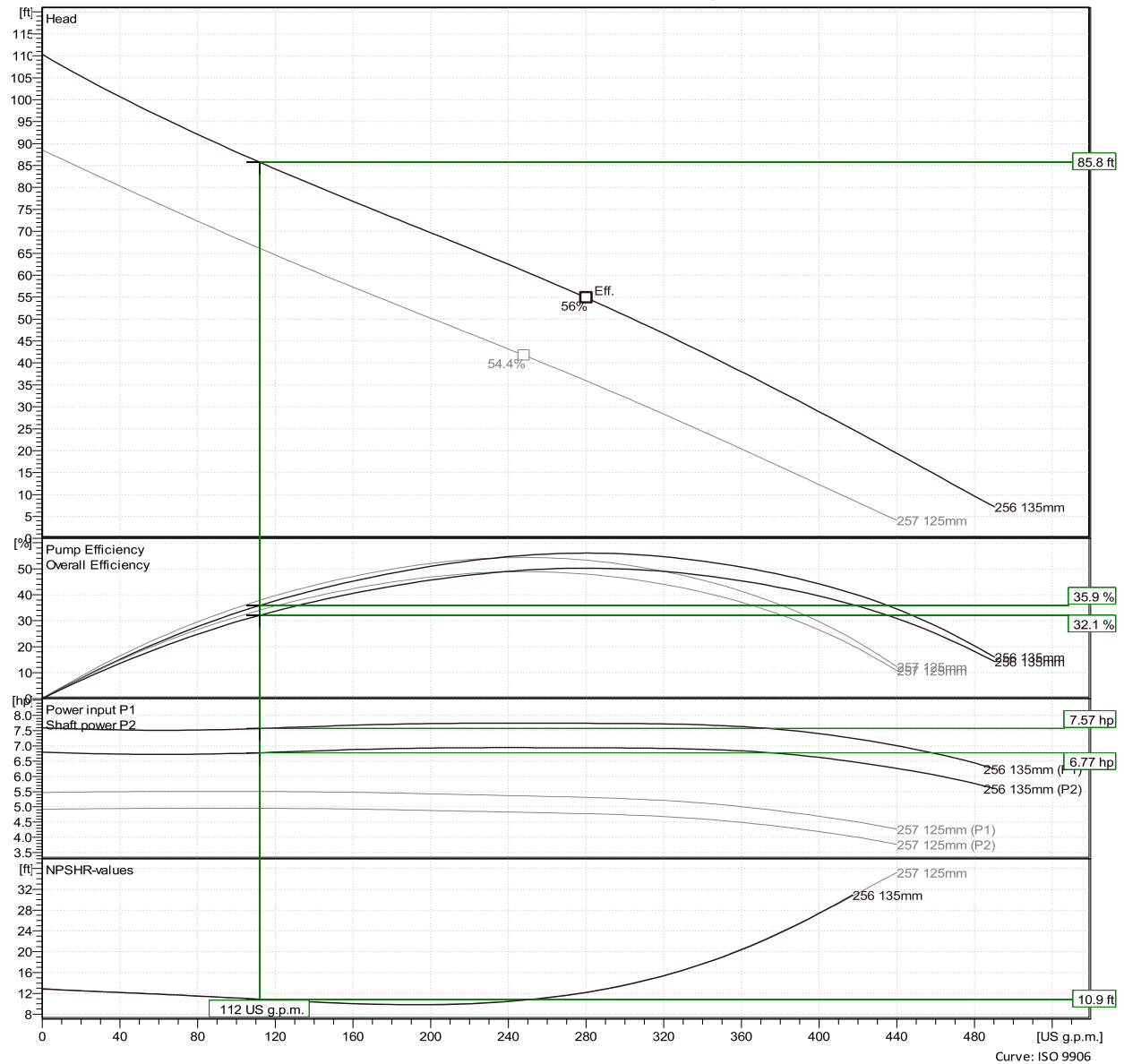


Duty point

Flow
112 US g.p.m.

Head
85.8 ft

Curves according to: Water, pure / Water, pure [100%], 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Project
Block

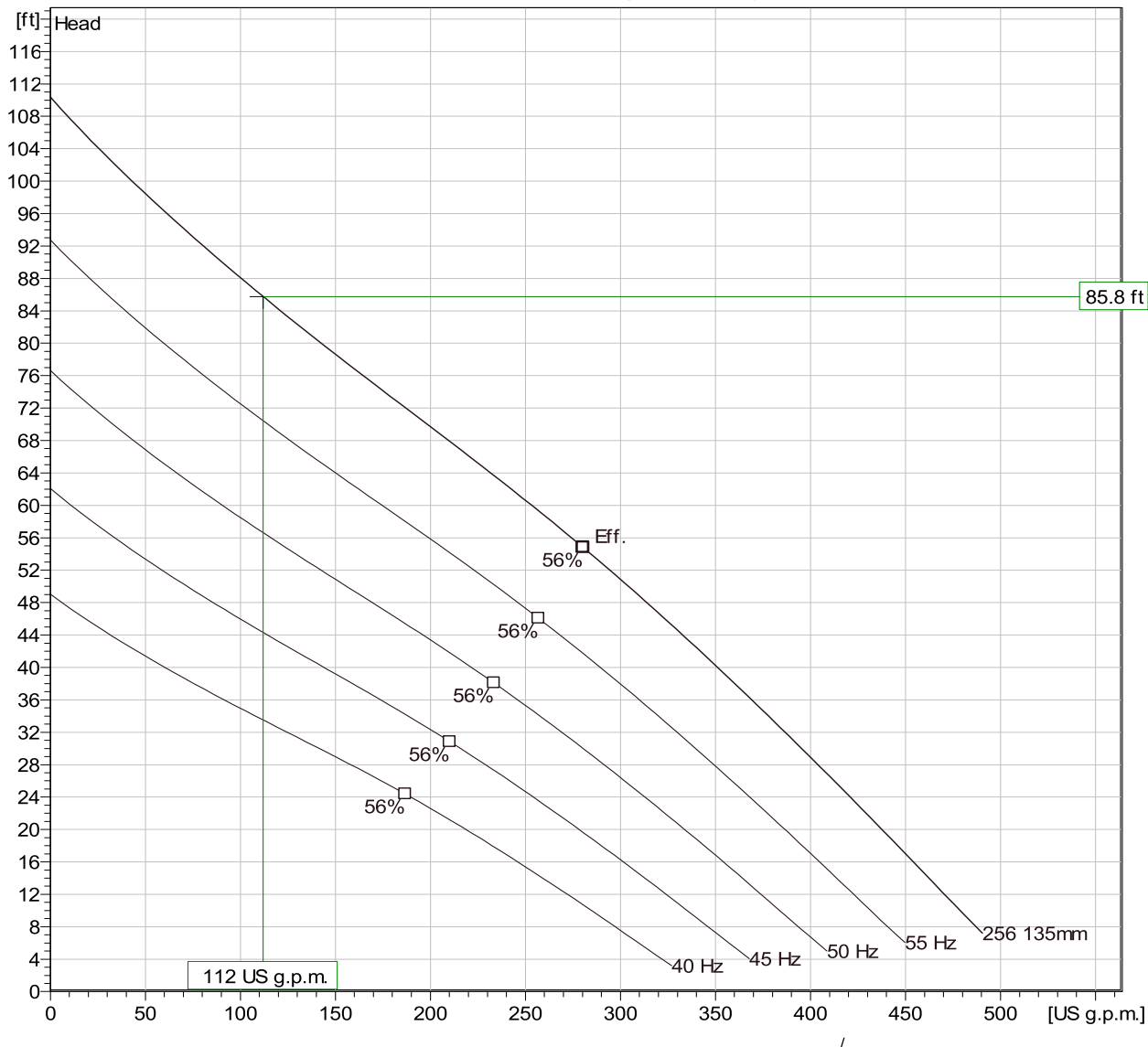
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Created on 1/27/2022 **Last update** 1/27/2022

NP 3102 SH 3~ Adaptive 256

Duty Analysis



Curves according to: Water, pure [100%] ; 39.2°F; 62.42lb/ft³; 1.6891E-5ft²/s



Operating characteristics

Pumps / Systems	Flow US g.p.m.	Head ft	Shaft power hp	Flow US g.p.m.	Head ft	Shaft power hp	Hydr.eff.	Spec. Energy kWh/US MG	NPSHre ft
1	112	85.8	6.77	112	85.8	6.77	35.9 %	840	10.9

Project
Block

Created by Sydney Schumacher
Created on 1/27/2022

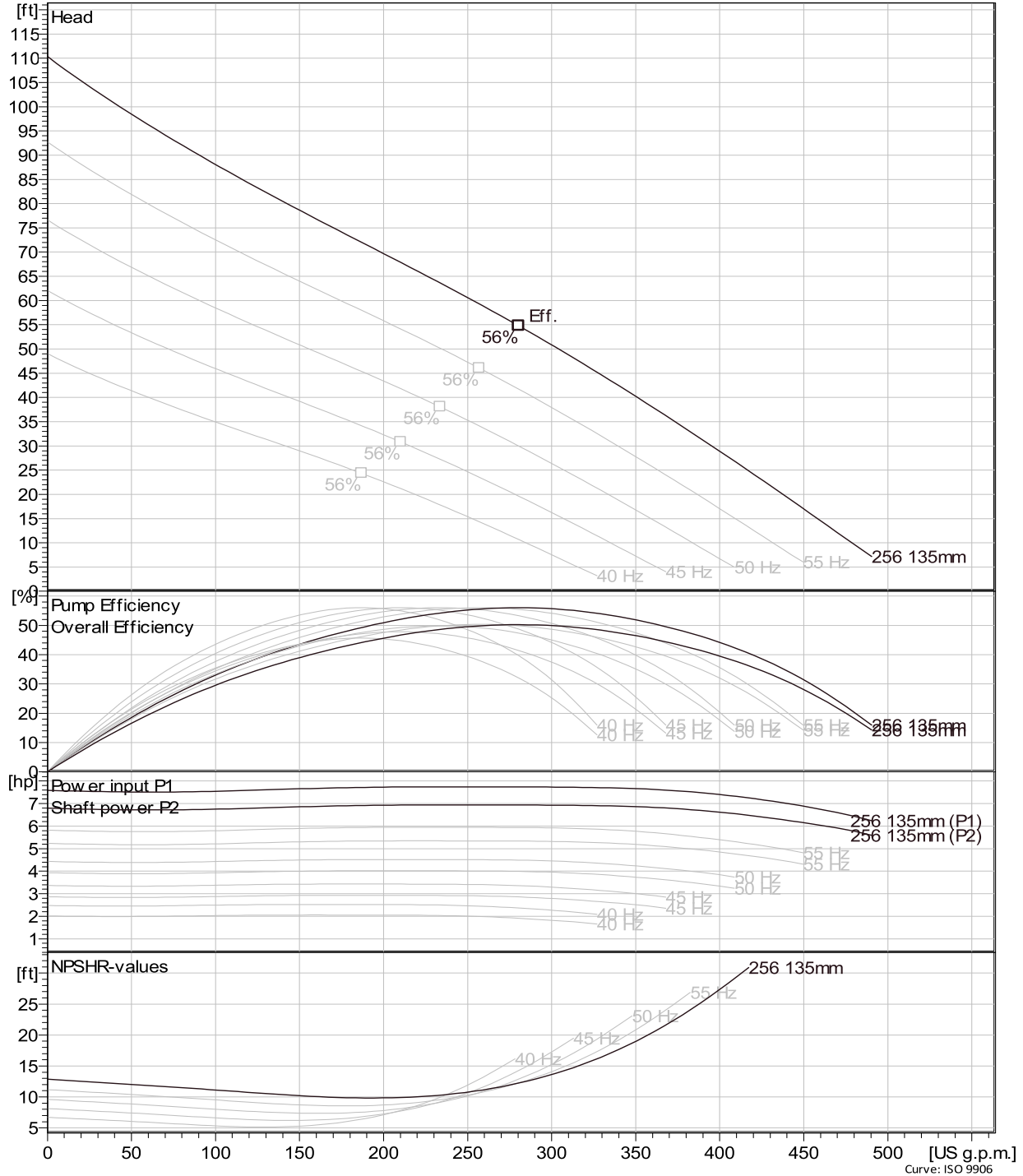
Last update 1/27/2022

NP 3102 SH 3~ Adaptive 256

VFD Curve



Curves according to: Water, pure, 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s

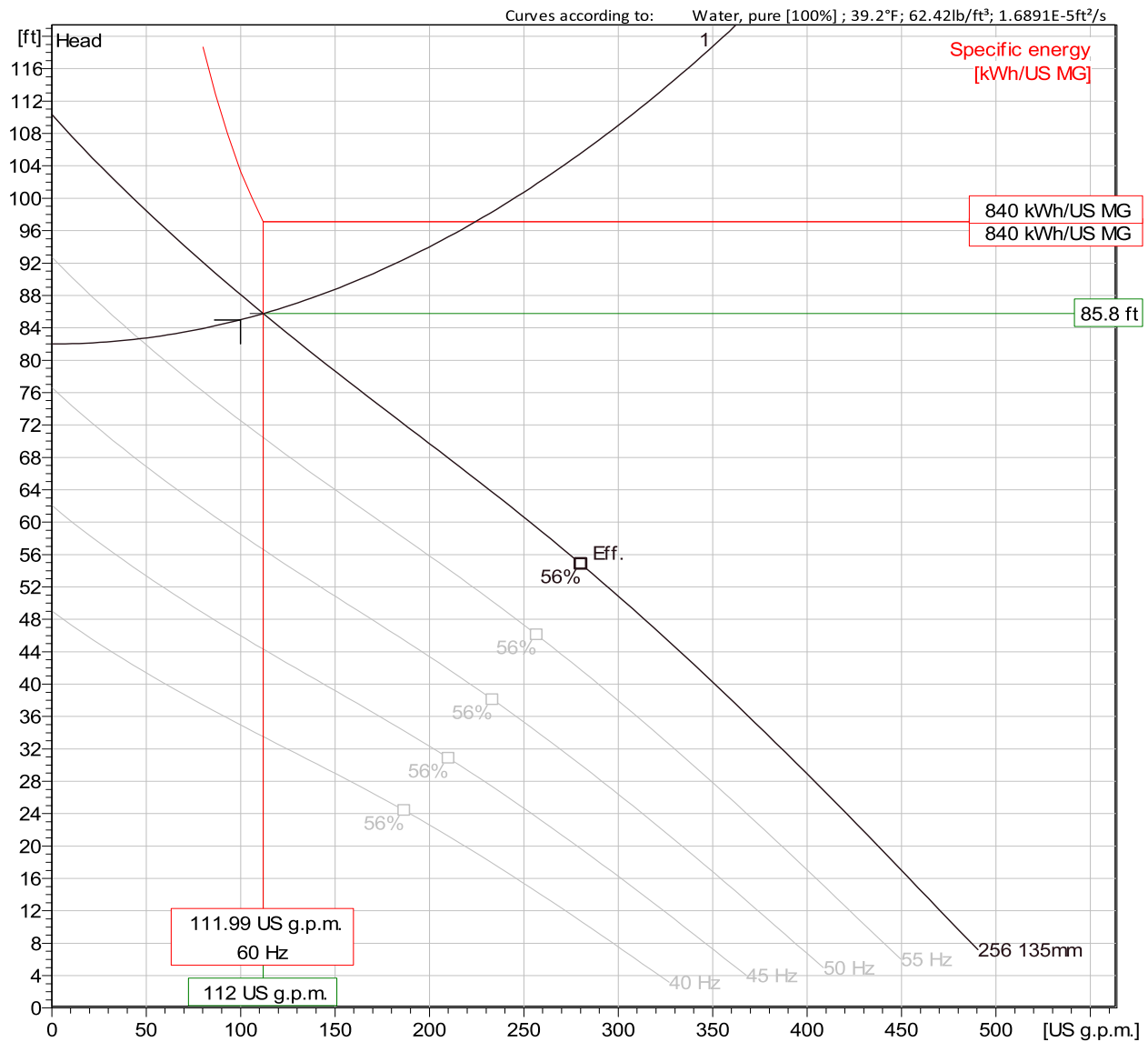


Project
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Created on 1/27/2022 Last update 1/27/2022

NP 3102 SH 3~ Adaptive 256

VFD Analysis



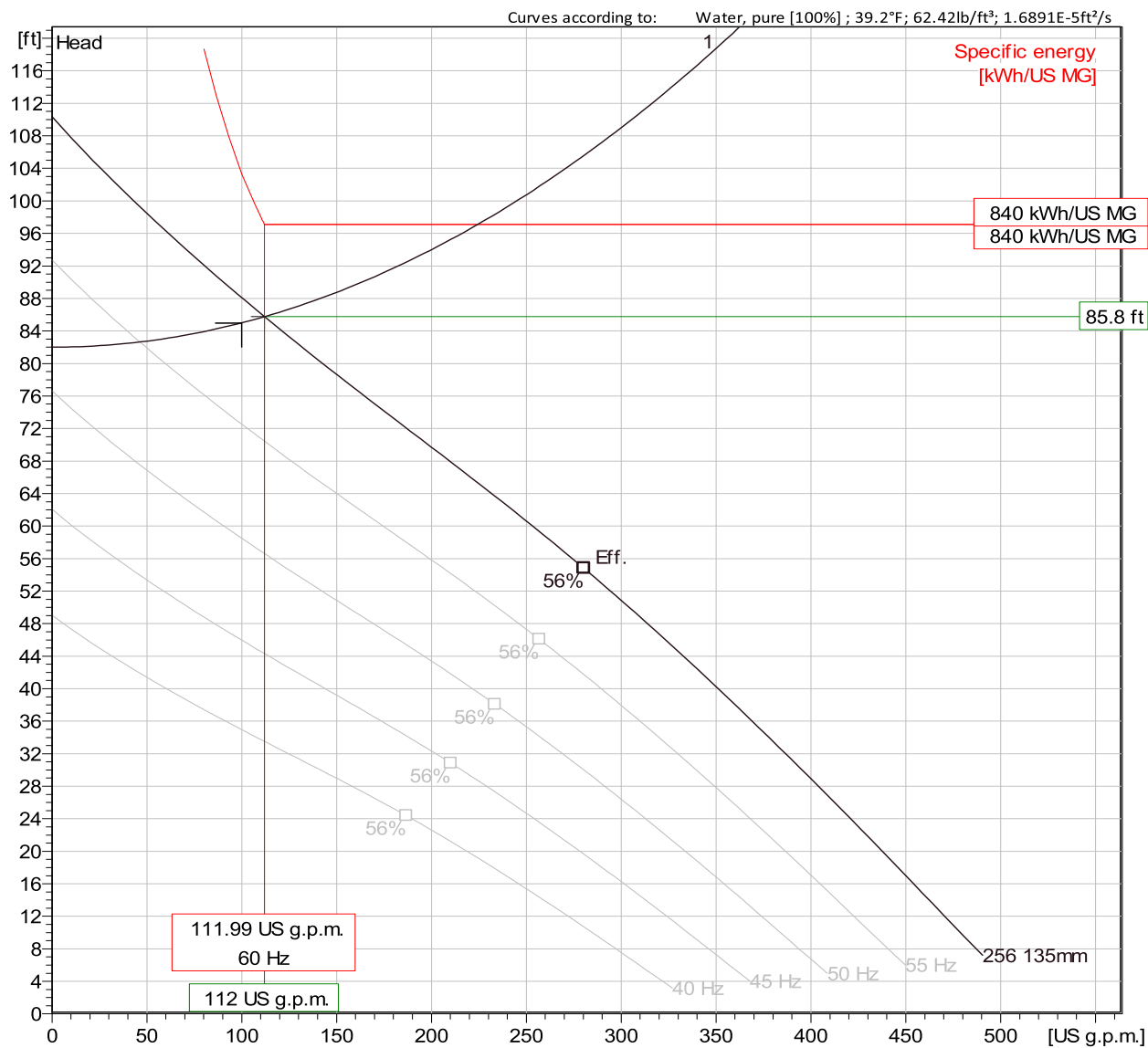
Operating Characteristics

[illegible]

Project	Created by	Sydney Schumacher		
Block	Created on	1/27/2022	Last update	1/27/2022

NP 3102 SH 3~ Adaptive 256

VFD Analysis



Operating Characteristics

Pumps / Systems	Frequency	Flow US g.p.m.	Head ft	Shaft power hp	Flow US g.p.m.	Head ft	Shaft power hp	Hydr. eff.	Specific energy kWh/US MG	NPSHre ft
1	40 Hz									

Project
Block

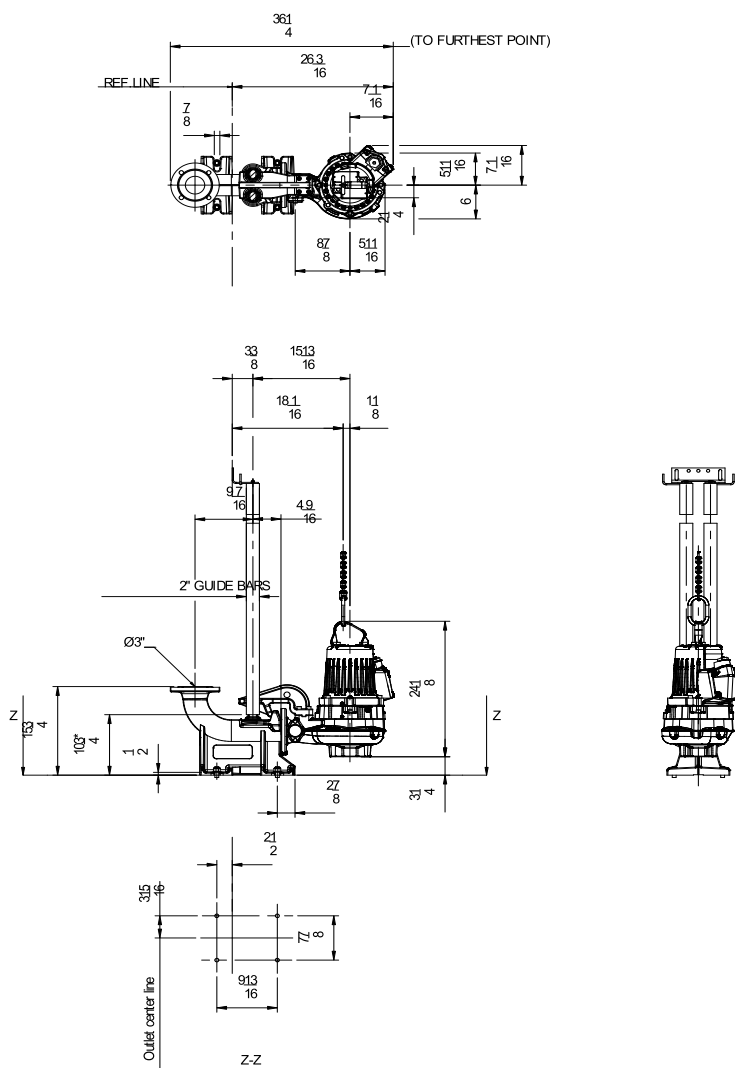
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Created on 1/27/2022

Last update

1/27/2022

NP 3102 SH 3~ Adaptive 256

Dimensional drawing



*DIMENSION TO ENDS OF GUIDE BARS



NP 3102 SH

Weight	Pump	Stand
lbs	235	80
Discharge outlet	3"	Scale
Pump outlet	3"	1:20
Pump inlet		Date
Suction inlet		191213
	Drawing number	Revision
	5385500	8

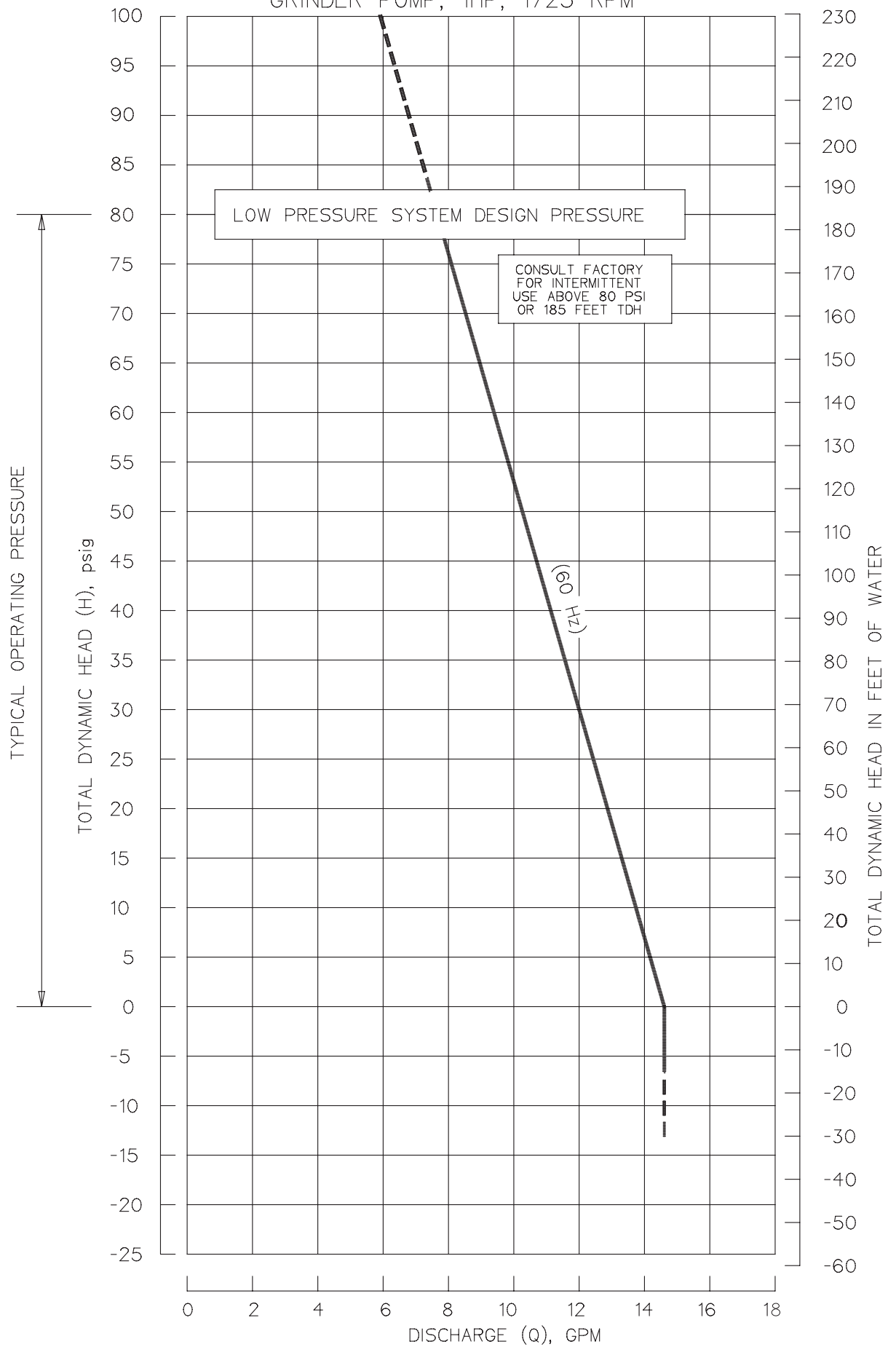
Project
Block

Created by Sydney Schumacher
Created on 1/27/2022 Last update 1/27/2022

E-One

PRELIMINARY E|ONE SPD PUMP PERFORMANCE CURVE

GRINDER PUMP, 1HP, 1725 RPM



Environment One Pump & Lateral Installation Example

E-One install Kit Options

DISCHARGE WHIP & COMPRESSION FITTINGS

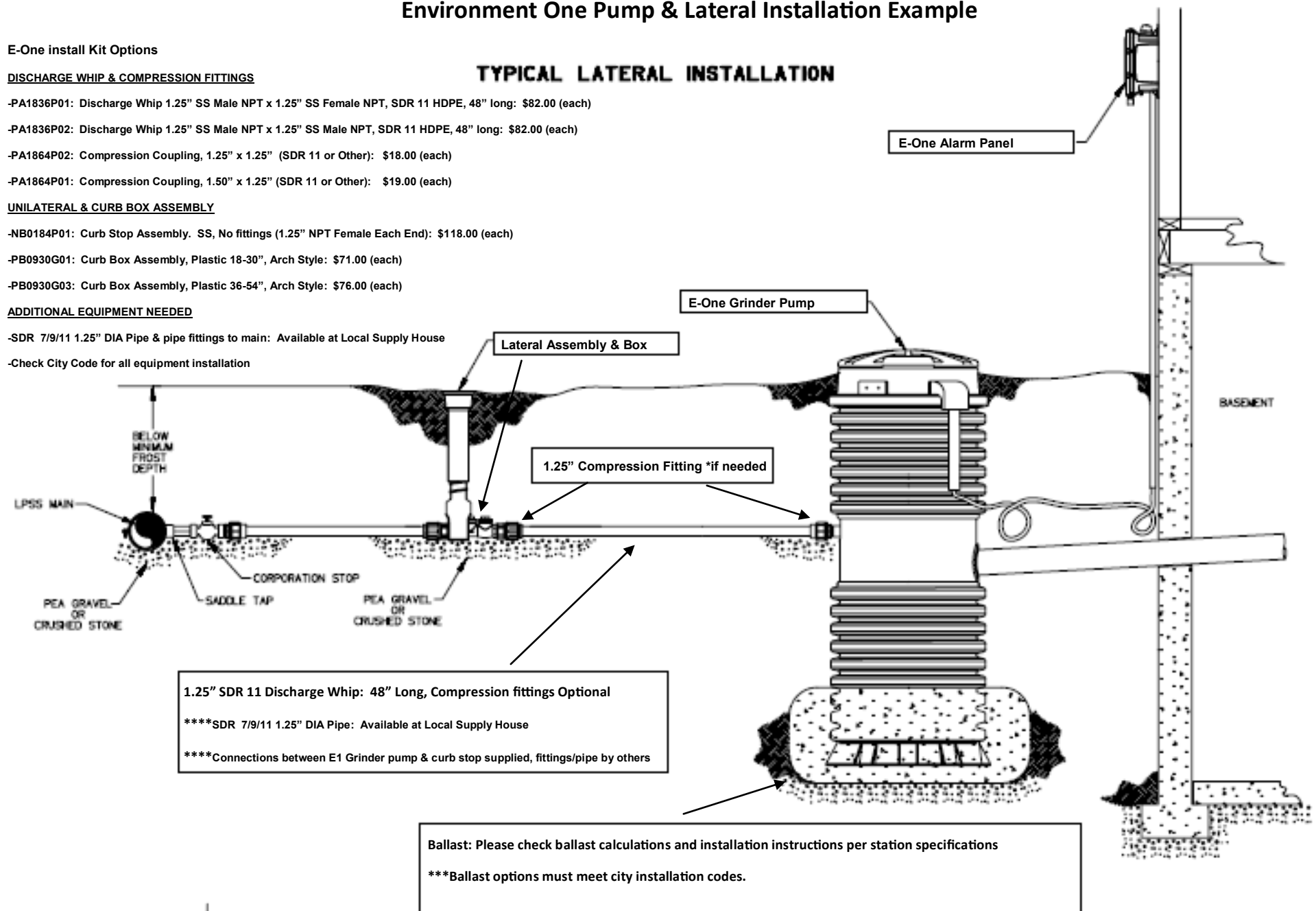
- PA1836P01: Discharge Whip 1.25" SS Male NPT x 1.25" SS Female NPT, SDR 11 HDPE, 48" long: \$82.00 (each)
- PA1836P02: Discharge Whip 1.25" SS Male NPT x 1.25" SS Male NPT, SDR 11 HDPE, 48" long: \$82.00 (each)
- PA1864P02: Compression Coupling, 1.25" x 1.25" (SDR 11 or Other): \$18.00 (each)
- PA1864P01: Compression Coupling, 1.50" x 1.25" (SDR 11 or Other): \$19.00 (each)

UNILATERAL & CURB BOX ASSEMBLY

- NB0184P01: Curb Stop Assembly, SS, No fittings (1.25" NPT Female Each End): \$118.00 (each)
- PB0930G01: Curb Box Assembly, Plastic 18-30", Arch Style: \$71.00 (each)
- PB0930G03: Curb Box Assembly, Plastic 36-54", Arch Style: \$76.00 (each)

ADDITIONAL EQUIPMENT NEEDED


- SDR 7/9/11 1.25" DIA Pipe & pipe fittings to main: Available at Local Supply House
- Check City Code for all equipment installation





**AGENDA
BILL
Item 9.A**

**General Manager's
Report**

DATE SUBMITTED:	July 6, 2022	MEETING DATE:	July 13, 2022
TO: BOARD OF COMMISSIONERS	FROM: Justin Clary, General Manager		
GENERAL MANAGER APPROVAL			
ATTACHED DOCUMENTS	1. General Manager's Report		
TYPE OF ACTION REQUESTED	RESOLUTION <input type="checkbox"/>	FORMAL ACTION/ MOTION <input type="checkbox"/>	INFORMATIONAL /OTHER <input checked="" type="checkbox"/>

BACKGROUND / EXPLANATION OF IMPACT

Updated information from the General Manager in advance of the Board meeting.

FISCAL IMPACT

None.

RECOMMENDED BOARD ACTION

None required.

PROPOSED MOTION

None.



LAKE WHATCOM WATER AND SEWER DISTRICT
General Manager's Report
Upcoming Dates & Announcements
Regular Meeting – Wednesday, July 13, 2022 – 6:30 p.m.

Important Upcoming Dates

Lake Whatcom Water & Sewer District			
Division 7 Reservoir Replacement Open House	Tues July 12, 2022	6:30 p.m.	Sudden Valley Community Assoc. Dance Barn
Regular Board Meeting	Wed July 27, 2022	8:00 a.m.	Remote Attendance
Employee Staff Meeting	Thu July 14, 2022	8:00 a.m.	Remote Attendance Commissioner Citron to attend
Investment Comm. Meeting	Wed Jul 27, 2022	10:00 a.m.	Remote Attendance
Safety Committee Meeting	Thu July 28, 2022	8:00 a.m.	Remote Attendance
Lake Whatcom Management Program			
Policy Group Meeting	Wed Sep 7, 2022	3:00 p.m.	Remote Attendance
Joint Councils Meeting	March 2023	TBD	TBD
Other Meetings			
WASWD Section III Meeting	Tue July 12, 2022	6:00 p.m.	Bob's Burgers, 8822 Quil Ceda Pkwy, Tulalip, WA
Whatcom Water Districts Caucus Meeting	Wed July 20, 2022	2:00 p.m.	Remote Attendance
Whatcom County Council of Governments Board Meeting	Wed Oct 12, 2022	3:00 p.m.	Remote Attendance

Committee Meeting Reports

Safety Committee:

- No committee meeting has been held since last board meeting.

Investment Committee:

- No committee meeting has been held since last board meeting.

Upcoming Board Meeting Topics

- General Facilities Charges rate analysis presentation
- Division 30 Booster/Sudden Valley Lift Station PLC Improvement task order authorization
- Glen Cove Water Association consolidation
- DISH Wireless proposed cell tower public hearing/resolution consideration

2022 Initiatives Status

Administration and Operations

Capital Improvement Project Financing Plan

- Develop a financial plan that proactively prepares the District for significant capital projects on the near-term horizon while maintaining Board-defined operational levels-of-service.
The board adopted an updated rate structure in 2021 and a review of general facilities charges is underway, both of which incorporate anticipated CIP costs over the next decade. Related efforts include meeting with Cathi Read of the state Department of Commerce's Small Communities Initiative to discuss funding strategies, application for a FEMA Hazard Mitigation Grant for the Sudden Valley WTP chlorine contact basin replacement; and ongoing dialogue with the city of Bellingham regarding financing the Post Point WWTP resource recovery project.

General Facilities Charges Review

- Conduct a review of District water and sewer general facilities (connection) charges (GFCs) to ensure appropriate fees are being assessed to new development.
Project kick-off presentation was provided during the April 27 meeting and a presentation on the analysis will be provided during the July 27 board meeting.

Records Management System Overhaul

- Complete transition of the District's current records management system to a more robust system that ensures compliance with statutory requirements and gains efficiencies in document management.
A District-consultant meeting was held on April 28. The next step is to develop a procurement plan for records management software.

Safety Program Update

- Continue systematic review and revision of District's safety programs by updating nine programs in 2022.
The safety committee has finalized updates to six programs (PPE, safety responsibilities, slips, trips and falls, heat-related illness, wildfire smoke, and respiratory protection) and is currently reviewing the back injury prevention program.

Capital Improvement Program Support

- Support the Engineering Department through management of specific capital improvement project(s).
The general manger is managing the Eagleridge Water Booster Station Conversion (District Project No. C2011) and Division 30 Reservoir Hazardous Tree Removal (District Project No. M2226) projects, and completed the Commissioner Boundary update (District Project No. A2116).

Emergency Response/System Security

Emergency Readiness

- Re-engage with Whatcom County Department of Emergency Management to hold tabletop emergency response exercises, as well as a field exercise (pandemic-dependent).
District held a tabletop exercise May 25 at the Whatcom County Division of Emergency Management facility—topic was cybersecurity awareness.
Whatcom Conservation District staff conducted facility audits (SVWTP, Division 30 reservoir, Beaver sewer lift station) on May 16 regarding wildfire resilience preparedness. Lessons learned will be applied to other District facilities.

Cybersecurity Assessment

- Hire an IT-service provider to perform a third-party assessment of the District's vulnerability to cybercriminal attack.
To be initiated.

Community/Public Relations

General

- Website
The District's web content is reviewed and updated on a regular basis.
- Social Media
Posts are made to District Facebook and LinkedIn pages regularly; Nextdoor is regularly monitored for District-related posts.
- Press Releases
Press releases were issued on March 2 (commissioner redistricting public hearing), March 21 (sewage overflow at North Point lift station), and June 29 (Commissioner McRoberts resignation).

Intergovernmental Relations

- *J Clary attended a Whatcom Water Alliance meeting on July 6.*
- *J Clary is scheduled to meet with Dan Pike, Sudden Valley Community Association general manager, on July 11.*
- *J Clary is scheduled to attend the Division 7 reservoir replacement project open house in Sudden Valley on July 12.*
- *J Clary scheduled to attend a Whatcom Water Alliance meeting on July 13.*
- *J Clary coordinated the agenda development for a joint District-city of Bellingham meeting to discuss the Post Point resource recovery project (July 20).*

Lake Whatcom Water Quality

Lake Whatcom Management Program

- Participate in meetings of Lake Whatcom Management Program partners.
J Clary scheduled to attend a Data Group meeting on July 14.

Onsite Septic System Conversion Program

- Pursue connection of the one remaining septic-served parcel located within 200 feet of District sewer system identified in the memorandum to the Board dated April 9, 2020.
To be initiated.