

City of Portsmouth  
Portsmouth, New Hampshire  
**Public Works Department**  
RFQ #15-13  
REQUEST FOR QUALIFICATIONS

ENGINEERING SERVICES  
PEASE WASTEWATER TREATMENT FACILITY EVALUATION

**INVITATION**

Sealed Statement of Qualifications (SOQ), plainly marked “RFQ #15-13, Pease Wastewater Treatment Facility Evaluation – Statement of Qualifications” on the outside of the mailing envelope, addressed to the Finance/Purchasing Department, City Hall, 1 Junkins Avenue, Portsmouth, NH 03801 will be accepted until **2:00 pm on December 13, 2012**. In a separate sealed envelope within the SOQ envelope, enclose a cost proposal for the proposed scope of work, plainly marked “RFQ #15-13, Pease Wastewater Treatment Facility Evaluation – Cost Proposal”.

The RFQ can be found on the City’s website at  
<http://www.cityofportsmouth.com/finance/purchasing.htm>.

**MANDATORY PRE-PROPOSAL MEETING**

There will be a **mandatory pre-proposal meeting on Tuesday, November 20, 2012** at 2:00 p.m. at the Pease WWTF on Corporate Drive. All firms will have an opportunity to ask questions at this meeting.

**FUNDING**

This effort will be funded by wastewater enterprise revenues.

**PROJECT BACKGROUND/PURPOSE**

The City of Portsmouth is a regional provider of wastewater collection and treatment services to the City of Portsmouth, Town of New Castle and portions of the Towns of Greenland and Rye. The City has two wastewater treatment facilities (WWTF), the 4.8 MGD wet weather Peirce Island WWTF and the 1.2 MGD Pease International Tradeport WWTF. The Peirce Island WWTF services downtown Portsmouth and the client communities. The Pease International Tradeport WWTF serves the collection system for the Pease International Tradeport.

The Pease International Tradeport area was at one time the Pease Air Force base. The Air Force base was repurposed for commercial and industrial use in the 1990’s. Parts of the original air force base were maintained and are still used by the NH Air National Guard. Zoning on Pease includes airport, airport industrial, industrial, business/industrial, natural resource protection and NH Air National Guard. There are number of large commercial/industrial facilities that contribute significant flow the WWTF including Lonza Biologics, Inc. and Craft Brew Alliance

(Redhook Ale Brewery). The overall make-up of wastewater flow is commercial/industrial in nature.

The Pease WWTF was originally constructed in the 1950's for the Pease Air Force Base. The WWTF was turned over to City ownership and for operation and maintenance through the authority of the Pease Development Authority in the 1990's. Since then the WWTF has been operated and maintained by the City. The collection system consists of approximately 11 miles of gravity sewer pipe. There is one pumping station within the collection system (Corporate Drive Pumping Station).

The original WWTF process included preliminary treatment (headworks including screening and aerated grit removal), raw sewage lift pumps, primary clarification, intermediate lift pumps, secondary trickling filters, secondary clarification, disinfection and discharge via an open pipe outfall to the Piscataqua River. The outfall is shared with the Town of Newington WWTF. Sludge management included primary and secondary digestion and sludge drying beds. The WWTF underwent a major upgrade in 1997. Improvements consisted of preliminary treatment headworks modifications including replacement of the bar screen with channel grinder and addition of a headworks superstructure; primary clarifier drive replacement and effluent launder covers; decommissioning of the trickling filters and construction of new sequencing batch reactors for secondary treatment; conversion of the secondary clarifiers to equalization basins; and conversion of one anaerobic digestion tank to a sludge storage tank. This upgrade also included the addition of a new laboratory/administration building, standby generator, gravity belt press for sludge dewatering and other miscellaneous improvements. The outfall was upgraded in 2000 with the addition of multiport diffusers. A septage receiving station including receiving equipment, and storage tanks were added in 2005.

The current WWTF process stream consists of preliminary treatment (headworks including screening and aerated grit removal), raw sewage lift pumps, primary clarification, intermediate lift pumps, secondary treatment and clarification with sequencing batch reactors, equalization, disinfection with chlorine, dechlorination and discharge via the multi-port diffuser outfall to the Piscataqua River. Ammonium hydroxide is added to the secondary effluent prior to chlorination as a temporary measure to resolve disinfection interferences. Sludge management includes sludge storage, dewatering by belt filter press and disposal at the Turnkey landfill in Rochester, New Hampshire. The WWTF was designed to handle an average day flow of 1.2 MGD, maximum day flow of 3.345 MGD and peak flow of 4.0 MGD. Design loadings were as follows: average day loads of 2,907 lb/d for BOD<sub>5</sub>, 2,907 lb/d for TSS, and 364 lb/d for TKN and maximum day loads of 5,467 lb/d for BOD<sub>5</sub>, 5,467 lb/d for TSS, and 829 lb/d for TKN. See attached process flow diagram, process design data and mass balance. Note the process design data and mass balance were completed prior to the septage upgrade.

Most of the major components of the original WWTF have been upgraded. However, there remain a number of original systems and components that remain and are in need of repair or replacement. Some systems and equipment upgraded in 1997 have exceeded their useful lifespan and are in need of repair or replacement. As part of this study, systems and equipment in need of repair or replacement will be identified and an estimate of cost developed for use in capital expense planning.

The Pease WWTF NPDES permit expired in 2005. The WWTF continues to operate under the conditions of the 2005 permit until a new permit is issued. The proposed permit limits are not known, but may include nutrient removal.

The City began an extensive Wastewater Master Plan (WWMP) process in 2008 in response to a Consent Decree by the US Environmental Protection Agency. As part of the WWMP process, a number of alternative collection and treatment layout concepts were developed. Many of these scenarios included improvements at Peirce Island and at the Pease WWTF. A number of developments since the submittal of the Final Supplement to the Draft Wastewater Master Plan/Long Term Control Plan have made it necessary to reconsider potential flow and load scenarios at the Pease WWTF. As part of this study, the selected consultant will be asked to consider different flow and load scenarios for the Pease WWTF at the direction of the City. The study will require consideration for different treatment levels for nitrogen including a potential permit level for monthly average total nitrogen removal to less than 8 milligrams per liter (mg/L) and 3 mg/L.

In addition, there are existing clients within the Pease International Tradeport that have requested increased flow and load capacity to meet changes in manufacturing requirements. The selected consultant will be asked to consider these requested flows and load scenarios in the study. A piloting firm will be procured under separate contract with the City to perform treatability studies related to the proposed request(s). The selected firm is expected to work with the piloting firm to develop necessary upgrades to be able to treat current and future loads.

The goals of this project include, but are not limited to, the following:

- Complete a detailed review of the existing structures, equipment, processes and systems
- Perform an engineering analysis of the existing structures, equipment, processes and systems regarding their condition, efficiency, energy use, sustainability, and capacity to meet current and proposed treatment conditions
- Perform flow and load scenarios based on buildout projections, flow shedding scenarios and client requests for capacity
- Develop a long term capital improvement plan for the Pease WWTF
- Provide the City with a comprehensive planning document to use for its capital planning needs

#### **SCOPE OF WORK**

The City anticipates the scope of work will be comprehensive and include all tasks necessary to provide a long term capital improvement plan that can be used for planning purposes. The scope of work is anticipated to include, but not be limited to, the following:

1. **Data Gathering and Review:** The selected consultant will request historical information necessary to understand the historical progression of improvements and the current condition of the WWTF. If available, requested information will be provided by the City. If information deemed necessary cannot be provided by the City, the consultant will obtain information from site visits or through survey(s), inspections, or other means acceptable to the City. This work will include a condition assessment of the existing

facilities, equipment and ancillary systems. The City will facilitate data collection from clients and the Pease Development Authority as necessary.

2. **Engineering Analyses:** Engineering analyses should include evaluations necessary for development of the improvement plan. The City and the consultant will collectively select the flow and load alternative scenarios to be evaluated. All evaluations will be performed for total nitrogen treatment levels to less than 8 mg/L and 3 mg/L. Consultant will be required to develop flow and loads associated with the selected scenarios. In addition to the flow and load scenarios, it is anticipated evaluations will include a condition assessment of facilities, equipment, processes, and all supporting systems and unit process evaluation. City and consultant will selected a single scenario for which the unit process analyses will be performed.
3. **Report Development:** Recommended improvements will be summarized in a concise report. The report should include a prioritized list of recommended improvement projects, associated cost estimates, and implementation schedule. All cost estimates shall be total project costs at a planning level accuracy with construction cost, engineering and construction contingencies clearly broken down and with reference to the correct ENR cost index at the time of estimate development. At a minimum, a draft report will be submitted for the City's review and comment. The final report will incorporate or address all City comments.
4. **Project Meetings:** The selected consultant will support their efforts through meeting with City staff and other stakeholders as necessary. At a minimum, the following meetings should be included in the scope of work: project kickoff meeting; data gathering site visit; technical work sessions (2); draft report presentation to DPW staff; draft report presentation to City Council; and final report presentation.

The final scope of work will be negotiated with the selected consultant prior to execution of a contract.

**AVAILABLE INFORMATION**

The following information will be made available to the consultant(s) for the purpose of developing the Statement of Qualifications (SOQ):

- Drawings entitled "Pease Development Authority, Pease International Tradeport, Portsmouth, NH, Record Drawings, Wastewater Treatment Plant Improvement Program", Underwood Engineers, Inc., Portsmouth, NH, November 20, 1997
- Selected drawings from plan set entitled "City of Portsmouth, New Hampshire, Record Drawings, Portsmouth Wastewater Facilities Upgrade", Underwood Engineers, Inc., Portsmouth, NH, November 25, 2005

**ENGAGEMENT OF THE ENGINEER****A. Required Contents of the Statement of Qualifications (SOQ)**

A sealed SOQ, plainly marked “RFQ #15-13, Pease Wastewater Treatment Facility Evaluation – Statement of Qualifications” on the outside of the envelope, addressed to the Finance/Purchasing Department, City Hall, 1 Junkins Avenue, Portsmouth, NH 03801 will be accepted until 2:00 pm on December 13, 2012. Five (5) copies of the SOQ shall be submitted and include the following information:

1. Firm (team) Experience (for each firm in the team):

Describe relevant experience in each of the following primary areas of focus:

- a. Familiarity with the City of Portsmouth Wastewater Division’s design and operations
- b. Flow and load projections
- b. WWTF assessments
- d. WWTF long-range planning and operational efficiency assessments

The firm’s experience shall be summarized in a matrix format. In addition, detailed project descriptions of no more than five reference projects containing the majority of the focus areas listed above shall be included. The project descriptions shall be current and limited to a maximum of one full page per project, along with client references and up-to-date contact information (name, title, organization, phone, cell and email).

2. Project Team:

List each member of the proposed Project Team along with their:

- a. Firm affiliation
- b. Area of specialty
- c. Office location
- d. Total years of experience
- e. Years with current firm
- f. Specific involvement/role in projects used as references

One member of the Project Team must be assigned as the Project Manager who will act as the primary client contact and be involved in day to day management of the Project. All resumes shall be included and limited to a maximum of two pages per team member.

3. Project Understanding and Approach Level of Effort:

Provide a project understanding and project approach. The approach should include a detailed list of anticipated tasks required to complete the project.

4. Man-Hour Level of Effort:

Provide a proposed man-hour level of effort in table format coordinated with the anticipated list of tasks to complete the work. The man-hour level of effort shall be comprehensive and inclusive of the total man-hours to complete the project. Do not include any fee associated with the level of effort in the Statement of Qualifications.

In a separate sealed envelope within the SOQ envelope, enclose a cost proposal for the proposed scope of work, plainly marked “RFQ #15-13, Pease Wastewater Treatment Facility Evaluation – Cost Proposal”.

**B. Ranking of Qualifications**

Each SOQ will be reviewed and ranked according to the following criteria:

- |   |                      |
|---|----------------------|
| a. Firm’s experience successfully completing similar projects and individual Project Team member experience | Maximum of 30 points |
| b. References indicating successful projects of this type   | Maximum of 20 points |
| c. Understanding and approach to project  | Maximum of 40 points |
| d. Quality of SOQ package   | Maximum of 10 points |

**SCHEDULE**

The project is anticipated to start in January 2012 with the initial analysis to take place during the first six months of the project and a final report due within three months after. Final schedule will vary based on the negotiated scope and work tasks.

**CITY ROLE**

City staff will be responsible for administering the project. Representatives of the City’s Public Works Department will provide input and assistance with any necessary field work and review all deliverables from the effort. The primary contact at the City will be Terry Desmarais, City Engineer Water and Sewer Divisions and he can be reached by phone at (603) 766-1421 or by email at [tldesmarais@cityofportsmouth.com](mailto:tldesmarais@cityofportsmouth.com).

**SELECTION AND CONTRACT DOCUMENT**

Upon review of all responsive SOQs using the criteria outlined above, the City may select up to three (3) firms to interview. Following interviews, the Cost Proposal of the highest ranking firm will be opened and reviewed. The highest ranking firm will be invited to negotiate a final Scope of Services and fee with the City. When the contract is executed by both parties, the Consultant will be instructed to commence providing the work outlined in the contract. All information, data, documents, photos, computer records, and other materials of any kind acquired or developed by the consultant pursuant to this project shall be the property of the City of Portsmouth. If the City is unable to reach agreement with the highest ranking firm, the City may enter into negotiations with the next highest ranking firm. The City reserves the right to negotiate directly with the firm(s) selected for additional project work.

**RESERVATION OF RIGHTS**

The City reserves the right to undertake such investigation as it deems necessary to evaluate the qualifications of the firm and to evaluate the qualifications submitted. Firms may be requested to

execute releases for information. Failure to provide a release upon request will result in disqualification.

The City of Portsmouth reserves the right to negotiate additional work including, but not limited to, preliminary design, final design and construction engineering services.

The City of Portsmouth reserves the right to reject any or all proposals, to waive technical or legal deficiencies, and to accept any proposal that it may deem to be in the best interest of the City and to negotiate the terms and conditions of any proposal leading to execution of a contract.

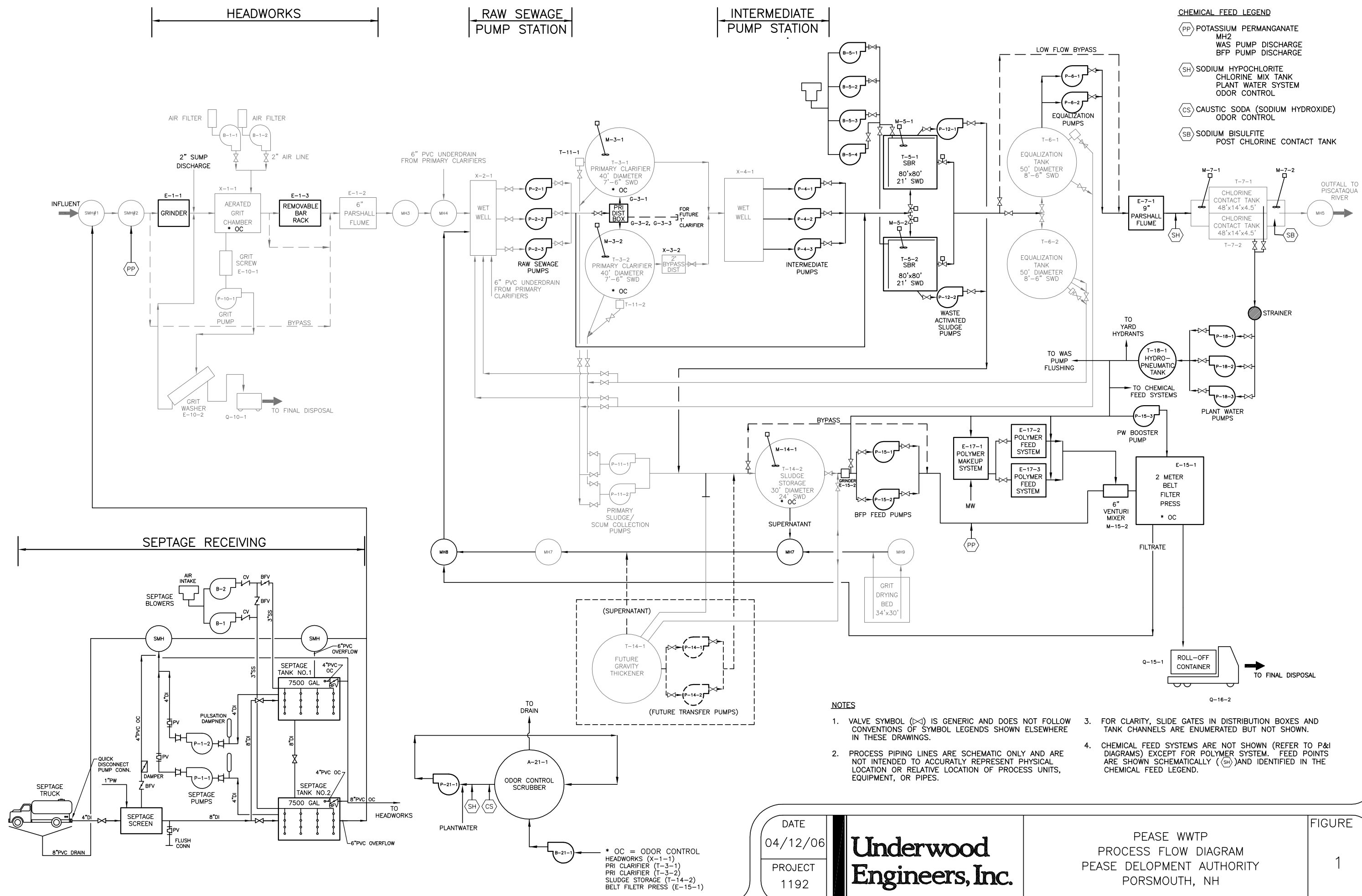
#### **ADDITIONAL INFORMATION**

Requests for additional information should be directed to Terry Desmarais, City Engineer at (603) 766-1421 or Peter Rice at (603) 766-1416. All questions shall be submitted by 4:30 PM on Friday, December 7, 2012. Addenda to this request for qualifications, if any, including written answers to questions, will be posted on the City of Portsmouth website at the City's web site at <http://www.cityofportsmouth.com/finance/purchasing.htm> under the project heading. Addenda and updates will NOT be sent directly to firms. Firms submitting qualifications should check the web site daily for addenda and updates after the release date. Firms should print out, sign and return addenda with the proposal. Failure to do so may result in disqualification.

#### **INDEMNIFICATION AND INSURANCE REQUIREMENTS**

The Contract will require the Consultant to agree to pay on behalf of and hold harmless the City of Portsmouth for all claims arising in whole or in part from its work on behalf of the City. Consultant will be required to maintain insurance in such form as will protect the Consultant from claims and liabilities for damages for bodily injury, including accidental death, and for property damage, which may arise from operations under this contract. Consultant shall also be required to maintain professional liability insurance. Amounts and coverage shall be subject to contract negotiations

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**CHEMICAL FEED LEGEND**

- ⬡ POTASSIUM PERMANGANATE
- MH2 WAS PUMP DISCHARGE
- BFP PUMP DISCHARGE
- ⬢ SODIUM HYPOCHLORITE
- ⬢ CHLORINE MIX TANK
- ⬢ PLANT WATER SYSTEM
- ⬢ ODOR CONTROL
- ⬢ CAUSTIC SODA (SODIUM HYDROXIDE)
- ⬢ ODOR CONTROL
- ⬢ SODIUM BISULFITE
- ⬢ POST CHLORINE CONTACT TANK

- NOTES**
1. VALVE SYMBOL (⊗) IS GENERIC AND DOES NOT FOLLOW CONVENTIONS OF SYMBOL LEGENDS SHOWN ELSEWHERE IN THESE DRAWINGS.
  2. PROCESS PIPING LINES ARE SCHEMATIC ONLY AND ARE NOT INTENDED TO ACCURATELY REPRESENT PHYSICAL LOCATION OR RELATIVE LOCATION OF PROCESS UNITS, EQUIPMENT, OR PIPES.
  3. FOR CLARITY, SLIDE GATES IN DISTRIBUTION BOXES AND TANK CHANNELS ARE ENUMERATED BUT NOT SHOWN.
  4. CHEMICAL FEED SYSTEMS ARE NOT SHOWN (REFER TO P&I DIAGRAMS) EXCEPT FOR POLYMER SYSTEM. FEED POINTS ARE SHOWN SCHEMATICALLY (⬢) AND IDENTIFIED IN THE CHEMICAL FEED LEGEND.

DATE 04/12/06	<b>Underwood Engineers, Inc.</b>	FIGURE 1
PROJECT 1192		PEASE WWTW PROCESS FLOW DIAGRAM PEASE DEVELOPMENT AUTHORITY PORSMOUTH, NH

\* OC = ODOR CONTROL  
 HEADWORKS (X-1-1)  
 PRI CLARIFIER (T-3-1)  
 PRI CLARIFIER (T-3-2)  
 SLUDGE STORAGE (T-14-2)  
 BELT FILTER PRESS (E-15-1)



**DESIGN DATA SUMMARY**

<b>Flow</b>		
Average Daily Flow	1.2 MGD	
Maximum Daily Flow	3.345 MGD	
Peak Flow	4.0 MGD	
<b>Loadings</b>		
BOD5	ADF	MDF
TSS	2,907 LB/D	5,467 LB/D
TKN	2,907 LB/D	5,467 LB/D
	364 LB/D	829 LB/D

**PRELIMINARY TREATMENT**

<b>Grinder</b>	
Number in Service	1
Horsepower	3 Hp
<b>Grit Collection</b>	
Number in Service	1
Size	10' x 10' x 8'
Blower HP	2 Hp
Type	Aerated
<b>Grit Pump</b>	
Number in Service	1
Horsepower	5 Hp
Type	Centrifugal
<b>Grit Classifier</b>	
Number in Service	1
Capacity	40 gpm
Horsepower	1 Hp
Type	9" diameter screw conveyor
<b>Flow Measurement</b>	
Type	Parshall flume
Size	6" throat
Capacity	0.0009 - 3.980 MGD
Level Instrumentation	Ultrasonic
<b>Raw Sewage Pumps</b>	
Number in Service	2
Number in Standby	1
Capacity - Batch	1100 GPM
Horsepower	15 Hp
Speed	Variable
Type	Centrifugal

**PRIMARY TREATMENT**

<b>Primary Clarifiers</b>	
Number in Service	2
Number in Standby	-
Size	40'Dia x 7'-10" SWD
Detention Time @ ADF	2.8 Hrs
Overflow Rate @ ADF	488 gpd/sf
Type	Column Supported
<b>Primary Sludge Pumps</b>	
Number in Service	2
Horsepower	5 Hp
Speed	1750 rpm
Type	Plunger
<b>Intermediate Pumps</b>	
Number in Service	2
Number in Standby	1
Capacity	1300 GPM @ 27 feet
Horsepower	20 Hp
Speed	1050 rpm
Type	Centrifugal

**SECONDARY TREATMENT**

<b>Sequencing Batch Reactors Tanks</b>	
Number in Service	2
Volume - Total	2.01 MG
Sidewater Depth @ LWL	14 Feet
Sidewater Depth @ HWL	21.1 Feet
Detention Time @ ADF	27 Hours
MLSS @ LWL	4,000 mg/L
F/M	0.058 days-1
<b>Inlet Valves</b>	
Number in Service	2
Type	Motor Operated Plug
Size	12"
<b>Mixer</b>	
Number in Service	2
Horsepower	30 Hp
<b>Aeration Equipment</b>	
Type	Membrane Tube Diffusers
SOR @ ADF	8570 lbs/day
Alfa F	0.6
Beta	0.95
Min Operating DO	2.0 mg/L
Number	(18) 50 tube rack

<b>Blowers</b>	
Number in Service	3
Number on Standby	1
Capacity - Each	1020 ICFM
Horsepower	75 Hp
<b>Decanter</b>	
Number in Service	2
Size	10 Feet Diameter
<b>Decant Valve</b>	
Number in Service	2
Type	Motor Operated Butterfly
Size	18"
<b>WAS Pumps</b>	
Number in Service	2
Capacity - Each	135 GPM
Horsepower	7-1/2 Hp
Speed	1750 rpm
Type	Double Disc
<b>Equalization Tanks</b>	
Number in Service	2
Size	50'Dia x 8'6" SWD
Volume - Total	250,000 gals
<b>Equalization Pumps</b>	
Number in Service	2
Capacity - Each	2150 gpm
Horsepower	14 Hp
Type	Submersible Centrifugal

**DISINFECTION**

<b>Chlorine Contact Basin</b>	
Number in Service	2
Volume - Each	25,245 gals
Sidewater Depth	4'-6"
Detention Time @ EQ	22 mins.
<b>Chlorine and Bisulfite Mixers</b>	
Number in Service	1 each
Horsepower	1.0 Hp
Type	Top Mounted
<b>Chlorine Storage Tanks</b>	
Chemical	Sodium Hypochlorite
Number of Tanks	1
Tank Material	XLPE -Black
Volume	6,200 gals
<b>Chlorine Feed Pumps</b>	
Number in Service	2
Number on Standby	1
Capacity - Each	0 - 13 gph
Speed	Variable
Type	Diaphragm
<b>Dechlorination Storage Tank</b>	
Chemical	Sodium Bisulfite
Number of Tank	1
Tank Material	XLPE
Volume - Each	1500 gals.
<b>Dechlorination Feed Pumps</b>	
Number in Service	2
Number on Standby	1
Capacity	0 - 5.0 gph
Speed	Variable
Type	Diaphragm
<b>Effluent Flow Measurement</b>	
Type	Parshall Flume
Size	9" Throat
Capacity	0.060-05.7 MGD
Instrumentation	Ultrasonic
<b>Plant Water Pumps</b>	
Number in Service	3
Number on Standby	-
Capacity - Total	300 gpm
Pressure	100 PSI
Horsepower - Each	10, 15, 15 Hp
Type	Vertical

**SOLIDS HANDLING**

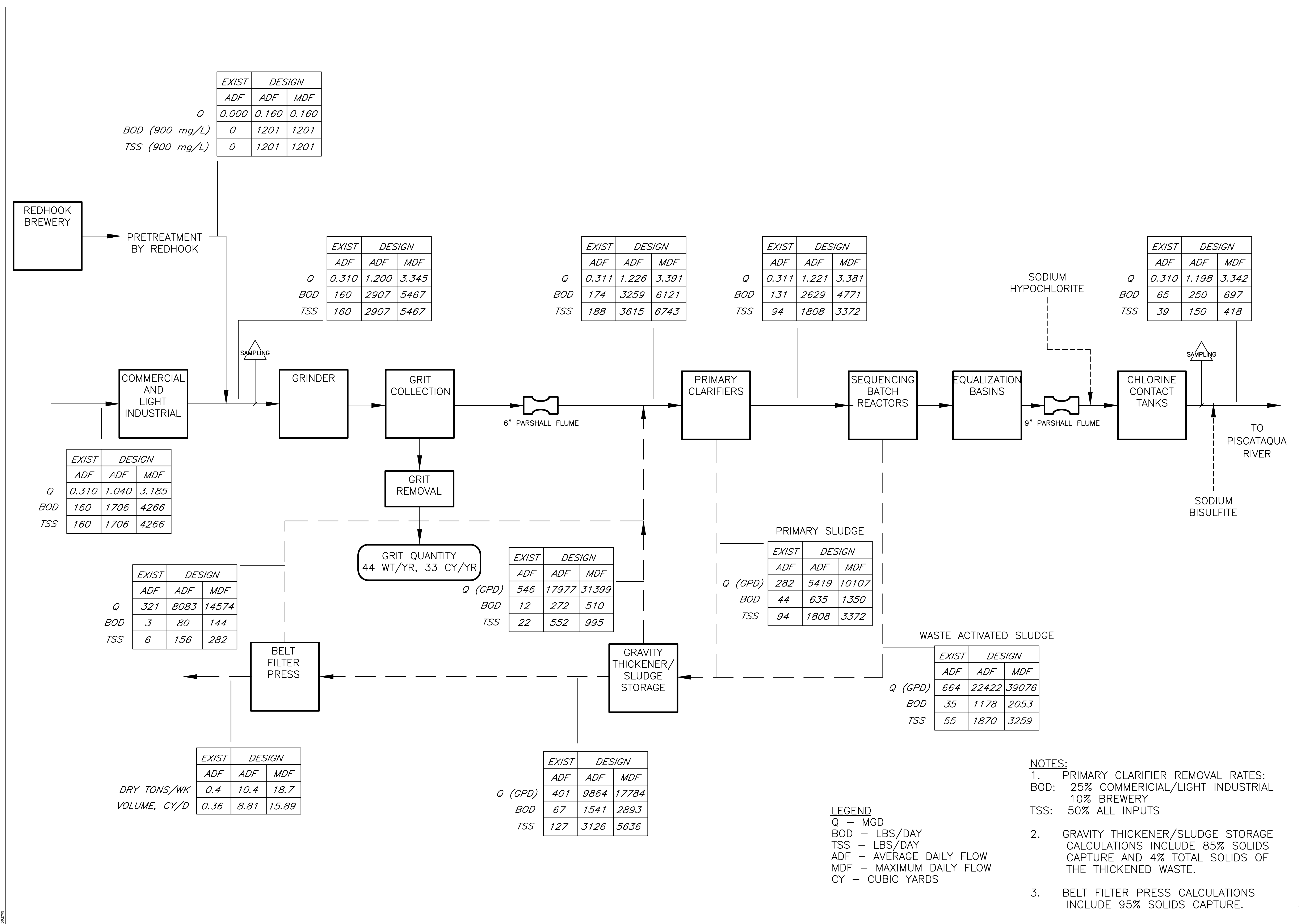
<b>Sludge Quantities</b>	
Primary Sludge	
Average @ 4.0%	5,419 GPD
Max Day @ 4.0%	10,107 GPD
Waste Activated Sludge	
Average @ 1.4%	22,422 GPD
Max Day @ 1.4%	39,076 GPD
<b>Sludge Storage</b>	
Number in Service	1
Size	30' Dia x 24' SWD
<b>Mixer</b>	
Number in Service	1
Horsepower	7-1/2 Hp
Type	Submersible Centrifugal
<b>Sludge Grinder</b>	
Number in Service	1
Horsepower	5 Hp
<b>Belt Filter Press Feed Pumps</b>	
Number in Service	1
Number on Standby	1
Capacity - Each	14 - 205 gpm
Horsepower - Each	10.0 HP
Speed	1750 rpm
Type	Double Disc
<b>Belt Filter Press</b>	
Number in Service	1
Hours of Operation @ ADF	17 Hrs/Wk
Organic Loading Rate	1,600 lbs./hr.
<b>Belt Filter Press Booster Pump</b>	
Number in Service	1
Capacity	90 gpm @ 60 PSI
Horsepower	7-1/2 Hp
Type	Centrifugal
<b>Polymer Feed System</b>	
Type	Liquid/Dry
Number in Service	1
Feed Capacity	14 lbs/hr @ 0.5%
<b>Polymer Storage</b>	
Number in Service	1
Capacity	380 gals.
Mixer - Horsepower	0.65 Hp
<b>Polymer Feed Pumps</b>	
Number in Service	1
Number on Standby	1
Capacity	0 - 5 gpm @ 50 PSI
Horsepower	3/4 Hp
Type	Centrifugal
<b>ODOR CONTROL SYSTEM</b>	
<b>Wet Scrubber</b>	
Type	Packed tower single stage
Size	5' Dia x 19' High
Airflow	7,000 CFM
Packing Depth	10 Feet
<b>Fan</b>	
Number in Service	1
Capacity	7,000 CFM
Horsepower	15 Hp
Type	Centrifugal Exhauster
<b>Chemicals</b>	
<b>Sodium Hydroxide</b>	
Number of Tanks	1
Tank Material	XLPE
Volume	550 gals
<b>Sodium Hydroxide Pumps</b>	
Number in service	1
Number on standby	1
Capacity	0-16.4 gph @ 130 PSI
Type	Diaphragm
<b>Sodium Hypochlorite Pumps</b>	
Number in service	1
Number on standby	1
Capacity	0-6 gph @ 130 PSI
Type	Diaphragm
<b>Recirculation Pump</b>	
Number in Service	1
Capacity	133 gpm @ 88 feet
Horsepower	5 Hp
Type	Centrifugal

ISSUE FOR	11/01/97	APPROVAL	
APPROVAL		Date 12/15/95	By FGU
CONSTRUCTION		Date 2/1/96	By FGU
RECORD DRAWING		Date 1/20/97	By FGU
REVISIONS			
NO.			
Drawn	JKC	Checked	JCK
Designed	JCK	WSC	
Approved	FGU	Date 12/15/95	
Book No.	125	Project No.	683
Dwg. ID	683GDSR	Scale	AS SHOWN

**Underwood Engineers, Inc.**  
 25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192

WWTIP IMPROVEMENT PROGRAM	GENERAL
<b>DESIGN DATA</b>	
DWG NO	SHEET
G-2	2

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	EXIST		DESIGN	
	ADF	ADF	MDF	MDF
Q	0.000	0.160	0.160	0.160
BOD (900 mg/L)	0	1201	1201	1201
TSS (900 mg/L)	0	1201	1201	1201

	EXIST		DESIGN	
	ADF	ADF	MDF	MDF
Q	0.310	1.200	3.345	3.345
BOD	160	2907	5467	5467
TSS	160	2907	5467	5467

	EXIST		DESIGN	
	ADF	ADF	MDF	MDF
Q	0.311	1.226	3.391	3.391
BOD	174	3259	6121	6121
TSS	188	3615	6743	6743

	EXIST		DESIGN	
	ADF	ADF	MDF	MDF
Q	0.311	1.221	3.381	3.381
BOD	131	2629	4771	4771
TSS	94	1808	3372	3372

	EXIST		DESIGN	
	ADF	ADF	MDF	MDF
Q	0.310	1.198	3.342	3.342
BOD	65	250	697	697
TSS	39	150	418	418

	EXIST		DESIGN	
	ADF	ADF	MDF	MDF
Q	0.310	1.040	3.185	3.185
BOD	160	1706	4266	4266
TSS	160	1706	4266	4266

	EXIST		DESIGN	
	ADF	ADF	MDF	MDF
Q	321	8083	14574	14574
BOD	3	80	144	144
TSS	6	156	282	282

GRIT QUANTITY  
44 WT/YR, 33 CY/YR

	EXIST		DESIGN	
	ADF	ADF	MDF	MDF
Q (GPD)	546	17977	31399	31399
BOD	12	272	510	510
TSS	22	552	995	995

	EXIST		DESIGN	
	ADF	ADF	MDF	MDF
Q (GPD)	282	5419	10107	10107
BOD	44	635	1350	1350
TSS	94	1808	3372	3372

	EXIST		DESIGN	
	ADF	ADF	MDF	MDF
Q (GPD)	664	22422	39076	39076
BOD	35	1178	2053	2053
TSS	55	1870	3259	3259

	EXIST		DESIGN	
	ADF	ADF	MDF	MDF
DRY TONS/WK	0.4	10.4	18.7	18.7
VOLUME, CY/D	0.36	8.81	15.89	15.89

	EXIST		DESIGN	
	ADF	ADF	MDF	MDF
Q (GPD)	401	9864	17784	17784
BOD	67	1541	2893	2893
TSS	127	3126	5636	5636

**LEGEND**  
 Q - MGD  
 BOD - LBS/DAY  
 TSS - LBS/DAY  
 ADF - AVERAGE DAILY FLOW  
 MDF - MAXIMUM DAILY FLOW  
 CY - CUBIC YARDS

- NOTES:**
1. PRIMARY CLARIFIER REMOVAL RATES:  
 BOD: 25% COMMERCIAL/LIGHT INDUSTRIAL  
 10% BREWERY  
 TSS: 50% ALL INPUTS
  2. GRAVITY THICKENER/SLUDGE STORAGE CALCULATIONS INCLUDE 85% SOLIDS CAPTURE AND 4% TOTAL SOLIDS OF THE THICKENED WASTE.
  3. BELT FILTER PRESS CALCULATIONS INCLUDE 95% SOLIDS CAPTURE.

Drawn: JCK Designed: JCK Checked: WSC Approved: FGU Date: 12/15/95 Book No.: 125 Project No.: 683 Dwg. ID: 683GMASR Scale: NOT TO SCALE	REVISIONS NO.	01/07/98 APPROVAL Date: 2/15/95 By: FGU
		CONSTRUCTION Date: 2/1/96 By: FGU
WWTIP IMPROVEMENTS PROGRAM GENERAL <b>MASS BALANCE DIAGRAM</b>		SHEET 3
Underwood Engineers, Inc. 25 Vaughan Mall, Portsmouth, N.H. 03801 Tel. 603-436-6192		DWG NO. G-3