CITY OF ATLANTA

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Mayor

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DEPARTMENT OF PROCUREMENT
Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP
Chief Procurement Officer
asmith@atlantaga.gov

April 30, 2015

Dear Potential Proponents:

Re: FC-8155, Design Build RM Clayton Water Reclamation Center ("WRC") Headworks Improvement Project

Attached is one (1) copy of **Addendum Number 2,** which is hereby made a part of the above-referenced project.

For additional information, please contact Ms. Jill Watkins, Contracting Officer, at (404) 865-8703 or by email at jewatkins@atlantaga.gov.

Sincerely,

Adam L. Smith

ALS/jew

cc: Jo Ann J. Macrina, PE
Mr. Cynthia Lunn
Mr. Anthony Stanley
Ms. Paula Days

ADDENDUM NO. 2

This Addendum No. 2 forms a part of the Request for Proposals ("**RFP**")and modifies the original solicitation package and any prior Addenda as noted below and is issued to incorporate the following:

1. **Attachment 2:** Part 4, Statement of Proponent's Qualifications forms for Proponent and Key Personnel (pages 5-17) are included here as Attachment 2 and should be incorporated into the RFP immediately following Statement of Proponent's Qualification's page 4.

   Please note: the enclosed forms have been revised slightly from the examples provided at the Pre-Proposal meeting on April 28, 2015.

2. **Attachment 3:** Task 6.03 - R. M. Clayton Grit and Headworks System Assessment FINAL Technical Memorandum.

All questions and inquiries concerning this project should be directed in writing to Jill Watkins, Contracting Officer, Department of Procurement, 55 Trinity Avenue, S.W., City Hall South, Suite 1900, Atlanta, Georgia 30303 or questions may be e-mailed to jewatkins@atlantaga.gov or by efax to (404) 739-4683.

The last day for questions is **Friday, May 1, 2015 at 12:00 noon ET.**

The Proposal due date has NOT been modified and Proposals are due on Wednesday, May 20, 2015 and should be time stamped in no later than 2:00 P.M. ET and delivered to the address listed below:

Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP
Chief Procurement Officer
Department of Procurement
55 Trinity Avenue, S. W.
City Hall South, Suite 1900
Atlanta, Georgia 30303

****All other pertinent information is to remain unchanged****

Acknowledgment of Addendum No. 2

Proponents must sign below and return this form with Proposal to the Department of Procurement, 55 Trinity Avenue, City Hall South, Suite 1900, Atlanta, Georgia 30303 as acknowledgment of receipt of this Addendum.

This is to acknowledge receipt of Addendum No. 2 for **FC-8155, Design Build RM Clayton WRC Headworks Improvement Project** on this the _____ day of _____, 20___.

_____
Legal Company Name of Proponent

_____
Signature of Authorized Representative

_____
Printed Name

_____
Title

_____
Date

ATTACHMENT NO. 2

Statement of Qualifications Forms for Proponent and Key Personnel

STATEMENT OF PROPONENT'S QUALIFICATIONS
COMPANY PROJECT EXPERIENCE
(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Is this a design build project?	
Project Manager	
Superintendent	
Owners Representative & Phone Number	
Design Consultant, Design Engineer Representative Name & Phone Number	
Treatment Facility Capacity (MGD)	
If this project involves Headworks improvement, briefly describe the work here.	
If this work includes demolition and maintenance of plant operation, briefly describe here.	
If this work involved fast track schedule driven projects, briefly describe here.	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
Description of Major Project Components:	

STATEMENT OF PROPONENT'S QUALIFICATIONS
DESIGN CONSULTANT PROJECT EXPERIENCE

(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Is this a design build project?	
Proponent's Design Consultant	
Owners Representative & Phone Number	
Design Consultant Name, Principal Representative Name & Phone Number	
Treatment Facility Capacity (MGD)	
If this project involves Headworks improvement, briefly describe the work here.	
If this work includes demolition and maintenance of plant operation, briefly describe here.	
If this work involved fast track schedule driven projects, briefly describe here.	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
Description of role for Major Project:	

STATEMENT OF PROPONENT'S QUALIFICATIONS
OVERALL PROJECT MANAGER'S EXPERIENCE

(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Is this a design build project?	
Proponent's Project Manager	
Owners Representative & Phone Number	
Design Engineer Representative Name & Phone Number	
Treatment Facility Capacity (MGD)	
If this project involves Headworks improvement, briefly describe the work here.	
If this work includes demolition and maintenance of plant operation, briefly describe here.	
If this work involved fast track schedule driven projects, briefly describe here.	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
List Any NPDES Permit Violations Due to Contractors Failure to Complete Project on Schedule or Due to Contractor's Failure to Properly Coordinate its Work.	
Description of Major Project Components:	

STATEMENT OF PROPONENT'S QUALIFICATIONS
CONSTRUCTION PROJECT MANAGER'S EXPERIENCE
(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Is this a design build project?	
Proponent's Construction Project Manager	
Owners Representative & Phone Number	
Design Engineer Representative Name & Phone Number	
Treatment Facility Capacity (MGD)	
If this project involves Headworks improvement, briefly describe the work here.	
If this work includes demolition and maintenance of plant operation, briefly describe here.	
If this work involved fast track schedule driven projects, briefly describe here.	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
List Any NPDES Permit Violations Due to Contractors Failure to Complete Project on Schedule or Due to Contractor's Failure to Properly Coordinate its Work.	
Description of Major Project Components:	

STATEMENT OF PROPONENT'S QUALIFICATIONS
CONSTRUCTION SUPERINTENDENT'S EXPERIENCE

(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Is this a design build project?	
Proponent's Construction Superintendent	
Owners Representative & Phone Number	
Design Engineer Representative Name & Phone Number	
Treatment Facility Capacity (MGD)	
If this project involves Headworks improvement, briefly describe the work here.	
If this work includes demolition and maintenance of plant operation, briefly describe here.	
If this work involved fast track schedule driven projects, briefly describe here.	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
List Any NPDES Permit Violations Due to Contractors Failure to Complete Project on Schedule or Due to Contractor's Failure to Properly Coordinate its Work.	
Description of Major Project Components:	

STATEMENT OF PROPONENT'S QUALIFICATIONS
DESIGN PROJECT MANAGER'S EXPERIENCE
(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Is this a design build project?	
Proponent's Design Project Manager	
Owners Representative & Phone Number	
Design Engineer Representative Name & Phone Number	
Treatment Facility Capacity (MGD)	
If this project involves Headworks improvement, briefly describe the work here.	
If this work includes demolition and maintenance of plant operation, briefly describe here.	
If this work involved fast track schedule driven projects, briefly describe here.	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
List Any NPDES Permit Violations Due to Contractors Failure to Complete Project on Schedule or Due to Contractor's Failure to Properly Coordinate its Work.	
Description of Major Project Components:	

STATEMENT OF PROPONENT'S QUALIFICATIONS
LEAD STRUCTURAL DESIGN ENGINEER'S EXPERIENCE
(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Is this a design build project?	
Proponent's Lead Structural Engineer	
Owners Representative & Phone Number	
Design Engineer Representative Name & Phone Number	
Treatment Facility Capacity (MGD)	
If this project involves Headworks improvement, briefly describe the work here.	
If this work includes demolition and maintenance of plant operation, briefly describe here.	
If this work involved fast track schedule driven projects, briefly describe here.	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
List Any NPDES Permit Violations Due to Contractors Failure to Complete Project on Schedule or Due to Contractor's Failure to Properly Coordinate its Work.	
Description of Major Project Components:	

STATEMENT OF PROPONENT'S QUALIFICATIONS
LEAD INTRUMENTATION AND CONTROLS ENGINEER'S EXPERIENCE

(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Is this a design build project?	
Proponent's Lead I&C Engineer	
Owners Representative & Phone Number	
Design Engineer Representative Name & Phone Number	
Treatment Facility Capacity (MGD)	
If this project involves Headworks improvement, briefly describe the work here.	
If this work includes demolition and maintenance of plant operation, briefly describe here.	
If this work involved fast track schedule driven projects, briefly describe here.	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
List Any NPDES Permit Violations Due to Contractors Failure to Complete Project on Schedule or Due to Contractor's Failure to Properly Coordinate its Work.	
Description of Major Project Components:	

STATEMENT OF PROPONENT'S QUALIFICATIONS
LEAD ELECTRICAL ENGINEER'S EXPERIENCE
(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Is this a design build project?	
Proponent's Lead Electrical Engineer	
Owners Representative & Phone Number	
Design Engineer Representative Name & Phone Number	
Treatment Facility Capacity (MGD)	
If this project involves Headworks improvement, briefly describe the work here.	
If this work includes demolition and maintenance of plant operation, briefly describe here.	
If this work involved fast track schedule driven projects, briefly describe here.	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
List Any NPDES Permit Violations Due to Contractors Failure to Complete Project on Schedule or Due to Contractor's Failure to Properly Coordinate its Work.	
Description of Major Project Components:	

STATEMENT OF PROPONENT'S QUALIFICATIONS
LEAD GEOTECHNICAL ENGINEER'S EXPERIENCE

(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Is this a design build project?	
Proponent's Lead Geotechnical Design Engineer	
Owners Representative & Phone Number	
Design Engineer Representative Name & Phone Number	
Treatment Facility Capacity (MGD)	
If this project involves Headworks improvement, briefly describe the work here.	
If this work includes demolition and maintenance of plant operation, briefly describe here.	
If this work involved fast track schedule driven projects, briefly describe here.	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
List Any NPDES Permit Violations Due to Contractors Failure to Complete Project on Schedule or Due to Contractor's Failure to Properly Coordinate its Work.	
Description of Major Project Components:	

STATEMENT OF PROPONENT'S QUALIFICATIONS
INDEPENDENT GRIT PERFORMANCE TESTING FIRM'S EXPERIENCE

(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Proponent's Grit Testing Firm's Project Manager	
Owners Representative & Phone Number	
Treatment Facility Capacity (MGD)	
If the performance testing described include grit removal performance, briefly describe the work here.	
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
Was the testing results accepted by the Owner?	
Description of Major Project Components:	

STATEMENT OF PROPONENT'S QUALIFICATIONS
SITE SAFETY OFFICER'S EXPERIENCE
(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Is this a design build project?	
Proponent's Project Manager	
Owners Representative & Phone Number	
Design Engineer Representative Name & Phone Number	
Treatment Facility Capacity (MGD)	
If this project involves Headworks improvement, briefly describe the work here.	
If this work includes demolition and maintenance of plant operation, briefly describe here.	
If this work involved fast track schedule driven projects, briefly describe here.	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
Safety Professional Certification, list certifications.	
Description of Major Project Components:	

STATEMENT OF PROPONENT'S QUALIFICATIONS
OTHER KEY SUB-CONTRACTOR PROJECT EXPERIENCE
(Complete Form Only For Projects That Meet Minimum Criteria)

Project Name	
Project Location	
Is this a design build project?	
Proponent's Additional Key Sub-contractor(s) Project Manager	
Was this experience for a design build project?	
Owners Representative & Phone Number	
Key Sub-contractor Name, Principal Representative Name & Phone Number	
Treatment Facility Capacity (MGD)	
If this project involves Headworks improvement, briefly describe the work here.	
If this work includes demolition and maintenance of plant operation, briefly describe here.	
If this work involved fast track schedule driven projects, briefly describe here.	
Initial Contract Amount	$
Final Contract Amount	$
Project Duration	Date Started: Date Completed: Time Extensions:
Was Project Completed on Time?	
Description of role for Major Project:	

ATTACHMENT NO. 3

Task 6.03 - R. M. Clayton Grit and Headworks System Assessment FINAL Technical Memorandum

Water Resource Management Plan:
Wastewater Component

Task 6.03 - R. M. Clayton
Grit and Headworks System Assessment
FINAL Technical Memorandum

Prepared for:

City of Atlanta
Department of Watershed Management
Task Order FC – 4906C
Purchase Order No. 51213958

Prepared by:

BGR Joint Venture:
Black & Veatch
Gresham, Smith & Partners
Rohadfox

Date Issued:
May 2013

Table of Contents

List of Figures

List of Tables

Appendices

APPENDIX A Existing Grit Removal System Specification

APPENDIX B BGR Site Visit Field Notes

APPENDIX C Smith & Loveless Field Assessment & Recommended Improvements

APPENDIX D Equipment Quotes, Cut Sheets and Installation Lists

APPENDIX E Budgetary-Level Construction Costs Estimates

Executive Summary

The R.M. Clayton WRC (RMCWRC) has experienced excessive amounts of grit that has accumulated in the primary clarifiers, aeration basins, anaerobic digesters, conveyance piping and other downstream processes. BGR and original equipment manufacturers conducted comprehensive condition assessments (site visits conducted end of 2012 and beginning of 2013) and root cause analysis to address extensive grit accumulation in processes and tankage throughout the RMCWRC. This memorandum summarizes the findings from BGR's evaluation under Task 6.03 for the RMCWRC headworks and provides practical solutions to improve grit removal and headworks performance in order to improve overall plant performance.

The conclusions of the comprehensive condition assessment and root-cause analysis are as follows:

- In general, the overall design of the GRU's complies with industry standard practices.
- The primary root-cause of grit issues at RMCWRC appear to be due to insufficient maintenance of the GRUs.
- Significantly increased grit loading correlates with wet weather events.
    - Based on operation reports for grit hauling and influent plant flow, the frequency of grit disposal correlates with wet weather events; however, the magnitude of grit disposal (on a weight basis) does not appear to correspond with increased flows. This may correspond to the reduced performance of Grit Removal Units (GRUs) at increased flows (e.g. grit disposal would be expected to increase proportionally with increased flows if the GRUs were performing as designed).
    - While plant staff have indicated that the increased grit loading during wet weather events appears to originate from Nancy Creek Tunnel, characterization of the grit sources under various flow conditions were not conducted as part of this study. Therefore, the specific source of increased grit loading to the plant cannot be confirmed.
- Reduced performance of the GRUs is compounded by the large opening size of the coarse screens allowing screenings and debris to enter the GRU's The 1-inch bar spacing of the coarse screens does not meet the recommended standard of design of $\leq$0.75-inch screen openings prior to grit removal.
- Existing coarse screenings conveyors and rampactors/washers appear to be undersized based on plant staff indication of screenings overloads associated with wet weather.
- Two of the four GRUs were not operational during all BGR's site visits.

- The non-operational GRUs (No. 1 and No. 4) have equipment missing; however, it appears that operations staff have continued to allow flow to pass through the units. Grit has been allowed to accumulate in GRU No. 1 up to 7-9 feet deep.
- GRU isolation gates do not provide a complete isolation. The gates have a gap between the top of gate and top of channel wall which allows wastewater to flow over and backflow into the GRUs.

In addition to the condition assessment, four options were evaluated that would enhance headworks and grit removal performance. The options evaluated were as follows:

- Option 1: Implement Critical Reliability Improvements
  - Includes rehab and replacement of existing equipment with minor modifications to improve reliability and performance
- Option 2: Option 1, New first-stage coarse screening system, New GRU System Downstream of Fine Screens
  - Includes all recommendations of Option 1 plus construction of a new first-stage coarse screening system and odor control system (mechanical screening improvements recommended in Option 1 become the second-stage screening system), and a new grit system using the Eutek HeadCell® GRU to provide additional grit removal
- Option 3: Coarse Screen Improvements and New GRU System
  - Construction of a new first-stage coarse screening system and odor control system, coarse screenings improvements recommended in Option 1 (second-stage screening system) and abandon in place the existing GRUs. A new Eutek HeadCell® GRU system will be construction adjacent to the existing GRUs.
- Option 4: New 240 MGD Peak Flow Headworks Facility
  - This option would replace the existing headworks in its entirety with a new headworks system. The new headworks would be construction adjacent to the existing and consist of two-stage coarse screening systems, fine screens, Eutek HeadCell® GRUs and new odor control system.

The options evaluation determined that the configuration of the existing grit system could not be modified in place to allow the retrofit of the Eutek Headcell ® system; therefore, all options considered that incorporation of the Eutek system into the headworks system will require new structures to house the proposed Eutek system.

Table ES-1 presents a summary of the budgetary-level construction cost estimate associated with each of the options.

Table ES-1: Summary of Budgetary-Level Construction Costs

Option	Construction Costs[1]
1	$ 6,610,000
2	$ 19,840,000
3	$ 19,960,000
4	$ 31,480,000

1. Cost estimates are in 2013 dollars.

The existing S&L grit system was designed to achieve 95% removal of grit particle sizes greater than 50-mesh (300 microns), 85% of the grit greater than 50-mesh (300 microns) but less than 70-mesh (210 microns), and 65% of the grit greater than 70-mesh (210 microns) but less than 100-mesh (150 microns) in size.

Based on the evaluations by BGR and manufacturers of the headworks systems presented in this TM, BGR recommends that the City move forward with a two-phase approach, short-term and long-term; implement Option 1 immediately and move forward with Option 2 as the long-term solution improve system reliability and performance.

Short-term Improvements – Option 1 Implement Critical Reliability Improvements

Option 1 includes upgrading the existing grit system to remove 95% of 105-micron particles (equal to the removal efficiencies provided by the Eutek Headcell® system). Option 1 provides enhanced screenings and grit removal with minimal structural and configuration modifications to the existing system.

- Replace the coarse screening equipment with continuously traveling, variable or two-speed mechanical bar screens with ½ -inch opening size
- Replace the screenings conveyors to alleviate capacity issues with the current shaft-less screw conveyors (e.g. belt conveyors or sluicing troughs).
- Replace rampactors with new compactors/washer system sized for increased screenings loadings associated with the ½ -inch screen opening size and new conveyors.
- Replace GRU isolation gates to provide complete isolation of a unit.
- Develop and implement standard maintenance practices based on manufacturer's recommendations and equipment/parts.
- Repair the existing GRUs according to Smith & Loveless (S&L) recommendations and upgrade the system to the configuration currently offered by S&L for new units (e.g. install the V-Force baffle system in order to improve the grit capture to 95% of 140-mesh (105 micron) size particles at peak design flow rate).
- Consider a preventive maintenance contract with S&L for a finite period of time with grit removal performance guarantee qualifiers associated with the PM contract.
- Modify the drum fine screen operation from manual to automatic based on differential level controls – similar to the coarse screens. Automatic operation will prolong the life

of the equipment.

- Modify the fine screens to a 4 mm screen opening size (existing is 6 mm) and repair the existing drum fine screens as recommended by Ovivo.

Long Term Improvements – Option 2

Option 2 includes all recommendations of Option 1 plus construction of a new first-stage coarse screening system and odor control system. The coarse screenings improvements recommended in Option 1 become the second-stage screening system. In addition a new grit system using the Eutek HeadCell® GRU is recommended to provide additional grit removal.

- Addition of a first-stage coarse screening system with continuously traveling, variable or two-speed coarse bar screens with 1-inch opening size followed by the second-stage mechanical screens with ½-inch opening size (Option 1)
- Addition of isolation gates in the influent junction box to provide complete isolation of a unit.
- Modifications to the existing influent channels and headworks building to tie-in the new second-stage screening system.
- Develop and implement standard maintenance practices based on manufacturer's recommendations and equipment/parts.
- Repair the existing GRUs and modify the existing fine screens as recommended in Option 1 (short-term improvements)
- Addition of the Eutek Headcell® system downstream of fine screens to remove 95% of all grit particles greater than or equal to 105 microns at a peak flow

1.0 Purpose and Summary of Options

This technical memorandum (TM) summarizes the findings from BGR's evaluation under Task 6.03 for the R.M. Clayton WRC (RMCWRC) headworks and presents options for improving performance, reliability and grit removal efficiency. Options considered include maintaining current operations of the existing grit removal units (GRUs) by implementing critical reliability improvements identified in the South Area Study (SAS) (i.e. restore out-of-service equipment to operational status), installation of additional grit removal capacity to the existing headworks facility or replacement of the existing GRUs with a new/alternative grit removal system and associated headworks components such as screens. BGR also performed a preliminary engineering feasibility analysis of the required modification for each option as well as development of the associated budgetary opinion of probable construction costs.

2.0 Background

A comprehensive condition assessment and root cause analysis to address extensive grit accumulation in processes and tankage throughout the RMCWRC is critically needed to develop practical solutions to improve overall plant performance. Poor performance of the vortex grit system to remove grit has allowed inert material to accumulate in downstream processes. The plant has experienced excessive amounts of grit that has accumulated in the primary clarifiers, aeration basins, anaerobic digesters, conveyance piping and other downstream processes. In addition to these conditions, the abrasive nature of the grit is prematurely shortening the operating life of pumps, valves, and other mechanical equipment such as centrifuges.

Plant staff has indicated that historically the Plant has experienced excessive material loading associated with the Nancy Creek Tunnel (constructed in 2006). The material settles and collects during dry weather when flow is minimal and is then re-suspended during high flows associated with wet weather events. This excessive material requires constant repair of the Nancy Creek Tunnel pumping system. BGR recommends further evaluation of this system to improve reliability and performance.

2.1 Existing Facility Description

The RMCWRC receives wastewater from the Nancy Creek Tunnel Pump Station (Nancy Creek Tunnel: 16-foot diameter) and West Area CSO Tunnel Pump Station (West Area Tunnel: 24-foot diameter) as well as gravity flow from Peachtree Creek Trunks (North and South trunks both 96-inch diameter) and a provision to accept flows from the old Proctor Creek Trunk (48-inch diameter). The headworks facility is designed to treat an annual average daily flow of approximately 103 MGD, average day maximum month flow of 122 MGD and peak hour flow of 240 MGD.

The plant currently operates four US Filter (Siemens) coarse mechanical bar screens with 1-inch openings. An additional manual bar screen with 1-inch openings is used for bypass operations. The mechanical screens are single-rake style and operate at a single speed. Rake operations are based on differential water level and/or a timer. The rake's total travel time is approximately two minutes due to the height of travel for the rake (travel distance is approximately 60 feet from top of the screen to the influent channel). Screened material is discharged into either of two shaftless screw conveyors which convey the material into either of two Brackett Green rampactors and 4 washers (also Brackett Green). Table 2-1 presents the design data for the existing coarse screens.

Table 2-1 Existing Coarse Screen Design

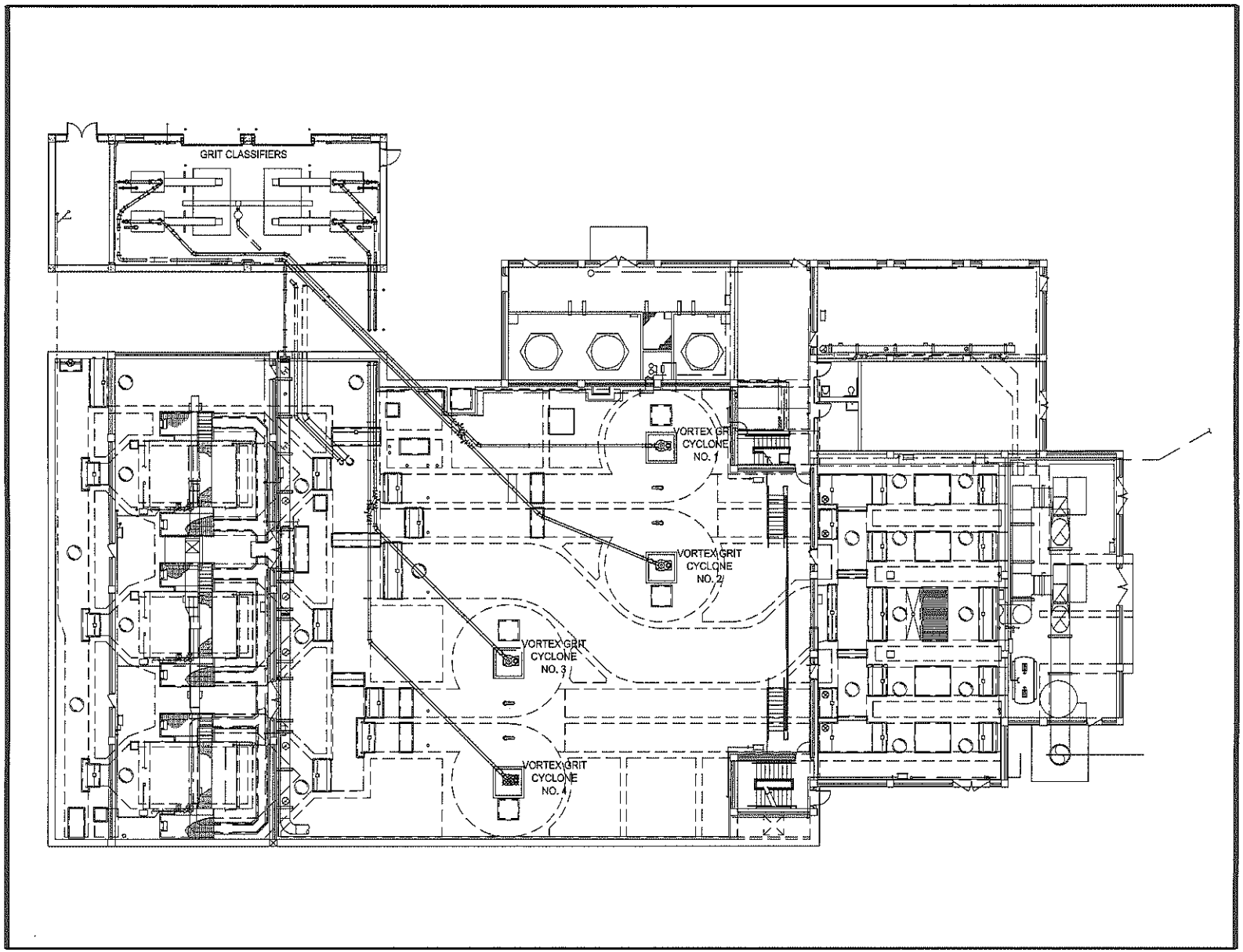
Parameter	Quantity		Units	
No. of Units	4			
Manufacturer	U.S. Filter			
Rated hydraulic Capacity of Each Unit	80		MGD	
Arrangement	Parallel			
Length of Each Unit	60		Feet	
Width of Each Unit	6		Feet	
Width of Bar Openings	1		Inch	
Approach Channel Dimensions	**Length (ft)**	**Width (ft)**	**Depth (ft)**	**Cross Sectional Area (sf)**
Unit No. 1	21	6	18.75	112.5
Unit No. 2	21	6	18.75	112.5
Unit No. 3	21	6	18.75	112.5
Unit No. 4	21	6	18.75	112.5

Note: Table from RMCWRC as-built drawings provided by the City.

After the coarse screens, wastewater flows into four Smith & Loveless (S&L) Grit Removal Units (GRUs). The S&L GRUs were installed in 2006 as a retrofit replacement of the original Jones & Atwood (now Ovivo) grit units. The GRUs create a vortex that separates grit by gravity from the wastewater. The grit travels to the center of the tank, particle velocities increase and the lighter and larger organics are lifted and returned to the forward flow passing through the units. Settled grit at the bottom of the tank is removed from the center storage hopper using vacuum-primed grit pumps located above the GRUs.

According to the design specifications for the S&L grit system, each unit is sized for a peak rated capacity of 70 MGD, additional information is provided in Appendix A. Each GRU is designed to achieve 95% removal of grit particle sizes greater than 50-mesh (300 microns), 85% of the grit greater than 50-mesh (300 microns) but less than 70-mesh (210 microns), and 65% of the grit greater than 70-mesh (210 microns) but less than 100-mesh (150 microns) in size.

Four S&L grit classifier/compactors wash and dewater the collected grit, which discharges into a dumpster and is hauled offsite for disposal. See Figure 2-1 for the existing GRU layout.



30 15 0 30 60

APPROX SCALE IN FEET

SOURCE: METCALF & EDDY /WILLIAMS, RUSSELL AND JOHNSON, INC., "R.M. CLAYTON WATER RECLAMATION CENTER GRIT SYSTEM UPGRADES" AS-BUILT DRAWINGS DATED 9/2008.

BGR JOINT VENTURE
BLACK & VEATCH - GRESHAM, SMITH & PARTNERS - ROHADFOX

EXISTING GRU LAYOUT

Figure 2-1

Table 2-2 presents the design data and as-built information for the existing GRUs. Appendix A includes the as-bid specification for the grit removal system.

Table 2-2 Existing GRU Design Criteria

Parameter	Quantity		Units	
No. of Units	4			
Manufacturer/Model	Smith & Loveless/ PISTA Grit			
Rated Hydraulic Capacity of Each Unit	70		MGD	
Arrangement	Parallel			
Diameter of Each Unit	24		Feet	
Depth from Deck to Top of Grout	15.67		Feet	
Volume per GRU Tank	53,021		Gallons	
Approach Channel Dimensions	**Length (ft)**	**Width (ft)**	**Depth (ft)**	**Cross Sectional Area (sf)**
Unit No. 1	28	6	4.83	29
Unit No. 2	28	6	4.83	29
Unit No. 3	60	6	4.83	29
Unit No. 4	60	6	4.83	29

Note: Table from RMCWRC as-built drawings provided by the City.

Table 2-3 presents several system hydraulic design parameters for the existing GRU system.

Table 2-3 Existing GRU Hydraulic Conditions

Parameter	Average Day Minimum Month in 2011[1]	Design[2]			
		Average Annual Day	Average Day Max Month	Max Day	Peak Hour
Flow (MGD)	43	103	122	194	240
Flow (cfs)	66.53	159.35	188.75	300.14	371.31
No. of Units Online[2]	1	2	2	3	4
Total GRU Volume (gal)	53,021	106,042	106,042	159,063	212,084
Detention Time in GRUs (sec)	107	89	75	71	76
Influent Channel Velocity (fps)	2.29	2.75	3.25	3.45	3.20

1. From RMCWRC 2011 plant data analysis.
2. CDM Design Development Report dated 1997

After the GRUs, the wastewater flows to three rotary drum fine screens (fine screens). The perforated plate fine screens have an opening size of ¼-inch and were manufactured by Brackett Green (Ovivo). Design data for the fine screens is presented in Table 2-4.

Table 2-4 Existing Fine Screen Design Criteria

Parameter	Quantity		Units	
No. of Units	3			
Manufacturer	Brackett Green			
Rated Hydraulic Capacity of Each Unit	120		MGD	
Arrangement	Parallel			
Diameter of Each Unit	7		Feet	
Width of Each Unit	3.5		Feet	
Size of Openings	5		mm	
Approach Channel Dimensions	**Length (ft)**	**Width (ft)**	**Depth (ft)**	**Cross Sectional Area (sf)**
Unit No. 1 Channel 1A/1B	24	4	7.33	29.32
Unit No. 2 Channel 2A/2B	24	4	7.33	29.32
Unit No. 3 Channel 3A/3B	24	4	7.33	29.32

Note: Table from RMCWRC as-built drawings provided by the City.

Table 2-5 summarizes the existing headworks facility equipment and rated hydraulic capacity for each unit. .

Table 2-5 Headworks Facility Equipment Summary

Process	Equipment Manufacturer	Number of Units	Rated Hydraulic Capacity Each Unit (MGD)
Coarse Bar Screens	U.S. Filter	4	80
Rampactors	Brackett Green	2	Unknown[1]
Screenings Washers	Brackett Green	4	Unknown[1]
Vortex Grit Separators	Smith & Loveless	4	70
Rotary Drum Screens	Brackett Green	3	120

1. Data not available at the time of this evaluation

3.0 Root-Cause Analysis of Grit System Problems

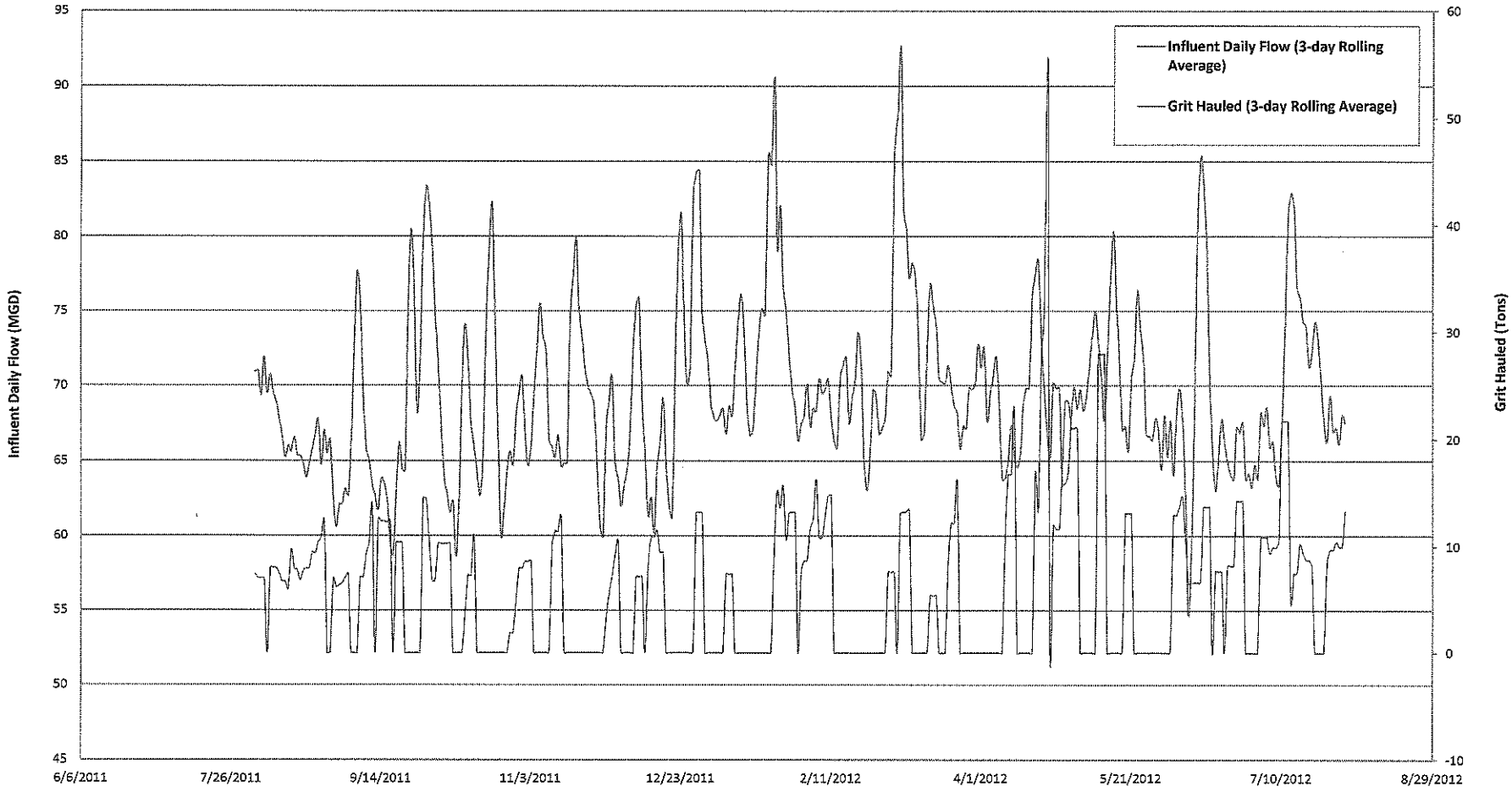
As noted in the South Area Study (SAS) Facility Assessment and Compliance Summary (BGR, May 2012), the grit system is allowing excessive amounts of grit to pass through the headworks into downstream unit processes. BGR conducted several site visits and condition assessments (see Section 3.1). The condition assessments concluded the root-cause of grit issues at the plant is primarily due to grit equipment failure, excessive down-time associated with the grit equipment, and inadequate coarse screening pretreatment prior to the grit system. The material that passes through the coarse screens can significantly hinder the performance and operation of the vortex grit removal system, particularly during wet weather events when high hydraulic flows result in increased grit concentration and debris entering the headworks.

Plant staff has indicated that historically the Plant has experienced excessive material loading associated with the Nancy Creek Tunnel (constructed in 2006). The material settles and collects during dry weather when flow is minimal and is then re-suspended during high flows associated with wet weather events. This excessive material requires constant repair of the Nancy Creek Tunnel pumping system. BGR recommends further evaluation of this system to improve reliability and performance.

Figure 3-1 presents a 3-day rolling average of influent flow data compared to tons of grit disposed. It appears that higher hydraulic loading does coincide with the frequency of grit disposal; however, the magnitude of grit disposal (on a weight basis) does not appear to correlate with increased flows. This can be attributed to the reduced performance of GRUs at increased flows. The magnitude of grit disposal would be expected to increase proportionally with increased flows if the GRUs were performing as designed.

As part of the root-cause analysis, BGR contacted representatives of Smith & Loveless and asked them to provide an evaluation of the existing PISTA® Grit Removal Systems that they supplied during the last renovation of the headworks. The objective of S&L's evaluation is to complement BGR's assessment of the current operational performance issues of each of the four GRUs and provide recommendations to repair, replace, and upgrade equipment to place the GRUs back in service to provide enhanced grit removal.

Figure 3-1 Comparison of Grit Hauled and Influent Flow



3.1 Site Visit Summary

BGR conducted site visits in August, October and November of 2012 and January of 2013 at the RMCWRC. The primary objectives of these site visits were to launch a detailed evaluation of the headworks processes at this facility and derive engineered solutions to improve the performance of the headworks to remove debris, screenings, and grit. Summarized below are the findings from these site visits. Appendix B includes the complete site visit reports.

At the time of the site visits only one or two of the four GRUs were operating (GRU # 2 or #3). GRUs #1 and #4 were not operational at the time of the site visits due to dismantled equipment or removed equipment. Additionally, the following key items were noted:

Coarse Screens, Conveyors, and Rampactors/Washers:

- Influent debris passes through the coarse bar screens and causes blockage in the grit pumps. As a result, the grit suction lift pumps lose prime allowing grit to accumulate in the vortex grit unit.
- Constant speed coarse screen rakes are too slow and infrequent to keep screens cleaned during wet weather events when debris loading is increased. There is only one climber rake per screen shown in Figure 3-2 that has to complete an entire cleaning and return cycle before the individual bar can then be raked again. The travel time of the rake to complete one rake cycle is approximately 2-minutes.

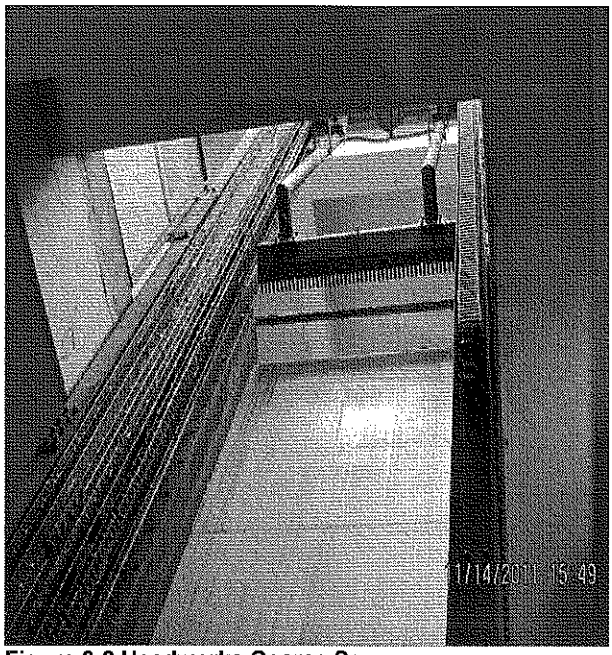


Figure 3-2 Headworks Coarse Screens

- Plastic floatables and other debris smaller than 1-inch in size pass through the screens to the vortex grit units.
- The plant experiences heavy loads of screening material during wet weather events, particularly during the fall months. The existing conveyors and rampactors appear to be undersized to handle the screenings loads. Plant staff has noted numerous occurrences of screenings overloading the

conveyors and spilling out onto the floor. Overloading events have occurred even when both conveyors and rampactors are operational.

S&L PISTA Grit Units:

- Preventive and routine maintenance is inadequate, as indicated with only two grit units in service. Additionally, maintenance staff performed repairs to the suction piping using JB Weld and metal plates. These repairs appear to be intended to be temporary; however, permanent repairs or repairs as recommended by the manufacturer do not appear to be implemented. Figure 3-3 shows a hole in the suction piping of GRU No. 3 that has been repeatedly repaired previously with JB Weld (photo taken on January 2013 site visit).

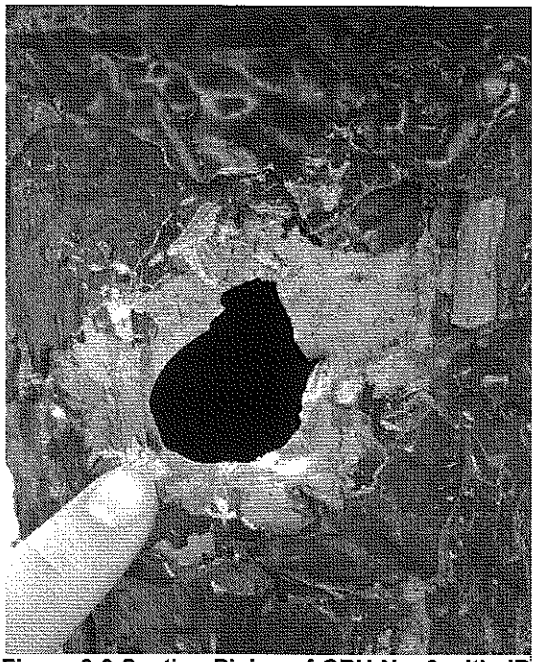


Figure 3-3 Suction Piping of GRU No. 3 with JB Weld

- Plant staff noted that the influent gates have a space between the top of the gate and the top of the wall which makes complete isolation of the grit units impossible during high flows (wastewater flows over the top of the gates during high flows approx. >80 MGD).
- The January 9, 2013 site visit notes show that approximately 7 feet of grit has accumulated in GRU No. 1. This measurement is based on as-built elevation information and measurements. See Figure 3-4.
- Prior to 2006/2007, the flooded suction system had 4-inch suction piping with 2 pumps for each grit unit. Plant staff indicated that the suction piping clogged regularly – particularly when the pumps were cycled. Plant staff also indicated that the impellers of the flooded suction piping experienced excessive wear. No attempt was made to replace the impellers with hardened metal.
- Flow splits from the bar screens to grit chambers may not be equal (see Section 3.2 for additional discussion). Plant staff has indicated that most of the grit appears to be collected in GRUs No. 1 and 4.

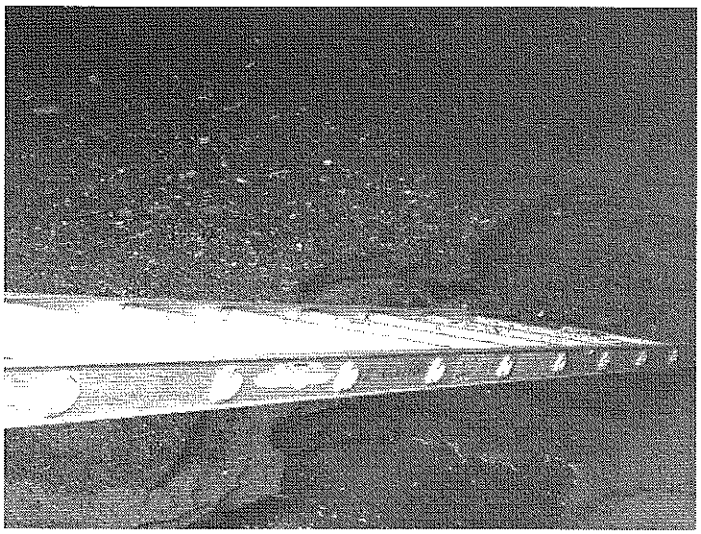


Figure 3-4 Grit Accumulation in GRU No. 1

- Each GRU has a vortex flow direction based on the orientation of the influent channel tie-in to each chamber, see Table 3-1. Additionally during the site visit in January 2013, the drive shaft for the paddles of GRU No. 2 was observed to be rotating in the opposite direction of the flow pattern whereas typically, and according to S&L, the drive shafts should rotate with the direction of the flow pattern in order to drive the grit into the hopper.

Table 3-1 Summary of GRU Flow Direction

Grit Removal Unit (GRU)	GRU Influent Flow Direction[1] Clockwise (CW) or Counter-Clockwise (CCW)
GRU No. 1 (S/N 3R-01148)	CW
GRU No. 2 (S/N 3R01149)	CCW[2]
GRU No. 3 (S/N 3R91150)	CW
GRU No. 4 (S/N 3R01151)	CCW

1. According to S&L, the drive shaft for each GRU should rotate in the same direction as the flow.
2. January 2013 site visit – shaft was observed to be operating CW.

Rotary Drum Fine Screens (Fine Screens – 6mm):

- Debris passing through the coarse bar screens and vortex grit units become suspended on the shaft of the fine screens exceeding the rated load capacity of the shaft – this leads to shaft failure. Staff indicated there have been events where the rotary drums have been overloaded by debris resulting in a failure of the shaft. See Figure 3-5.

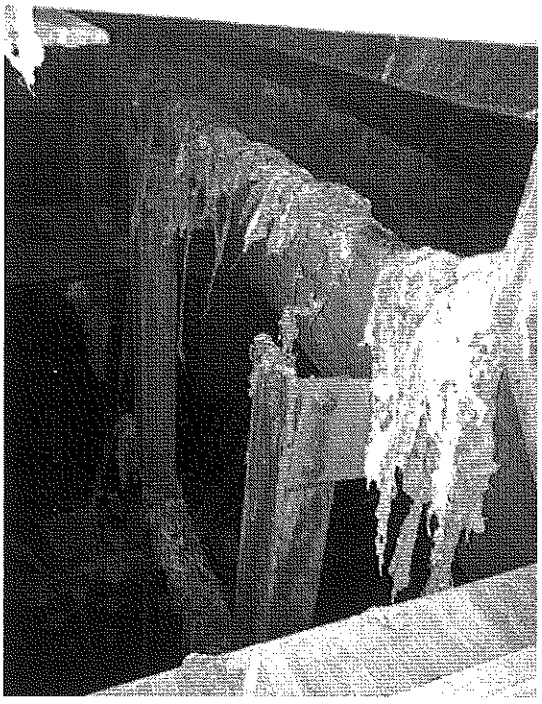


Figure 3-5 Rotary Drum Overloaded with Debris

- All fine screens appear to be operational. Plant staff indicated that No. 1 and No. 3 are typically operated in manual on/off mode and No. 2 is operated only during high flows.
- Plant staff indicated that the original shaft for fine screen unit No. 2 failed 2.5 years ago and was welded back together. The original shafts for fine screens No. 1 and No. 3 subsequently failed. All three shafts were then replaced with OEM shafts which have been operational since replacement.
- Plant staff reports difficulty maintaining the level of the pinion shaft of drum screen 1. This position causes the pinion gear to not set true with the teeth on the drum and wears the outside of the gear.
- Plant staff indicated that the pinion gear for fine screen unit No. 1 is replaced every 2-3 months. The frequency of replacement could be due to the difficulty with maintaining the level and true fit with the gear teeth on the drum.
- Plant staff indicated that the grease pins require weekly grease application in order to prevent locking of the shafts. See Figure 3-6.
- While onsite, the drum screen manufacturer, Ovivo, indicated that the fine screens are typically designed to operate on a differential level setting; however the configuration of the fine screens monitoring and controls only provide operation based on remote or local manual mode. Therefore, the fine screens and wash water systems are typically in constant operation.

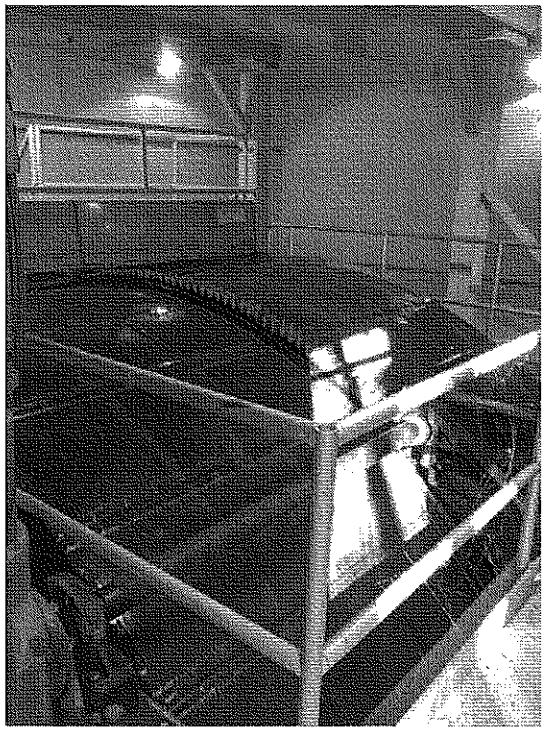


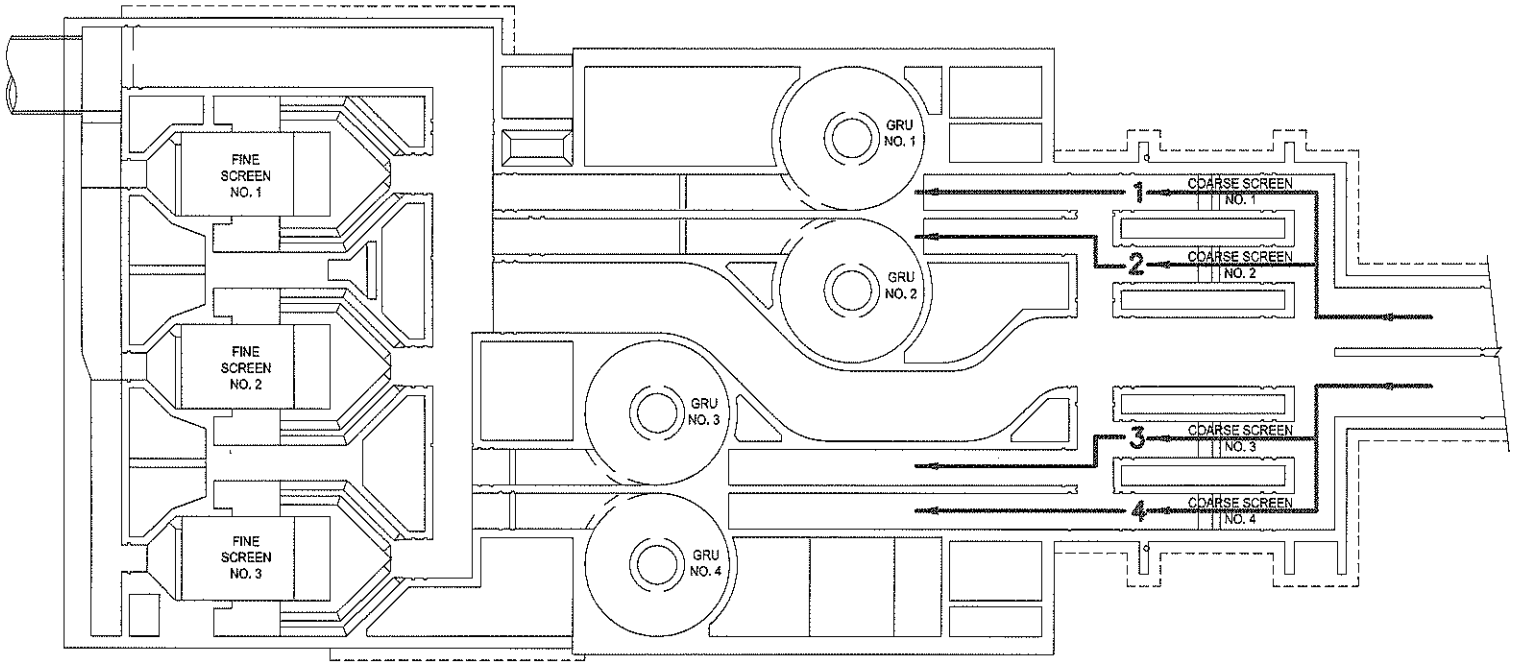
Figure 3-6 Rotary Drum Fine Screen

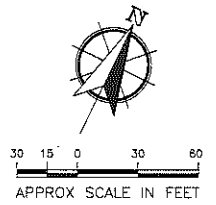
- BGR noted that the current total run-times for the fine screens indicate that plant staff operates No. 2 significantly less frequently than fine screens No. 1 and No. 3. Runtimes for each screen was recorded as follows:
  - Fine Screen No. 1: 60,093 hours
  - Fine Screen No. 2: 48,644 hours
  - Fine Screen No. 3: 76,673 hours

As noted in the SAS, one indicator of poor operational performance of the grit system is the relatively small amount of grit removed by the classifiers. Operational records reveal this system removes approximately one dumpster every few weeks as shown in Figure 3-1. By comparison, a typical plant with a similar wastewater flow and load as RMCWRC disposes a 20-30 CY dumpster of grit approximately every few days.

3.1.1 Hydraulic Flow Path

Increased grit loading to GRUs No. 1 and No. 4 compared to No. 2 and No. 3, as noted by plant staff, may be an indicator of a hydraulic imbalance creating a preferential flow pattern through the headworks facility. Figure 3-7 shows the current configuration of the headworks channel system.





SOURCE: CAMP DRESSER & MCKEE / HARRINGTON, GEORGE & DUNN, PC, "R.M. CLAYTON WATER RECLAMATION CENTER EXPANSION, PHASE III" CONFORMED DRAINGS DATED 9/1998.

BGR JOINT VENTURE
BLACK & VEATCH / GRESHAM, SMITH & PARTNERS / ROHADFOX

EXISTING HEADWORKS CONFIGURATION

Figure 3-7

With the headworks bypass channel closed, influent flow is routed through a 90-degree turn leading towards channels 1 and 2, and similarly for channels 3 and 4. Because the flow has already turned, the flow path is less likely to turn again through another 90-degree turn to enter channel 2 or channel 3. Therefore, the wastewater preferentially flows into channel 1 or channel 4. Once the flow passes through the coarse bar screens, the flow from channel 1 continues on a straight path into GRU No. 1 and similarly for flows from channel 4 continuing into GRU No. 4. Channel 2 and 3, however, are not aligned with the GRU No. 2 channel and the GRU No. 3 channel, respectively, so the flow is forced to change direction again to continue into GRU No. 2 and GRU No. 3. The additional change in direction preferentially distributes more flow into GRU No. 1 and No. 4.

3.2 Comparison to Design Standards

There is no State of Georgia EPD design criteria identified for grit removal facilities. Standard design criteria for grit removal systems presented in three accepted engineering documents, the Recommended Standards for Wastewater Facilities (10 State Standards); Water Environment Federation (WEF) Manual of Practice (MOP) 8 – Design of Municipal Wastewater Treatment Plants; and Metcalf & Eddy's (M&E) Wastewater Engineering were reviewed and compared to the design criteria for the existing grit removal system at RMCWRC. The comparison is presented in Table 3-2.

Table 3-2 Current Vortex Grit System Design Comparison to Industry Standard Design Practices

Design Criteria Existing GRUs	Industry Standards			Current System	Status
	M & E	MOP 8	10 State Standards		
Detention Time at Average Flow	20 sec to 30 sec (30 sec typical)	Not Specified (NS)	NS	95 sec w/2 units online (@ ADF)	Complies
GRU Chamber Dimensions	Upper Chamber (UC) Diameter 4 - 24ft Lower Chamber (LC) 3-6ft Height (H) 9-16ft	NS	NS	UC Dia.- 24ft LC Dia.- 5ft H- 15.67ft	Complies
Detention Time at Peak Design Flow	NS	20 to 30 sec (larger units may improve performance)	NS	76 sec @ peak design Q with 4 units online.	Complies
Influent Channel Velocity	NS	2 to 3 fps or 40 to 80% of peak flow	NS	2.3-3.45 fps	Partially complies
Minimum Acceptable Inlet Channel Velocity	NS	0.5 fps	NS	2.3 fps (Ave min day flow in 2011)	Complies
Number of Units	NS	≥2 units for combined systems and large plants (>4 MGD). Single unit with bypass for small plants	Combined sewer facilities should have at least two mechanically cleaned GRUs, with provisions for bypassing	4 units	Complies

Design Criteria Existing GRUs	Industry Standards			Current System	Status
	M & E	MOP 8	10 State Standards		
Inlet Channel Length	NS	7 times the width of the inlet channel or 15-feet whichever is greater	NS	GRU Nos. 1 & 2 = 28 ft, GRU Nos. 3 & 4 = 60 ft	GRU's 3 & 4 comply
Length of Grit Pump Suction	NS	- Should be minimized and flooded suction should be used whenever possible - Minimize horizontal and vertical pipe bends to reduce blockages	NS	Long run of suction piping	Partially complies
Discharge Pipe Velocity	NS	3 to 6 fps should be maintained	NS	5.7 fps	Complies
Grit Pump Discharge Piping Diameter	NS	>4-inches is preferable to avoid high scouring pressures	NS	6-inch suction	Complies
Grit System Removal Efficiency	NS	Should remove 75% of 150-micron particles	NS	65%[1]	Does not comply

1. Grit Study by Grit Solutions Oct 31, 2008.
   - 07/09/08: Ave. Q = 77.1 MGD, 52% Removal
   - 10/15/08: Ave. Q = 70.0 MGD, 86% Removal
   - 10/16/08: Ave. Q = 72.5 MGD, 93% Removal

In general, the overall design of the GRUs complies with industry standard practices. Another consideration in the design of the current vortex grit removal systems is the recommendation to have screens with ≤0.75-inch spacing preceding the GRU operation. The 1-inch coarse mechanical screens at RMCWRC do not comply with this design condition. Upgrades and repairs to the headworks system are needed in order to provide adequate pretreatment for, and improve the operations and maintenance of, downstream unit processes. These upgrades and repairs are summarized in Section 5.2.

3.3 Root-Cause Assessment

Based on BRG's field assessment of the headworks facility, the following items have been identified as the root-cause of the grit system problems at RMCWRC:

- Inadequate coarse screening upstream of grit removal process - recommended pretreatment screen size for vortex grit units is a maximum of ¾-inch opening. BGR is recommending ½-inch screen opening size in order to provide additional screen capture and improve the grit removal efficiency.
- Limited number of fully-functional GRUs. While the grit system includes four units each originally rated at 70 MGD capacity, the plant currently only operates two units (GRU No. 2 and No. 3). GRU No. 1 and No. 4 are non-operational at the time of this assessment - rotating assemblies removed or the entire pumping system removed.
- Insufficient and limited preventive maintenance performed on the GRUs. Maintenance that is contrary to manufacturer-recommended procedures has reduced the effectiveness of the GRUs to remove grit as originally designed. Examples include:
    - GRU No. 2 drive shaft rotating in the opposite direction of the flow reduces the grit collected in the hopper.
    - GRU No. 1 drive shaft appeared to be installed incorrectly where the paddles are under the vortex plates rather than above per manufacturer's recommendations. This also limits grit collection when the unit was operational.
    - GRU No. 2 and No. 3 suction piping is consistently repaired with JB Weld (not intended as a permanent solution) instead of replacing the suction piping.

3.4 Smith and Loveless Grit Unit Condition Assessment

Smith & Loveless' overall field assessment of the grit system and their detailed evaluation of GRU No. 1 and No. 3 provide the following findings and recommendations. Appendix C includes the complete field assessment.

S&L Assessment of GRU No. 1:

- Components inside the vacuum priming panel are not protected from the elements. Failure to properly close the panel means potentially high voltage exposure for personnel and vulnerability of equipment outage.
- The suction weld assembly is in two pieces.
- The highest concentration of wear appears to be directly below the pump volute and on top of the bullgear.
- The paddle drive motor is currently not functional.
- The chamber appeared to be in good working order. The stainless steel drive tube and hopper are in good condition.
- The paddles are in sound mechanical condition; however, they are mounted 6-inches below the hopper plates. The paddles should have been mounted 3-½ inches above the hopper plates. Mounting them below the hopper plates will have an impact on the system's overall grit removal.
- The straightening vane is in-place and show no signs of wear.
- The inlet shelf shows no signs of wear or erosion of the concrete floor or the exit shelf. The spoiler plate mounted on top of the inlet to deflect grit downward in high flow conditions is in good condition as well.

S&L recommended the following improvements for GRU No. 1:

- One (1) Air Compressor for the Pinch Valve.
- One (1) Vacuum pump.
- One (1) Suction Weld Assembly.
- One (1) SONIC START® STREAMLINE™ explosion proof kit (depending on code)
- One (1) Drive motor for the gear reducer
- One (1) Vacuum priming panel or the repair of the one on site.
- One (1) Rotating Assembly
- 316 SST V-FORCE™ Baffles

S&L Assessment of GRU No. 3

- This unit was partially dewatered to approximately only 10" of water in the grit chamber. The grit patterns in this chamber were as expected in a working chamber.

- The grit was flowing in the vortex pattern associated with the S&L flat floor design.
- Hopper plate modification is recommended.
- While in the grit chamber, it was noted that the axial flow paddles were mounted correctly in Chamber No. 3 and in good condition. These paddles were adjusted to the proper height.
- The hopper plates are also in good condition and are located in the proper place.
- The suction lift weld assembly is in bad condition and needs replacement.
- The pump and volute are in good condition.
- The vacuum priming panel was much the same as the others on site with the exception of Chamber No. 4. The vacuum priming panel for GRU No. 4 had been 100% removed.

S&L recommended the following improvements for GRU No. 3:

- One (1) Air Compressor for the Pinch Valve.
- One (1) Vacuum pump.
- One (1) Suction Weld Assembly.
- One (1) SONIC START® STREAMLINE™ explosion proof.
- One (1) Vacuum priming panel or the repair of the one on-site.
- 316 SST V-FORCE™ Baffles.

S&L did not enter GRU Nos. 2 and 4; however, it was assumed that the findings will be similar to that of GRU Nos. 1 and 3. It was noted that in Chamber No. 2 the paddles were rotating the wrong direction. The S&L equipment had been removed from the headwork's facility.

S&L recommended the following improvements for GRU No. 2:

- Suction Weld Assembly.
- One (1) Air Compressor for the Pinch Valve.
- One (1) Vacuum pump.
- One (1) Suction Weld Assembly.
- One (1) SONIC START® STREAMLINE™ explosion proof.
- One (1) Vacuum priming panel or the repair of the one on-site.
- 316 SST V-FORCE™ Baffles.

S&L recommended the following improvements for GRU No. 4:

- Total equipment replacement and the addition of the 316 SST V-FORCE™ Baffles.

3.5 Fine Screen Condition Assessment

All of the existing fine screen units ((6 mm) are operational at the time of the field visits and Ovivo's condition assessment (conducted on January 24, 2013). Ovivo entered fine screen unit #2 to conduct a preliminary condition assessment. Ovivo recommends replacement of the rack segments, pinion gears and connection hardware on each of the three fine screens. They also recommend manufacturer's services to field dismantle and reinstall of all the equipment. In order to capture additional screenings material and provide the City with the greatest pre-treatment capabilities in the headworks, BGR recommends replacing the fine screens with 4 mm opening size.

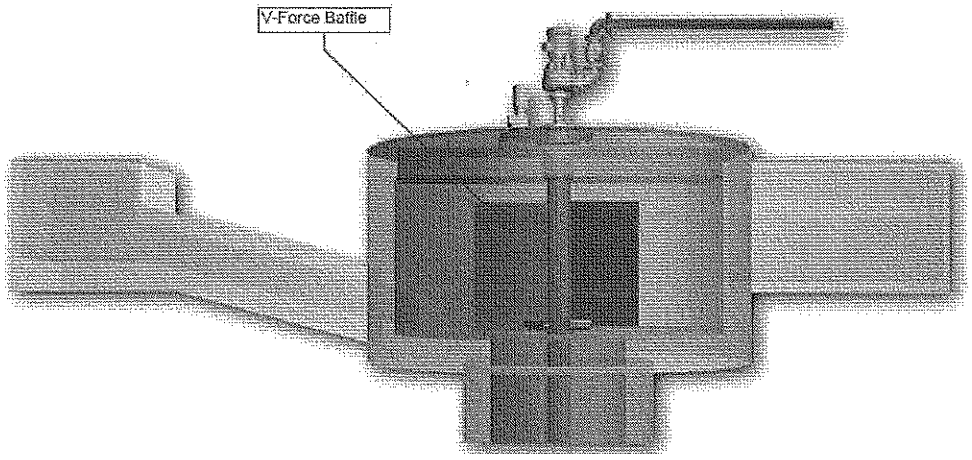
4.0 Evaluation of Options

4.1 Option 1 - Implement Critical Reliability Improvements

Under Option 1, critical improvements recommended in the SAS would be implemented to achieve an acceptable level of operational reliability. The current 1-inch bar screens would be replaced with 1/2-inch bar screens for more effective removal of debris and material. This reduction in screen opening will approximately double the volume of screenings removed. Continuous traveling mechanism with VFDs or speed controls are recommended to be provided to increase screen cleaning based on flow and differential water level/headloss through the screen. New screening conveyor and compactor equipment would be provided to handle the additional screening load introduced by the new, finer mechanical screens. Appendix D includes a comparison of vender quotes for the John Meunier, Duperon, Parkson and Vulcan Industries mechanical screening options. Additionally, the existing fine screens will be rehabbed in place as part of this option.

The existing S&L GRUs will be repaired according to BGR's and manufacturer's recommendations. Additionally, the GRUs will be upgraded to the configuration of the currently-offered PISTA® system with the V-Force Baffle system (Figure 4-1) in order to improve grit removal to 95% of 140-mesh (105-micron) particle size at a peak hydraulic flow of 70 MGD. Figure 4-2 presents an overall layout of the headworks system improvements

Figure 4-1 Smith & Loveless V-Force Baffle



N

60 30 0 60 120

APPROX SCALE IN FEET

OPTION 1:

- Existing Grit System to be upgraded
- No site improvements

BGR JOINT VENTURE

BLACK & VEATCH + GRESHAM, SMITH & PARTNERS + RICHARDSON

OPTION 1 PRELIMINARY SITE LAYOUT DRAWING

Figure 4-2

4.1.1 Advantages and Disadvantages

Advantages and disadvantages of pursuing Option 1 and completing the recommended improvements to achieve an appropriate level of operational reliability are presented in Table 4-1.

Table 4-1 Option 1 Advantages & Disadvantages

Advantages	Disadvantages
• Reduces the amount of debris entering the GRUs • Reduces the risk of clogging grit piping and pumps • Increased system reliability • Finer grit removal than existing with upgrade to V-Force Baffle System • No additional footprint required	• Does not provide firm grit system capacity at peak influent flow (210 MGD name-plate grit capacity with one unit out of service)

Option 1 addresses solutions to the root causes of the grit system problems by reducing the amount of debris entering the GRUs, which reduces the risk of clogging grit piping and pumps.

4.1.2 Budgetary Opinion of Probable Construction Costs

Estimated budgetary project costs associated with Option 1 are presented in Table 4-2. These costs include the up-front capital investment associated with the recommended critical reliability improvements.

Table 4-2 Option 1 Budgetary Opinion of Probable Construction Costs

Item	Construction Costs[1]
Mechanical Screen Equipment	$ 3,520,000
Washer Compactor	$ 400,000
Conveyors	$ 940,000
GRU Unit 1 Rehabilitation	$ 160,000
GRU Unit 2 Rehabilitation	$ 100,000
GRU Unit 3 Rehabilitation	$ 100,000
GRU Unit 4 Replacement	$ 280,000
GRU V-FORCE Baffles	$ 280,000
S&L Quarterly Service Contract (5 yrs Labor	$ 240,000
Fine Screen Equipment Modification (4mm)	$ 590,000
Total Construction Costs:	**$ 6,610,000**

1. Cost estimates are in 2013 dollars.

4.2 Option 2 - Option 1 Plus First Stage Coarse Screening System and New GRU System Downstream of Fine Screens

The improvements proposed in Option 1 would also be implemented in Option 2. Additionally, a new first-stage coarse screening system and the Eutek HeadCell® system would be installed downstream of the drum fine screens.

4.2.1 *First-Stage Coarse Screening System:*

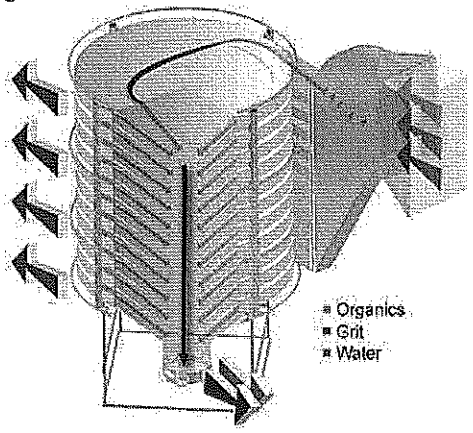
A two-staged screening system is recommended to increase system reliability and improve screenings removal during peak flow conditions. A first-stage coarse screening building will be constructed between the existing influent junction box and the existing Headworks building. The mechanical screening system upgrades referenced in Option 1 (upgrade existing screens to 1/2-inch mechanical screens) will become the second-stage screening system under Option 2.

The addition of isolation gates, modifications to the existing influent channels and existing headworks building are required to tie-in the first stage screening system. The new building will house two 10 ft wide, 1-inch mechanical bar screens with continuous traveling mechanisms with VFDs or speed controls based on flow and differential water level/headloss through the screen. Screening will discharge from the mechanical screens into washer/compactors and then into a large roll-off container neighboring the units. A new odor control system will also be installed inside the building.

4.2.2 *New Eutek HeadCell® system*

This HeadCell® grit removal system is designed to remove 95% of all grit particles greater than or equal to 110 microns at a peak flow of 240 MGD. A pilot study to determine grit removal capabilities, efficiency, and performance of the Eutek system is recommended; however, the City decided that piloting could be performed at a later time if Option 2 were to be pursued.

Figure 4-3 Eutek Headcell Unit



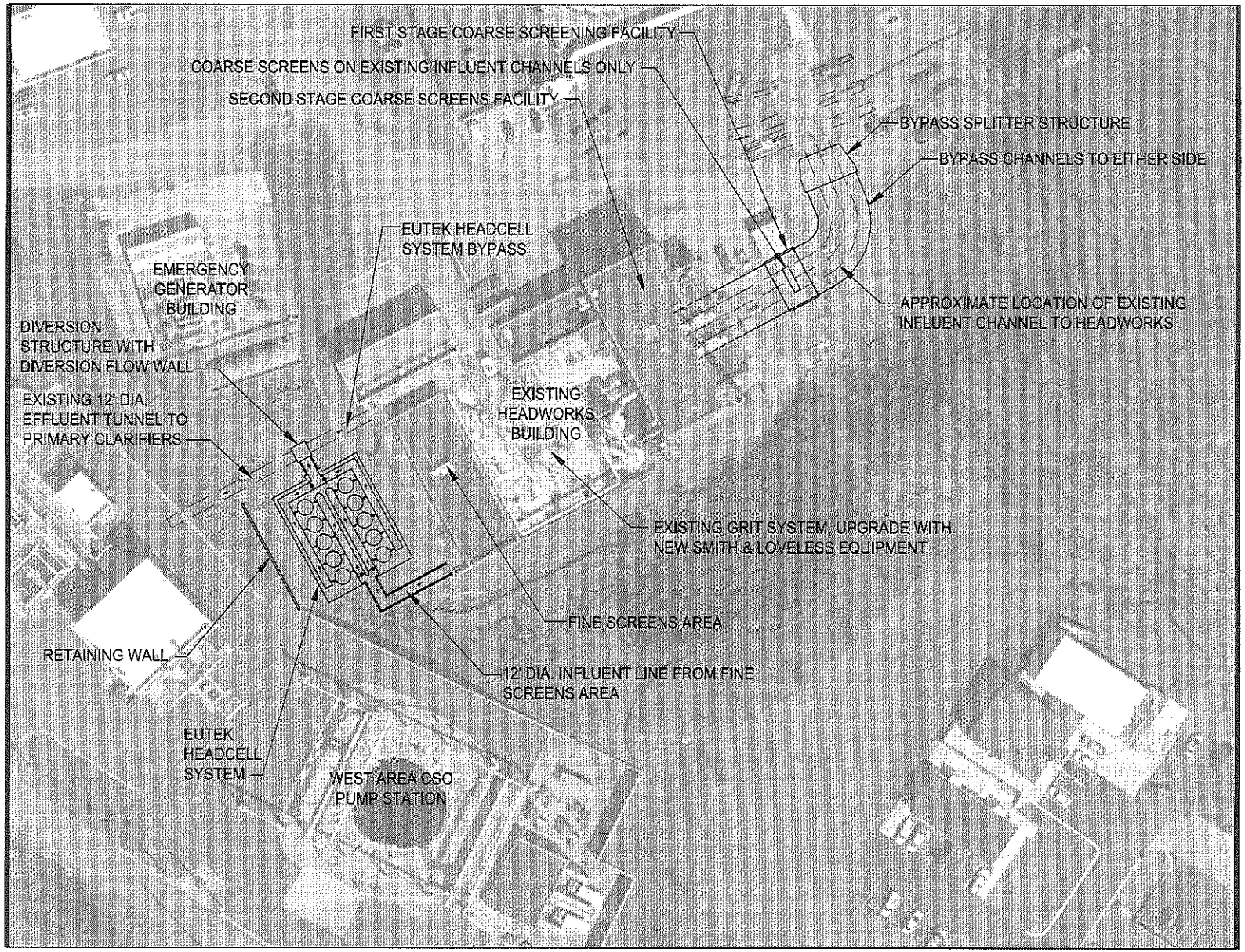
Source: http://www.hydro-int.com/us/products/eutek-headcell

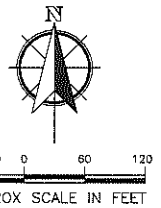
The Eutek HeadCell®, as shown in Figure 4-3, captures fine particles due to the large surface area and short settling distances. Evenly split flow eliminates thermal short-circuiting which reduces the performance of conventional grit basins. This system is a hydraulically driven forced vortex system, which requires no moving parts within the

vortex unit (grit pumping, conveyance, and washing is still required).

A high efficiency flow distribution header evenly distributes influent over multiple conical trays. Tangential feed creates a vortex flow pattern allowing solids to settle into a boundary layer on each tray and then be swept down to the center underflow collection chamber. The settled grit is continuously pumped from the collection chamber to a grit dewatering system. This system requires ¾-inch or finer screenings prior to the grit removal system. Appendix D includes the complete Eutek HeadCell® system proposal and specifications.

A preliminary site layout for Option 2 is presented in Figure 4-4.





OPTION 2:

- New 1" coarse screens to be added to existing influent channels only
- New Eutek HeadCell System added - Ten 12' diameter units in operation
- Existing Grit System to be upgraded
- Route flow to Eutek HeadCell System after the fine screens

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OPTION 2 PRELIMINARY SITE LAYOUT DRAWING

Figure 4-4

4.2.3 Advantages and Disadvantages

Advantages of pursuing Option 2 and completing the recommended improvements to achieve an appropriate level of operational reliability are listed in the Table 4-3.

Table 4-3 Option 2 Advantages & Disadvantages

Advantages	Disadvantages
• New coarse screening systems • Reduces the amount of debris entering the GRUs • Reduces the risk of clogging grit piping and pumps • Increased system reliability • Maximizes grit capture and minimizes pass-through	• Increased maintenance with additional screenings system online • Training required for O&M of the new Eutek technology • Increased maintenance with additional grit system online • Incompatible with existing GRU configuration • Increased footprint requirements • Proprietary design, sole source equipment

Option 2 addresses the root causes of the grit system problems by increasing system reliability and reducing the amount of debris entering the GRUs, which reduces the risk of clogging grit piping and pumps. It also improves overall grit removal by providing two GRU systems, the improved primary system and a new secondary system, to collect any remove carry-over grit that bypasses the primary grit removal process.

4.2.4 Budgetary Opinion of Probable Construction Costs

Estimated budgetary project costs associated with Option 2 are presented in Table 4-4. Costs for Option 2 include up-front capital investment associated with the recommended critical reliability improvements. Additional details are provided in Appendix E.

Table 4-4 Option 2 Budgetary Opinion of Probable Construction Costs

Item	Construction Costs[1]
First-Stage Mechanical Screen Equipment (includes washer/compactors, building, channel modifications, and influent splitter box modifications)	$ 3,070,000
Second-Stage Mechanical Screen Equipment	$ 3,180,000
Washer Compactor	$ 360,000
Conveyors	$ 850,000
GRU Unit 1 Rehabilitation	$ 150,000
GRU Unit 2 Rehabilitation	$ 90,000
GRU Unit 3 Rehabilitation	$ 90,000
GRU Unit 4 Replacement	$ 250,000
GRU V-FORCE Baffles	$ 250,000
S&L Quarterly Service Contract (5 yrs Labor Only)	$ 240,000
Fine Screen Equipment Modification (4mm)	$ 530,000
Eutek HeadCell® System	$ 7,640,000
Earthwork	$ 180,000
Concrete	$ 2,810,000
Retaining Wall	$ 150,000
Total Construction Costs:	**$ 19,840,000**

1. Cost estimates are in 2013 dollars.

4.3 Option 3 – Coarse Screen Improvements & New GRU System

The two-stage coarse screen improvements recommended in Option 2 would also be implemented in Option 3. Additionally, the existing GRU systems would be replaced with the Eutek HeadCell® system discussed in Option 2. A pilot study to determine grit removal capabilities, efficiency, and performance of the Eutek system is recommended but was not conducted as part of this study. Furthermore, the existing fine screens will be rehabbed in place as part of this option.

Coarse screened effluent would bypass the existing GRUs (abandon in-place existing GRUs) to a new facility hosting the Eutek HeadCell® system as shown in Figure 4-5. This new facility would be constructed east of the existing GRU facility, requiring the leveling of a portion of the neighboring hill to maintain the current hydraulic profiles and the construction of a retaining wall to support the remaining portion of the hill.

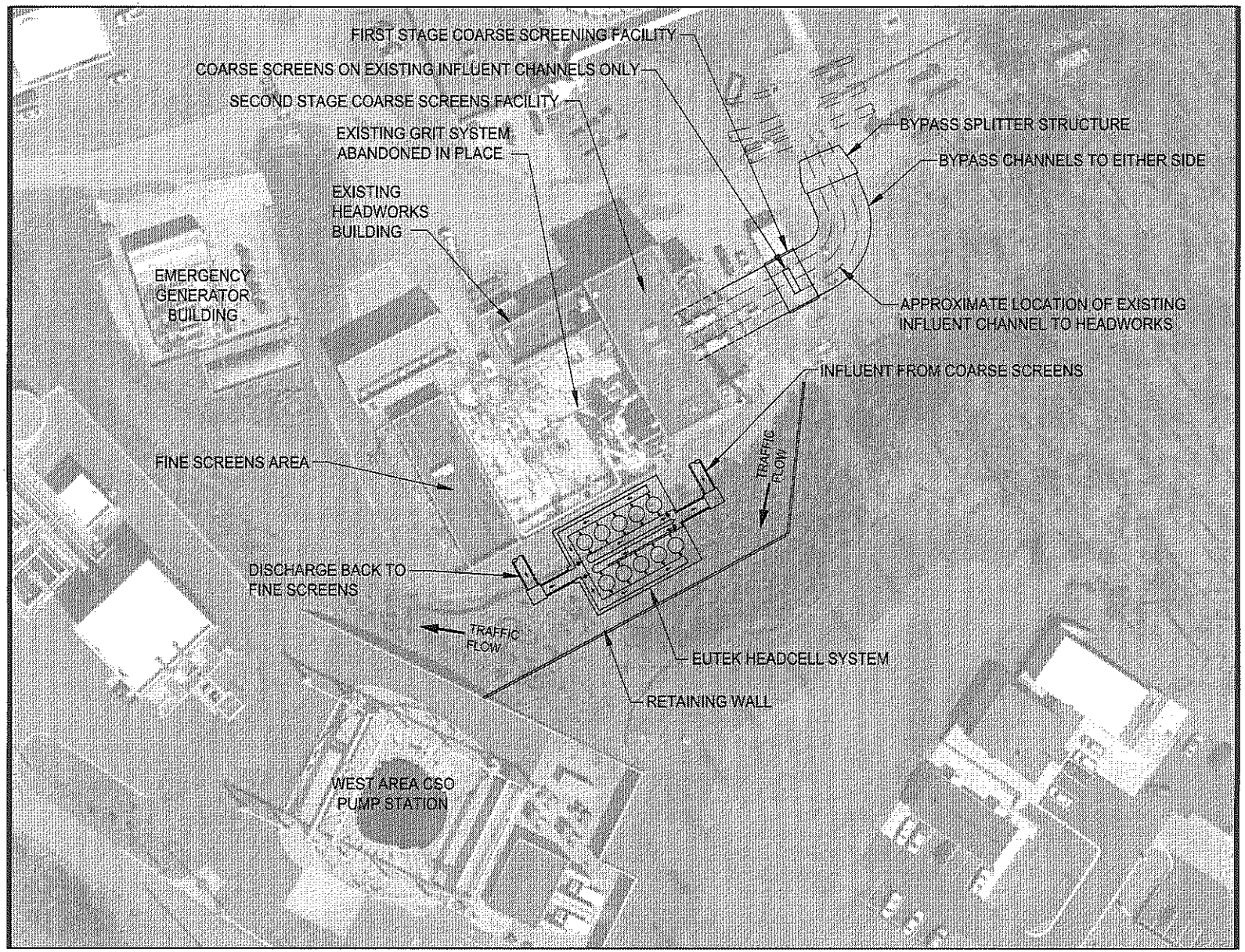
4.3.1 Advantages and Disadvantages

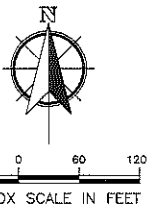
Advantages and disadvantages of pursuing Option 3 and completing the recommended improvements to achieve an appropriate level of operational reliability are listed in the Table 4-5.

Table 4-5 Option 3 Advantages & Disadvantages

Advantages	Disadvantages
• New coarse screening systems • Reduces the amount of debris entering the GRUs • New grit system • Increased system reliability • Maximizes grit capture and minimizes pass-through • No drive shaft required	• Increased maintenance with additional screenings system online • Training required for O&M of the new Eutek technology • Increased maintenance with additional units needed • Incompatible with existing GRU configuration • Reduced hydraulic through-put capabilities per unit • Increased footprint requirements • Proprietary design, sole source equipment

Option 3 addresses the root causes of the grit system problems by increasing system reliability and reducing the amount of debris entering the GRUs, which reduces the risk of clogging grit piping and pumps. It also improves overall grit removal by providing finer grit removal with a new GRU system.





OPTION 3:

- New 1" coarse screens to be added to existing influent channels only
- New Eutek HeadCell System added - Ten 12' diameter units in operation
- Route flow to Eutek HeadCell System after the coarse screens and return flow to the Headworks before the fine screens
- Existing grit system will be abandoned in place

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OPTION 3 PRELIMINARY SITE LAYOUT PLAN

Figure 4-5

4.3.2 Budgetary Opinion of Probable Construction Costs

The estimated budgetary project costs associated with Option 3 are presented in Table 4-6. Costs for Option 3 include up-front capital investment associated with the recommended critical reliability improvements. Additional details are provided in Appendix E.

Table 4-6 Option 3 Budgetary Opinion of Probable Construction Costs

Item	Construction Costs[1]
First-Stage Mechanical Screen Equipment (includes washer/compactors, building, channel modifications, and influent splitter box modifications)	$ 3,220,000
Second-Stage Mechanical Screen Equipment	$ 3,320,000
Washer Compactor	$ 370,000
Conveyors	$ 890,000
Eutek HeadCell® System	$ 7,960,000
Fine Screen Equipment Modification (4mm)	$ 560,000
Earthwork	$ 560,000
Concrete	$ 2,930,000
Retaining Wall	$ 150,000
Total Construction Costs:	**$ 19,960,000**

1. Cost estimates are in 2013 dollars.

4.4 Option 4 - New 240 MGD Headworks Facility

Under Option 4, a new 240 MGD headworks facility would be constructed in the area east of the existing headworks. This new facility would include two-stage coarse screening system with 1-inch bar spacing followed by mechanical bar screens with ½ -inch spacing. Both systems will operate using speed controls that vary based on level or headloss. New screening conveyor/compactor equipment described in Option 1 and 2 will also be installed. The mechanical screening would be followed by new fine screens (4 mm opening size) and the Eutek HeadCell® system described in Option 2. BGR recommends revising the plant process flow through the preliminary treatment equipment to optimize removal of screenings, both coarse and fine, prior to grit removal. A preliminary site layout drawing is provided in Figure 4-6.

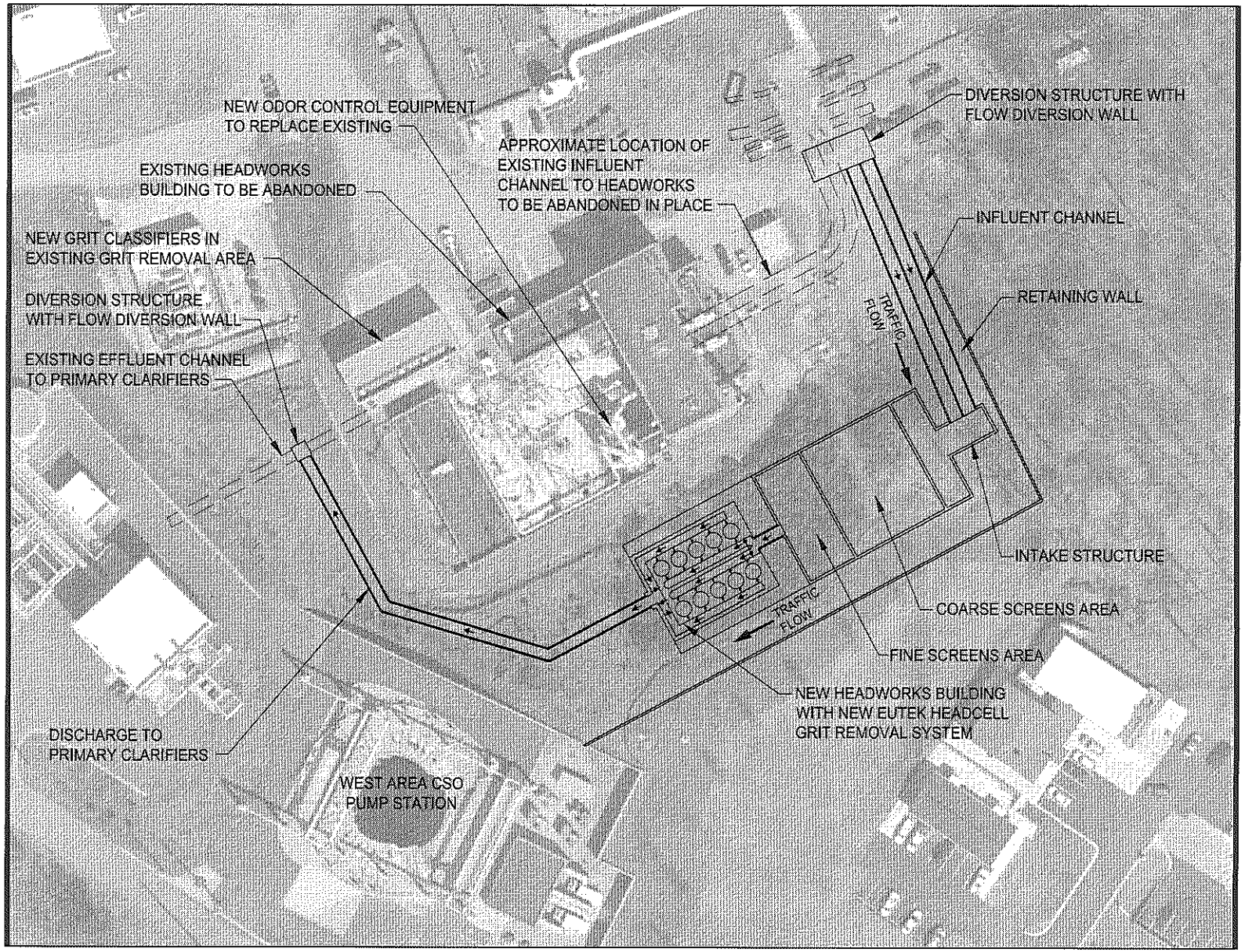
4.4.1 Advantages and Disadvantages

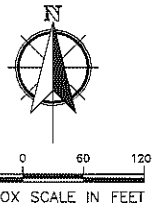
Advantages of pursuing Option 4 and completing the recommended improvements to achieve an appropriate level of operational reliability are listed in the Table 4-7.

Table 4-7 Option 4 Advantages & Disadvantages

Advantages	Disadvantages
• Improved process flow through preliminary treatment system • Improved hydraulic flow distribution to the GRUs • Provides new headworks system with state-of-the-art equipment and configuration	• Increased maintenance with additional screenings system online • Training required for O&M of the new Eutek technology • Increased maintenance with number of grit units required • Reduced hydraulic through-put capabilities per unit • Increased footprint requirements • High capital cost • Proprietary design, sole source equipment

Option 4 addresses the root causes of the grit system problems by providing new state-of-the-art equipment for the headworks facility. All equipment will be designed to industry standard practices and will improve primary treatment at the plant.





OPTION 4:

- Dual coarse screening capability
- Build new Headworks
- New Eutek HeadCell System added - Ten 12' diameter units in operation
- Keep existing Headworks in service until the new Headworks facility is brought on-line
- Abandon existing Headworks in place
- New odor control equipment
- New grit classifiers

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OPTION 4
PRELIMINARY SITE LAYOUT DRAWING

Figure 4-6

4.4.2 Budgetary Opinion of Probable Construction Costs

Estimated budgetary costs associated with Option 4 are presented in Table 4-8. These costs include up-front capital investment associated with the recommended critical reliability improvements. It also improves overall grit removal by providing finer grit removal with a new GRU system. Additional details are provided in Appendix E.

Table 4-8 Budgetary Opinion of Probable Construction Costs

Item	Construction
First-Stage Mechanical Screen Equipment (includes washer/compactors)	$ 1,280,000
Second-Stage Mechanical Screen Equipment	$ 3,150,000
Washer Compactor	$ 350,000
Conveyors	$ 840,000
Eutek HeadCell® System	$ 7,560,000
Fine Screen Equipment (4mm)	$ 9,450,000
Earthwork	$ 880,000
Concrete	$ 1,000,000
Retaining Wall	$ 350,000
New Headworks Building	$ 6,620,000
Total Construction Costs:	**$ 31,480,000**

1. Cost Estimates are in 2013 dollars

5.0 Conclusions and Recommendation

5.1 Conclusions

The conclusions from this assessment are as follows:

- In general, the overall design of the GRU's complies with industry standard practices.
- The primary root-cause of grit issues at RMCWRC appear to be due to insufficient maintenance of the GRUs.
- Significantly increased grit loading correlates with wet weather events.
  - Based on operation reports for grit hauling and influent plant flow, the frequency of grit disposal correlates with wet weather events; however, the magnitude of grit disposal (on a weight basis) does not appear to correlate with increased flows. This can be attributed to the reduced performance of GRUs at increased flows. Grit disposal would be expected to increase proportionally with increased flows if the GRUs were performing as designed.
  - While plant staff have indicated that the increased grit loading during wet weather events appears to originate from Nancy Creek Tunnel, characterization of the grit sources under various flow conditions were not conducted as part of this study. Therefore, the specific source of increased grit loading to the plant cannot be confirmed.
- Reduced performance of the GRUs is compounded by the large opening size of the coarse screens allowing screenings and debris to enter the GRU's The 1-inch bar spacing of the coarse screens does not meet the recommended standard of design of $\leq$0.75-inch screen openings prior to grit removal.
- Existing coarse screenings conveyors and rampactors/washers appear to be undersized based on plant staff indication of screenings overloads associated with wet weather.
- Two of the four GRUs were not operational during all BGR's site visits.
  - The non-operational GRUs (No. 1 and No. 4) have equipment missing; however, it appears that operations staff have continued to allow flow to pass through the units. Grit has been allowed to accumulate in GRU No. 1 up to 7-9 feet deep.
- GRU isolation gates do not provide a complete isolation. The gates have a gap between the top of gate and top of channel wall which allows wastewater to flow over and backflow into the GRUs.

BGR has evaluated four options to improve the preliminary treatment at RMCWRC. Table 5-1 presents a summary of the budgetary-level construction cost estimates associated with each of these options.

Table 5-1 Summary of Budgetary-Level Construction Cost Estimates

Option	Construction Costs[1]
1	**$ 6,610,000**
2	**$ 19,840,000**
3	**$ 19,960,000**
4	**$ 31,480,000**

1. Cost estimates are in 2013 dollars

5.2 Recommendations

Based on the evaluations by BGR and manufacturers of the headworks systems presented in this TM, BGR recommends the City move forward with a two-phased approach, short-term and long-term, to improve performance and reliability of the preliminary treatment processes at the plant. BGR recommends the City implement Option 1 immediately and move forward with Option 2 as the long-term solution.

5.2.1 *Short-term Improvements: Option 1- Implement Critical Reliability Improvements.*

- Replace the existing coarse screening equipment.
  - Reduce the coarse screen opening size to ½ -inch to capture a greater amount of material and reduce the non-grit material loading to the GRUs.
  - Install continuously traveling, variable or two-speed mechanical bar screens.
- Replace the screenings conveyors to alleviate capacity issues with the current shaft-less screw conveyors.
  - Belt conveyors or sluicing troughs will be considered in order to increase capacity and provide ease of maintenance of the conveyor system.
- Replace rampactors with new compactors/washer system sized for increased screenings loadings associated with the ½ -inch screen opening size and new conveyors.
- Replace GRU isolation gates to provide complete isolation of a unit.
- Develop and implement standard maintenance practices based on manufacturer's recommendations and equipment/parts.
- Repair the existing GRUs according to S&L's recommendations and upgrade the system to the configuration currently offered by S&L for new units (e.g.

install the V-Force baffle system in order to improve the grit capture to 95% of 140-mesh (105 micron) size particles at peak design flow rate).

- S&L's recommendations from Section 3.4 and Appendix C are summarized as follows:

  GRU #1:

  - One (1) Air Compressor for the Pinch Valve.
  - One (1) Vacuum pump.
  - One (1) Suction Weld Assembly.
  - One (1) SONIC START® STREAMLINE™ explosion proof kit (depending on code)
  - One (1) Drive motor for the gear reducer
  - One (1) Vacuum priming panel or the repair of the one on site.
  - One (1) Rotating Assembly
  - 316 SST V-FORCE™ Baffles

  GRU #2:

  - One (1) Air Compressor for the Pinch Valve.
  - One (1) Vacuum pump.
  - One (1) Suction Weld Assembly.
  - One (1) SONIC START® STREAMLINE™ explosion proof.
  - One (1) Vacuum priming panel or the repair of the one on-site.
  - 316 SST V-FORCE™ Baffles.

  GRU #3:

  - Suction Weld Assembly
  - One (1) Air Compressor for the Pinch Valve.
  - One (1) Vacuum pump.
  - One (1) Suction Weld Assembly.
  - One (1) SONIC START® STREAMLINE™ explosion proof.
  - One (1) Vacuum priming panel or the repair of the one on-site.
  - 316 SST V-FORCE™ Baffles.

  GRU #4:

  - Total equipment replacement and the addition of the 316 SST V-FORCE™ Baffles.

- Consider a preventive maintenance contract with S&L for a finite period of time with grit removal performance guarantee qualifiers associated with the PM contract.

- Modify the drum fine screen operation from manual to automatic based on differential level controls – similar to the coarse screens. Automatic operation will prolong the life of the equipment.
- Modify the fine screens to a 4 mm screen opening size (existing is 6 mm) and repair the existing drum fine screens as recommended by Ovivo.

5.2.2 *Long-term Improvements: Option 2 - Option 1 Plus First Stage Coarse Screening System and New GRU System Downstream of Fine Screens*

Option 2 includes recommendations presented in Option 1, plus the addition of a first-stage coarse screening system and new Eutek HeadCell® GRU system downstream of fine screens to provide additional grit removal.

- Addition of a first-stage coarse screening system with continuously traveling, variable or two-speed mechanical bar screens with 1-inch opening size followed by the second-stage screens with ½ -inch opening size (Option 1)
- Addition of isolation gates in the influent junction box to provide complete isolation of a unit.
- Modifications to the existing influent channels and headworks building to tie-in the new second-stage screening system.
- Develop and implement standard maintenance practices based on manufacturer's recommendations and equipment/parts.
- Repair the existing GRUs and modify the existing fine screens as recommended in Option 1 (short-term improvements)
- Addition of the Eutek Headcell® system downstream of fine screens to remove 95% of all grit particles greater than or equal to 105 microns at a peak flow

The technical analysis and cost estimates described in this memo are preliminary in nature. Further technical development of Option 1 and Option 2 will be determined during the engineering phase, and the cost will be refined to account for a more detailed design.

APPENDIX A

Existing Grit Removal System Specifications

SECTION 11325
GRIT PUMPING AND CLASSIFICATION EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Furnish all labor, materials, equipment, and incidentals required and install, test, and place into operation the grit pumping and classification equipment, complete and ready for operation as shown on the Drawings and as specified.

B. The grit pumping and classification equipment shall be provided as an integrated operating system by a single manufacturer who is assigned unit responsibility as specified in Section 01600, GENERAL MATERIAL AND EQUIPMENT REQUIREMENTS, and shall include the following subsystems:

1. Installation of a spoiler, inlet baffle (straightening vane), and other channel modifications at the existing vortex grit collectors as recommended by the equipment manufacturer.

2. New drive unit, new drive tube with propeller and fluidizer, and grit storage hopper plate for the existing vortex grit collectors.

3. Grit pump mounted on top of the vortex grit collectors, complete with suction piping, vacuum priming system, and pinch valve.

4. Controls to vacuum-prime the grit pump.

5. Grit concentrator.

6. Grit classifier (dewatering screw conveyor).

1.02 QUALITY ASSURANCE

A. The grit collection, pumping, and classification equipment shall be designed, fabricated, assembled, and tested by a single manufacturer and shall be provided as a system.

B. The manufacturer shall be Smith & Loveless or equal.

C. Manufacturer's Services.

1. Furnish minimum of five (5) site trips at a minimum of fourteen (14) days total of qualified manufacturer's representative at the jobsite for inspection, testing, equipment start-up, certification of the installation, and training of Owner's personnel. Should difficulties arise due to manufacturer's faulty design or fabrication, additional services shall be provided at no cost to the Owner.

D. Extended Warranty: The manufacturer shall provide a warranty, as described in Section 00700, GENERAL CONDITIONS, for five (5) years.

1.03 SUBMITTALS

A. Submit the following Product Data in accordance with Section 00700, GENERAL CONDITIONS.

1. Descriptive literature, bulletins, and/or catalog cuts for the equipment, including the following:

   a. Complete bill of materials listing each component and its material of construction.

   b. Equipment performance data.

      1) Submit factory test data demonstrating full compliance with performance requirements specified.

      2) For pumps, include pump characteristic curves showing total head in feet versus flow rate in gpm, efficiency, brake horsepower, and required NPSH for the entire operating range from shut-off to manufacturer's maximum recommended flowrate. Separately note minimum and maximum recommended flow rate.

      3) Top-mounted Turbo Pump sizing calculations, including calculations to establish pump total dynamic head pressure and motor horsepower.

   c. Equipment motor horsepower and motor and drive RPM, and calculations and procedures used for their selection.

   d. Motor catalogue cut sheets and data sheets.

   e. Drive catalogue cut sheets and data sheets.

   f. Recommended instrumentation and other appurtenances with catalogue cut sheets.

   g. Schematic electrical wiring diagram and electrical controls information. See Division 13 and Division 16 for additional requirements.

   h. Operating description and recommendations, such as frequency of operation.

   i. A list of scheduled maintenance.

   j. Detailed description of procedure(s) to replace major wear items, including liners and rotating elements.

k. Vibration characteristics, including typical and maximum allowable vibration levels during operation.

l. A list of special tools and manufacturer's spare parts required for installation and normal operation and maintenance for two (2) years. Special tools and spare parts shall be provided with the equipment.

m. Coating manufacturer's technical data sheet(s) for factory and field applied coating systems.

2. Drawings showing all important dimensions and details of construction and installation, including the following:

a. Assembly of equipment and motor, including component parts.

b. Interface connections dimensioned to a common location.

c. Disassembly clearances.

d. Size, weight, and lifting details of major components.

e. Details and dimensions of baseplate(s), anchor bolt size and locations, foundation loading, and other foundation requirements.

3. Certificate of Compliance with qualification requirements as specified herein, including reference list.

4. Certificate of Unit Responsibility in accordance with Section 01600, GENERAL MATERIAL AND EQUIPMENT REQUIREMENTS.

B. Submit the following Manufacturer's Certificates in accordance with Section 00700, GENERAL CONDITIONS:

1. Manufacturer's certified factory test reports, as specified herein.

2. Manufacturer's certified field test reports, as specified herein.

3. Manufacturer's Certificates in accordance with Section 01600, MANUFACTURER'S FIELD SERVICES: Proper Installation; Functional Test Acceptance; Performance Test Acceptance; and Unit Responsibility.

4. Contractor's Certificate of Equipment Start-Up Readiness.

C. Submit Operations and Maintenance Manuals in accordance with Section 00700, GENERAL CONDITIONS for all products specified under this section.

PART 2 - PRODUCTS

2.01 GENERAL

A. See Section 01600, GENERAL MATERIAL AND EQUIPMENT REQUIREMENTS for additional requirements.

B. Pump characteristic curves shall rise steadily from the design point to shutoff. Pumps shall operate free of excessive vibration and hydraulic instability from maximum recommended flowrate to shutoff head

C. Equipment design shall be such that all critical speeds shall be at least 25% greater than operating speeds.

D. The equivalent "A" weighted sound pressure level of combined motor and driven equipment shall not exceed 85 dBA free field measured 3-feet horizontally from the base of the equipment and 5-feet above floor level.

E. Provide special tools and manufacturer's spare parts required for installation and normal operation and maintenance for two (2) years. Provide following minimum spare parts.

1. Two-year supply of lubricants, including summer and winter grades.

2. Vortex Grit Collector Drive and Drive Tube:

    a. One set of radial and thrust bearings for the gear reducer.

    b. 2 sets of all gaskets.

3. Top-Mounted Grit Pump: Provide one (1) spare pump and motor assembly.

4. Grit Cyclone Concentrator:

    a. 2 sets of all gaskets.

    b. Provide one (1) spare concentrator.

5. Grit Classifier:

    a. 1 set of drive bearings.

    b. 1 set of oil seals and gaskets.

    c. 2 lower bearing assemblies.

    d. 2 sets of all gaskets.

    e. 1 drive belt.

    f. 1 lock bushing.

    g. 1 set of trough liners.

2.02 MANUFACTURERS

A. Smith & Loveless Model 70 grit removal system with top-mounted Turbo Pump Model 6C3H, and Model 17 screw conveyor (dewatering grit classifier).

B. Or equal.

2.03 QUANTITY

A. Four.

2.04 PROCESS MATERIAL CHARACTERISTICS

A. Influent flow to the vortex grit collectors consists of coarse-screened (nominal 1-inch bar openings), combined-sewer, municipal wastewater which may contain gross waste solids, rags, vegetable parts, petroleum products, industrial solvents, animal fats, and oils in addition to large quantities of grit, including gravel, sand, mud, cinders, and heavy organic particles such as egg shells, seeds, bone chips, and coffee grinds.

B. Manufacturer shall verify that all wetted materials are compatible with the process material.

2.05 EQUIPMENT COMPONENTS/MATERIALS AND PERFORMANCE REQUIREMENTS

A. Modify existing vortex grit collection system to meet the following minimum requirements. Operation shall be suitable for 24 hours per day, 7 days per week continuous operation.

B. General: Equipment components and materials shall be manufacturer's standard for service, except as modified herein.

1. Electrical and Instrumentation: See Division 13 and Division 16 for additional requirements.

   a. Conform to National Electrical Code (NEC).

   b. Conform to National Electrical Manufacturers Association (NEMA).

   c. Electrical insulation shall be suitable for 600-volts, although operating voltages may be less.

   d. Motors and Controls:

      1) Not in New Dewatering Bldg: Totally enclosed, rated Class 1, Division 1 and NEMA 7, as applicable.

      2) In New Dewatering Bldg: Totally enclosed and NEMA 4X, as applicable.

   e. Equipment Power Supply: 460-volts, 3-phase, 60-hertz.

   f. Controls Power Supply: 120-volts, 1-phase, 60-hertz

2. Drives:

   a. AGMA Class II.

   b. Designed to transmit at least the rated motor torque.

   c. Designed to withstand all probable peak torques from starting, braking, jams, back driving, vibration, etc.

   d. Service Factor at Standard Operating Speeds: 5.0 or greater.

3. Bearing Life:

   a. Turntable bearing supporting propeller assembly: B-10 life of 20 years.

   b. All other bearings: B-10 life of 50,000 hours.

4. Equipment Structural Elements, including Supports: Designed and provided by equipment manufacturer. Provide manufacturer's recommended skid or baseplates, as applicable.

5. Safety Guards: Provide appropriate and OSHA required safety guards for protection of personnel from all exposed moving and/or rotating machine elements.

6. Miscellaneous Trim: Provide all miscellaneous trim, including instrumentation, access port(s), any flushing or lubrication piping, safety accessories, mounting brackets, pipe supports, etc., for a complete and operable system.

   a. All hardware, including bolts, washers, nuts, etc., shall be Type 316 stainless steel.

7. Equipment Tagging. Equipment shall be provided with a solidly attached, Type 316 stainless steel, permanent tag which includes the manufacturer, the model, capacity, horsepower, RPM, voltage, and the manufacturer's serial number.

8. Provide lifting lugs for all items weighing over 100 pounds.

C. Modifications to Existing Vortex Grit Collector Channel:

1. Modify existing vortex grit collector channel and chamber, including installation of a Coanda ramp and inlet baffle, as recommended by manufacturer.

2. Submerged and/or wetted metals shall be Type 316 stainless steel.

D. Replacement of Vortex Grit Collector Equipment:

1. Provide new drive, drive tube assembly, propeller, and bottom fluidizer, made of Type 316 stainless steel.

2. Rated Capacity: 70 mgd peak.

3. Motor Horsepower: 2hp/ 460V/ 3phase. The connected load shall not exceed the motor nameplate rating under any operating condition

4. Maximum Actual Drive Output RPM: 20.

5. 95% removal efficiency of 50 mesh grit or larger having a 2.65 specific gravity.

6. 85% removal efficiency of 50 to 70 mesh grit having a 2.65 specific gravity.

7. 65% removal efficiency of 70 to 100 mesh grit having a 2.65 specific gravity.

8. Maximum headloss: ¼-inch.

9. Drive Head Housing: Cast iron.

10. Gears: Machined and hardened alloy steel. Spur gear pinion cut from heat-treated steel.

11. Hopper Plate: To cover the grit storage hopper. Provided in two sections with lifting slots to permit access to hopper.

E. Top-Mounted Turbo Grit Pump:

1. Manufacturer's recommended pump for this application mounted directly to the top of the vortex grit collector with Type 316 stainless steel, 4in. pump suction tube mounted through the center of the drive tube.

2. Rated Capacity: 500 gpm at total dynamic head pressure to be determined by manufacturer using specific gravity of 1.4 for grit slurry.

3. Discharge Size: 6 inches, flange with ANSI B16.1 125# drilling.

4. Minimum Passing Sphere: 4 inches diameter.

5. Suction Lift Capability: Provide vacuum priming system to meet system requirements.

6. Maximum NPSH Required at Rated Capacity: To meet system requirements.

7. Maximum Horsepower: 30. The connected load shall not exceed the motor nameplate rating under any operating condition.

8. Maximum Speed: 1760 RPM.

9. Ni-Hard construction and impeller.

10. Mechanical seal lubricated by the pumped fluid.

11. Pump Shaft: Solid stainless steel.

12. Vacuum Priming System:

a. To prime grit pump in 60 to 240 seconds.

b. Complete system, including vacuum pump, vacuum control solenoid valve, prime level sensing probe, heater, float operated check valve to prevent liquid from

entering vacuum pump, and associated controls for manufacturer-supplied pinch valve. Provide and install vacuum priming tubing to prevent freezing of water that may condense in the tubing. Vacuum priming tubing shall be UV-resistant.

c. Provide following to interface with existing Plant controls system.

1) Relay dry contact input to initiate start of vacuum priming system.

2) Relay dry contact output from prime level sensing probe to indicate that system is primed and the grit pump can start.

3) Relay dry contact output to provide indication of vacuum priming system failure.

13. Pinch Valve: 6 inches; flanges with ANSI B16.1 125# drilling; pneumatically-controlled; complete with controls located in vacuum priming panel, including solenoid valve and oil-less air compressor.

14. Lifting Stanchion: Manufacturer's standard stanchion with lifting arm to lift pump.

15. Pump discharge pressure switch and gauge with annular seal to be provided under Division 13 (not provided by grit system manufacturer).

F. Grit Cyclone Concentrator:

1. 95% removal efficiency of organic material, such that recovered grit at classifier outlet shall contain less than 5% of organic material.

2. Liquid Capacity: 500 gpm to inlet with a maximum of 50 gpm at outlet (minimum 90% removal of water).

3. Maximum headloss: 18 to 20 feet water column.

4. Inlet Diameter: 4 inches, flange with ANSI B16.1 125# drilling. Actual inner diameter at inlet shall be greater than inner diameter of Class 56 ductile iron piping (i.e., 3.98 inches).

5. Overflow Port: 6 inches, flange with ANSI B16.1 125# drilling; with 180-degree return bend as shown on the Drawings or as recommended by the manufacturer.

6. Materials of Construction: Ni-hard.

G. Grit Classifier:

1. 95% removal efficiency of 150 mesh grit or larger having a 2.65 specific gravity.

2. Liquid Capacity: Suitable for the underflow of the grit cyclone concentrator.

3. Motor Horsepower: 3. The connected load shall not exceed the motor nameplate rating under any operating condition

4. Maximum Motor RPM: 1200.

5. Maximum Drive Output RPM: 9.

6. Materials of Construction: Carbon steel.

7. Trough: 3/16-inch minimum thickness.

8. Flight: High strength carbon steel, 250 minimum Brinell hardness helical screw, 3/16-inch minimum thickness with center shaft.

9. Upper Bearing: Outboard, AFBMA L-10 life of 50,000 hours at maximum load.

10. Lower Bushing: Bronze with external grease fitting.

11. Trough Liners: ½"-thick Xylethon™.

12. Covers: Solid, gasketed, and removable, with odor control connection 3-inches, flange with ANSI B16.1 125# drilling.

13. Water Flushing Connection: 3/8" DIA at upper end, equipped with isolation valve.

2.06 CORROSION PROTECTION

A. Prime and finish coatings:

1. Per Section 09900, PAINTING.

2. Apply at factory.

3. Touch-up in field.

2.07 FACTORY TESTS

A. Perform certified factory tests on Top-Mounted Turbo Grit Pumps in accordance with Hydraulic Institute Standards on pumps actually furnished.

1. Hydrostatic pressure test at 150 psig.

2. Running tests to determine curves of head, input horsepower, and efficiency from shutoff to 150% of Rated Capacity. A minimum of six points, including shutoff, shall be taken for each test run. At least one point of the six shall be taken as near as possible to specified Rated Capacity.

3. Pumps shall operate satisfactorily throughout testing and shall be free of problematic operation, including leaking, overheating, cavitation, and excessive vibration.

B. Manufacturer's standard factory tests on vortex grit collector and grit classifier.

PART 3 - EXECUTION

3.01 GENERAL

A. See Section 01600, GENERAL MATERIAL AND EQUIPMENT REQUIREMENTS for additional requirements.

3.02 INSTALLATION

A. Installation shall be staged and coordinated with the Plant and Section 11314, RECESSED IMPELLER PUMPS so that only one (1) existing vortex grit collector, one (1) grit pump, and one (1) grit classifier is out of service at any given time.

B. Assist in determining appropriate speed setting of pumps installed under Section 11314, RECESSED IMPELLER PUMPS.

C. Coat stainless steel bolts with an anti-galling compound before nut installation. Provide two nuts for each anchor bolt.

3.03 FIELD TESTS

A. Functional Test: Successfully operate equipment as a system for 48-hours minimum.

B. Non-Conforming Equipment: Adjust, modify, or replace non-conforming equipment and repeat Field Tests at no additional cost to the Owner.

+ + + END OF SECTION 11325 + + +

APPENDIX B

BGR Site Visit Field Notes

TECHNICAL MEMORANDUM
Confidential

FROM:	Ken Baker	**TO:**	Chris Haney, P.E.
Cc:	Ron Abraham, P.E.	**DATE:**	September 17, 2012
SUBJECT:	Topic:	R.M. Clayton WRC	
		Task 6.03 – Grit System Assessment	
		Atlanta Wastewater Master Plan	
	GS&P Project No.	27874.05	

An initial site visit by the BGR Joint Venture was performed on August 9, 2012 at the R.M. Clayton Water Reclamation Center (RMCWRC). The primary objective of this site visit is to launch a detailed evaluation of the headworks' processes at this facility and derive engineered solutions to improve the performance of the headworks to remove debris and grit. The headworks processes include coarse barscreens, vortex grit separators, and, rotary drum fine screens.

R.M. Clayton WRC
Headworks

Process	Equipment	Number of Units	Number of Units Operational on 8/9/2012	Rated Hydraulic Capacity (mgd)
Coarse Barscreens	U.S. Filter	4	2	80.0
Vortex Grit Separators	Smith and Loveless	4	2	70.0
Rotary Drum Screens	Brackett Green	3	2	120.0

As noted in the South Area Study – Facility Assessment and Compliance Summary – prepared by the BGR Joint Venture and submitted in May 2012, the condition assessment indicated that the headworks processes at RMCWRC are susceptible to poor performance.

R.M. Clayton WRC
Headworks Condition Assessment

Process	Operating Condition	Comments	Design Guidelines[1]
Coarse Barscreens	• 1-inch bar spacing • 2 of 4 units operating • Single, constant speed rake • 1 of 2 shaft-less screening troughs operating • 1 of 2 rampactors operating	• Plastic floatables smaller than 1-inch in size pass through to the vortex grit units • Constant rake speed maybe too slow to keep screens cleaned during wet weather events • Preventive and routine maintenance is lacking • Rule of thumb: Each 0.5-inch reduction in screen opening size will approximately double the volume of screenings removed	• Protection of downstream processes is best achieved with screen openings of 0.125 to 0.5 inches • Ideal approach velocity is ≥1.3 ft/sec to prevent grit deposits • Wet weather approach velocity is ~3 ft/sec • Recommended velocity through the screen is 2 to 4 ft/sec • Dual controls include timers and differential head measurement • Variable frequency drives or two-speed motor controls
Vortex Grit Separators	• Non-self priming suction lift pumps • Long pipe reach from pista grit units to grit classifiers • 2 of 4 units operating • Grit particles <297-microns in size account for 60.1 to 80.3% of the total grit[2]	• Debris passing through the coarse barscreens can create blockages and loss of pump prime • Grit removal is needed to protect downstream equipment and pumps such as pumps, centrifuges, etc. • High flow events promote scouring of grit accumulated in the Nancy Creek Tunnel and lead to excessive grit loadings during wet weather	• Mechanical Vortex – inlet channel length should be seven times the width of the inlet channel or 15-feet which ever is greater • Inlet channel velocity of 2 to 3 ft/sec or 40 to 80% of peak flow • Minimum acceptable inlet channel velocity is 0.5 ft/sec • Detention time at peak design flow is 20 to 30 seconds • Length of grit pump suction should be minimized and flooded suction should be used whenever

Process	Operating Condition	Comments	Design Guidelines[1]
		• Preventive and routine maintenance is lacking	possible • Minimize horizontal and vertical pipe bends to reduce blockages • Discharge pipe velocities of 3 to 6 ft/sec should be maintained • Discharge piping >4-inches is preferable to avoid high scouring pressures • Grit systems should remove 75% of 150-micron particles
Rotary Drum Screens	• Screens appear to be operating normally • 2 of 3 units operating • Debris accumulation of the drum shaft is indicative of poor screening	• Suspect debris passing through the coarse barscreens and vortex grit units become suspended on the shaft of the rotary drum screens exceeding the rated load capacity of the shaft – this leads to shaft failure	• Coarse screening is recommended prior to fine screening • Grit removal often precedes fine screens

[1] **WEF Manual of Practice No. 8**

[2] **Grit Solutions Study – October 2008**

An inordinate volume of grit is passing through the headworks processes at the RMCWRC. This is validated by the excessive volume of grit captured in the primary clarifiers and sampled in inlet channel conveying flow from the headworks to the primary clarifiers. Excessive grit in the plant is detrimental to the performance of the digesters and the biological processes as they are primarily inert particles that consume volume in these basins. As an abrasive, the excessive grit prematurely wears mechanical processes such as pumps and centrifuges. Annual reconditioning of the waste activated sludge thickening centrifuges is a prime example of the abrasive effects of grit passing through the headworks into the bioreactors and secondary clarifiers.

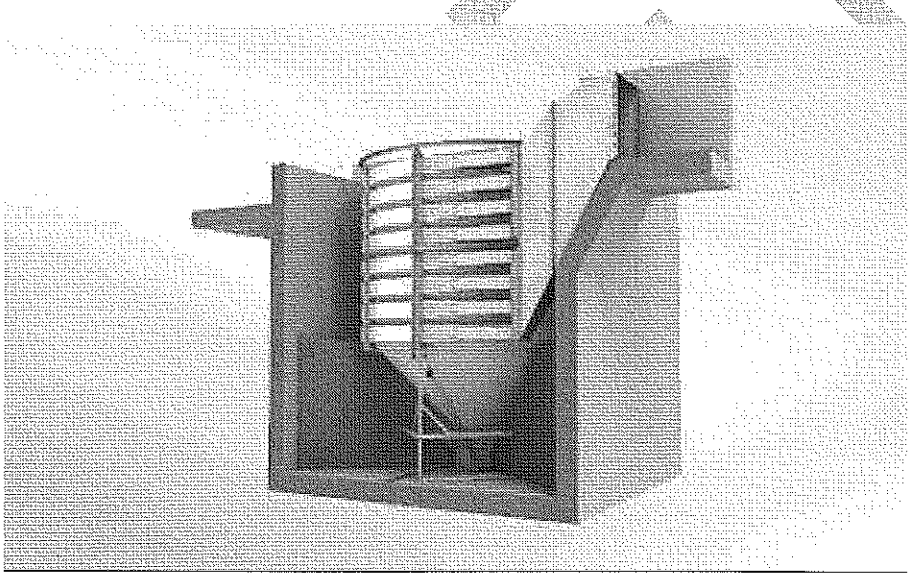
Effective removal of grit at the RMCWRC will require a better understanding of the volume and physical characteristics of the grit contributed by wet weather events and flushing of the Nancy Creek Tunnel. This could include a survey of the combined sewer system feeding the RMCWRC to determine if there is one particular source of grit that is accumulating in the tunnel or multiple sources that is typical of combined sewer systems.

The BGR Joint Venture team proposes a multi-faceted approach to finding a practical but effective solution to improve grit removal at this facility:

Process	Action	Schedule
Coarse Barscreens	• Review design drawings and specifications to assess conformance with accepted design guidelines	October 8 – 12
	• Review current maintenance practices with O&M staff and mutually update Standard Operating Procedures	October 8 - 31
	• Evaluate the physical requirements needed to replace two of the existing 1-inch coarse screens with 0.5-inch screen openings	October 8 - 31
	• Evaluate the cost to retrofit the existing coarse screen motors with VFD's	October 8 - 31
	• Evaluate whether the existing coarse screens can be retrofitted with multiple rakes to improve removal of screenings	October 8 - 31
	• Recommend improvements or replacement of the existing screenings conveyor and	October 8 – November 9

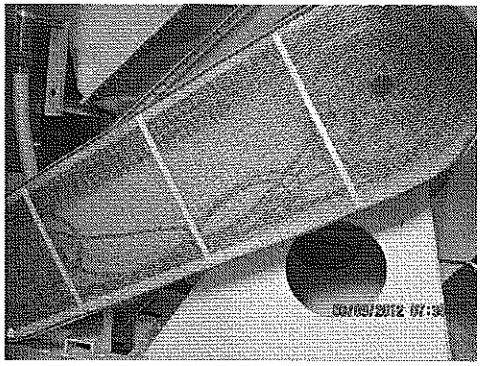
Process	Action	Schedule
	compactor units	
	• Develop costs to refurbish equipment to improve reliability and redundancy	October 8 - 31
	• Finalize report of findings and recommendations	March 2013
Vortex Grit Separators	• Review design drawings and specifications to assess conformance with accepted design guidelines	October 8 - 12
	• Review current maintenance practices with O&M staff and mutually update Standard Operating Procedures	October 8 - 31
	• Retain the services of representatives from Smith and Loveless to provide a detailed assessment of the existing Pista Grit units and recommend solutions in a report to improve the performance of the units	October 8 – November 16
	• Develop a testing protocol for the Eutek Headcell pilot unit	October 8 - 19
	• Secure Eutek Headcell pilot unit and operate it for a minimum of three months to assess its capabilities to efficiently remove grit as compared to the existing Pista Grit system	October - January
	• Finalize report of findings and recommendations	March 2013
Rotary Drum Screens	• Review design drawings and specifications to assess conformance with accepted design guidelines	October 8 - 12
	• Review current maintenance practices with O&M staff and mutually update Standard Operating Procedures	October 8 - 12
	• Assess cost to refurbish the screens	October 8 - 31
Nancy Creek Tunnel and Pump	• Evaluate the hydraulic conditions	October 8 – November 14

Process	Action	Schedule
Station	that contribute slug grit loadings to the headworks during wet weather events – this could include another grit study during wet weather conditions	
	• Update and validate the hydraulic profile from the Nancy Creek Pump Station and Tunnel through the headworks	October 8 - 26
	• Finalize report of findings and recommendations	March 2013

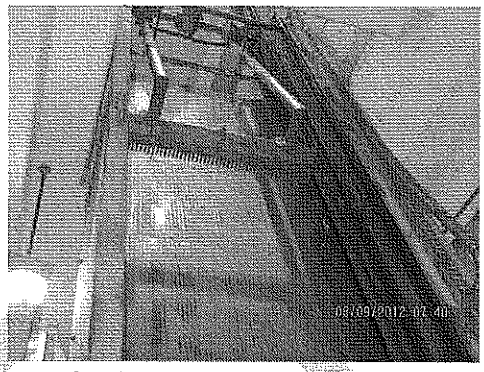


Eutek Headcell

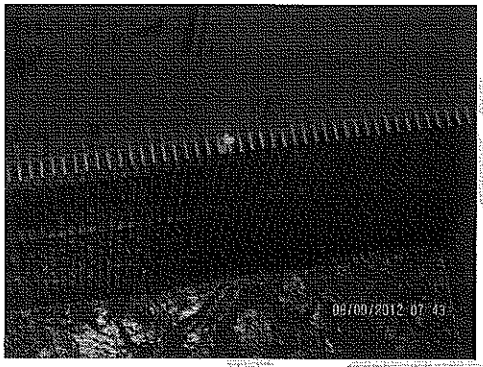
R.M. Clayton WRC
Headworks Photographs
August 9, 2012



Belt Drive for Odor Control Fans

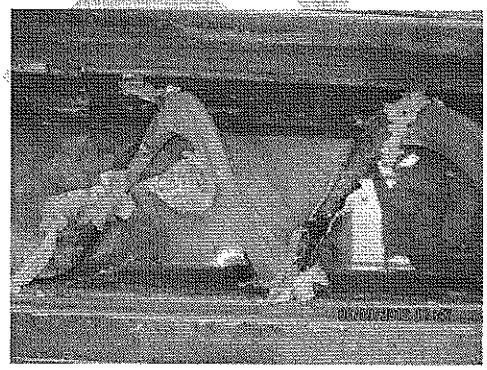


Single Rake Coarse Barscreen

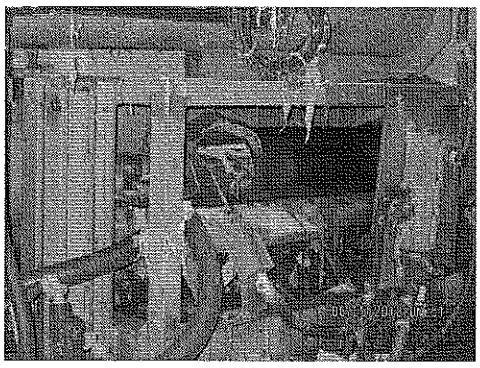


One Inch Bar Spacing

Screening Conveyance Trough

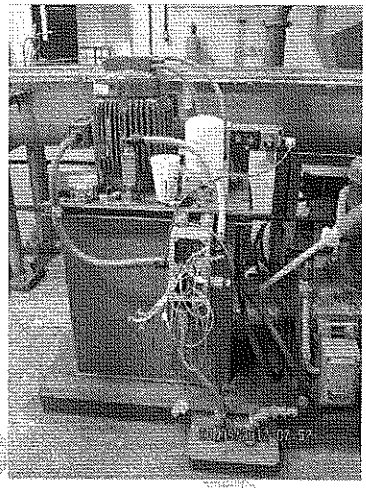


Shaftless Screw Screening Conveyor

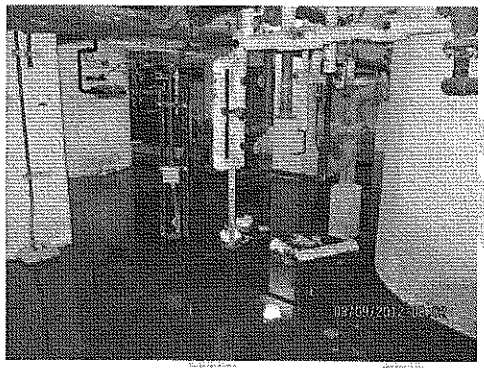


Rampactor

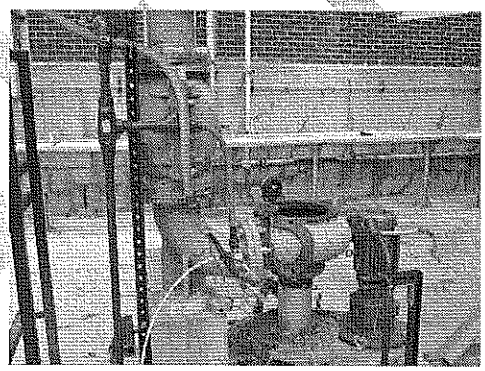
Screw Conveyors



Rampactor Drive Motor

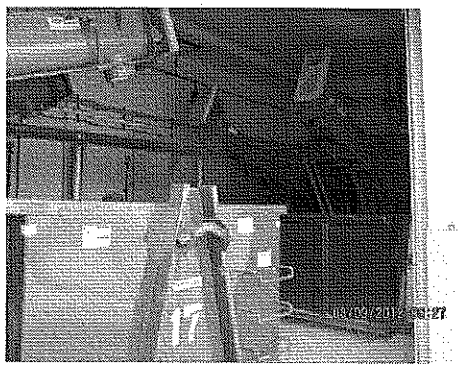


Basement Below Grit Units



Out of Service Suction Lift Pumps

Screen Debris in Rotary Screens



Grit Classifiers

January 9, 2013

FIELD OBSERVATION REPORT

DATES OF OBSERVATION:	January 7, 2013- January 9, 2013
PARTICIPANTS:	Tim O'Brien — BGR Giny Jacob – BGR Ann Blissit – BGR Tim Paulson – S&L
CoA STAFF ATTENDING:	Joe Porter, Bryan Dodson, Freddie, Clarence, Wade

Field Notes:
January 7, 2013:

- Shaftless screw conveyors and liners have been replaced, and both rampactors are operational for the coarse barscreens.
- Two of the four grit chambers are currently in operation.
- CoA staff attempted to drain GRU #1 with a sump pump because the grit pump had been dismantled. The GRU#1 was partially pumped down; however flows increased in the afternoon which overflowed the influent isolation gate allowing wastewater to enter GRU#1. CoA staff noted that the influent gates have a space between the top of the gate and the top of the wall which makes complete isolation of the GRUs difficult during high flows (wastewater flows over the top of the gates during high flows approx. >80 MGD).
- CoA did not allow access into GRU#3 since the plant only has 2 units operational and flows were in excess of a single unit's capacity.
- Access into GRU#1 was not possible due to wastewater accumulation within the unit.
- Photos attached.

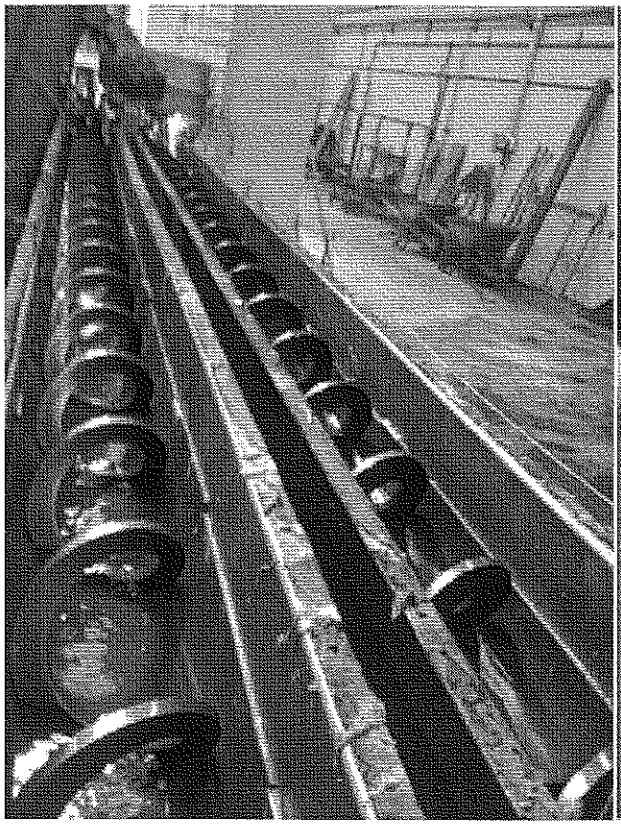
January 8, 2013:

- Tim Paulsen indicated that a typical grit load for sanitary sewer systems is 7-8 ppm; He stated that RM Clayton could potentially have a 14-16 ppm grit loading which could potentially reduce the hydraulic capacity of the units to below 70 MGD (original stated capacity). Tim Paulsen indicated that he would check with his modeling engineers if CFD modeling can be performed on the existing GRUs and if the CFD modeling takes into account grit load to predict removal efficiencies.
- Based on as-built elevation information and measurements, there appears to be approximately 7 feet of grit in GRU#1.
- Photos attached.

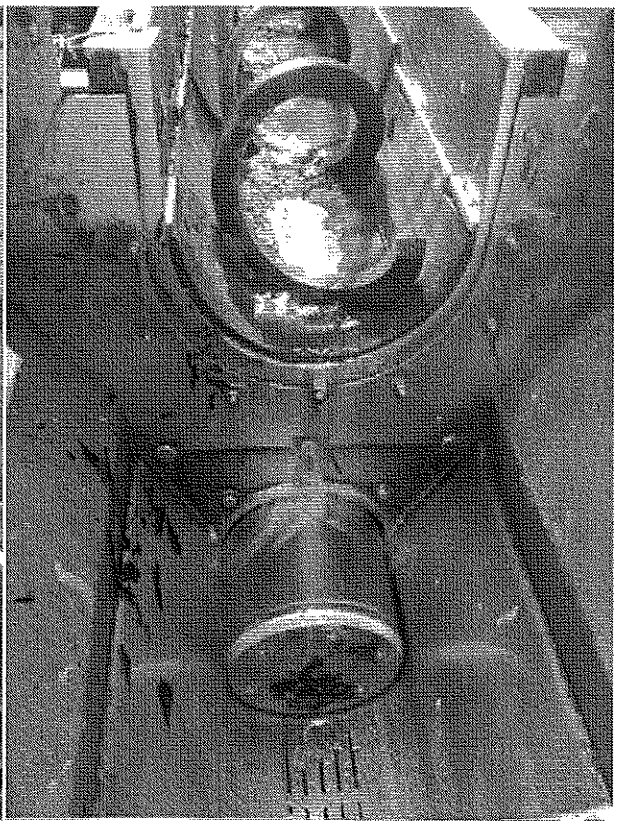
January 9, 2013:

- KleenGuard on site to vacuum grit out of GRU#1 for assessment of S&L equipment.
- Facilities replaced the flooded suction pumps to top mounted pumps in 2006-2007 time frame.
- Pre-2006/2007 flooded suction system had 4" piping with 2 pumps each GRU. The suction piping clogged regularly – particularly when the pumps were cycled. Plant staff also indicated that the impellers of the flooded suction piping experienced excessive wear. No attempt was made to replace the impellers with hardened metal.
- Flow splits from barscreens to grit chambers may not be even; Most of the grit appears to be collected in GRUs #4 and 1.
- GRU#3 paddle motor not functional (plant staff indicate that the potential down time was approximately 2 weeks to 2 months). GRU#2 appears to be the only fully functional chamber.
- GRU#3 suction piping has a hole that has been patched with JB Weld. During the site visit, a pin-hole through the patch prevented the pump from priming. All four GRU suction pipes appear to have been fixed with JB Weld epoxy.
- GS&P discussed with Tim Paulsen the options available for a thicker-walled suction piping and stronger suction weld assembly. Tim Paulsen will determine the options.
- S&L will provide recommended O&M after complete rehab of existing GRUs. The operations will include recommended flow ranges that correspond to the number of GRUs in operation.
- S&L recommends RMC to consider a PM service contract for a specified period of time after the rehab is completed. Additionally, training sessions for O&M should be performed with plant staff.
- Plant staff indicate that the existing HeadCell GRUs on the CSO treatment facility do not perform as designed. Staff did not indicate specific issues with these units however.
- S&L was unable to access GRU#3 to assess the grit patterns.
- Photos attached.

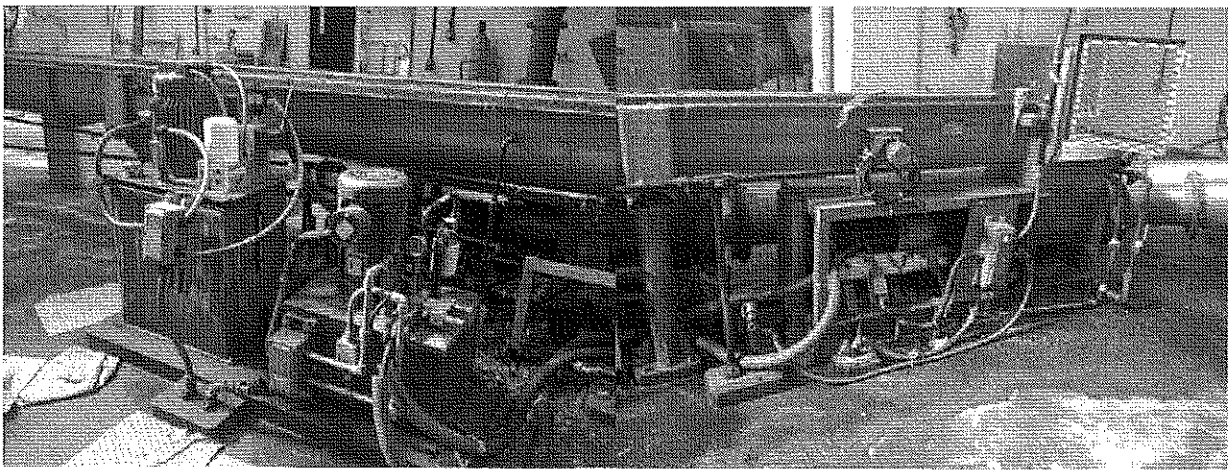
R.M. Clayton WRC Photographs Headworks January 7, 2012



Screening Conveyance Trough

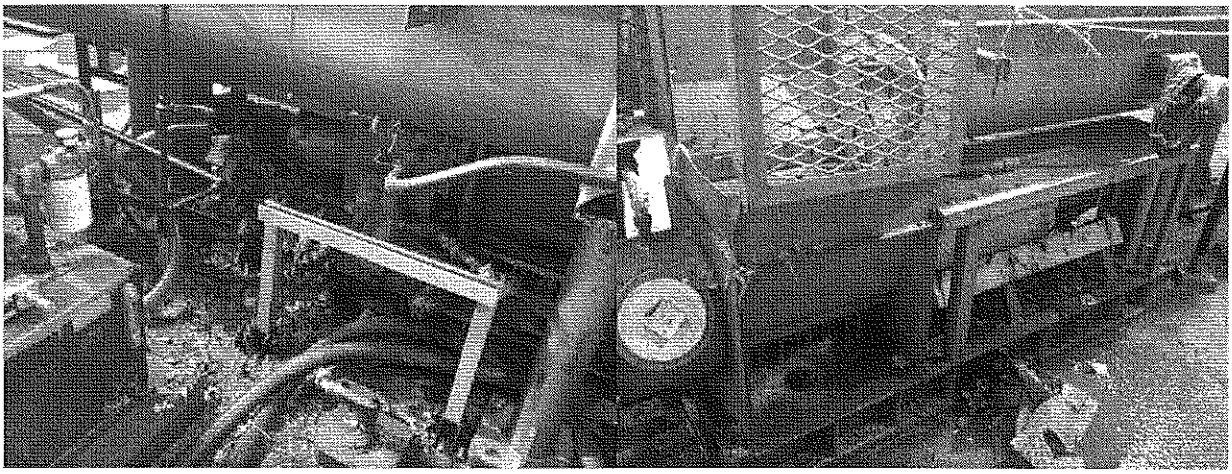


Conveyance Trough Drain & Rampactor



Rampactor Drive Motor

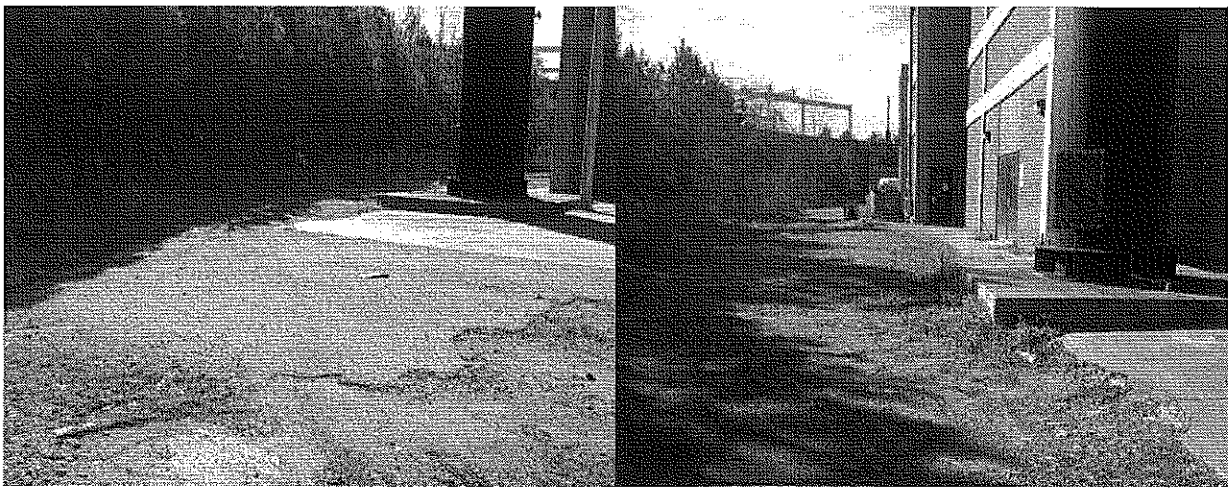
Rampactor (Drive Side)



Rampactor (Drive Side)

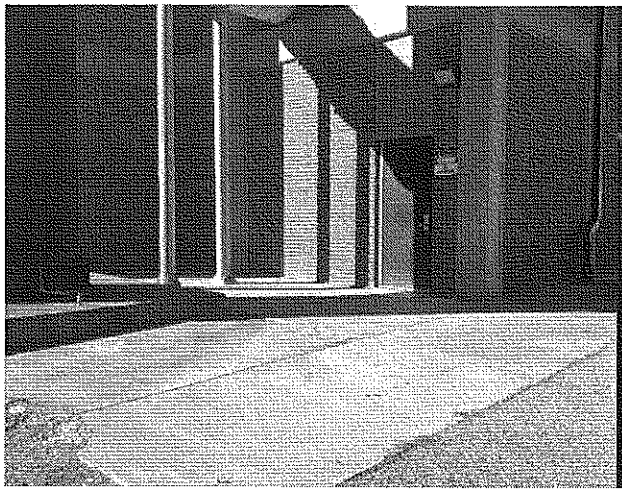
Rampactor (Opposite Side)

R.M. Clayton WRC Photographs Headworks January 8, 2012

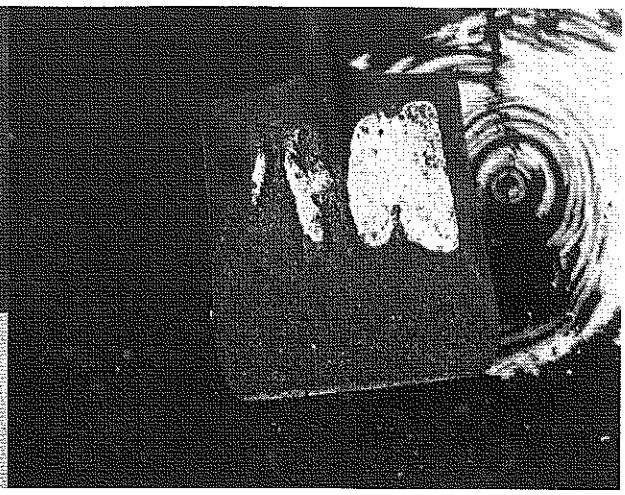


Potential Grit Pilot Site

Rear of Building Access Drive

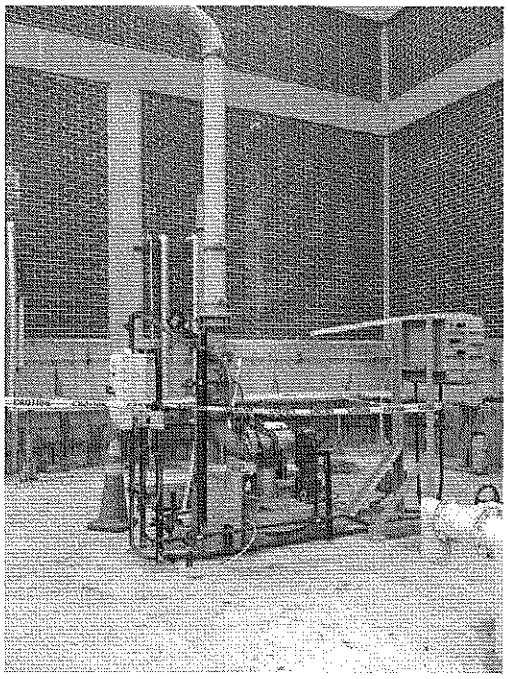


Potential Grit Pilot Site

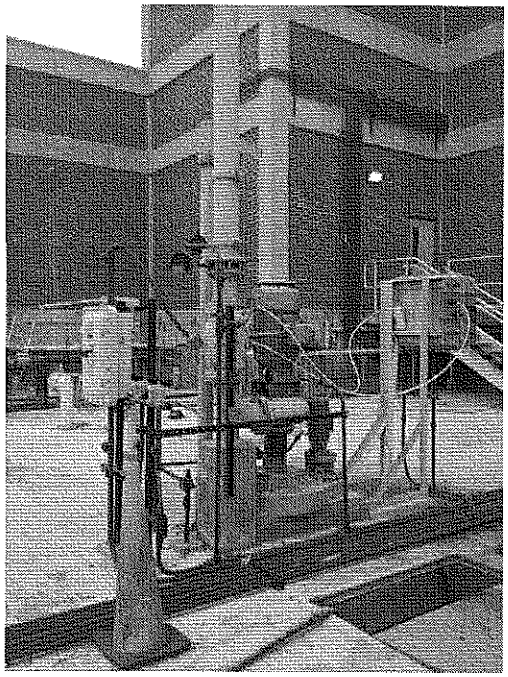


Inside GRU #1

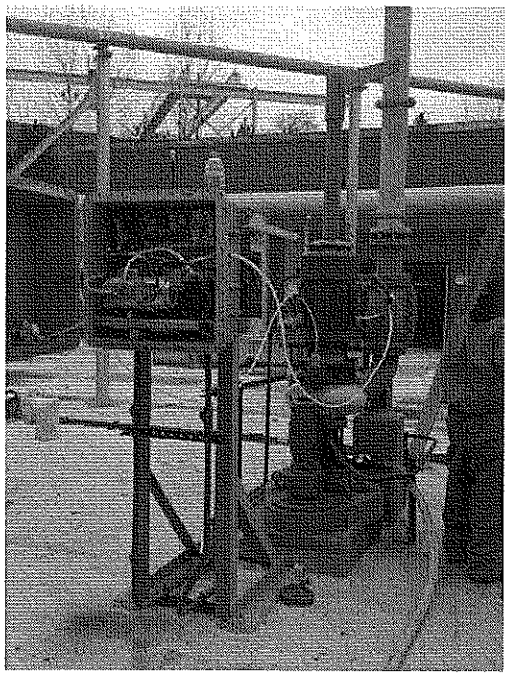
R.M. Clayton WRC Photographs Headworks January 9, 2012

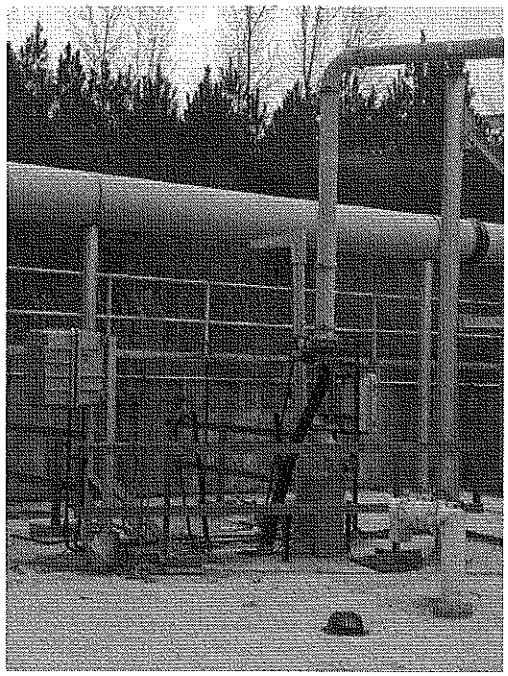


GRU #1 Pump (Dismantled)



GRU #2 Pump

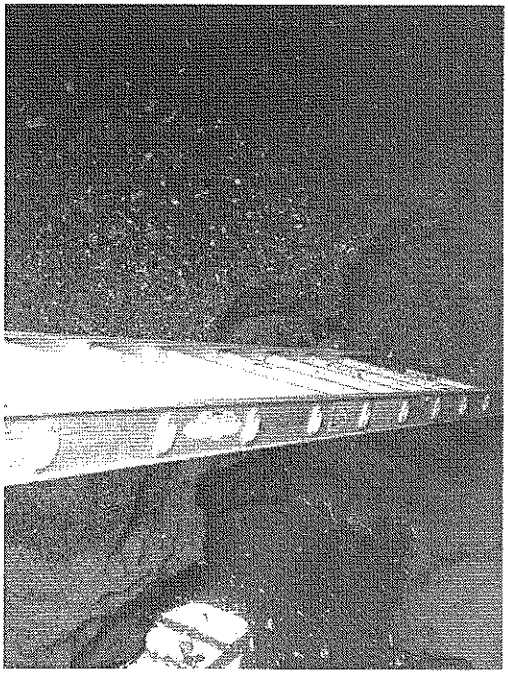




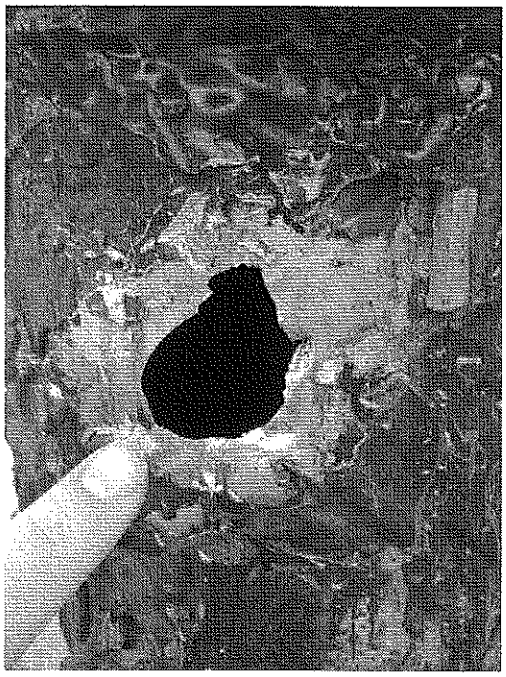
GRU #3 Pump

GRU #4 Pump (Removed)

Inside GRU #1



GRU #1 Grit Accumulation



GRU #1 Grit Accumulation

Hole in GRU #3 Suction Piping

GRU #3 Suction Piping - Repair with JB Weld Epoxy

APPENDIX C

Smith & Loveless Field Assessment and Recommended Improvements

Smith & Loveless, Inc.

14040 Santa Fe Trail Drive
Lenexa, KS 66215-1234, USA
Ph: 913) 8885201
Fax: 913.748.0106
Toll Free: 800.922.9048

January 23, 2013

Tim O'Brien, PE
Gresham, Smith and Partners
Architecture, Engineering, Interiors, Planning
2325 Lakeview Pkwy., Suite 400
Alpharetta, GA 30009-7940

SUBJECT: RM Clayton WRC **PISTA®** Grit Chamber Evaluation
S&L SN: 3R-01148/49/50/51

Dear. Mr. O'Brien:

This is the formal site evaluation of the **PISTA®** Grit Chambers at the RM Clayton WRC location. We were able to visit the site and enter into two of the **PISTA®** Grit Chambers. The first **PISTA®** Grit Chamber we were able to enter was **PISTA®** Grit Chamber number 1. Chamber number 1 has the following issues that need to be resolved in order to bring this unit back on-line. The first is the vacuum priming panel. It is currently Class I, Div I. Technically, this is not necessary as the control panels are located outside and more than 18-inches above-grade. While the vacuum priming panel was originally specified this way from the start of the original project in 2004, I noticed there was not a single bolt left in the explosion-proof vacuum priming panel. This poses a problem, in two manners. First, the components inside the vacuum priming panel are not protected from the elements. Second, failure to properly close the panel means potentially high voltage exposure for personnel is a risk. I would recommend switching this out to Smith & Loveless' standard NEMA 3R vacuum priming panel. There would be approximately a 50% reduction in cost compared to purchasing a replacement explosion-proof priming panel. The longevity of the panel would be greatly increased, as the 3R panel is easy to maintain and keep secure (no bolts). I see this as an important safety factor and upgrade. It is worth investigating in depth whether this conversion can be done and still maintain compliance with all codes.

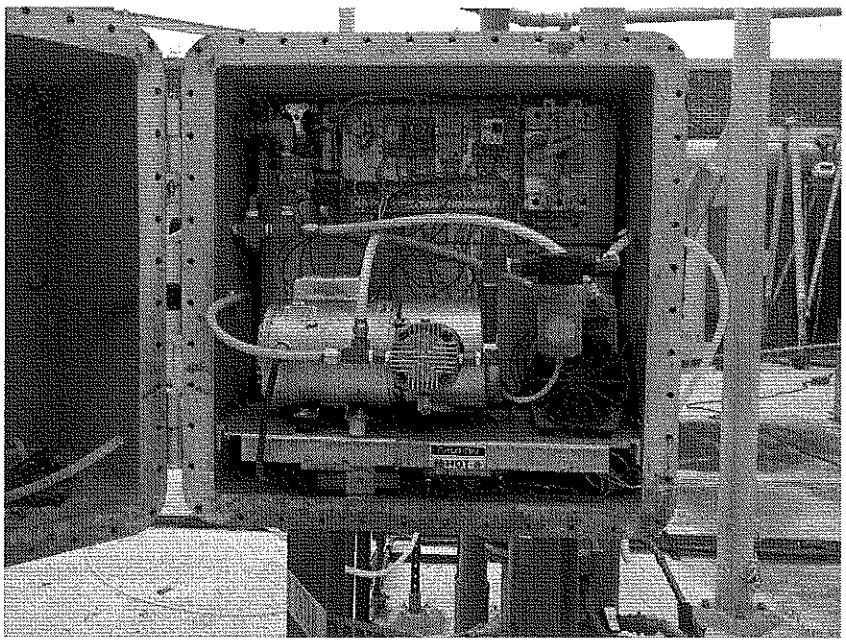


Photo of Explosion Proof, Class I, Div 1 panel from Number 1 unit. This is open to the elements.

The next thing to address in **PISTA®** Grit Chamber number 1 is the rotating assembly of the pump. While at the job site, personnel advised me that there is one (1) rotating assembly either in need of repair or in the process of getting repaired. Bottom line is that it is missing. Based on the extreme conditions of the job site, I would think it would be better suited for the complete rotating assembly to be replaced.

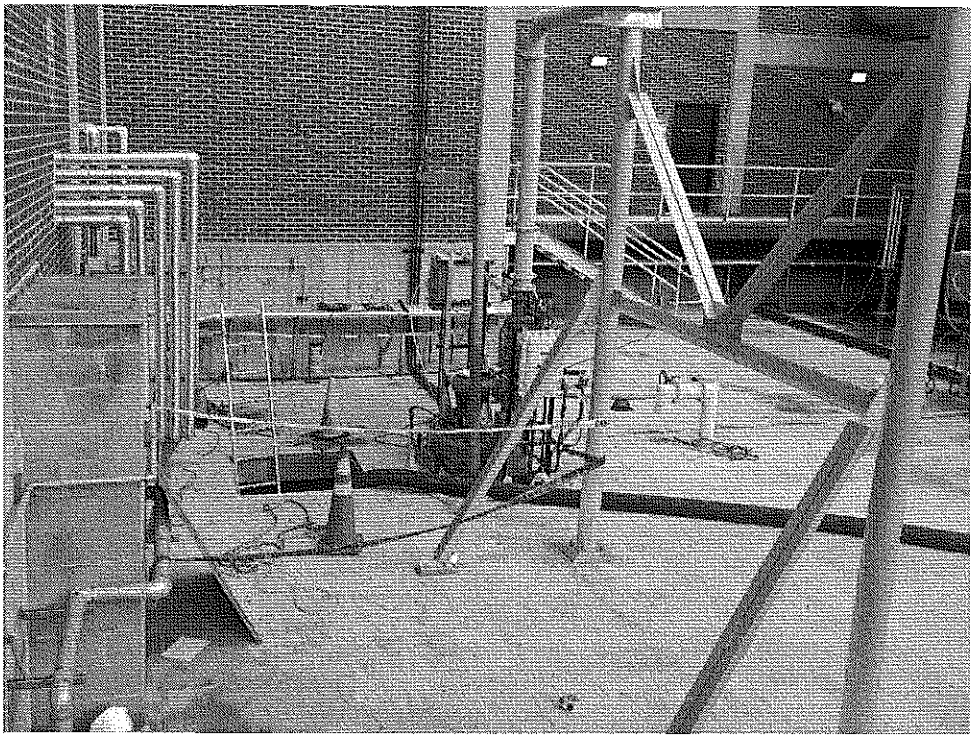


Photo of missing rotating assembly on grit pump for unit Number 1.

The benefits of replacing the complete rotating assembly include:

- The rotating assembly will come with a new Ni-hard impeller and a larger shroud.
- Tungsten mechanical seal will be supplied.

The next thing we looked at was the suction pipe or the suction weld assembly, as we refer to it. The current suction lift weld assembly was in two pieces. The exact cause of why it was in two pieces is still unknown, but it would appear as if it had been cut. The new suction lift weld assembly version has reinforcing alloys in the areas of high wear. In this case, the highest concentration of wear appears to be directly below the pump volute and on top of the bullgear. This will now be manufactured in a two piece design with additional reinforcing. The highest wear area will be in the 6-inch pipe located between the volute and bullgear. This new design fabrication will allow this piece to replaced in less than an hour. We have made this modification already in house and will send the suction weld assemblies they have already ordered in this configuration. Below this is the paddle drive motor, which is currently not functional. There is a motor mounted to the reducer, however, this motor is mounted to the gearbox to protect the gear reducer from the elements. The gear reducer and bullgear appear to be functional, but because there is no motor, this could not be verified. Finally, after filling out confined space paperwork, we entered the grit chamber. The grit chamber had been cleaned out. On my previous visit, it had approximately 7-9 feet of grit on the chamber floor. How this happened has several versions. I can conclude whatever the case, the grit chamber was left on-line without being fully functional.

Once the grit was removed, I entered the chamber and everything appeared to be in good working order. I checked the stainless steel drive tube and found it to be in good structural condition. I also noted the hopper plates were in great condition. Then, I inspected the paddles. The paddles were in sound mechanical condition; however, they were mounted 6-inches below the hopper plates.

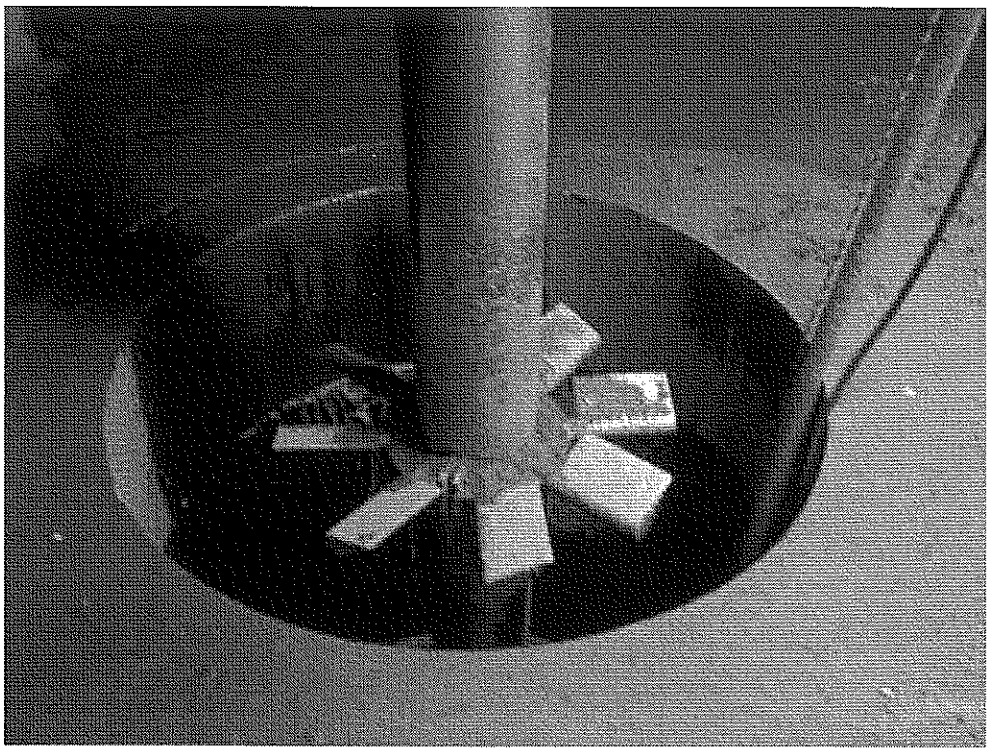


Photo of axial flow propellers located 6" below the hopper plates, rather than 3-1/2" above the hopper plates.

The paddles should have been mounted 3-½ inches above the hopper plates. Mounting them below the hopper plates will have a huge impact on the system's overall grit removal. These were verified to be correct at start-up. Sometime between then and now the paddles were changed. The rest of the chamber was inspected, as well. The straightening vane was in-place and showed no signs of wear.

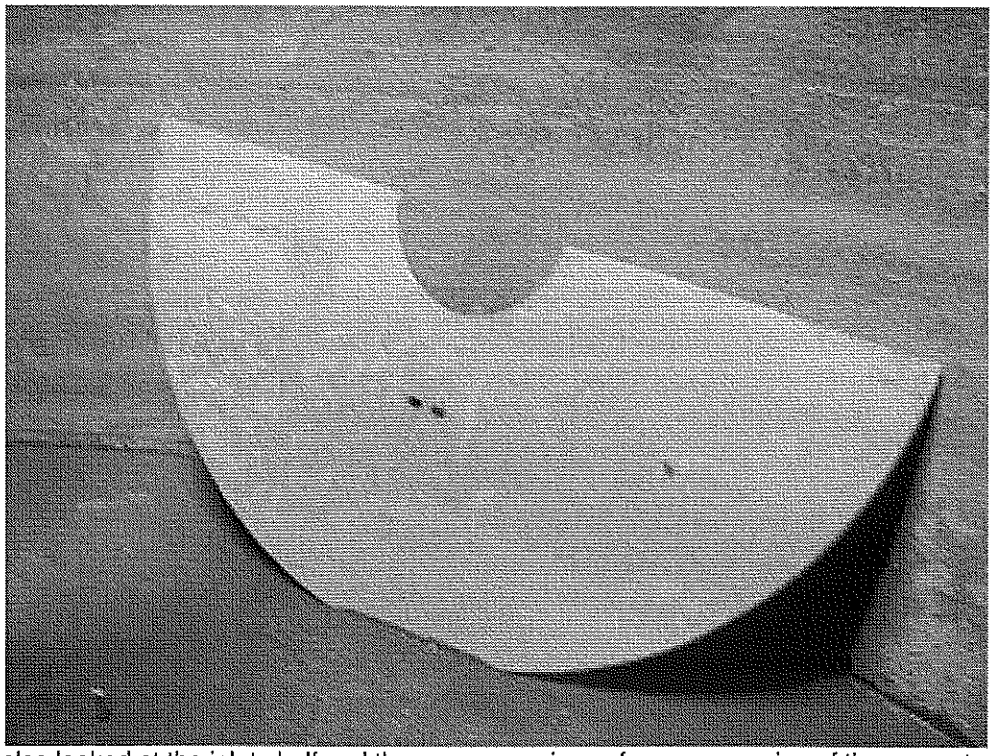


Photo of ½ of the hopper plate.

I also looked at the inlet shelf and there were no signs of wear or erosion of the concrete floor or the exit self. The spoiler plate mounted on top of the inlet to deflect grit downward in high flow conditions was in good condition as well. Therefore, from an internal perspective, the grit chamber was in great condition for such heavy grit loading. Here is the recommended equipment that will need to be replaced for **PISTA®** Grit Chamber Number 1:

One (1) Air Compressor for the Pinch Valve.
One (1) Vacuum pump.
One (1) Suction Weld Assembly.
One (1) **SONIC START® STREAMLINE™** explosion proof kit (depending on code)
One (1) Drive motor for the gear reducer
One (1) Vacuum priming panel or the repair of the one on site.
One (1) Rotating Assembly.

Total cost Chamber Number 1: **$55,847,** *plus freight* (assuming a vacuum panel replacement)

Next, we were able to enter **PISTA®** Grit Chamber Number 3. This unit was partially dewatered to approximately only 10" of water in the grit chamber. The grit patterns in this chamber were as expected in a working chamber. I was able to verify there was heavy grit loading in the chamber. The RM Clayton facility has some of the highest grit loading; if not the highest grit loading per MGD of any plant in the United States.

Upon reviewing Number 3, I observed that the grit was flowing in the vortex pattern associated with the Smith & Loveless, Inc. flat floor design. The problem was the grit was slugging the system during peak flows and settling out during down time, such as when the gates were not closed properly and the pump was turned off. While in the grit chamber, I noted that a hopper plate modification will be needed. This was in large part due to the fact that this grit loading in nowhere near typical. This level of grit was more in line with what is expected in an application associated with the mining industry. Why so much grit? The plant already experiences a huge grit load and then the grit load from the **Nancy interceptor** pushes total grit loading off the charts.

After and during rain events, the system becomes overloaded. Other impacts to consider include floods that have probably had great impact on an already aging infrastructure.

While in the grit chamber, which was covered in 8-inches deep of grit, I observed the fact that the axial flow paddles were mounted correctly in Chamber Number 3 and in good condition. I felt each paddle. These paddles were adjusted to the proper height.

The hopper plates were also in good condition and were located in the proper place. The suction lift weld assembly was in bad condition, and will certainly need to be replaced. The pump and volute were in good condition. The vacuum priming panel was much the same as the others on site with the exception of chamber Number 4. The vacuum priming panel on chamber Number 4 had been 100% removed. When asked about chamber Number 4, personnel said that due to the hydraulics of the system, that chamber Number 4 was the unit that removed the most grit. However, Number 4 had been removed from operation. Here is the recommended equipment that will need to be replaced for **PISTA®** Grit Chamber Number 3:

One (1) Air Compressor for the Pinch Valve.
One (1) Vacuum pump.
One (1) Suction Weld Assembly.
One (1) **SONIC START® STREAMLINE™** explosion proof.
One (1) Vacuum priming panel or the repair of the one on-site.

Total cost Chamber Number 3: **$33,508**, *plus freight* (Assuming a vacuum panel replacement)

While we did not enter Chambers 2 & 4, we can assume the findings will be similar. However it was noted that in chamber number 2 the paddles were rotating the wrong direction. How long it has been this way was not determined. The only difference is that chamber Number 4 has been removed from the headwork's facility. Chamber Number 4 will require total replacement for a cost of **$97,288**, *plus freight.* Chamber Number 2 will require a suction pipe and control panel work very similar to chamber Number 3 for a total cost of **$33,508**, *plus freight.* We also have site supervision and service contracts available. Please let me know what is desired and I will send you pricing.

To maximize overall total grit removal we recommend upgrading to **V-FORCE™** Baffles. This would include four (4) new 316 SST **V-FORCE™** Baffles**.** By installing these it would convert the existing chamber from the current 360A design to the latest technology 360B. This would allow the RM Clayton WRC to achieve grit removal efficiencies of 95% of all grit down to 140-mesh (105 microns) in particle size with the **V-FORCE™** Baffle is installed.

Total cost for **V-FORCE™** Baffles **$96,388**, *plus freight*

The next upgrade that I would recommend is (4) new **DURALYTE™** grit concentrators. This is our latest offering for the marketplace. This will last longer than the existing grit concentrators. The one key feature here is that this is a two-piece design so just the cone area (discharge nozzle) can be replaced versus the entire unit. The cone weighs about 50 pounds versus the current models you have that weigh nearly 500 pounds. The cone area is where the highest concentration of wear will occur.

Total cost for **DURALYTE™** grit concentrators **$36,388**, *plus freight*

I would also recommend a quarterly service contract. I propose a factory trained technician come to the job site for 3 days each quarter to review the four (4) **PISTA®** Grit Chambers. This would allow them to make any adjustments to the equipment required and also allow on-site operators to ask questions regarding the equipment. Also a full review of the equipment would be performed noting any wear or damage. Three days on site per quarter would be between $12,000 per year. If budget is a concern, we would reduce the amount of time on site to 2 days for $8,000 per year.

Respectfully submitted,

Tim Paulsen
After Market Sales Manager
Smith & Loveless, Inc.

APPENDIX D

Equipment Quotes, Cut Sheets and Installation Lists

OVIVO
Bringing water to life
1335 Regents Park Dr., Ste 260, Houston, Tx 77058
PH: (281) 480-7955 -- FAX: (281) 480-8225

SUBJECT: BUDGET PROPOSAL REQUEST

TO:	Gresham, Smith & Partners		28 February 2013
Attn:	Ms. Annie Blissit, P.E.	Email Address: ann_blissit@gspnet.com	
Rep:	Eshelman Company		
Attn:	Mr. Steve Osburne	Email Address:	steve@eshelco.com
FROM:	Mr. James Impero	NO. OF PAGES:	Three (3) + Attachments

SUBJECT: BUDGET PROPOSAL REQUEST
CUSTOMER REFERENCE INFORMATION: Email Request
CUSTOMER/SITE REFERENCE: RM Clayton WWTP
EQUIPMENT RECOMMENDED: Double Entry Drum Screens
BG-USA FILE REFERENCE NUMBER: HW B13-020

Our offer is for the superior Brackett Green, Double Entry Sewage Drum Screens with the Proprietary/Patented 9.0mm thick Polyurethane ProPaPanels® with 6.0mm aperture. Only screens with the in-to-out flow pattern (such as the OVIVO/Brackett Green Single & Double Entry Drum Screens & Central Flow Band Screens) can totally prevent screenings carry over, fibrous debris hairpinning, & plugging from heavy oils & grease.

We at OVIVO Water are therefore pleased to provide the following Budget Proposal based on the above customer reference information and the following conditions/considerations: (Ex-works our facility)

I. EQUIPMENT INCLUDED IN BUDGET PRICE BY (X)

X	Double Entry Sewage Drum Screens	X	Factory Coating
X	Controls	X	Factory Testing
X	Anchor Bolts	X	Shipment Loading
X	O & M Manuals	X	Freight to Site (Separate)
X	Warranty	X	Field Service (Separate)

II. ITEMS NORMALLY SUPPLIED BY OTHERS

Unloading at Site / Field Touch-up
Installation / Erection / Mounting
Civil Works / Grouting / Anchor Installation
Conduit / Wiring / Cables & Glands
Access Ladders / Handrails / Flooring
Site Protection / Storage
State, Federal, Local Taxes or Use Taxes

III. TYPICAL DELIVERY AND SHIPMENT

A. DELIVERY

The Equipment can be typical delivered in 40-52 weeks based on:

		WEEKS
A.	General Drawings for Review	12-16
B.	Review by Client/User	4-8
C.	Details, Fabrication Shipment	24-28
	TOTAL	40-52

B. OVERALL SIZE / WEIGHT

A.	Approximate Size	See drawings
B.	Approximate Weight	Provided Later

IV. VALIDITY AND PAYMENT

A. VALIDITY

This Budget Proposal should be considered as valid for approximately two (2) months based on normal industry circumstances. After such time, please check with us for changes such as material/labor rates continued validity.

B. NORMAL PAYMENT TERMS

The budget prices are based on our standard payment terms.

V. NORMAL TERMS AND CONDITIONS

The following budget prices are based on our standard general conditions of tender available on request.

A. ***Three, (3) Duty Only Double Entry Sewage Drum Screens,*** each 23.0 ft. diameter x 11.60 ft. effective width with our **6-mm** ProPaPanel®, **for a peak flow of 120 MGD**, constructed of mainly **Coated Carbon Steel** with Coated Carbon Steel hopper & associated access platforms with spray enclosures, Controls with Ultra-Sonic Differential Controls and local control switches.

Total Budget Price: $969,800.00 X (3) = $2,909,400.00 USD Total

(Two Million Nine Hundred Nine Thousand Four Hundred Dollars)

OPTIONAL: 316 "Stainless Steel"

B. ***Three, (3) Duty Only Double Entry Sewage Drum Screens,*** each 23.0 ft. diameter x 11.60 ft. effective width with our **6-mm** ProPaPanel®, **for a peak flow of 120 MGD**, constructed of mainly **316 Stainless Steel** & associated access platforms with spray enclosures, Controls with Ultra-Sonic Differential Controls and local control switches.

Total Budget Price: $1,195,700.00 X (3) = $3,587,100.00 USD Total

(Three Million Five Hundred Eighty Seven Thousand One Hundred Dollars)

C. Freight to be determined at a later date.

D. Field Service

We suggest including $23,000 for field service to include Five (5) trips and thirty (23) days on site which includes start-up & training. If additional days are required, our Field Service Technicians are available for $1,150.00 USD/Day plus all travel, living and per diem at cost.

VI. INFORMATION ATTACHED

X	Typical Specification Reference	Attached
X	Typical Drawing Reference	Attached
X	Brochure Reference	Attached
	Data/Calculations Reference	
	Other Reference	

If you have any further questions, please contact the undersigned directly at 832-622-4855

Best Regards,
Eimco Water Technologies LLC

James Impero
Product Manager, Municipal Head Works

OVIVO
Bringing water to life

NORTH AMERICAN
FIELD SERVICE RATE SHEET

Effective January 1, 2013

Standard (Travel)	Daily Rate (8 hour day)	$ **1200.00**
Hourly Rate (4 hour minimum)		$ 150.00
Standard (Labor)		$ **1200.00**
Hourly Rate (4 hour minimum)		$ 150.00
Saturday	Daily Rate (8 hour day)	$ **1800.00**
Hourly Rate (4 hour minimum)		$ 225.00
Sundays/Holidays *	Daily Rate (8 hour day)	$ **2400.00**
Hourly Rate (4 hour minimum)		$ 300.00
Overtime **	Hourly Rate - Standard Day	$ **225.00**
Hourly Rate - Weekends & Holidays		$ **300.00**

** For all hours worked over eight (8) hours per day

UNLESS OTHERWISE ARRANGED; EXPENSES ARE CHARGED AT ACTUAL COST PLUS 10%

Please Note:

- All of the rates provided are portal to portal. In addition, travel and living expenses will be invoiced at actual cost PLUS 10 % and documentation will be provided for these expenses. ***If a fixed Per Diem rate is required, it will be charged at $250.00 per day (lodging and meals) with the exception of the east coast where the price will be $300.00).*** Travel on Saturday, Sunday or Holidays, and after 8 hours per day will be billed at the overtime rate.

- Use of **Ovivo USA** Fleet vehicles for travel will be charged at the rate of $0.565 per mile.

SECTION 11325

DOUBLE ENTRY SEWAGE DRUM SCREEN

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including the indicated specifications sections (as applicable) , apply to work of this section.

B. REQUIREMENTS OF THE FOLLOWING SECTIONS APPLY:

1. Section 01300 – SUBMITTALS
2. Section 01400 – QUALITY CONTROL
3. Section 01600 – MATERIAL AND EQUIPMENT
4. Section 01780 – CLOSEOUT SUBMITTALS
5. Section 01750 – PLANT STARTUP AND INITIAL OPERATION
6. Section 09900 – PAINTING
7. Section 15170 – MOTORS
8. Division 16 – ELECTRICAL

1.02 DESCRIPTION OF WORK

A. Under this section of the specifications, the Contractor shall furnish and install Three (3) Drum Screen and controls and associated ACCESSORIES as described herein.

B. The above-described equipment shall be installed in the New RM Clayton , as shown on the drawings and further described herein.

C. Drum Screen, controls and accessories shall be the product of a single manufacturer who shall have sole responsibility for providing an integrated system, which is to be complete and operable in all aspects.

D. Minimum maintenance and efficiency of screening are prime considerations, therefore design alternatives will not be allowed.

1.03 QUALITY ASSURANCE

A. The manufacturer will have been regularly engaged in the design and manufacture of Drum Screens similar to that specified herein for at least five (5) years. Proposed design alternatives utilizing slotted, rectangular or trapezoidal mesh openings or different flow patterns are strictly prohibited.

1.04 SUBMITTALS

A. Submit shop drawings and technical information to demonstrate compliance with this specification in accordance with Section 01300. The information shall include the following:

1. Dimensional and assembly drawings, including plan view and sections, piping, and electrical drawings.
2. Wiring diagrams for all control panels.
3. Materials of construction for all components.

B. Operation and Maintenance Manuals: Three (3) copies of the Operation and Maintenance (O&M) Manuals shall be submitted to the Owner's Representative prior to delivery of the equipment.

O&M Manuals shall include instructions for storage, installation, start-up and operation maintenance, together with a complete parts list and a recommended spare parts list. The O&M Manuals shall comply with Section 01730.

C. Warranty: The Contractor shall warrant that all equipment furnished under this specification shall be free from defects in the material and workmanship for a period of one (1) year from the date of acceptance. Warranties shall be in accordance with Section 01780.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Drum Screen

1. Brackett Green® Double Entry Sewage Drum Screen

B. Control System

1. Brackett Green Model – USDC

2.02 DRUM SCREEN

A. GENERAL DESCRIPTION

The Double Entry Drum Screen will consists of a rotating cylindrical structure with mesh panels attached to the periphery. The water being screened will pass from both sides into the center of the drum and outwards through the panels. As the screen rotates, the debris to be collected on the inside of the screen panels is to be lifted above deck level, where it will be washed off into hoppers.

B. SCREEN FRAME

The rotating structure is constructed from rolled steel sections, supported by members radiating from a central hub, mounted on a main shaft. The main shaft is carried in self-aligning double roller bearings at each end, which will be enclosed in watertight housings arranged for food grade oil lubrication from small reservoirs mounted at each side of the screen. The ends of the main shaft in the area of the bearing housing glands are sleeved with corrosion resistant sleeves.

Sealing between the screen and the civil work chamber is by means of a flexible molded neoprene seal attached to the screen end rings, which runs in contact with a low friction sealing face mounted on a fixed sealing angle, attached to the walls of the chamber.

C. SCREENING ELEMENTS

Each screen panel will comprise the special purpose molded polyurethane screen medium, ProPaPanel®* having openings as specified in the data facing the flow tapering to 0.5 mm dia. larger over the 9 mm thickness. (* US patent no. 5,407,563). The screen panels are interchangeable and individually sandwiched to the periphery of the screen with nut and bolt fixings. Sealing strips are sandwiched between the screen panels and the screen structure as required.

Elevating plates are fitted to the horizontal arms inside the screen to assist in lifting large debris which does not adhere to the mesh panels.

D. DEBRIS REMOVAL / SCREEN CLEANING

As the screen rotates, the screen panels pass over two debris hoppers located inside the screen structure, supported from the access platform and are washed by a series of wash water jets mounted on a jet pipe located above the screen panels and extending the full width of the screen.

The edges of the debris hoppers are formed into a curve and in order to prevent the build up of debris, and will be wiped clean by wipers attached to the screen structure.

The debris hoppers and jet pipe will be supported by a fabricated structure, incorporating an access platform with flooring, access step ladder and safety hand railing, to facilitate access to the wash water jets for maintenance. The sides and back of the access platform are fully covered in with splash plates.

The jet pipe is enclosed by a splashguard, fitted with hinged covers to provide access to the wash water jets.

The jets are attached to the jet pipe by quick release connections for ease of cleaning. The debris and wash water collected in the hoppers will be discharged into gullies formed in the civil work deck (or into fabricated troughs mounted above deck level).

E. DRIVE UNIT

The screen will be driven by a pinion, engaging with rack attached to the periphery and mounted on the end of a drive shaft. The drive shaft will be carried out in a pair of split roller bearings and will be connected via a flexible coupling to a reduction gearbox, driven by an electric motor. The drive motor will be fitted with an anti-condensation heater if required.

F. SITE DATA

Site	New RM Clayton	
Location	Indoors	
Liquid Being Screened	Domestic Sewage	
Screen Service	Head works WWTP	
Flow conditions	CSO	
	English Units	**SI Units**
Deck Level	23.92 feet	7.290 m
Water Level at Design Flow Rate	17.88 feet	5.450 m
Screen Centerline Level	17.31 feet	5.275 m
Inlet Culvert Base Level	6.59 feet	2.010 m
Screen Chamber Base Level	0.00 feet	0.000 m
Invert Culvert Width	6.00 feet	1.828 m
Screen Chamber Width (incld. Culverts)	29.89 feet	9.112 m
Minimum Immersion at Design Flow Rates	17.88 feet	5.450 m

G. HYDRAULIC DATA

	English Units	SI Units
Screen Capacity- Each	120.0 MGD	5.258 m^3/s
Velocity through culverts at min. immersion	1.37 ft/sec	0.418 m/s
Velocity over Inlet Cill	0.44 ft/sec	0.133 m/s
Velocity through Mesh	1.12 ft/sec	0.342 m/s
Head loss over Inlet Cill	inches	2 mm
Head loss through Mesh	inches	14 mm
Total Head loss	inches	16 mm

(Data based on minimum immersion and clean screen conditions)

H. SCREEN DATA

	English Units	SI Units
Number of Screens	3	3
Diameter	23.00 feet	7.010 m
Effective Screening Width	11.60 feet	3.536 m
Screen Chamber Width	0.00 feet	4.236 m
Design Differential	3.28 feet	1.000 m
ProPaPanel Aperture Dia.	0.197 inches	5.00 mm
Height of Screen above Deck	4.89 feet	1.49 m
Number of Jet pipes	One (1)	
Jet pipe Diameter	4 inches	101.6 mm
Jet pipe End Connection	RF Flanged	
Number of Jets per Jet pipe	26	
Jet Type	Vee Jet	
Wash water Quantity Required	225 GPM	850 l/min
Wash water Pressure at Jet pipe	30 PSI	2.0 bar
Pressure Gauge Calibration	0-60 PSI	0-4 bar
Gear Unit Manufacturer	Typically SEW Eurodrive	
Gear Unit Type	Helical or Helical Bevel	
Gear Unit Ratio	later	
Torque Limiter Type	Current Monitor Overload	
Motor Manufacturer	As required by specifications	
Motor Size	Hp	kW
Motor Speed	900/1800 RPM	900/1800 RPM
Motor Type	Squirrel Cage Induction	
Motor Enclosure	TEFC or Explosion Proof (Optional)	
Motor Insulation	Class "F"	
Motor Supply	460 Volts / 3 Phase / 60 Hertz	
Anti-Cond. Heater Supply	120 Volts / 1 Phase / 60 Hertz	
Screen Nominal Speed	36 / 72 Surface ft/min	11 / 22 Surface m/min
Direction of Rotation	with flow	

I. MATERIALS OF CONSTRUCTION

	Mainly Carbon Steel	*Mainly Stainless Steel*
Framework	Carbon Steel - ASTM A-36	Stainless Steel - Grade 304
Main shaft	Carbon Steel	Stainless Steel - Grade 304
Main shaft Sleeves	Stainless Steel	Stainless Steel - Grade 304
Main shaft Bearing Housings	Cast Iron	Stainless Steel - Grade 316 C16
Bearings Soleplate	Carbon Steel	Stainless Steel - Grade 304
Hub	Cast Iron	Stainless Steel - Grade 304
Seal	Neoprene	Neoprene
Seal Plate	Carbon Steel - ASTM A-36	Stainless Steel - Grade 304

Seal Clamp Angle	Carbon Steel - ASTM A-36	Stainless Steel - Grade 304
Sealing Face	Low Friction Plastic	Low Friction Plastic
Sealing Angle	Carbon Steel - ASTM A-36	Stainless Steel - Grade 304
ProPaPanel	Polyurethane - 9mm thk.	Polyurethane - 9mm thk.
Elevator Plates	Carbon Steel - ASTM A-36	Stainless Steel - Grade 304
Drive Rack	Cast Iron	Cast Nylon
Structural Fixings	Stainless Steel Gr. 18-8	Stainless Steel Gr. 18-8
Mesh panel Fixings	Stainless Steel Gr. 18-8	Stainless Steel Gr. 18-8
Foundation Fixings	Stainless Steel Gr. 18-8	Stainless Steel Gr. 18-8
Debris Hoppers	Stainless Steel - ASTM A-240 Gr. 304	Stainless Steel - Grade 304
Wash water Jets	Stainless Steel	Stainless Steel - Grade 304
Jet pipe	Stainless Steel	Stainless Steel - Grade 304
Access Platform Structure	Carbon Steel - ASTM A-36	Carbon Steel - ASTM A-36
Splashguard	Stainless Steel - ASTM A-240 Gr. 304	Stainless Steel - Grade 304
Flooring	Carbon Steel, Galvanized	Carbon Steel, Galvanized
Access Ladder	Carbon Steel, Galvanized	Carbon Steel, Galvanized
Drive Pinion	Nylon	Nylon
Drive Shaft	Carbon Steel	Stainless Steel - Grade 304
Drive Gear Base plate	Carbon Steel	Stainless Steel - Grade 304
Guards	Carbon Steel	Stainless Steel - Grade 304

Note: 316 may be required for above based on project

J. ACCESSORIES

The following items will be supplied:

- First filling of lubricants

K. PROTECTION

All items **not manufactured in corrosion resistant materials**, or otherwise protected, are protected as follows:

a. Abrasive blast clean to SSPC SP-10

b. Apply two (2) coats of self priming coal tar epoxy at 5-6 mills per coat, (average dry film thickness).

Total average coating thickness of finished system 10-12 mils, (average dry film thickness).

Finish color - as available

2.03 CONTROL PANELS

A. General

1. One (1) control panel with ultrasonic differential level control shall be furnished for each Drum Screen.

2. Control Panel shall be provided in enclosures and shall include all switches, relays, timers, level sensors and logic devices as required to automatically operate the screen as an integrated system according to the sequence of operations.

3. All electrical controls shall comply with the requirements of Division 16.

2.04 FACTORY ASSEMBLY, TESTING, AND INSPECTION

A. The Drum Screen frame will be partially shop assembled and inspected before being shipped. The contractor/engineer/owner may, [at their option and expense] witness the factory assembly. The equipment will then be disassembled as defined by the shipping requirements. Equipment will be shipped to the destination for erection and installation by the Contractor.

PART 3 EXECUTION

3.01 INSTALLATION

A. The contractor shall install the equipment as indicated on the drawings, specifications and as specified herein.

B. The equipment shall be erected in accordance with the manufacturer's recommendations and O&M procedures.

3.02 INITIAL LUBRICATION

A. All lubrication required for initial operation shall be furnished and applied in accordance with the manufacturer's recommendations, where applicable.

3.03 INSPECTION, STARTUP AND TESTING

A. The manufacturer of the equipment shall provide a representative to check the installation, recommend final adjustments, supervise the initial startup of each mechanism and prepare a written report for submission to the contractor.

B. The representative shall also instruct the Owner's personnel in the operation and maintenance of the equipment for a period of one (1) eight (8) hour day.

C. The manufacturer's representative shall be available for a minimum of three (3) eight (8) hour days to perform the above. Whether or not these days are consecutive shall be dependent on the construction schedule.

END OF SECTION

SPECIFICATION

FOR

DOUBLE ENTRY SEWAGE DRUM SCREEN

A. DESCRIPTION

The screen consists of a rotating cylindrical structure with mesh panels attached to the periphery. The water being screened will pas form both sides into the center of the drum and outwards through the panels. As the screen rotates, the debris collected on the inside of the screen panels is lifted above deck level, where it will be washed off into collecting hoppers.

The rotating structure is constructed from rolled steel sections, supported by members radiating from a central hub, mounted on a main shaft. The main shaft is carried in self-aligning double roller bearings at each end, which will be enclosed in watertight housings arranged for oil lubrication from small reservoirs mounted at each side of the screen. The ends of the main shaft in the area of the bearing housing glands are sleeved with corrosion resistant sleeves.

Sealing between the screen and the civil work chamber is by means of a flexible molded neoprene seal attached to the screen end rings, which runs in contact with a low friction sealing face mounted on a fixed sealing angle, attached to the walls of the chamber.

Each screen panel will comprise the special purpose molded polyurethane screen medium, ProPaPanel®* having openings as specified in the data facing the flow tapering to 0.5 mm dia. larger over the 9 mm thickness. (* US patent no. 5,407,563) The screen panels are interchangeable and individually attached to the periphery of the screen with nut and bolt fixings. Sealing strips are sandwiched between the screen panels and the screen structure.

Elevating plates are fitted to the horizontal arms inside the screen to assist in lifting large debris which does not adhere to the mesh panels.

As the screen rotates, the screen panels pass over two debris hoppers located inside the screen structure, supported from the access platform and are washed by a series of wash water jets mounted on a jet pipe located above the screen panels and extending the full width of the screen.

The edges of the debris hoppers are formed into a curve and in order to prevent the build up of debris, are wiped clean by wipers attached to the screen structure.

The debris hoppers and jet pipe will be supported by a fabrication structure, incorporating an access platform with flooring, access step ladder and safety hand railing, to facilitate access to the wash water jets for maintenance. The sides and back of the access platform are fully covered in with splash plates.

The jet pipe is enclosed by a splashguard, fitted with hinged covers to provide access to the wash water jets.

The jets are attached to the jet pipe by quick release connections for ease of cleaning. The debris and wash water collected in the hoppers will be discharged into gullies formed in the civil work deck.

The screen will be driven by a pinion, engaging with rack attached to the periphery and mounted on the end of a drive shaft. The drive shaft will be carried out in a pair of split roller bearings and will be connected via a flexible coupling to a reduction gearbox, driven by an electric motor. The drive motor will be fitted with an anti-condensation heater.

B. SITE DATA

Site	New RM Clayton	
Equipment Location	Indoors	
Liquid Being Screened	Domestic Sewage	
Screen Service	Head works WWTP	
Flow conditions	CSO	
	English Units	**SI Units**
Deck Level	23.92 feet	7.290 m
Water level at design flow rate	17.88 feet	5.450 m
Screen Centerline Level	17.31 feet	5.275 m
Inlet Culvert Base Level	6.59 feet	2.010 m
Screen Chamber Base Level	0.00 feet	0.000 m
Inlet Culvert Width	6.00 feet	1.828 m
Screen Chamber Width (including culverts)	29.89 feet	9.112 m
Minimum Immersion at design flow rate	17.88 feet	5.450 m

C. HYDRAULIC DATA	**English Units**	**SI Units**
Screen Capacity- Each	120.0 MGD	5.258 m^3/s
Velcity through culverts at min. immersion	1.37 ft/sec	0.418 m/s
Velocity over Inlet Cill	0.44 ft/sec	0.133 m/s
Velocity through Mesh	1.12 ft/sec	0.342 m/s
Headloss over Inlet Cill	0.09 inches	2 mm
Headloss through Mesh	0.53 inches	14 mm
Total Headloss	0.63 inches	16 mm

(Data based on minimum immersion and clean screen conditions.)

D. SCREEN DATA	**English Units**	**SI Units**
Number of Screens	3	3
Diameter	23.00 feet	7.010 m
Effective Screening Width	11.60 feet	3.536 m
Screen Chamber Width	13.90 feet	4.236 m
Design Differential	5.00 feet	1.524 m
ProPaPanel Aperture Dia.	0.197 inches	5.00 mm
Height of Screen above Deck	4.89 feet	1.49 m
Number of Jetpipes	One (1)	
Jetpipe Diameter	4 inches	101.6 mm
Jetpipe End Connection	RF Flanged	
Number of Jets per Jetpipe	26	
Jet Type	Vee jet	
Washwater Quantity Required	225 gpm	850 l/min
Washwater Pressure at Jetpipe	30 psi	2.0 bar
Pressure Gauge Calibration	0-60 psi	0-4 bar
Gear Unit Manufacturer	Typically SEW Eurodrive	

Gear Unit Type	Helical or helical bevel			
Gear Unit Ratio	later			
Torque Limiter Type	Current Monitor Overload			
Motor Manufacturer	As required by specifications			
Motor Size		Hp		kW
Motor Speed	900/1800	RPM	900/1800	RPM
Motor Type	Squirrel Cage Induction			
Motor Enclosure	TEFC or Explosion Proof (Optional)			
Motor Insulation	Class "F"			
Motor Supply	460	Volts /	3 Phase /	60 Hertz
Anti-Condensation Heater Supply	120	Volts /	1 Phase /	60 Hertz
Screen Nominal Speed	36 / 72	Surface ft/min	11 / 22	Surface m/min
Direction of Rotation	with flow			

E. MATERIALS OF CONSTRUCTION

	Mainly Carbon Steel	***Mainly Stainless Steel***
Framework	Carbon Steel - ASTM A-36	Stainless Steel - Grade 304
Mainshaft	Carbon Steel	Stainless Steel - Grade 304
Mainshaft Sleeves	Stainless Steel	Stainless Steel - Grade 304
Mainshaft Bearing Housings	Cast Iron	Stainless Steel - Grade 316 C16
Bearings Soleplate	Carbon Steel	Stainless Steel - Grade 304
Hub	Cast Iron	Stainless Steel - Grade 304
Seal	Neoprene	Neoprene
Seal Plate	Carbon Steel - ASTM A-36	Stainless Steel - Grade 304
Seal Clamp Angle	Carbon Steel - ASTM A-36	Stainless Steel - Grade 304
Sealing Face	Low Friction Plastic	Low Friction Plasic
Sealing Angle	Carbon Steel - ASTM A-36	Stainless Steel - Grade 304
ProPaPanel	Polyurethane - 9mm thk.	Polyurethane - 9mm thk.
Elevator Plates	Carbon Steel - ASTM A-36	Stainless Steel - Grade 304
Drive Rack	Cast Iron	Cast Nylon
Structural Fixings	Stainless Steel Gr. 18-8	Stainless Steel Gr. 18-8
Meshpanel Fixings	Stainless Steel Gr. 18-8	Stainless Steel Gr. 18-8
Foundation Fixings	Stainless Steel Gr. 18-8	Stainless Steel Gr. 18-8
Debris Hoppers	Stainless Steel - ASTM A-240 Gr. 304	Stainless Steel - Grade 304
Washwater Jets	Stainless Steel	Stainless Steel - Grade 304
Jetpipe	Stainless Steel	Stainless Steel - Grade 304
Access Platform Structure	Carbon Steel - ASTM A-36	Carbon Steel - ASTM A-36
Splashguard	Stainless Steel - ASTM A-240 Gr. 304	Stainless Steel - Grade 304
Flooring	Carbon Steel, Galvanized	Carbon Steel, Galvanized
Access Ladder	Carbon Steel, Galvanized	Carbon Steel, Galvanized
Drive Pinion	Nylon	Nylon
Drive Shaft	Carbon Steel	Stainless Steel - Grade 304
Drive Gear Baseplate	Carbon Steel	Stainless Steel - Grade 304
Guards	Carbon Steel	Stainless Steel - Grade 304

F. ACCESSORIES

The following items will be supplied:

>First filling of lubricants

G. PROTECTION

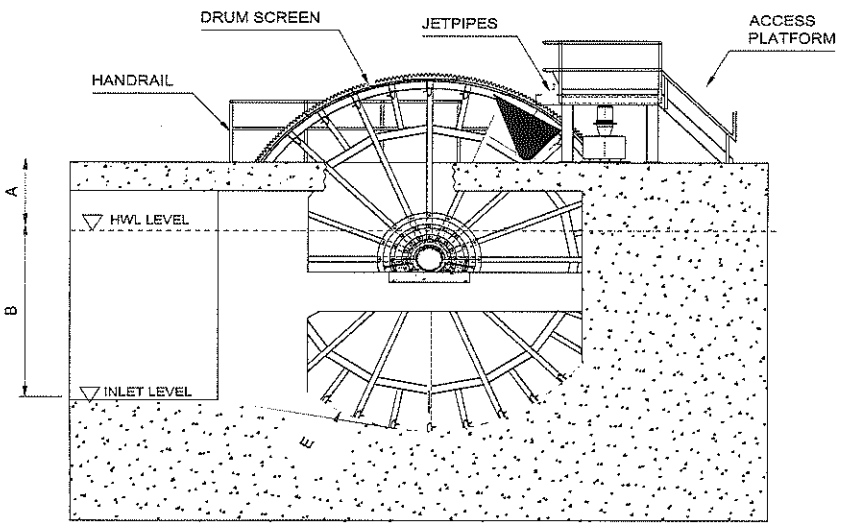
All items **not manufactured in corrosion resistant materials**, or otherwise protected, are protected as follows:

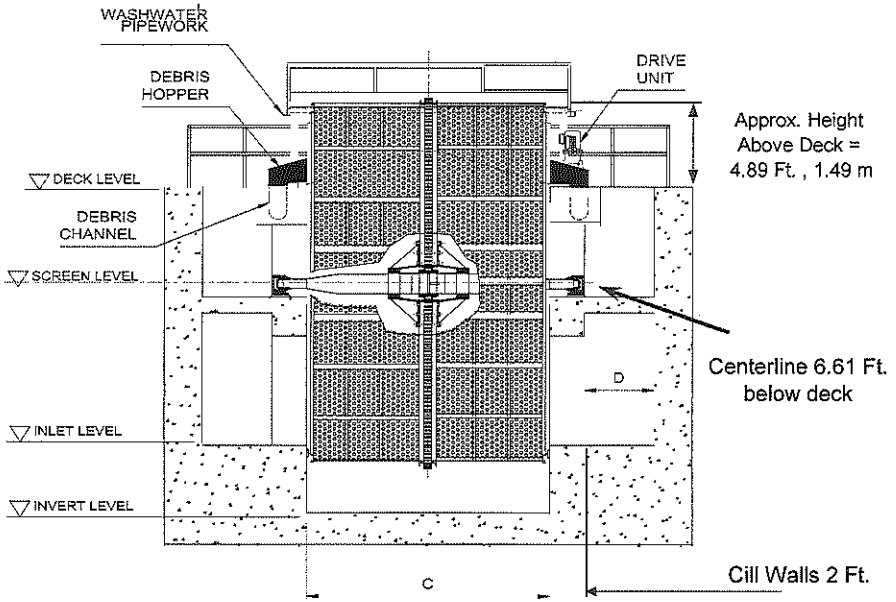
a. Abrasive blast clean to SSPC SP-10

b. Apply two (2) coats of self priming coal tar epoxy to 5-6 mils per coat, average dry film thickness.

Total minimum coating thickness of finished system 10-12 mils, average dry film thickness.

Finish color – as available





DRUM SCREEN LEVELS (ELEVATION)	FEET	METERS
DECK LEVEL	23.92	7.29
WATER LEVEL AT SPECIFIED FLOW	17.88	5.45
INLET LEVEL	6.59	2.01
INVERT LEVEL	0.00	0.00
SCREEN CENTER LEVEL	17.31	5.28

DRUM SCREEN DETAILS	FEET	METERS
DIAMETER OF SCREEN	23.00	7.01
SCREEN WIDTH (OVERALL)	13.90	4.24
SCREEN WIDTH (EFFECTIVE)	11.60	3.54

DRUM SCREEN DIMENSIONS	FEET	METERS
A	6.04	1.840
B	11.29	3.440
C	13.90	4.236
D	6.00	1.828
E	10.68	3.255

Total Chamber Width = C + 2D + 2 x cill walls = 29.89 Ft. , 9.11 m

EIMCO WATERTECHNOLOGIES

DOUBLE ENTRY SEWAGE DRUM SCREEN

Client:	Gresham, Smith & Ptners
Site:	New RM Clayton
EWT Ref.:	HW B13-020

RMCWRC Coarse Screening Equipment Comparison

Manufacturer	Rake Type	Model	Construction	Bar Screens	Washer / Compactor(s)	Screw Conveyor	Total	Notes
John Meunier	Multi-rake	Cont-Flo® Type ER Bar Screen & Washer/Compactor	AISI 316 stainless steel				$1,640,000	1. Four (4) Cont-Flo® Type ER Multi-Rake Bar Screen, model ERL13-67XBC 2. Two (2) Rotopac® type RLK Shaftless Screw Conveyors RLK-300X153C 3. One (1) Rotopac® Screw Washer Compactor, model RPW-300XD. Quote for all components (no redundancy….)
Duperon	Multi-rake		304L SST	$1,460,000		$175,000	$1,635,000	1. Four (4) FlexRake® Model, Full Penetration Fine Screens with ½-inch openings (Quote for Bar Screens includes washer/compactor) 2. Two (2) Duperon Washer/Compactors 3. Two (2) SPIRAC U420's each 95 ft in length
Parkson	Single Rake	Aqua Guard screen model AG-S-T	304 SS construction for the frames and filter shafts (plastic elements)	$2,600,000	$300,000	$175,000	$3,075,000	1. Four (4) Aqua Guard screen model AG-S-T 2. Two (2) Aqua Wash Press unit model AWP17 3. Two (2) SPIRAC U420's each 95 ft in length
Vulcan Industries	Single Rake	Mench Crawler Bar Screen	304 stainless steel construction	$1,750,000		$290,000	$2,040,000	1. Four (4) Model FT-72 Mensch Severe Duty Crawler Bar Screens 2. One (1) Model ST-18 Sluicing Trough x 90 ft (approximately) (no redundancy….) 3. Two (2) Model EWP 400/1000 Washing Presses (one duty, one standby)

Duperon® PRELIMINARY LIQUIDS/SOLIDS SEPARATION TECHNOLOGIES | Now, there's an easier way!℠

DATE: November 21, 2012

Mechanically Cleaned Bar Screen
Budgetary Proposal Number 6543

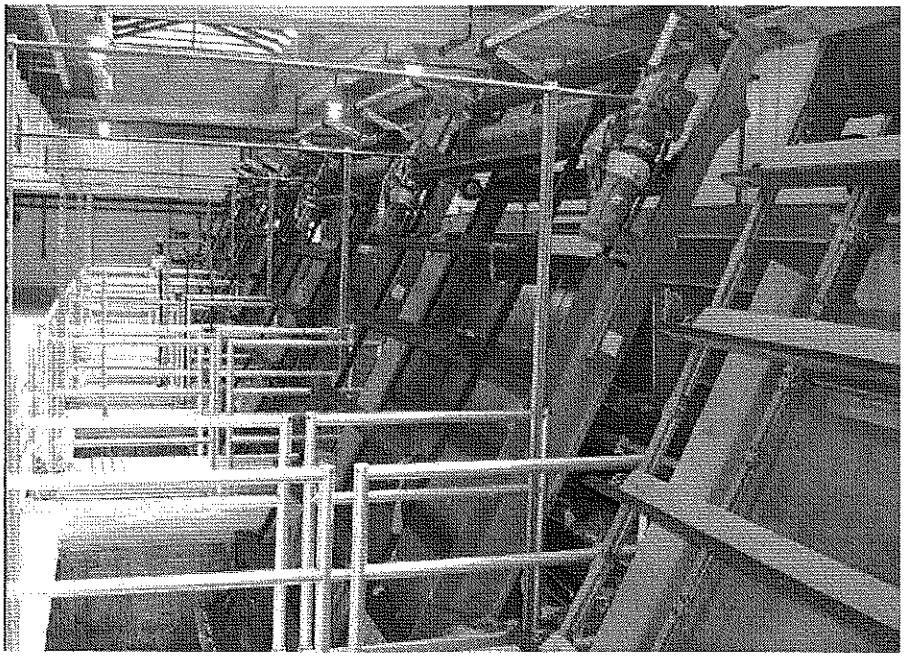
City of Atlanta

To: City of Atlanta

Sales Rep:
Clinton R. Curl
The TDH Company, LLC
(770) 509-1808
770-509-0620
ccurl@tdhco.com

From:
Bryce Funchion
Estimator
Duperon Corporation
Phone: (800) 383-8479
Fax: (989) 754-2175
Email: bfunchion@duperon.com

Lorene Bruns
Regional Sales Manager
Duperon Corporation
989-754-8800
lbruns@duperon.com



Budgetary
Proposal Number
6437

Scope of Supply:

(4) Full Penetration, Fine Screen Model FlexRake® - Stainless Steel Link Driven, Front Cleaning, Front Return Mechanically Cleaned Bar Screen

- Continuous Cleaning without an operator
- Head Sprocket Only Design – no critical components under water
- Continuous Cleaning, top to bottom, the entire width of scraper
- Scrapers of UV Stabilized UHMW and/or Stainless Steel
- SSTL304 side fabrications, dead plate and cross members
- SSTL304 full enclosure covering from deck to discharge
- SSTL304 enclosure access panels
- SSTL304 FlexLinks
- Drive Head:
  - Drive Sprockets and end castings 304SSTL
  - Drive Shaft 304SSTL

Dimensions and design criteria

- 20 degree from vertical
- .5 inch clear opening
- 0.25 inch x 0.75 inch x 0.13 inch SSTL316 tear drop bar screen
- 52 ft nominal angle length from channel invert to top of screen enclosure
- 3 ft compactor height
- 39.74 ft channel invert to top of operating deck
- 1 ft of head differential structural design
- 6ft channel width
- 12000 lbs ea, estimated weight

Clarifications/Exceptions/By Others

- Field assembly of SSTL screen enclosure required
- Spreader bar may be required for unloading
- Crane may be required for unloading

(2) Screen Controls Package

- 2 Wall mount NEMA 4 painted steel enclosures, 2 screens, 1 spirac, 1 WC
- Main disconnect for 480/3/60 incoming power
- 3 AC Tech VFD drives for speed control, 1/2HP, 3/4HP
- Full voltage starter for conveyor
- Unitronics PLC for differential level control on two screens
- Thermostat for fan and heater
- Pilot lights, push buttons and selector switches on front door
- Intrinsic safety barrier for float and submersible sensors
- Voltage sensing relay for torque overload
- Zero speed sensor provided by conveyor manufacturer
- Terminal blocks, ETM's, breakers, timers and relays where required

FIELD MOUNTED DEVICES

- 6 Three hole N7 PB enclosures for E-Stop, Forward and Reverse
- 2 Two hole N7 PB enclosures for Stop and Run
- 4 Single hole N7 PB enclosures for E-Stop on lower level
- 4 Mechanical floats for high water alarm
- 4 Submersible sensors for upstream level 1 per screen
- Pull cord for conveyors provided by manufacturer

(2) Duperon® Washer Compactor 150X.2 SSTL304 - Dual Auger System

- Reduced Maintenance
  - Accepts variable debris up to four inches, including rocks, clothing, concrete, metal, grease and septage – eliminating jams and equipment shutdown
  - Positive displacement technology assures that all debris which enters the hopper is washed, compacted, and discharged for disposal
  - Durable dual auger design eliminates debris wrapping
  - Non-clogging flood wash port located prior to compaction housing – ideal for non-potable water
- Reduced Odor
  - Up to 60% dry solids and up to 60% mass/weight reduction – significantly reducing fecal content and odor
- Reduced Landfill Costs
  - Up to 84% volume reduction
  - Self-Regulating Compaction Housing – allows for consistent dry solids output regardless of fluctuations in debris volume
- Reduced Power Consumption
  - 5 HP inverter duty motor
  - Requires 0.4 KWH
- SSTL304, 11 gauge compactor housing
- SSTL304 augers 0.375 inch thick and 4.00 inch flight pitch
- SSTL17-4 spur gears
- UHMWPE thrust bearings for 2,000 lb thrust load
- Non-Clog Flood Washing
  - Utilizes filtered effluent or municipal water
  - Consumes 3 to 5 gallons per minute
  - Requires 40 to 60 PSI
  - Drain connection is 3 inch NPT female
  - Supply connection is 0.50 inch NPT

Clarifications/Exceptions/By Others

- Crane may be needed for unloading
- Some minor field assembly required
- Water supply and discharge piping
- Mounting hardware

(1) Washer Compactor Controls

- Integrated into panel for screen.

Local to equipment mounted devices
- (1) Three hole NEMA 7/9 PB enclosure for E-Stop, Forward and Reverse

Washer Compactor Spare Parts
- (2) side screw supports
- (2) upper/lower screw supports
- Fasteners

Operation and Maintenance Manuals
- (6) Hard Copies

Warranty
- One Year Standard material and workmanship

Freight to Jobsite
- FOB Origin, LTL Common Carrier

Screen Spare Parts
- (1) Drive Clevis Pin
- (10) Snap Rings
- (4) Link Clevis Pins
- (4) Hex Head Cap Screw
- (4) Scraper Nut
- (1) Never Seez
- (1) Snap Ring Tool
- (1) 14 oz. Tube Shur Stick

On Site Technical Assistance
- (3) Trip(s)
- (1) Technician
- (6) 8 hour man-days

Operation and Maintenance Manuals
- 6 Hard Copies

Warranty
- One Year Standard material and workmanship
- Five Year on all rotating parts

Freight to Jobsite

Budgetary
Proposal Number
6437

Price is valid for 30 days.

Submittals: 4-6 weeks after approved purchase order

Equipment Delivery: 12-14 weeks after approval

Clarifications:

- Scope of supply and pricing above does not include additional structure for seismic, additional head differential or high wind conditions
- The FPFS screen quoted uses SSTL FlexLinks which, like most screens, needs water to self lubricate thereby preventing galling of the SSTL. As a result, the flow channel will need a minimum of 1 ft of water during times the screen is in operation.

Not Included:

- Anything not specifically stated in this Proposal.
- Bonding, tariffs, permits, taxes, liquidated damages.
- Construction and /or installation work of any kind at the jobsite.
- On-site conditions affecting the work described or which affects the installation.
- Conduit, stands, control mounting wiring, junction boxes, or other accessories.
- Any site work or installation tasks (ie, unloading, placement, dewatering, diving, clearing the forebay, wiring, provision of concrete structure, etc.), equipment (such as cranes, hammer drills, etc.), or anchor bolts.
- Pre-installation tasks such as touch-up painting, checking bolts for tightness, removal of shipping containment devices, etc.
- Engineering: Does not include drawings other than those for the FlexRake.
- Additional structure for seismic or high wind conditions.
- Offloading or handling of delivered equipment.
- Union labor for all field support services.
- Controls not specifically listed above.
- Videotaping of the training sessions
- Release of proprietary information.
- Insulation or weather proofing.
- Site/field painting or touch up.
- Vibration and noise testing.
- Anchor Bolts by others.
- Discharge system.
- Stilling wells.

Proposal Terms:

- Subject to acceptance by our credit department.
- Provision for retainage is not included in this proposal.

- Pricing is subject to changes based upon time of order and current stainless steel prices.
- Terms may be negotiated upon request

Right to Refuse:

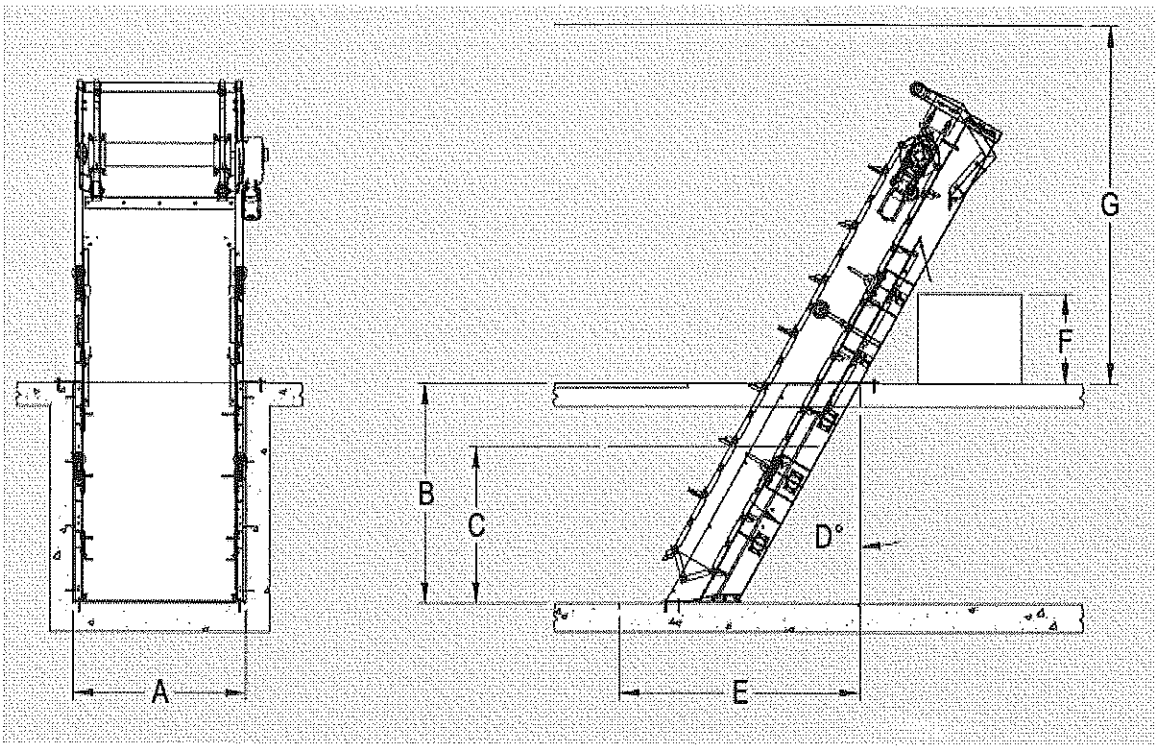
This proposal is based upon the information available at this time and may be impacted by future specifications, scope, and other requirements. This information may be relied upon and used for project estimating purposes only. Note In the event of cancellation of a purchase order or contract, Duperon Corporation will be compensated for all costs that it or its subcontractors have incurred for performance of work in good faith. Due to the current volatility of the steel market, prices may be impacted at time of order. Please be advised that Duperon Corporation retains the right to revise, withdraw, or negotiate this offer at any time prior to signing a material contract.

Proposal Number
6543

City of Atlanta, GA RM Clayton Headworks Coarse Sreen

Equipment Scope of Supply:

4 FlexRake Full Penetration Fine Screen
2 Washer Compactor 30X 304
95 Spirac Shaftless Conveyor



Site Data:

A) Channel Width in Feet	6	E) Channel Depth in Feet	
B) Channel Height in Feet	18.74	F) Container Height in Feet	4
C) Max Water Level in Feet		G) Overhead Constraint in Feet	
D) Angle (from Vertical)	20	H) Operating Deck (if diff than B)	39.74

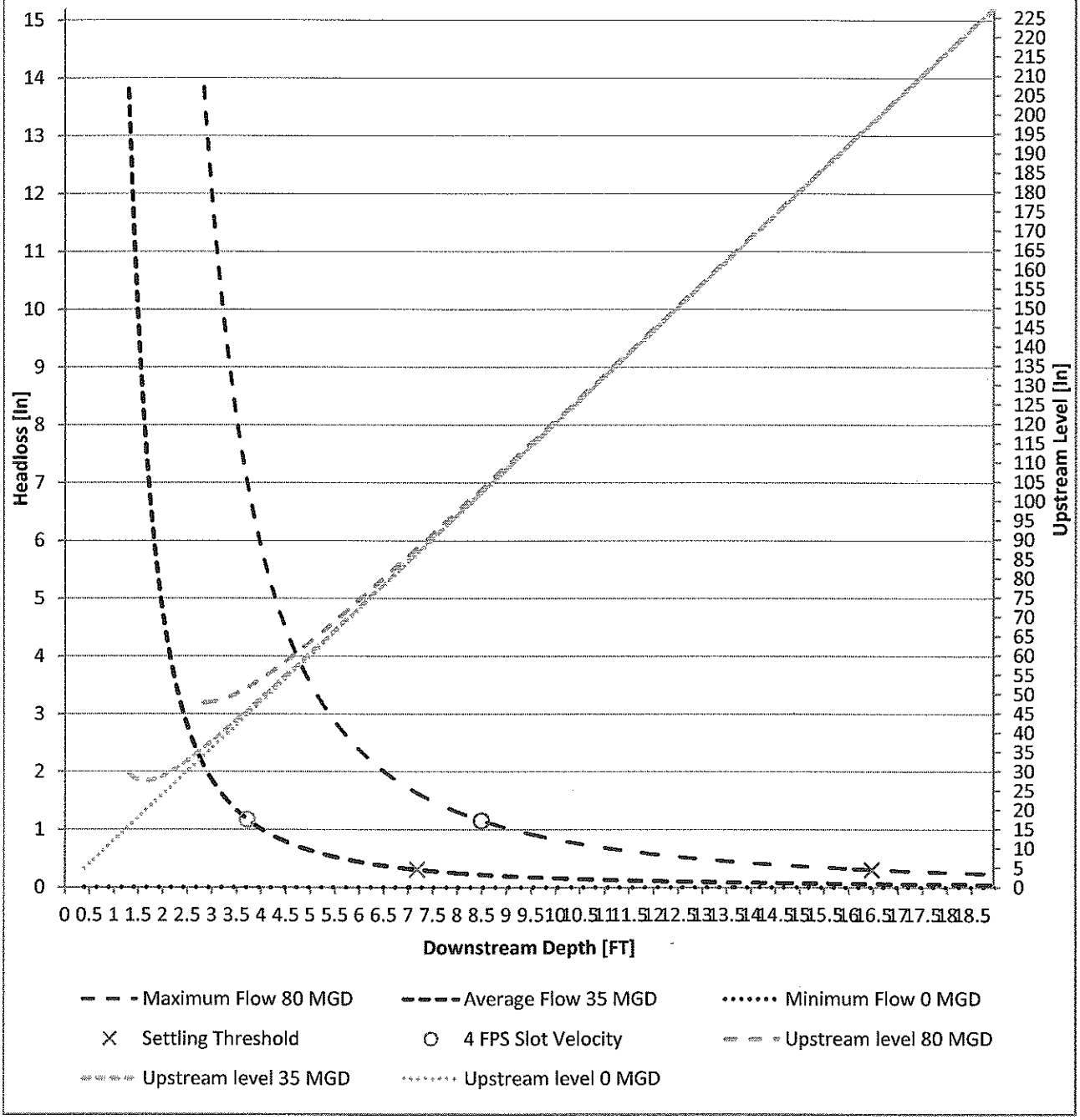
Bar Screen Design Data:

Clear Bar Opening in Inches	0.5	Material of Construction	304 SSTL
Average Flow Rate in MGD	35	Link Material	304 SSTL
Max Flow Rate in MGD	80	Approximate Weight in Tons	6

Duperon Corporation

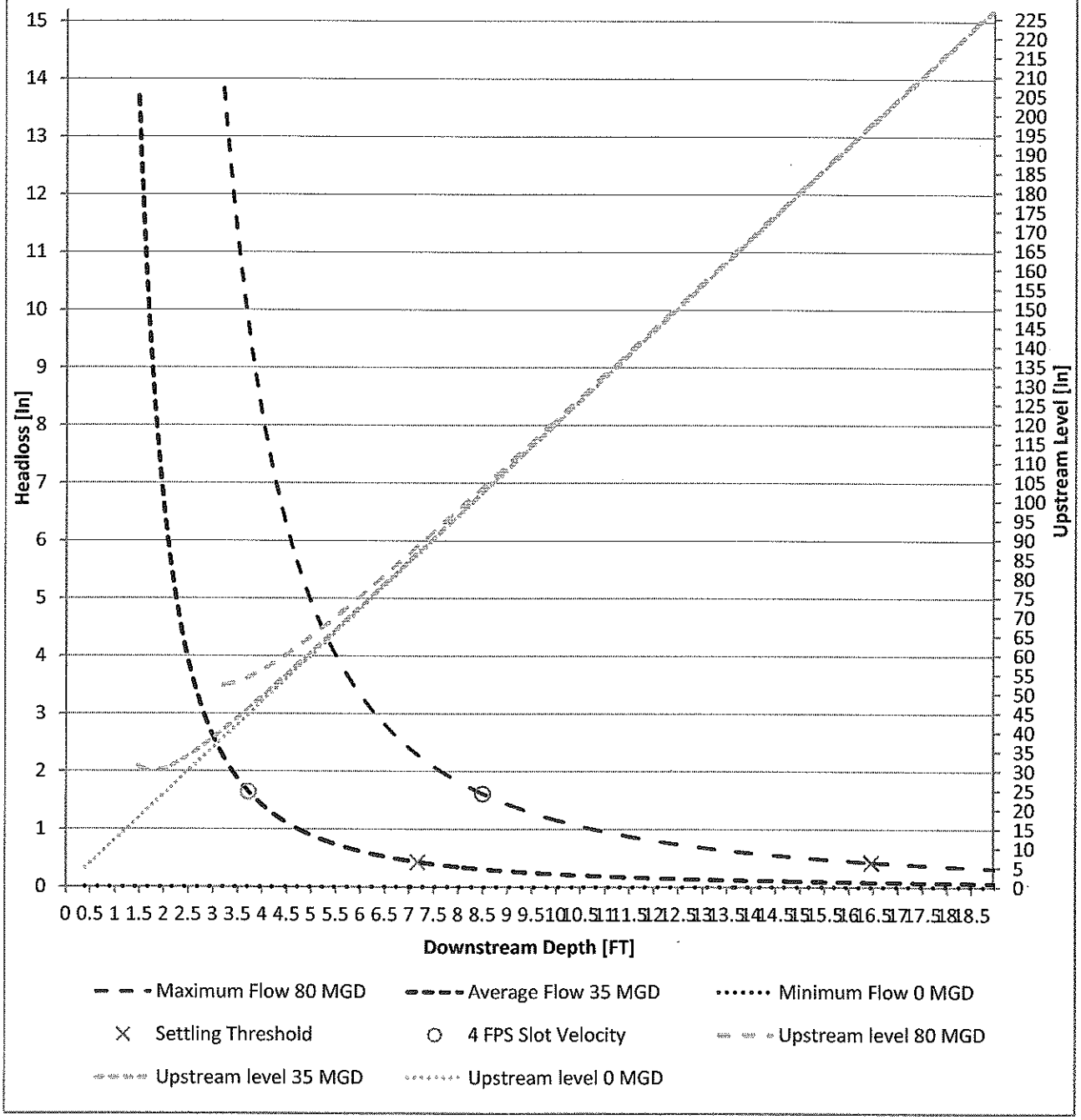
Head Loss Vs Downstream Water Depth 0% Blocked

Date:	11/21/2012	Bar Width:	0.25 [In]
Proposal no.:	6534	Clear Opening:	0.5 [In]
Machine Type:	FPFS	Channel Depth:	18.74 Feet
Description:	City of Atlanta	Channel Width:	6 Feet
Site Address:	Clayton, GA	Maximum Capture:	41.67 [Ft^3/Hr]



Duperon Corporation
Head Loss Vs Downstream Water Depth 10% Blocked

Date:	11/21/2012	Bar Width:	0.25 [In]
Proposal no.:	6534	Clear Opening:	0.5 [In]
Machine Type:	FPFS	Channel Depth:	18.74 Feet
Description:	City of Atlanta	Channel Width:	6 Feet
Site Address:	Clayton, GA	Maximum Capture:	41.67 [Ft^3/Hr]



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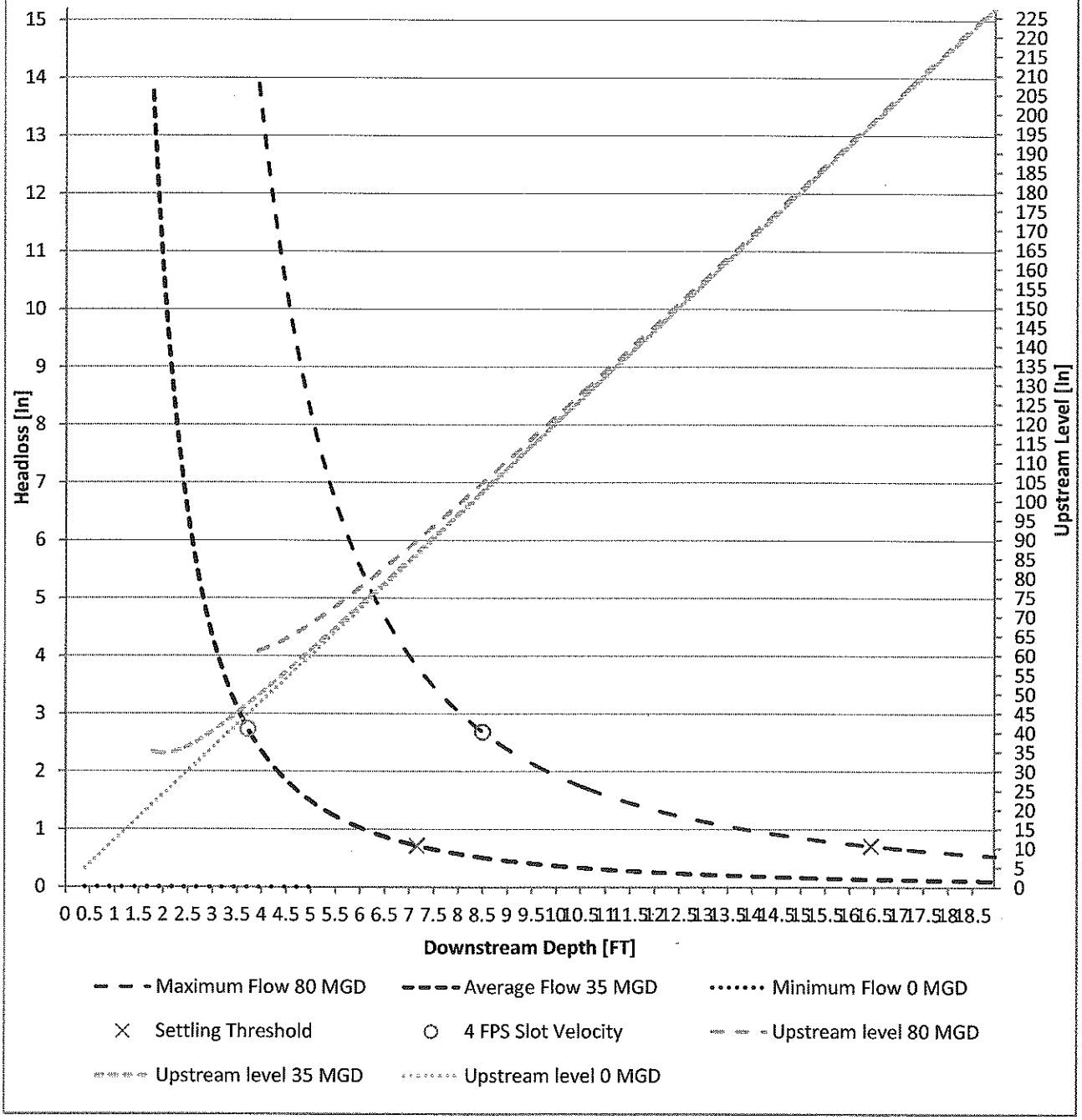
Duperon Corporation
Head Loss Vs Downstream Water Depth 25% Blocked

Date:	11/21/2012	Bar Width:	0.25 [In]
Proposal no.:	6534	Clear Opening:	0.5 [In]
Machine Type:	FPFS	Channel Depth:	18.74 Feet
Description:	City of Atlanta	Channel Width:	6 Feet
Site Address:	Clayton, GA	Maximum Capture:	41.67 [Ft^3/Hr]



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REVISIONS				
REV.	DESCRIPTION	DATE	DRAWN	APPROVED
-	-	-	-	-

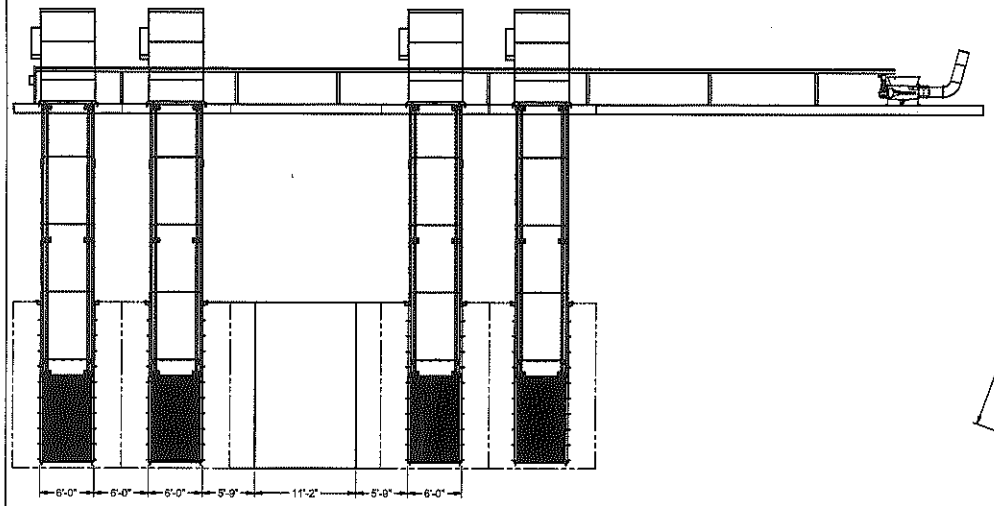
NOTE #1:

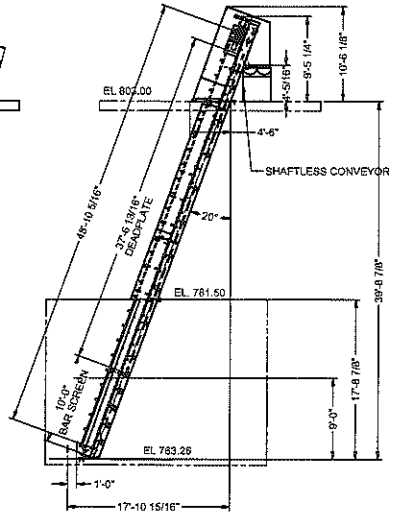
CONTRACTOR TO VERIFY THAT THE PROPOSED INSTALLATION IS SUITED TO THE SITE.

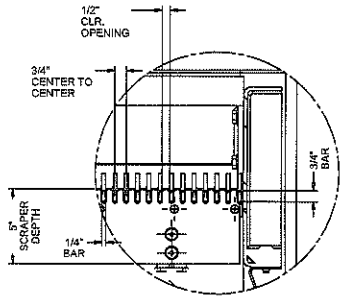
a. VERIFY CHANNEL WIDTH DIMENSION FULL HT. OF EACH CHANNEL.
b. VERIFY MOTOR LOCATION ON LEFT SIDE OF EACH UNIT.
c. VERIFY CHANNEL HEIGHTS (2) PLACES, EACH CHANNEL.
d. VERIFY CHANNEL DEPTH, (3) PLACES, EACH CHANNEL.
e. VERIFY MINIMUM WATER LEVEL REQUIRED DOWNSTREAM..
f. VERIFY MAXIMUM WATER LEVEL.
g. VERIFY DEBRIS CONTAINMENT HEIGHT AND LOCATIONS (2) PLACES.

NOTE #2:

1. BARSCREEN AND SCRAPERS NOT SHOWN FOR CLARITY.
2. SITE DIMENSIONS ARE SUBJECT TO CHANGE UPON SITE VERIFICATIONS.
3. FRONT AND REAR ENCLOSURE INCLUDED. FRONT ENCLOSURE IS 14 GA. SSTL w/ OPTIONS AVAILABLE FOR 16 GA. SSTL OF 1/4" THK. REMOVABLE POLYCARBONATE PANELS. REAR ENCLOSURE IS 14 GA. AND HAS HINGED, REMOVABLE ACCESS DOORS w/ VIEWING DOOR. SIDE PANELS INCLUDED BETWEEN TOP OF CHANNEL AND OPERATING DECK.
4. MODIFICATIONS AS REQUIRED TO EXISTING SITE INCLUDING FLOOR EXTENTIONS, HANDRAIL AND PLATE/GRATING TO BE (BY OTHERS).
5. DECK SUPPORT INCLUDED IF DECK EDGE IS NOT AVAILABLE FOR FlexRake(R) ANCHORAGE.







SCRAPER DETAIL

PART NUMBER NO.	NO. OF PCS'S PER	DESCRIPTION	MATL. STOCK	WTH LENGTH	INCH	NOTES

FOR FABRICATION

DIMENSIONING & TOLERANCING IN ACCORDANCE WITH ANSI Y14.5M-1982
TOLERANCES = UNLESS OTHERWISE SPECIFIED
X" = ±0.12
.XX = ±0.25
.XXX = ±0.005
ANGULAR = ±0.5°

Duperon®
Saginaw, Michigan 48607
TF 800.383.8478

DRAWN	BRF	11/19/12
CHECKED		
APPROVED		
APPROVED		
APPROVED		

SHEET TITLE
DUPERON CORPORATION
FlexRake®
PART NAME
City of Atlanta

SIZE D | DRAWING | DWG. NO. P6543 | REV -
SCALE 1:30 | SHEET 1 OF 1

XX MAIN LAYOUT

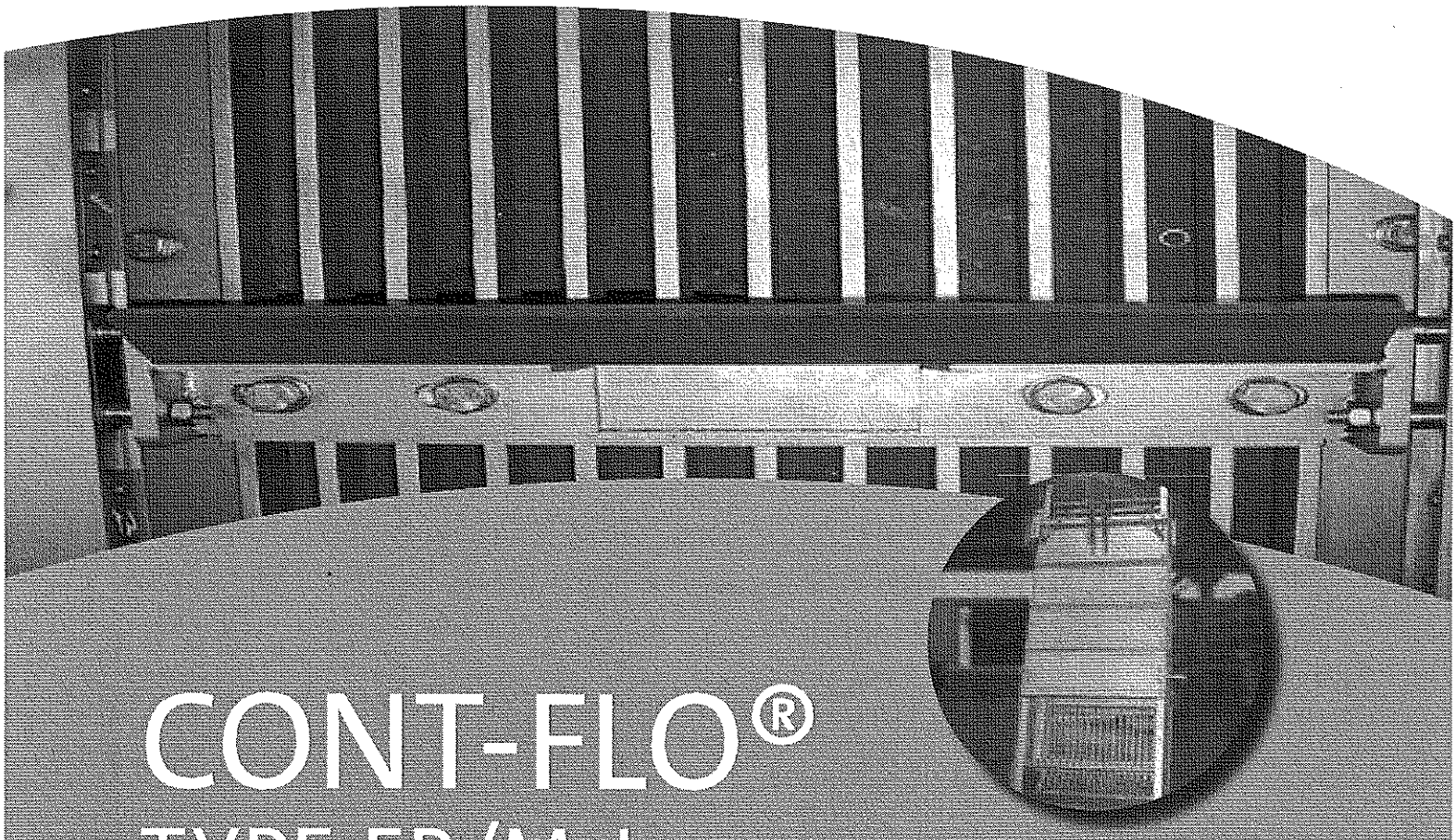
GENERAL NOTES:
ALL TAPPED OR MACHINED HOLES ARE TO BE MASKED ON COMPONENTS THAT ARE BLASTED AND PRIMED PRIOR TO SUBASSEMBLY. ON CASTINGS INSPECT TAPPED OR MACHINED SURFACES FOR CRACKS OR POROSITY.

BREAK ALL SHARP CORNERS.

KPC > CRITICAL PRODUCT CHARACTERISTIC AFFECTS FIT OR FUNCTION OF PRODUCT

KCC > CRITICAL CUSTOMER CHARACTERISTIC AFFECTS INSTALLATION, OPERATION, APPEARANCE, OR RELIABILITY OF PRODUCT AT CUSTOMER SITE

JOHN MEUNIER



CONT-FLO®

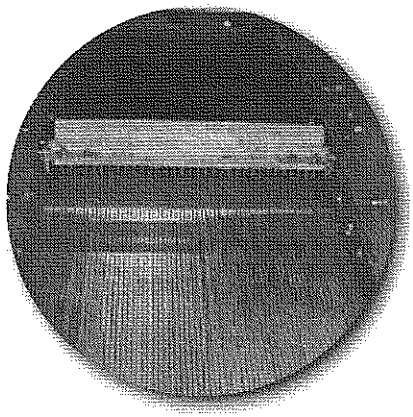
TYPE ER/M-L

Multi-Rake Bar Screen

VEOLIA WATER

Solutions & Technologies

ER/M-L Type
Multi-Rake Bar Screen



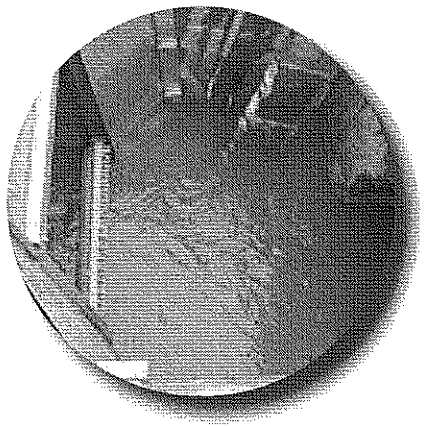
Description

The ER/M-L unit is a front clean multi-rake type bar screen. The screen frame is normally set at an angle in the channel and requires only a short length of parallel channel. The bar rack is cleaned by robust rakes fastened to chains located on each side of the screen frame. The number of rakes can be varied to provide greater removal of screenings.

Screenings are carried up the screen bars and dead plate to the upper level of the screen where they are scraped off by a wiper onto the discharge point. The raking action is on the endless chain principle although there are normally no bottom sprockets in the flow. The screen drive is by a shaft mounted motorised gear unit which is protected by a current monitor supplied with the control system.

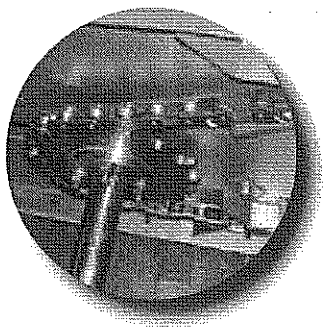
Other available options:

- Dual speed drive
- Variable frequency drive
- Inch reverse grid obstruction clearance control scheme
- Spring loaded rake assembly for obstructing solids bypass



Type	Multi-Rake Bar Screen	
Capacity (Flows up to)	225 MGD	850,000 m3/d
Spacings (Bar)	¼ to 2-1/2 inches	6 to 60 mm
Setting Angle (Screen)	15° vs. vertical (Nominal *)	
Cleaning Rake	min. of 2 rakes *	
Travel Speed (Rake)	16 – 20 ft/min (Nominal *)	5 - 6 m/min (Nominal *)
Material (Frame and chute)	Galvanized carbon steel (AISI 304 or AISI 316 on request)	
Material (Rake Mechanism)	Galvanized carbon steel (AISI 304 or AISI 316 on request)	
Material (housing)	AISI 304 (AISI 316 on request)	
Main shaft	Carbon steel (AISI 304 or AISI 316 on request	
Chain wheel	Carbon steel or Cast iron *	
Material (Chain)	Protected steel (AISI 304 - AISI 316 on request)	
Chain Type	Roller	

* Variable adjusted to suit application
Note: Wash water is not required



Advantages

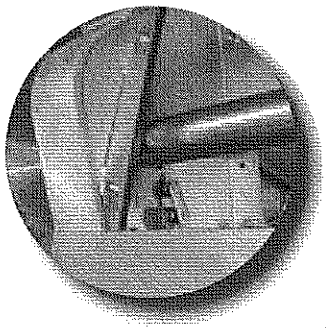
- Low head loss
  15° nominal angle of inclination increases submerged screening area and exposure to the incoming flow.
- Small footprint
  Compact space-saving design
- Low headroom requirement
- Rapid cleaning cycle available

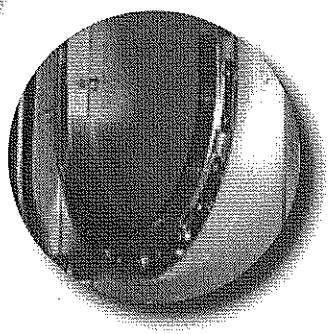
Benefits

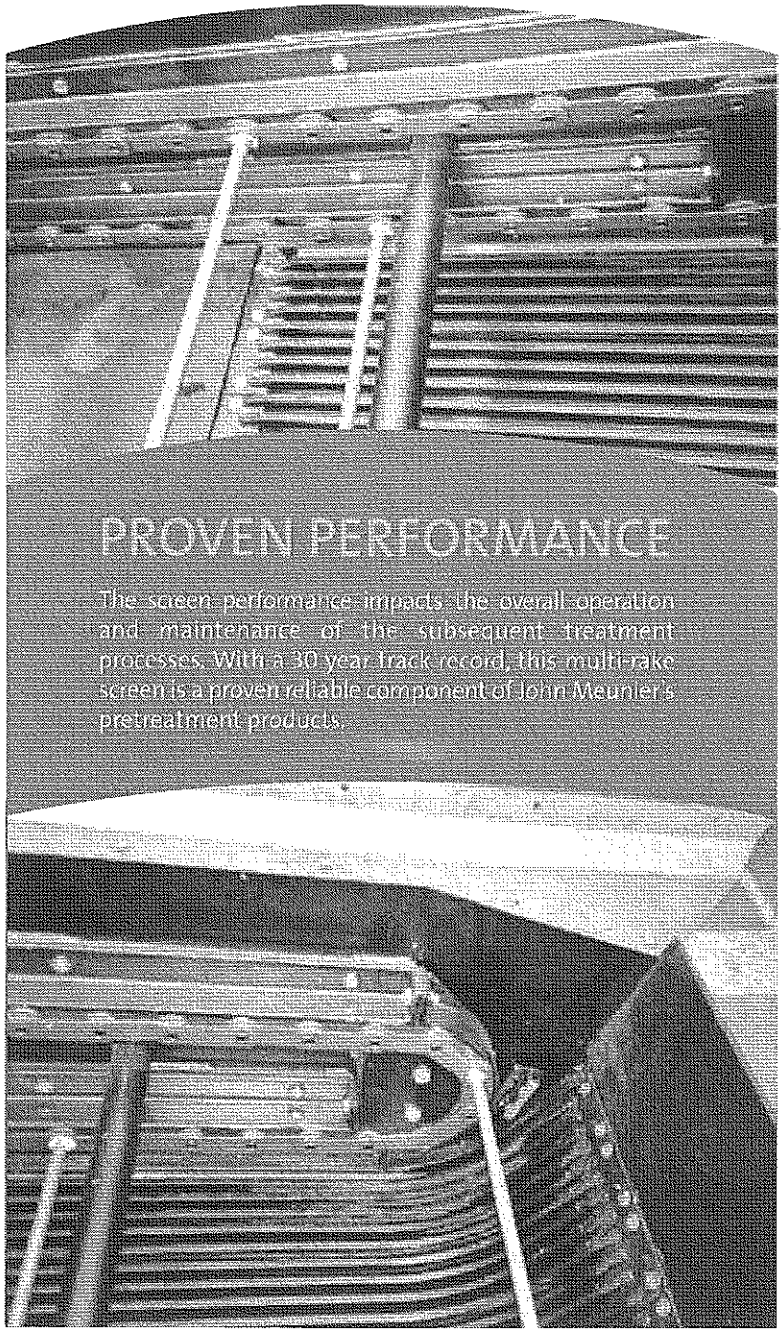
- High quality and reliability at low costs
- Easy installation
- Retrofit capability into existing channels
- Stainless steel fabrication available
- Enclosed for odour control

Applications

- Municipal & Industrial waste water
- First stage screenings removal prior to MBR
- Storm or Sea Outfall discharge

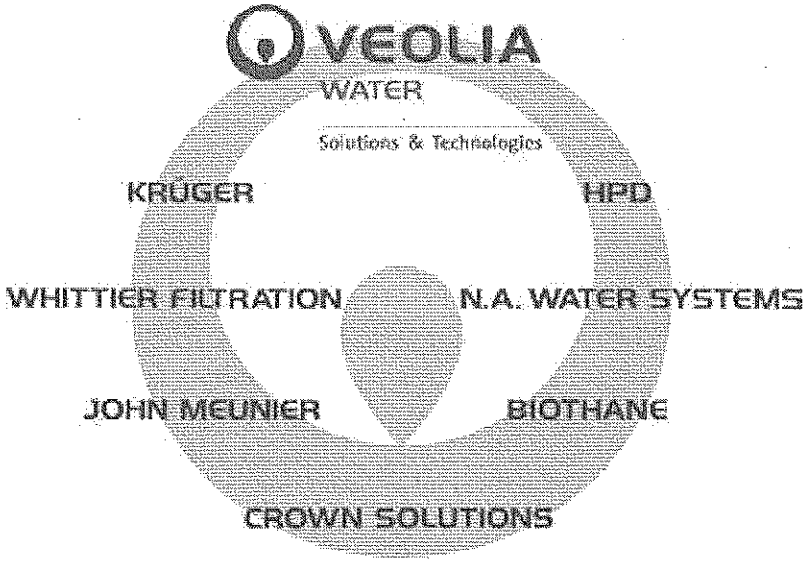






PROVEN PERFORMANCE

The screen performance impacts the overall operation and maintenance of the subsequent treatment processes. With a 30 year track record, this multi-rake screen is a proven reliable component of John Meunier's pretreatment products.



John Meunier Inc. has been serving North American municipalities and industries since 1948 by offering them complete water and wastewater treatment solutions. With our state-of-the-art technologies, efficient products and a team of seasoned professionals, we design solutions to perfectly match the needs of our clients.

John Meunier Inc. is a subsidiary of Veolia Water Solutions & Technologies, the Veolia Water division which designs and manufactures technological solutions for water and wastewater treatment. Veolia Water is the world leader in water services, serving over 110 million people worldwide with close to 68,000 employees.

www.johnmeunier.com - sales@johnmeunier.com

Revised 2011-09-12

John Meunier Inc.
ISO 9001: 2008

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Mississauga, ON, Canada
L5N 1W1

Tel.: 905-286-4846
Fax: 905-286-0488

USA Office
2209 Menlo Ave.
Glenside, PA
19038

Tel.: 215-885-4740
Fax: 215-885-4741

JOHN MEUNIER

December 5, 2012

Attn: **Mr. Tom O'Brien, P.E.**
Gresham Smith and Partners

Our Local Representative:
Templeton and Associates
4324 Brogdon Exchange, suite 100
Suwanee GA 30024
Contact: Mr. Dave Williams
Ph. 404-219-8469

Subject: **Atlanta, GA – RM Clayton Plant Screen Replacement**
Our Project Reference: **12PE53**
Budget Proposal Rev02

Dear Sir,

As specialists in potable water, process water, wastewater treatment and stormwater management, John Meunier Inc. has been serving North American municipalities and industries since 1948.
Further to your request, we are pleased to submit our budget proposal for the supply only of the equipment listed hereafter.

Screenings Removal System

For this application, we recommend our **Cont-Flo® Type ER Bar Screen** used in combination with our **Rotopac® Type RLK Conveyor and Rotopac® Screw Washer Compactor**, in order to wash, dewater and compact the screenings.

A) Four (4) **Cont-Flo®** Type ER Multi-Rake Bar Screen, model ERL13-67XBC
B) Four (4) **Rotopac®** type RLK Shaftless Screw Conveyors RLK-300X153C
C) Two (2) **Rotopac®** Screw Washer Compactor, model RPW-300XD

Our TOTAL Budget Price (as per Scope of Supply and General Conditions)..... **$ 1,894,000.00 Lot Net**
Factory Start-Up Service and Freight charges to site included.

The foregoing price includes Type 316 stainless steel construction for all components where use of such material is available.

Option:

Replace Type 316 stainless steel components with Type 304 stainless steel

Our TOTAL Budget Price (as per Scope of Supply and General Conditions)..... **$ 1,662,250.00 Lot Net**

The equipment selection has been based on a **peak flow of 240 MGD** of municipal waste water. The hydraulic profile has been based on the data presented in Drawing Sheet G-7. A water depth of **80.4** inches has been considered in the channel downstream of the screen.

Should the operating conditions differ we will be pleased to review our selection accordingly.

For over 60 years, John Meunier Inc. has been building a multitude of references which support our capabilities.
Sincerely,

Sean Lapalme, Jr.Eng.
Application Junior Engineer | Pretreatment Equipment

On behalf of:

JOHN MEUNIER

Alan Steele
National Sales Manager

John Meunier Inc.
5929 High Ridge Circle / Doylestown, PA 18902
Ph: 267-544-5176 / Cell: 412-417-6614 / Fax: 267-544-5177
email: asteele@johnmeunier.com / www.johnmeunier.com

VEOLIA WATER

SCOPE OF SUPPLY

Screenings Removal System

A) Four (4) Cont-Flo® Type ER Multi-Rake Bar Screen, model ERL13-67XBC

- Screen type — Multi rake / Front clean
- Peak flow capacity each — 80 MGD
- Bar spacing — 0.5 in
- Installation angle — 80 degrees
- Channel width — 72 in
- Channel depth (invert to operating floor) — 477 in
- Discharge above operating floor — 60 in
- Downstream water depth at peak flow — 80.4 in (per sheet G-7)
- Bar screen head loss at peak flow — 0.81 in (Clean Water)
- Bar screen head loss at peak flow — 3.26 in (50% blinding)
- Construction in **AISI 316 stainless steel**, unless specified otherwise;
- Equipment to be rated for **Class 1 Division 1 Group D explosion-proof** classified area;

Each including:

- Structural frame, bar rack (tapered bars), guides, discharge chute and covers;
- Multi-rake assembly with shafts and sprockets, c/w motor* and gear drive*;
- Extra-strong roller chain;
- Differential level control system, ultrasonic type, NEMA-7 enclosure;
- High water level start float switch;
- Main control panel with Relay logic, NEMA-4X 304 SS enclosure;
- Local control station, NEMA-7 enclosure;
- Fasteners & anchors in stainless steel AISI 304.

* Standard manufacturer materials

Gross shipping weight 15,850 lbs each

B) Four (4) Rotopac® Type RLK Shaftless Screw Conveyor, model RLK-300X153C (2 Conveyor Trains, 2 Conveyors per Train)

- Type — Shaftless screw conveyor
- Material handling — Screenings from municipal wastewater sewage
- Transport type — Pushing
- Solids loading capacity — Up to 125 ft^3/h
- Length — 605 in (to be confirmed)
- Installation angle — Inclined at 1-5° (to be confirmed)
- Discharge height — 36 in
- Trough size (nominal) — 12 inches
- Construction in **AISI 316 stainless steel**, unless specified otherwise;
- Equipment to be rated for **Class 1 Division 1 Group D explosion-proof** classified area;

Each including:

- Trough c/w UHDPE liner, two (2) inlet hoppers and floor mounted supports;
- Shaftless high abrasion resistant steel (HTCS) screw, motor* and gear drive (304SS);
- Axial discharge,
- Main control panel with Relay logic, NEMA-4X SS enclosure;
- Local control station, NEMA-7 enclosure;
- Fasteners & anchors in stainless steel AISI 304.

* Standard manufacturer materials

Gross shipping weight 5,900 lbs each

C) Two (2) Rotopac® Type RPW Screw Washer Compactor, model RPW-300XD

- Type — High efficiency washer and compactor
- Material handling — Screenings from municipal wastewater sewage

- Solids loading capacity — Up to 125 ft^3/h
- Discharge height — 48 in
- Solids volume reduction — Up to 60%
- Dryness — Up to 50%
- Organics reduction — Up to 90%
- Construction in **AISI 316 stainless steel**, unless specified otherwise;
- Equipment to be rated for **Class 1 Division 1 Group D explosion-proof** classified area;

Each Including:

- Trough, hopper with 24 inch bottom inlet and floor mounted support;
- Shafted high abrasion resistant steel screw and bearings box, c/w motor* and gear drive*;
- Solids washing system and dewatering zone washing system;
- Set of solenoid and manual valves for washing systems, NEMA-7 enclosure;
- Control system included in screen common control panel;
- Local control station, NEMA-7 enclosure;
- Fasteners & anchors in stainless steel AISI 304.

* Standard manufacturer materials

Gross shipping weight 3,000 lbs each

GENERAL CONDITIONS

1) **Factory Start-Up Service:** **1 Trip of 2 Days** **Included**
   - On site factory service by one (1) technician including living and traveling expenses
   - JMI requires a 20-day written advance notice to proceed

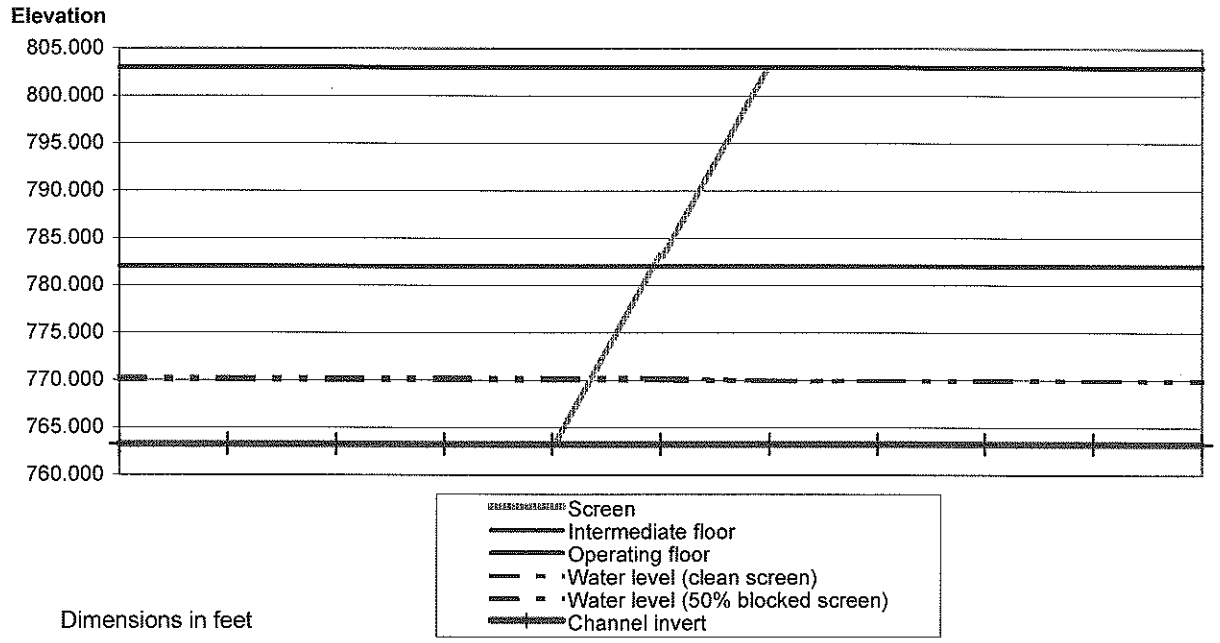
2) **Freight Charges to Atlanta, GA** **Included**

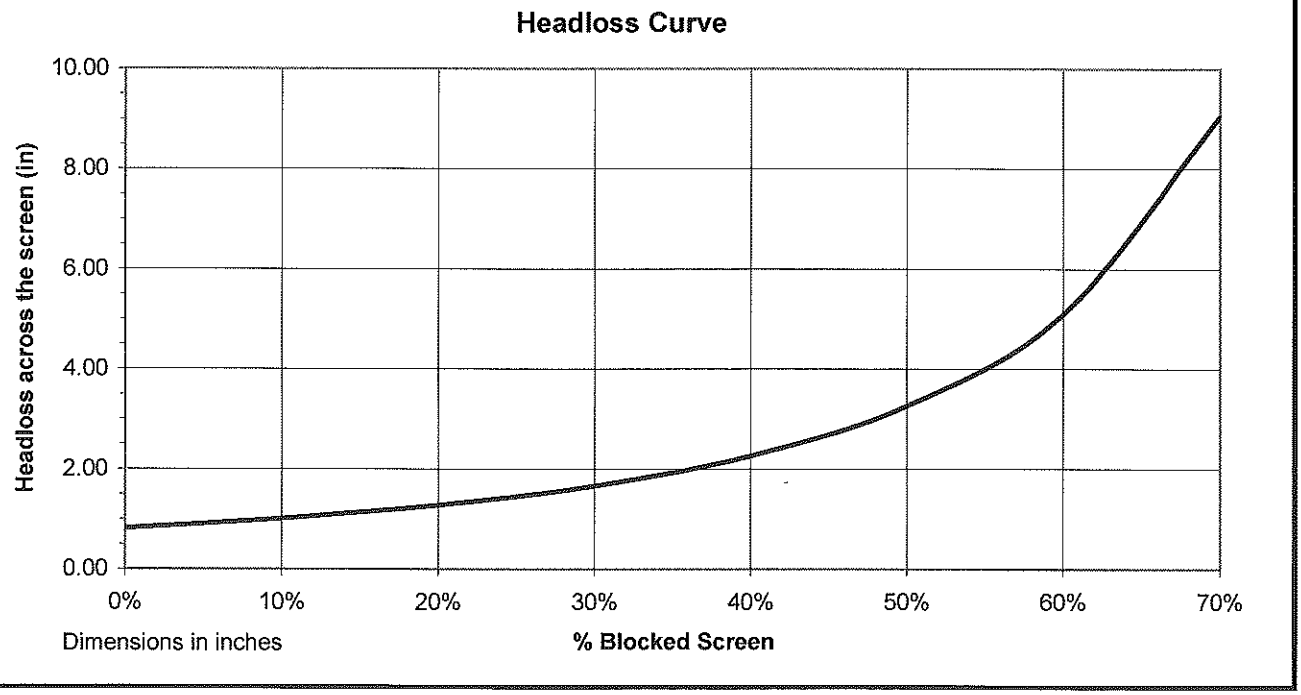
3) **Test**
   - Mechanical and electrical shop test is included in the basic price.
   - Mechanical and electrical operational site test of the above listed equipment is included in item identified as **"Factory Start-Up Service"**, should you decide to include this item in your proposal.
   - In the event where **operational performance test** be required, the performance test, laboratory expenses, support facilities and equipment to properly conduct these tests, should they be required, **are not part of our supply**.

4) **NOTE**
   - **TERMS:** Standard John Meunier terms will apply (100% Net 30 days on Delivery)
   - **PRICES:** All prices in **US funds**, all applicable taxes **extra**.
   - **SHIPPING SCHEDULE:** Units will be shipped within **24 weeks** (Ex-Factory) after receipt of approved documents and drawings in Montreal.
   - **WARRANTY PERIOD:** The period will be for **12 months** from the date of Start Up of the equipment, **18 months** maximum from the date of shipment (ex-works).
   - **VALIDITY:** This proposal will remain valid for **30 days** following the date of this proposal.

Project name	RM Clayton Plant, GA
Project ref.	12PE53 Rev 0
Model reference	ERL13-67XB

Peak flow per unit	80.00 MGD	Downstream hydraulic condition	Client profile
Bar spacing	0.50 in	Downstream water depth	80.40 in
Channel width	72.00 in	Approach velocity (clean screen)	3.05 ft/s
Channel depth	477.00 in	Velocity between bars (clean screen)	2.09 ft/s
Installation angle	80 °	Downstream velocity	3.08 ft/s

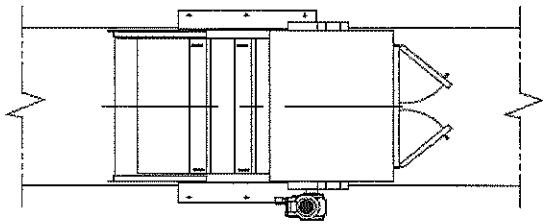


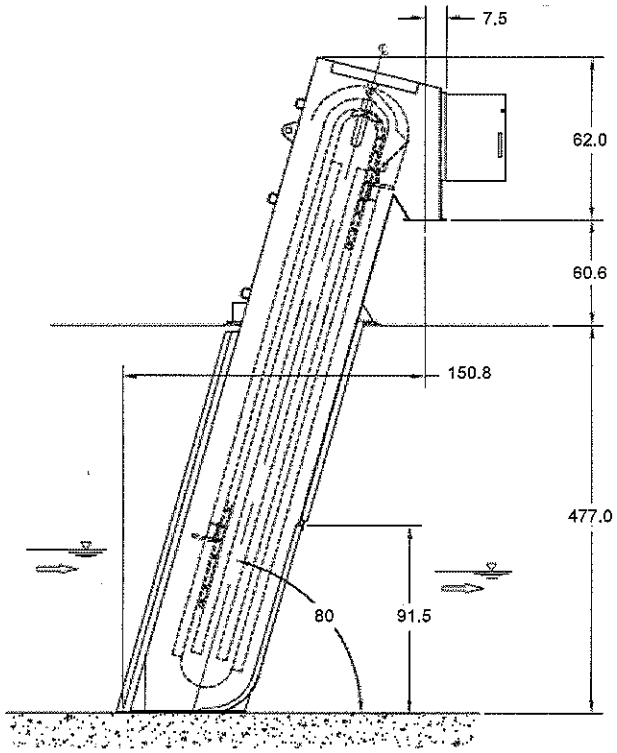


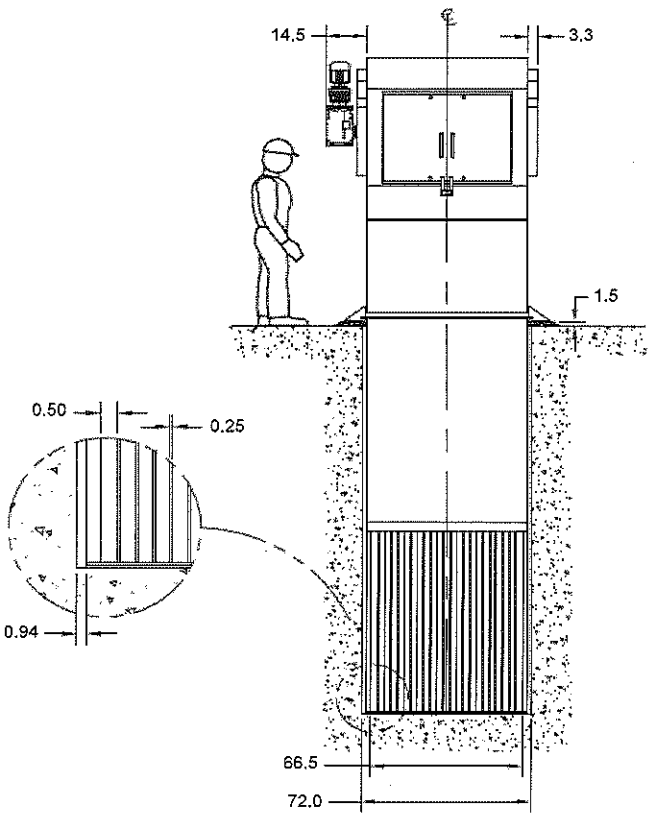
STD: "A" 8x11 | REF: | BAR = 1" A L'ECHELLE D'IMPRESSION

DO NOT USE FOR CONSTRUCTION

FOR INFORMATION ONLY







Dimensions in in

DESIGNER V.C	DATE 2011-10-24
ENGINEER A.P	DATE 2011-10-24
SCALE: N/A (TYPICAL)	

TITLE: CONT-FLO TYPE ER MULTI-RAKE BAR SCREN
MODEL: ERL13-67XB

JOHN MEUNIER ISO 9001: 2000
4105 Sartelon Street, Saint-Laurent, Qc, Canada H4S 2B3 / Tel: (514) 334-7230 / Fax: (514) 334-8070

PROJECT	DRAWING		SHEET	REV
ER –	B80	12PE53	1 OF 1	A

From: Clint Curl
To: Jacob, Giny; O"Brien, Tim
Cc: Baker, Ken
Subject: City of Atlanta RM Clayton Headworks Coarse Screening Equipment - Parkson
Date: Tuesday, November 20, 2012 1:51:22 PM
Attachments: Atlanta, GA R M Clayton AGS.doc
Atlanta, GA R M Clayton AG-S-T-85.dwg
AWP17 030112 RSS.dwg
Cover.doc.doc

Giny:
I have the offering from Parkson on the replacement screens for the RM Clayton facility in Atlanta. We have enclosed a preliminary sizing design with drawing for Aqua Guard model S screens per your request. Based on the design parameters provided, the Aqua Guard screens would be able to handle a peak flow of 80 MGD per unit. The head loss would be higher than the current bar screens, which is certainly to be expected due to the finer screening being provided.

We have also included a reference letter which discusses several large Aqua Guard installations, most or all of which handle combined sewer flows.

It is very difficult to determine an exact estimated price for screens of this size without a full and complete production review. Based on previous projects of screens with sizes in this range, we would estimate an Aqua Guard screen model AG-S-T 6' wide x 45.5' discharge height in 304 SS construction for the frames and filter shafts (plastic elements) at **$650K per unit**.

Our Aqua Wash Press unit model AWP17 could be a consideration for washing and compacting of the screenings. The AWP17 would have an estimated price of **$150K per unit**.

Our budget price for two (2) SPIRAC U420's each 95 ft in length is **$175,000**.
This price is based on the following;

- 304SS trough, lids and supports
- LOR and Estop
- 2 inlets/1 outlet each conveyor
- Controls are by others
- Freight and startup services included

Please look this over and let me know if you need anything else at this time.

Clint Curl | The TDH Company
3225 Shallowford Rd NE | Marietta, GA 30062 | T: 770-509-1808 | C: 678-983-6795 | ccurl@tdhco.com | www.tdhco.com

---

From: Jacob, Giny [mailto:giny_jacob@gspnet.com]
Sent: Thursday, November 15, 2012 8:21 AM
To: Doug Blackmon (dblackmon@tdhco.com)
Cc: O'Brien, Tim; Baker, Ken
Subject: City of Atlanta RM Clayton Headworks Coarse Screening Equipment

Good Morning Doug,

Per our discussion yesterday please see the attached as-built drawings for the Headworks building. Also attached is the HGL from a previous design, the flow at peak HGL shown is 122 mgd.

Please provide expected headloss through the screen at the given design flows below:

Ave. Day Flow – 35 mgd (total firm capacity of 105 mgd)

Peak Hour Flow– 80 mgd (total firm capacity of 240 mgd) however, as noted yesterday their historical peak is just under 150 mgd.

Downstream of the existing screens are Pista grit units followed by perf plate rotary drum fine screens.

Please assume an integrated standard controls system for the budgetary quote with Class 1, Div 1 enclosures/electrical. The current SCADA system is Foxboro. Also include conveyors and compactors/washers in the budget proposals from Parkson.

Feel free to give me a call if you need additional information.

I appreciate the help.

Giny Jacob, E.I.
Water Services

GRESHAM, SMITH AND PARTNERS
2325 Lakeview Parkway, Suite 400
Alpharetta, GA 30009-7940
[P] 678.518.3893
[C] 678.777.8235
www.gspnet.com
GS&P Dialogue & Showcase
Facebook, Twitter, LinkedIn

562 Bunker Court
Vernon Hills IL 60061-1831

Phone 847.816.3700
Fax 847.816.3707

Parkson Corporation is pleased to provide our proposal for Aqua Guard® fine screens model AG-S per the above referenced request for information. Included as part of this proposal is an equipment scope of supply with budget price, sizing design sheet, technical specification, Autocad dimensional drawing, installation list, and other general information for the Aqua Guard screen.

Parkson's experience and "know how" in supplying Municipal Wastewater Screening products cannot be matched. With more than 2,000 domestic and 5,000 worldwide installations, the Aqua Guard screen is the leader when it comes to in-channel moving media screens.

The carrying capacity of an Aqua Guard model S screen is unrivalled in the industry. With a row of element hooks every 8", the S screen has a solids carrying capacity 7 times greater than a multi-rake type screen running at standard speed. To match our carrying capacity, the competitor's multi-rake screen must run at close to 40 ft/min, creating safety concerns and obviously accelerating wear and tear on the equipment. An Aqua Guard S screen will be expected to remain in service for more than 20 years, and we have many installations around the country with S screens that have been installed even longer.

As with all chain and rake screens, capture rate is going to be a concern. The vertical bars used to make up the rack on the competitor's multi-rake screen have no means of providing a vertical spacing. They create what is essentially a very long, slotted opening. The slot length will be equal to the depth of the water in the channel. This does mean that a multi-rake screen will have lower headloss than the Aqua Guard screen, however this low headloss comes at the expense of screenings capture which will be 15 points lower than the Aqua Guard screen. The Aqua Guard screen provides a very small rectangular opening and employs a very effective "two stage" filtering method.

The competitor's multi-rake screen still employs a submerged bearing and sprocket assembly which has been very problematic in the past. While they advertise that this submerged bearing is "ceramic and self lubricating", it must still be a maintenance concern. The Aqua Guard screen has no submerged bearings as part of its design.

Parkson
Treating Water Right

562 Bunker Court
Vernon Hills IL 60061-1831

Phone 847.816.3700
Fax 847.816.3707

Of the next 10 cities in population in the State of Indiana after Indianapolis, 7 have been using Aqua Guard screens for several years. All of these installations are using the heavy-duty model S design which we are proposing for Belmont. These installations are as follows:

-Fort Wayne, IN 3 screens total, 2 screens running since 2003, 1 screen running since 2007
Units are 5' wide x 55.5' discharge height, having 60 MGD capacity per screen
Contact at this facility is Mr. Chris Gach at 260/427-1243

-Evansville, IN 3 screens total, 2 screens at Eastside WWTP (1 running since 2003, 1 just purchased), 1 screen at Westside WWTP running since 2008
Units at Eastside are 4' wide x 48.5' discharge height, having 20 MGD capacity per screen
Unit at Westside is 7' wide x 32.5' discharge height, having 40 MGD capacity
Contact at this facility is Mr. Harry Lawson at 812/428-0548

-South Bend, IN 3 screens running since 2000
Units are 6' wide x 25.5' discharge height, having 62 MGD capacity per screen
Contact at this facility is Mr. Ken Smith at 574/277-8515

-Bloomington, IN Dillman Road WWTP 2 screens total, 1 screen running since 2000, 1 screen running since 2007
Units are 4' wide x 35.5' discharge height, having 50 MGD capacity per screen
Contact at this facility is Mr. Mike Hicks at 812/349-3903 or Steve Drake at 812/824-4900

-Muncie, IN 2 screens running since 2007
Units are 3' wide x 18.5' discharge height, having 35 MGD capacity per screen
Contact at this facility is Mr. John Barlow at 765/747-4805

-Lafayette, IN 3 screens running since 2002
Units are 5' wide x 19.5' discharge height, having 26 MGD capacity per screen
Contact at this facility is Mr. Brad Talley at 765/807-1800

-Hammond, IN Howard Avenue Pumping Station 2 screens running since 2003
Units are 5' wide x 33.5' discharge height, having 50 MGD capacity per screen
Contact at this facility is Mr. Richard Sutton at 219/853-6413

At all of these installations, the screens are seeing similar flow and solids loadings to what you have at your plants. All experience heavy solids loadings with leaves in the fall. Parkson also has large installations in Ohio similar to those listed above. They are as follows:

562 Bunker Court
Vernon Hills IL 60061-1831

Phone 847.816.3700
Fax 847.816.3707

-Akron, OH 4 screens running since 1995
Units are 8' wide x 13.5' discharge height, having 70 MGD capacity per screen
Contact at this facility is Mr. Tom Smith at 330/928-1164

-Columbus, OH Southerly WWTP 2 screens running since 2002
Units are 6.5' wide x 43.5' discharge height, having 87 MGD capacity per screen
Contact at this facility is Mr. John Murakami at 614/645-3138

Finally, we have a large installation at Dallas, TX Southside WWTP that has 6 units running since 1999. These units are 6' wide x 58.5' discharge height, having 80 MGD capacity per screen. Contact at this facility is Mr. Mark Evers at 214/670-8565.

These installations are in addition to many hundreds of both large and small screen installations, with thousands installed worldwide for over 30 years. The above installations are highlighted because they are similar in size, flow capacity, and solids loading that you are seeing at your facilities.

Thank you for your consideration of Parkson Corporation equipment. If you have any questions concerning this proposal or need to discuss any items further, please contact our local representative, or me.

Sincerely,

Joseph G. Nagel
Municipal Sales

From:	Jerry Wills
To:	Jacob, Giny
Cc:	O"Brien, Tim
Subject:	Atlanta-R.M. Clayton, Vulcan Bar Screens
Date:	Friday, November 16, 2012 10:04:33 AM
Attachments:	Mensch Crawler Bar Screen brochure.pdf EWP Washing Press brochure.pdf

Giny,

For this application, Vulcan Industries recommends four (4) Model FT-72 Mensch Severe Duty Crawler Bar Screens mounted in the existing 6 ft wide channels. Budget price for the four screens is $1,750,000 and includes 304 stainless steel construction, heavy duty pin rack and drive mechanism, shrouded discharge chute @ approximately 7 ft above the operating floor, timer w/ultrasonic differential level control, 2-speed "true" patented submersible drive motor, NEMA 7 local control station, NEMA 4X main control panel, safety cage, freight and factory start-up services.

Since conveyors of the length of the existing are becoming obsolete and being replaced by sluicing troughs, Vulcan suggests the following for conveying the screenings from the Bar Screens to the washing presses. Since it appears that you have plenty of height in the building to increase the screenings discharge, you can use one trough to sluice the screenings to a splitter box into one of two presses. For screening handling, Vulcans recommends one (1) Model ST-18 Sluicing Trough x 90 ft (approximately) to be mounted under the screen discharges that discharge into Two (2) Model EWP 400/1000 Washing Presses (one duty, one standby). Budget Price is $290,000 and includes 304 stainless steel construction, trough covers, trough solenoid valve/shut-off valve, trough supports, press splitter box with hand slide gates, press inlet hopper, press solenoid/shut off valve manifold, press explosion proof motor, programmable logic controller and operator interface terminal, NEMA 7 local control station, NEMA 4X main control panel, freight and factory start-up services.

Attached are the Mensch bar screen and EWP washing press brochures.

Please let me know if you have any questions or need to discuss in more detail.

Sincerely,

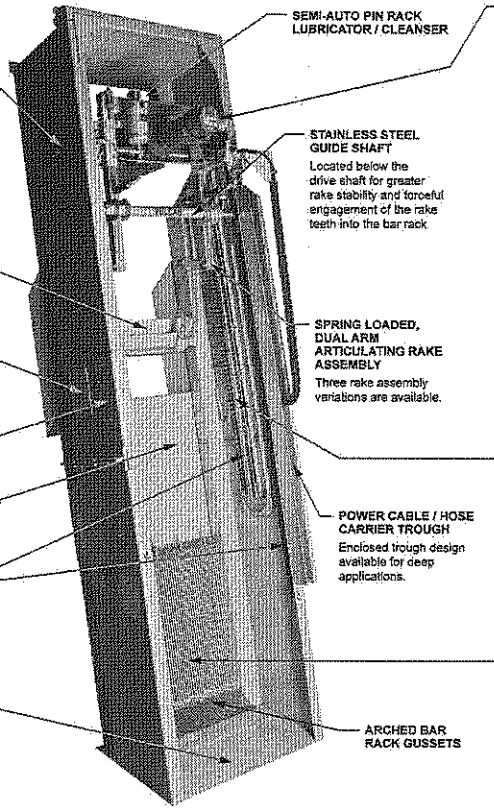
Jerry

Jerry Wills

Principle Environmental
1770 The Exchange, Suite 210
Atlanta, GA 30339

770-952-9444 office
770-952-7933 fax
404-285-1481 cell

Mensch Crawler™ BAR SCREEN



STAINLESS STEEL SIDE FRAME
Full Frame (as shown), Partial Frame, Spliced Frame (for installation in existing buildings). Standard side frames are formed from a minimum 3/8" thick stainless steel plate with four engineered bends for rigidity creating a side frame width of 34".

WIPER MECHANISM
Internal to screen frame

SIDE ACCESS PANELS
Drive shaft roller removal access

RAKE REMOVAL PLATES

DEAD PLATE

SEPARATE GUIDE TRACKS
Provided for the drive shaft rollers and the guide shaft rollers on the rake assembly.

FLUSH BOTTOM BASE PLATE

SEMI-AUTO PIN RACK LUBRICATOR / CLEANSER

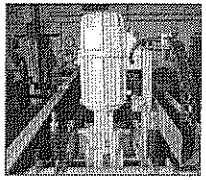
STAINLESS STEEL GUIDE SHAFT
Located below the drive shaft for greater rake stability and forceful engagement of the rake teeth into the bar rack.

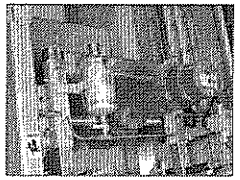
SPRING LOADED, DUAL ARM ARTICULATING RAKE ASSEMBLY
Three rake assembly variations are available.

POWER CABLE / HOSE CARRIER TROUGH
Enclosed trough design available for deep applications.

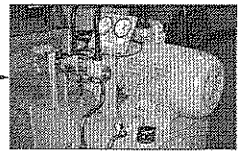
ARCHED BAR RACK GUSSETS

DRIVES


Submersible Electric Brake Motor


Electric Brake Motor


Submersible Hydraulic Drive


External Hydraulic Power Unit

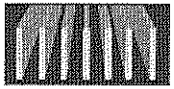
PIN RACK TYPES


Hardened Steel ANSI Chain Links

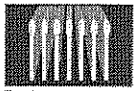

Individual Rollers and Bushings (Hardened Steel or Stainless Steel)

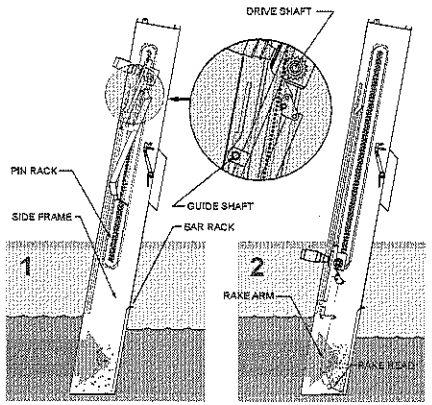

Individual Non-Metallic Pin Rack Components

BAR RACK - TYPES OF BARS


Rectangular


Trapezoidal

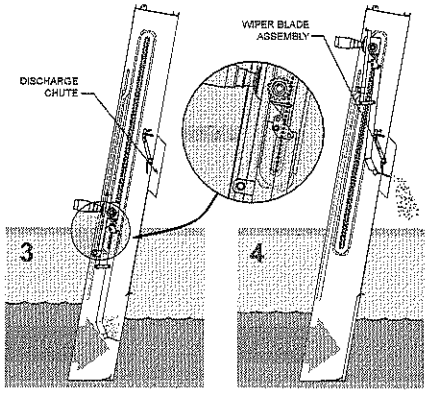

Teardrop



Mensch Crawler™ Bar Screen Operational Sequence

1 The bar screen cleaning cycle begins when the rake assembly travels downward after it is activated from the "park" position.

2 As the rake assembly rotates around the lower end of the pin rack, the rake arms force the rake head teeth to engage the bar rack.



3 The rake assembly travels up the pin rack, cleaning debris from the bar rack and delivering the screenings to the point of discharge.

4 The rake engages the wiper blade to clean the rake head. The rake assembly then returns to the "park" position.

Mensch Crawler™ BAR SCREEN

Dimensions:
- Minimum channel width: 18 inches
- Maximum channel width: 30 feet
- Maximum channel depth: 100 feet

Drives:
- Electric Brakemotor
  - Explosion proof version available
  - TEFC
  - UL approved for continuous service
- Submersible Electric Brakemotor
  - Fully submersible
  - Explosion Proof
  - TENV
  - UL approved for continuous service above and below the waterline
  - Impact resistant cast housing
  - No external gauges or valves
- Hydraulic
  - Fully submersible
  - Inherently explosion proof
  - Quiet operation
  - Equipped with external hydraulic power unit
  - Rake speed adjustment is possible

Pin Rack Options:
- Hardened Steel ANSI Chain Links
  - Commercially available when replacement is necessary
  - Includes hardened steel cog wheels
  - Stronger than Individual Rollers and Bushings
- Individual Rollers and Bushings
  - Hardened steel or stainless steel
  - Includes hardened steel cog wheels
  - Non-lubricated designs available
- Individual Non-Metallic Pin Rack
  - Includes non-metallic cog wheels

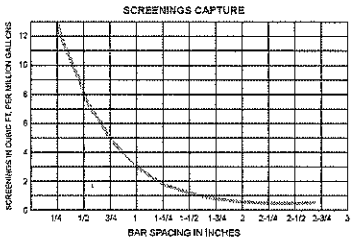
Bar Rack Options:
- Bar spacing from 1/4" to 3"+
- Extruded Teardrop or Extruded Trapezoidal
  - Reduces headloss
  - Assists in preventing blinding
- Rectangular
  - For wider bar spacings

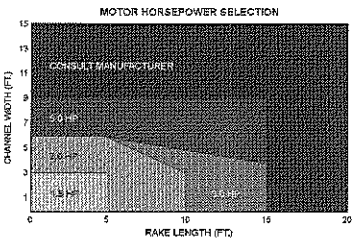
Severe Duty™ Rake Options:
- Fixed drive
- Rotating drive
- Fixed drive - split drive shaft

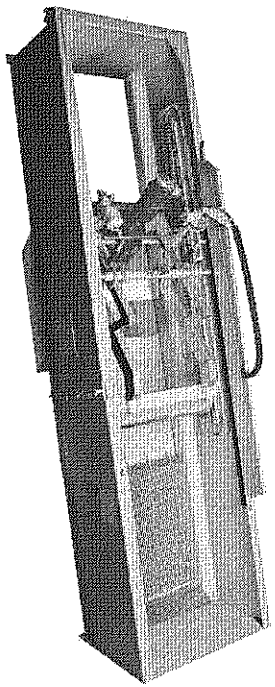
Since 1988, **Vulcan Industries, Inc.** has offered the Mensch Crawler™ Bar Screen as the standard of excellence in operation and reliability for mechanical screening applications around the world. We bring a level of experience, unrivaled in the industry, for designing and manufacturing customized bar screens for new and existing facilities.

Each Mensch Bar Screen is designed to the exact specifications of each project. The unique frame design extends from the channel invert to the top of the unit providing structural integrity and reduces installation costs and the chance for installation error. To guard against corrosion, reduce maintenance, and ensure years of productive operation, the rugged frame and many of the components are fabricated from stainless steel. The low maintenance pinrack/cogwheel drive system eliminates chains, lower sprockets and the need for permanently submerged moving parts.

Unless facility conditions require modular installation, the Mensch Bar Screen is shipped and installed completely assembled. Prior to delivery, each Mensch Bar Screen is fully tested by our expert staff to ensure proper operation when it reaches your facility.







VULCAN
INDUSTRIES, INC.

Mensch Crawler™
BAR SCREEN

Mensch Crawler™ BAR SCREEN

ELECTRICAL CONTROLS

Each control panel we provide is designed and manufactured by our in-house electrical shop to meet the specifications for each particular project. Our panels are UL listed and can be labeled UL 508 or UL 913. Prior to shipment, each panel is fully assembled and tested. Panels can be installed as free standing, wall mounted or screen mounted. Controls can also be installed into existing MCC buckets.

DRIVE SYSTEM OPTIONS

Vulcan Industries offers drive systems to complement the available drives in various applications.

The two-speed drive system is an option for all electric and hydraulic drives to provide a faster cleaning rate during first flush events. As needed, the system increases the rake speed to clear debris rapidly during periods of higher screenings volume.

For wider screens, the dual synchronized drive system adds the power and reliability of two drives to each rake arm assembly. Available for electric drives, the dual system can be implemented for deep channels and submersible drives.

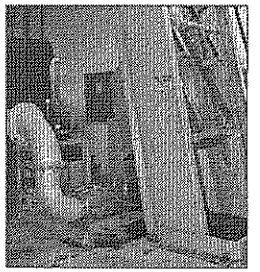
Rake speeds available from 20 fpm to 40 fpm. Please contact Vulcan if faster speeds are deemed necessary.

DID YOU KNOW?

Vulcan Industries has manufactured the largest reciprocating rake bar screens in the world. Five Mensch Crawler™ Bar Screens produced for Jefferson County, Alabama each extend 113 feet from the channel invert to the top of the unit. With fully submersible hydraulic drives, these units remove screenings from a channel 90 feet deep! From 1988 to 2003 Vulcan Industries has manufactured over 600 Mensch Crawler™ Bar Screens.

POST-SCREENING DEVICES

In addition to primary screening devices, Vulcan Industries offers a wide array of post-screening and dewatering devices. The Model EWP Washing Press and Model ESP Screw Press provide dewatering and transport for screenings. Connect multiple screening devices to a single post-screening dewatering and compacting device with a conveyor from Vulcan Industries. To assemble the most cost effective and efficient array of screening and post-screening devices, please contact your Vulcan Industries representative.



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Rev.:

VULCAN
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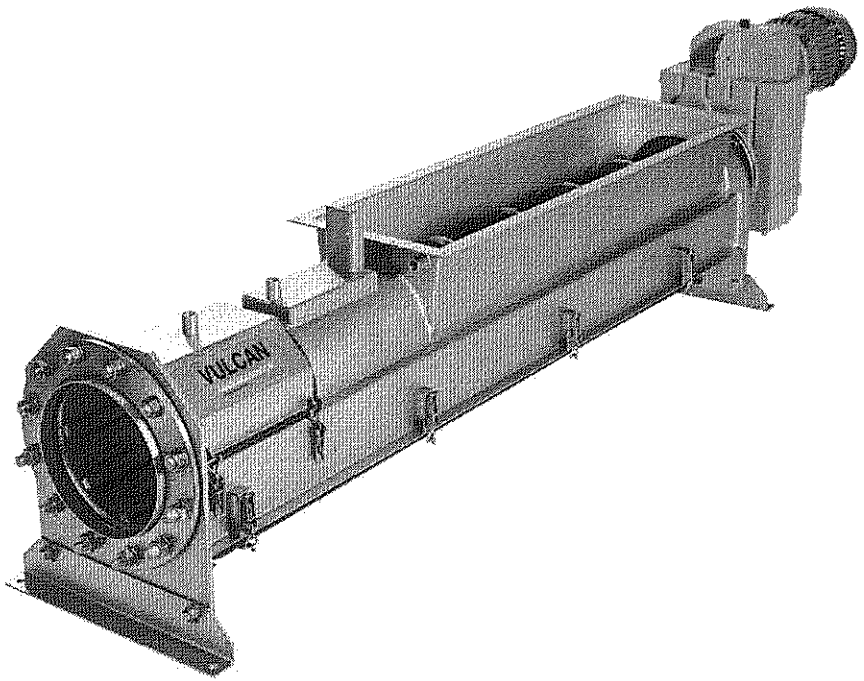
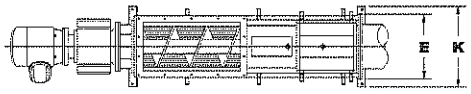
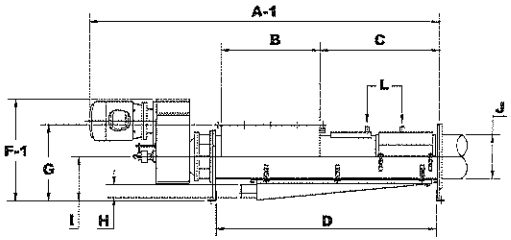
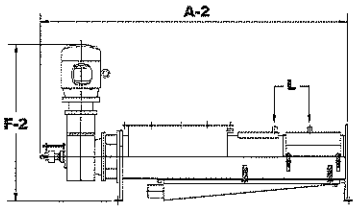
Model EWP WASHING PRESS







PARALLEL DRIVE



RIGHT ANGLE DRIVE

	Input Capacity of Raw Screenings	
Type	Continuous Mode	Batch Mode
EWP 150	Up to 49 ft³/hr	Up to 16.3 ft³/hr
EWP 250	Up to 99 ft³/hr	Up to 33 ft³/hr
EWP 300	Up to 159 ft³/hr	Up to 53 ft³/hr
EWP 400	Up to 247 ft³/hr	Up to 82.3 ft³/hr

Type	Wash Water Requirements
EWP 150	19 gpm at 35 psi minimum – 60 psi maximum
EWP 250	19 gpm at 35 psi minimum – 60 psi maximum
EWP 300	27 gpm at 35 psi minimum – 60 psi maximum
EWP 400	27 gpm at 35 psi minimum – 60 psi maximum

Type	A-1	A-2	B	C	D	E	F-1	F-2	G	H	I	J	K	L	MOTOR
EWP 150/600	81"	70.25"	24"x7"	25"	50.75"	12.5"	22.25"	36.5"	15.5"	2"	10.5"	6"ø	16"	1/2"	3 HP
EWP 150/800	89"	78.25"	32"x7"	25"	58.75"	12.5"	22.25"	36.5"	15.5"	2"	10.5"	6"ø	16"	1/2"	3 HP
EWP 150/1000	96.75"	86.25"	40"x7"	25"	66.75"	12.5"	22.25"	36.5"	15.5"	2"	10.5"	6"ø	16"	1/2"	3 HP
EWP 150/1200	104.75"	94.25"	48"x7"	25"	74.75"	12.5"	22.25"	36.5"	15.5"	2"	10.5"	6"ø	16"	1/2"	3 HP
EWP 250/600	85.5"	74.75"	24"x10"	29"	57"	16"	24"	40"	19"	4"	12"	10"ø	20"	1/2"	5 HP
EWP 250/800	93.5"	82.75"	32"x10"	29"	65"	16"	24"	40"	19"	4"	12"	10"ø	20"	1/2"	5 HP
EWP 250/1000	101.25"	90.75"	40"x10"	29"	73"	16"	24"	40"	19"	4"	12"	10"ø	20"	1/2"	5 HP
EWP 250/1200	109.25"	96.5"	48"x10"	29"	81"	16"	24"	40"	19"	4"	12"	10"ø	20"	1/2"	5 HP
EWP 250/1600	125.25"	112.5"	63"x10"	29"	92"	16"	24"	40"	19"	4"	12"	10"ø	20"	1/2"	5 HP
EWP 250/2000	141"	128"	78"x10"	29"	107"	16"	24"	40"	19"	4"	12"	10"ø	20"	1/2"	5 HP
EWP 300/600	97.5"	85"	24"x12"	34"	58"	19"	30"	50"	22"	4"	13"	12"ø	21"	3/4"	7.5 HP
EWP 300/800	105.5"	93"	32"x12"	34"	65"	19"	30"	50"	22"	4"	13"	12"ø	21"	3/4"	7.5 HP
EWP 300/1000	113.25"	100.5"	40"x12"	34"	73"	19"	30"	50"	22"	4"	13"	12"ø	21"	3/4"	7.5 HP
EWP 300/1200	121.5"	108.5"	48"x12"	34"	81"	19"	30"	50"	22"	4"	13"	12"ø	21"	3/4"	7.5 HP
EWP 300/1600	137"	124.25"	63"x12"	34"	96"	19"	30"	50"	22"	4"	13"	12"ø	21"	3/4"	7.5 HP
EWP 400/600	116.75"	97.75"	24"x16"	42"	70"	23.5"	39"	62"	25"	4"	14.5"	16"ø	26"	3/4"	10 HP
EWP 400/800	124.75"	105.75"	32"x16"	42"	78"	23.5"	39"	62"	25"	4"	14.5"	16"ø	26"	3/4"	10 HP
EWP 400/1000	132.5"	113.5"	40"x16"	42"	86"	23.5"	39"	62"	25"	4"	14.5"	16"ø	26"	3/4"	10 HP
EWP 400/1200	140.5"	121.5"	48"x16"	42"	94"	23.5"	39"	62"	25"	4"	14.5"	16"ø	26"	3/4"	10 HP

Model EWP
WASHING PRESS

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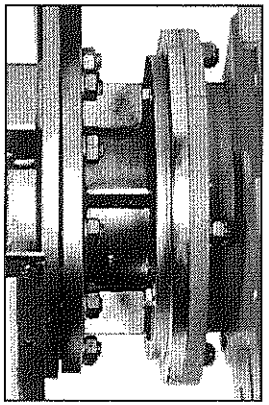
Rev. 2

Model EWP WASHING PRESS

The Model EWP Washing Press is a spiral press used to wash organic matter out of screenings material. The Washing Press washes, dewaters, compresses and transports screenings to a conveyor, container or other suitable receiving device.

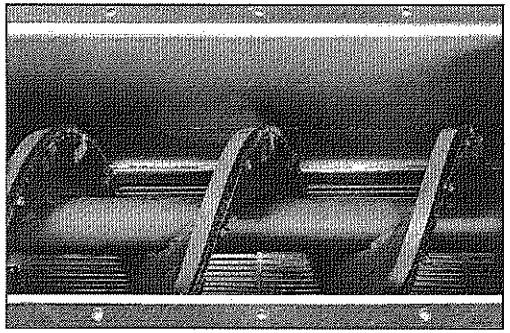
CONSTRUCTION

The Washing Press consists of a press body with separate washing and dewatering sections, hollow shaft spiral, axial thrust bearing (*see photo on right*), gear reducer and motor, drain pan, washwater headers and sequencing valves.



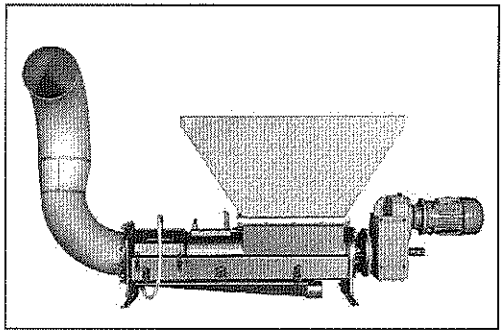
The press body is constructed of stainless steel. A wedge wire drain constructed of individual profile bars is mounted on the bottom of the press and extends from the inlet hopper to the washing section. The wedge wire, with 2 mm spacings, guarantees clog-free drainage of the washwater.

The spiral, of alloy steel construction, is welded to the hollow shaft. The hollow shaft contains perforations located in the washing zone to introduce washwater to the screenings from the inside out. A nylon brush is attached to the trailing edge of the spiral to ensure debris is thoroughly removed from the drainage area. The drain pan is constructed of stainless steel, and is located directly under the press body. A flushing nozzle periodically rinses the drain pan. Sealed with a gasket, and secured with a latching system, the drain pan is easily removed for service.



Above: A detail of the axial thrust bearing that connects the gear reducer to the press body and the shafted spiral. This bearing handles the load created during compaction and carries the overhung load of the spiral. This protects the gear reducer and extends the life of the unit.

Left Above: Note the substantial construction of the shafted spiral. A nylon brush is affixed to the trailing edge of the spiral to ensure the drain is clean, even when greasy material is present. Beneath the spiral you can see the wedgewire drain. The profiled bars used in the drain construction allow for greater flow and prevent blinding. The spiral is cantilevered off the thrust bearing and does not rest in the housing. This reduces wear on the nylon brush and the press body by eliminating metal-to-metal contact.

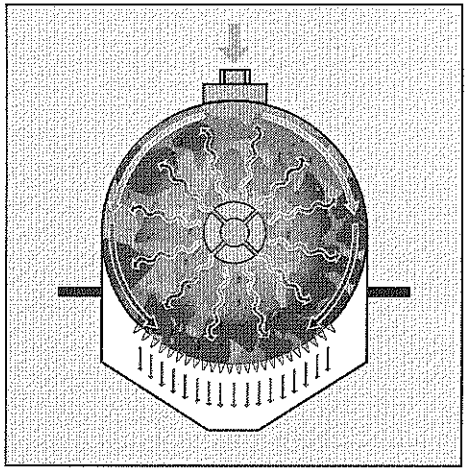


Left Below: Here you see a Model EWP 250/600 Washing Press with an inlet hopper and discharge pipe. The inlet hopper can be directly connected to a primary screening device such as a Mensch Crawler™ Bar Screen or Stair Screen, or can be fed by a conveyor. The discharge pipe can be fitted with a bagging assembly, or feed directly into a receiving container.

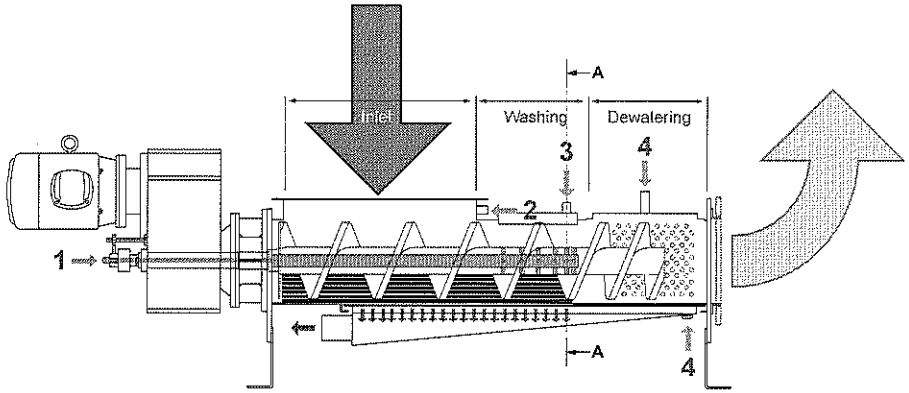
OPERATION

The Washing Press receives the screenings from a primary screening device or conveyor through the inlet hopper. The spiral transports the screenings from the inlet to the washing zone where they are compacted and washed. In the washing zone, washwater is injected into the screenings from the openings in the hollow shaft of the spiral, and from a nozzle at the top of the unit.

To maximize washing, after the press compacts the screenings the spiral reverses, pulling apart the compacted screenings. The cycle is repeated a minimum of four times, recompacting the screenings and squeezing out excess washwater. The repetition helps the press achieve up to **90% organic removal** from the screenings. As the screenings move into the dewatering zone, the pitch of the spiral continues to decrease, further compacting the screenings for maximum water extraction prior to entering the discharge pipe. From inlet hopper to discharge, the **screenings volume is reduced by up to 85%.**



Section A-A through the washing zone.



Valve Operations

1 **Injects washwater into the washing zone through the hollow shaft spiral**

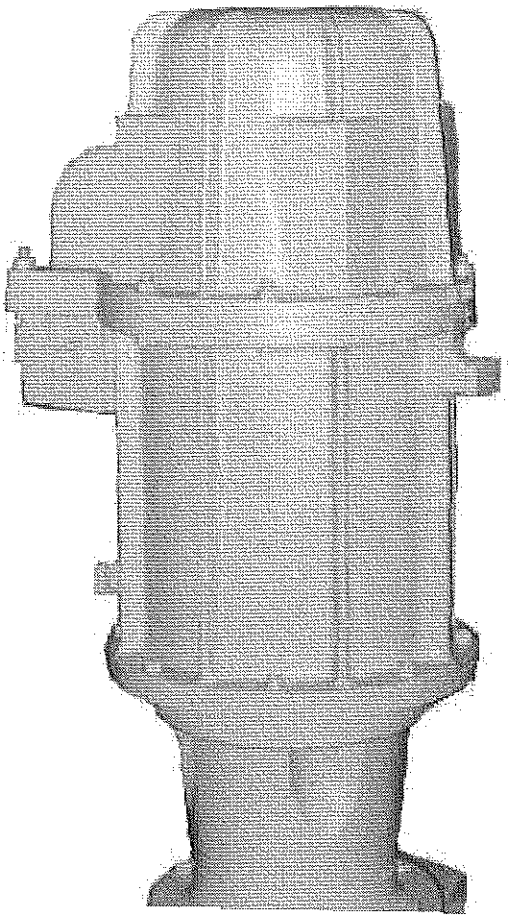
2 **Sprays water over screenings as they enter the inlet hopper**

3 **Introduces washwater into the top of the washing zone**

4 **Flushes dewatering zone and drain pan**

VULCAN
INDUSTRIES, INC.

SUBMERSIBLE EXPLOSION-PROOF ELECTRIC BRAKEMOTOR



FEATURES

- UL Rated for operation in Division 1, Class 1, Group C & D Environments
- Fully submersible to a 30' water depth
- Equipped with electro-mechanical brake with access cover for manually releasing brake.

Each motor isindividually tested and certified at the factory. Below is datafor a 3 horsepower motor, these motors also are available in 1.5, 2.0 and 5.0 hp.

HorsePower		3
RPM Synchronous		1800
Frame		FC210CZ
Volts		480
Phases/Hertz		3/60
No Load Amps		2
Locked RotorAmps		25
Full LoadAmps		4
Full Load RPM		1755
Locked RotorTorque (%)		200
BreakDownTorque(%)		300
% Efficiency	½ load	83.0
	¾ load	85.5
	4/4load	86.5
% Power Factor	½ load	61.0
	¾ load	85.5
	4/4load	78.5
Insulation Class. F Installed, B Rated		
Maximum Ambient (°C)		40
Duty		Continuous
Service Factor		1.15
Enclosure	TENV, UL Rated Class I GRPC XP, Fully submersible	
Bearings	PermSealed BB	

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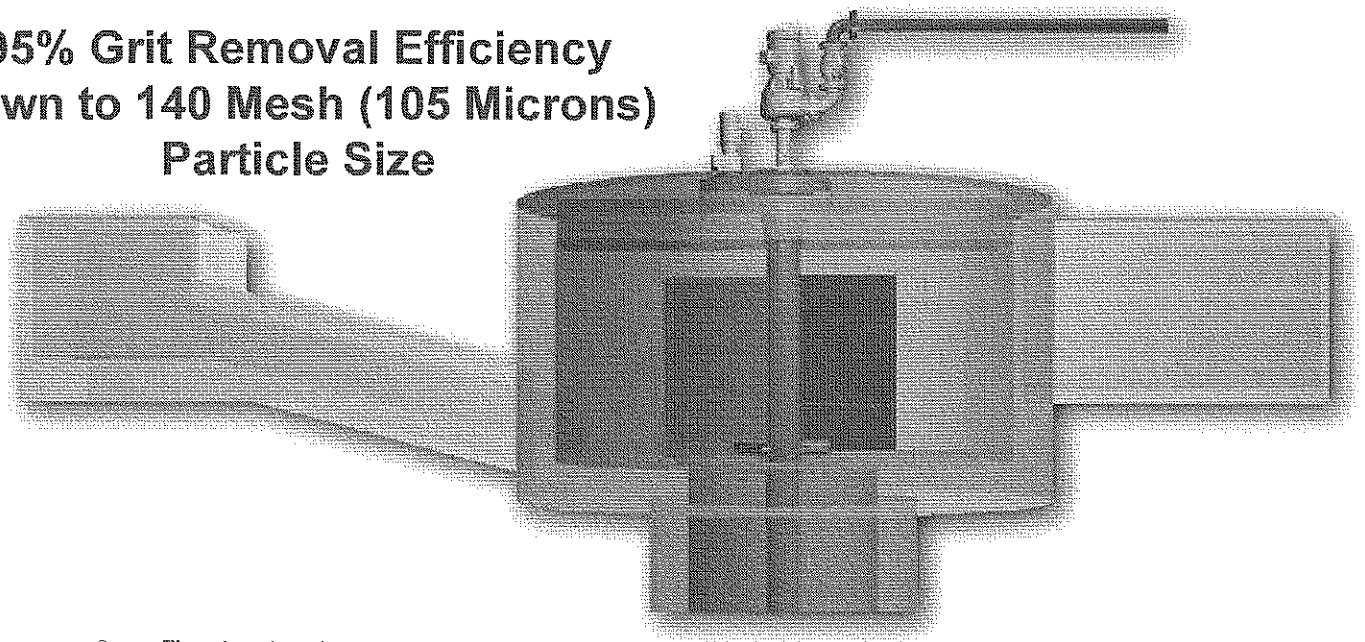
Smith & Loveless Inc.
Above All Others

PISTA® 360™ with V-FORCE BAFFLE™

95% Grit Removal Efficiency Down to 140 Mesh (105 Microns) Particle Size



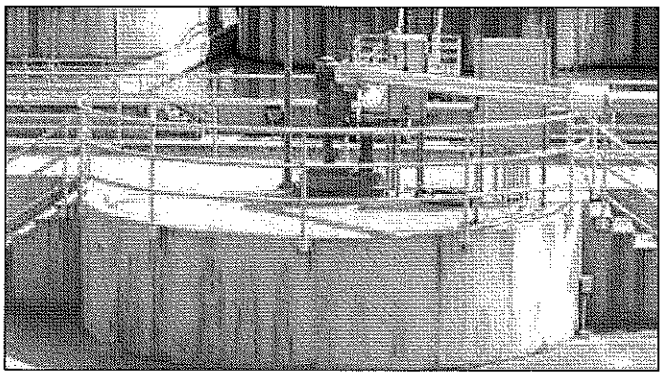
The **PISTA® 360™** Grit Chamber is equipped with the patented **V-FORCE BAFFLE™**, which is an integral flow control baffle for both the inlet and outlet of the main chamber. The **V-FORCE BAFFLE™** directs the inlet flow into the chamber in a manner that ensures the proper vortex flow and prevents short-circuiting. The **V-FORCE BAFFLE™** allows for a full 360° rotation from the inlet to the outlet, providing maximum flow travel for effective grit removal.

The **V-FORCE BAFFLE™** directs the flow out of the **PISTA®** Grit Chamber and acts as a "slice weir", controlling the water level in the main chamber and the inlet channel. No additional downstream flow control device is required to keep the velocity between 3.5 fps (1.06 m/s) at peak flow and 1.6 fps (0.48 m/s) at minimum flow with a 10:1 turn down.

This most recent innovation further enhances the world's best grit removal scheme by providing engineering and cost saving considerations. By increasing chamber velocity during low flow periods, less grit is permitted to settle in upstream channels. The **V-FORCE BAFFLE™** also extends the grit extraction path within the vortex grit chamber. This is a key feature because a longer grit path within the flow pattern dramatically increases the effectiveness of grit being captured on the chamber's flat-floor.

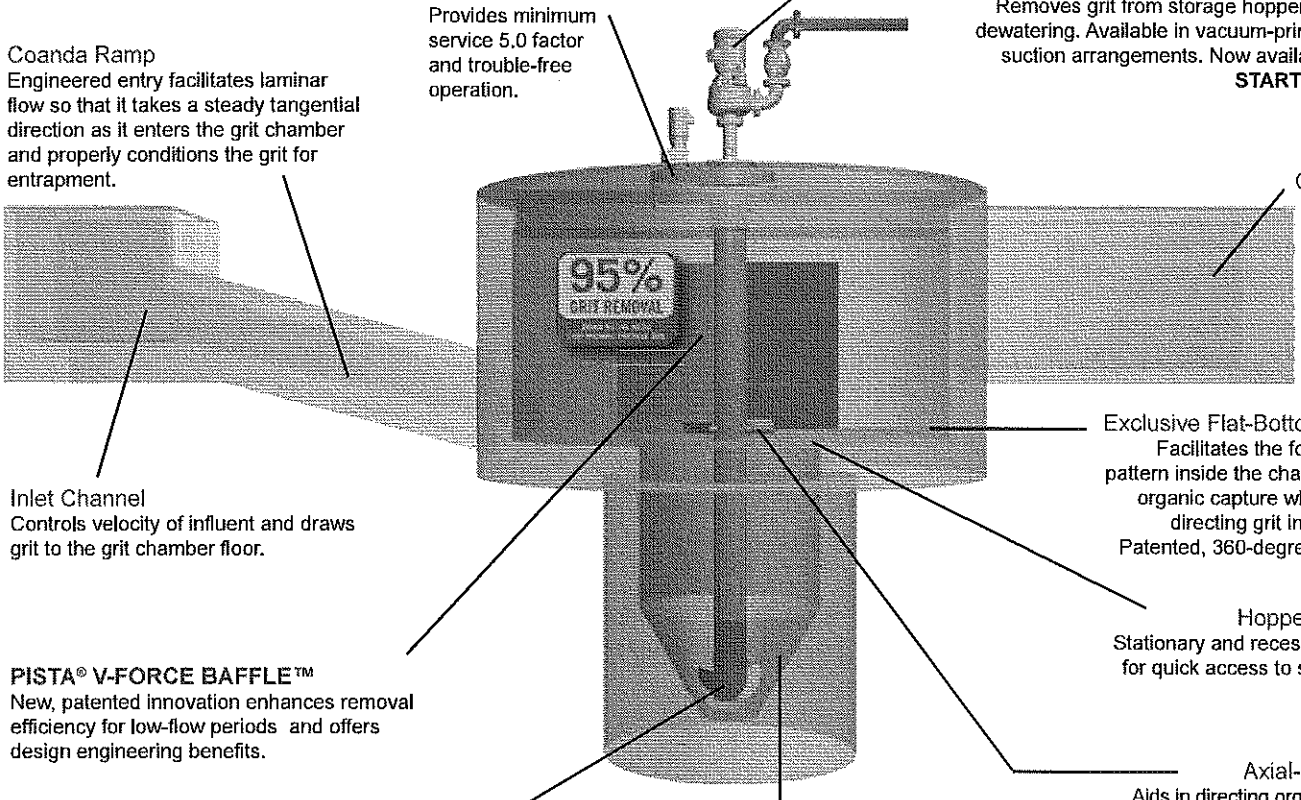
Beyond this, the **PISTA® 360™** with **V-FORCE BAFFLE™** also permits design flexibility so that water elevations can be controlled. Water level control is important because it maintains the correct velocities approaching the grit chamber. Previously, the most common way to accomplish water level control in the chamber was to back up the flow with a downstream submerged weir. The **PISTA® 360™** with **V-FORCE BAFFLE™** has preset inlet and outlet openings that supplant the need for the submerged weir. With all of these improvements, the **PISTA® 360™** with **V-FORCE BAFFLE™** achieves 95% grit removal efficiency down to 140 mesh (105 microns).

By integrating water elevation settings with the **V-FORCE BAFFLE™**, the overall outlet footprint requirements decrease by as much as half the typical distance. The resulting smaller footprint provides significant construction cost savings. The **PISTA® 360™** with **V-FORCE BAFFLE™** represents the latest innovation that makes cents from Smith & Loveless.



*The **PISTA® 360™** with **V-FORCE BAFFLE™** is just one of many Smith & Loveless design innovations that make **PISTA®** the world's leading grit removal system.*

PISTA® Grit Chamber Features and Benefits



PISTA® TURBO™ Grit Pump
[Top-Mounted & Remote-Mounted Options]
Removes grit from storage hopper to washing and dewatering. Available in vacuum-primed and flooded suction arrangements. Now available with **SONIC START®** prime sensing.

Bull Gear Drive
Provides minimum service 5.0 factor and trouble-free operation.

Coanda Ramp
Engineered entry facilitates laminar flow so that it takes a steady tangential direction as it enters the grit chamber and properly conditions the grit for entrapment.

Outlet Channel
S&L can assist with design information for optimal performance.

Exclusive Flat-Bottom Basin Floor
Facilitates the forced vortex flow pattern inside the chamber. Minimizes organic capture while hydraulically directing grit into lower hopper. Patented, 360-degree in-line design.

Inlet Channel
Controls velocity of influent and draws grit to the grit chamber floor.

Hopper Cover Plate
Stationary and recessed, it removes for quick access to storage hopper.

PISTA® V-FORCE BAFFLE™
New, patented innovation enhances removal efficiency for low-flow periods and offers design engineering benefits.

Axial-Flow Propeller
Aids in directing organic-free grit into lower hopper by enhancing flow patterns. Rounded edges prevent solids build-up, thus ensuring high efficiency.

PISTA® Grit Fluidizer
Patented blade exclusive to S&L design. Loosens collected grit, preventing compacting.

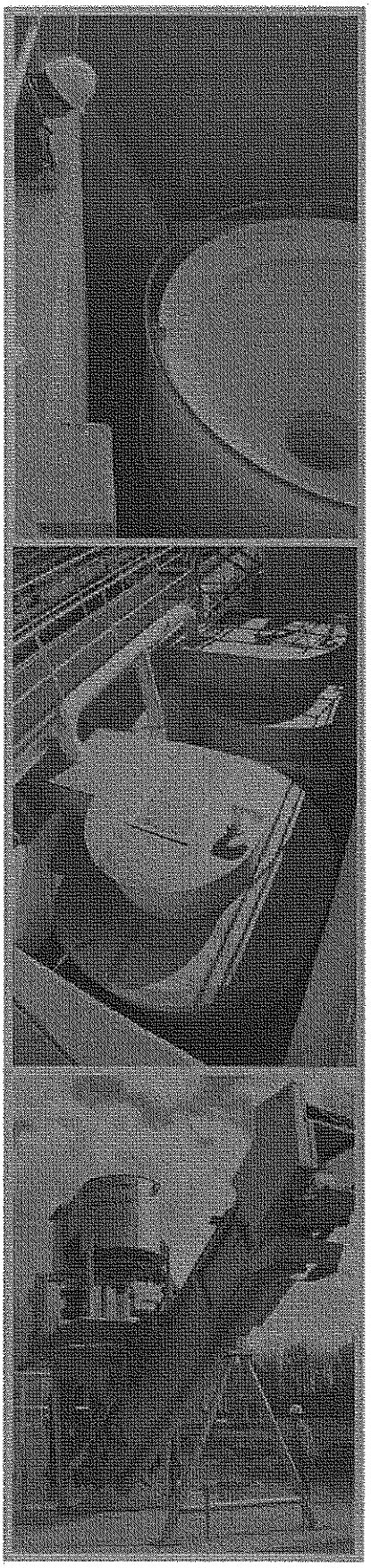
Storage Hopper
Stores removed grit prior to dewatering.

V-FORCE BAFFLE™ Benefits

- 95% grit removal efficiency down to 140 mesh (105 microns) particle size.
- Construction cost savings due to decreased overall grit system footprint requirements.
- Increases grit chamber velocity during low-flow periods.
- Full 360° rotation in the chamber, lengthening grit extraction path.
- Eliminates the need for downstream level control devices.
- Designed to handle wide range of flows.

PISTA® Model Number	Max. Flow (U.S. / Metric / LPS)
0.5 I 0.5A I 0.5B	0.5 MGD / 1,892 CMD / 22 LPS
1.0 I 1.0A I 1.0B	1.0 MGD / 3,785 CMD / 44 LPS
2.5 I 2.5A I 2.5B	2.5 MGD / 9,465 CMD / 110 LPS
4.0 I 4.0A I 4.0B	4.0 MGD / 15,140 CMD / 175 LPS
7.0 I 7.0A I 7.0B	7.0 MGD / 26,495 CMD / 307 LPS
12.0 I 12.0A I 12.0B	12.0 MGD / 45,420 CMD / 526 LPS
20.0 I 20.0A I 20.0B	20.0 MGD / 75,700 CMD / 876 LPS
30.0 I 30.0A I 30.0B	30.0 MGD / 113,550 CMD / 1,314 LPS
50.0 I 50.0A I 50.0B	50.0 MGD / 189,250 CMD / 2,190 LPS
70.0 I 70.0A I 70.0B	70.0 MGD / 265,000 CMD / 3,067 LPS
100.0 I 100.0A I 100.0B	100.0 MGD / 378,500 CMD / 4,381 LPS

PISTA 360™ WITH V-FORCE BAFFLE™



Proposal Package

Grit Removal System

Atlanta, GA
RM Clayton WPCP

Engineer:
Gresham Smith & Partners
Representative:
Principle Environmental

Manufacturer:

Hydro International wastewater

2925 NW Aloclek Drive,
Suite 140
Hillsboro, OR 97124
Phone (503) 615-8130
Toll Free (866) 615-8130
Fax (503) 615-2906

grit removal at its finest...™

www.hydro-international.biz

October 24, 2012

Mr. Ken Baker
Gresham Smith & Partners
511 Union St, Suite 1400
Nashville, TN 37219

RE: Headworks Grit Control & Dewatering System
Atlanta, GA – RM Clayton WPCP
File #09-3856-E

Dear Mr. Baker:

Thank you for your interest in Hydro International. We are pleased to present our proposal for a Eutek HeadCell® Grit Removal, Classification, Washing, and Dewatering System. Hydro International is dedicated to providing innovative, high performance grit removal equipment through superior engineering, high-quality products and unmatched customer service. Our extensive experience includes thousands of installations throughout the world.

Grit is continually introduced into collection systems, but is not uniformly carried to treatment facilities. As flows increase, the grit load entering the plant elevates. Once in the treatment plant, where velocities are slower than in the collection system, grit will deposit in processes, disrupting systems, decreasing equipment longevity, and increasing maintenance costs. The Eutek HeadCell® Grit Removal System offers many benefits over conventional grit removal systems including:

- Removing fine grit protects equipment and processes from abrasive wear and sedimentation
- All-hydraulic design with no moving parts, minimizing operating and maintenance costs
- Small footprint system capable of high efficiency solids capture and removal
- Robust design allowing long component life with minimal wear
- Complete grit system with no weak link through capture to washing/classification to dewatering
- Minimal headloss at peak flows fits most existing flow profiles
- Structured flow ensures maximum utilization of tray surface area and equal surface loading rates throughout the system
- Large surface area with short settling distances ensures higher performance in a smaller footprint
- Compact, yet expandable design capable of high efficiency solids capture and removal
- Continuous boundary layer flow over hydrophobic surfaces prevents grease build-up

We sincerely appreciate your interest in our equipment and look forward to working with you on this project. As you progress with the design, we can quickly generate CAD drawings, budget updates, and specifications as well as review equipment layouts and specifications for your particular application. Reference lists are available through your local representative. If you have any questions or concerns, do not hesitate to contact us.

Regards,
Hydro International

Lindsey Schweitzer
Sr. Applications Engineer

cc: Mr. John Harward – Principle Environmental

Performance Objective

Hydro International is pleased to propose the following Eutek HeadCell® grit removal, washing, and dewatering system to be installed in an existing plant. Each component of the grit removal system is designed to remove 95% of all grit 106 or better at a peak flow. The complete grit removal system shall remove 85-95% of all grit particles, with specific gravity of 2.65, greater than or equal to 106 micron at a peak flow of 240 mgd.

Proposed Equipment Summary

Eutek HeadCell® Grit Concentrator:

The Eutek HeadCell® is an all-hydraulic grit concentrator, which uses vortex flow and a stacked tray design to efficiently capture and settle fine grit via large surface area and short settling distances. The unit can be installed into the process flow, downstream of screening, in any system where limited head is available. The unit requires no external power source, has no internal moving parts, is self-cleaning, and has a compact modular construction. Wide turndown ratios can be accommodated in the Eutek HeadCell® when it is combined with Hydro's high performance washing system.

Quantity:	10
Size:	12' diameter
Number of Trays per Unit:	12
Surface Area/Unit:	1,356 ft^2
Loading rate at Peak Flow:	12.29 gpm/ft^2
Performance:	95% removal of all grit (specific gravity 2.65) ≥ 110 microns @ peak flow
Performance:	95% removal of all grit (specific gravity 2.65) ≥ 75 microns @ average flow
Average Flow/Unit:	8 mgd with no more than 2" headloss
Peak Flow/Unit:	24 mgd with 12" headloss
Discharge:	Weir
Underflow Connection:	6"
NPW Connection:	1" NPT
NPW Requirement:	Continuous 20 gpm @ 50 psig (contact Hydro for alterative options)
Materials of Construction:	304 SS Support Structure/Duct/Underflow
	Low Density Polyethylene Trays
Weight Dry (approximate):	7,000 lbs

Eutek SlurryCup™ Grit Washing/Classification Unit:

The Eutek SlurryCup™ is a all hydraulic, high efficiency free vortex unit that effectively captures, classifies, and removes fine grit, sugar sand, and high density fixed solids from grit slurries, in both grit washing and sludge degritting applications. The Eutek SlurryCup™ is a dynamic grit separator and requires continuous flow to achieve optimum results. Utilizing both boundary layer effects and a secondary washing step the

Eutek SlurryCup™ discharges a clean (low organic) grit slurry, which emits fewer odors and requires only dewatering to meet stringent disposal regulations.

Quantity:	10
Size:	32" diameter
Performance:	95% removal of all grit (specific gravity 2.6) ≥ 75 microns within flow range
Design Flow/Unit:	300 gpm with 180" headloss
Minimum Flow/Unit:	280 gpm with 154" headloss
Maximum Flow/Unit:	400 gpm with 314" headloss
Influent Solids Concentration:	≤1.0%
Influent Connection:	6" flanged pipe
Effluent Connection:	8" flanged pipe
Underflow Connection:	3" NPT
NPW Connection:	1.5" NPT
Continuous NPW Requirement:	Continuous 30 gpm @ 50 psig
Back Wash NPW Requirement (for 30-120 sec. every 1–2 hrs.)	Intermittent 47 gpm @ 50 psig
Material of Construction:	304 SS
Weight Dry/Wet (approximate):	1,000/1,300 lbs
Operation Time:	Continuous or a minimum of 10-15 minutes

Eutek Grit Snail® Dewatering Unit:

The Eutek Grit Snail® uses a slow moving cleated belt to dewater grit by gently escalating grit from the clarifier pool without re-suspending fine grit particles into the clarifier overflow. The large clarifier and a low overflow rate provide sufficient time for fine grit particles to settle. The Eutek Grit Snail® dewaters and retains settleable high-density solids as small as 75 micron from municipal grit slurries or industrial abrasive slurries. The unit is capable of producing dry grit with low organic content for landfill disposal.

Quantity:	5
Capacity:	3 cy/hr
Belt Width:	18"
Clarifier:	72" Square
Motor:	1/3 hp, TENV, 480V/3 phase/ 60 hz
Overflow Connection:	6" flanged pipe
Drain Connection:	3" flanged pipe
NPW Connection:	1.5" NPT
NPW Requirement:	continuous 15 gpm @ 50 psig
Material of Construction (housing):	304 SS Housing
	Rubber Cleated Belt
Weight Dry/Wet (approximate):	2,050 / 7,100 lbs
Performance:	≥60% (wt) total solids and ≤15% volatile solids

Control Panel:

The panel shall contain all timers, starters, switches, and indicator lights to operate two (2) Eutek SlurryCup™ units, one (1) Eutek Grit Snail® unit, and two (2) Grit Pumps run relay in either fully automated or manual mode.

Quantity:	5
Enclosure Material:	304 SS
Enclosure Type:	NEMA 4X
Power Supply:	480V/15 amp/3-phase
Control Logic:	Relay Logic
Grit Pump Control:	Call for Relay

System Hydraulics:

System hydraulics is the responsibility of the design engineer. Hydro International can provide information on Eutek HeadCell® hydraulics, Eutek SlurryCup™ flow vs. headloss curves and pumping and piping FAQ's to assist the engineer in determining system hydraulics and pump requirements, upon request.

Design Recommendations:

- 3/4" or finer screening prior to the grit removal system
- Estimated grit load a peak flow 9.93 yd^3/hr
- 2 – 3 ft/s channel velocities at peak flow as recommended by industry design manuals
- 4 – 7 ft/s grit slurry pipe velocities as recommended by industry design manuals
- Incorporate a drain line, piped to a floor drain, in the grit dumpster to allow for further dewatering prior to disposal
- A minimum 18" of access clearance around all equipment and minimum 3' of access clearance above equipment
- Operators find that it is useful to locate a spray hose adjacent to the equipment so that they can spray all equipment down during an inspection
- Incorporate a minimal access platform to facilitate inspection access to the top of the equipment
- Intermittent operation of grit pump/Eutek SlurryCup™ system may be an option. Contact Hydro for further information.
- Grit pumps may require NPW for seal flushing. Requirements for flushing are dependent on the make, model, and seal type of the pump specified by the engineer.

Start-up

One (1) factory trained representative, two (2) trips, for start-up and instruction services as required totaling four (4) days.

Quote Validity: 30 days

Exclusions

Any item(s) not specifically described above are excluded and are not to be supplied by Hydro International including but not limited to the following:

- Erection and installation
- Anchor Bolts
- Interconnecting piping and valving not expressly stated above
- Pipe connections and fittings not expressly stated above
- All pipe supports, hangers and braces
- Controls, switches, control panels and instrumentation of any kind not expressly stated above
- Wiring and conduit
- Grit pump(s)
- Field or touch-up paint, painting, blasting and touch-up of surface finish

- Spare parts not specifically stated above
- Unloading, hauling and storage charge
- Lubricating oil and greases
- Grit study, field performance testing, laboratory testing and sample collection and analysis
- All concrete and grouting work
- Insulation and heat tracing of any kind
- Seismic analysis
- Grit dumpsters

Options

Quotes will be provided upon request for the following optional features:

- Stainless steel valve bodies
- Additional field days for startup or training
- Explosion proof upgrade
- Odor control covers for the Eutek Grit Snail®
- PLC Based Control Panel
- Upgrade 304 to 316 Stainless Steel
- Seismic Certification
- Grit Pump(s)
- Extended Warranty

Warranty

Hydro International's Standard Warranty shall apply per the Terms and Conditions of Sale.

Delivery

Please allow 4 weeks after receipt of purchase order for approval drawings. Shipment is typically a maximum of 16 weeks after receipt of "Approved" or "Approved As Noted, Resubmittal Not Required" submittal package. Price includes truck freight to jobsite, but does not include any state or local taxes if required.

Terms & Conditions

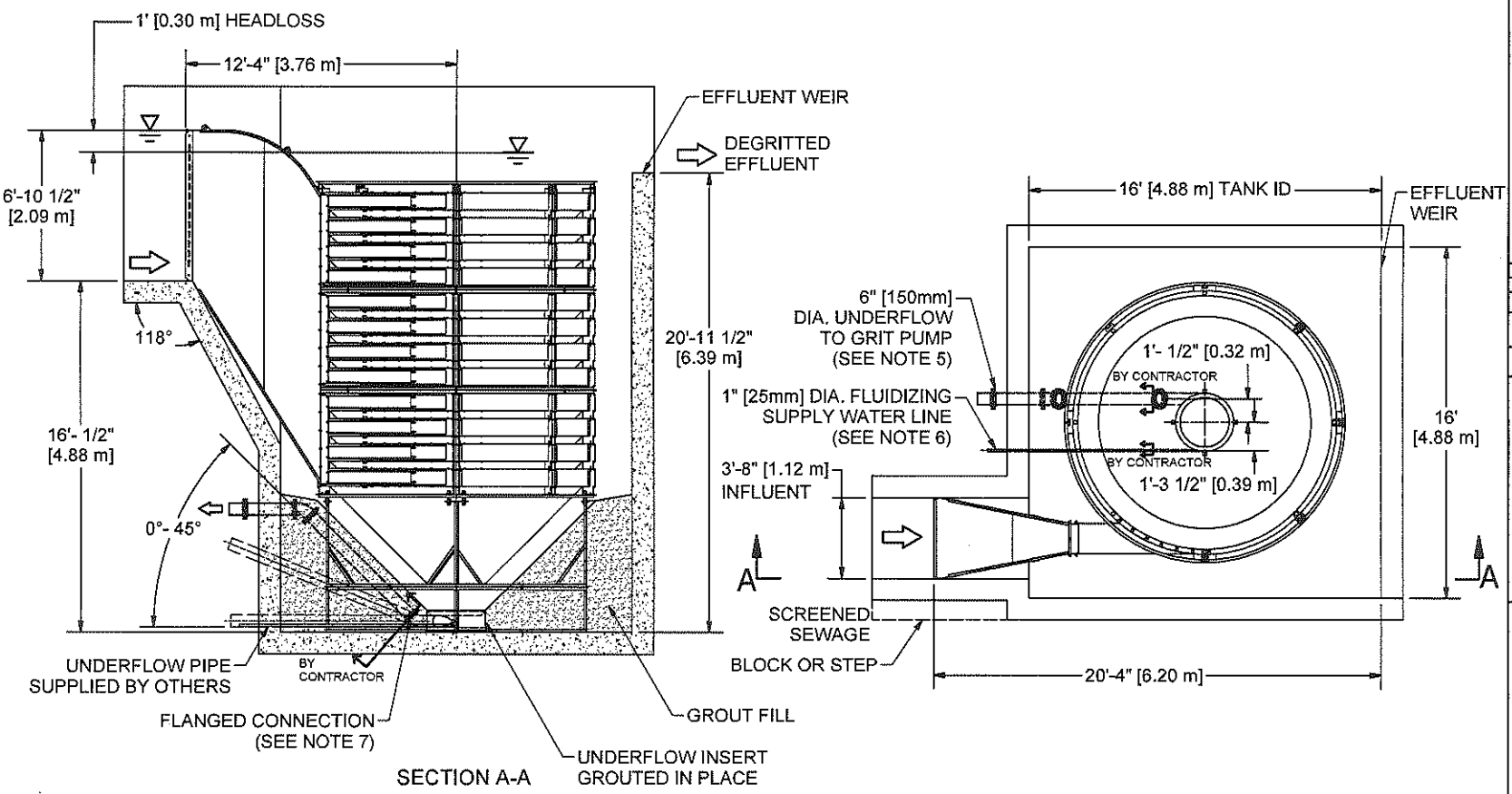
This proposal is made pursuant to Hydro International's standard Terms & Conditions of Sale, attached hereto and made a part hereof.

Contact:

Local Representative:

Mr. John Harward
Principle Environmental
2014 South Long Hollow
Trion, GA 30753
Phone: (770) 952-9444
Fax: (770) 952-7933
Email: johnharward@mindspring.com

DO NOT CHANGE DUCT LAYOUT OR PIPE ORIENTATION
WITHOUT CONSULTING HYDRO INTERNATIONAL



PROJECTION

1. ALLOW GRIT PUMP TO FULLY DRAIN HEADCELL TANK.
2. PLANT FLOW BYPASS RECOMMENDED TO ALLOW THE HEADCELL TO BE TAKEN OUT OF SERVICE IF MAINTENANCE IS REQUIRED.
3. CLOCKWISE & COUNTERCLOCKWISE UNITS ARE AVAILABLE.
4. ALTERNATE EFFLUENT CONFIGURATIONS ARE AVAILABLE.
5. THE GRIT PUMP SUCTION LINE SHOULD BE DESIGNED FOR A 4-7 ft/s [1.2-2.2 m/s] LINE VELOCITY.
6. FLUIDIZING WATER REQUIREMENTS
   11 gpm [0.7 l/s] FOR 4', 6', AND 9' HEADCELL
   20 gpm [1.3 l/s] FOR 12' HEADCELL
7. UNDERFLOW PIPE CONNCETION CAN BE SUPPLIED AT 0°, 22.5°, OR 45° ANGLE.

REV	BY	DATE	DESCRIPTION
-	SR	9/9/2010	FIRST RELEASE

REVISION HISTORY

Date: 9/9/2010 | Scale: 3/16" = 1'0"
Drawn By: SR | Checked By: - | Approved By: -

Title
EUTEK HEADCELL
PROPOSAL DRAWING

12' DIAMETER
12 TRAY
125 MICRON

Hydro International wastewater

2925 NW Aloclek Drive
Suite 140
Hillsboro, OR 97124
Tel: (503) 615-8130
Fax: (503) 615-2906
email: sales@eutek.com

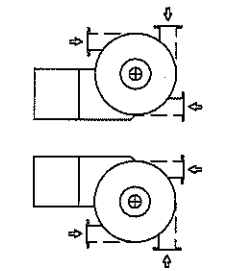
DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. TOLERENCES ARE:

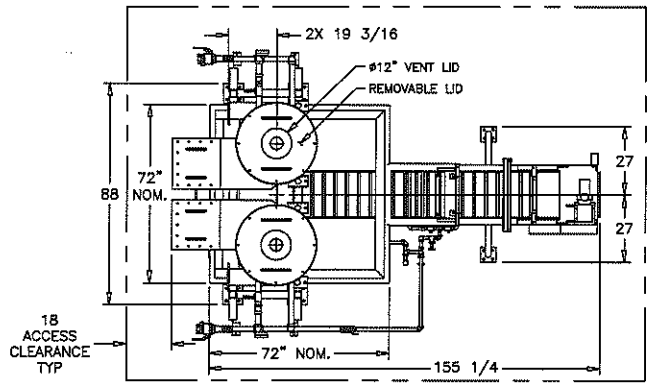
FRACTIONS ± 1/4
DECIMALS ± 0.25
ANGLES ± 1°

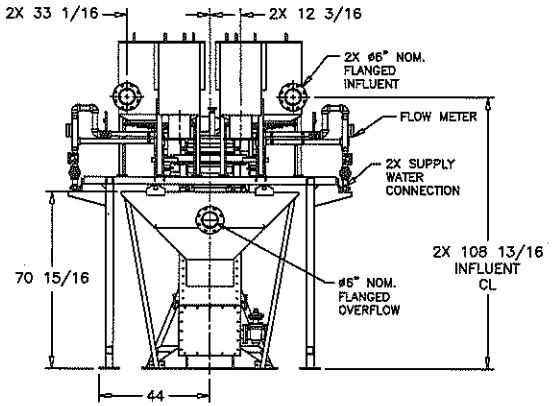
Approximate Weight: 7000 LBS
Finish:
Treatment:
Sheet Size: B
Sheet: 1 OF 1

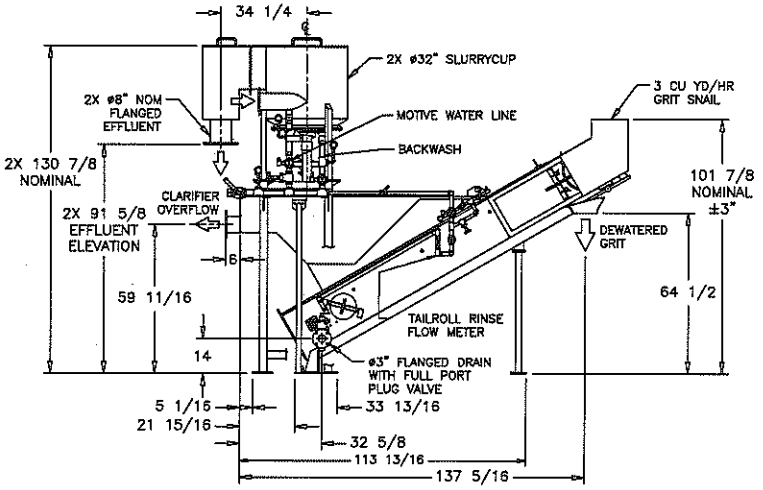
Next Assembly: -
Ref. No.: PROPOSAL
Drawing No.: 12' 12 Tray 125m HC
Rev: -



ALTERNATE FLOW CONFIGURATIONS







PROJECTION

1. SLURRYCUPS ARE AVAILABLE IN CLOCKWISE AND COUNTER-CLOCKWISE ORIENTATION.

2. PLUMBING WILL BE LAYED OUT AND INSTALLED ON EQUIPMENT DURING FABRICATION TO INSURE PROPER FIT AND CORRECTNESS.

3. CONTRACTOR WILL BE REQUIRED TO MAKE A SINGLE WATER CONNECTION FOR EACH SLURRYCUP/GRITSNAIL GROUPING.

4. EQUIPMENT WEIGHTS:
EACH SLURRYCUP: DRY: 1,000 LBS.; WET: 1,300 LBS.
GRIT SNAIL: DRY: 2,050 LBS.; WET: 7,100 LBS.
SUPPORT STRUCTURE: 500 LBS.

5. PROVIDE ADEQUATE CLEARANCE AROUND EQUIPMENT FOR OPERATIONS AND MAINTENANCE.

REV	BY	DATE	DESCRIPTION
C	SR	05/10/10	RE-ISSUE NEW BORDER

REVISION HISTORY

Date	Scale
06/09/00	1/4" = 1' 0"

Drawn By	Checked By	Approved By
AN	EJP	-

Title

DUAL EUTEK SLURRYCUP
32 INCH
w/ EUTEK GRIT SNAIL
3 CU YD/HR
72 INCH CLARIFIER

PROPOSAL DRAWING

Hydro International wastewater

2925 NW Aloclek Drive
Suite 140
Hillsboro, OR 97124
Tel: (503) 615-8130
Fax: (503) 615-2906
email: sales@eutek.com

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. TOLERENCES ARE:

FRACTIONS ± 1/16
DECIMALS ± .06
ANGLES ± 1°

Approximate Weight:	Next Assembly:
SEE NOTE 4	-
Finish: -	Ref. No. PROPOSAL
Treatment: -	
Sheet Size: B	Sheet: 1 OF 1
Drawing No. SC32D-GS1872-DB	Rev C

Standard Terms & Conditions of Sale

1. **DEFINITIONS.** "Hydro" is Hydro International Wastewater, Inc., with an address of 2925 NW Aloclek Drive #140 in Hillsboro, Oregon. "Buyer" is the party purchasing the goods from Hydro.

2. **GENERAL.** Hydro's agreement is based on these terms and conditions of sale. This document, together with any additional writings signed by Hydro, represents a final, complete, and exclusive statement of the agreement between the parties and may not be modified, supplemented, explained, or waived by parol evidence, Buyer's purchase order, any course of dealing, Buyer's payment or acceptance, or in any other way except in writing signed by Hydro through its authorized representative. These terms and conditions are intended to cover all activity of Hydro and Buyer hereunder, including sales and use of products, parts, and work, and all related matters (references to products include parts and references to work include construction and installation). Hydro's obligations hereunder are expressly conditioned on Buyer's assent to these terms and conditions. Hydro objects to any terms that are different from, or additional to, these terms and conditions. Any applicable detail drawings and specifications are hereby incorporated and made a part of these Terms and Conditions of Sale insofar as they apply to the material supplied hereunder.

3. **SPECIFICATIONS.** Products are supplied in accordance with information received by Hydro, or its duly authorized agent, from Buyer. Hydro shall have no responsibility for products created or sold based upon inaccurate and/or incomplete information supplied to it. Buyer shall ensure that Hydro receives all relevant information in time to enable it to supply the appropriate products.

4. **INSTALLATION AND APPLICATION OF PRODUCTS.** Products supplied hereunder shall be installed and used only in the particular application for which they were specifically designed. Buyer should not presume that any products supplied by Hydro may be utilized for any applications other than those specified; nor shall Hydro's obligations, including, without limitation, any warranty obligations, survive Buyer's transfer of products supplied hereunder to third parties unless the products are transferred with Hydro's consent. In addition, Buyer shall not use any product supplied hereunder at any location other than at the location for which Hydro has previously received notice from Buyer. Any breach of any of the foregoing restrictions may amount to an infringement of the patent for the products in question and will in any event void all express or implied warranties relating to the products supplied hereunder.

5. **PURCHASE PRICE AND PAYMENT TERMS.** All prices are in U.S. dollars and all payments shall be made in U.S. dollars. Payment terms are as follows:

	Incremental Payment	Cumulative Payment
Upon Approval of Shop Drawings	10%	10%
Upon Delivery of Equipment to Site	80%	90%
Upon Final Acceptance or 45 days following completion of equipment start up	10%	100%

If payments are not made in conformance with the terms stated herein, any unpaid balance shall be subject to interest at a rate 1½% per month, but not to exceed the maximum amount permitted by law. If shipment is delayed by Buyer, the previously agreed date of readiness for shipment shall be deemed to be the date of shipment for payment purposes. If manufacture is delayed by Buyer, a payment shall be made based on purchase price and percentage of completion, with the balance payable in accordance with the terms as stated. If at any time in Hydro's judgment Buyer may be or may become unable or unwilling to meet the terms specified, Hydro may require satisfactory assurance or full or partial payment as a condition to commencing, or continuing manufacture, or in advance of shipment.

Until payment in full has been received by Hydro, this Standard Terms and Conditions of Sale shall constitute a security agreement and Buyer hereby grants Hydro a purchase money security interest in and to the products produced by Hydro hereunder, and any products or proceeds thereof. In particular:

(i) Hydro will retain an express purchase money security interest in and to the products and all proceeds thereof.

(ii) Until full payment for the products is received by Hydro, Hydro reserves the right to retake possession of the products at any time and for this purpose Buyer authorizes Hydro or its duly authorized agent to enter upon land or premises where it believes the product may be.

(iii) Proceeds of any disposal of the products shall be held in trust for Hydro pursuant to the terms of the Maine Uniform Commercial Code.

(iv) Buyer grants Hydro a power of attorney for the purpose of filing a UCC-1 financing statement in the name of Buyer to evidence Hydro's security interest in the products.

6. **BACKCHARGES.** In the event that Buyer is required to make repairs, corrections or modifications to the goods supplied by Hydro, it shall only do so upon written approval from Hydro. Backcharges shall be limited to the costs directly associated in making the repairs, corrections or modifications to the goods supplied by Hydro. The costs of such backcharges shall be subject to approval by Hydro and shall be limited to: (1) directly related labor and material costs, (2) directly related equipment and tool rental at prevailing rates in the project location and (3) Buyer's overhead & supervision costs to make repairs, corrections or modifications to the goods supplied by Hydro. Buyer shall submit complete documentation to Hydro's satisfaction including but not limited to labor time sheets, material lists, and rental fees detailing the nature of the back charges. Backcharges shall be in the form of an adjustment to the

contract price or reduction in retained payments and not a direct payment. No incidental or consequential backcharges shall be allowed.

7. **DELIVERY.** The goods are sold F.O.B. manufacturing site, freight prepaid to Buyer at job site. Except as outlined in Paragraph 8 below, the risk of loss passes to Buyer after Hydro delivers the goods to the carrier. Hydro reserves the right to select the method of shipment and carrier. Delivery dates are approximate only and are not a guarantee of delivery on a particular day. Hydro is not liable for failure or delays in deliveries of any cause whatsoever beyond the control of Hydro.

8. **TITLE & INSURANCE:** Title to the product(s) and risk of loss or damage shall pass to Buyer upon delivery to a carrier as outlined in Paragraph 7 above, or, in the event Buyer delays shipment, by the previously agreed date of readiness for shipment, except that a security interest in the product(s) or any replacement shall remain in Hydro's name, regardless of the mode of attachment to realty or other property, until the full price has been paid in cash. Buyer agrees to protect Hydro's interest by adequately insuring the product(s) against loss or damage from any external cause with Hydro named as insured or co-insured.

9. **ERECTION:** Unless otherwise stated in writing, the goods provided hereunder shall be assembled and erected by and at the expense of Buyer.

10. **CANCELLATION & BREACH:** Orders placed cannot be canceled, nor shipments of goods made up, or in process, be deferred beyond the original shipment dates specified, except with Hydro's written consent and upon terms which shall indemnify Hydro against all loss. In the event of cancellation or the substantial breach of Buyer's obligations, as by failing to make any of the payments when due, the parties agree that Hydro will suffer a serious and substantial damage that will be difficult, if not impossible, to measure, both as of the time of entering into this purchase agreement and as of the time of such cancellation or breach. Therefore, the parties agree that, upon such cancellation or breach, Buyer shall pay to Hydro the sums set forth herein below, which sums the parties do hereby agree shall constitute agreed and liquidated damages in such event:

    - If cancellation or breach shall occur after the acceptance of the purchase order but prior to mailing of submittal documents by Hydro to Buyer, liquidated damages shall be 10% of the selling price.
    - If cancellation or breach shall occur within thirty (30) days from the mailing of submittal documents by Hydro to Buyer, the liquidated damages shall be 20% of the selling price.
    - If the cancellation or breach occurs after thirty (30) days from the mailing of submittal documents by Hydro to Buyer, but prior to notification that the order is ready for shipment, the liquidated damages shall be the total of 30% of the selling price plus the expenses incurred, cost of material, and reasonable value of the work expended to fill the order involved herein by Hydro's engineers and other employees, agents and representatives after the mailing of general arrangement drawings by Hydro to Buyer, said sums to be determined at the sole reasonable discretion of Hydro; provided, however, that the total liquidated damages under this provision shall not exceed the total selling price.
    - If cancellation or breach shall occur after Hydro has notified Buyer that the order is ready for shipment, then the liquidated damages shall be the total selling price, less costs associated with startup or field testing.

11. **MATERIALS OF CONSTRUCTION, PAINTS AND COATINGS:** Buyer is responsible for determining the suitability of, and for giving final approval of, the materials of construction, paints, coatings, etc. to be used by Hydro.

12. **WARRANTY:** Any product that proves defective in material, workmanship or design within twelve (12) months after delivery (or entry into storage) will be, at the discretion of HYDRO, modified, repaired or replaced, or Buyer's payment for the products will be refunded. This shall be Buyer's sole remedy. HYDRO EXPRESSLY EXCLUDES AND DISCLAIMS ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHER WARRANTIES, EXPRESS OR IMPLIED.

    This warranty does not cover any defects or costs caused by: (1) normal wear and tear of equipment from designed operation. (2) modification, alteration, repair or service of the goods by anyone other than Hydro; (3) physical abuse to, or misuse of, the goods, or operation thereof in a manner contrary to Hydro's instructions; (4) any use of the goods other than that for which they were intended; (5) chemicals or components which were not disclosed to Hydro; (6) storage contrary to Hydro's instructions; or (7) failure to maintain the goods in accordance with Hydro's instructions.

    This warranty does not apply to component parts of the goods that were not both originally designed and manufactured by Hydro, including, but not limited to, valves and controls. These component parts do not carry any warranties by Hydro, and only carry the warranties, if any, of their manufacturers.

    In order for Buyer to make a claim under this warranty, Buyer must promptly, and within the warranty period, notify Hydro in writing of any defect(s) in the goods covered by this warranty. If any defect(s) in the goods covered by this warranty are visible at the time of delivery, Buyer must notify Hydro of the defect(s) in writing within five working days. To make any claim under this warranty, Buyer must also fully comply with written authorization and return instructions from Hydro.

13. **FIELD SERVICE:** Startup/Field Service will only be scheduled upon written request. Buyer shall notify Hydro of schedule requirements at least ten (10) working days in advance, or additional charges may be added to cover late-scheduled travel costs. Additional costs will be limited to those arising out of late-scheduled costs. Should Buyer have outstanding balances due Hydro, no startup / field service will be scheduled until such payments are received by Hydro. Hydro will send documents to Buyer defining the service or startup requirements. Buyer assumes all responsibility for the readiness of the system when it requests startup service. Should Hydro's Field Service Engineer arrive at the jobsite and determine that the system cannot be started up within a reasonable time, Hydro shall have the option to bring the Field Service Engineer home and bill Buyer for time, travel and living expenses. Additional field service is available from Hydro at the prevailing per-diem rate at the time of the request for service plus all travel and living expenses, portal-to-portal. A purchase order or change order will be required prior to scheduling this additional service.

14. **LIMITATION OF HYDRO'S LIABILITY.** Hydro assumes no liability or responsibility for the misuse of its products by Buyer, Buyer's employees, agents or assigns, or other use inconsistent with the use appropriate to the performance specification requirements submitted to Hydro, and Buyer agrees to indemnify and hold harmless Hydro for any loss, costs, expense or liability that it may incur or be put to as a result of misuse or inconsistent use of the products. In addition, Hydro shall have no liability to Buyer for any consequential or incidental damages incurred by Buyer in connection with the contract documents or the products purchased by Buyer. Hydro shall not be liable for any loss which results from delay in delivery caused by any reason beyond its control, including, but not limited to, acts of God, casualty, civil disturbance, labor disputes, strikes, transportation or inability to obtain materials or services, any interruption of its facilities, or act of any governmental authority. The time for delivery shall be extended during the continuance of such conditions.

15. **CONFIDENTIAL INFORMATION.** The information contained herein and in related contract documents is considered proprietary and confidential information. Buyer agrees to keep such information confidential and not to disclose such information to third parties.

16. **INTERPRETATION OF CONTRACT.** This contract shall be construed according to the laws of the State of Maine.

17. **CHOICE OF FORUM.** Buyer and Hydro hereby consent and agree that the United States District Court for the District of Maine or the District Court or Superior Court located in the City of Portland, County of Cumberland, Maine will have exclusive jurisdiction over any legal action or proceeding arising out of or relating to the contract documents, and each party consents to the personal jurisdiction of such Courts for the purpose of any such action or proceeding. Buyer and Hydro further hereby consent and agree that the exclusive venue for any legal action or proceeding arising out of or relating to the contract documents will be in the County of Cumberland, Maine. Each party hereby waives all rights it has or which may hereafter arise to contest such exclusive jurisdiction and venue.

18. **ATTORNEYS' FEES.** If any judicial or non-judicial proceeding is initiated for the purpose of enforcing a provision of this contract, the prevailing party shall be awarded reasonable attorneys' fees in addition to all other costs associated with the proceeding, whether or not the proceeding advances to judgment.

19. **SEVERABILITY.** If any provisions of this contract are held invalid by a court of competent jurisdiction, the remainder of this contract shall not be rendered invalid, and such invalid provisions shall be modified, in keeping with the letter and spirit of this contract, to the extent permitted by applicable law so as to be rendered valid.

20. **ANTI-BRIBERY.** Hydro International will not engage in any form of bribery or corruption. The offering, giving or receiving of bribes is contrary to Hydro International's values and can play no part in the way in which it carries out its business. Hydro requires you to support our approach and implement provisions consistent with our policy through your own organization and your supply chain. Please find a copy of our Anti-Bribery and Corruption Policy on our website at http://plc.hydro-intl.com/content/view/296/247/

APPENDIX E

Budgetary-Level Construction Cost Estimates

City of Atlanta RM Clayton WRC Headworks Evaluation
Evaluation of Options 1, 2, 3 and 4
Option 1 - Capital Costs

Item	Quantity	Units	Unit Price	Capital Costs
1/2-inch Coarse Screen Equipment and Installation Only	4	EA	$ 450,000	$ 1,800,000
Washer Compactor	2	EA	$ 100,000	$ 200,000
Conveyors	2	EA	$ 240,000	$ 480,000
GRU Unit 1 Rehabilitation	1	LS	$ 80,000	$ 80,000
GRU Unit 2 Rehabilitation	1	LS	$ 50,000	$ 50,000
GRU Unit 3 Rehabilitation	1	LS	$ 50,000	$ 50,000
GRU Unit 4 Replacement	1	LS	$ 140,000	$ 140,000
GRU V-FORCE Baffles	4	EA	$ 33,000	$ 140,000
GRU Quarterly Service Contract (5 yrs Labor Only)	5	YR	$ 12,000	$ 240,000
Fine Screen Equipment Rehab	3	EA	$ 100,000	$ 300,000
Capital Costs- Subtotal			$3,480,000	

Additional Items		
Electrical Gear and Instrumentation and Controls	15%	$ 522,000
New Coarse Screen Facility	100%	$ 1,000,000
Contractor's Administration	5%	$ 174,000
Contractor's Profit	8%	$ 278,400
Contractor's Bond and Insurance	1%	$ 34,800
Contractors General Conditions	4%	$ 139,200
Undefined SOW (Contingency)	30%	$ 1,044,000
Engineering and Administration	12%	$ 417,600
Total Costs	**$6,568,000**	

City of Atlanta RM Clayton WRC Headworks Evaluation
Evaluation of Options 1, 2, 3 and 4
Option 2 - Capital Costs

Item	Quantity	Units	Unit Price	Capital Costs
1-inch Coarse Screen Equipment and Installation Only	2	EA	$ 280,000	$ 560,000
Washer Compactor	1	EA	$ 50,000	$ 50,000
Conveyors	1	EA	$ 120,000	$ 120,000
1-inch Screening Facility and Splitter Box Improvements	1	LS	$ 1,000,000	$ 1,000,000
1/2-inch Coarse Screen Equipment and Installation Only	4	EA	$ 450,000	$ 1,800,000
Washer Compactor	2	EA	$ 100,000	$ 200,000
Conveyors	2	EA	$ 240,000	$ 480,000
GRU Unit 1 Rehabilitation	1	LS	$ 80,000	$ 80,000
GRU Unit 2 Rehabilitation	1	LS	$ 50,000	$ 50,000
GRU Unit 3 Rehabilitation	1	LS	$ 50,000	$ 50,000
GRU Unit 4 Replacement	1	LS	$ 140,000	$ 140,000
GRU V-FORCE Baffles	4	EA	$ 33,000	$ 140,000
GRU Quarterly Service Contract (5 yrs Labor Only)	5	YR	$ 12,000	$ 240,000
Fine Screen Equipment Rehab	3	EA	$ 100,000	$ 300,000
Eutek HeadCell® System and Installation Only	1	LS	$ 4,320,000	$ 4,320,000
Earthwork	1	LS	$ 100,000	$ 100,000
Concrete	1	LS	$ 1,590,000	$ 1,590,000
Retaining Wall	1	LS	$ 80,000	$ 80,000
Capital Costs- Subtotal			$11,300,000	

Additional Items		
Electrical Gear and Instrumentation and Controls	15%	$ 1,695,000
Contractor's Administration	5%	$ 565,000
Contractor's Profit	8%	$ 904,000
Contractor's Bond and Insurance	1%	$ 113,000
Contractors General Conditions	4%	$ 452,000
Undefined SOW (Contingency)	30%	$ 3,390,000
Engineering and Administration	12%	$ 1,356,000
Total Costs	**$19,775,000**	

City of Atlanta RM Clayton WRC Headworks Evaluation
Evaluation of Options 1, 2, 3 and 4
Option 3 - Capital Costs

Item	Quantity	Units	Unit Price	Capital Costs
1-inch Coarse Screen Equipment and Installation Only	2	EA	$ 280,000	$ 560,000
Washer Compactor	1	EA	$ 50,000	$ 50,000
Conveyors	1	EA	$ 120,000	$ 120,000
1-inch Screening Facility and Splitter Box Improvements	1	LS	$ 1,000,000	$ 1,000,000
1/2-inch Coarse Screen Equipment and Installation Only	4	EA	$ 450,000	$ 1,800,000
Washer Compactor	2	EA	$ 100,000	$ 200,000
Conveyors	2	EA	$ 240,000	$ 480,000
Eutek HeadCell® System and Installation Only	1	LS	$ 4,320,000	$ 4,320,000
Fine Screen Equipment Rehab	3	EA	$ 100,000	$ 300,000
Earthwork	1	LS	$ 300,000	$ 300,000
Concrete	1	LS	$ 1,590,000	$ 1,590,000
Retaining Wall	1	LS	$ 80,000	$ 80,000
Capital Costs- Subtotal			$10,800,000	

Additional Items		
Electrical Gear and Instrumentation and Controls	15%	$ 1,620,000
Contractor's Administration	5%	$ 540,000
Contractor's Profit	8%	$ 864,000
New Coarse Screen Facility	100%	$ 1,000,000
Contractor's Bond and Insurance	1%	$ 108,000
Contractors General Conditions	4%	$ 432,000
Undefined SOW (Contingency)	30%	$ 3,240,000
Engineering and Administration	12%	$ 1,296,000
Total Costs	**$19,900,000**	

City of Atlanta RM Clayton WRC Headworks Evaluation
Evaluation of Options 1, 2, 3 and 4
Option 4 - Capital Costs

Item	Quantity	Units	Unit Price	Capital Costs
1-inch Coarse Screen Equipment and Installation Only	2	EA	$ 280,000	$ 560,000
Washer Compactor	1	EA	$ 50,000	$ 50,000
Conveyors	1	EA	$ 120,000	$ 120,000
1/2-inch Coarse Screen Equipment and Installation Only	4	EA	$ 450,000	$ 1,800,000
Washer Compactor	2	EA	$ 100,000	$ 200,000
Conveyors	2	EA	$ 240,000	$ 480,000
Eutek HeadCell® System and Installation Only	1	LS	$ 4,320,000	$ 4,320,000
Fine Screen Equipment and Installation Only	1	LS	$ 5,400,000	$ 5,400,000
Earthwork	1	LS	$ 500,000	$ 500,000
Concrete	1	LS	$ 570,000	$ 570,000
Retaining Wall	1	LS	$ 200,000	$ 200,000
New Headworks Facility	1	LS	$ 3,780,000	$ 3,780,000
Capital Costs- Subtotal			$17,980,000	

Additional Items		
Electrical Gear and Instrumentation and Controls	15%	$2,697,000
Contractor's Administration	5%	$899,000
Contractor's Profit	8%	$1,438,400
Contractor's Bond and Insurance	1%	$179,800
Contractors General Conditions	4%	$719,200
Undefined SOW (Contingency)	30%	$5,394,000
Engineering and Administration	12%	$2,157,600
Total Costs	**$31,465,000**	