City of Corona

Water Reclamation Facility #1

Tertiary Screen Repair/Replacement Assessment - DRAFT

December 2020

Coenraad Pretorius, PE
Project Manager
320 Goddard Way, Unit 200
Irvine, CA 92618

Table of Contents

Figure Index

Table Index

Appendix Index

1. Background/History

The City of Corona (City) owns and operates three water reclamation facilities (WRFs). Treatment at WRF-1 includes preliminary treatment, primary treatment (part of the flow), secondary treatment and tertiary treatment as well as solids handling. Secondary treatment occurs in two parallel plants. The combined secondary effluent from the two plants is filtered in a continuous backwash filtration system consisting of 12 cells, each made up of four 50 square foot modules, and was commissioned in 1998 with a rated capacity of 15.0 mgd.

When the filters were put in service, it required excessive operator attention: due to frequent plugging of the filters, a schedule of cleaning one filter cell every day – an effort that required the full time attention of one operator. Filter performance was affected and meeting effluent turbidity limits was challenging. To maintain media in the filters, one to two super sacks of media had to be added to the filters every year.

In 2007 a multidisc screen was added in the feed channel upstream of the filters, along with a discharge chute and a screenings conveyor/compactor, to address these issues. To accommodate the filter, the project also diverted the pumped flow from the secondary effluent equalization basins to the opposite end of the filter feed channel, where there was room to install the screen. The screen solved the plugging and frequent cleaning issues. It apparently operated well without excessive maintenance requirements. Media retention also improved so that one to two super sacks now last between three and four years.

In 2011 the headworks screenings grinders and rotating drum screens (Auger Monsters) were replaced with mechanically cleaned 6 mm bar screens supplied by Parkson, and screenings washer/compactor units supplied by Vulcan. While the screening openings may not have been changed by the project, getting rid of the screening grinder or macerator appears to have improved screenings capture efficiency. The weight of screenings removed by the bar screens is reportedly three times the weight removed by the rotating drum screens. This significantly reduced the screenings passing through to the downstream process units, including the tertiary screen, although the operations staff did not notice a reduction in screenings load removed by the tertiary screen.

In early 2020, the tertiary screen broke down, leading the City to explore its options. The City identified two options: repair the screen with parts from the original manufacturer or replace the screen with a new unit. As part of an effort to standardize equipment at its facilities, the City is exploring replacing the screen with a bar screen from Parkson, so the tertiary screen would be from the same manufacturer as the two headworks screens and potentially the same model, but with smaller spacing.

The City wants to evaluate whether the potential savings in operation and maintenance costs for the replacement screen is worth the additional upfront investment plus the additional labor required to replace, rather than repair, the existing screen. The screens also need to be compared in terms that are not strictly monetary: screening efficiency, operations and maintenance requirements as well as reliability.

2. Fine Screen Technologies

Screens in the wastewater industry can be classified as coarse or fine. In headworks applications, it often makes sense to place a coarse screen upstream of a fine screen. In a tertiary application a fine screen can be installed by itself, as the screen is still downstream of the headworks screen. The existing tertiary screen is a fine screen, as would be its potential replacement.

Commonly used fine screens include static wedge wire screens, rotating drum wedge wire screens, step screens and rotating band screens. Of these, only a rotating band screen, installed at a steep angle, would fit into the limited room available for the screen at WRF-1 filters. The existing multi-disc screen may well have been selected due to the limited floor area it requires and the fact that installing this screen minimized the modifications required to the filter feed channel.

3. Description of Options

In addition to the two options identified by the City, there is also the option of simply removing the tertiary screen. The vast majority of tertiary filters, including continuous backwash filters, are installed without tertiary screens.

3.1 Repair

The first option is to repair. The original screen manufacturer, Infilco Degremont is part of Suez Treatment Solutions (Suez), and Suez has decided to no longer manufacture or support the multidisc screen. With spare parts no longer provided by the manufacturer, replacement parts must be custom made. This can add significant cost and be prone to long lead times.

The existing multidisc screen consists of crescent-shaped mesh panels, with 2 mm orifice diameters, which circulate from the top of the flow channel, down one side of a central separator and up the other side, until they reach their original position. The panels are connected at the rear and installed across the channel. The single flow through the screen minimizes headloss. Debris is captured while the panel is submerged and carried to deck level, where it is removed by a spray system. One benefit of the multidisc screen compared to band screens is that no debris can be carried over to the downstream side of the screen if it is not removed the first time it passes by the spray system, since the upstream side of the screen remains at the upstream side at all times. Individual mesh panels can be changed at deck level. The multidisc screen is installed within the channel across the direction of flow, so that it requires little space in the direction of flow.

The City has requested and received a proposal from Suez to repair the screen. The repair includes replacing 28 mesh panels and 16 sprocket segments, including some machining on-site. The proposal is included as Appendix A and shows a total order cost of $171,574.35, excluding sales tax.

3.2 Replace

The City is also exploring whether it makes sense to replace the existing screen with a different unit, and has obtained a quote from Parkson for replacing the existing screen with an Aqua Guard Ultra Clean self-

cleaning bar screen. The bar screen would also require replacing the existing screenings washer/compactor with a new ESP 250/1200 Screw Press manufactured by Vulcan Industries. The screen will be installed at 85 degrees to the horizontal, which is a standard option, and would allow the screen to fit into the available room.

The screen consists of a moving element that conveys captured screenings to the top of the unit and on to the rear, where a brush is used to dislodge the capture screenings into a chute that drops the screenings directly into the washer/compactor. The brush is the main wear item but can be maintained while the unit remains in operation. Parkson offers two opening size options, 3 mm x 8 mm slots (nominally a 3 mm screen) or 3 mm round holes in perforated plates. The difference is be explored below.

The proposal from Parkson for a screen is included in the Appendix and totals $268,317.81 while the proposal from Vulcan, also in Appendix A totals $62,707.16. The total capital cost for this option would be $331,024.97, excluding sales tax.

City staff would remove the existing multidisc screen and install the new Parkson bar screen.

3.3 Remove

Unlike other filtration technologies, dynamic sand filters have a tendency to trap plastic debris and other screenings. The accumulated screenings can adversely affect filter performance and some of it will eventually pass through to the effluent. Screenings passing through the filter can affect reclaimed water use, for example, by plugging sprinkler heads.

The existing screen has been out of service for most of the year 2020, with no apparent impact on filter operation, maintenance or performance. It may be due to a gradual and ongoing buildup of debris in the filters that has not yet reached the level where their impact has become obvious. So far, there appears to be no deterioration in filter performance or any increase in operator attention to keep the filters in service. It seems likely that the new headworks screen is removing screenings to a degree where the screenings passing through are at a level where the previous plugging issues are not recurring.

Tertiary screens are not common, and moving bed sand filters are typically able to function without the need for a dedicated screen to keep trash out of the units. There will always be some trash that enters the effluent stream downstream of the headworks, either being inadvertently dropped into process units and open channels or being blown into large open units by the wind.

A tertiary screen offers an additional layer of protection to the filters, which needs to be weighed against the cost of repair or replacement as well as operations and maintenance cost associated with the screen versus any additional maintenance that may be required at the filter due to the increased screenings load. If more frequent media replacement is required, the operator effort, as well as the need to enter confined space during media replacement, would also need to be considered.

4. Comparison of Options

Treatment options have been compared in terms of their expected financial impact as well as in non-financial terms.

4.1 Preliminary Financial

The capital cost for the repair and replace options simply reflect the vendor quotes mentioned in Section 3 and included in Appendix A. The costs are summarized in Table 1. The remove option would incur no capital cost.

Table 1 Capital Cost

Item	Repair	Replace
Multi-disc Filter Repair by Suez	$171,574	
AquaGuard Screen by Parkson		$268,318
Screw Press by Vulcan		$62,707
TOTAL	**$171,574**	**$331,025**
Difference	$159,451	

The table shows the difference between the two options is nearly $160,000. City staff would remove the existing multidisc screen and install the new bar screen and the cost of labor has been included in the budget. While it is a viable strategy, there is a risk that the replace option would run into unforeseen complications, such as new equipment not fitting exactly into the available space, power requirements not matching available power, control systems not easily incorporated into the new equipment, etc.

Excluding the cost of labor, the remove option would have no capital cost.

Both screens would require routine maintenance and operational adjustments by City staff per the manufacturers' recommendations. The existing screen has been in service for almost thirteen years, since 2007, before breaking down. For the sake of the analysis, it was assumed the screen would remain in service for twelve years before requiring another major repair and the future repair would incur the same cost. Based on the increased screenings capture at the headworks since the installation of the bar screen, and the corresponding lower screenings load to the tertiary screen, this seems like a conservative assumption.

For the replacement screen the representative estimates that the screen would need to be removed from service and rebuilt every 10 – 15 years in a typical headworks application. In a tertiary application, where the service is less severe, it seems reasonable to assume that the frequency for rebuilding would be 15 years. The rebuilds typically cost 30 – 50% of the initial equipment cost, and 40% was used for the analysis.

Washer compactors need rebuilding too, typically after 10 years in a headworks application. Considering the lighter material, as well as the lower load in a tertiary application, using a 20 year interval seems reasonable. For the Vulcan washer-compactor, the representative estimates that the rebuild would cost in the range of $20,000 - $25,000. It is assumed that the existing washer-compactor would incur the same cost to rebuild. The main difference is that the existing washer-compactor has been in service for almost 13 years and it may require a rebuild in the next few years, whereas a new washer-compactor would reset the clock.

The remove option would obviously require no maintenance efforts or rebuilding of tertiary screens or washer-compactors. To understand the maintenance costs for the remove option, one would need to consider the impact of the tertiary screen on the continuous backwash filters. The existing system appears to have been in service since 2007 without media replacement. Over time, some media is lost, and the operations staff estimate that the current rate of media make-up is one to two super sacks of media per year. Given that a super sack may be either 3,000 or 4,000 lb, the rate of make-up is somewhere between 1.5 and 4 tons of media per year. For the analysis a value of 3 tons per year was assumed. It is further assumed that the coarser rotating band screen would require a media makeup rate of 4 tons/year.

As mentioned, a continuous backwash filter without an upstream tertiary screen is a common installation. The representative for the filters estimates that in these applications the media is typically replaced, in other words remaining media is removed from the filter and completely replaced by fresh media, every 5 – 7 years. Conversations with some of the operations staff at these facilities showed that they believed the interval was closer to 5 years, and that the removed media was often packed with screenings, such as the material that a tertiary screen would remove. The analysis assumes the remove option would require full media replacement every 5 years. Given that each module in a standard filter contains 10.2 tons of media, the media requirement for full replacement comes to 490 tons. Based on recent projects, the media cost is about $210/ton excluding $2,000 - $5,000 for freight.

Table 2 summarizes the operating and maintenance costs for all three options.

Table 2 Annual Operating and Maintenance Cost and Payback

Item	Repair	Replace	Remove
Screen Repair and Rebuild	$14,300	$7,200	-
Washer-Compactor Rebuild	$1,000	$1,000	-
Filter Media Makeup and Replace	$750	$990	$21,600
TOTAL	**$16,050**	**$9,190**	**$21,600**
Simple Payback versus Remove, years	31	27	
Simple Payback versus Repair		23	

In strictly financial terms, remove is the most attractive option. Between repair and replace, repair is the more financially attractive option, with simple payback for replace at more than 20 years.

The risks associated with remove will be discussed in the next section.

The main financial risk associated with the repair option is that future repairs may cost more, especially if fewer of these styles of screens remain in service. While there is little the City can do to safeguard against future cost increases, the City can at least limit the damage, by choosing to replace, if any increase is considered too high, or reduces the payback for replace to an acceptable value.

4.2 Non-Financial

A large part of the end-user's experience with any piece of equipment is the responsiveness of the representative for that piece of equipment. When equipment fails or need servicing, the representative can make a big difference regarding the speed and quality of service.

The representatives for Parkson in Southern California, Coombs-Hopkins have a good record of being responsive, and provide field assistance that is typically knowledgeable about the equipment they represent. Suez listed Carotech Engineering as their sales representative, but all communications appears to have been with Suez personnel located in Richmond, VA.

There is obviously an issue with equipment no longer being supported by the manufacturer. The main concern is that even a minor repair can be costly and/or require excessive downtime while a replacement part is custom made. Some agencies have had success finding local machinists or millwright mechanics willing and able to make aftermarket components at reasonable cost. This obviously will require some investment of time by City staff, but can be successful, especially in cases where there is a particular critical part that tends to breakdown with any regularity. Nonetheless, unsupported equipment does introduce an element of risk for future operation of the multi-disc screen.

The difference in the opening size between the multi-disc screen (2 mm orifice) and the Parkson bar screen (3 mm x 8 mm opening) is significant, and one the multi-disc screen would remove significantly more screenings based on that difference alone. For example, cylindrically shaped screenings with a length between 3 and 8 mm would be captured with high efficiency by the existing screen, but only partially by the bar screen.

Parkson does offer a 3 mm perforated plate option. A 3 mm orifice is not equivalent to a 2 mm orifice. Screenings volume typically increases as the screen spacing decreases. If one extrapolates curves to the 2 and 3 mm spacing range, assuming the curve holds to these smaller spacings, it appears that a 2 mm screen would capture approximately 6% more screenings than a 3 mm screen. Considering this difference and the actual size of the screenings, we would consider a 3 mm perforated plate screen equivalent to a 2 mm screen for this application. If the City were interested in pursuing this option, the head loss through the 3 mm perforated plate screen would need to be checked to ensure that it would not rise to the point where it would regularly cause bypassing of the screen.

In a rotating band screen, the screen moves up the upstream side of the screen, and over to the brush section at the rear and down the downstream side of the screen. This means the flow must pass through the screen twice: once in the operating direction and once in the reverse direction. In the multi-disc screen flow passes through the screen only once. This minimizes head loss. Screenings removal is also more critical in the band screen: any screenings left on the screen after passing by the brush at the top rear may be dislodged by the reverse flow at the back of the unit and carried downstream.

Some of the risks associated with the remove option includes the labor required to replace the media, and the fact that media replacement would likely require entry into confined space. In addition, the accumulation of screenings in the filter media may affect filter performance. There is also the risk that screenings pass through the filter and are conveyed to the water reclamation system where it might plug sprinklers and require additional maintenance of the irrigation system or it could settle out in the chlorine contact tank or reclaimed water storage tank.

One option to reduce the risk of screenings passing through the filter would be to convert the filter to an intermittent backwash operation, the so-called Ecowash strategy. It is claimed that intermittent operation would also improve performance by creating a more structured barrier for the effluent to pass through. Intermittent operation would also reduce operating cost. Assuming intermittent operation would result in successful trapping of any screenings, it may still be necessary to consider backwash routing, and whether such screenings would simply be returned to the liquid stream where it would build up until it reaches a level where the filter can no longer capture it all and it eventually breaks through to the effluent.

Media replacement would also affect system reliability and redundancy since it would require taking filters out of service.

4.3 Financial for Viable Options

After submitting the draft version of this report, GHD requested a proposal from Parkson for an Aqua Guard PF Model screen, the 3 mm perforated plate screen, which is based on the same chassis as the Aqua Guard Model, that was originally proposed. The proposal is attached in the Appendix. The capital cost is summarized in Table 3.

Table 3 Capital Cost for Perforated Plate Screen

Item	Perforated Plate Option
AquaGuard PF Model Screen by Parkson	$300,000
Screw Press by Vulcan	$62,707
TOTAL	**$362,707**
Difference compared to Repair Option	$191,133

With the cost for the perforated screen available, it replaced the bar screen for the replace option in the remainder of this report, for reasons discussed in the previous section.

We performed a 30-year life cycle cost analysis for the three options, including the following costs, based on project completion later this year (2021):

- Repair: identical cost for future repairs, as escalated, performed every twelve years (2033 and 2045). With the screen no longer in production, there is some risk that this cost may increase substantially in future.
- Replace: 40% of installation cost every 15 years (2036).

- Repair and replace: $20,000 every 20 years for washer compactor (repair: 2027 and 2047; replace: 2041).
- Repair and replace: Filter media make-up of $750 per year, assuming the same protection from both screens. This is different than was assumed for the preliminary analysis, when the lower protection offered by the bar screen was factored in.
- Replace: Full media replacement every 5 years. Considering that the screen has been out of service for most of 2020, the first replacement would be required in 2025, followed by 2030,2035,2040, 2045 and 2050.
- It is assumed that the annual labor for operation and maintenance as well as the power cost for both screens (repair and replace) would be similar enough not to skew the analysis. The remove option would have no annual labor or power cost, but the filter media replacement labor cost every 5 years may actually exceed the cost of labor and power for the screens over the same period, and is also excluded from the analysis.
- An escalation and discount rate of 3.5% per year.

The results of the analysis are summarized in Table 4.

Table 4 Life Cycle Cost Comparison

Item	Repair	Replace	Remove
Capital Cost	$171,574	$362,707	-
Life Cycle Cost	$577,223	$525,207	$664,896
Savings Compared to Remove	$87,673	$139,689	-
Savings Compared to Repair	-	$52,016	-

The table shows that the replace option has the most attractive life cycle cost over the next 30 years, followed by the repair option.

5. Recommendations

GHD recommends the following:

1) Based on the life cycle cost analysis, replacing the existing screen with a rotating panel 3 mm perforated plate screen.
2) Prior to installing the new screen, the head loss through the new screen needs to be investigated. The existing continuous backwash filters have a rated capacity of 15 mgd. It is unclear what the peak flow through the filters would be at this flowrate. It needs to be confirmed that the new screen would not limit filter capacity under any operating condition. GHD can assist the City with this evaluation.

Appendix Index

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering,

Coenraad Pretorius, PE
Coenraad.Pretorius@ghd.com
949.585.5209

www.ghd.com

Appendix A— Proposals

Treatment Solutions
Water and Wastewater
Equipment

SUEZ Treatment Solutions Inc.
8007 Discovery Drive, Richmond, VA 23229
P.O. Box 71390, Richmond, VA 23255
Tel: 800- 446-1150
Fax: 804-756-7643

PROPOSAL and CONTRACT

Date: May 20, 2020

Proposal Number: W0520201

To: City of Corona DWP
Corona, CA
C/O Carotech Engineering

Attn: Tim Oates

Telephone: On File
Fax: On File
Email: Timothy.Oates@CoronaCA.gov
Description: Parts, Multidisc Screen
Reference: Original Contract # 06546

(Hereinafter referred to as "Purchaser")

SUEZ Treatment Solutions Inc. (SUEZ) offers to furnish the following described materials and equipment ("Products") and/or services at the prices ("Purchase Price") stated below or as otherwise confirmed in writing by SUEZ and in accordance with the Conditions of Sale and other provisions contained herein. This Proposal shall remain in effect for _60_ days from the date hereof and shall expire at that time unless extended in writing by SUEZ. The Purchase Price is based upon all of the Conditions of Sale and other provisions contained herein. Purchaser's acceptance of this Purchase Price, whether by issuance of a purchase order or otherwise, or acceptance of delivery of the Products and/or services furnished hereunder, shall be considered acceptance by the Purchaser of all the Conditions of Sale and other provisions contained herein, notwithstanding any statement in Purchaser's acceptance or order to the contrary. SUEZ hereby objects to and rejects any proposal by Purchaser to modify, amend, limit, add to or delete any of the Conditions of Sale or other provisions contained herein unless expressly accepted in writing by SUEZ

Quantity	Part Number	Description	Unit Price	Extension
28	8105.91.42	Mesh Panel MDS350.D2 Assembly	4,614.38	$129,202.64
16	8105.88.29	Sprocket Segment, (8 segments need per sprocket) Teeth Segments are undrilled and have to be drilled according to existing sprocket on site	350.09	$5,601.44
1	8100.05.49	1 Lot of Hardware for 16 Teeth Segments (48 ea, bolts, washers and nuts in S.S.)	173.34	$173.34
28	8105.83.76	Roller Chain, Strand, 30 x 5L	1,266.21	$35,453.88
5	8104.87.84	Roller, Multidisc for Roller Chain	228.61	$1,143.05
			(Prices Exclude Sales Tax)	
			Order Total:	**$171,574.35**

Estimated Shipment: 18-22 Weeks ARO

Payment Terms: Net 30 Days after Respective Shipment

Shipping Terms: FOB Ship Point, Freight Allowed, Via Common Carrier

Suez, Treatment Solutions

By: _____

John Walsh for Garrett Haywood, INFILCare

Sales Representative:

Carotech Engineering

Purchasers Acceptance:

Company: _____

By: _____

Title: _____

Date: _____

CC: Kevin Smith File

SUEZ TERMS AND CONDITIONS OF SALE

1. ENTIRE AGREEMENT. The Terms and Conditions of Sale set forth herein, and any supplements which may be attached hereto, constitute the full and final expression of the contract (the "Contract") for the sale of equipment or services (hereinafter referred to as "Equipment") Purchaser, and supersedes the terms and conditions of any request for proposal or request for quotations, specifications, quotations, purchase orders, correspondence or communications whether written or oral between the Purchaser and SUEZ. No amendment or modification hereto nor any statement, representation or warranty not contained herein shall be binding on SUEZ unless made in writing and signed by an authorized representative of SUEZ. Prior dealings, usage of the trade or a course of performance shall not be relevant to determine the meaning of this Contract.

2. TAXES. The Purchase Price does not include any state or local sales or use taxes.

3. PAYMENT. Payment shall be net thirty (30) days in accordance with SUEZ's proposal.

4. RISK OF LOSS. Risk of loss or damage to the Equipment, or any part thereof, shall pass to Purchaser upon delivery of the Equipment or part to Purchaser at the delivery point stated in SUEZ's proposal.

5. EXCUSABLE DELAY. SUEZ shall not be liable for any delay in performance or failure to perform due to any cause beyond SUEZ's reasonable control including, fire, flood, or any other act of God, strike or other labor difficulty, any act, instructions, directions or omission to act of any civil or military authority or of the Purchaser, Owner, or Engineer, change in laws, acts of war, any insurrection, riot, embargo, unavailability or delays in transportation or car shortages. In the event SUEZ's performance is delayed by any of the foregoing causes, SUEZ's schedule for performance shall be extended accordingly without penalty. If Purchaser's, Owner's, or Engineer's actions delay SUEZ's performance, Purchaser shall pay SUEZ any additional costs incurred by SUEZ resulting from such delay and shall also pay SUEZ's invoice for any stored Equipment, or any part thereof, as if they had been delivered in accordance with the milestone schedule.

6. PROPRIETARY INFORMATION. All information, plans, drawings, tracings, specifications, programs, reports, models, mock-ups, designs, calculations, schedules, technical information, data, manuals, proposals, CADD documents and other materials, including those in electronic form (collectively the "Instruments of Service") prepared and furnished by SUEZ for use solely with respect to this Project. SUEZ shall be deemed the author and owner of these Instruments of Service and shall retain all common law, statutory and other reserved rights, including copyrights. The Purchaser, Engineer, or Owner shall not use these Instruments of Service for future additions or alterations to this Project or for other projects, without the prior written agreement by SUEZ. The Instruments of Service furnished by SUEZ are proprietary to SUEZ, submitted in strict confidence and shall not be reproduced, transmitted, disclosed or used in any other manner without SUEZ's written authorization.

7. INSPECTION BY PURCHASER. Purchaser may inspect the Equipment at the point of manufacture, provided that such inspection is arranged and conducted so as not to unreasonably interfere with SUEZ's or the manufacturer's operations.

8. WARRANTY OF TITLE. SUEZ warrants and guarantees that upon payment title to all Equipment covered by any invoice submitted to Purchaser will pass to Purchaser free and clear of all liens.

9. WARRANTY. SUEZ warrants that its Equipment shall conform to the description contained in SUEZ's proposal and be free from defects in material and workmanship for a period of one (1) year from date its Equipment is initially placed in operation or eighteen (18) months from date its Equipment is shipped, whichever occurs first. Upon SUEZ's receipt of written notice within thirty (30) days of discovery of any defect, and a determination by SUEZ that such defect is covered under the foregoing warranty, SUEZ shall, at its option, repair or replace the defective part or parts, f.o.b. factory. This warranty does not cover failure or damage due to storage, installation, operation or maintenance not in conformance with SUEZ's written instructions and requirements or due to accident, misuse, abuse, neglect or corrosion. This warranty does not cover reimbursement for labor, gaining access, removal, installation, temporary power or any other expenses that may be incurred with repair or replacement. SUEZ shall have no responsibility for the condition of primed or finish painted surfaces after the Equipment leaves its point of manufacture. Field touch-up of shop primed or painted surfaces are normal and shall be at Purchaser's or Owner's expense. Unless otherwise specifically provided for herein, SUEZ provides no other guarantee of product performance or process results. Correction of non-conformities in the manner and for the period of time provided above shall constitute SUEZ's sole liability and purchaser's exclusive remedy for failure of SUEZ to meet its

warranty obligations, whether claims of purchaser are based in contract, tort (including negligence or strict liability), or otherwise. THE FOREGOING WARRANTIES ARE EXCLUSIVE, AND IN LIEU OF ALL OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

10. BACKCHARGES. SUEZ shall not be liable for any charges incurred by Purchaser for work, repairs, replacements or alterations to the Equipment, without SUEZ's prior written authorization, and any adverse consequences resulting from such unauthorized work shall be Purchaser's full responsibility.

11. LIQUIDATED DAMAGES. Any liquidated damages clauses for failure to meet shipping or job completion promises are not acceptable or binding upon SUEZ, unless such clauses are specifically accepted in writing by an authorized representative of SUEZ at its headquarters office.

12. LIMITATION OF LIABILITY. Neither party shall be liable to the other party for any special, indirect, incidental, consequential or punitive damages arising from their obligations under this Contract, whether such damages are based upon breach of contract, breach of warranty, tort, strict liability or otherwise. In no event shall either party's liability to the other party exceed the purchase price of the Equipment or parts of the Equipment on which such liability is based.

13. CANCELLATION BY PURCHASER. If Purchaser cancels this Contract or refuses to accept delivery of the Equipment, Purchaser shall be liable to SUEZ for reasonable costs incurred by SUEZ including, cancellation charges, administrative costs, and commissions to sales representatives for all work performed or in process up to the time of cancellation or refusal to accept delivery.

14. DEFAULT BY PURCHASER. In the event Purchaser should breach its obligations under this Contract, SUEZ may, without prejudice to any other right or remedy it may have at law or equity, terminate this Contract or suspend performance if Purchaser fails to cure such breach within thirty (30) days of written notice. In such event, SUEZ shall be paid for all work performed prior to termination/suspension, including all costs related to the termination/suspension. If payments are not made in accordance with the terms contained herein, a service charge may, without prejudice to the right of SUEZ to immediate payment, be added in an amount equal to the lower of 1.5% per month or fraction thereof or the highest legal rate on the unpaid balance. Purchaser shall reimburse SUEZ for all attorney's fees and costs related to collection of past due amounts.

15. DEFAULT BY SELLER. In the event of any default by SUEZ and prior to Purchaser terminating the work for default, Purchaser shall give written notice of default to SUEZ. SUEZ shall remedy the default to the reasonable satisfaction of the Purchaser within thirty (30) days of receipt of such written notice or, if such default cannot reasonable be remedied within such thirty (30) day period, SUEZ shall promptly begin to remedy the default within the thirty (30) day period and thereafter diligently prosecute to conclusion all acts necessary to remedy the default, in which event such default shall be deemed to be remedied.

16. PATENT AND COPYRIGHT INFRINGEMENT. SUEZ shall defend any action or proceeding brought against Purchaser based on any claim that the Equipment infringes any United States patent or copyright, provided the Equipment is used in the manner specified and is not modified, altered, or combined with any other equipment without SUEZ's prior written permission. Purchaser shall give prompt written notice to SUEZ of any such action or proceeding and will reasonably provide authority, information and assistance (at Purchaser's expense) in the defense of same. If Purchaser is enjoined from the operation or use of the Equipment, SUEZ shall take reasonable steps to procure the right to operate or use the Equipment. If SUEZ cannot so procure such right within a reasonable time, SUEZ shall promptly, at SUEZ's option and expense, (i) modify the Equipment so as to avoid infringement of any such patent or copyright, (ii) replace said Equipment with equipment that does not infringe or violate any such patent or copyright, or (iii) as a last resort, remove the Equipment and refund the purchase price.

17. INDEMNITY. To the extent and proportion of its negligence, SUEZ will indemnify and hold Purchaser harmless for any claims, damages, suits, or losses by third parties for death or bodily injury or damage to tangible property (other than to the Equipment itself) directly caused by SUEZ's performance under this Contract.

18. GOVERNING LAW/JURISDICTION. This Contract shall be governed by the laws of the Commonwealth of Virginia, without regard to any conflicts of law principles thereof. Any dispute that cannot be resolved amicably by the Parties shall be referred to the federal or state courts having jurisdiction over Henrico County, Virginia. The Parties irrevocably waive the right to request trial by jury.

19. NOTICES. Unless otherwise provided, any notices to be given hereunder shall be given in writing at the address and to the representatives mentioned in the Contract Documents and shall be deemed effectively given (i) upon personal delivery to the party to be notified, (ii) on confirmation of receipt by fax by the party to be notified, (iii) one business day after deposit with a reputable overnight courier, prepaid for overnight delivery and addressed as set forth herein, or (iv) three days after deposit with the U.S Post Office, postage prepaid, registered or certified, with return receipt requested.

20. ASSIGNMENT/SUCCESSORSHIP. Neither SUEZ nor Purchaser may assign this Contract without the prior written consent of the other party, which consent shall not be unreasonably withheld or delayed, except that SUEZ may assign this Contract to an affiliate without consent. Any prohibited assignment shall be null and void. SUEZ and Purchaser intend that the provisions of this Contract are binding upon the parties, their employees, agents, heirs, successors and assigns.

21. SEVERABILITY. If any term, condition or provision of this Contract or the application thereof to any party or circumstance shall at any time or to any extent be invalid or unenforceable, then the remainder of this Contract, or the application of such term, condition or provision to parties or circumstances other than those which it is held invalid or unenforceable, shall not be affected thereby, and each term, condition and provision of this Contract shall be valid and enforceable to the fullest extent permitted by law.

22. NO WAIVER. The failure of either party to insist upon or enforce strict performance by the other party of any provision of this Contract or to exercise any right under this Contract shall not be construed as a waiver or relinquishment to any extent of such party's right to assert or rely upon any such provision or right in that or any other instance; rather, the same shall be and remain in full force and effect.

. “STSI would like to note that under the current exceptional circumstances under the COVID 19 Pandemic situation, STSI may not be in a position to guarantee and comply with the planned schedule for project delivery or performance and that should there be any new measures taken by any governmental authority which may impede or delay the said schedule or performance, STSI reserves the right to modify the schedule / contract accordingly. STSI will promptly inform you of any changes which may impact the contract or the project.””

Quotation

NUMBER: B020 **DATE:** July 15, 2020

TO: City of Corona – Dept. of Water & Power
Attn : Mr. Rodney Williams

REF.: Corona, CA WWTP #1
Pre-Filter Screen

Parkson Corporation is pleased to provide a quotation for the following equipment.

ITEM 1 EQUIPMENT

One (1) Aqua Guard® Ultra Clean™ self-cleaning bar/filter screen model AGUC-MN-A

1.A Equipment Description:

1. Unit shall be 5'-0" wide (W) and designed for installation in a channel 6'-0" wide x 9'-0" deep (H). Solids larger than 3 mm nominal screen opening shall be removed from the flow and conveyed to a discharge point approximately 4'-0" above the top of the channel. When installed, the screen shall be inclined 85° from the horizontal and have a total discharge height (H1) of 13'-0" (as measured from the base of the screen to the discharge point).
2. Units shall be capable of passing a peak flow of 16 MGD. The head loss across the screen at this flow will not exceed 13" assuming a downstream water level of 3'. The head loss calculation is based on assumption of a clean screen, clean water and **steady state flow.**
3. Materials of construction will be as follows:
   Frame: Type 316 stainless steel, 3/16" thick.
   Filter elements: High impact plastic.
   Side plates: High impact plastic.
   Shafts, chain links, guide rails, drive sprocket inserts: Type 316 stainless steel.
   Rollers: 400 series stainless steel (heat treated).
   Chain bushings: 400 series stainless steel (heat treated).
   Side seals: Neoprene rubber, with type 316 stainless steel backing plates.
4. Screen drive with a 1 HP, 230/460V, 3 ∅, 60 Hz TEFC motor.
5. Manifold lubrication system.
6. Screen washing system consisting of two (2) type 316 stainless steel spray bars with quick release spray nozzles and NEMA 4X brass body solenoid valve with a 1-1/2" NPT connection.
7. Brush assembly of hybrid construction, with a side mounted door to provide access for brush replacement.
8. Brush drive with a 1.5 HP, 230/460V, 3 ∅, 60 Hz TEFC motor.
9. Electrical overload device consisting of SSAC current monitors.
10. Front and rear covers fabricated of 14 gauge type 316 stainless steel, to enclose the portion of the screen above the channel.
11. Discharge chute fabricated of 14 gauge type 316 stainless steel, to direct screenings into the washer/compactor inlet chute.
12. E-stop pushbutton in a NEMA 4X polycarbonate enclosure.

13. Main control panel furnished in a NEMA 4X type 316 stainless steel enclosure, housing controls for the screen and washer/compactor. To include the following:
    1 - Enclosure, NEMA 4X, 316 Stainless Steel, Wall Mount
    1 - Main Disconnect, with Door Interlocked Handle
    3 - Motor Circuit Breaker Protection
    2 - Motor Starter, NEMA, Non-Reversing, w/Overload Relay [Screen, Brush]
    1 - Motor Starter, NEMA, Reversing, w/Overload Relay [Wash Press]
    3 - Current monitors, SSAC type
    1 - Control power transformer, 480-120VAC
    1 - Lot, 120VAC circuit breakers
    1 - Surge Protection, 120VAC
    1 - PLC, Allen-Bradley CompactLogix with L33ER CPU, Ethernet/IP, and Required I/O
    1 - Operator Interface, Allen-Bradley PanelView 4" display
    1 - Ethernet switch, 5-Port, unmanaged type
    1 - Power supply, 24VDC
    1 - UPS battery backup
    1 - Air conditioner
    3 - Elapsed Time Meter in the operator interface
    1 - Heater with thermostat
    1 - Lot, Push buttons, [As Required]
    1 - Lot, Pilot lights, Transformer Type [As Required]
    1 - Lot, Selector switches, [As Required]
    1 - Lot, Control relays, socket type
    1 - Lot, Terminal blocks, [As Required]
    1 - Lot, Dry contacts for remote monitoring [As Required]
    Differential level controller assembly:
    1 - HydroRanger 200 HMI, NEMA 4X, Fiberglass
    2 - Transducers, with 10m cable

NOTE: Final drawings of the existing site will be needed for confirmation of dimensions as proposed.

ITEM 2 SERVICES

2.A Drawings and Installation, Operation and Maintenance (IO&M) Manuals:

1. Approval drawings: 2 prints included
2. Certified drawings: 2 prints included
3. IO&M manuals: 2 included

2.B Start-Up Assistance:

Parkson will furnish a factory representative for a total of two (2) days during one (1) trip to the jobsite to assist in installation inspection, start-up supervision, and operator training. Dates of service to be scheduled upon Purchaser's written request.

2.C Mechanical Warranty:

Per Section XVI of the Standard Conditions of Sale.

PURCHASE PRICE:

All of the above for ..... $268,317.81.
F.O.B. shipping point, freight allowed to jobsite, taxes excluded.

Price Breakdown as follows:
Equipment: $238,346
Freight: $7,500
Service: $4,000
Tax (7.75%): $18,471.81

VALIDITY:

Purchase Price is valid for 30 days from quotation date, for shipment of equipment within the timetable stated below.

PAYMENT TERMS:

90% net 30 days after shipment, 10% not to exceed 120 days after delivery.

TIMETABLE GUIDELINE:

Within ten (10) business days of receiving a written Purchase Order in Parkson's office, if necessary, Parkson will submit a written Request for Additional Information requesting items including, but not limited to, full-scale drawings, specification sections, amendments and other documents necessary for Parkson to begin work on this Project. No work can be done on this Project until all Additional Information is received by Parkson, thus beginning the Submittal Phase. If you do not receive such a Request for Additional Information within the stated ten (10) business days, then the Submittal Phase will begin on the eleventh (11th) business day following receipt of the written Purchase Order in Parkson's office. The Shipment Phase is thereafter contingent upon your final approval of all submitted Approval Drawings. Once said final approval is received in Parkson's offices, the Shipment Phase will begin.

Submittal Phase:	Approval drawings will be submitted six (6) weeks from receipt of all requested Additional Information if necessary, or if not necessary, from the eleventh (11th) business day following receipt of a written Purchase Order in Parkson's office.
Shipment Phase:	Sixteen (16) weeks following receipt of final approval of all submitted Approval Drawings in Parkson's office.

If the Submittal Phase is waived, the Shipment Phase will begin on receipt of all requested Additional Information if necessary, or if not necessary, on the eleventh (11th) business day following receipt of a written Purchase Order in Parkson's offices.

Dates are subject to confirmation upon receipt of written Purchase Order.

TERMS AND CONDITIONS:

This Quotation is governed by and subject to Parkson's Standard Conditions of Sale, which are incorporated by reference and accessible at: *http://www.parkson.com/files/documents/Sales-conditions.pdf*.

BUYER/OWNER RESPONSIBILITY:

- Anchor bolts.
- Spare parts.
- Washer compactor.
- Concrete or steel supports.
- Local disconnects or junction boxes.
- Level sensor mounting pipe.
- Control panel supports or mounting.
- Spray wash water connection and piping.
- Heat tracing and power for heat tracing of spray wash water piping.
- Drain connections and piping.
- Manual shutoff valves, gate valves, check valves, butterfly valves, Y-strainers.
- Pressure gauges.
- Screenings dumpster.
- Lubricants.
- Shop or field painting.
- Unloading, uncrating, installation and installation supervision. Installation will, at minimum, require a forklift and possibly a crane/hoist.
- Readiness of the equipment before requesting start-up service. Non-readiness may incur additional charges.
- Electrical connection and interconnecting wiring (including any of the following: Solenoid valves, level sensors, motors, E-stop, main controls); wiring and conduit from each unit-mounted electrical device to a terminal box or control panel.
- Interconnecting piping.
- Piping connections, platforms, ladders, gratings and railings unless stated otherwise.
- Determining the compatibility of equipment materials of construction and process conditions (air and water) is the responsibility of the owner and/or consulting engineer. Note that even relatively low levels of H2S and/or Chlorides can cause corrosion of 304SS and thus it is important for the owner and/or consulting engineer to pay particular attention to materials suitability for the specific water/wastewater in which the equipment will be operated. Higher grades of stainless steel like 316 are options.
- Any other auxiliary equipment or service not detailed above.

Please return one signed copy of this Quotation, or your Purchase Order, to Parkson Corporation at the address below. Refer to this Quotation, date, and related correspondence.

Issued By:

PARKSON CORPORATION
562 Bunker Court
Vernon Hills, IL 60061

Joseph G. Nagel

Name: Joseph G. Nagel
Title: Municipal Sales
Date: July 15, 2020

Accepted By: (Herein called the Buyer)

Name
Title:
Date:

1401 West Cypress Creek Road
Fort Lauderdale FL 33309-1969

Phone 954.974.6610
Fax 954.974.1809

Date: February 25, 2021

Company:

Subject: Parkson Headworks Select Aqua Guard PF Model
Preliminary Design Proposal for Corona, CA

Thank you for your interest in Parkson's Headworks Select Aqua Guard PF Model. Based upon the data provided for this project, we developed the Aqua Guard® PF design described in this proposal. We believe that this Aqua Guard PF design provides an excellent solution for this application.

We look forward to working with you on this project. Should you have any questions or need clarifications, please do not hesitate to contact me.

Sincerely,

Joe Nagel

PARKSON CORPORATION

An Axel Johnson, Inc. Company

Aqua Guard® PF

Project/Plant Name

Preliminary Design Proposal

February 26, 2021

Table of Contents

1. Design Basis

1.1. Design Parameters

The proposed system design is based on wastewater influent with the following characteristics:

Table 1.1 – Influent Design Criteria

INFLUENT PARAMETER	UNITS	QUALITY*
Peak Design Flow	MGD	16
Channel Width	Ft	5
Channel Depth	Ft	9
Discharge Height	Ft	13
Upstream Water Level	Ft	4.25
Downstream Water Level	Ft	3
Perforated Opening	in	.125
Open Area	%	40
Percentage of Screen Blinded	%	30
Installation angle	Degrees	75
Channel recess for unit	inches	0

2. Aqua Guard PF Screen Details

Table 2.1 – Materials of Construction details

COMPONENT	THICKNESS	MATERIAL
Screening wetted surface		316 SST
Screen Panel		316 SST
Screening frame	1/4"	316 SST
Channel seals		Neoprene
Channel seal backing plates		316 SST
Drive Shaft and Sprockets		316 SST
Guide Rails		316 SST
Screen covers	14 gauge	316 SST
Discharge chute	14 gauge	316 SST
Side plates		316 SST
Rollers Pins and Bushings		400 series

Table 2.2 – Screening Components

COMPONENT	SIZE	TYPE
Screen drive motor		Explosion proof
Cleaning brush motor		Explosion-proof
E-Stop		NEMA 7
Main Control Panel		NEMA 4X

3. Aqua Guard PF Description

The Aqua Guard PF screen is built on the original Aqua Guard bar/filter screen chassis that was introduced to the marketplace in the 1970s. The continuous screen belt is made up of precisely meshed individual perforated panels. Solids larger than the panel perforations are retained on the screen belt while screened flow passes through. Solis capture is further enhanced when a filter mat of solids is built on the perforated plate media which increases the solids capture rate.

As the solids accumulate on the surface of the screen, the headloss (differential water levels from upstream and downstream of the screen) increases. Upon the upstream water level reaching a high level, the moving perforated panel screens indexes, carrying solids up and out of the channel to a point of disposal on the screen. The moving belt also allows introduction of clean screen at the bottom of the channel. As the mat moves out of the water flow and the clean screen moves into the water flow, the headloss decreases and movement of the screen belt stops. The cycle repeats, until eventually the captured screenings enter the cleaning portion of the screen. A spray system and a rotating brush facilitate the removal of solids from the screen belt. Discharged solids are directed through the discharge opening of the screen and into a collection device (such as a receptacle, conveyor or screenings washing unit.

4. Cost Estimate and Terms

Estimated price for (1) Aqua Guard perforated screen model AGPF-MN 5’ wide x 13’ discharge height is $300,000.

1) Submittals - typically 6 weeks after receipt of written order.
2) Equipment Shipment - typically 16 weeks after release for fabrication.

5. Supplemental Information (attachments)

5.1. Aqua Guard PF Brochures

5.2. Typical General Arrangement Drawings

July 16, 2020

PROPOSAL

Project Location:	City of Corona - Dept. of Water & Power (Mr. Rodney Williams) Plant #1 Tertiary Filter Screenings Handling
Vulcan Representative:	Matt Rebmann The Coombs-Hopkins Co. matt@chcwater.com
Prepared by:	Andrew Synhorst, PE Sales Manager andrew@vulcanindustries.com

Vulcan Industries, Inc. is pleased to provide you with our proposal for One (1) ESP 250/1200 Screw Press to receive screenings from the Parkson AquaGuard Tertiary Filter Screen for the above referenced project.

Scope of Supply – One (1) Vulcan Model ESP 250/1200 Screw Press:

- ✓ Type 316 stainless steel construction.
- ✓ Inlet hopper to receive screenings from a Parkson AquaGuard with a discharge height above the operating floor of 4'-0".
- ✓ Discharge piping.
- ✓ Stainless steel axial thrust bearing to handle all loads created during compaction and reversal of the screw as well as fully support and allow the screw to be cantilevered inside the press body.
- ✓ Hollow shafted alloy steel screw with an outside diameter of 8-1/2" and 3/4" thick flighting.
- ✓ Nylon brush attached to screw flighting in the drain area.
- ✓ Integral 1/4" thick stainless steel drain section with 2 mm slotted openings.
- ✓ 5.0 HP TEFC motor.
- ✓ One (1) NEMA 4X, 304 stainless steel local and main combined control station with HAND-OFF-AUTO, FORWARD-OFF-REVERSE selector switches and INITIATE and E-STOP pushbuttons. Control components to include, but not limited to relay logic, reversing starter, current sensing relay (CSR) and all necessary relays, pilot lights, switches and internal wiring.
    - Dry contact communication with associated Parkson Main Control Panel. Signals TO Parkson Panel include "Press in Auto," "Press Common Fail," and "Press Running." Signals FROM Parkson Panel include "Screen Running."
    - Parkson Main Control Panel to communicate dry contact signals to plant SCADA with Ethernet IP.
    - See included wiring diagram and example panel layout included in the Appendix.

- ✓ One (1) machine mounted wash water valve manifold assembly consisting of one (1) solenoid valve and one (1) ball valve.
- ✓ Press Capacity: Up to 99 cu.ft./hr.
- ✓ Freight to jobsite.
- ✓ Approx. washing press weight: 1,000 lbs.
- ✓ No startup services provided.
- ✓ Full 1-year warranty from date of operational start-up.

Note: Price does not include installation, wiring and conduit between controls, ancillary devices, startup services, and equipment not explicitly called out in this proposal, or anything else not identified in this proposal.

Equipment submittal drawings to be completed 4-6 weeks after receipt of purchase order
Equipment delivery to occur 18-20 weeks after receipt of approved submittal drawings

TOTAL LUMP SUM PRICE FOR PREVIOUSLY DESCRIBED SCOPE: $62,707.16

Price Breakdown as follows:
Equipment: $51,886
Freight: $4,400
Service: $2,400
Tax (7.75%): $4,021.16

Thank you in advance for your review of the above. Should you have any questions or comments, please do not hesitate to contact Vulcan or The Coombs-Hopkins Company.

Sincerely,

Andrew Synhorst, PE
Sales Manager

Enclosures:

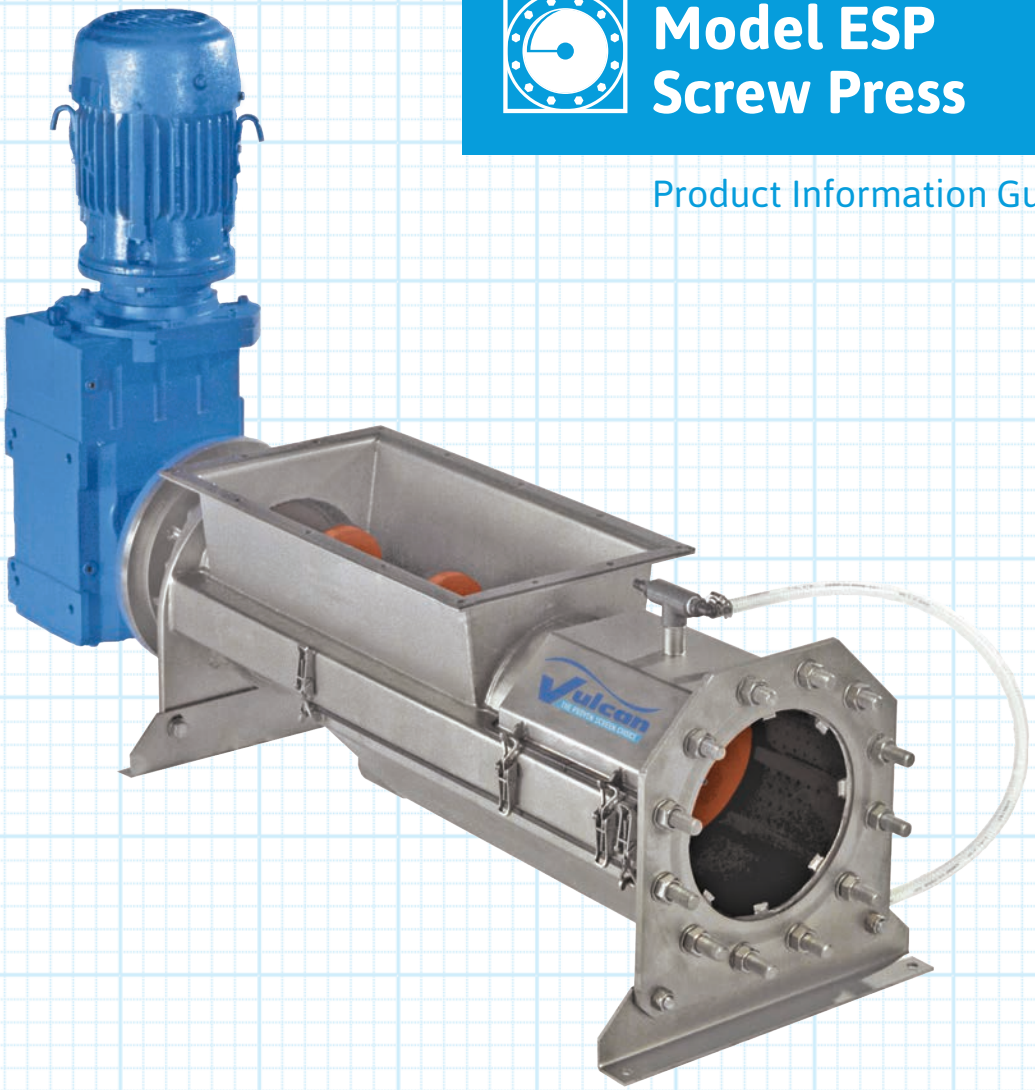
Vulcan Product Brochure
Standard Equipment Drawing
Wiring Diagram and Example Panel Layout

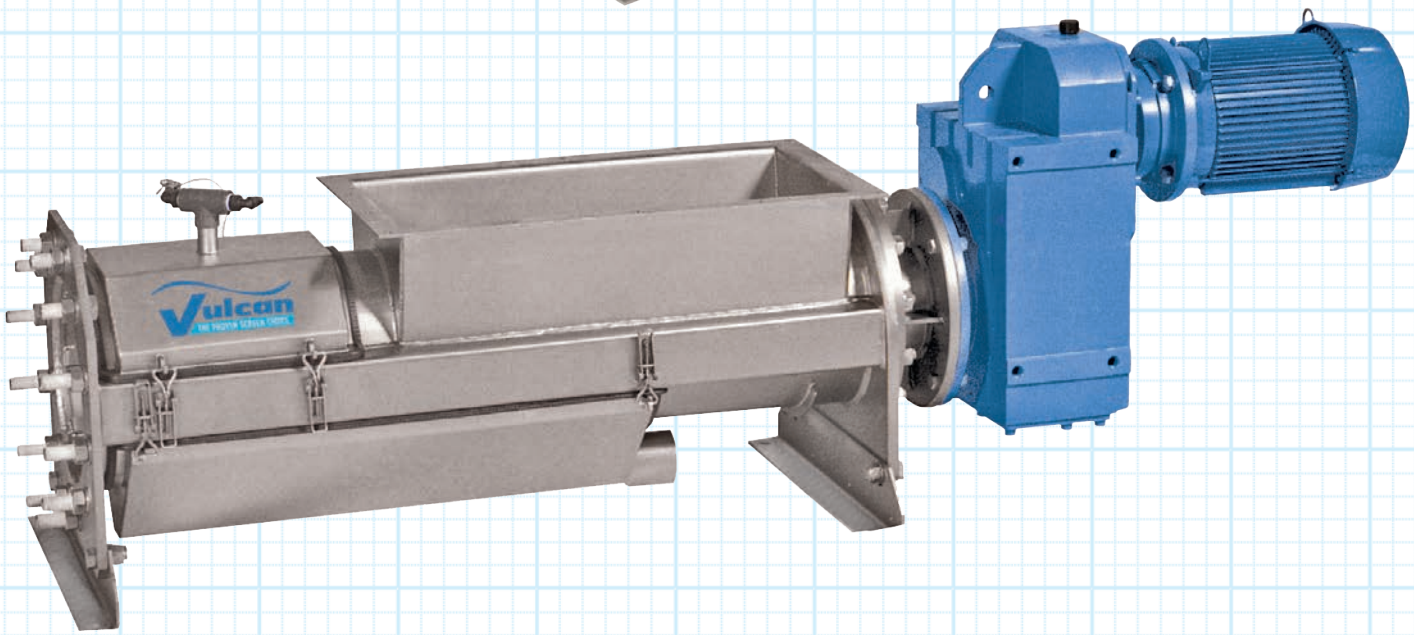
APPENDIX

Vulcan Equipment Product Brochure

Model ESP
Screw Press

Product Information Guide





Find more product information at:

vulcanindustries.com

Vulcan
THE PROVEN SCREEN CHOICE

Model ESP Screw Press

The **Model ESP Screw Press** consists of an axial thrust bearing with a stainless steel body; inlet hopper; wedge-wire drain; substantial, precision machined shafted spiral; press housing with compression zone; flushing nozzle; press water drain pan and drive assembly.

Construction

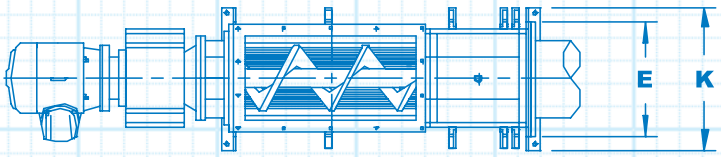
The shafted spiral is cantilevered off the thrust bearing, and does not rest in the housing. This eliminates metal-to-metal contact during operation.

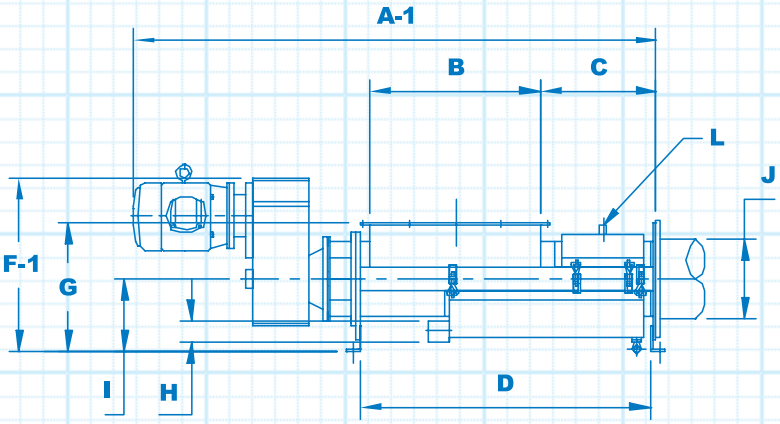
The profiled bars used in the construction of the wedge-wire drain allows for greater flow than perforated drains and helps to prevent blinding. A nylon brush is affixed to the outside edge of the spiral to aide clearing the drain even when greasy material is present.

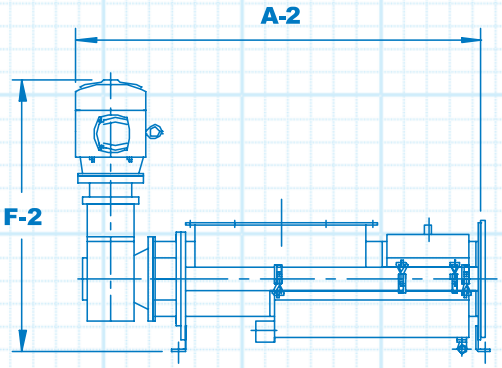
Operation

Screenings are received in the hopper directly from the mechanical screen or from a conveyor or flushing flume. Excess water drops away from the screenings and flows through the wedge-wire drain as the spiral moves the screenings into the dewatering zone where they are compacted and further dewatered up to 50%. Wash water flushes the dewatering zone and the drain pan and the compacted screenings are transported to a container, conveyor or other suitable receiving device.

The Model ESP Screw Press works in conjunction with the Vulcan Industries Mensch Bar Screen and Stair Screen as well as many other types of mechanical screens.







Type	Input Capacity of Raw Screenings
ESP 250	up to 99 ft³/h (up to 2.8 M³/h)
ESP 400	up to 247 ft³/h (up to 7.0 M³/h)

Type	A-1	A-2	B	C	D	E	F-1	F-2	G	H	I	J	K	L	Motor
ESP 250/600	74"	56"	24"x12"	16"	40 1/4"	15 3/4"	24"	40"	17 3/4"	3"	10"	10"	20"	1/2"	5 HP
ESP 250/800	82"	64"	32"x12"	16"	48 1/4"	15 3/4"	24"	40"	17 3/4"	3"	10"	10"	20"	1/2"	5 HP
ESP 250/1000	90"	72"	40"x12"	16"	56 1/4"	15 3/4"	24"	40"	17 3/4"	3"	10"	10"	20"	1/2"	5 HP
ESP 250/1200	98"	80"	48"x12"	16"	64 1/4"	15 3/4"	24"	40"	17 3/4"	3"	10"	10"	20"	1/2"	5 HP
ESP 400/600	96"	72"	24"x16"	24"	49 3/4"	33 3/4"	33 3/4"	62"	24 1/2"	4"	14"	16"	26"	3/4"	10 HP
ESP 400/8000	104"	80"	32"x16"	24"	57 3/4"	33 3/4"	33 3/4"	62"	24 1/2"	4"	14"	16"	26"	3/4"	10 HP
ESP 400/1000	112"	87"	40"x16"	24"	65 3/4"	33 3/4"	33 3/4"	62"	24 1/2"	4"	14"	16"	26"	3/4"	10 HP
ESP 400/1200	120"	95"	48"x16"	24"	73 3/4"	33 3/4"	33 3/4"	62"	24 1/2"	4"	14"	16"	26"	3/4"	10 HP

Find more product information at:
vulcanindustries.com

212 S. Kirlin Street
Missouri Valley, Iowa 51555 USA
712-642-2755 Fax 712-642-4256

Vulcan
THE PROVEN SCREEN CHOICE

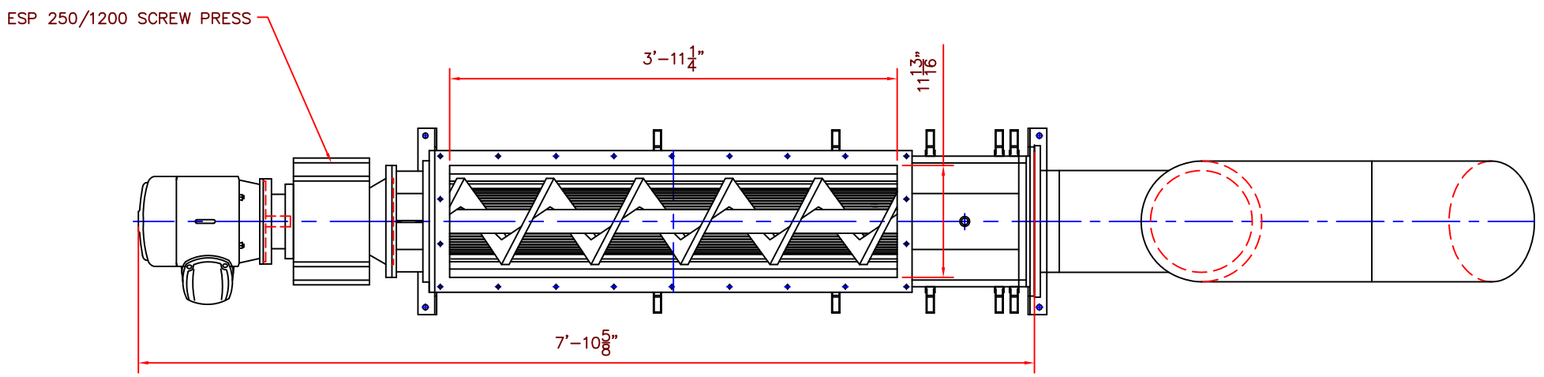
APPENDIX

Standard Equipment Drawing

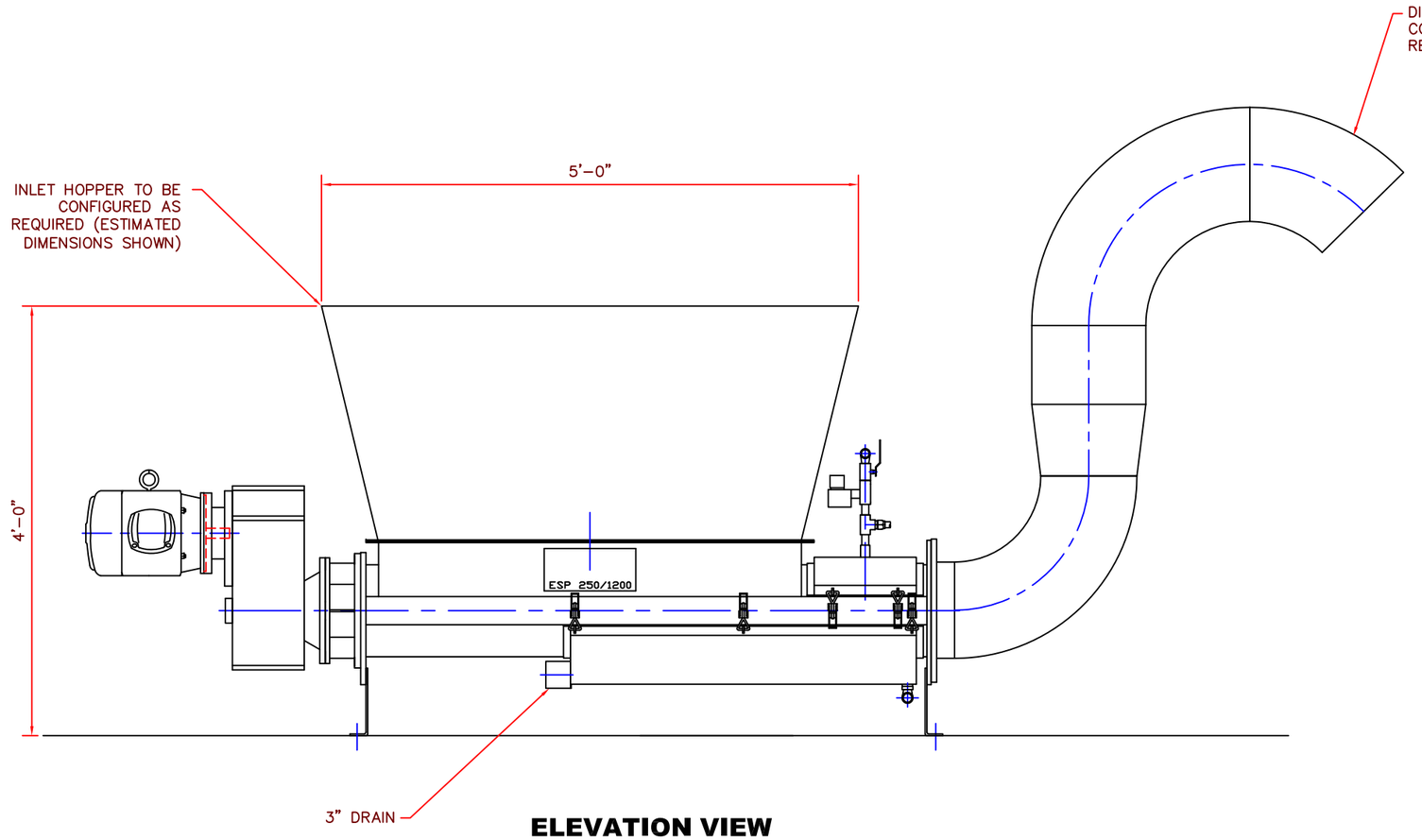
212 SOUTH KIRLIN STREET
MISSOURI VALLEY, IA. 51555
712-642-2755
www.vulcanindustries.com

SCALE: 3/4"=1'-0"	PRODUCT: ESP 250/1200 SCREW PRESS	DRAWN BY: ARS
DATE: 6/30/2020		REVISED BY:
CUST:		REVISED:
ENG:		FACT NO:
PROJECT: PLANT #1 – TERTIARY FILTER SCREENS CORONA, CA.		DRAWING NO: VI-ESP-L1

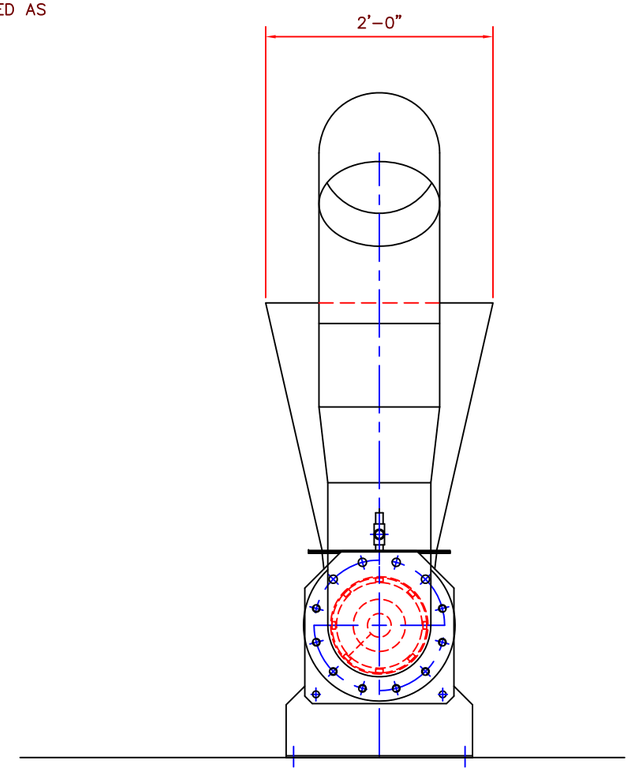
PRELIMINARY



PLAN VIEW



ELEVATION VIEW



DISCHARGE END VIEW

APPENDIX

Wiring Diagram and Example Panel Layout

MAIN DISCONNECT
W/DOOR MOUNTED OPERATOR
CB1
480/3/60
15A
CSR
LOOP
F
OL1
T1
T2
T3
XX HP
XX FLA
DRIVE
MOTOR
R
3A FU1
3A FU2
H1 H3 H2 H4
500VA
X1 X2
120
X1
5A FU3
CONTROL
POWER
OFF ON OX
12A
EMERGENCY
STOP
OFF
HAND AUTO
OFF
FOR REV
CR2
M1
OL1
MOTOR
STARTER
NO 3,4,4,17
NC 16
NO 5,5,6,18
NC 15
TD1
CR1
RUNNING
RELAY
NO 35
NC 25
RUNNING
INDICATOR
HM
REMOTE INDICATION OF
'PRESS IN AUTO'
DRY CONTACT TO PARKSON
PLC FOR SCADA
TD2
CR3
SOL1
1/2"
FLUSH
SOLENOID VALVE
THE OFF DELAY SET POINT DETERMINES HOW LONG
THE PRESS RUNS AFTER THE START CONTACT OPENS
OFF DELAY
START CONTACT
(BY OTHERS)
START PRESS
DRY CONTACT
FROM PARKSON
PLC
OFF DELAY
TIMER
NO 17
NC
THE ONE SHOT SET POINT DETERMINES HOW LONG THE FLUSH
SOLENOID VALVE IS ENERGIZED AFTER THE PRESS STOPS
ONE SHOT
FLUSH
ONE SHOT TIMER
NO 20
NC
OVERTORQUE
INDICATOR
CSR
OVERTORQUE
RELAY
NO 35
NC 15,20
COMMON
RESET
CURRENT
SENSING RELAY
SOLID-STATE
MOTOR OVERLOAD
REMOTE RESET
WASH PRESS
AUX MOL
OL2
MOTOR OVERLOAD
INDICATOR
MOTOR
OVERLOAD RELAY
NO 34
NC 20
REMOTE INDICATION
'PRESS RUNNING'
DRY CONTACT TO
PARKSON PLC FOR SCADA
REMOTE INDICATION
RUNNING
REMOTE INDICATION
COMMON FAIL
REMOTE INDICATION
'PRESS COMMON FAIL'
DRY CONTACT TO PARKSON
PLC FOR SCADA

INTERCONNECTING CONDUIT AND WIRING
TO BE PROVIDED BY OTHERS.

CAUTION!
THIS CONTROL PANEL IS DESIGNED TO BE MOUNTED IN A NON-EXPLOSIVE ENVIRONMENT. INSTALL PROPER CONDUIT RUNS AND SEALING FITTINGS BETWEEN EXPLOSIVE AND NON-EXPLOSIVE ENVIRONMENTS PER NATIONAL ELECTRIC CODES.

CONTROL WIRING
FIELD WIRING
CONTROL PANEL TERMINAL
VALVE ENCLOSURE TERMINAL

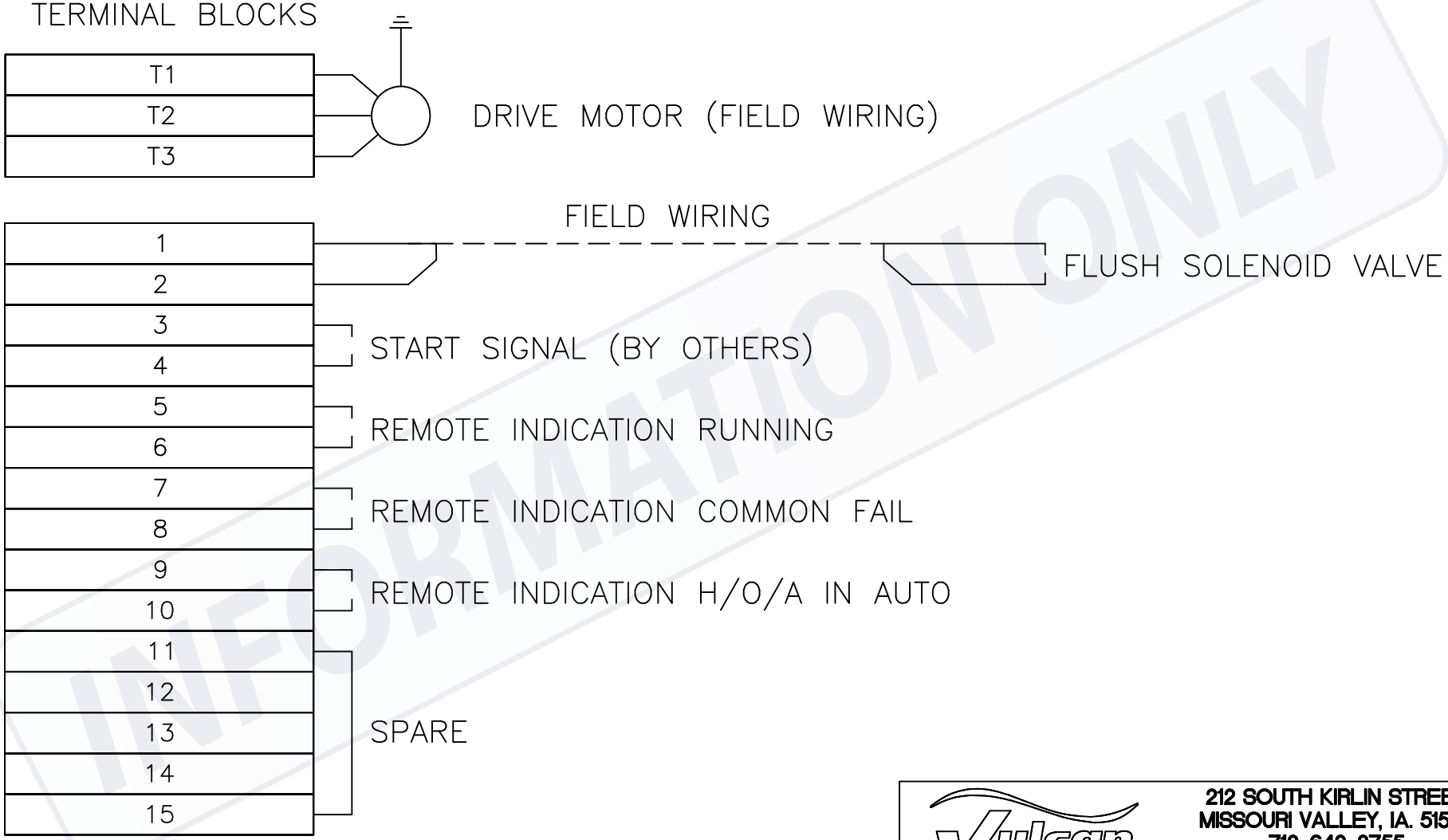
1. CONTROL PANEL NEMA 4X SS.
2. SOLENOID VALVES NON EXP.
3. CONTROL PANEL UL LISTED.

DENOTES FIELD MOUNTED
DENOTES BY OTHERS
DENOTES DOOR MOUNTED

Vulcan
THE PROPER SCREEN CHOICE
212 SOUTH KIRLIN STREET
MISSOURI VALLEY, IA. 51555
712-642-2755
www.vulcanindustries.com

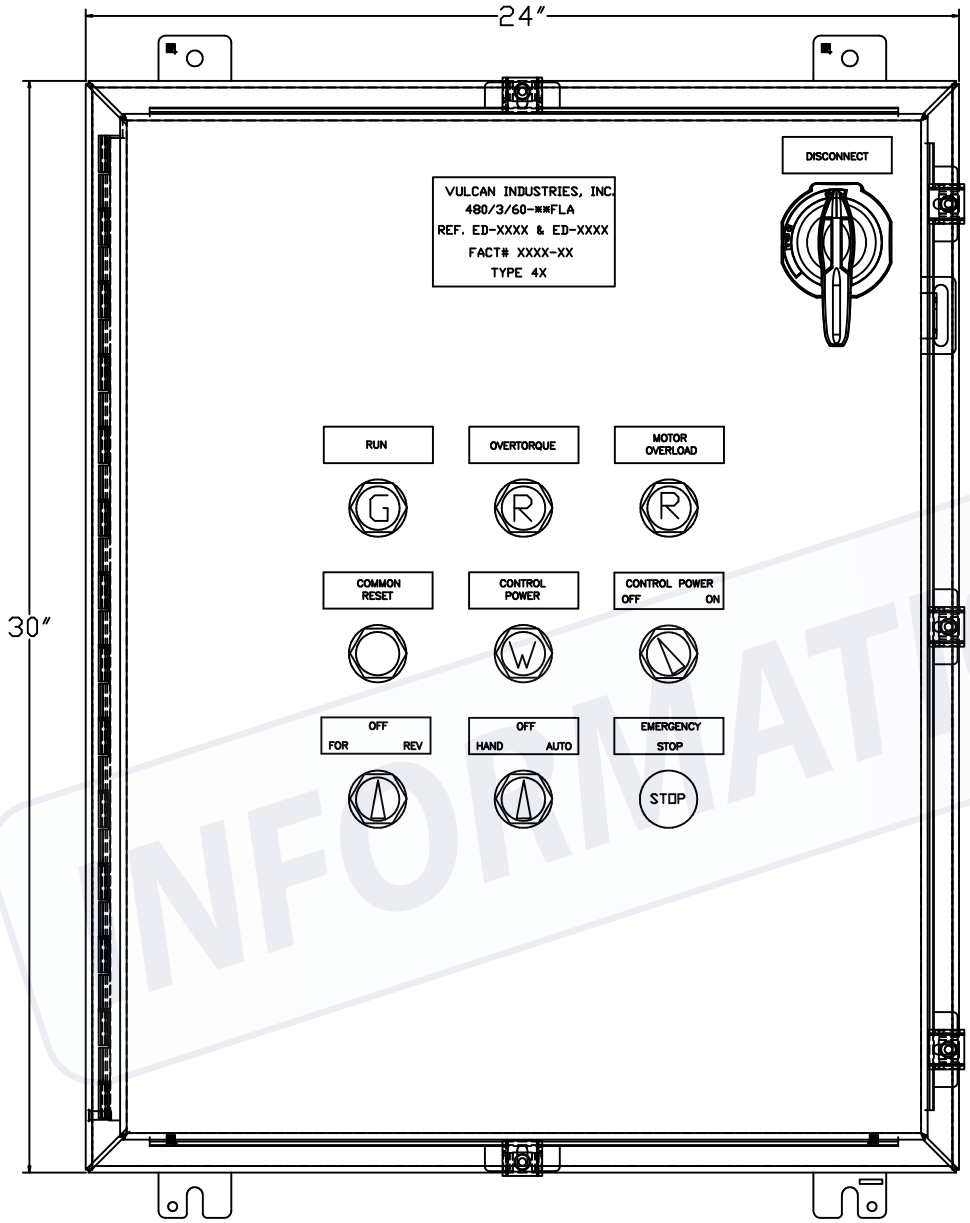
SCALE: NONE			DRAWN BY: SES
DATE: 6/30/2020	SHEET NUMBER: 1 OF 3		REVIEWED BY: SES
TITLE: ESP ELECTRICAL SCHEMATIC			PROJECT NUMBER: REF ONLY
PROJECT: T-FILTER PRESS - CORONA, CA #1			DRAWING NUMBER: ED-REFONLY

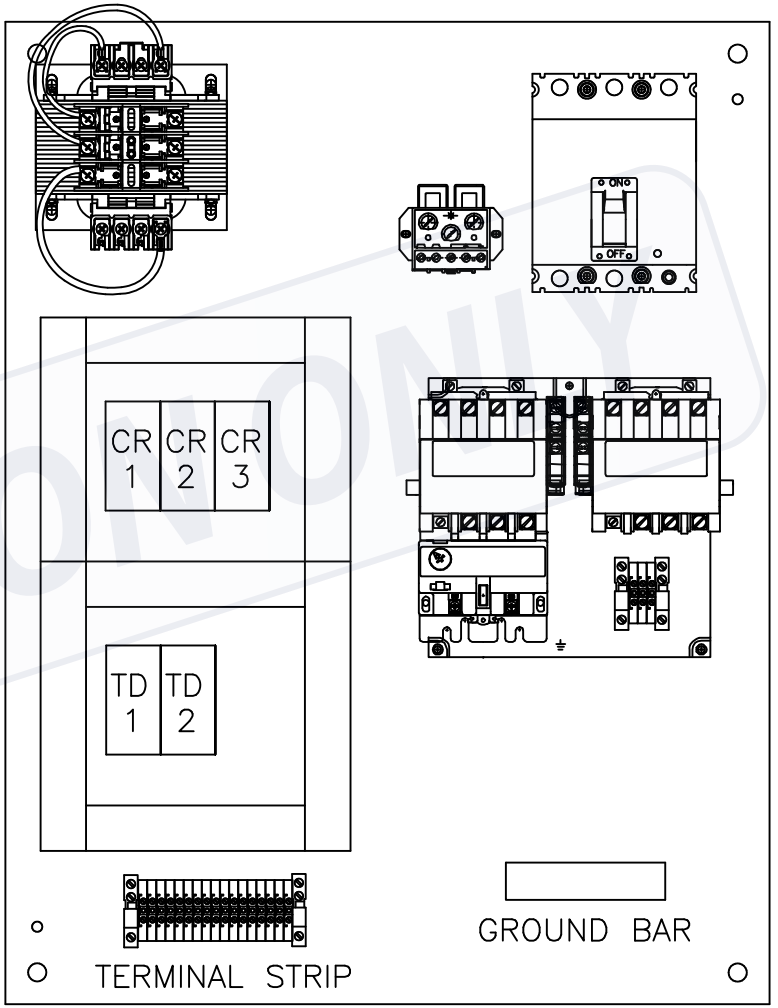
MAIN CONTROL PANEL
TERMINAL BLOCKS



Vulcan
THE PROVEN SCREEN CHOICE
212 SOUTH KIRLIN STREET
MISSOURI VALLEY, IA. 51555
712-642-2755
www.vulcanindustries.com

SCALE: NONE		DRAWN BY: SES
DATE: 6/30/2020	SHEET NUMBER: 2 OF 3	REVIEWED BY: SES
TITLE: ESP TERMINAL BLOCKS		PROJECT NUMBER: REF ONLY
PROJECT: T-FILTER PRESS - CORONA, CA. #1		DRAWING NUMBER: ED-REFONLY





ENCLOSURE NEMA 4X
HOFFMAN # A-30H2408SSLP

NO CONDUIT ENTRANCES
PROVIDED IN THE ENCLOSURE

212 SOUTH KIRLIN STREET
MISSOURI VALLEY, IA. 51555
712-642-2755
www.vulcanindustries.com

SCALE: NONE		DRAWN BY: SES
DATE: 6/30/2020	SHEET NUMBER: 3 OF 3	REVIEWED BY: SES
TITLE: CONTROL PANEL LAYOUT		PROJECT NUMBER: REF ONLY
PROJECT: T-FILTER PRESS - CORONA, CA. #1		DRAWING NUMBER: ED-REFONLY