Heart of the Valley Metropolitan Sewerage District

801 Thilmany Road, Kaukauna, WI 54130

Headworks Screening System Evaluation Hydraulics and Configuration

July 2, 2025 – DRAFT

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Donohue Project No.: 13649 TO12

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1. EXECUTIVE SUMMARY

Heart of the Valley Metropolitan Sewerage District (HOV) owns and operates the Heart of the Valley Metro Sewage Plant, an advanced water resource recovery facility (WRRF) that treats wastewater from five local communities and discharges treated effluent to the Fox River. Preliminary treatment includes two mechanical step screens for protection of downstream equipment from debris. The existing screens were installed in 1999 and consist of two step screens, single conveyor and one washer/compactor. HOV would like to replace the aging infrastructure with a reliable screen with finer openings.

A variety of screen types were evaluated in this report, including: step, through-flow perforated plate, center-flow perforated plate, and drum perforated plate. Screens were evaluated based on durability, capture rate, cost, hydraulic capacity, maintenance requirements, operation and ease of installation. Four alternatives were feasible for consideration. Given the increased screenings capture rate, HOVs history with the technology, and cost, HOV has selected Alternative 1, two step screens with 1/8-inch openings, for replacement of the existing screens. Two manufacturers to be considered for installation include: Huber and Vulcan.

The conveyor and washer/compactor are single points of failure for the existing screening system. HOV would like to replace the washer/compactors that can handle the screenings load without a conveyor and enhance the redundancy of the screenings handling process. Washer/compactors provided by the same manufacturer as the screens will be considered for installation.

The budgetary cost estimate for this project is $3.9M.

2. BACKGROUND

Heart of the Valley Metropolitan Sewerage District (HOV) owns and operates an advanced water resource recovery facility (WRRF) that treats wastewater from five municipal entities: Combined Locks, Darboy, Kaukauna, Kimberly, and Little Chute. The wastewater originates from domestic (residential, commercial, public, and light industrial) and industrial. Industrial dischargers are regulated by the local pretreatment program. The Facility also accepts and treats hauled-in wastes. Treated effluent is discharged to the Fox River. The WRRF has an average-day capacity of 8.5 mgd, a peak secondary treatment capacity of 26 mgd, and a blended treatment capacity of 60 mgd.

The WWTF is protected by a raw wastewater screening system immediately upstream of the Actiflo pumping wet well. Raw wastewater screens are important, removing large debris at the front of the liquid train and protecting all downstream equipment and processes. This initial process consists of two 1/4-inch Hycor Rotoscreen step screens. Captured screenings are deposited on a single conveyor that feeds one washer/compactor, both installed at the same time as the screen. This screening system was installed in 1999 and has a capacity of 26 mgd. Owner has concerns on the reliability of the aging infrastructure would like to replace the screenings system with a reliable screen with finer openings. The screens run well, however, the service life of a well-maintained step screen is generally considered to be 15 – 20 years. Given the age of the screens, HOV faces an increasing risk that the existing step screens will fail, jeopardizing the protection of downstream equipment and processes.

The report provides guidance in determining the appropriate screening system for use by the Owner. Screening technologies and upstream hydraulic impacts are evaluated in the report. The improvements recommended in this report will enhance debris removal and the reliability and performance of downstream equipment at the WWTF.

2.1 PROJECT CONSTRAINTS

A number of constraints were identified during the screen evaluation and selection process. The constraints have been summarized into hydraulic capacity, constructability, and operation and maintenance. Below is a summary of the goals and constraints:

Hydraulic Capacity
(Goal: maintain hydraulic capacity)

- Maintain screen system capacity with finer screen openings

Constructability
(Goal: Reduce construction cost)

- Fit within existing structure without extensive structural modifications

Operation & Maintenance
(Goal: Reduce operator attention to equipment)

- Increased solids capture to protect downstream equipment
- Capable of handling large debris
- Minimize single points of failure in screenings system

3. DESIGN CONDITIONS

Historical flows from January 2021 through December 2024 are summarized in Table 3-1. The WRRF can provide full secondary treatment up to 26 mgd, but has the capability, by way of the excess flow system, to process flows up to 60 mgd. Periodically, flows exceed the 26-mgd secondary treatment capacity.

Table 3-1 Historical Flows (mgd)

Year	Average Day	Maximum Month	Maximum Week	Maximum Day
2021	6.3	8.9	11.7	16.7
2022	6.4	10.1	12.2	15.4
2023	6.7	12.2	15.6	20.4
2024	7.2	11.3	13.3	18.1

The existing fine screens were designed to handle the design maximum flow of 26 mgd. A bypass screening system was installed in 2008 for flows greater than 26 mgd up to 60 mgd. The bypass screen is in good condition and is not considered for replacement as part of this study. The improvements recommended in this report will neither increase nor decrease the WWTF flow capacities.

A set of design criteria based upon historic plant data and the project constraints is provided in Table 3-2. The existing mechanical bar screens have 1/4-inch openings; in order to provide better screenings capture, the new screens will be designed with 1/8-inch openings.

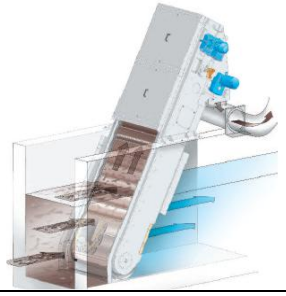
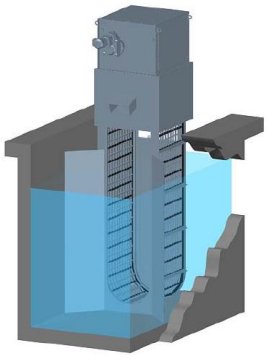
Table 3-2 Design Criteria for Screens

Number of Screens	2	3
Design Flow Rate	26 mgd	26 mgd
Design Flow Rate per Screen	13 mgd	8.7 mgd
Opening Size	1/8” (3 mm)	1/8” (3 mm)
Headloss Requirement	24 inches or less	24 inches or less
Dimensions	Fit in existing channel or expand channels into manual screen bypass channel	Fit into existing channels, utilizing manual screen bypass channel

4. FINE SCREENING TECHNOLOGY ALTERNATIVES

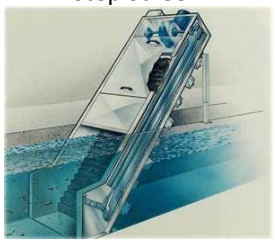
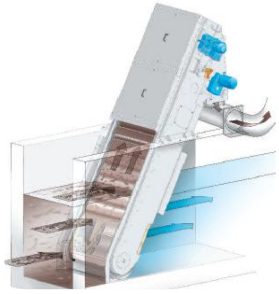
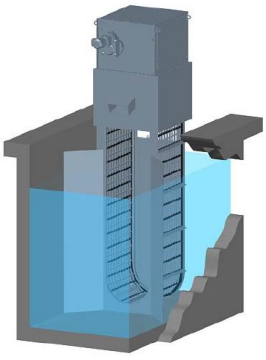
Several screen types are evaluated in this report based on operation, screenings removal, maintenance, headloss and a number of other items. Four screen types were suitable given the existing screen channel and fine screen requirement (1/8-inch). The types included: step, through flow band, center flow band, and drum. Provided in Table 4-1 is a summary of operation for each screen. In Table 4-2, a list of advantage and disadvantages for each type of screen is presented.

Table 4-1 Screening Technology Overview

Type of Screen	Operation
Step Screen 	The screen consists of a series of steps like an escalator that rotate vertically around the equipment. Each step is composed of evenly spaced bars. Screenings are collected on each step and carried to the top where they are removed. The rotation speed of the step assembly is used to control the rate of screen cleaning. Typical setting angle is 45 to 75 degrees.
Through Flow Perforated Plate Screen 	The screen is either a perforated plate with circular openings or a mesh. A chain drive intermittently rotates the screen vertically around the equipment (upward on the upstream side). Flow passes the upward traveling portion of the screen and then through the downward portion. The screenings are discharged by gravity through a chute at the top of the equipment. The screen is cleaned in two stages with a brush and spray water assembly. Band rotation speed is used to control the rate of screenings removal. The typical setting angle is 60 to 85 degrees.
Center Flow Perforated Plate Screen 	The screen is either a perforated plate with circular openings or a mesh. The screen is parallel to the influent flow, flow enters in between the screen band and then through each side. A chain drive rotates the screen vertically around the equipment. Hooks and trays along the screen band remove larger objects. Screenings are removed at the top by gravity and a spray wash system. Band rotation speed is used to control the rate of screen cleaning. Setting angle for the equipment is 90 degrees.

Type of Screen	Operation
Perforated Drum Screen 	The screen is either a perforated plate with circular openings or a mesh. Flow enters the inside of the drum and flows through, capturing solids on the inside of the drum. As the drum rotates, the captured solids are conveyed out of the drum by an integral screw conveyor to the discharge point. Screenings are removed at the top by gravity and a spray wash/compaction system. The typical setting angle is 35 degrees.

Table 4-2 Advantages and Disadvantages of Screening Technologies

Type of Screen	Advantages	Disadvantages
Step Screen 	• High flow capacity • Short cleaning cycle • No submerged bearings • Can pivot out of channel for maintenance	• Screenings are collected below water surface
Through Flow Perforated Plate Screen 	• Screenings are not removed below water • High removal efficiency due to small openings • Normal maintenance is conducted at the operating level • Can pivot out of channel for maintenance	• Hydraulically limited due to small openings and dual pass • Submerged drive sprocket • Rear return mechanism has potential for solids loss downstream • Brush maintenance
Center Flow Perforated Plate Screen 	• High flow capacity • Debris damage is minimized as perforated plates or mesh is not directly in flow path • Screenings are not collected below water surface • High removal efficiency due to small openings	• Greater equipment cost • Excess water in screenings • Cannot not pivot out of channel for maintenance

Type of Screen	Advantages	Disadvantages
Perforated Drum Screen 	• Can pivot out of channel for maintenance • High removal efficiency due to small openings	• Screenings are collected below water surface

The through flow, center flow, and drum screens can be provided with a few different screen grids. Figure 1 shows a close-up view of three options. The laced link is like the design of a rake or step screen. The wire mesh and perforated plate offer finer screening and are the standard selection for band and center flow band screens.

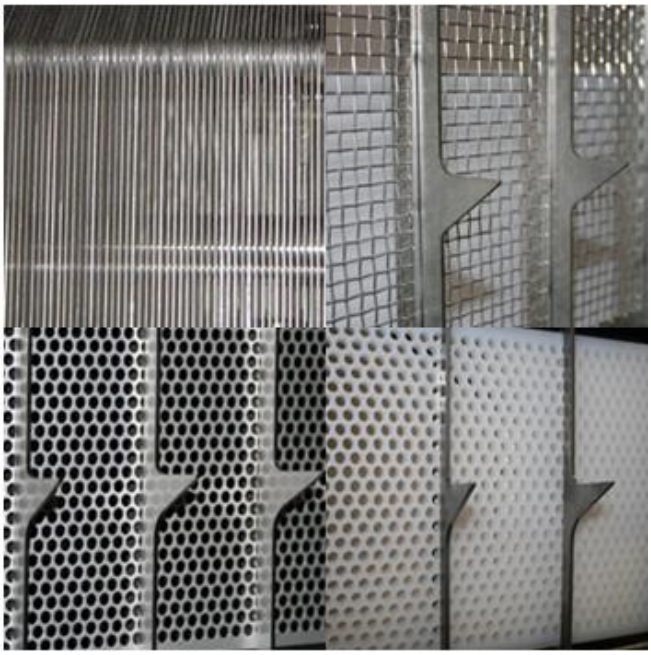


Figure 1 Wedge Wire Grid (Upper Left), Wire Mesh Grid (Upper Right), Steel Perforated Panel (Bottom Left), UHMWPE Perforated Panel (Bottom Right)

Three alternatives are practical and cost effective for the HOV situation: Alternative 1 – Step Screen, Alternative 2 – Through Flow Perforated Plate Screen and Alternative 2 – Center Feed Perforated Plate Screen. No manufacturers recommended a perforated drum screen for this application.

Several screen manufacturers were evaluated for each screen type. Drum screens were eliminated from consideration as they were not recommended by manufactures for this application. Table 4-3 provides equipment cost, headloss, and conveyance type to the wash press for different manufacturers and screen

types. Costs include screens and equivalent number of washer/compactors. Equipment cost ranges from $588K to $930K. Layouts for the various screen types are provided in Appendix A.

Table 4-3 Screen Cost and Manufacturers

Option	Screen Type	Number of Screens	Cost ($) For Equipment[1]	Manufacturer and Model	Headloss @ 26 MGD	Conveyance to Wash Press
A	Step Screen	2	620,000	Huber SSF-HE 4000	11.5 inch[4]	Conveyor[2]
B		2	500,000	Vulcan ESR 28	18.0 inch[3]	N/A[2]
C	Through Flow Perforated Plate Screen	2	588,000	Headworks Perforator	30.4 inch[3]	N/A
D		2	737,000	Saveco FRSIII 700	14.6 inch[3]	N/A[2]
E		3	914,500	Headworks Perforator	31.79 inch[4] 21.35 inch[4]	Conveyor and N/A
F		3	825,000	Parkson Aqua Guard	26.9 inch[3]	N/A
G	Center Flow Perforated Plate Screen	2	735,000	Headworks Eliminator	10.9 inch[3]	Conveyor and N/A
H		3	965,000	Hydro-Dyne Great white	10.7 inch[5]	Conveyor[2]

Error! Reference source not found. notes:
1 – Cost estimates include screens, conveyance, washer/compactors, control panels
2 – Option to use hydraulic flume for screenings conveyance in place of a conveyor
3 – 30% Blinded
4 – 35% Blinded
5 – 65% Blinded

Each manufacturer provided headloss data for their screens at a flow rate of 26 mgd and a specified percentage of screen blinding. This represents a worst-case condition, combining peak design flow with significant debris accumulation. Headloss is a critical factor, as it determines the maximum allowable channel water level before overflow occurs to the peak flow screen. A calibrated hydraulic model estimated a headloss of approximately 22-inches through the existing screen system at design maximum flow. A headloss exceeding 24-inches was determined excessive for the system. Several screen options from manufacturers exceeded 24-inches of headloss; specifically Options C, E, and F. Therefore, the options exceeding the allowable headloss were excluded from further consideration. As a result, from the remaining viable options, four screen alternatives were identified as feasible for continued evaluation.

For Alternative 1 (Option A and B), two step screens are installed in the existing mechanical screen channels with a dedicated wash press per screen. The following work is required:

- Minor modifications to existing channels for two new mechanical screens
- Center manual rake screen remains
- Concrete removal for two wash presses
- Common improvements described in Section 6

For Alternative 2 (Option D), two through flow screens are installed in deeper channels with a dedicated wash press per screen. The following work is required:

- Major channel modifications for construction of two deeper channels – Channels increase depth by 1 foot
- Center manual rake screen remains
- Concrete removal for two wash presses
- Common improvements described in Section 6

For Alternative 3 (Option G), two center flow screens are installed in wider and deeper channels with dedicated wash press per screen. The following work is required:

- Major channel modifications for construction of deeper channels – Channel depth increases by 3.5 foot, Channel width increases by 1.5 foot each
- Center channel manual rake screen removed for construction of larger screen channels
- Concrete removal for two wash presses
- Common improvements described in Section 6

For Alternative 4 (Option H), three center flow screens are installed in the existing screen channels with a dedicated wash press per screen. The following work is required:

- Minor modifications to existing channels
- Center channel manual rake screen removed for installation of third mechanical screen. Larger center screen can be provided if desired. Manufacturer proposed all screens the same size for commonality for operation and maintenance.
- Concrete removal for three wash presses
- Common improvements described in Section 6

5. WASHER/COMPACTOR TECHNOLOGIES

Each screening manufacturer included a washer/compactor unit with their screen submittal. While there were minor differences among them, all followed a similar process: screenings are discharged directly into the wash press or conveyed from the screen discharge to the wash press (see Table 4-3 for information specific to each manufacturer). Many manufacturers offer systems that allow screenings to to be discharged directly into the wash press and then be pushed to a dumpster. However, in some cases, the push distance required by the existing structure layout was too long to be feasible, requiring conveyance.

Once screenings enter the wash press, they are transported into a washing zone with sprayers and then pass to a dewatering zone. There is a wedge wire or perforated drain underneath the washing and dewatering zone. Previous experience suggests that washer/compactors with wedge wire drain are better at trapping grease. The screw typically has a nylon brush attached to the edge to continuously clean the drain. After dewatering, the screenings are compacted and transported to a discharge chute. A summary of the washer/compactor models is provided in Table 5-1.

Table 5-1 Screening Washer/Compactor Technologies

Manufacturer & Model	Features	Wash Water	Capacity (cu ft/hr)
Headworks Screwpactor	Shafted spiral washer/compactor, brush on screw	10 gpm @ 40 psi	123
Headworks Transpactor	Shaftless spiral conveyor washer/compactor with perforated drain and wash zone	15 gpm @ 40 psi	132
Huber WAP	Perforated drain, Nylon brush on screw	16 gpm @ 60 psi	140
Hydrodyne Washing Compactors	Wedge wire drain, Nylon brush on screw	112 gpm @ 60 psi	Not Provided
Saveco FSM	Perforated drain, Nylon brush on screw	16 gpm @ 40 psi	177
Vulcan EWP 250/1200 Washing Press	Wedge wire drain, Nylon brush on screw	19 gpm @ 40 psi	125

The new mechanical screens will have a 1/8-inch opening size whereas the existing screens have 1/4-inch openings. Reduction in the openings will increase screenings capture and consequently the volume of screenings hauled to landfill. Currently, the screenings dumpsters are emptied approximately once per month. In general, the screenings removal operation will not change and HOV will continue their current operation with screenings bagging and dumpster removal operations.

6. PROJECT IMPLEMENTATION

Cost Estimate and Scope

The screenings project will include new screens, washer/compactors, electrical and controls upgrades and additional improvements deemed necessary or beneficial. In addition to replacement of the screens and washer/compactors, the following items have been identified as part of the project scope:

- Provide separate Make-up Air Unit (MAU) for the Headworks Building and the Peak Flow Screen Building
- All new exhaust fans and ductwork installed in locations to improve cross ventilation and low level exhaust (Design to ventilate with 12)
- Provide separate positive pressurization unit for the electrical room
- Remove heat exchanger (minimum classification of CID2 shouldn't be exchanging air streams)
- Provide floor panels instead of open grating
- Continuous air monitoring for H2S, CO, and combustible gas

The cost for each screening technology is provided in Table 6-1.

Table 6-1 Simple Project Cost Estimate (Equipment and required ancillary items)

Alternative	Description	Project Cost (Million $)
1	2 Step Screen	$3.88
2	2 Through Flow Perforated Plate Screen	$4.22
3	2 Center Flow Perforated Plate Screen	$4.94
4	3 Center Flow Perforated Plate Screen	$6.07

Alternative 1 is the lowest-cost alternative that addresses the most important shortcomings: [1] replacing aging infrastructure, [2] increasing headworks screen capture efficiency, and [3] providing screenings handling redundancy and eliminating the screenings conveyor.

Donohue recommends that HOV should move forward with design of the two step screens. With the headworks improvements, the total project capital cost opinion is $3.9 MM. Details on the project cost estimates are provided in Appendix B.

Construction Sequencing

Replacement of the raw wastewater screens is more complicated than simply swapping out a piece of equipment. The project timing and methodology is critical to safely removing and installing the new screens. A couple of construction recommendations are provided below.

- Replace screen during dry weather to reduce the use of the peak flow screen.

- The screen must be manufactured in multiple pieces and brought into the building through the overhead door on the south side of the building.

Operation and Maintenance

HOV staff has experience with operating and maintaining step screens, screenings conveyors, and wash presses in the existing headworks facility. The new technology will be operated and maintained similar to the existing equipment. Normal operation will have two step screens operating, each with a dedicated screenings conveyor and wash press. The screens will be stationary to build a filter mat of screenings. This enables the screen to effectively capture particles smaller than the 1/8-inch screen spacing would otherwise retain. The cleaning of the screens will be controlled in time mode or differential level mode. Captured solids from each screen are deposited onto screenings conveyor or directly into a wash press. The screenings from each screen are then combined in a dumpster and will be hauled to the landfill.

An example maintenance activity schedule is provided in Table 6-2 and Table 6-3 for Huber step screen and wash press, respectively.

Table 6-2 Step Screen Maintenance Activities

Weekly Interval	• Check air injection pipes of level control and clean the injection pipes and probes with a hose. • Hose off deposited material and blockages on the lamellae and/or lamellae fittings, if any. • Regularly check the lamellae if the installed lamellae are of plastic material and the content of faeces contained in the screenings is high. For this purpose, switch the screen to manual operation until all the screenings have been transported and removed. Then, inspect the lamellae and hose them down. • Check the spray system for perfect function (if there is a bottom step washing system).
Monthly Interval	• Hose down the complete plant including the inside of the screen cover and tank (if any) with a high pressure cleaning device if possible. This prevents sedimentation and chloride accumulation that may lead to corrosion in the long run. • Check if the plastic spacers on the fixed lamellae are complete. If required, replace spacers.
Yearly Interval	• Check the play of the journal bearing of the linkage system. If the play exceeds 1mm, replace the bearing. • Check the functional bolts of the eccenter, on the motor and on the lamellae magazines if they fit tight. • Check if the fixed and movable lamellae are congruent in zero position. If the movable lamellae do not travel far enough over the fixed lamellae, the basic setting of the lamellae has changed. In this case the pulling rod must be re-adjusted. If this is impossible, the journal bearing of the linkage system are worn and must be replaced.
Other	• Under normal operational conditions it is recommended to replace the lubricants after approximately 20,000 operating hours. Independent of the operation time, lubricant replacement is recommended after 10 years at the latest.

Table 6-3 Wash Press Maintenance Activities

Daily Interval	• Check screenings container and replace or empty it if necessary to avoid back-up of screenings into the discharge unit. • If the amount of screenings discharged is smaller than usual and/or the screenings are wet, this is a sign of a failure or high wear. In such a case, immediately carry our the monthly and semi-annual inspection work. • With optional screenings grinder: Check the screw of the screenings grinder for clogging.
Monthly Interval	• Check the water supply. • Clean the plant. • Check that the press liquor runs off freely from the drainage trough, analogous to the wash press.
Semi-Annually Interval	• Check the sealing of the gear motor • Check hydraulic unit for leakage • Visual inspection for wear with the machine shut down • Visual inspection of the running behavior of the screw
Other	• Under normal operational conditions it is recommended to replace the lubricants after approximately 15,000 operating hours. Independent of the operation time, lubricant replacement is recommended after 2 or 3 years at the latest.

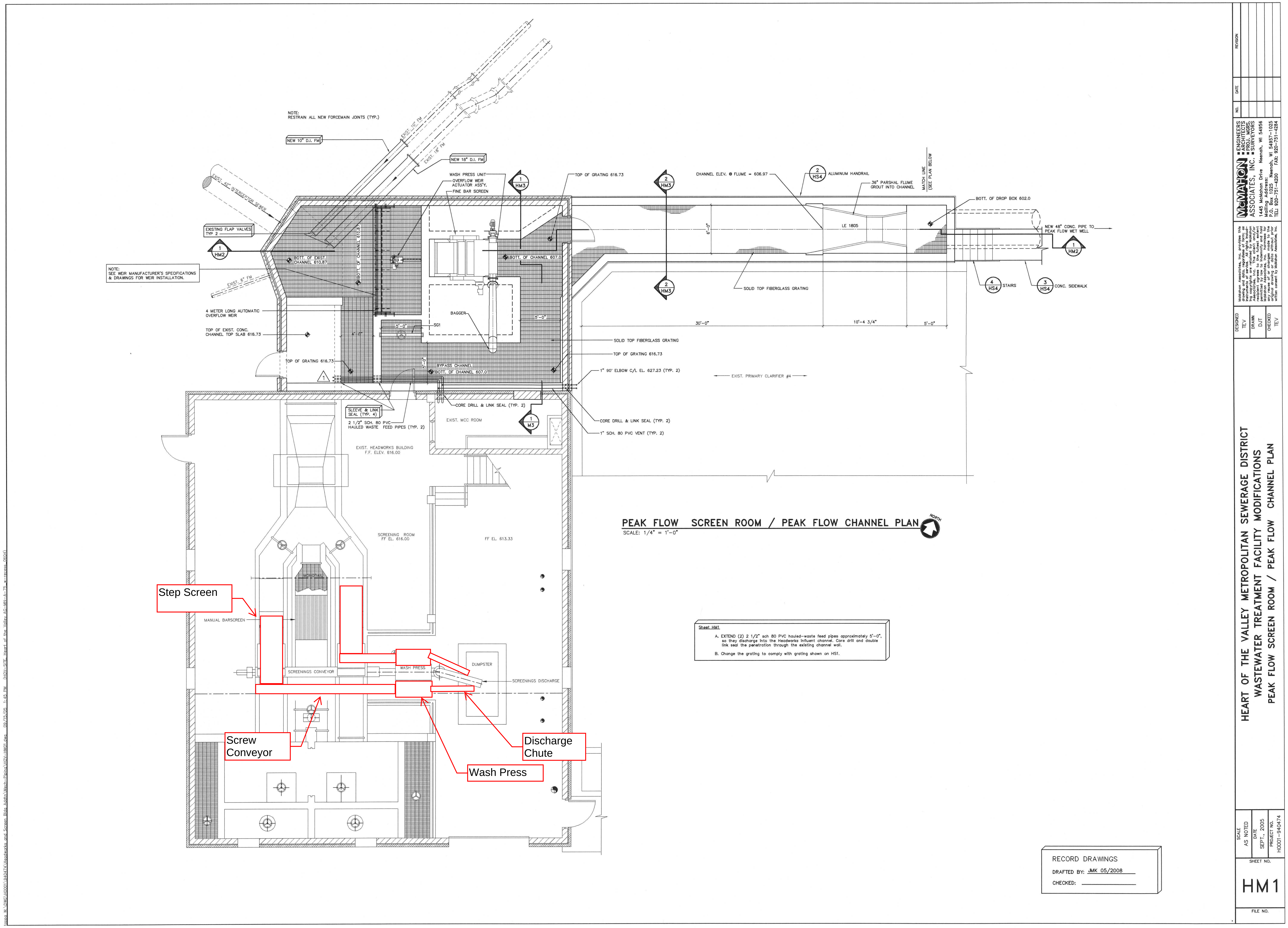
Project Schedule

A preliminary project implementation schedule is provided in Table 6-4. Design is scheduled to start late in 2025 with construction beginning in the summer of 2027. The schedule can be flexible to meet HOV's needs.

Table 6-4 Headworks Screening System Implementation Schedule

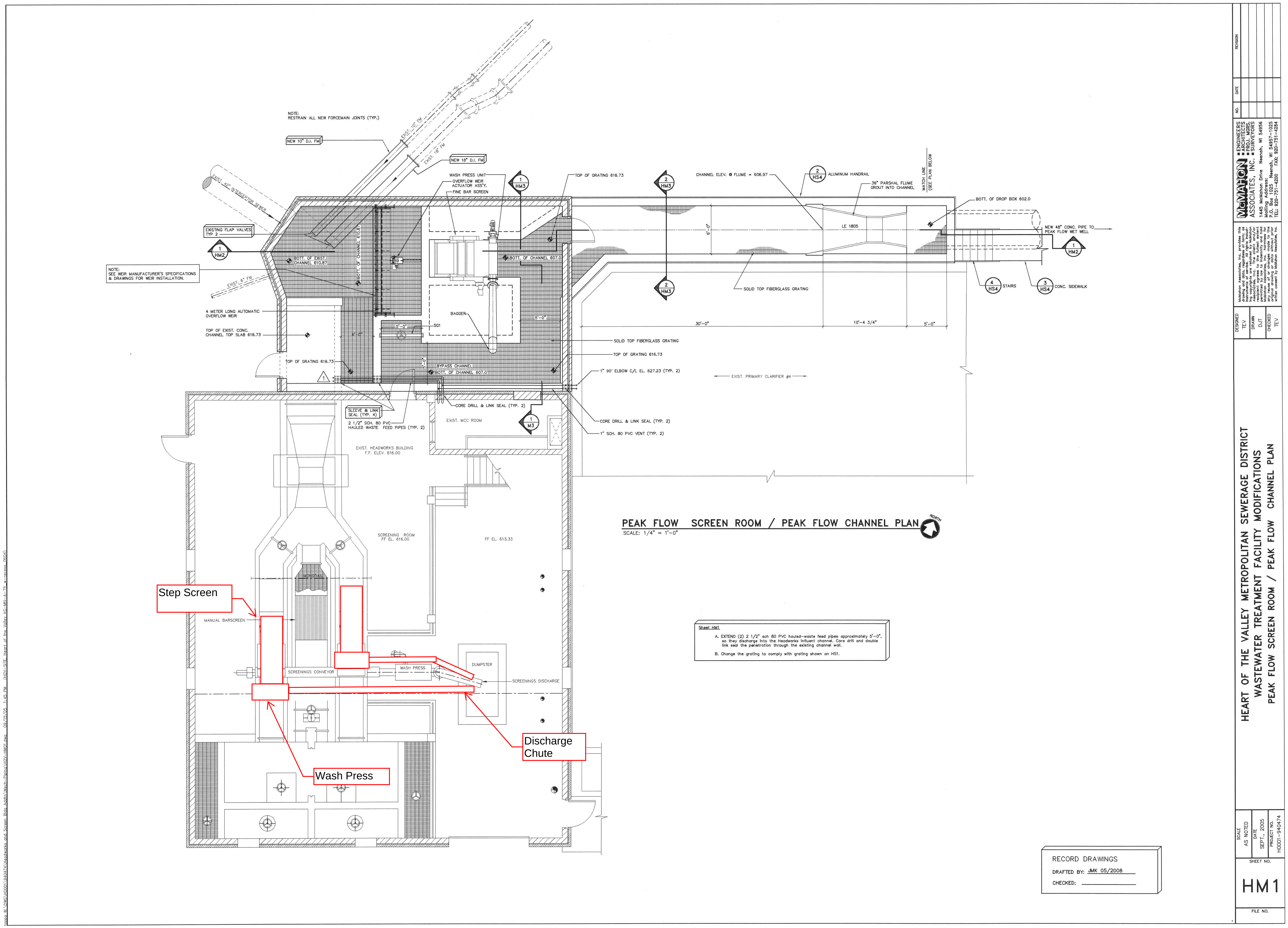
Step/Task	**2025**				**2026**				**2027**				**2028**			
Headworks Screen System Upgrades	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Design																
Bidding																
Construction																

Option A - STEP SCREEN 2 Huber

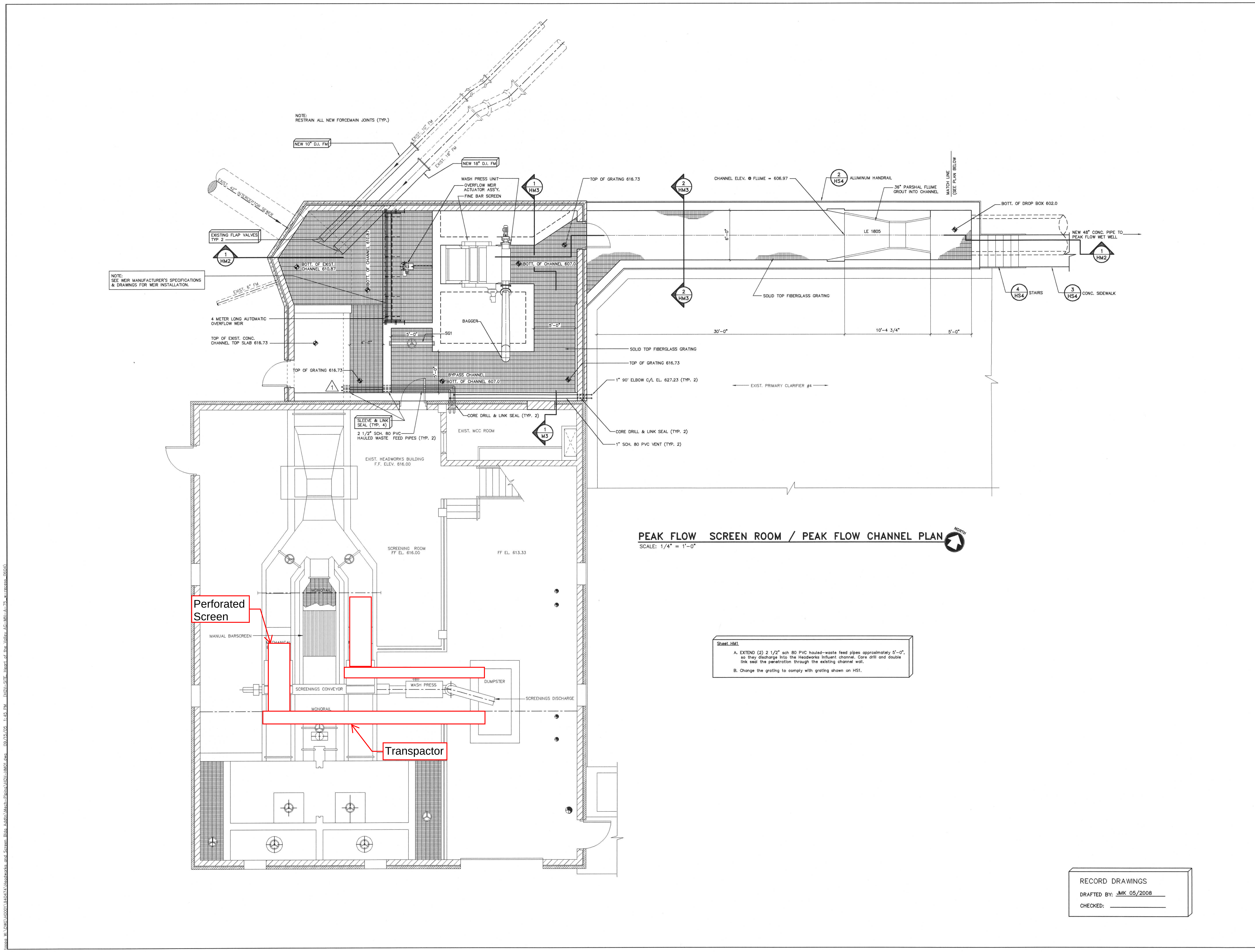


W:\DWG\H0001\940474\Headworks and Screen Bldg Addtn\Mech-Piping\HOV-HM01.dwg, Model, 10/2/2008 9:12:22 AM, pkolarik, 1:96

Option B - STEP SCREEN 2 Vulcan



Option C - THROUGH FLOW 2 Headworks



Sheet HM1

A. EXTEND (2) 2 1/2" sch 80 PVC hauled-waste feed pipes approximately 5'-0", so they discharge into the Headworks influent channel. Core drill and double link seal the penetration through the existing channel wall.

B. Change the grating to comply with grating shown on HS1.

RECORD DRAWINGS

DRAFTED BY: JMK 05/2008

CHECKED:

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Mailing Address: P.O. Box 1025 Neenah, WI 54957-1025
TEL: 920-751-4200 FAX: 920-751-4284

HEART OF THE VALLEY METROPOLITAN SEWERAGE DISTRICT
WASTEWATER TREATMENT FACILITY MODIFICATIONS
PEAK FLOW SCREEN ROOM / PEAK FLOW CHANNEL PLAN

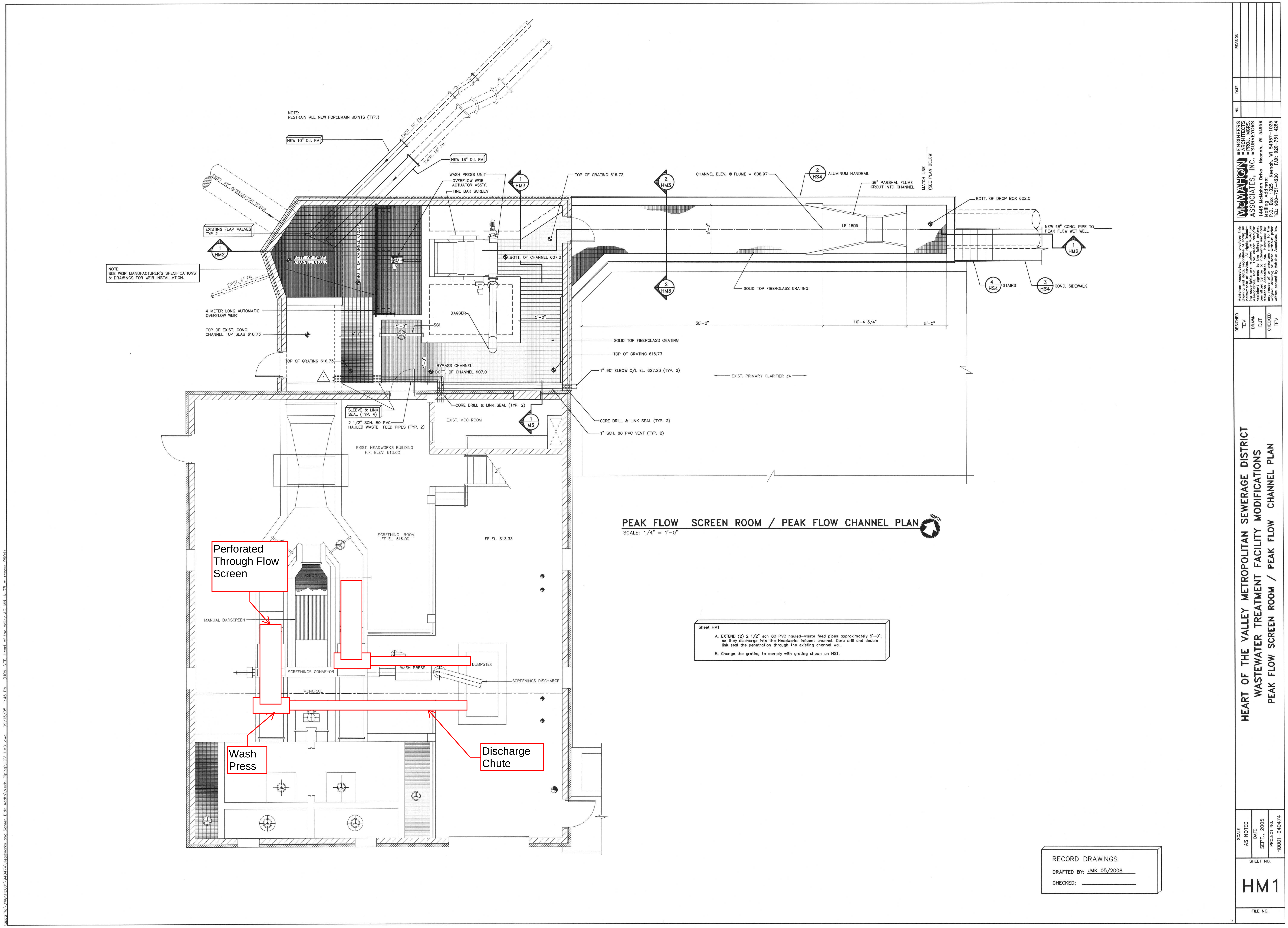
DESIGNED TEV | DRAWN DJT | CHECKED TEV

SCALE AS NOTED | DATE SEPT. 2005 | PROJECT NO. H0001-940474

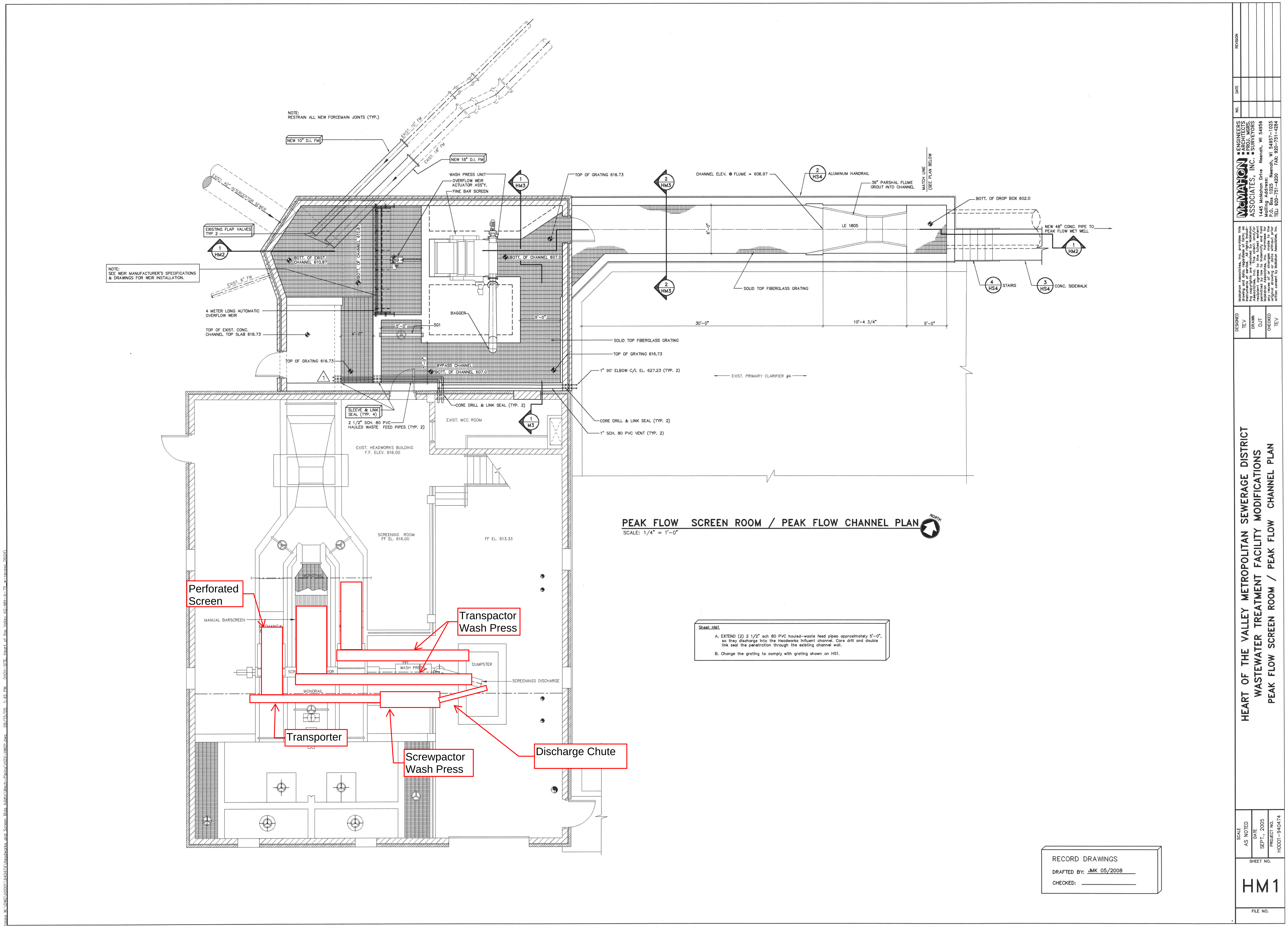
SHEET NO. HM1

FILE NO.

Option D - THROUGH FLOW 2 Saveco



Option E - THROUGH FLOW 3 Headworks


Perforated Screen
Transpactor Wash Press
Transporter
Screwpactor Wash Press
Discharge Chute
NOTE: RESTRAIN ALL NEW FORCEMAIN JOINTS (TYP.)
NEW 10" D.I. FM
NEW 18" D.I. FM
EXIST. 10" FM
EXIST. 18" FM
EXIST. 42" INTERCEPTOR SEWER
EXISTING FLAP VALVES TYP. 2
NOTE: SEE WEIR MANUFACTURER'S SPECIFICATIONS & DRAWINGS FOR WEIR INSTALLATION.
EXIST. 6" FM
4 METER LONG AUTOMATIC OVERFLOW WEIR
TOP OF EXIST. CONC. CHANNEL TOP SLAB 616.73
TOP OF GRATING 616.73
BOTT. OF EXIST. CHANNEL 610.87
WASH PRESS UNIT
OVERFLOW WEIR ACTUATOR ASS'Y.
FINE BAR SCREEN
BOTT. OF CHANNEL 607.0
BADGER
BYPASS CHANNEL
TOP OF GRATING 616.73
CHANNEL ELEV. @ FLUME = 606.97
ALUMINUM HANDRAIL
36" PARSHAL FLUME GROUT INTO CHANNEL
MATCH LINE (SEE PLAN BELOW)
BOTT. OF DROP BOX 602.0
NEW 48" CONC. PIPE TO PEAK FLOW WET WELL
SOLID TOP FIBERGLASS GRATING
STAIRS
CONC. SIDEWALK
SOLID TOP FIBERGLASS GRATING
TOP OF GRATING 616.73
1" 90° ELBOW C/L EL. 627.23 (TYP. 2)
EXIST. PRIMARY CLARIFIER #4
CORE DRILL & LINK SEAL (TYP. 2)
1" SCH. 80 PVC VENT (TYP. 2)
SLEEVE & LINK SEAL (TYP. 4)
2 1/2" SCH. 80 PVC HAULED WASTE FEED PIPES (TYP. 2)
EXIST. MCC ROOM
EXIST. HEADWORKS BUILDING F.F. ELEV. 616.00
SCREENING ROOM FF EL. 616.00
FF EL. 613.33
MANUAL BARSCREEN
DUMPSTER
SCREENINGS DISCHARGE
MONORAIL
PEAK FLOW SCREEN ROOM / PEAK FLOW CHANNEL PLAN
SCALE: 1/4" = 1'-0"
NORTH
Sheet HM1
A. EXTEND (2) 2 1/2" sch 80 PVC hauled-waste feed pipes approximately 5'-0", so they discharge into the Headworks influent channel. Core drill and double link seal the penetration through the existing channel wall.
B. Change the grating to comply with grating shown on HS1.
RECORD DRAWINGS
DRAFTED BY: JMK 05/2008
CHECKED:
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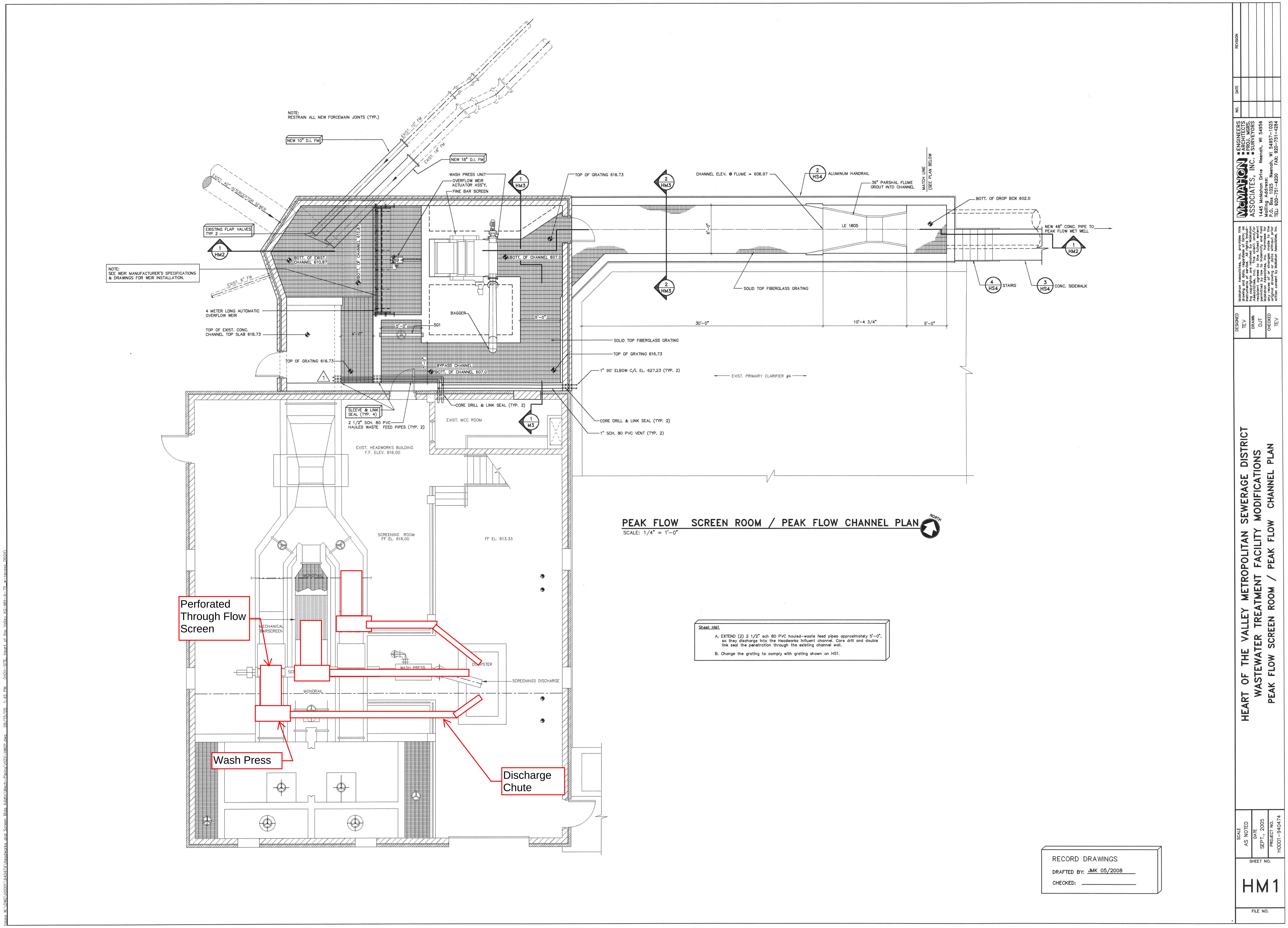
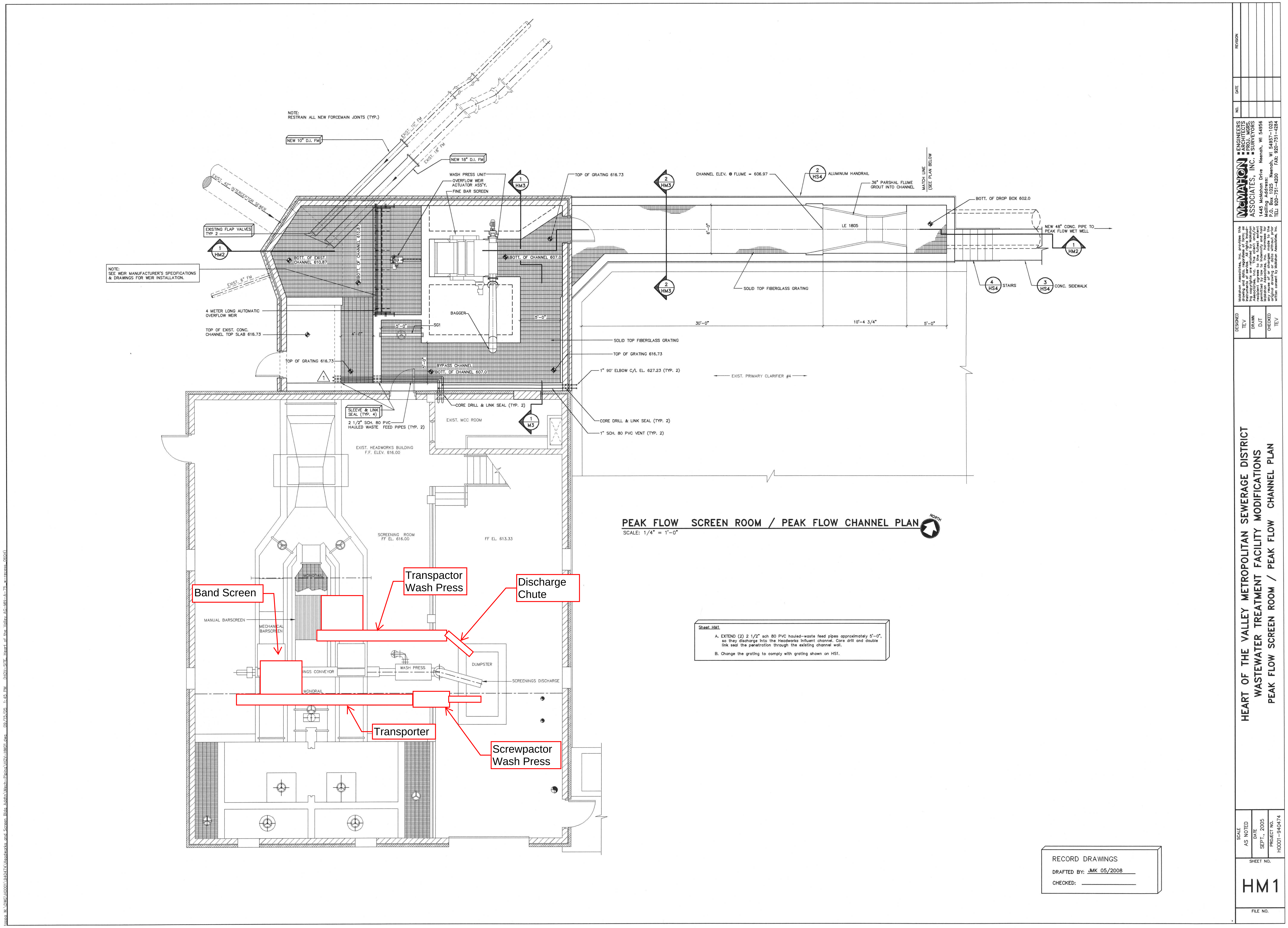
WASTEWATER TREATMENT FACILITY MODIFICATIONS
PEAK FLOW SCREEN ROOM / PEAK FLOW CHANNEL PLAN
DESIGNED TEV
DRAWN DJT
CHECKED TEV
SCALE AS NOTED
DATE SEPT. 2005
PROJECT NO. H0001-940474
SHEET NO.
HM1
FILE NO.

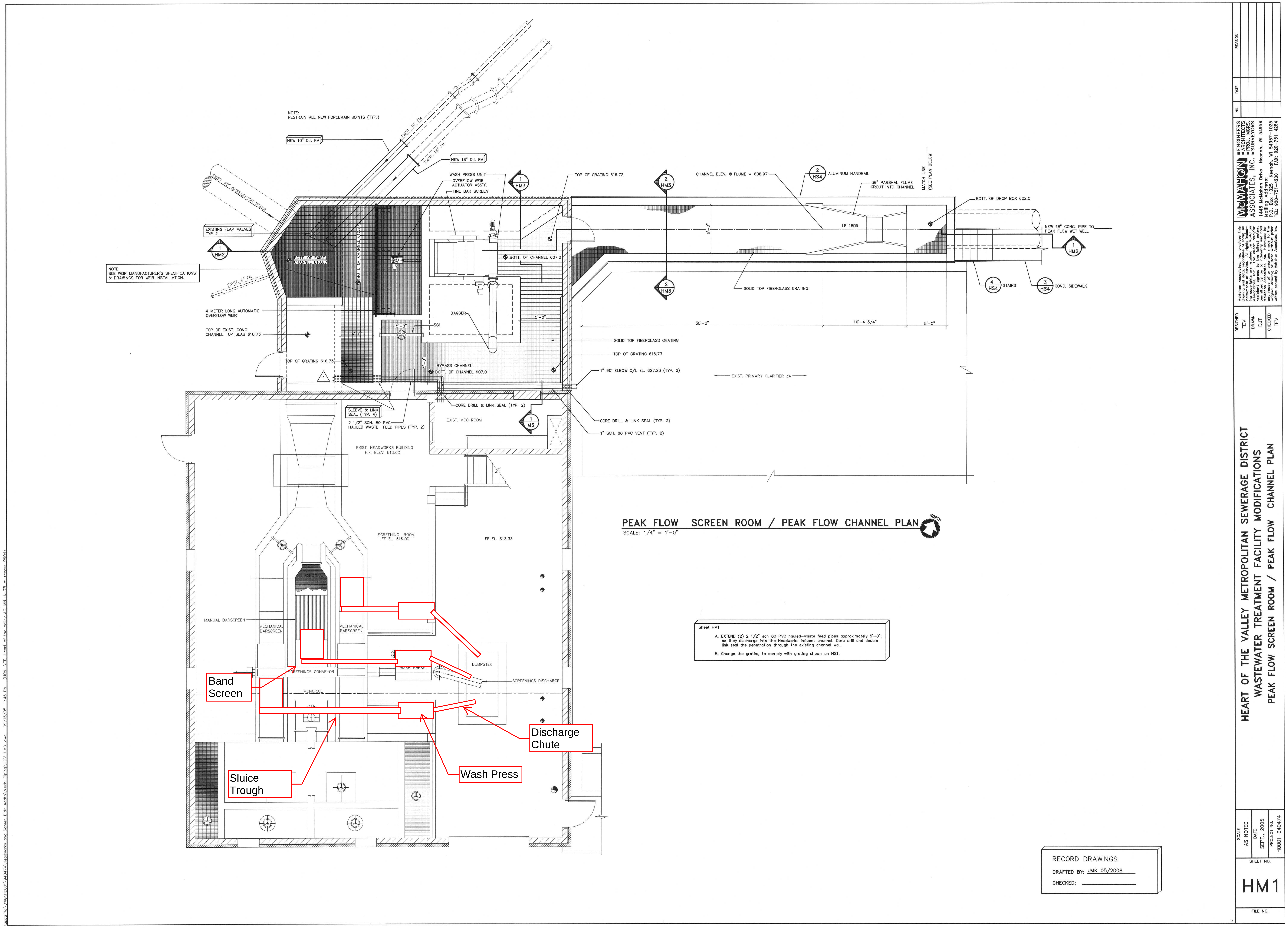
Option F - THROUGH FLOW 3 Parkson



Option G - CENTER FLOW 2 Headworks



Option H - CENTER FLOW 3 HydroDyne



Heart of the Valley Waste Water Treatment Facility
Headworks Screening System Evaluation
Kaukauna, WI

1: Step Screen - Two Screens

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COST

General Description

Screens replaced in-kind with two new steps screens with new wash press per screen. Work includes minor modifications to existing channels for two screen arrangement with center channel rake and concrete removal for two wash presses. HVAC equipment is replaced.

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)
Screen, Conveyor, Wash Press Removals	LS	1	30,000	30,000
Remove and replace monorail system with hoist	LS	1	50,000	50,000
Existing concrete removal	CF	100	50	5,000
Channel Modications	LS	1	10,000	10,000
Temorarily support existing roof beam	LS	1	50,000	50,000
Replace Influent Step Screens w/ wash presses	EA	2	256,900	620,200
Bypass Bar Rack	EA	1	existing	
Screen Installation	LS	1	124,040	124,040
Screenings Conveyance	EA	2	included	
Screenings Conveyance Installation	LS	1	included	
Wash Press	EA	2	included	
Wash Press Installation	LS	1	included	
Remove railing and grating	LS	1	15,000	15,000
HVAC Removals	LS	1	8,000	8,000
Replace MAU and HVAC ductwork	LS	1	245,000	245,000
Air Monitoring - H2S, CO, combustile gas detection	LS	1	15,000	15,000
Misc SST anchors and fabrications	LS	1	10,000	10,000
Concrete Walls	CY	2	1,500	3,000
Channel Gates	EA	4	15,000	60,000
Influent Gate Nut for Drill Attachment	EA	2	300	600
Concrete Slab	CY	2	1,000	2,000
Drilled in Dowels	EA	100	100	10,000
Railing, Plank Grating, Grating supports	LS	1	25,000	25,000
Misc Coatings	LS	1	10,000	10,000
Civil % Not Listed Above	%		0%	$0
Process-Mechanical % Not Listed Above	%		5%	$96,481
Electrical % Not Listed Above	%		10%	$192,961
Instrumentation and Control % Not Listed Above	%		10%	$192,961
Plumbing % Not Listed Above	%		5%	$96,481
HVAC % Not Listed Above	%		3%	$57,888
Subtotal				1,929,612
Contingency			40%	771,845
Subtotal				2,701,457
Contractor Overhead & Profit			25%	675,364
Total Construction Cost				**3,376,821**
Engineering			15%	506,523
Total Initial Cost				**3,884,000**

Heart of the Valley Waste Water Treatment Facility
Headworks Screening System Evaluation
Kaukauna, WI

2: Perforated Plate - Through Flow Two Screens

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COST

General Description

Screens replaced with two new perforated plate through flow screen with new wash press per screen. Work includes modifications to existing channels to provide two larger channels for two screen arrangement and concrete removal for two wash presses. Perforated plate screens are stagged in channels for direct discharge to the dedicated wash press. HVAC equipment is replaced.

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)
Screen, Conveyor, Wash Press Removals	LS	1	30,000	30,000
Remove and replace monorail system with hoist	LS	1	50,000	50,000
Channel Modifications	LS	1	25,000	
Existing concrete removal	CF	400	50	20,000
Temporarily support existing roof beam	LS	1	50,000	50,000
Influent Screens, wash presses, launder channel, co	EA	2	259,176	518,353
Bypass Bar Rack	EA	1	existing	
Screen Installation	LS	1	103,671	103,671
Wash Press	EA	2	90,000	180,000
Wash Press Installation	LS	1	36,000	36,000
Remove Railing and grating	LS	1	15,000	15,000
HVAC Removals	LS	1	8,000	8,000
Replace MAU and HVAC ductwork	LS	1	245,000	245,000
Air Monitoring - H2S, CO, combustile gas detection	LS	1	15,000	15,000
Misc SST Anchors and Fabrications	LS	1	10,000	10,000
Concrete Walls	CY	5	1,500	7,500
Channel Gate	EA	4	15,000	60,000
Influent Gate Nut for Drill Attachment	EA	2	300	600
Concrete Slab	CY	10	1,000	10,000
Drilled in dowels	EA	100	100	10,000
Railing, Plank Grating, and Grating Supports	LS	1	25,000	25,000
Misc Coatings	LS	1	10,000	10,000
Civil % Not Listed Above	%		0%	$0
Process-Mechanical % Not Listed Above	%		5%	$104,785
Electrical % Not Listed Above	%		10%	$209,571
Instrumentation and Control % Not Listed Above	%		10%	$209,571
Plumbing % Not Listed Above	%		5%	$104,785
HVAC % Not Listed Above	%		3%	$62,871
Subtotal				2,095,706
Contingency			40%	838,282
Subtotal				2,933,988
Contractor Overhead & Profit			25%	733,497
Total Construction Cost				**3,667,485**
Engineering			15%	550,123
Total Initial Cost				**4,218,000**

Heart of the Valley Waste Water Treatment Facility
Headworks Screening System Evaluation
Kaukauna, WI

3: Perforated Plate - Center Flow Two Screens

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COST

General Description

Screens replaced with two new perforated plate center feed screen with new wash press per screen. Work includes modifications to existing channels to provide two larger channels for two screen arrangement and concrete removal for two wash presses. HVAC equipment is replaced.

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)
Screen, Conveyor, Wash Press Removals	LS	1	30,000	30,000
Remove and replace monorail system with hoist	LS	1	50,000	50,000
Existing concrete removal	CF	1,500	50	75,000
Temporarily Support Existing roof beam	LS	1	50,000	50,000
Center Feed Screen	EA	2	239,272	478,543
Screen Installation	LS	1	95,709	95,709
Wash Press	EA	2	155,128	310,256
Wash Press Installation	LS	1	62,051	62,051
Remove railing and grating	LS	1	15,000	15,000
HVAC Removals	LS	1	8,000	8,000
Replace MAU and HVAC ductwork	LS	1	245,000	245,000
Air Monitoring - H2S, CO, combustile gas detection	LS	1	15,000	15,000
Misc SST anchors and fabrications	LS	1	10,000	10,000
Concrete Walls	CY	40	1,500	60,000
Channel Gates	EA	4	15,000	60,000
Influent Gate Nut for Drill Attachment	EA	2	300	600
Concrete Slab	CY	20	1,000	20,000
Drilled in Dowels	EA	100	100	10,000
Railing, plank grating, and grating supports	LS	1	25,000	25,000
Skylight	LS	2	6,250	12,500
Misc Coatings	LS	1	10,000	10,000
Civil % Not Listed Above	%		0%	$0
Process-Mechanical % Not Listed Above	%		5%	$122,586
Electrical % Not Listed Above	%		10%	$245,173
Instrumentation and Control % Not Listed Above	%		10%	$245,173
Plumbing % Not Listed Above	%		5%	$122,586
HVAC % Not Listed Above	%		3%	$73,552
Subtotal				2,451,730
Contingency			40%	980,692
Subtotal				3,432,421
Contractor Overhead & Profit			25%	858,105
Total Construction Cost				**4,290,527**
Engineering			15%	643,579
Total Initial Cost				**4,935,000**

Heart of the Valley Waste Water Treatment Facility
Headworks Screening System Evaluation
Kaukauna, WI

4: Perforated Plate - Center Flow Three Screens

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COST

General Description

Screens replaced with three new perforated plate center feed screens with new wash press per screen. Work includes minor modifications to existing channels for three screen arrangement and concrete removal for three wash presses. HVAC equipment is replaced.

ITEM	Units	Quantity	Unit Cost ($)	Initial Cost ($)
Screen, Conveyor, Wash Press Removals	LS	1	30,000	30,000
Remove and replace monorail system with hoist	LS	1	50,000	50,000
Existing concrete removal	CF	200	50	10,000
Temporarily Support Existing roof beam	LS	1	50,000	50,000
Existing channel modifications	LS	1	10,000	10,000
Center Feed Screen	EA	3	321,667	965,000
Screen Installation	LS	1	193,000	193,000
Wash Press	EA	3	90,000	270,000
Wash Press Installation	LS	1	54,000	54,000
Remove railing and grating	LS	1	15,000	15,000
HVAC Removals	LS	1	8,000	8,000
Replace MAU and HVAC ductwork	LS	1	245,000	245,000
Air Monitoring - H2S, CO, combustile gas detection	LS	1	15,000	15,000
Misc SST anchors and fabrications	LS	1	10,000	10,000
Concrete Walls	CY	4	1,500	6,000
Channel Gates	EA	2	15,000	30,000
Influent Gate Nut for Drill Attachment	EA	3	300	900
Concrete Slab	CY	4	1,000	4,000
Drilled in dowels	EA	40	100	4,000
Railing and plank grating	LS	1	25,000	25,000
Skylight	LS	3	5,000	15,000
Misc coatings	LS	1	10,000	10,000
Civil % Not Listed Above	%		0%	$0
Process-Mechanical % Not Listed Above	%		5%	$150,739
Electrical % Not Listed Above	%		10%	$301,478
Instrumentation and Control % Not Listed Above	%		10%	$301,478
Plumbing % Not Listed Above	%		5%	$150,739
HVAC % Not Listed Above	%		3%	$90,443
Subtotal				3,014,776
Contingency			40%	1,205,910
Subtotal				4,220,687
Contractor Overhead & Profit			25%	1,055,172
Total Construction Cost				**5,275,858**
Engineering			15%	791,379
Total Initial Cost				**6,068,000**