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Wastewater Facility Plan
Technical Memorandum 7
Buildings and Support Facilities

City of Whitewater
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CHAPTER I – PURPOSE AND INTRODUCTION

1.1 PURPOSE

Wastewater treatment goals and improvement alternatives were discussed in TM 3 – Nutrient Management and TM 6 – Liquids Treatment. The purpose of this technical memorandum (TM) is to evaluate the needs and proposed improvements to the remaining existing buildings and wastewater treatment support facilities to supplement the various treatment alternatives.

1.2 INTRODUCTION

The buildings associated with processing wastewater and sludge were reviewed for compliance with National Fire Protection Association (NFPA) 820 guidelines. The raw wastewater dry pit area, preliminary treatment building, buildings with sludge pumping, and the digester building and associated tunnel connection are of particular concern.

Staff space and laboratory needs for the Administration Building were discussed with plant staff during planning workshops along with other miscellaneous plant improvements and were noted in TM 2 – Flows, Loadings, and Existing Conditions. This TM will provide estimated construction costs for these proposed improvements as part of larger facility improvement project.

CHAPTER II – ELECTRICAL IMPROVEMENTS

2.1 BACKGROUND

The transformer and switchgear are at the end of their design lives and should be replaced. There have been two instances where the plant main breaker tripped before the feeder breaker associated with the fault tripped.

The project will include replacing the existing main switchgear with new 480 volt draw-out switchgear. To allow for construction phasing a new Electrical Building will be constructed to house the new main switchgear so the existing electrical distribution system can remain in service until the new Electrical Building, new main switchgear, and new underground duct bank system can be installed and energized. Then one-by-one the buildings, motor control centers in the Administration Building, and emergency generators will be transferred over to the new main switchgear. Once all the loads have been removed form the existing switchgear, the existing switchgear will be removed. A power system study including short circuit analysis, coordination study, and arc flash study (to determine incident energy available and the proper PPE required) will be performed on the entire revised electrical distribution system. See Figures 1, 2, and 3 in Appendix TM7-B for conceptual layout of the Electrical Building, underground duct bank system, and new switchgear one-line diagram.

The new switchgear will contain a PLC auto throw over system that will monitor and control the main circuit breaker, the generator circuit breakers, the generation circuit breaker, and the existing generators. PLC auto throw over system will allow the existing generators to be paralleled together and be momentarily paralleled with the electric utility. In the event of a power outage the main utility breaker will automatically open, the generators will automatically start, the generators will automatically be paralleled, and the generation breaker will automatically close providing generator power to the Plant. After the electric utility power returns and is stable the generators will be automatically paralleled with the electric utility, the main utility breaker will automatically be closed, the generators will be automatically unloaded, and the generation breaker will automatically be opened providing a “bumpless” transition back to the electric utility power.

A number of conduits are broken throughout the site causing water to run into buildings and electrical manholes. This project assumes that all underground electrical conduits would be replaced. The project will include a new underground concrete encased conduit duct bank system with electrical manholes. Conduits will be pitched away from the buildings towards the electrical manholes so the conduit system drains into the electrical manholes. The duct banks will be routed along roads to avoid areas that might be used for future structures or buildings. Most of the old underground conduit system will be abandoned with the exception of the conduits that stub out from the vault below the Administration Building and the existing electrical manholes and conduits installed during the Preliminary Treatment Building project. These conduits will be reused by connecting the new duct bank system into these existing systems. See Figures 1 and 2 in Appendix TM7-B for the conceptual layout of the new underground concrete encased conduit duct bank system.

It appears the only ground for each of the buildings (except the Administration Building, Filter Building, and the Primary and Secondary Pump Building) may be from the ground conductors run with the power feeds to each of the buildings. Three ground rods and an associated ground conductor should be installed and tested for each of the service entrance Motor Control Centers (MCC) in each building.

Improvement alternatives for consideration are:

1. Dual 480V Feeds - This alternative includes costs for the construction of a new switchgear building, new duct bank system, grounding improvements, and providing dual feeders from the new switchgear building to the existing MCCs similar to the plant's current system.

2. Single 480V Feeds – This alternative is very similar to the dual feed system except that only a single feed conductor would be run to each MCC and a manual transfer switch would be provided at each MCC.

3. Medium Voltage Loop – This alternative would install a medium voltage loop around the plant with redundant step down transformers for each MCC. This would allow for redundancy like the dual feed arrangement but at a reduced cost.

4. MCC Replacement – This alternative would provide new smart MCCs throughout the plant to replace the existing aging equipment.

2.2 ESTIMATED COSTS

Costs estimates for the proposed electrical improvements are presented in Appendix TM7-A. Depending on which electrical service alternative is selected the electrical improvements could have a construction cost (not including engineering) up to $3,803,000.

CHAPTER III – NFPA 820 EVALUATION

3.1 BACKGROUND

Fire protection for wastewater treatment facilities is covered by the National Fire Protection Association's NFPA 820, *Standard for Fire Protection in Wastewater Treatment and Collection Facilities*, 2012 edition. NFPA 820 defines the hazardous classifications associated with the different processes in a wastewater treatment facility. Areas in a wastewater treatment facility are either an unclassified location, a Class I, Division 1, Group D, Hazardous classified location, or a Class I, Division 2, Group D, Hazardous classified location. The National Electrical Code (NEC- NFPA 70) defines these classified locations as follows:

- Class I, Division 1 – A location in which ignitable concentrations of flammable gases or vapors can exist under normal operating conditions.
- Class I, Division 2 – A location in which volatile liquids or flammable gases are handled, processed, or used, but in which the liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems or in case or abnormal operation of equipment.

NFPA 820 has been around since 1990 and has gone through updates and the current version is the 2012 version. Most of the existing facilities at Whitewater were built prior to the development of NFPA 820 and are exempt from NFPA 820 requirements. However, when making modifications to existing exempt structures, the structures should be brought up to the current codes and standards.

We reviewed the existing structures to determine the hazardous classifications for the structures as defined by NFPA 820. The structures are listed below with the current conditions at the structure and modifications required to meet NFPA 820.

3.2 ADMINISTRATION BUILDING

The Administration Building has two readily apparent NFPA 820 issues via its connection to treatment process areas. The Administration Building is directly connected to the lower level of the Digester Complex through the tunnel system, creating an extension of the Digester Complex's hazardous environment into the Administration Building. The raw wastewater drywell is also directly connected to the main portion of the Administration Building creating the need to be ventilated the entire building continuously at a rate of 6 Air Changes per Hour (AC/h) to eliminate a hazardous environment classification per NFPA 820 from the drywell.

In order for the Administration Building to be considered a non-hazardous environment it must be physically separated from the Digester Complex and the pump station drywell. This would include walling off one end of the tunnel and providing a new exit from the tunnel and separating the pump station area and sealing any penetrations and conduits to these areas. The raw wastewater drywell ventilation system should then be modified to provide 6 AC/h in order to consider the space non-hazardous.

3.3 PRELIMINARY TREATMENT BUILDING

The process area (screening and grit removal) of the preliminary treatment building was designed as a Class I Division 1 hazardous location and meets the requirements of NFPA 820. The chemical feed portion of the building is not considered a hazardous area per NFPA 820 and is properly separated from the process area.

The grit basin outside the building has a Class I Division 2 hazardous area extending 10 feet from the basin and channels per NFPA 820.

3.4 PRIMARY CLARIFIERS AND PUMP BUILDING

The primary clarifiers and primary splitter box have a Class I Division 2 hazardous area from 18 inches above the tank wall and 18" above ground for 10 feet from the tank walls per NFPA 820.

The scum pumping well has a Class I Division 2 hazardous area extending 10 feet from the well NFPA 820.

The Primary Sludge Pump Building contains two primary sludge pumps which creates a Class I Division 2 hazardous environment inside the building unless the space is ventilated at 6 AC/h continuously. The existing ventilation system is not designed to so. The building ventilation system should be modified to provide the needed ventilation, 6 AC/h continuously, to consider the building a non-hazardous environment.

3.5 RBC BUILDINGS

The RBC Buildings are not considered a hazardous area per NFPA 820.

3.6 SECONDARY CLARIFIERS AND PUMP BUILDING

The secondary clarifiers and secondary splitter box are not considered a hazardous area per NFPA 820.

The scum pumping well has a Class I Division 2 hazardous area extending 10 feet from the well NFPA 820.

The Secondary Sludge Pump Building contains two sludge pumps which creates a Class I Division 2 hazardous environment inside the building unless the space is ventilated at 6 AC/h continuously. The existing ventilation system is not designed to so. The building ventilation system should be modified to provide the needed ventilation, 6 AC/h continuously, to consider the building a non-hazardous environment.

3.7 FILTER BUILDING, UV, AND POST AERATION

The effluent filters, UV disinfection, and post aeration basins are all considered non-hazardous areas per NFPA 820.

3.8 DIGESTER CONTROL BUILDING

Due the presence of gas handling equipment (condensate/sediment traps and drip traps) within the building the entire space should be considered a hazardous area regardless of the ventilation provided. In order for the Digester Control Building to be considered a non-hazardous area the gas handling equipment would need to be separated into its own area isolated from the rest of the building. After isolation of the gas handling equipment the sludge pumps on the lower would require that the entire building be ventilated at 6 AC/h in order for the remainder of the building to be considered non-hazardous.

3.9 ESTIMATED COSTS

Costs estimates for the work required to comply with NFPA 820 are presented in Appendix TM7-A. Bringing all the structures considered into NFPA 820 compliance would have a construction cost of approximately $882,000.

The facilities at the Whitewater wastewater treatment facility were built prior to the development of NFPA 820 and are exempt from NFPA 820 requirements. However, when making modifications to existing exempt structures, the structures should be brought up to the current codes and standards. In some cases the expense in modifying existing facilities to comply with NFPA 820 exceeds the benefit in improved fire protection. NFPA 820 acknowledges this and page 820-44 of NFPA 820, paragraph A-1-3.1 in Appendix TM7-A states:

> "**A-1-3.1** In existing facilities, it is not always practical to strictly apply the provisions of this standard. Physical limitations could necessitate disproportionate effort or expense with little increase in fire protection. In such cases, the authority having jurisdiction should be satisfied that reasonable fire protection is ensured. In existing facilities, it is the intent that any condition that represents a serious threat to fire protection should be mitigated by application of appropriate safeguards. It is not the intent to require modification for conditions that do not represent a significant threat to fire protection, even though such conditions are not literally in conformance with the fire protection requirements."

CHAPTER IV – ADMINISTRATION BUILDING IMPROVEMENTS

4.1 BACKGROUND

Based on the numerous improvements for the Administration Building identified in TM 2 and further discussions with plant staff the following list of potential improvement projects was developed:

1. Lab Remodeling – The existing laboratory and lab storage sizes are sufficient for current operations but laboratory and laboratory records storage remodeling may be required to address inefficiencies in the current layout and operation. The lab windows would be replaced with high efficiency insulated windows. Consistent with the lab improvements, the windows throughout the administration areas will be replaced. The existing windows create undesirable temperature gradients within the lab which plant staff attempt to compensate for by having lab temperature requirements dictate HVAC performance to the rest of the building. A separate air handling system for the laboratory would be provided to allow for continuous tight temperature control in the laboratory while allowing occupancy based control for the rest of the building.

2. Office Space Addition - Existing office space is limited; the addition of workspace and records storage is recommended. Total additional square footage would equal approximately 250 square feet. The additional office space would be added to the old belt filter press room upstairs. This may require the addition of an elevator to the second floor to provide barrier free access if the cost of providing such access does not exceed 20% of the cost of the total improvements being made.

3. Breakroom Addition - The existing breakroom was built into space originally designated as a welding booth; it is not adequately sized for current staff. A new break/training room with square footage equal approximately 500 square feet would be provided. This area can also be located in the belt filter press room. The existing breakroom space will be returned to welding space. Currently welding is done at the end of the shop by the front entrance creating a safety concern as staff must pass through the area to access the rest of the shop.

4. Map/CMOM Room Addition – Construction of a 250 square foot Map/CMOM Room is recommended. This room would replace the existing room above the existing breakroom adjacent to the shop. Stair between the breakroom and map room does not meet current code because of 7 1/2-inch rise and 9-inch tread and headroom requirements. This area can also be located in the belt filter press room.

5. New Women's Locker Room - Currently there is no female locker room; women's facilities (locker room and showers) must be provided to meet the current building code. Addition of space to accommodate this new locker and shower facilities would total approximately 400 square feet.

6. Remodel Men's Locker Room – The existing restrooms and locker room are not accessible/barrier-free. Toilet/Locker Room ventilation systems did not appear functional and radiant heating panels were providing only minimal heat. Remodeling to meet current code requirements is required.

7. HVAC Controls - The pneumatic HVAC controls are original to the plant but have been repaired as needed over the years. HVAC controls would be upgraded to direct digital controls (DDC) to provide central monitoring and control.

8. Boiler Replacement - There are two existing Clever Brooks Model 4 boilers. These boilers should be in a rated room, separated from the vehicle storage garage. There is no apparent means of combustion air intake into the space as the louver dampers are currently manually operated. The boiler circulating pump control panel is powered from a different circuit than the associated boilers. If power is lost to the circulating pump control panel, the pumps shut down but the boilers do not. According to plant staff, the boilers are oversized and constantly cycle on and off when in the Auto mode because they come up to temperature so fast. Because of this, the boilers are operated in the Manual mode, which makes their operation less efficient. One of the expansion tanks is not operational. The expansion tanks in general have been experiencing pinholes and should be replaced. According to plant staff, a corrosion inhibitor has not been added in a long time. This is recommended to prevent degradation of the piping interior. These boilers would be replaced with new high efficiency condensing boilers in a new mechanical room upstairs in the old belt filter press room. Consideration should be given to re-interconnecting the building heating loop with the process heating loop to allow for the digester gas generated heat to be used in the Administration Building.

9. Generator Improvements – The standby power engines are dual fuel natural gas and diesel. They work fine on diesel, but the engines trip out on overtemp on natural gas. Generator exhaust and silencer are uninsulated and there is no means to prevent exhaust condensate from running back to engines. Engine radiators are not ducted to the exterior, which leads to high temperatures in the space and overheating of the generators. This project would provide new louvers and ducting to control heat buildup within the building.

10. 10 ft Monorail Extension – This project would extend the existing loading dock monorail by another 10 ft. This would require the construction of a support structure with two columns and a cross beam to support the longer monorail.

11. Loading Dock Enclosure – This project would construct a masonry enclosure including an exterior door around the existing loading dock to convert the space into additional storage.

4.2 ESTIMATED COSTS

Costs estimates for the various renovations to the Administration Building are presented in Appendix TM7-A. Completing all the renovations considered would have a construction cost of approximately $948,000. Depending on the various renovations planned for the old belt filter press room an elevator may or may not be required.

CHAPTER V – MISCELLANEOUS PLANT IMPROVEMENTS

5.1 BACKGROUND

During site visits and discussions with plant staff various other desired improvements to the wastewater facility were identified. These miscellaneous improvements include:

1. Access Roads - Rebuilding the damaged plant access roads and extending the access road to UV disinfection.

2. Site Lighting - Installing new exterior LED lights for site lighting to replace the nonfunctioning existing lights.

3. City Water - Extending City water to the site to replace the troublesome well system. The high mineral content of the well water has made the water unsuitable for WWTP staff to drink; therefore, the staff drinks bottled water at the plant. A local supplier provides jugs of laboratory quality water for use in testing.

4. Fiber Optic Network - Providing a new plant wide fiber optic ring to improve reliability. Fiber-optic cable is not susceptible to lightning strikes and electrical noise, which can damage the PLCs or cause operational issues. A self-healing ring would provide redundancy in the fiber-optic communication loop such that if a fiber is damaged, the system automatically switches to a second pair of fibers to keep the communications functional.

5. Septage Receiving - The current septage receiving facilities are located inside the WWTP fenced area immediately next to an air intake for the Administration Building. When haulers unload, the Administration Building receives a strong dose of odors. Relocating the septage receiving facilities would significantly reduce nuisance odors at the Administration Building.

6. Screening Improvements - The existing screen has reached the end of its life and is not capable of handling the peak flow by itself. This option would replace the existing mechanical screen with a newer multi-rake model and install a second mechanical screen in the existing bypass channel. These new ¼" screens would reduce maintenance requirements on downstream processes. These screens would be capable of handling 11 mgd each and provide a firm screening capacity of 11 mgd.

7. Grit Handling - Replace the grit pump and classifier with new equipment. The grit pump and classifier are now nearly 20 years old and showing signs of deterioration and should be replaced with new equipment.

8. Scum Pumping - Modifying scum pumping at the Primary and Secondary Sludge Pump Buildings by installing larger submersible pumps with recirculation into the scum well.

9. Sludge Pumping - Lowering the elevations of the primary and secondary rotary lobe pumps to keep air from accumulating in the pumps and improve pumping operation.

10. Alum Feed Improvements - The alum containment area is drained via sump in the middle of the storage area sealed with a rubber stopper. If there is a leak in the storage area staff have to reach across with a pole and attempt dislodge the plug. A chemically resistant sump pump with a discharge running over the working area equipped with a quick connect hose fitting would be provided. The existing alum feed pumps have no output signals to existing control system, if a pump fails it will not be noticed until the next walk around check. New pump outputs would be provided. The ventilation system in the storage area is activated when a person enters the room and must be manually deactivated. This has caused freezing problems in the past with alum's relatively high freezing point when the ventilation system is inadvertently left running. Additional ventilation controls would be provided to remove the need for a manual shut off. The emergency wash station only receives a cold water supply, a new tempered water source would be provided.

11. Filter Building Joists - Inspection and possible replacement of the Filter Building joists. The high humidity environment in the building may have led to deterioration of the steel joists. Inspection would require removing sections of the interior panels underneath the joists. The construction cost estimate assumes the joists and roofing system will need to be replaced.

12. Air Scour Blower - Staff report 10 to 12 inches of filter media present at the bottom of the waste backwash well. The air scour blower flow rate is suspected to be too high causing media loss. The blower itself is nearly 30 years old and is due for replacement. A new blower with a flow meter on the discharge line would be installed to measure flow and the blower capacity controlled via a new VFD.

13. Filter Building HVAC Modifications - The Filter Building electrical room is located adjacent to the filters. Providing a slight positive pressure to the electrical room would help prevent the moist filter room environment from getting into the electrical room.

14. Final Effluent System - The final effluent system has been difficult to control with the pumps not equipped with VFDs. The compressor serving the system is undersized, the system requires an operating pressure of 100 psig and the compressor is only sized for 70 psig forcing the staff to run it outside the rated range. VFDs would be provided for the final effluent pumps and an adequately sized compressor installed to maintain the functionality of the plant effluent water system.

15. Postaeration Blower VFDs - Maintaining dissolved oxygen levels in the postaeration tank has been difficult with the current constant speed positive displacement blowers. New adjustable speed drives and automated DO control would be provided to maintain the required dissolved oxygen level.

16. Postaeration Blowers – The postaeration blowers are over 20 years old and have reached the end of their design life. This project would provide new positive displacement postaeration blowers.

17. Effluent Pipe Repair – Plant effluent runs above ground for a portion of the way to Whitewater Creek through a 48" corrugated metal pipe. This pipe is 30 years old and is leaking in at least one known location. This above grade portion should be inspected and replaced as needed.

18. Sewer Cleaning Debris Pad - Currently, sewer cleaning crews use the WWTP site to store sewer cleaning/jetting debris. To improve dewatering and handling of such material, a drained concrete pad or drying bed would be provided.

19. Effluent Filter Flow Control Splitter Box – This project would construct an effluent splitter box between the secondary clarifiers and sand filters. The splitter box would be designed to direct flows from 0-4.5 mgd to filters and for flows above 4.5 mgd to passively overflow to a bypass line to eliminate the need to manually operate a bypass valve during high flow conditions to avoid overflows at the secondary clarifier scum wells. The splitter box would also contain a drop box leading a potential future chemical mix/floc tank upstream of a low level phosphorous filter.

20. Sidestream Metering and Sampling – This project would combine return flows from the filters, digesters, and solids thickening or dewatering at a common point and provide flow metering and sampling equipment so their overall impact on plant loadings can be determined.

21. Vehicle Storage Building – This project would construct a vehicle storage building approximately 40’ x 68’ with three 14’ wide bays.

5.2 ESTIMATED COSTS

Costs estimates for the various miscellaneous projects are presented in Appendix TM7-A.

CHAPTER VI – RECOMMENDATIONS

6.1 Recommended Projects

The various projects presented in this TM along with their estimated capital costs were presented to the City in a Workshop on May 19, 2014. After discussion and in consideration with the overall project budget the projects presented in Table 1 were retained to be included in the overall recommended facility plan:

Table 1 Recommended Projects

Project	Estimated Construction Cost
Electrical Improvements	
Single 480V Feeds	$2,007,390
MCC Replacement	$1,036,000
NFPA 820	
Administration Building Dry Well Separation and Ventilation	$155,000
Administration Building Tunnel Separation	$68,200
Primary Sludge Pump Building Ventilation	$77,500
Secondary Sludge Pump Building Ventilation	$77,500
Administration Building Improvements	
Lab Remodeling	$50,375
Office Space Addition	$34,875
Breakroom Addition	$69,750
Map/CMOM Room Addition	$34,875
Second Floor Elevator	$155,000
New Women's Locker Room	$98,813
Remodel Men's Locker Room	$59,288
HVAC Controls	$155,000
Boiler Replacement and Room to House Boilers	$166,850
Wet Well Ventilation Switch	$4,650
Generator Improvements	$93,000
10 ft Monorail Extension	$3,953
Loading Dock Enclosure	$21,669
Miscellaneous Plant Improvements	
Access Roads	$444,755
Site Lighting	$141,515
Fiber Optic Network	$38,750
Septage Receiving	$209,250
Screening Improvements	$600,600
Grit Handling	$195,000

Scum Pumping	$62,000
Sludge Pumping	$156,000
Alum Feed Improvements	$27,900
Filter Building Joists	$140,275
Air Scour Blower	$117,000
Filter Building HVAC Modifications	$46,500
Final Effluent System	$23,250
Postaeration Blower VFDs	$18,600
Postaeration Blowers	$84,240
Effluent Pipe Repair	$7,750
Bypass Flow Metering	$54,250
Sewer Cleaning Debris Pad	$62,000
Effluent Filter Flow Control Splitter Box	$271,250
Sidestream Metering and Sampling	$69,750
Vehicle Storage Building	$210,800
Total Estimated Construction Cost	**$7,351,122**
Estimated Engineering Cost @ 15%	$1,102,668
Total Estimated Capital Cost	**$8,453,790**

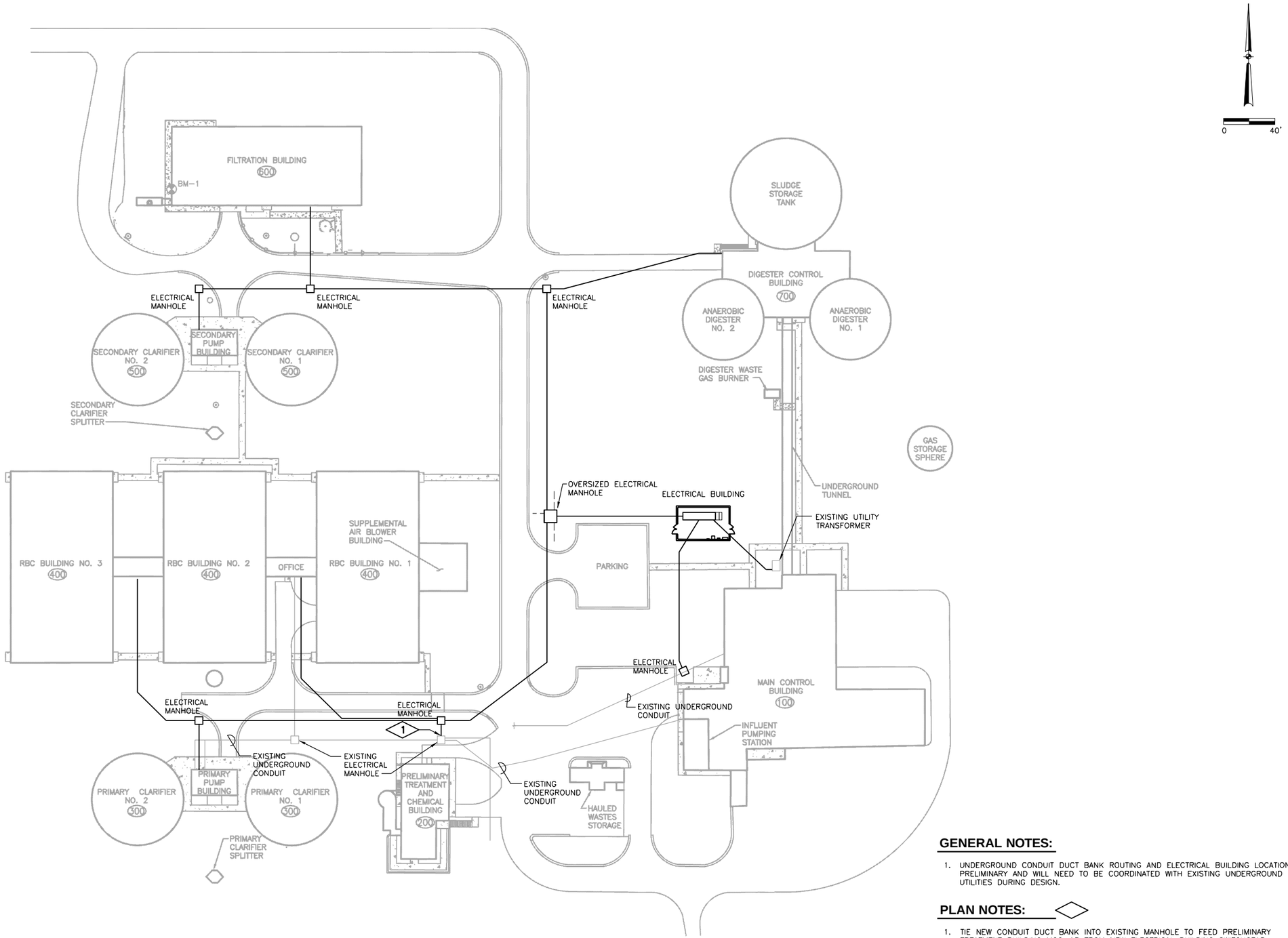
Appendix TM7-A
Cost Estimates

City of Whitewater
Wastewater Facility Plan
TM 7 - Buildings and Support Facilites
Poject Cost Estimates

Item	Unit	Quantity	Unit Price	Material Labor	Equip	OHP Material Labor	OHP Equip	Contingency Material Labor	Contingency Equip	Global %	Total Line Item	Total Construction	Include
Electrical Upgrades												**3,043,390**	
New Switch Gear Building, Dual 480V Feeds, Duct Bank, Grounding	LS	1	1,632,500	1,632,500	385,000	25%	10%	15%	15%		2,766,750		
New Switch Gear Building, Single 480V Feeds, Duct Bank, Grounding	LS	1	1,065,100	1,065,100	413,000	25%	10%	15%	15%		2,007,390		x
Medium Voltage Loop with Redundant Step-Down Transformers	LS	1	947,500	947,500	730,000	25%	10%	15%	15%		2,239,000		
MCC Replacement	LS	1	740,000	740,000	0	25%	10%	15%	15%		1,036,000		x
NFPA 820 Compliance												**378,200**	
Administration Building Dry Well Separation Ventilation	LS	1	100,000	100,000	0	25%	10%	30%	15%		155,000		x
Administration Building Tunnel Separation	LS	1	44,000	44,000	0	25%	10%	30%	15%		68,200		x
Primary Sludge Pump Building Ventilation	LS	1	50,000	50,000	0	25%	10%	30%	15%		77,500		x
Secondary Sludge Pump Building Ventilation	LS	1	50,000	50,000	0	25%	10%	30%	15%		77,500		x
Digester Control Building Separation and Ventilation	LS	1	325,000	325,000	0	25%	10%	30%	15%		503,750		
Administration Building Improvements												**948,097**	
Lab Remodel: HVAC Remodel + Window Costs	SF	650	50	32,500	0	25%	10%	30%	15%		50,375		x
Office Space Addition: Remodel Cost	SF	250	90	22,500	0	25%	10%	30%	15%		34,875		x
Breakroom Addition: Remodel Cost	SF	500	90	45,000	0	25%	10%	30%	15%		69,750		x
Map/CMOM Room Addition: Remodel Cost	SF	250	90	22,500	0	25%	10%	30%	15%		34,875		x
Second Floor Elevator	LS	1	100,000	100,000	0	25%	10%	30%	15%		155,000		x
New Women's Locker Room: New Structure Cost	SF	425	150	63,750	0	25%	10%	30%	15%		98,813		x
Remodel Men's Locker Room: Remodel Cost	SF	425	90	38,250	0	25%	10%	30%	15%		59,288		x
HVAC Controls	LS	1	100,000	100,000	0	25%	10%	30%	15%		155,000		x
Boiler Replacement and Room to House Boilers	SF	300	90	27,000	100,000	25%	10%	30%	15%		166,850		x
Wet Well Ventilation Switch	LS	1	3,000	3,000	0	25%	10%	30%	15%		4,650		x
Generator Improvements	LS	1	60,000	60,000	0	25%	10%	30%	15%		93,000		x
10 ft Monorail Extension	LF	85	30	2,550	0	25%	10%	30%	15%		3,953		x
Loading Dock Enclosure	LS	1	13,980	13,980	0	25%	10%	30%	15%		21,669		x
Miscellaneous Plant Improvements												**2,981,435**	
Access Roads	LS	1	286,939	286,939	0	25%	10%	30%	15%		444,755		x
Site Lighting	EA	22	4,150	91,300	0	25%	10%	30%	15%		141,515		x
City Water	FT	3,400	50	170,000	0	25%	10%	30%	15%		263,500		
Fiber Optic Network	FT	2,500	10	25,000	0	25%	10%	30%	15%		38,750		x
Septage Receiving	LS	1	135,000	135,000	0	25%	10%	30%	15%		209,250		x
Screening Improvements	LS	1	77,000	77,000	385,000	25%	10%	30%	15%		600,600		x
Grit Handling	LS	1	25,000	25,000	125,000	25%	10%	30%	15%		195,000		x
Scum Pumping	LS	1	40,000	40,000	0	25%	10%	30%	15%		62,000		x
Sludge Pumping	LS	1	20,000	20,000	100,000	25%	10%	30%	15%		156,000		x
Alum Feed Improvements	LS	1	18,000	18,000	0	25%	10%	30%	15%		27,900		x
Filter Building Joists	LS	1	90,500	90,500	0	25%	10%	30%	15%		140,275		x
Air Scour Blower	LS	1	15,000	15,000	75,000	25%	10%	30%	15%		117,000		x
Filter Building HVAC Modifications	LS	1	30,000	30,000	0	25%	10%	30%	15%		46,500		x
Final Effluent System	LS	1	15,000	15,000	0	25%	10%	30%	15%		23,250		x
Postaeration Blower VFDs	LS	1	12,000	12,000	0	25%	10%	30%	15%		18,600		x
Postaeration Blowers	LS	1	10,800	10,800	54,000	25%	10%	30%	15%		84,240		x
Effluent Pipe Repair	LF	50	100	5,000	0	25%	10%	30%	15%		7,750		x
Bypass Flow Metering	LS	1	35,000	35,000	0	25%	10%	30%	15%		54,250		x
Sewer Cleaning Debris Pad	LS	1	40,000	40,000	0	25%	10%	30%	15%		62,000		x
Effluent Filter Flow Control Splitter Box	LS	1	175,000	175,000	0	25%	10%	30%	15%		271,250		x
Sidestream Metering and Sampling	LS	1	45,000	45,000	0	25%	10%	30%	15%		69,750		x
Second Plant Entrance	FT	1,700	200	340,000	0	25%	10%	30%	15%		527,000		
Vehicle Storage Building	SF	2,720	50	136,000	0	25%	10%	30%	15%		210,800		x

Total Capital Cost	**7,351,122**
15 % Engineering	**1,102,668**
Total Initial Cost	**8,453,790**

Appendix TM7-B
Electrical Drawings



GENERAL NOTES:

1. UNDERGROUND CONDUIT DUCT BANK ROUTING AND ELECTRICAL BUILDING LOCATION IS PRELIMINARY AND WILL NEED TO BE COORDINATED WITH EXISTING UNDERGROUND UTILITIES DURING DESIGN.

PLAN NOTES: ◇

1. TIE NEW CONDUIT DUCT BANK INTO EXISTING MANHOLE TO FEED PRELIMINARY TREATMENT BUILDING MCC-13 FROM NEW ELECTRICAL BUILDING SWITCHGEAR.

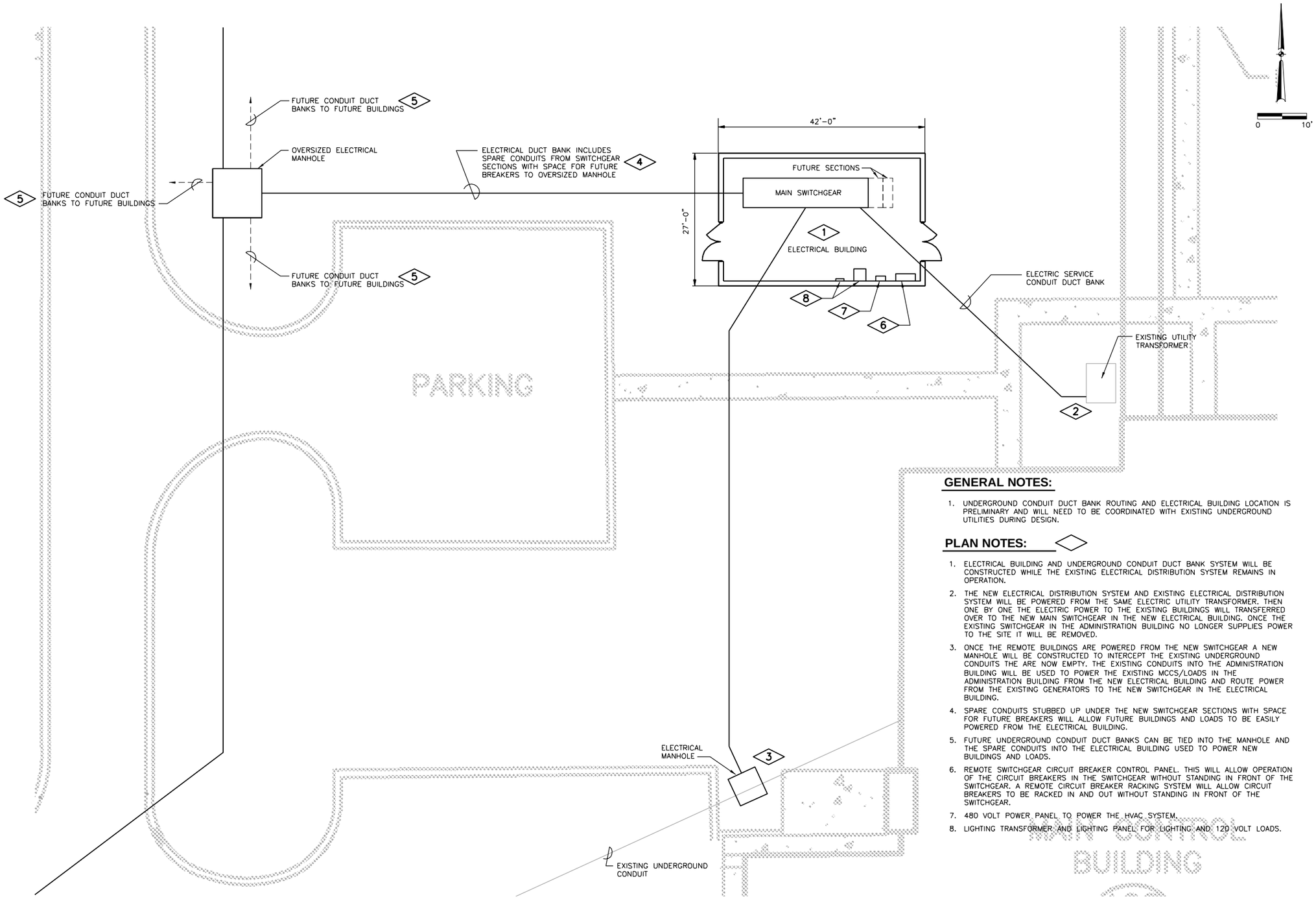
FIGURE 1
ELECTRICAL DISTRIBUTION CONCEPTUAL SITE PLAN
CITY OF WHITEWATER
WASTEWATER FACILITY PLAN

WHITEWATER, WISCONSIN

DONOHUE

JULY 2014

12600



GENERAL NOTES:

1. UNDERGROUND CONDUIT DUCT BANK ROUTING AND ELECTRICAL BUILDING LOCATION IS PRELIMINARY AND WILL NEED TO BE COORDINATED WITH EXISTING UNDERGROUND UTILITIES DURING DESIGN.

PLAN NOTES:

1. ELECTRICAL BUILDING AND UNDERGROUND CONDUIT DUCT BANK SYSTEM WILL BE CONSTRUCTED WHILE THE EXISTING ELECTRICAL DISTRIBUTION SYSTEM REMAINS IN OPERATION.
2. THE NEW ELECTRICAL DISTRIBUTION SYSTEM AND EXISTING ELECTRICAL DISTRIBUTION SYSTEM WILL BE POWERED FROM THE SAME ELECTRIC UTILITY TRANSFORMER. THEN ONE BY ONE THE ELECTRIC POWER TO THE EXISTING BUILDINGS WILL TRANSFERRED OVER TO THE NEW MAIN SWITCHGEAR IN THE NEW ELECTRICAL BUILDING. ONCE THE EXISTING SWITCHGEAR IN THE ADMINISTRATION BUILDING NO LONGER SUPPLIES POWER TO THE SITE IT WILL BE REMOVED.
3. ONCE THE REMOTE BUILDINGS ARE POWERED FROM THE NEW SWITCHGEAR A NEW MANHOLE WILL BE CONSTRUCTED TO INTERCEPT THE EXISTING UNDERGROUND CONDUITS THE ARE NOW EMPTY. THE EXISTING CONDUITS INTO THE ADMINISTRATION BUILDING WILL BE USED TO POWER THE EXISTING MCCS/LOADS IN THE ADMINISTRATION BUILDING FROM THE NEW ELECTRICAL BUILDING AND ROUTE POWER FROM THE EXISTING GENERATORS TO THE NEW SWITCHGEAR IN THE ELECTRICAL BUILDING.
4. SPARE CONDUITS STUBBED UP UNDER THE NEW SWITCHGEAR SECTIONS WITH SPACE FOR FUTURE BREAKERS WILL ALLOW FUTURE BUILDINGS AND LOADS TO BE EASILY POWERED FROM THE ELECTRICAL BUILDING.
5. FUTURE UNDERGROUND CONDUIT DUCT BANKS CAN BE TIED INTO THE MANHOLE AND THE SPARE CONDUITS INTO THE ELECTRICAL BUILDING USED TO POWER NEW BUILDINGS AND LOADS.
6. REMOTE SWITCHGEAR CIRCUIT BREAKER CONTROL PANEL. THIS WILL ALLOW OPERATION OF THE CIRCUIT BREAKERS IN THE SWITCHGEAR WITHOUT STANDING IN FRONT OF THE SWITCHGEAR. A REMOTE CIRCUIT BREAKER RACKING SYSTEM WILL ALLOW CIRCUIT BREAKERS TO BE RACKED IN AND OUT WITHOUT STANDING IN FRONT OF THE SWITCHGEAR.
7. 480 VOLT POWER PANEL TO POWER THE HVAC SYSTEM.
8. LIGHTING TRANSFORMER AND LIGHTING PANEL FOR LIGHTING AND 120 VOLT LOADS.

FIGURE 2
ELECTRICAL BUILDING CONCEPTUAL PLAN
CITY OF WHITEWATER
WASTEWATER FACILITY PLAN

WHITEWATER, WISCONSIN

DONOHUE

JULY 2014

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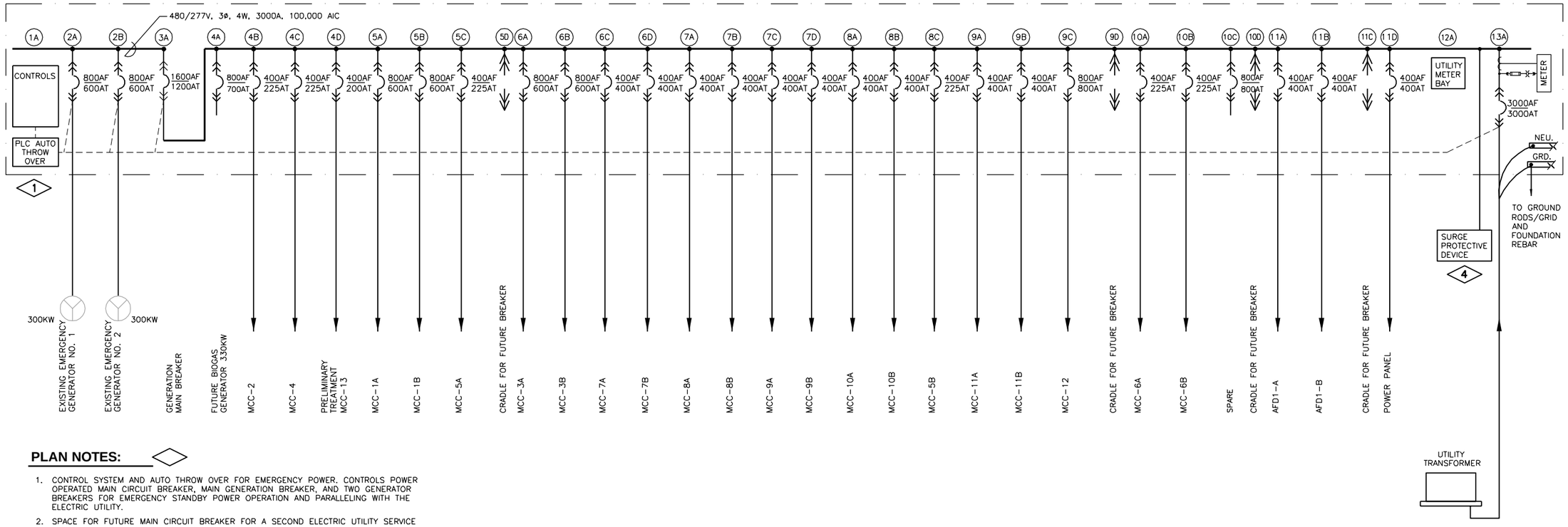
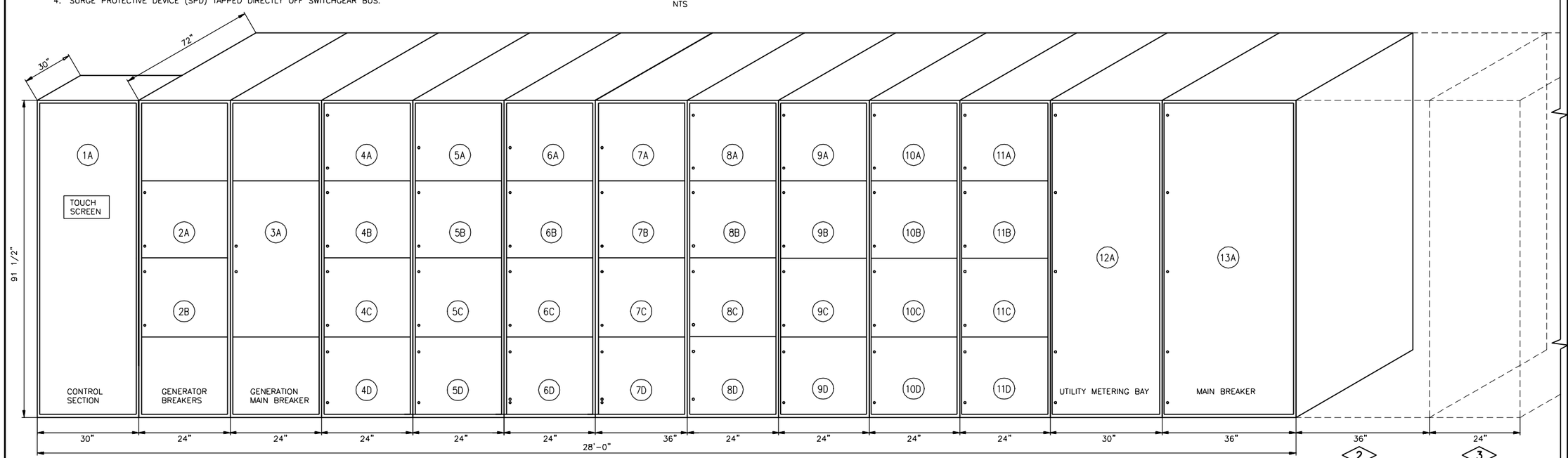


PLAN NOTES:

1. CONTROL SYSTEM AND AUTO THROW OVER FOR EMERGENCY POWER. CONTROLS POWER OPERATED MAIN CIRCUIT BREAKER, MAIN GENERATION BREAKER, AND TWO GENERATOR BREAKERS FOR EMERGENCY STANDBY POWER OPERATION AND PARALLELING WITH THE ELECTRIC UTILITY.
2. SPACE FOR FUTURE MAIN CIRCUIT BREAKER FOR A SECOND ELECTRIC UTILITY SERVICE OR FOR A FUTURE CIRCUIT BREAKER DISTRIBUTION SECTION.
3. SPACE FOR FUTURE CIRCUIT BREAKER DISTRIBUTION SECTION.
4. SURGE PROTECTIVE DEVICE (SPD) TAPPED DIRECTLY OFF SWITCHGEAR BUS.

MAIN SWITCHGEAR ONE-LINE DIAGRAM
ELECTRICAL BUILDING
NTS



MAIN SWITCHGEAR ELEVATION
ELECTRICAL BUILDING
NTS

FIGURE 3
ELECTRICAL ONE-LINE DIAGRAM CONCEPTUAL PLAN
CITY OF WHITEWATER
WASTEWATER FACILITY PLAN

WHITEWATER, WISCONSIN

DONOHUE

JULY 2014

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