STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

July 10, 1998

City of Osage
806 Main
P.O. Box 29
Osage, IA 50461

SUBJECT: Variance Request for Final Clarification Sizing
Wastewater Treatment Facility Improvements
Osage, Iowa

The Iowa Department of Natural Resources in accordance with subrule 567--64.2(9)c of the Iowa Administrative Code has approved the request from Yaggy Colby Associates for a variance from Iowa Wastewater Facilities Design Standards 14.5.2.2.3 which pertains to reliability requirements for sizing of final clarifiers. Under this variance each of the two proposed final clarifiers can be designed based on 50% of the total design loading to that unit operation in lieu of the 75% total design loading required by our design standards.

The engineering justification submitted substantially demonstrates that this variance will result in at least equivalent effectiveness while significantly reducing costs.

Sincerely,

DARREL MCALLISTER
BUREAU CHIEF
WATER QUALITY BUREAU

(fme191.bp)

cc: Yaggy Colby Associates, Mason City, IA
Field Office No. 2

9-11-06

VARIANCE REQUEST

City of Osage

Iowa Department of Natural Resources

1.	Date:	March 24, 1998	
2.	Review Engineer:	Fred Evans	
3.	Date Received:	2/2/98; 5/6/98 and 5/27/98	
4.	County Number:	66	
6.	Program Area:	CP (Wastewater)	
7.	Facility Type:	C05	
8.	Subject Area:	321	
9.	Rule Reference:	567-64.2(9)a	
10.	Design Stds Ref:	14.5.2.2.3	
11.	Consulting Engr:	Yaggy Colby Associates	
12.	Variance Rule:	567-64.2(9)c	
13.	**Decision:** Date:	Approved 7/2/98	
14.	**Appeal:** Date:		

15. **Description of Variance Request**

The City of Osage is in the process of upgrading their wastewater treatment plant by the addition of an oxidation ditch system. The proposed system will consist of two ditches and two final clarifiers meeting all applicable Iowa Design Standards with the possible exception of final clarifier sizing.

It has been determined that the treatment facility is a Class I facility with respect to reliability criteria. It has also been determined that the unit process reliability falls under Class B. As such, the Iowa Standards require that each final clarifier be sized to handle 75% of the design flow.

Yaggy Colby Associates is submitting this request for a variance from Iowa Design Standard 14.5.2.2.3 regarding the need for 75% flow capacity for final clarifiers on behalf of the City of Osage for wastewater treatment plant improvements presently being designed.

16. **Consulting Engineer's Justifications**

1. The Osage treatment facility includes a large polishing pond preceding disinfection. This pond has a total volume of 1.91 million gallons and provides a significant hydraulic retention time regardless of the flow experienced. This polishing pond is currently an integral portion of the treatment process and will continue to be an integral part of the

2, Yaggy Colby Associates wishes to take advantage of this polishing pond and the related hydraulic retention provide by such. The firm is proposing that each one of the two proposed final clarifier be designed based on 50% of the design flow rather than the 75% set forth in the Iowa Standards. It is the firm's opinion that a significant cost savings could be realized by the City of Osage should this variance be granted and the environment would be not subjected to any additional risk due to a wash out of a clarifier.

3, Here is some information on serpentine wiers to cut down weir loading rates and some information on stamford baffles. I couldn't find much on stamford baffles, but they are being used around the country and there are several "clarifier optimizing" companies that use them as well as other items to get better performance.

We would strongly consider both in Osage if allowed to use the 50% PHWW clarifier loading criteria for design.

17. Department's Justifications Approval is recommended.

1, Rock excavation will be required for new final clarifi

2. The proposed 38 ft. diameter final clarifiers will each provide 75% reliability for PHWW flows of 1.512 MGD. Fo any PHWW flows in excess of 1.512 MGD, when only a single final clarifier is in operation, the additional solids removal through the existing 1.91 MG polishing po should provide for treatment equivalent or better than reliability requirements.

3. In a telephone conversation of 6/9/98 the designing engineer advised that Stamford baffles will be included in the design of the final clarifiers to increase solids rem

18. Precedents Used

Iowa Falls - Denied. It was proposed to use two existing final clarifiers in the upgrading of the WWT The smaller of the two final clarifiers would only

STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
LARRY J. WILSON, DIRECTOR

July 10, 1998

City of Osage
806 Main
P.O. Box 29
Osage, IA 50461

SUBJECT: Variance Request for Final Clarification Sizing
Wastewater Treatment Facility Improvements
Osage, Iowa

The Iowa Department of Natural Resources in accordance with subrule 567--64.2(9)c of the Iowa Administrative Code has approved the request from Yaggy Colby Associates for a variance from Iowa Wastewater Facilities Design Standards 14.5.2.2.3 which pertains to reliability requirements for sizing of final clarifiers. Under this variance each of the two proposed final clarifiers can be designed based on 50% of the total design loading to that unit operation in lieu of the 75% total design loading required by our design standards.

The engineering justification submitted substantially demonstrates that this variance will result in at least equivalent effectiveness while significantly reducing costs.

Sincerely,

DARREL MCALLISTER
BUREAU CHIEF
WATER QUALITY BUREAU

(fme191.bp)

cc: Yaggy Colby Associates, Mason City, IA
Field Office No. 2

City of Osage

VARIANCE REQUEST

Iowa Department of Natural Resources

1.	Date:	March 24, 1998	
2.	Review Engineer:	Fred Evans	
3.	Date Received:	2/2/98; 5/6/98 and 5/27/98	
4.	County Number:	66	
6.	Program Area:	CP (Wastewater)	
7.	Facility Type:	C05	
8.	Subject Area:	321	
9.	Rule Reference:	567-64.2(9)a	
10.	Design Stds Ref:	14.5.2.2.3	
11.	Consulting Engr:	Yaggy Colby Associates	
12.	Variance Rule:	567-64.2(9)c	
13.	Decision:	Approved	
	Date:	7/2/98	
14.	Appeal:		
	Date:		

15. **Description of Variance Request**

The City of Osage is in the process of upgrading their wastewater treatment plant by the addition of an oxidation ditch system. The proposed system will consist of two ditches and two final clarifiers meeting all applicable Iowa Design Standards with the possible exception of final clarifier sizing.

It has been determined that the treatment facility is a Class I facility with respect to reliability criteria. It has also been determined that the unit process reliability falls under Class B. As such, the Iowa Standards require that each final clarifier be sized to handle 75% of the design flow.

Yaggy Colby Associates is submitting this request for a variance from Iowa Design Standard 14.5.2.2.3 regarding the need for 75% flow capacity for final clarifiers on behalf of the City of Osage for wastewater treatment plant improvements presently being designed.

16. **Consulting Engineer's Justifications**

1. The Osage treatment facility includes a large polishing pond preceding disinfection. This pond has a total volume of 1.91 million gallons and provides a significant hydraulic retention time regardless of the flow experienced. This polishing pond is currently an integral portion of the treatment process and will continue to be an integral part of the proposed facility. Clarifier effluent will pass through the polishing pond prior to chlorination and ultimate discharge to the receiving stream.

2. Yaggy Colby Associates wishes to take advantage of this polishing pond and the related hydraulic retention provide by such. The firm is proposing that each one of the two proposed final clarifier be designed based on 50% of the design flow rather than the 75% set forth in the Iowa Standards. It is the firm's opinion that a significant cost savings could be realized by the City of Osage should this variance be granted and the environment would be not subjected to any additional risk due to a wash out of a clarifier.

3, Here is some information on serpentine wiers to cut down weir loading rates and some information on stamford baffles. I couldn't find much on stamford baffles, but they are being used around the country and there are several "clarifier optimizing" companies that use them as well as other items to get better performance.

We would strongly consider both in Osage if allowed to use the 50% PHWW clarifier loading criteria for design.

17. Department's Justifications Approval is recommended.

1, Rock excavation will be required for new final clarifiers

2. The proposed 38 ft. diameter final clarifiers will each provide 75% reliability for PHWW flows of 1.512 MGD. For any PHWW flows in excess of 1.512 MGD, when only a single final clarifier is in operation, the additional solids removal through the existing 1.91 MG polishing pond should provide for treatment equivalent or better than reliability requirements.

3. In a telephone conversation of 6/9/98 the designing engineer advised that Stamford baffles will be included in the design of the final clarifiers to increase solids removal

18. Precedents Used

Iowa Falls - Denied. It was proposed to use two existing final clarifiers in the upgrading of the WWTP. The smaller of the two final clarifiers would only provide 36.6% reliability and there is no polishing pond following the final clarifiers.

19.	Staff Reviewer: Fred Evans	Date: 6/12/98
20.	Supervisor: Wayne Farrand	Date: 7/2/98
21.	Authorized by: Darrell McAllister	Date: 7/2/98

SURVEYORS

YAGGY COLBY ASSOCIATES

LANDSCAPE ARCHITECTS

PLANNERS

January 30, 1998

Mr. Wayne Farrand
Iowa Department of Natural Resources
Wastewater Section
Wallace State Office Building
900 East Grand
Des Moines, Iowa 50319

RE: Variance Request for Final Clarification Sizing
Wastewater Treatment Facility Improvements
Osage, Iowa

Dear Mr. Farrand:

Yaggy Colby Associates is submitting this request for a variance from Iowa Design Standard 14.5.2.2.3 regarding the need for 75% flow capacity for final clarifiers on behalf of the City of Osage for wastewater treatment plant improvements presently being designed.

The City of Osage is in the process of upgrading their wastewater treatment plant by the addition of an oxidation ditch system. The proposed system will consist of two ditches and two final clarifiers meeting all applicable Iowa Design Standards with the possible exception of final clarifier sizing.

It has been determined that the treatment facility is a Class I facility with respect to reliability criteria. It has also been determined that the unit process reliability falls under Class B. As such, the Iowa Standards require that each final clarifier be sized to handle 75% of the design flow.

The Osage treatment facility includes a large polishing pond preceding disinfection. This pond has a total volume of 1.91 million gallons and provides a significant hydraulic retention time regardless of the flow experienced. This polishing pond is currently an integral portion of the treatment process and will continue to be an integral part of the proposed facility. Clarifier effluent will pass through the polishing pond prior to chlorination and ultimate discharge to the receiving stream.

Yaggy Colby Associates wishes to take advantage of this polishing pond and the related hydraulic retention provide by such. The firm is proposing that each one of the two proposed final clarifier be designed based on 50% of the design flow rather than the 75% set forth in the Iowa Standards. It is the firm's opinion that a significant cost savings could be realized by the City of Osage should this variance be granted and the environment would be not subjected to any additional risk due to a wash out of a clarifier.

MASON CITY OFFICE:
215 North Adams
Mason City, IA 50401
515-424-6344
Fax 515-424-0351

ROCHESTER OFFICE:
507-288-6464
Fax 507-288-5058

Yaggy Colby Associates and the City of Osage greatly appreciate your consideration of this variance request. Please call if you have any questions or require additional information pertaining to this matter.

Sincerely,

YAGGY COLBY ASSOCIATES

Craig R. Olson, P.E.
Project Manager

cc: Mr. Jerry Dunlay, Director of Public Works, Osage
Mr. Al Tompkins, IDNR, Mason City

CRO/jmw-5812dn_3.doc

Reliability % provided by final clarifiers

Proposed diameter of 38', $A = 1134 ft^2$
PHWW flow = 2.163 MGD

Maximum loading to clarifier @ 1000 gpd/ft²

$1134 \times 1000 = \underline{1.134}$ MGD

% of Design PHWW flow

$1.134 \div 2.163 = 0.52 = \underline{52\%}$

Check PHWW flow which could be handled by a single final clarifier at a PHWW flow of 1000 gpd/ft²

Flow = $1134 \times 1000 = \underline{1.134}$ MGD

For 75% of PHWW

$1.134 \div 0.75 = \underline{1.512}$ MGD

From flow chart submitted the wettest hour determined by the engineer from past plant records was approximately 1.5 MGD in May 1996

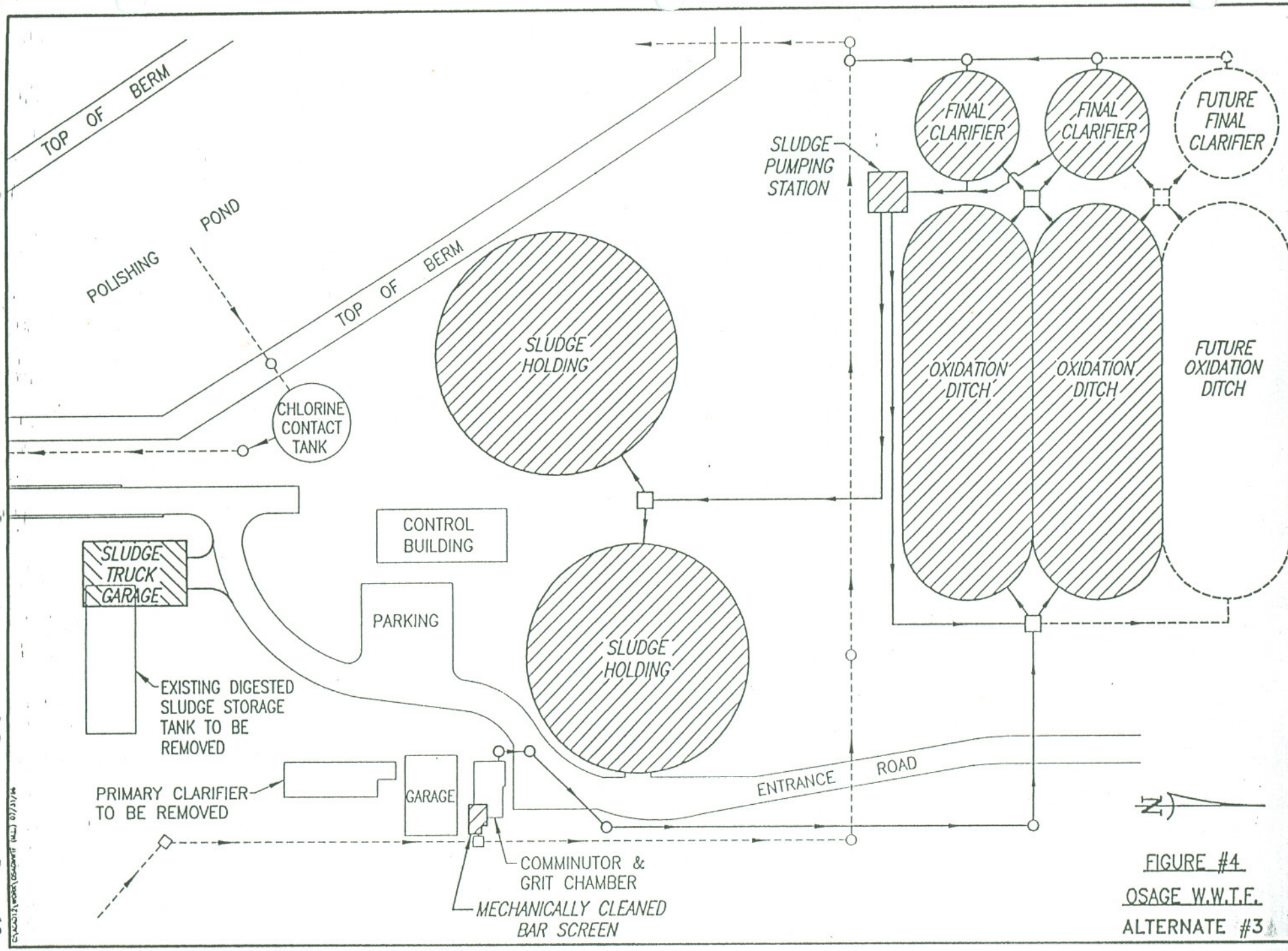


FIGURE #4
OSAGE W.W.T.F.
ALTERNATE #3

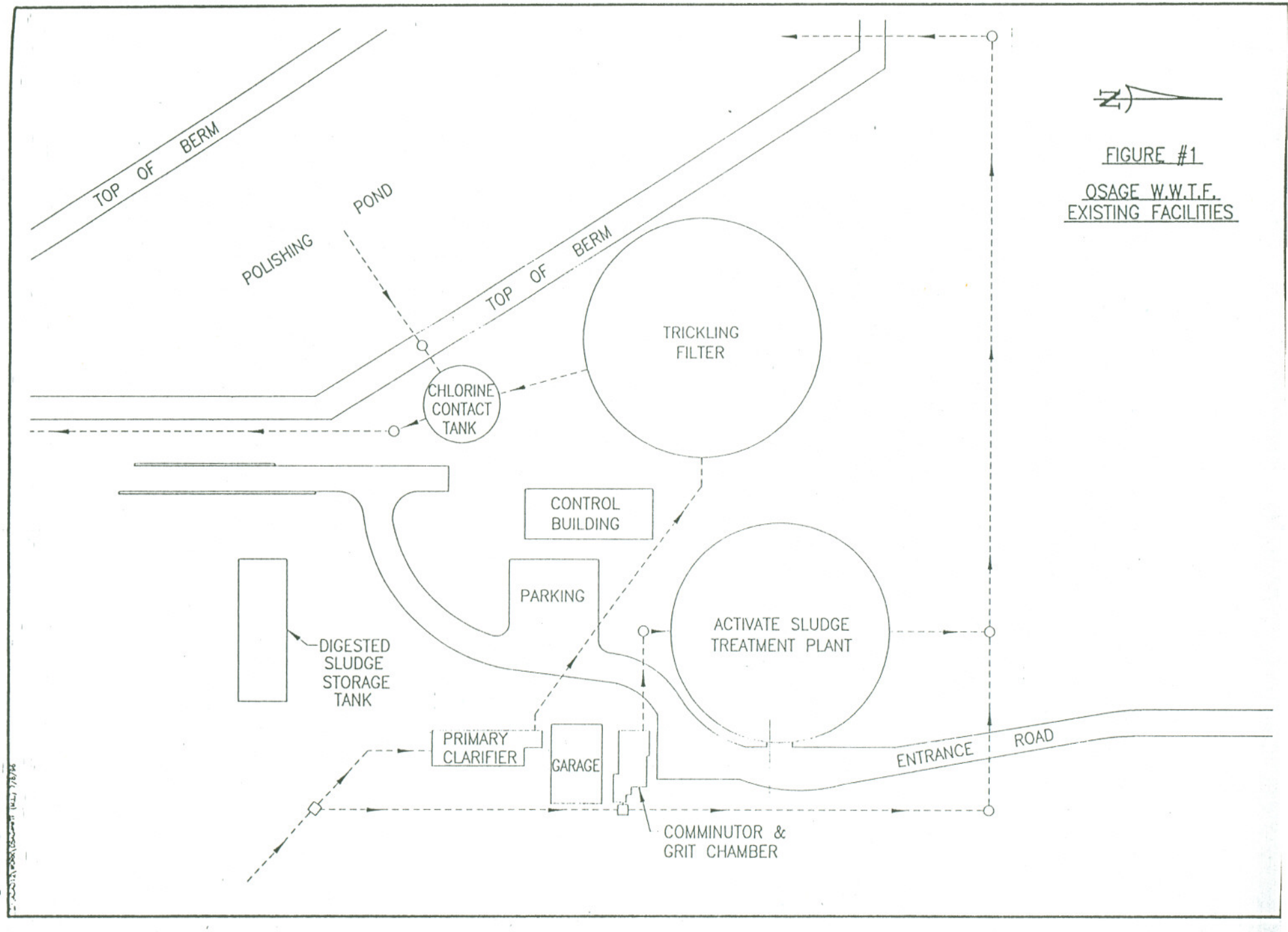


FIGURE #1

OSAGE W.W.T.F.
EXISTING FACILITIES

YAGGY COLBY ASSOCIATES
ENGINEERS • ARCHITECTS • SURVEYORS • PLANNERS
LANDSCAPE ARCHITECTS
215 NORTH ADAMS
MASON CITY, IOWA 50401

FACSIMILE TRANSMITTAL HEADER SHEET

NAME	OFFICE SYMBOL	OFFICE NO.	FAX NO.
FROM:	Yaggy Colby Assoc	(515)	(515)
Craig Olson		**424-6344**	**424-0351**
TO:	IDNR	515	515
Fred Evans		**281-8885**	**281-8895**

Wed May 6, 1998 3:58PM	NO. PAGES (including header)	7	Unclass	ASAP	

Fred,

Here is the much awaited information on Osage. Sorry it took so long. I guess we really wanted it to be right this time. For a change it seems like we have too much data. Nice problem.

I will be sending a letter to Ralph T. (I've already left him a voice mail message) that we will be revising the MWW and PHWW flows. The MWW of 1.3 MGD has a pretty decent basis in the existing flow data plus projected growth. The PHWW flow likewise is firmly rooted in the flow data. The attached circular chart shows our wettest hour we could find (approx. 1.5 MGD). By adding peaked growth to that number, we come up with the 2.163 MGD figure.

These numbers should be good. Fortunately, the primary design numbers for ADW and AWW have not changed at all.

The new PHWW flow changes the final clarifier diameters to:

38 feet to meet the 50% criteria, and;
46 feet to meet the 75% criteria. This is down from 40 and 50 respectively.

Regardless of clarifier diameter the basis of the variance requested is still valid, although the volume difference and corresponding cost difference of rock requiring excavation has been reduced somewhat.

If you have any further questions, please give me a call.

Craig

CONSTRUCTION PERMIT APPLICATION
SCHEDULE G, Treatment Project Design Data

DATE PREPARED	PROJECT IDENTITY	DNR USE
4/28/98	City of Osage, Iowa	PROJECT NO.
DATE REVISED 5/20/98	Wastewater Treatment Facility Improvements	PERMIT NO.

1. Project Description: Conversion to oxidation ditch system with expanded sludge storage.

2. Design Basis:

Plant Design Loading		Present			Design Year (2020)		
		ADW	AWW	MWW	ADW	AWW	MWW
Residential Waste	Population	3439			3783		
	Flow, MGD	0.205	0.205	0.205	0.239	0.239	0.239
	BOD5, #/day	1191.0	1191.0	1191.0	1391	1391	1391
	TKN, #/day	71.0	71.0	71.0	82.9	82.9	82.9
Out of Town Students	Number	0			0		
	Flow, MGD	0	0	0	0	0	0
	BOD5, #/day	0	0	0	0	0	0
	TKN, #/day	0	0	0	0	0	0
Industrial	Flow, MGD	0.146	0.146	0.146	0.278	0.278	0.278
	Rated Flow, MGD	0.162	0.162	0.162	0.324	0.324	0.324
	BOD5, #/day	425	425	425	809	809	809
	TKN, #/day	8	8	8	15	15	15
Other (specify)	Flow, MGD	0	0	0	0	0	0
	Rated Flow, MGD	0	0	0	0	0	0
	BOD5, #/day	0	0	0	0	0	0
	TKN, #/day	0	0	0	0	0	0
Infiltration, MGD		0	0.229	0.466	0	0.233	0.843
Inflow, MGD		0	0	0	0	0	0
Total	Flow, MGD	0.351	0.580	0.817	0.517	0.750	1.360
	Rated Flow, MGD	0.367	0.596	0.833	0.563	0.796	1.406
	BOD5, mg/l	552	334	237	510	352	194
	BOD5, #/day	1616	1616	1616	2200	2200	2200
	TKN, mg/l	27	16	12	40	21	19
	TKN, #/day	79.0	79.0	79.0	98.1	98.1	98.1

Infiltration #'s derived from observed flow data - Industrial flow

3. Peak hourly Dry Weather Flow 1.320 MGD + Peak Hourly Infiltration 0.843 MGD = Peak Hourly Inflow 0.000 MGD = Total Peak Hourly Wet Weather Flow: 2.163 MGD (in design year 2020)

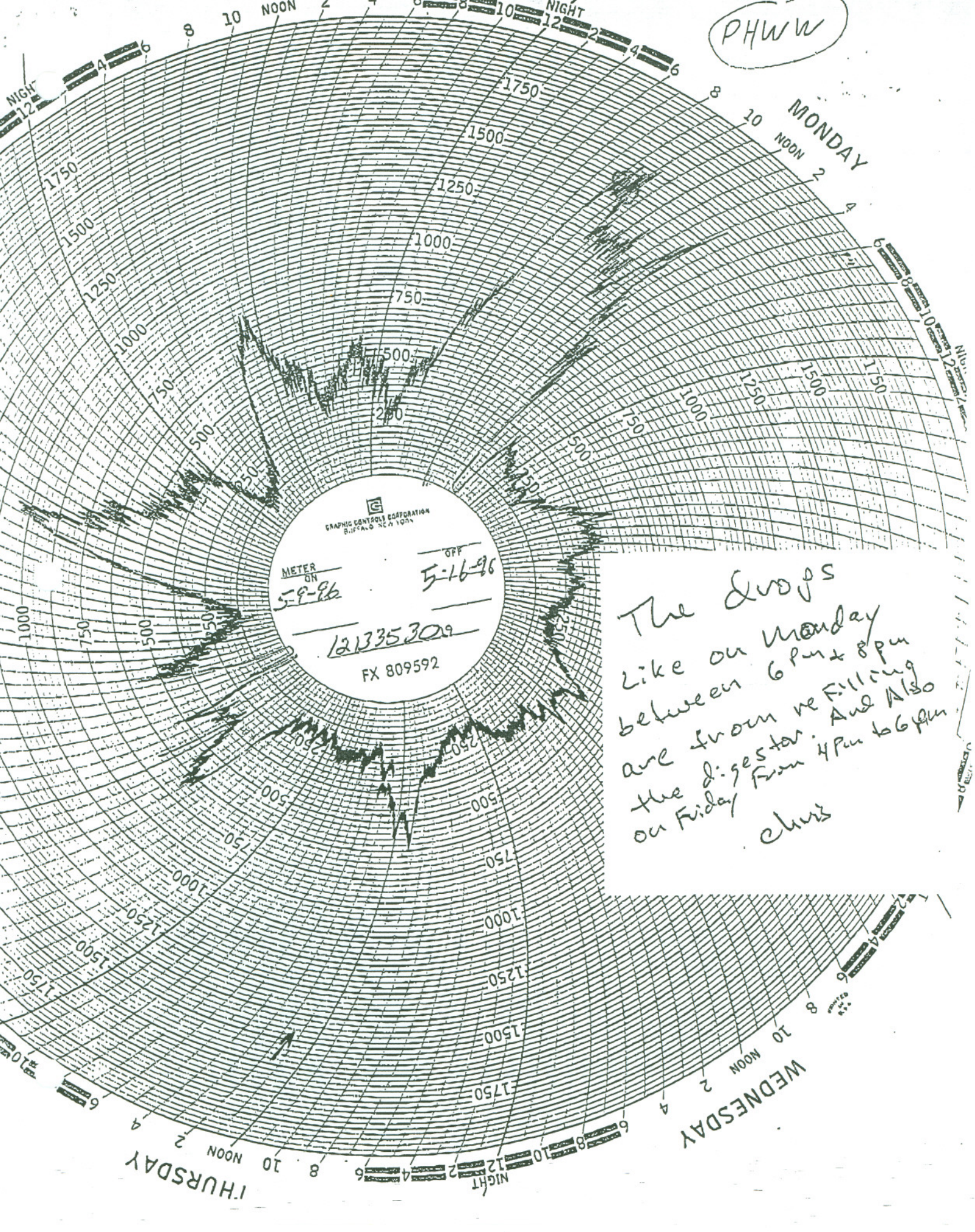
4. Identify effluent limitations:

		BOD5/day		Suspended Solids		NH3-N			
		Ave	Max	Ave	Max	Ave	Max		
Operation Permit Effluent Limits	mg/l	25	40	30	45				
	#/day	157	252	189	283				
Design Effluent** Quality	mg/l	25	40	30	45				
	#/day	157	252	189	283				

** Assume secondary standards pending new wasteload allocation.

5. Identify significant industrial/commercial contributors:

Waste Contributors	Pretreatment	Operation		Design Loadings					
				Flow (MGD)		BOD5 (#/day)	SS (#/day)	TKN (#/day)	Oil/Grease (#/day)
		hrs/day	days/week	Total	Rated				
A-Z Drying North	No	24		0.02	0.02	100	100		
A-Z Drying South	No	24		0.08	0.08	340	475		
Fox River Mills	No	24		0.155	0.155	350	200		
Floyd - Mitchell	No	8		0.023	0.069	19	20	8	


PHWW
MONDAY
TUESDAY
WEDNESDAY
THURSDAY
NIGHT
NOON
METER ON 5-9-96
OFF 5-16-96
12133530
FX 809592
The drops like on Monday between 6pm + 8pm are from refilling the digestor. And also on Friday from 4pm to 6pm
Chris