Amendment to Design/Build Agreement

THIS AMENDMENT TO DESIGN/BUILD AGREEMENT ("Amendment") is entered into as of this 4th day of November, 2005 by and between TERRA COTTA REALTY CO. ("Owner") and LINTECH ENGINEERING, LLC ("Engineer") and JOSEPH J. HENDERSON & SON, INC. ("Contractor") (collectively, "Design/Builder"), under the following circumstances:

A. Owner and Design/Builder are parties to that certain Agreement dated September 4, 2003, as amended by that certain Change Order No. 1 dated September 21, 2004 ("Change Order No. 1") and that certain Change Order No. 2 dated on or about the date hereof ("Change Order No. 2"), which documents are incorporated herein by this reference and made a part hereof (collectively, the "Design/Build Agreement"), with respect to the expansion of an existing wastewater treatment facility from a capacity of 100,000 gallon per day ("gpd") to 1,000,000 gpd (the "Project");

B. On September 21, 2004, pursuant to Change Order No. 1, Owner and Design/Builder suspended work on the Project;

C. The parties have now entered into Change Order No. 2 to resume work on the Project;

D. Owner has entered into that certain Amended and Restated Asset Purchase Agreement with Illinois-American Water Company, an Illinois corporation ("Illinois-American"), dated on or about the date hereof (the "Illinois-American Agreement") with respect to, among other things, the ownership and operation of the Project;

E. Owner has entered into a contract (the "Westminster Contract") to sell a portion of its land to WS Land Partners – Prairie Grove II, LLC, an Illinois limited liability company ("Westminster"); and

F. Owner and Design/Builder wish to amend the Agreement on the terms and conditions set forth herein.

NOW, THEREFORE, in consideration of the mutual covenants contained herein and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Owner and Design/Builder hereby agree as follows:

1. **Cost.** Pursuant to Change Order No. 2, the total fixed, lump sum price to be paid by Owner to Design/Builder for the Project shall be increased by $1,036,529 to $10,035,771.

2. **Schedule.** Pursuant to Change Order No. 2, the date by which the Project shall be substantially completed is September 15, 2006. Final completion of the Project shall occur by December 20, 2006.

3. **Funding.** At the request of Owner at any time, payments under the Design/Build Agreement may be made through a construction escrow established with a nationally recognized title insurance company and based on their standard escrow forms (the "Escrow"). Design/Builder shall be a party to the Escrow and comply with its documentation and other requirements. At the request of Owner at any time, payments under the Design/Build Agreement may also be made pursuant to a letter of credit in a form and with an institution reasonably acceptable to Illinois-American and reasonably satisfactory to Design/Builder (the "Letter of Credit"), with or without the Escrow. At the request of Owner, Illinois-American and/or Westminster may be parties to the Escrow or the Letter of Credit. Design/Builder shall not be responsible for the cost of the Escrow or the Letter of Credit.

4. **Inspection.** Design/Builder acknowledges and agrees that Owner, Illinois-American and Westminster shall have the right from time-to-time to reasonably inspect the Project as it is being constructed; provided that (i) the inspection right of Illinois-American shall terminate if, prior to assignment of the Design/Build Agreement to Illinois-American under the terms of Paragraph 5 hereof, the Illinois-American Agreement has terminated in accordance with its terms; and (ii) the inspection right of Westminster shall terminate if Owner notifies Design/Builder that the Westminster Contract has terminated.

5. **Assignment.** Design/Builder acknowledges and agrees that Owner may assign the Design/Build Agreement (including, without limitation, the one year warranty contained in Section 6.18 of the General Conditions to the Design/Build Agreement, as modified by the Supplementary Conditions, and the duty to correct defective work for at least one year after the date of Substantial Completion under Section 12.07 of the General Conditions to the Design/Build Agreement) and the manufacturer's warranty discussed below, to any person or entity at any time as provided in the Agreement. If Owner so assigns the Design/Build Agreement to Illinois-American in accordance with the terms of the Illinois-American Agreement, then (i) Owner shall only remain liable for matters which arose or accrued prior to the date of such assignment and shall have no liability for matters which arise or accrue after the date of such assignment; and (ii) Illinois-American shall be solely responsible and liable for all obligations and liabilities of Owner under the Design/Build Agreement which arise or accrue after the date of such assignment. If Owner assigns the Design/Build Agreement to any other person or entity, then Owner shall remain liable as provided in the Design/Build Agreement.

6. **Cooperation.** Design/Builder shall reasonably cooperate with Illinois-American and Westminster with respect to the Project and promptly add them as additional insured parties under the insurance policies required under the Design/Build Agreement, and provide them with reasonable evidence thereof; provided that (i) such cooperation and insurance obligations regarding Illinois-American shall terminate if, prior to assignment of the Design/Build Agreement to Illinois-American under the terms of Paragraph 5 hereof, the Illinois-American Agreement has terminated in accordance with its terms; and (ii) such cooperation and insurance regarding Westminster shall terminate if Owner notifies Design/Builder that the Westminster Contract has terminated. Owner and Design/Builder acknowledge and agree that any requirement for bonds under the Design/Build Agreement was previously waived by mutual agreement.

7. **Warranty.** In addition to (i) the one year warranty contained in Section 6.18 of the General Conditions to the Design/Build Agreement, as modified by the Supplementary Conditions, and (ii) the duty to correct defective work for at least one year after the date of Substantial Completion under Section 12.07 of the General Conditions to the Design/Build Agreement, Design/Builder shall provide to Owner upon final acceptance of the Project a one-year manufacturer's warranty in the standard form provided by such manufacturer on the Project that will become effective upon final acceptance of the Project.

8. **Miscellaneous.** Except as expressly provided herein, the Design/Build Agreement shall not otherwise be amended and shall remain in full force and effect. In the event of any conflicts or inconsistencies between the provisions contained in this Amendment and the provisions contained in the Design/Build Agreement, the provisions contained in this Amendment shall supersede, govern and prevail in all respects. This Amendment may be executed in counterparts. The Recitals set forth on page 1 hereof shall be incorporated herein by this reference and made a part hereof.

[signature page follows]

IN WITNESS WHEREOF, the parties hereto have entered into this Amendment as the date first above written.

DESIGN/BUILDER:

LINTECH ENGINEERING, LLC

By: _____
Its: _____

JOSEPH J. HENDERSON & SON, INC.

By: _____
Its: _____

OWNER:

TERRA COTTA REALTY CO.

By: _____
Thomas Z. Hayward, Jr.
Chairman

IN WITNESS WHEREOF, the parties hereto have entered into this Amendment as the date first above written.

DESIGN/BUILDER:

LINTECH ENGINEERING, LLC

By: _____
Its: _____

OWNER:

TERRA COTTA REALTY CO.

By: _____
Thomas Z. Hayward, Jr.
Chairman

JOSEPH J. HENDERSON & SON, INC.

By: David Henderson
Its: VICE PRESIDENT

IN WITNESS WHEREOF, the parties hereto have entered into this Amendment as the date first above written.

DESIGN/BUILDER:

LINTECH ENGINEERING, LLC

By: _____
Its: Principal

JOSEPH J. HENDERSON & SON, INC.

By: _____
Its: _____

OWNER:

TERRA COTTA REALTY CO.

By: _____
Thomas Z. Hayward, Jr.
Chairman

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CHANGE ORDER FORM

Change Order No. 2

Project: Terra Cotta WWTP **Date of Issuance:** November 3, 2005

Owner: Terra Cotta Realty Co. **Design/Builder:** Lintech Engineering, LLC
J.J. Henderson & Son, Inc.

Description:	Resume Work, Change of Contract Time, & Balance of Change Order
Purpose:	Project has been suspended due to Owner's request.
Attachments:	Attachment A

CHANGE IN CONTRACT PRICE		CHANGE IN CONTRACT TIME	
Original Contract Price:	$ 8,999,242.00	Original Contract Time:	365 days
Change Order:	*$ 1,036,529.00		
Previous Change Orders:	*Estimate $27,200*	Substantial Completion:	9-15-06
Revised Contract Price:	$10,035,771.00	Final Completion:	12-20-06

***SEE ATTACHMENT A**

DESIGN/BUILDER:

Lintech Engineering, LLC

J.J. Henderson & Son, Inc.

OWNER:

Terra Cotta Realty Co.

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ATTACHMENT A

Prior to the work stoppage, the DESIGN/BUILDER had a free source of 15,000 cubic yards of backfill material to be used in the construction of the WWTP, and the source is no longer available. The DESIGN/BUILDER and OWNER will work towards finding suitable backfill material to be used for the project. DESIGN/BUILDER will notify Terra Cotta Realty at least 45 days prior to needing the backfill material. If a suitable source is not available, the DESIGN/BUILDER will provide a cost to OWNER for backfill material for review and approval prior to acquiring the backfill material.

LINTECH ENGINEERING, LLC
500 Coventry Lane, Suite 270 Crystal Lake, IL 60014 Tel: 815.479.5180 Fax: 815.479.5185
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TERRA COTTA REALTY CO., ILLINOIS
TERRA COTTA WASTEWATER TREATMENT PLANT IMPROVEMENTS

AGREEMENT

THIS AGREEMENT is made this 4th day of September, 2003, by and between the Terra Cotta Realty Co., (hereinafter called OWNER), and Lintech Engineering, LLC, (ENGINEER) and Joseph J. Henderson & Son, Inc. (CONTRACTOR) as a joint venture, (hereinafter called DESIGN/BUILDER). OWNER and DESIGN/BUILDER, in consideration of the mutual covenants hereinafter set forth, agree as follows:

Article 1. WORK.

DESIGN/BUILDER shall design, build, test and complete all Work as specified or indicated in the Contract Documents. The Work consists of expanding the treatment capacity of the existing Terra Cotta Wastewater Treatment Plant (WWTP) to a Phase I design average flow of 1.0 mgd for a design population of 10,000 P.E. and a Phase II design average flow of 1.60 mgd for a design population of 16,000 P.E.

1.1 The Phase I Work includes the following major construction:

a. Construct a pre-cast raw sewage pumping station with three (3) submersible pumps having a capacity of 1,050 gpm each with VFD and submersible transducer.
b. Construct a 12-inch force main from the raw sewage pumping station to the fine screen.
c. Construct a metering manhole with magnetic flow meter for influent metering.
d. Construct a screen building including one (1) fine screen with hydraulic capacity of 4.79 mgd including bagger, manual bypass bar screen, influent sampler, and gas detection sensor. Building will be split-face concrete masonry with truss roof.

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e. Construct a dual-tank oxidation ditch with anaerobic selector (U.S. Filter/Krueger) for 1.0 mgd DAF complete with aeration rotors, submersible mixers, instrumentation, and controls.
f. Construct two (2) 65-ft diameter secondary clarifiers (U.S. Filter/Envirex) with fiberglass covers. Provide two (2) sludge blanket level detectors.
g. Construct a UV disinfection system consisting of two (2) banks of self-cleaning UV bulbs (Trojan 3000+), level control gate, and controls.
h. Construct a Parshall flume structure for effluent metering with nested flume.
i. Provide an effluent sampler with weatherproof enclosure.
j. Construct a RAS pumping station with two (2) submersible pumps having a capacity of 700 gpm each with VFD, submersible transducer, and metering manhole with magnetic flow meter.
k. Construct a WAS pumping station with two (2) submersible pumps having a capacity of 450 gpm each and metering manhole with magnetic flow meter.
l. Construct a drain pumping station with two (2) submersible pumps having a capacity of 500 gpm each.
m. Construct a 54-ft diameter aerobic digester with 18-ft diameter interior sludge holding tank and cover. Provide coarse bubble diffusers for aerobic digester.
n. Provide a 1.5-meter combination belt filter press/gravity belt thickener (Ashbrook) complete with washwater pump and controls.
o. Provide two (2) sludge feed pumps (Moyno), sludge grinder (JWC), sludge conveyor, and polymer feed system (Stranco) for the dewatering system.
p. Provide two (2) positive displacement blowers rated at 800 cfm for the aerobic digester.
q. Provide a non-potable water system complete with pumps, pressure tanks, and yard hydrants.
r. Construct an effluent supply pumping station with two (2) submersible pumps having a capacity of 100 gpm each with level controls to supply effluent to the non-potable water system.
s. Provide chemical feed systems to feed alum (or ferric chloride) and polymer including storage tank and feed pump.

t. Construct a control building consisting of electrical room, sludge dewatering room, sludge bay, blower room, laboratory, and washroom. Building will be split-face concrete masonry with truss roof. Laboratory will be provided with cabinets, countertop, and sink.
u. Construct a dewatered sludge storage pad for 150 days storage.
v. Provide a truck fill station for sludge hauling.
w. Provide an emergency standby generator to power treatment plant in case of power failure.
x. Provide site work and landscaping including final grading and seeding, gravel driveway, sidewalks, fencing and plantings per approved landscape plan.
y. Provide a new ComEd power service to the plant site for the new equipment (see allowance).
z. Provide hookup to existing SCADA system.
aa. Provide mechanical, electrical, and piping necessary for a complete installation.

1.2 The Phase II Work includes the following major construction:

a. Construct a new 53' x 132' x 12.5' W.D. oxidation ditch with an anaerobic selector, 18.5' x 18.5' x 13' W.D., complete with aeration rotors, submersible mixers, instrumentation, and controls.
b. Construct one (1) new 65-ft diameter secondary clarifier with fiberglass cover. Provide one (1) sludge blanket level detector.
c. Add additional UV disinfection equipment.
d. Construct a new 40.5-ft diameter aerobic digester with 13.5-ft diameter interior sludge holding tank and cover. Provide coarse bubble diffusers for aerobic digester.
e. Provide one (1) positive displacement blower rated at 800 scfm for the aerobic digester.
f. Construct an additional dewatered sludge storage pad to make the existing pad.
g. Provide mechanical, electrical, and piping work necessary for a complete installation.

1.3 The Work for Phase I and Phase II does not include the following:

1.3.1 The required floodplain compensatory storage (minimum of 12 acre-ft for Phase I) to be constructed off-site.

1.3.2 Stormwater management of the plant site such as stormwater detention pond and outlet structure in accordance with applicable stormwater management regulations set forth by McHenry County or other regulatory agencies having jurisdiction.

1.3.3 Remediation of any hazardous materials uncovered or revealed at the site. Remediation of Hazardous Conditions are provided in paragraph 4.04 of the General Conditions.

1.4 The Work includes the measures in Attachment "B" to remedy unsuitable soil conditions.

1.4.1 The changes in the Work due to any other unsuitable soil conditions or differing site conditions are provided in paragraph 4.02 of the General Conditions.

1.5 The Basis of Design for the Work which is included as Attachment "A", is in accordance with the Illinois Recommended Standards for Sewage Works to meet the effluent limitations set forth in the NPDES Permit No. IL0038202, dated July 24, 2003. The Work does not include any additional treatment systems, if required by the IEPA, to meet a possible more stringent effluent limitations any future NPDES modifications for Phase II Work.

Article 2. THE PROJECT.

The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Terra Cotta Wastewater Treatment Plant
Phase I Improvements

Article 3. CONTRACT TIME.

3.1 The Phase I Work will be substantially completed in accordance with paragraph 13.05 of the General Conditions and ready for operation within 365 days after receiving the construction permits from the IEPA and the Village of Prairie Grove, and the permits for plant site floodplain and stormwater management, and fully completed and ready for final payment in accordance with paragraph 13.09 of the General Conditions

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within 540 days after the date that Phase I Work commences. The time periods indicated shall define "Contract Time".

Article 4. CONTRACT PRICE.

4.1 OWNER shall pay DESIGN/BUILDER for completion of the Phase I Work, in accordance with the Contract Documents as follows:

a. Engineering Fee: (Lintech Engineering, LLC)	$1,010,000
b. Construction Cost: (Joseph J. Henderson & Son, Inc.)	$7,989,242
c. Total: DESIGN/BUILDER's Lump Sum Price	$8,999,242

4.1.1 The construction cost for Phase I Work includes the following allowances:

a. Permit fees:	$ 10,000
b. Utilities connection fees:	$ 20,000
c. Driven foundation piling:	$ 400,000
d. Additional soil borings and testing:	$ 20,000
e. Unsuitable soil removal and replacement:	$ 80,000
f. Laboratory supplies and equipment	$ 5,000

4.1.2 Unit prices for additional Work:

a. Excavation and disposal of excavated materials on site:	$ 6.50 per c.y.
b. Granular backfilling:	$14.50 per c.y.
c. Additional suitable soil backfilling:	$ 7.50 per c.y.

4.2 OWNER shall pay DESIGN/BUILDER for completion of the future Phase II Work described in paragraph 1.2 of this AGREEMENT as follows:

a. Engineering Fee: (Lintech Engineering, LLC)	$ 420,000
b. Construction Cost: (Joseph J. Henderson & Son, Inc.)	$2,830,000
c. Total: DESIGN/BUILDER's Lump Sum Price	$3,250,000

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4.2.1 The engineering fee for the future Phase II Work does not include engineering services for:

a. Facilities Planning Report or Engineering Report required for the modification of NPDES Permit.
b. Anti-degradation study of the receiving stream.
c. Design and Construction – related services for any Work in addition to the Work described in paragraph 1.2 of this AGREEMENT to meet the future NPDES Permit.

4.2.2 The Construction cost for Phase II Work includes the following allowances:

a. Permit fees:	$	2,000
b. Driven foundation piling:	$	220,000
c. Additional soil borings and testing:	$	10,000
d. Unsuitable soil removal and replacements:	$	40,000

4.2.3 The DESIGN/BUILDER's total Lump Sum Price for the future Phase II Work is effective for 5 years until December 31, 2008.

Article 5. PAYMENT PROCEDURES.

DESIGN/BUILDER shall submit and OWNER will process Applications for Payment in accordance with Article 13 of the General Conditions.

Article 6. DESIGN/BUILDER'S REPRESENTATIONS.

DESIGN/BUILDER makes the following representations, warranties and covenants.

6.1 DESIGN/BUILDER has examined and carefully studied the Contract Documents and the other related data prior to the submittal of the Proposal.

6.2 DESIGN/BUILDER has visited the site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, performance or furnishing of the Work.

6.3 DESIGN/BUILDER is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work.

6.4 DESIGN/BUILDER has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site which have been identified or made available by OWNER. DESIGN/BUILDER has advised OWNER with respect to any studies or other information needed and is satisfied with that information made available to it at the time of executing this Agreement.

6.5 DESIGN/BUILDER is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Contract Documents.

6.6 DESIGN/BUILDER has correlated the information known to DESIGN/BUILDER, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents and all additional examination, investigations, explorations, tests, studies, and data with the Contract Documents.

6.7 DESIGN/BUILDER has given OWNER written notice of all conflicts, errors, ambiguities or discrepancies that DESIGN/BUILDER has discovered in the Contract Documents and the written resolution thereof by OWNER is acceptable to DESIGN/BUILDER, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

6.8 The DESIGN/BUILDER's services shall be performed as expeditiously as is consistent with professional skill and care and the orderly progress of the Project in accordance with the Project schedule.

6.9 The DESIGN/BUILDER shall perform the services hereunder in a manner consistent with a relationship of trust and confidence and owes the duties of good faith and loyalty to OWNER.

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6.10 Notwithstanding anything to the contrary contained herein, the obligations and liabilities of the DESIGN/BUILDER as set forth herein shall at not time be diminished in any way by reasons of any approval by or consent of OWNER with respect to the Drawings and Specifications nor shall the DESIGN/BUILDER be released from any responsibility by reason thereof.

6.11 DESIGN/BUILDER is financially solvent, able to pay its debts as they mature and possessed of sufficient working capital to complete the services required and perform his obligations hereunder as long as OWNER fulfills its payment obligations hereunder.

6.12 All of the Drawings and Specifications shall be stamped by an architect or engineer duly registered and in good standing under all applicable registration and licensing laws.

Article 7. CONTRACT DOCUMENTS.

7.1 The Contract Documents which comprise the entire agreement between OWNER and DESIGN/BUILDER concerning the Work consist of:

1. This Agreement, the General Conditions, Supplementary Conditions, and all subsequent documents executed in accordance with the terms of the General and Supplementary Conditions.

2. Drawings and Specifications prepared by Lintech Engineering, LLC dated, May 15, 2003 and titled:

Illinois-American Water Company
Terra Cotta Wastewater Treatment Plant
Phase I Improvements

Article 8. MISCELLANEOUS.

8.1 The Standard General Conditions of the Contract Between OWNER and DESIGN/BUILDER are referred to herein as the General Conditions.

8.2 Terms used in this OWNER-DESIGN/BUILDER Agreement which are defined in Article 1 of the General Conditions will have the meanings indicated therein.

8.3 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, monies that may become due and monies that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents, except that OWNER shall have the right to assign this Agreement without the consent of DESIGN/BUILDER as long as OWNER remains fully liable hereunder.

8.4 OWNER and DESIGN/BUILDER each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

8.5 Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and DESIGN/BUILDER, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

Article 9. OTHER PROVISIONS.

9.1 The Work in accordance with the Contract Documents is subject to the inspection and final acceptance by Illinois-American Water Company.

9.1.1 DESIGN/BUILDER will perform any additional Work required by OWNER as a result of the inspection and/or final acceptance which is not included in the Contract Documents in accordance with the provisions of Articles 9,10,11 and 12 of the General Conditions.

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9.2 The Standard General Conditions of the Contract Between OWNER and DESIGN/BUILDER (EJCDC Form No. 1910-40 (1995 Edition), that certain Rider thereto and that certain Supplementary Conditions (Form 00801) are all incorporated herein by this reference and made a part hereof as if set forth fully herein.

9.3 Engineer and Contractor shall be jointly but not severally liable for all the obligations of the DESIGN/BUILDER hereunder.

IN WITNESS WHEREOF, the parties hereto have caused the execution of this Agreement by their duly authorized officers as of the day and year first above written.

OWNER:

TERRA COTTA REALTY CO.

By _____
President

(SEAL)
OFFICIAL SEAL
SANDRA M OLSZEWSKI
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES: 05-05-07

ATTEST:
_____
Clerk

DESIGN/BUILDER:

ENGINEER:

LINTECH ENGINEERING, LLC

By _____
Manager

(SEAL)
OFFICIAL SEAL
CINDY SHIVE
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 6-29-2004

ATTEST:
_____
Notary Public

CONTRACTOR:

JOSEPH J. HENDERSON & SON, INC.

By _____
President

(SEAL)
OFFICIAL SEAL
CINDY SHIVE
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 6-29-2004

ATTEST:
_____
Clerk

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ATTACHMENT "A"

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Illinois-American Water Company
Terra Cotta WWTP Improvements
Basis of Design

GENERAL DATA	PHASE I	PHASE II
Wastewater Flow		
1. Design Population	10,000 P.E.	16,000 P.E.
2. Design Average Flow (DAF)	1.00 mgd	1.60 mgd
3. Design Maximum Flow (DMF)	2.00 mgd	3.20 mgd
4. Design Peak Hourly Flow (DPHF)	3.00 mgd	4.50 mgd
Wastewater Characteristics		
5. BOD_5 @ 0.22 ppd/P.E.	2,200 lbs/day	3,520 lbs/day
6. TSS @ 0.25 ppd/P.E.	2,500 lbs/day	4,000 lbs/day
7. NH_3-N @ Design peak conc. 35 mg/l	292 lbs/day	467 lbs/day
8. Total P @ 8 mg/L	67 lbs/day	107 lbs/day

EFFLUENT LIMITATIONS

Based on draft NPDES permit no. IL 0038202, dated 5/08/03

Parameter		Monthly Avg.	Daily Max.
$CBOD_5$, (mg/L)		10	20
TSS, (mg/L)		12	24
NH_3-N (mg/L)	March – May / Sept. - Oct	1.5	6.1
	June – August	1.1	5.6
	Nov. – Feb.	3.9	8.3
pH (unit)		6-9	
Fecal coliform			400/100 ml
Phosphorus (mg/L)		< 1.0	

MAJOR TREATMENT UNITS

1. Raw Sewage Pumps		
No. of pumps	3	3
Capacity, each	1,050 gpm	1,600 gpm
Total capacity with largest pump as standby =	2,100 gpm	3,200 gpm

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	PHASE I	PHASE II
2. Screening		
Provide one unit with manual by-pass bar screen		
No. of units = 1		
Max. hydraulic capacity = 4.79 mgd		
3. Anaerobic Selector		
Number of stages =	3	3
Length per stage =	18.5 ft	18.5 ft
Width per stage =	18.5 ft	18.5 ft
Side water depth =	13 ft	13 ft
Detention time @ DAF =	2.4 hours	1.5 hours
Number of submersible mixers per stage =	1	1
Total number of mixers =	3	3
4. Aeration Tanks (Oxidation Ditch)		
Nitrification		
BOD_5 loading @ 15 ppd/1,000 ft^3		
Total volume required =		
(BOD loading/15 x 1,000)	146,667 ft^3	234,667 ft^3
No. of tanks =	2	3
Tank width =	53 ft	53 ft
Tank depth =	12.5 ft	12.5 ft
Tank length =	132 ft	132 ft
Volume of 1 tank =	80,625 ft^3	80,625 ft^3
Total volume provided =	161,250 ft^3	241,875 ft^3
Denitrification		
Volume provided for anoxic zone denitrification =	14,583 ft^3	7,208 ft^3
Detention time @ DAF	29 hours	27 hours
Aeration Requirements:		
BOD Loading @ 15 ppd/1,000 ft^3	2,200 lbs/day	3,520 lbs/day
Peak BOD_5 @ 150%	3,300 lbs/day	5,280 lbs/day
Peak NH_3-N @ 35 mg/l	292 lbs/day	467 lbs/day
Lb. O_2 per lb. BOD_5	1.29	1.29
Lb. O_2 per lb. NH_3-N	4.60	4.60
Total AOR	233 lbs/hr	373 lbs/hr

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	PHASE I	PHASE II
5. Secondary Clarifiers		
Nos. of tanks	2	3
Diameter =	65′	65′
Side water depth =	12′	12′
Total surface area	6,637 ft^2	9,955 ft^2
Surface settling rate (SSR)		
@ DAF	151 gpd/ft^2	161 gpd/ft^2
@ DMF	301 gpd/ft^2	321 gpd/ft^2
@ DPHF	452 gpd/ft^2	452 gpd/ft^2
6. UV Disinfection System		
Design peak hourly flow	3.0 mgd	4.5 mgd
Disinfection standard	400/100mL	400/100mL
UV dosage	40,000 uwatt-sec/cm^2	40,000 uwatt-sec/cm^2
UV Transmittance (UVT)	65%	65%
No. of Channels	1	1
No. of Banks in Series	2	2
No. of Modules/Bank	3	4
No. of Lamps/Module	6	6
No. of Lamps	36	48
7. Sludge Production		
A. Waste Activated Sludge Production		
W.A.S. @ 0.65 lbs/lb BOD applied	1,430 lbs/day	2,288 lbs/day
Volatile solids, @ 70% volatile	1,000 lbs/day	1,602 lbs/day
Volume @ 0.75% T.S.	22,862 gpd	36,600 gpd
B. Sludge Holding Tank		
Provide sludge holding tank for 1-day WAS production		
No. of tanks =	1	2
Phase I		
Dimensions: 18′ dia. × 13′ s.w.d.		
Volume =	24,750 gal	
Phase II		
Dimensions: 13.5′ dia. ×13′ s.w.d.		
Volume =		13,920 gal
Total volume provided =		38,670 gal

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	PHASE I	PHASE II
C. Gravity Belt Thickener		
No. of units = 1		
Belt size = 1.5 meter		
Capacity = 500 lbs/hr/meter		
Feed rate = 200 gpm @0.75% T.S.		
Total sludge loading	22,862 gpd	36,600 gpd
Operating time, 5-day week		
Sludge will be thickened to a minimum of 3% solids		
D. Aerobic Digesters		
Volume req. @ 3.0 ft^3/P.E. × (2%/3%)	20,000 ft^3	32,000 ft^3
Construct one circular digester in Phase 1 and one in Phase 2.		
Each digester will be divided into two compartments.		
Phase I		
Dimensions: (outer tank 54′ dia. – inner tank 18′ dia.) x 13′ s.w.d.		
Total volume =	25,700 ft^3	
Volatile solids loading	39 lbs/day/ 1,000 ft^3	
Expected volatile solids reduction	50%	
Digested sludge	930 lbs/day	
Phase II		
Dimensions: (outer tank 40.5′ dia. – inner tank 13.5′ dia.) x 13′ s.w.d.		
Digester tank volume =		14,890 ft^3
Total volume provided =		40,600 ft^3
Volatile solids loading		56 lbs/day/ 1,000 ft^3
Expected volatile solids reduction		50%
Digested sludge		1,487 lbs/day
E. Digested Liquid Sludge Storage		
Provide 4 days storage prior to dewatering		
Maximum digested sludge @ 0.16 ppd/P.E.	1,600 lbs/day	2,560 lbs/day
Maximum volume @ 2% T.S.	9,600 gpd	15,350 gpd
4-day storage volume required	5,134 ft^3	8,200 ft^3
Digester volume required	20,000 ft^3	32,000 ft^3
Total volume required (digester + storage)	25,134 ft^3	40,200 ft^3
Total volume provided	25,700 ft^3	40,600 ft^3

	PHASE I	PHASE II
F. Sludge Dewatering		
Average digested sludge	930 lbs/day	1,487 lbs/day
Max. digested sludge @ 0.16 lbs/day/P.E.	1,600 lbs/day	2,560 lbs/day
Provide new belt filter press for dewatering		
No. of units = 1		
Size = 1.5 meter		
Capacity = 500 lbs/hr/meter		
Operating time, 5 day week		
Average	1.7 hrs/day	2.8 hrs/day
Maximum	3 hrs/day	4.8 hrs/day
Maximum dewatered sludge vol. @ 18% T.S.	143 ft^3	228 ft^3
G. Dewatered Sludge Storage		
Required sludge storage capacity = 150 days		
Volume required for 150 days	21,450 ft^3	34,200 ft^3
Provide new paved concrete storage bed		
Dimensions:	50' x 100'	50' x 100'
Area	5,000 ft^2	10,000 ft^2
Storage Height	4.3 ft	3.4 ft
8. Aeration Blowers for Aerobic Digesters		
Total Tank Volume	25,700 ft^3	40,600 ft^3
Air requirement @ 30 cfm/1,000 ft^3	770 cfm	1,220 cfm
Phase I		
No. of blowers =	2	
Capacity, each = 800 cfm @ 7.0 psi		
Total capacity with one unit as standby	800 cfm	
Phase II		
Add one additional blower, 800 cfm @ 7.0 psi		
No. of blowers =		3
Total capacity with one unit as standby		1,600 cfm
9. RAS/WAS Pumping Station		
No. of pumps	2	2
Capacity, each = 1,125 gpm with VFD		
Total capacity with one pump as standby =	1,125 gpm	1,125 gpm

10. Chemical Feed System for Phosphorus Removal

Maximum effluent P to be removed = 2 mg/l

2.0 mg/l × 8.34 × 1.0 mgd = 16.7 lbs/day P

A. Liquid Alum Precipitation

Theoretical Al:P weight ratio = 0.87:1

Alum strength = 9.1% of Al, or 17% of Al_2O_3

Provide Alum:P ratio = 22:1 (2Al:1P)

Alum dosage = 22 × 16.7 = 367.4 lbs/day (17% of Al_2O_3)

Use liquid alum with commercial strength of 8.3% Al_2O_3

Liquid alum = 367.4 × (17÷ 8.3) = 753 lbs/day

Liquid alum density = 11.1 lbs/gal

Liquid alum volume required = 753 ÷ 11.1 = 68 gal/day

B. Liquid Ferric Chloride ($FeCl_3$) Precipitation – Optional

Theoretical Fe:P weight ratio = 1.8:1

$FeCl_3$:P ratio = 5.2:1

Use application $FeCl_3$ ratio = 10.4:1

$FeCl_3$ dosage = 10.4 × 16.7 = 174 lbs/day

Liquid $FeCl_3$ commercial strength = 38% $FeCl_3$

Liquid $FeCl_3$ required = 174 ÷ 0.38 = 458 lbs/day

Liquid $FeCl_3$ density = 11.8 lbs/dal

Volume required = 458 ÷ 11.8 = 39 gal/day

C. Liquid Polymer Addition

Polymer dosage = 1.0 mg/l, or 8.34 lbs/day

D. Chemical Storage Tank

Provide 10 days storage for liquid alum

Storage volume = 10 days × 68 gal/day = 680 gallons

Provide 5' diameter × 5' depth double wall tank

Volume = 810 gallons

E. Chemical Feed Pump

Provide chemical feed pump for feeding liquid alum (or $FeCl_3$)

Design • Build

ATTACHMENT "B"

The Phase I Work Includes removing unsuitable soils to the following elevations and backfilling with structural granular fill.

STRUCTURES	ELEVATIONS (ft)
Raw Sewage Pump Station	753.00
Raw Sewage Pump Station Value Vault	764.25
Drain Pump Station	746.75
Drain Pump Station Valve Vault	764.25
Screening Building	768.33
Control Building Footings	769.50
Control Building Slab on Grade	772.83
Engine Generation Pad	772.00
Aeration Tanks (Driven pipe piles allowance $400,000)	762.67
Secondary Clarifiers	757.00
Truck Fill Station	769.00
Mixed Liquid Flow Divider Switch	751.50
Aerobic Digester	760.33
Dewatered Sludge Storage Pad Footings	769.00
Dewatered Sludge Storage Pad Slab on Grade	772.00
Ultraviolet Disinfection Structure	762.17 to 765.83
Outfall Head Wall	759.00
Site Piping	Soils at anticipated
Electrical Duct Bank	Excavation should be
Pavement and Walks	Sufficient for the structures.