

Kennedy/Jenks Consultants

Engineers & Scientists

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7 June 2010

Mr. David Henderson
Utility Director
City of West Lafayette
500 River Road
West Lafayette, IN 47906

Subject: Proposal for Professional Services for
Secondary Process Modeling and Capacity Evaluation
K/J B09006

Dear Mr. Henderson:

As a follow-up to our earlier conversation, we are submitting our proposal to provide the City of West Lafayette (City) with a Secondary Process Modeling and Capacity Evaluation.

Project Understanding

This evaluation will identify potential limitations of the primary clarifiers, activated sludge process, and secondary clarifiers at the West Lafayette WWTP in treating wastewater flows of up to 13 MGD in compliance with anticipated NPDES effluent permit limits and any Total Maximum Daily Load (TMDL) limits that may have been established for the plant. The conclusion of this assessment will be a recommendation to pursue a targeted stress-testing program and engage in other evaluative activities to re-rate the process capacities, or pursue a more detailed preliminary design report to resolve the identified limitations.

Scope of Work

The following tasks are an extension of the tasks identified in the Contract Agreement dated 19 March 2009.

Two methods will be used to evaluate process capacity: 1) mathematical determinations based on known engineering principles and common practice, and 2) computer process simulations of the activated sludge process.

Biological process modeling of the activated sludge process will be carried out using the BioWin 3.01 simulator, developed by EnviroSim of Ontario, Canada. The BioWin model uses complex biological interactions to predict material transformations and pollutant removals in different processes at a wastewater treatment plant. The model enables the user to simulate carbonaceous oxidation, nitrification, denitrification, biological phosphorus removal, fermentation, and digestion using mechanistic activated sludge models. Additionally, BioWin 3.01 can simulate other various in-plant processes, such as sedimentation or filtration, using

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simplified one-dimensional flux models, empirical models, or by applying user-defined removal rates that are typical of that process.

The scope of work for this evaluation includes the following work elements:

Task 1 - Calibration Data Collection and Analysis

Wastewater characterization data collected from the primary clarifier influent, primary clarifier effluent, aeration basins, secondary clarifier effluent, return activated sludge, and waste activated sludge will be reviewed by our biological process experts and summarized. Additionally, the recycle streams from the gravity belt thickener (GBT) and the lagoon will be reviewed and summarized.

Task 2 - Development and Calibration of the Activated-Sludge Process Mode

The process simulator will be calibrated around historical operating data and using the supplemental calibration data collected as a part of this preliminary design effort. The recycle streams (GBT and lagoon) will be included in the modeling effort. The potential impacts of future FOG and food waste digestion programs will be considered with the lagoon recycle.

Task 3 – Process Simulation of Existing System

The activated sludge system will be modeled to evaluate process capacity and assist in identifying process bottlenecks and areas needing improvement. Multiple operating scenarios will be evaluated to capture the dynamic response of a real treatment system to variable flow and loading conditions and seasonal temperature variation.

Task 4 - Capacity Assessment using Known Engineering Principles

Not funded or used

Task 5 - Process Capacity Technical Memorandum

The process capacity technical memorandum will present a summary of the existing processes, treatment objectives, calibration data and calibration methodology, and the projected capacity limitations using biological process simulation. This memorandum will be submitted draft for review, and review comments will be incorporated into the final report.

Task 6 – Quality Assurance/Quality Control (QA/QC)

This project will be executed according to the Kennedy/Jenks standard QA/QC procedure.

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Task 7 – Meetings

We propose an initial meeting to be conducted during the execution of Task 1. This meeting would be held after the data has been submitted to Kennedy/Jenks and we've reviewed and compiled it for modeling purposes. At this meeting we will discuss with City staff the adequacy of representation of plant operation and performance by the data set and if there are any additional flow scenarios that need to be represented. We will conduct a workshop with the City staff following the completion of Tasks 1-3 to discuss the modeling results within the context of the City's operational experience with the West Lafayette WWTP and typical process design principles. This workshop will be conducted in a format that will facilitate discussion and will provide for preliminary evaluation of various "what ifs" at the meeting.

DELIVERABLES

This assessment includes the following deliverables:

- **Process capacity technical memorandum:** the process capacity technical memorandum will contain recommendations for either pursuing a process capacity re-rating or a preliminary design report to cost-effectively resolve the identified bottlenecks or limitations.

SCOPE ASSUMPTIONS

The engineering budget and the tasks presented in this proposal are based on the following assumptions, clarifications, and exclusions:

- Three years of influent characterization and plant operating data will be compiled by the WWTP staff and provided for simulator calibration.
- Treatment objectives will be maximum month and average annual limits. TMDLs will be converted to concentration-based limits.
- Up to 10 days of additional sampling may be necessary for this or subsequent evaluation. Samples would likely be collected from the primary clarifier influent, primary clarifier effluent, aeration basins, RAS/WAS, GBT and Lagoon recycle and secondary clarifier effluent. Samples will be collected, logged, and packaged by plant staff for lab analyses.
- All process modeling will be conducted under steady-state conditions. Up to four (4) operating scenarios may be evaluated with the existing activated sludge process.
- Process simulations for the process capacity technical memorandum will include the primary clarifiers, primary sludge pumps, activated sludge process tanks, secondary clarifiers, aeration system, and RAS/WAS pumping.

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Proposed Budget

The proposed budget for each task is as follows:

Task 1 – Data Collection & Analysis	\$ 3,100
Task 2 – Model Development and Calibration of the Activated-Sludge Process Model	\$ 6,200
Task 3 – Process Simulation of Existing System	\$4,000
Task 5 – Process Capacity Technical Memorandum	\$5,900
Task 6 & 7 - QA/QC & Meetings	\$5,800
Total Budget	\$ 25,000

The engineering services for the additional scope items described above will be performed on a cost-reimbursable basis in accordance with our Schedule of Charges, dated 1 January 2010. A detailed fee breakdown is attached to this proposal.

Schedule

The following are proposed key schedule milestones:

- A request for wastewater characterization data will be transmitted within 1 week of NTP (notice-to-proceed), per Task 1.
- The data and operations review meeting, described in Task 7, will be held within 4 weeks of receipt of the data set requested as part of Task 1.
- Any additional sampling required and data collection for process simulator calibration will be made within one week of the data and operations review meeting.
- The modeling review workshop, described in Task 7, will be held within 4 weeks of the receipt of any required supplemental calibration data, per Task 2. The work described in Tasks 1-3 will be completed prior to this workshop.
- A draft of the process capacity technical memorandum, described in Task 5, will be delivered 4 weeks after conducting the process review workshop.
- A final process capacity technical memorandum will be delivered 2 weeks after receipt of comments on the draft technical memorandum.

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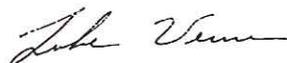
Thank you again for this opportunity. We welcome the opportunity to discuss this amendment with you and make any additions or modifications. Please call Mike at 650/852-2833 or Luke at 541/338-8135 if you have any questions.

Very truly yours,

KENNEDY/JENKS CONSULTANTS

A handwritten signature in black ink, appearing to read "Mike Joyce".

Mike Joyce, P.E.
Principal

A handwritten signature in black ink, appearing to read "Luke Werner".

Luke Werner
Project Manager

Enclosure

Client/Address: City of West Lafayette
500 River Road
West Lafayette, IN 47906

Contract/Proposal Date: 7 June 2010

Schedule of Charges

January 1, 2010

Personnel Compensation

Classification	Hourly Rate
CAD-Technician	\$100
Designer-Senior Technician	\$130
Engineer-Scientist-Specialist 2	\$125
Engineer-Scientist-Specialist 3	\$140
Engineer-Scientist-Specialist 4	\$155
Engineer-Scientist-Specialist 5	\$170
Engineer-Scientist-Specialist 6	\$190
Engineer-Scientist-Specialist 7	\$215
Engineer-Scientist-Specialist 8	\$225
Engineer-Scientist-Specialist 9	\$230
Project Administrator	\$90
Administrative Assistant	\$75
Aide	\$60

In addition to the above Hourly Rates, a three percent Communications Surcharge will be added to Personnel Compensation for normal and incidental copies, communications and postage.

Direct Expenses

Reimbursement for direct expenses, as listed below, incurred in connection with the work, will be at cost plus ten percent for items such as:

- Maps, photographs, reproductions, printing, equipment rental, and special supplies related to the work.
- Consultants, soils engineers, surveyors, contractors, and other outside services.
- Rented vehicles, local public transportation and taxis, travel and subsistence.
- Specific telecommunications and delivery charges.
- Special fees, insurance, permits, and licenses applicable to the work.
- Outside computer processing, computation, and proprietary programs purchased for the work.

Reimbursement for vehicles used in connection with the work will be at the federally approved mileage rates or at a negotiated monthly rate.

Reimbursement for use of computerized drafting systems (CAD), geographical information systems (GIS), and other specialized software and hardware will be at the rate of \$12 per hour.

Rates for professional staff for legal proceedings or as expert witnesses will be at rates one and one-half times the Hourly Rates specified above.

Other in-house charges for prints and reproductions, equipment usage, laboratory analyses, etc. will be at standard company rates.

Excise and gross receipts taxes, if any, will be added as a direct expense.

The foregoing Schedule of Charges is incorporated into the agreement for the services provided, effective January 1, 2010 through December 31, 2010. After December 31, 2010, invoices will reflect the Schedule of Charges currently in effect.