

**HILLSBOROUGH
COUNTY**

REQUEST FOR PROFESSIONAL SERVICES (RPS)

RPS-S-0062-0-2011/JSW

PROFESSIONAL ENGINEERING SERVICES FOR DALE MABRY ADVANCE WASTE WATER TREATMENT
PLANT (AWWTP) HEADWORKS REHABILITATION

FOR

PUBLIC UTILITIES DEPARTMENT

Scope Review Meeting and Site Visit: December 8, 2010, at 9:00 AM

Location:

Dale Mabry Advanced Wastewater Treatment Plant
Environmental Laboratory
Room No. Lab Conference Room
13055 Delwood Road
Tampa, Florida 33624

RPS Submittal Deadline: 5:00 p.m. on December 21, 2010

to

**Department of Procurement Services
601 E. Kennedy Blvd
County Center 18th Floor
Tampa, Florida 33602**

IMPORTANT NOTICE: Hillsborough County issues its solicitations electronically through its contracted vendor, Onvia DemandStar. All addenda to such solicitations will be issued exclusively through Onvia DemandStar. If you have obtained this solicitation from a source other than Onvia DemandStar, you will not be listed on the plan holders list and may not receive notification of any addenda issued. Failure to receive any issued addenda shall not relieve the bidder/proposer from any obligation(s) contained in the addenda. To access Hillsborough County solicitations and any resulting addenda, please go to www.demandstar.com or call 1-800-711-1712.

Any response, or portion thereof, received after the
above submittal deadline will not be considered. All responses
are to be submitted to the contact person listed below.

Contact Person: James S. Wunderle, Senior Procurement Analyst
Services Team
Telephone: (813) 301-7087
Fax: (813) 272-6290

WEB SITE: www.hillsboroughcounty.org/procurementservices

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**SECTION A
INSTRUCTIONS FOR RESPONSES**

1.0 ELIGIBILITY FOR CONSIDERATION

1.1 COMPLIANCE WITH CERTIFICATION REQUIREMENTS

- 1.1.1 Only firms certified by Hillsborough County as qualified to provide the required services will be recommended for selection for this project.
- 1.1.2 Certification for this project is required in **Engineering**.
- 1.1.3 If a response is otherwise compliant with the requirements of this RPS, and the submitting firm is not certified, the response will be forwarded to the Evaluation Committee for evaluation.
- 1.1.4 If the certification requirements are not complete by the announcement of the shortlist, the firm will be given no further consideration for selection for the project.
- 1.1.5 All requests for certification shall be submitted to the contact person specified on the cover sheet of this RPS. The information and forms are also available on the internet at <http://www.hillsboroughcounty.org/procurementservices/certification/criteria.cfm>
- 1.1.6 Each firm shall submit its response in the name in which it is certified.
- 1.1.7 DM/DWBE/EEO information can be found at <http://www.hillsboroughcounty.org/econdev>.
- 1.1.8 A list of certified firms can be found at <http://www.hillsboroughcounty.org/procurement/services/resources/publications/ccnaconsultantlist.pdf>

1.2 COMPLIANCE WITH SUBMISSION DEADLINE

- 1.2.1 The response for this project must be submitted in its entirety by the deadline specified on the front cover. **The delivery is solely and strictly the responsibility of the respondent.**
- 1.2.2 No response, or portion thereof, will be accepted for consideration after the specified deadline.

1.3 COMPLIANCE WITH RPS REQUIREMENTS

- 1.3.1 Each response that is forwarded for evaluation **must** meet the requirements specified in this RPS.
- 1.3.2 Failure to submit all required items in the manner specified may result in your submittal being found unacceptable.
- 1.3.3 Any submittal found unacceptable will not be considered for selection for this project.
- 1.3.4 The TABLE OF CONTENTS FOR PROFESSIONAL CONSULTANT RESPONSE is to be completed by the submitting firm and included in the bound copies of the firm's response.
 - 1.3.4.1 Response materials shall be arranged in the order indicated on the TABLE OF CONTENTS FOR PROFESSIONAL CONSULTANT RESPONSE form provided in this RPS.
 - 1.3.4.2 The submitting firm is to include the appropriate page numbers to indicate the location for each of the listed items.
- 1.3.5 The response information should be included on either the forms provided in this RPS, or a reasonable facsimile of the provided forms.
- 1.3.6 Firms choosing to use reasonable facsimiles of required forms should maintain both the format and content of the provided forms.
- 1.3.7 **Four (4) copies** of the firm's response must be submitted. **Three (3) copies** should be bound and one (1) copy should be unbound but secured with a rubber band, spring clip, etc. All copies should be submitted in one (1) sealed container. Each copy **must** contain the following:
 - 1.3.7.1 The FIRM DATA SHEET for the prime firm only.

- 1.3.7.2 Responses to the evaluation criteria
 - Each of the criteria in Section 5.0 must be specifically addressed.
 - Responses should include, but not necessarily be limited to, the information included with each of the criteria.
 - Responses **shall not exceed** the established page limits.
- 1.3.8 One (1) copy of ATTACHMENT A – DM/DWBE PARTICIPATION may be submitted, at the option of the firm, for bonus points.
 - 1.3.8.1 All pages of this attachment are to be securely fastened together. **THE COUNTY ASSUMES NO RESPONSIBILITY FOR THE LOSS OF ANY UNSECURED PAGES.**
 - 1.3.8.2 **Submit ATTACHMENT A in a separate envelope marked "ATTACHMENT A".**
 - 1.3.8.3 The name of the submitting firm is to be indicated on the outside of the envelope.
- 1.3.9 One (1) copy of ATTACHMENT B - EQUAL OPPORTUNITY AND AFFIRMATIVE ACTION QUESTIONNAIRE must be submitted.
 - 1.3.9.1 All pages of this attachment are to be securely fastened together. **THE COUNTY ASSUMES NO RESPONSIBILITY FOR THE LOSS OF ANY UNSECURED PAGES.**
 - 1.3.9.2 **Submit ATTACHMENT B in a separate envelope marked "ATTACHMENT B".**
 - 1.3.9.3 The name of the submitting firm is to be indicated on the outside of the envelope.
- 1.3.10 One (1) copy of the completed RPS CHECKLIST must be submitted in the unbound copy of the firm's response.

2.0 INITIAL RANKING FOR THE PROJECT

- 2.1 The initial ranking for this project will be made on the basis of scoring on the following items for each firm submitting a response that has been determined responsive to the requirements of this RPS:
 - 2.1.1 Responses to the five evaluation criteria specified in Section 5.0 of this RPS.
 - **MAXIMUM POINTS -100**
 - Scored by the Evaluation Committee.
 - The Evaluation Committee's scoring will be based only on the information contained in the response.
 - 2.1.2 ATTACHMENT A - DM/DWBE PARTICIPATION FOR BONUS POINTS
 - **MAXIMUM POINTS - 6**
 - 2.1.3 ATTACHMENT B - EQUAL OPPORTUNITY/AFFIRMATIVE ACTION QUESTIONNAIRE
 - **MAXIMUM POINTS - 4**
 - 2.1.4 VOLUME OF WORK REPORT
 - **MAXIMUM POINTS - 5**
 - 2.1.5 PAST PERFORMANCE RATING
 - **MAXIMUM POINTS - 5**

3.0 VOLUME OF WORK (See Exhibit III – Volume of Work)

- 3.1 A Volume of Work Score will be applied to the evaluation score for each firm submitting a response to the RPS.
- 3.2 The volume of work for a firm shall be the amount of payments made to a firm during the two previously completed fiscal years. The amounts are retrieved from the Clerk's Office official financial accounting system (FAMIS).

- 3.3 The volume of work will be converted to a Volume of Work Score, based on a predetermined conversion chart.
- 3.4 The range of points will be a maximum of five (5) and a minimum of zero (0).
- 3.5 A firm will receive no points when its total payments for the two previously completed fiscal years have exceeded **\$1,000,000**.

4.0 RATING OF PAST PERFORMANCE WITH HILLSBOROUGH COUNTY BY DISCIPLINE (See Exhibit II – Past Performance)

- 4.1 A Past Performance Score in the discipline specified in this project (i.e., engineering, architecture, landscape architect, or surveying and mapping) will be applied to the evaluation score for each firm submitting an acceptable response to the RPS.
- 4.2 Past Performance Score for firms with performance evaluations on file:
 - 4.2.1 The applicable time period shall be the twenty-four month period prior to submittal deadline.
 - 4.2.2 Only those evaluations on file by the submittal deadline will apply to this project.
 - 4.2.3 The range of points will be a maximum of (5) and a minimum of (-5).
- 4.3 Past Performance Score for firms with no performance evaluations on file:
 - 4.3.1 The applicable time period shall be the two previously completed fiscal years (FY09 & FY10).
 - 4.3.2 The Past Performance Score shall be the equivalent to the county-wide average for all firms during the applicable fiscal year.
 - 4.3.3 The minimum score allowable for a firm with no performance evaluations on file shall be 3 points.
 - 4.3.4 The county-wide average score for the current fiscal year (FY11) is **92.28** or 4 past performance points.

5.0 EVALUATION CRITERIA FOR WRITTEN RESPONSE (See Exhibit I – Rating Guide)

5.1 ABILITY OF FIRM AND ITS PROFESSIONAL PERSONNEL

Maximum Points - **40**

Responses limited to 2 page(s) maximum, plus resumes for key personnel and organizational charts

- 5.1.1 Attach resumes **only** for key personnel of the Project Team, detailing past experience as it relates to projects of similar size and type.
- 5.1.2 Submit separate organizational charts delineating personnel assigned to both construction and design services, if applicable.

5.2 FIRM'S EXPERIENCE WITH PROJECTS OF A SIMILAR SIZE AND TYPE

Maximum Points - **35**

Responses must have only one (1) project per page.

- 5.2.1 List a **maximum of five (5)** recent projects, preferably during the past **five (5)** years, to indicate proficiency in similar work.

5.3 FIRM'S WILLINGNESS AND ABILITY TO MEET SCHEDULE AND BUDGET REQUIREMENTS

Maximum Points - **10**

Response limited to 2 pages maximum.

- 5.3.1 Provide a short narrative outlining how you propose to manage the project in order to meet schedule and budget requirements.
- 5.3.2 Indicate the controls to be utilized to maintain both schedule and budget for this project.
- 5.3.3 Describe how personnel will be assigned, and tasks effectively handled, in order to provide the most efficient service on the project (during both the design and the construction phases, if applicable).

5.4 EFFECT OF FIRM'S RECENT, CURRENT AND PROJECTED WORKLOAD

Maximum Points - **10**

Responses limited to 2 pages maximum, plus a one page graphic representation.

5.4.1 Describe the current workload and your daily ability to handle the scope of services.

5.4.2 Provide a graphic representation of your current commitment over the next one year period for key members of the project team.

5.5 EFFECT OF PROJECT TEAM LOCATION (Scored by the Evaluation Chairperson only).

Maximum Points - **5**

Response limited to 1 page maximum.

5.5.1 Define where elements of the work will be performed (city/state), whether performed by prime or subconsultant firms, and who in the Proposer's organizational chart will oversee performance that work.

5.5.2 Specify the members of the project team and office location for each.

5.5.3 A firm shall be considered local if it is within the Tampa Bay Regional Partnership area, made up of Hillsborough, Pinellas, Pasco, Polk, Manatee, Sarasota and Hernando Counties.

6.0 ORAL PRESENTATIONS/TELEPHONE DISCUSSIONS

6.1 Plan to shortlist no less than **three (3)** firms for this project.

6.2 Oral Presentations by the shortlisted firms **will** be required on this project.

6.3 Telephone Discussions **will not** be held with each of the shortlisted firms.

7.0 RIGHT TO REJECT PROPOSALS

7.1 Subsequent to the issuance of this RPS, the COUNTY reserves the right to reject any and all proposals received in response to this RPS.

7.2 In exercising this right, the COUNTY accepts no liability for any cost incurred by any firm or firms preparing responses to this RPS.

8.0 CONFLICT OF INTEREST

8.1 No firm shall be eligible for selection on any project and no work shall be assigned to a firm which conflicts with or is duplicative of any work by the firm or any affiliated business entity, including, but not limited to, partnerships, joint ventures, and subsidiaries of the same parent corporation or firm.

9.0 CONTACT WITH MEMBERS OF THE EVALUATION COMMITTEE

9.1 Members of the Evaluation Committee are prohibited from discussing a submittal on any project with any firm whose proposal they are reviewing until negotiations with the top-ranked firm(s) have been authorized.

9.2 Firms are requested not to contact Evaluation Committee members regarding this project. Firms failing to comply with this request may be deemed ineligible for consideration for selection.

10.0 REQUESTS FOR INFORMATION/CLARIFICATION

10.1 Any firm requesting additional information and/or clarifications relating to this project shall direct such requests to the individual specified as Contact Person on the cover sheet.

10.2 Requests should be made, in writing, at least five days prior to the submittal deadline. Requests may be transmitted by facsimile machine (fax) (813) 272-6290.

11.0 OBJECTIONS

11.1 Any professional consultant firm which expresses objection to any activity, decision or determination made during this professional consultant selection process is encouraged to contact the Contact Person on the cover sheet to attempt an informal resolution of the matter. If this approach is unsuccessful, a formal protest may be filed in accordance with Department of Procurement Services' protest procedures.

11.2 The protest shall contain the specific basis for the firm's objection to the issue in question.

12.0 REUSE OF EXISTING PLANS

- 12.1 The plans on this project are subject to reuse in accordance with F.S. 287.055(10).

13.0 CHANGES IN PROJECT TEAM-FOR SHORTLISTED FIRMS ****PLEASE NOTE****

- 13.1 A CHANGE IN THE PROJECT TEAM OF A SHORTLISTED FIRM AFTER THE SUBMISSION OF THE RESPONSE TO THIS RPS COULD RESULT IN RECONSIDERATION OF THE SCORING OF APPLICABLE EVALUATION CRITERIA.
- 13.2 ANY CHANGES IN THE PROJECT TEAM OF A SHORTLISTED FIRM SHOULD BE BROUGHT TO THE ATTENTION OF THE COUNTY AS SOON AS POSSIBLE AFTER THE CHANGE IS MADE. THE CHANGES, THE REASONS FOR THE CHANGES, AND RESUMES FOR THE INDIVIDUALS BEING SUBSTITUTED FOR AN ORIGINAL PROJECT TEAM MEMBER, MUST BE SUBMITTED, PRIOR TO ORAL PRESENTATION, TO THE INDIVIDUAL SPECIFIED AS CONTACT PERSON ON THE COVER SHEET OF THIS RPS.
- 13.3 NO INCREASES IN SCORING WILL RESULT FROM THE RECONSIDERATION OF CHANGES IN THE PROJECT TEAM OF A SHORTLISTED FIRM.
- 13.4 DECREASES IN SCORING MAY RESULT FROM THE RECONSIDERATION OF CHANGES IN THE PROJECT TEAM OF A SHORTLISTED FIRM.

14.0 CHANGES IN RPS REQUIREMENTS

- 14.1 No interpretation, explanations or clarifications of requirements of this RPS will be made, or can be relied upon, unless issued in the form of an RPS ADDENDUM.
- 14.2 Any addenda issued on this RPS shall become a part of the RPS and shall supersede previous requirements, conditions and time frames specified in the RPS and/or previous addenda.
- 14.3 **Include a signed copy of any addenda issued against this RPS with your response or separately if response has already been submitted. The signed addenda shall be submitted prior to the deadline of the RPS submittal date.**

15.0 ACCEPTANCE OF APPLICABLE POLICIES AND PROCEDURES

- 15.1 Firms responding to this RPS agree by submission of such response to accept and comply with the county policies and procedures that apply to the selection process for this project.
- 15.2 Any concerns, or issues, relating to current policies and procedures may be addressed with county staff, but separate from this selection process.

16.0 FAILURE TO PERFORM

Firms responding to this RPS agree by submission of such response that if, during the term of the resulting contract, the Consultant should refuse or otherwise fail to perform any of its obligations under the contract, the County reserves the right to:

- a) Obtain the services from another Consultant; and/or
- b) Terminate the contract; and/or
- c) Suspend/Debar the Consultant from proposing/bidding on Hillsborough County procurement/contracts for a period of up to 24 months and/or
- d) Pursue any and all other remedies available to the County.

17.0 SECURITY OF PLANS AND SPECIFICATIONS

Professional agrees to use care in protecting plans and specifications for County Infrastructure from access by unauthorized persons. *Release of documents or information other than as required to fulfill the scope of the contract is prohibited. The County's Project Manager is empowered to authorize release of documents.* Failure to protect these documents could jeopardize the safety of the citizens of Hillsborough County, so they must always be treated with the utmost care.

18.0 INSURANCE REQUIREMENTS FOR THE PROJECT

The following insurance coverage is required for this project. ***General Liability, Auto Liability, Garage Keepers, and Aircraft Insurance must include "Hillsborough County, a political subdivision of the State of Florida" as an Additional Insured.**

18.1 **Worker's Compensation and Employer's Liability Insurance:**

Employer's Liability:

Limit Each Accident.....	\$100,000
Limit Disease Aggregate	\$500,000
Limit Disease Each Employee	\$100,000

18.2 **Commercial General Liability Insurance:**

General Aggregate	\$1,000,000
Products - Completed Operations Aggregate	\$1,000,000
Personal and Advertising Injury	N/A
Each Occurrence	\$1,000,000
Fire Damage (Any One Fire)	N/A

18.3 **Business Automobile Liability Insurance:**

Bodily Injury & Property Damage Liability "ANY AUTO" Coverage is required. Proof of Auto Liability only, Add'l Insured waived.

Combined Single Limit Each Accident	\$1,000,000
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18.4 **Professional Liability – Architects and Engineers:**

Maximum Deduction	\$1,000,000
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18.5 **Aircraft Liability Insurance** shall be maintained by the **PROFESSIONAL** as to the ownership, maintenance, and use of all of its owned, non-owned, leased or hired aircraft with limits of not less than: Maximum Deduction..... N/A

18.6 **Pollution Liability Insurance:**..... N/A

19.0 PUBLIC ENTITY CRIMES STATEMENT

A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid, proposal, or reply on a contract to provide any goods or services to a public entity, may not submit a bid, proposal, or reply on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids, proposals, or replies on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017, Florida Statutes, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list.

Additionally, pursuant to COUNTY policy, a conviction of a public entity crime may cause the rejection of a bid, offer, or proposal. The COUNTY may make inquiries regarding alleged convictions of public entity crimes. The unreasonable failure of a bidder, offerer or proposer to promptly supply information in connection with an inquiry may be grounds for rejection of a bid, offer or proposal.

20.0 IRS FORM W-9, REQUEST FOR TAXPAYER IDENTIFICATION NUMBER AND CERTIFICATION

Firms must complete and submit one copy of the attached W-9 form in the unbound copy of their response to this RPS.

21.0 HILLSBOROUGH COUNTY BUSINESS TAX

All Proposers are requested to submit a copy of their Hillsborough County Business Tax Receipt in the unbound copy of their response to this solicitation, if applicable. The Business Tax Receipt must be current as of the opening date of this solicitation.

EXHIBIT I
PROFESSIONAL SERVICES COMMITTEE
CONSULTANT SELECTION CRITERIA
RATING GUIDE

EVALUATION CRITERIA NO. 1: ABILITY OF FIRM AND ITS PROFESSIONAL PERSONNEL (40)

- (0) Project team personnel do not have appropriate level of qualifications and experience. Project team does not contain all critical disciplines. Organization of project team is inappropriate. Prime firm lacks adequate professional resources to properly provide services. Proposed project manager is not appropriate.
- (1-10) Some project team personnel have adequate level of qualifications and experience. Project team lacks minor disciplines. Organization of project team is marginal. Prime firm's professional resources to properly provide services are marginal. Proposed project manager's qualifications are marginal.
- (11-20) Project team personnel have adequate level of experience. Project team contains all necessary disciplines. Organization of project team is adequate to the project. Prime firm has adequate professional resources to properly provide services. Proposed project manager's qualifications are adequate.
- (21-30) Project team personnel have above average level of experience and the project manager is uniquely qualified. Project team contains all necessary disciplines. Organization of project team is adequate to the project. Prime firm has superior professional resources to properly provide services.
- (31-40) Project team personnel have exceptional level of experience and several are uniquely qualified. Project team contains all necessary disciplines. Organization of project team is superior. Prime firm has exceptional professional resources to properly provide services. Proposed project manager is uniquely qualified.

EVALUATION CRITERIA NO. 2: FIRM'S EXPERIENCE WITH PROJECTS OF A SIMILAR SIZE AND TYPE (35)

- (1-7) Prime firm has marginal experience with projects of a similar size and type.
- (8-14) Prime firm has minor successful experience with projects of a similar size and type. Scope of services provided for representative projects vary from RPS Scope.
- (15-21) Prime firm has adequate successful, recent (within past five years) experience with projects of a similar size and type. Scope of services provided for representative projects are similar to RPS scope.
- (22-28) Prime firm has more than adequate successful, recent (within past 5 years) experience with projects of a similar size and type. Scope of services provided for representative projects are similar to RPS scope.
- (29-35) Prime firm has superior past and recent successful experience with projects of a similar size and type. Scope of services provided for representative projects are similar to RPS scope.

EVALUATION CRITERIA NO. 3: FIRM'S WILLINGNESS AND ABILITY TO MEET SCHEDULE AND BUDGET REQUIREMENTS (10)

- (1-5) Submittal does not address either the schedule or budget.
- (6-10) Submittal shows inadequate understanding of schedule and budget requirements.
- (11-15) Submittal shows adequate schedule approach and understanding of budget control. Project budget and schedule can be met or modified to meet project intent.

(16-20) Submittal shows good understanding of and approach to schedule and budget. Project budget and schedule can be met.

(21-25) Submittal shows superior understanding of and approach to schedule and budget with potential improvements for project delivery and cost savings.

EVALUATION CRITERIA NO. 4: EFFECT OF FIRM'S RECENT, CURRENT AND PROJECTED WORKLOAD (10)

- (0) Submittal shows that consultant does not have sufficient available personnel to complete services on schedule.
- (1-2) Submittal shows that consultant's workload commitments will impact its ability to complete services on schedule
- (3-5) Submittal shows that while consultant has adequate time and available personnel, prior workload commitments may impact its ability to complete services on schedule.
- (6-8) Submittal shows that consultant's project team has adequate time and available personnel to complete services on schedule.
- (9-10) Submittal shows that consultant's project team has adequate staffing available to complete services on schedule. Submittal indicates backup staffing capability in the event of unforeseen circumstances.

ENGINEERING

EVALUATION CRITERIA NO. 5: EFFECT OF PROJECT TEAM LOCATION ON PROJECT (5)

Scored by Evaluation Committee Chairperson ONLY

Note: "Local" is any county within the Tampa Bay Regional Partnership area, i.e. Hillsborough, Pinellas, Pasco, Polk, Manatee, Sarasota and Hernando Counties.

- (1) Non-local location of most of project team, including the prime firm and Project Manager, may adversely affect work quality and schedule.
- (2) Non-local location of some of project team, although prime firm and project manager may be local, may adversely affect work quality and schedule.
- (3) One or two key elements of project teams are non-local and may adversely affect work quality and schedule. All major sub-consultants (Civil, Structural, Mechanical, Electrical, Plumbing) are local.
- (4) Only minor elements of project team are non-local and probably will not affect work quality or schedule.
- (5) All of the project team is local.

**EXHIBIT II
CONSULTANT EVALUATION OF PAST PERFORMANCE
BY
PRIMARY DISCIPLINE**

RATING CONVERSION CHART

<u>AVERAGE SCORE</u>	<u>NUMBER OF POINTS</u>	<u>CAPES EVALUATION RATINGS</u>
100 - 97	5.00	25.00 - 24.25 = SUPERIOR
96 - 92	4.00	24.00 - 23.00 = SUPERIOR
91 - 84	3.00	22.75 - 21.00 = ACCEPTABLE
83 - 80	2.00	20.75 - 20.00 = ACCEPTABLE
79 - 75	1.00	19.75 - 18.75 = ACCEPTABLE
74 - 72	0.00	18.50 - 18.00 = MARGINAL
71 - 70	-1.00	17.75 - 17.50 = MARGINAL
69 - 68	-2.00	17.25 - 17.00 = MARGINAL
67 - 66	-3.00	16.75 - 16.50 = MARGINAL
65 - 64	-4.00	16.25 - 16.00 = MARGINAL
Below 64	-5.00	Below 16.00 = UNACCEPTABLE

NOTES REGARDING THE RATING CONVERSION CHART:

1. This conversion chart will be used in determining the past performance points to be assigned to a firm. The chart is based on the conversion of performance evaluation scores for the project's **primary** discipline (i.e. engineering, architecture, etc.) for Hillsborough County projects to past performance points.
2. The time period for which evaluations will be considered is 24 months prior to the submittal date. Firms with no prior evaluations on file will be assigned the County-wide average.
3. Scores falling between ranges (examples 56.40 and 69.56) will be rounded off as follows:
If the fraction is less than 0.5, the fraction will be dropped. (Examples: 56.40 would round to 56.0.)
If the fraction is 0.5 or greater, the score will be rounded to the next whole number. (Example: 69.56 would round to 70.0)

The Director of the Requesting Department is responsible for ensuring that evaluations (past performance) are conducted at a minimum at the end of each contract or work order (in the case of miscellaneous contracts). Interim evaluations may be completed at the reasonable discretion of the Requesting Department Director based on the length of the contract or work order. Evaluation data shall be provided to Department of Procurement Services through the Consultant Automated Performance Evaluation System (CAPES).

EXHIBIT III
VOLUME OF WORK POINTS

<u>DOLLAR VOLUME</u>	<u>POINTS</u>
\$0 - \$200,000	5.0
\$200,001 - \$400,000	4.0
\$400,001 - \$600,000	3.0
\$600,001 - \$800,000	2.0
\$800,001 - \$1,000,000	1.0
OVER - \$1,000,000	0

SUMMARY

- Maximum of five (+5) points
- The time period for which volume of work will be considered: the two (2) previously completed fiscal years
- Points are based on actual fees paid to the firm during the two (2) previously completed fiscal years, as retrieved from the Clerk of the Circuit Court's official financial accounting system (FAMIS)
- Point categories are incremented by 1.0 point
- No points are awarded when the two (2) year total exceeds \$1,000,000

**SECTION B
REQUIRED FORMS
AND ATTACHMENTS**

COVER SHEET FOR RESPONSE

RPS CHECKLIST

TABLE OF CONTENTS FOR PROFESSIONAL CONSULTANT RESPONSE

FIRM DATA SHEET

ATTACHMENT A (if firm is requesting DM/DWBE Participation bonus points)

ATTACHMENT B

EO/AA REQUIREMENTS

EO/AA GRID

PROFESSIONAL CONSULTANT RESPONSE FORMS

5.1 ABILITY OF FIRM AND ITS PROFESSIONAL PERSONNEL

5.2 FIRM'S EXPERIENCE WITH PROJECTS OF A SIMILAR SIZE AND TYPE

5.3 FIRM'S WILLINGNESS AND ABILITY TO MEET SCHEDULE AND BUDGET REQUIREMENTS

5.4 EFFECT OF FIRM'S RECENT, CURRENT AND PROJECTED WORKLOAD

5.5 EFFECT OF PROJECT TEAM LOCATION

PROFESSIONAL CONSULTANT SELECTION

COVER SHEET FOR RESPONSE

PROJECT TITLE: **PROFESSIONAL ENGINEERING SERVICES FOR DALE MABRY AWWTP
HEADWORKS REHABILITATION**

RPS-S-0062-0-2011/JSW

APPLICANT FIRM:

NAME: _____

ADDRESS: _____

TELEPHONE NUMBER: _____

FAX NUMBER: _____

CONTACT PERSON/TITLE: _____

ALTERNATE CONTACT PERSON/TITLE: _____

FEDERAL TAX ID NUMBER: _____

EMAIL ADDRESS: _____

RPS CHECKLIST

RPS-S-0062-0-2011/JSW

FIRM _____

YES	No	
_____	_____	1. Is your firm currently certified?
_____	_____	2. <u>If not currently certified, indicate if the following documents are being included in a separate packet for certification:</u>
	_____	Current Standard Form 330, Part II
	_____	Certificate of Status from Florida Department of State
	_____	Certificate of Registration from Florida Department of Professional Regulations
_____	_____	3. Four (4) copies (three (3) bound and one unbound) of your responses are provided.
_____	_____	4. All copies contain the completed FIRM DATA SHEETS for the prime firm.
_____	_____	5. All copies contain a response to each of the five evaluation criteria.
_____	_____	6. The responses are provided either on the response forms provided in the RPS or on reasonable facsimiles of the required forms.
_____	_____	7. If the responses are provided on reasonable facsimiles, both the format and content are The same as in the forms provided in the RPS.
_____	_____	8. The response to each of the criteria is within the specified page limits?
	_____	Criteria 5.1
	_____	Criteria 5.2
	_____	Criteria 5.3
	_____	Criteria 5.4
_____	_____	Criteria 5.5
_____	_____	9. One copy of optional ATTACHMENT A- DM/DWBE BONUS POINTS REQUEST is included.
	_____	A letter is included to request Bonus Points and specifies the number of Bonus Points requested
	_____	The required Letter of Intent from the subconsultant firm is included.
	_____	The firm is not certified by Hillsborough County, but is certified by DMS. A copy of the DMS Certification Letter is included.
	_____	ATTACHMENT A is in a separate envelope with Firm's name on the outside.
_____	_____	10. One copy of the required ATTACHMENT B - EQUAL OPPORTUNITY/AFFIRMATIVE ACTION QUESTIONNAIRE.
	_____	ATTACHMENT B is in a separate envelope with Firm's name on the outside.
_____	_____	11. One copy of all signed Addenda is included in unbound copy.
_____	_____	12. One copy of W-9 is completed and included in unbound copy.
_____	_____	13. One copy if Business Tax license is included, if applicable in unbound copy.
_____	_____	14. Signature page.

ONLY ONE COPY OF THIS FORM IS TO BE COMPLETED AND SUBMITTED WITH IN UNBOUND COPY

**TABLE OF CONTENTS
FOR
PROFESSIONAL CONSULTANT RESPONSE**



FIRM: _____

PROJECT: _____

RPS-S-0062-0-2011/JSW

<u>ITEM</u>	<u>PAGE</u>
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FIRM DATA SHEET	
EVALUATION CRITERIA	
5.1 ABILITY OF FIRM AND ITS PROFESSIONAL PERSONNEL	
5.2 FIRM'S EXPERIENCE WITH PROJECTS OF A SIMILAR SIZE AND TYPE	
5.3 FIRM'S WILLINGNESS AND ABILITY TO MEET SCHEDULE AND BUDGET REQUIREMENTS	
5.4 EFFECT OF FIRM'S RECENT, CURRENT AND PROJECTED WORKLOAD	
5.5 EFFECT OF PROJECT TEAM LOCATION	

FIRM DATA SHEET

Page 1 of 2

RPS-S-0062-0-2011/JSW

APPLICANT FIRM NAME: _____

ADDRESS: _____

TELEPHONE NUMBER: () _____

FAX NUMBER: _____

FEIN NUMBER: _____

CONTACT PERSON/TITLE: _____

Type Ownership: _____

Submittal for _____ Parent Company

_____ Branch or Subsidiary

Parent Company, if any

Former Parent Company/Companies:

Name/Title/Phone Number of two Principals in the firm:

Present Offices: City/State/Number of personnel for each:

FIRM DATA SHEET

Page 2 of 2

Personnel by Discipline: (For submitting office)
List each person only once, by primary function:

_____ Administrative	_____ Engineers	_____ Geologists
_____ Architects	_____ Chemical	_____ Hydrologists
_____ CADD Operators	_____ Civil	_____ Interior Designers
_____ Construction	_____ Electrical	_____ Landscape Architects
_____ Inspectors	_____ Mechanical	_____ Land Surveyors
_____ Draftsmen	_____ Mining	_____ Oceanographers
_____ Ecologists	_____ Sanitary	_____ Planner
_____ Economists	_____ Soils	_____ Urban/Regional
_____ Structural	_____ Specification Writers	_____ Transportation
_____ Others (Specify)		

SUBCONSULTANT FIRMS:

FIRM NAME AND ADDRESS

SERVICES TO BE PROVIDED

1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

ATTACHMENT A

DISADVANTAGED MINORITY / DISADVANTAGED WOMEN BUSINESS ENTERPRISE PARTICIPATION

Disadvantaged Minority / Disadvantaged Women Business Enterprise (DM/DWBE): Qualified firms may receive up to a maximum of six (6) bonus points for DM/DWBE participation. The term "DM/DWBE" shall mean a business that is certified as a *bona fide* DM/DWBE with Hillsborough County or has been granted reciprocal certification by Hillsborough County. Provisional Reciprocal Certification shall be granted for **one** six-month period to firms which are principally domiciled in the State of Florida and certified by other jurisdictions within the State. Owners of firms that are no longer economically disadvantaged and have graduated from Hillsborough County's program shall not be counted toward goal attainment through reciprocal certification, or a joint venture. The DM/DWBE Directory and a list of those firms that have graduated can be found on the county website at: <http://www.hillsboroughcounty.org/econdev/enterprise>

When requesting bonus points, firms shall include a copy of the certification letter issued to the DM/DWBE being utilized by the certifying governmental agency. It will be the responsibility of the proposing firm to furnish all the necessary information and documentation to the County in order to receive bonus points. **Only one level of participation may be chosen. Bonus points are not cumulative.** Bonus points will be assigned based on the level of DM/DWBE participation as outlined below:

Level	Certification Statements	Points
1	The applicant firm is a certified DM/DWBE and has issued a signed letter of commitment certifying that a minimum of 10% of its ultimate fees will be subcontracted to (an) other certified DM/DWBE(s), which is/are identified in the request for bonus points.	6
2	The applicant firm has issued a signed letter of commitment certifying that a minimum of 10% of its ultimate fees will be subcontracted to certified DM/DWBE(s), which is/are identified in the request for bonus points.	5

Submit one (1) bound copy of Attachment A.

The request for bonus points shall be made on company letterhead and must include the following:

1. The RPS number and project name.
2. The number of bonus points requested.
3. The name of the firm(s) to be utilized and the **corresponding certification statement** required for bonus points.
4. **A signed letter of intent from the DM/DWBE, on its letterhead, stating its intent to perform the services and the scope of work. This letter must reference the project.**
5. **A copy of the DM/DWBE's current certification.**

NOTE: FAILURE TO COMPLY WITH ANY OF THESE REQUIREMENTS WILL RESULT IN DENIAL OF THE REQUESTED BONUS POINTS.

SPECIAL NOTE: If the successful proposer has received bonus points, that firm will be required to submit to the DM/DWBE & SBE Programs Section of the Economic Development Department a copy of the executed subcontract agreement with each DM/DWBE listed in the letter of commitment. Annual reports detailing the amount of money paid to each DM/DWBE must also be submitted. Failure to provide this information may result in the denial of future bonus points.

If you have any questions, you may contact the Hillsborough County Economic Development Department by telephoning (813) 272-5969.

ATTACHMENT B

EQUAL OPPORTUNITY AND AFFIRMATIVE ACTION QUESTIONNAIRE

All proposers are required to respond to this questionnaire as it relates to their firm's employment practices. Joint ventures are required to submit a response to Attachment B for each firm in the joint venture. It is possible to obtain a maximum of 4 points in Attachment B.

Provide a completed workforce distribution matrix (EEO category grid), a copy of your firm's Affirmative Action Plan (AAP), and Equal Employment Opportunity Statement. **(Please Note:** An Affirmative Action Plan is required if your firm has at least fifteen (15) employees. If your firm has fewer than fifteen (15) employees, an Affirmative Action Policy Statement, Equal Employment Opportunity Policy Statement and a completed workforce distribution matrix are required. The two Policy Statements must be signed and dated by the firm's chief operating officer.)

Level	Certification Statements	Points
1	Properly completed workforce distribution matrix indicating EEO categories	1
2	Equal Employment Opportunity Policy Statement, signed and dated by chief operating officer.	.5
3	A complete Affirmative Action Plan which includes: self-analysis (0.5 point); goals (0.5 point); actions to be taken (0.5 point); discrimination complaint procedure (0.5 point). In addition the proposer shall provide a separate, signed statement of adherence to regulations and other provisions requiring non-discrimination in the employment of handicapped persons, disabled veterans, and veterans of the Vietnam Era (0.5 point). This statement must be signed by the firm's chief operating officer. (Firms having fewer than fifteen employees will be awarded 2.5 points for an Affirmative Action Policy Statement.)	2.5

Attachment B evaluation scores and comments are available from the Services and Construction Section of the Department of Procurement Services. For technical assistance or if additional information is needed concerning Attachment B, please call the DM/DWBE & SBE Programs Section of the Economic Development Department at 272-5969.

Due to the unchanging nature of corporate policy, responses to parts 2 & 3 above may be submitted on an annual basis (based on a calendar year) to the DM/DWBE & SBE Programs Section of the Economic Development Department. To exercise this option, firms must indicate on each proposal that their annual submittal is on file with the DM/DWBE & SBE Programs Section. The response to part 1 (EEO category grid) must be submitted with each proposal. Any revisions or updated goals in the AAP due to workforce composition changes should also be submitted as changes occur.

If you have any questions, you may contact the Hillsborough County Economic Development Department by telephoning (813) 272-5969.

FIRM NAME: _____

JOB CATEGORY	TOTAL EMPLOYEES		MALES					FEMALES				
	MALE	FEMALE	WHT	BLK	HISP	API	AI	WHT	BLK	HISP	API	AI
Officials & Managers												
Professionals												
Technicians												
Sales Workers												
Office & Clerical												
Craftsmen (Skilled)												
Operatives (Semi-Skilled)												
Laborers (Unskilled)												
Service Workers												
TOTAL												

HISP: Hispanic
 API: Asian/Pacific Islander
 AI: American Indian

Job categories as provided herein are those categories identified and used in EEO (1-6) reporting requirements, required from employers by the Federal government.

(DO NOT LEAVE THIS PAGE BLANK)

Substitute W-9

Request for Taxpayer Identification Number (TIN)

And Certification

PART I – PERSONAL or BUSINESS INFORMATION			
Please type or print legibly.	1-NAME of INDIVIDUAL, business name, or sole proprietor's name (as registered with the IRS-Internal Revenue Service)		
	2-BUSINESS NAME (DBA-doing business as), if different from above.		
	3-CHECK ONE BOX to identify the type of business named above. ☐ Individual/Sole Proprietor ☐ Partnership ☐ Corporation ☐ Non-profit 501(c) ☐ Associations/Estate or Trust ☐ Government Entity (Exempt under section 501(a)) ☐ Medical or Legal Corporation ☐ Foreign Entity(fill out appropriate W-form) ☐ LLC-Limited Liability Company (If business listed on line 2 is an LLC, must also select an LLC type from below) [] Disregarded entity [] Partnership [] Corporation [] Individual/Sole Proprietor (enter owner/individual's name on line 1 above, business/DBA name on line 2)		
	4-WITHHOLDING (Optional) ☐ Already subject to backup withholding ☐ Exempt from backup withholding		
	5-PROTECTED STATUS – Florida Statute 119.071(4)(d)		
	Are you a member of law enforcement (active or former), a firefighter, judge or any other protected status as defined by Florida Statute 119.071(4)(d)? ☐ Yes ☐ No		
	6-ADDRESS - Street (include apt # or suite number)		
	City _____ State _____ ZIP _____		
	E-mail address _____		
	PART II – TAXPAYER IDENTIFICATION NUMBER (TIN)		
Enter your TIN in the Appropriate box. The TIN provided must match the name given on Line 1 to avoid backup withholding. For individuals, this is your social security number (SSN). For other entities, it is your employee identification number (EIN).			
SSN		TIN / EIN	
PART III - CERTIFICATION			
Under penalties of perjury, I certify that:			
1	The number shown on this form is my correct TIN (tax payer identification number) or I am waiting for a number to be issued to me, <u>and</u>		
2	I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding <u>and</u>		
3	I am a U.S. citizen or other U.S. person (see definition below).		
The IRS does not require your consent to any provision of this document other than the certifications required to avoid backup withholding			
Sign here >			Date >

Florida Statute 119.07 (5) and the Federal Privacy Act of 1974; Collection of Social Security Numbers

The Hillsborough County Clerk of the Circuit Court collects your social security number for the purposes of tax reporting to the Department of the Treasury, Internal Revenue Service (IRS) and for identity verification purposes. Florida Statute 119.07 (5) and the Federal Privacy Act of 1974 require the Clerk to notify you in writing of the reason for collecting this information which will be used for no other purpose than herein stated.

GENERAL INSTRUCTIONS (section references are to the Internal Revenue Code unless otherwise noted).

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners' share of the income from such business. Further, in certain cases where a form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.

ONE COPY OF THE BUSINESS TAX LICENSE MUST BE SUBMITTED IN THE UNBOUND COPY FOR FIRMS WITH AN OFFICE IN HILLSBOROUGH COUNTY

FIRMS CAN OBTAIN INFORMATION ABOUT THE LICENSE AT:

<http://www.hillstax.org/occweb/default.asp>

PROFESSIONAL CONSULTANT RESPONSE FORMS

THIS SECTION MUST CONTAIN EACH SUBCATEGORY LISTED IN THIS RPS, SECTION A, AT A MINIMUM AND MUST BE WITHIN THE PAGE LIMITATIONS STATED AND NUMBER OF PROJECTS LISTED WHERE INDICATED. ANY PAGES EXCEEDING THE LIMITATIONS WILL BE REMOVED FROM ALL COPIES OF THE PROPOSAL AND WILL NOT BE FORWARDED TO THE EVALUATION COMMITTEE MEMBERS FOR EVALUATION.

- 5.1 ABILITY OF FIRM AND ITS PROFESSIONAL PERSONNEL
- 5.2 FIRM'S EXPERIENCE WITH PROJECTS OF A SIMILAR SIZE AND TYPE
- 5.3 FIRM'S WILLINGNESS AND ABILITY TO MEET SCHEDULE AND BUDGET REQUIREMENTS
- 5.4 EFFECT OF FIRMS RECENT, CURRENT AND PROJECTED WORKLOAD
- 5.5 EFFECT OF PROJECT TEAM LOCATION

5.2 FIRM'S EXPERIENCE WITH PROJECTS OF A SIMILAR SIZE AND TYPE

1. Project Title: _____
2. Project Location: _____

3. Project Description: _____

4. Owner's Contact Name and Address: _____

Contact Person/Phone No.: _____
5. Project costs at project completion: Design: _____
Construction: _____
6. Were the Design Services completed within budget? _____
If not, what were the original design fees? _____
7. Were the Construction Services completed within budget? _____
8. Project Duration (Dates):
 - a. Design: Start Date: _____ Completion Date _____
 - b. Construction: Start Date: _____ Completion Date _____
9. Were the Design Services completed within schedule? _____
If not, what was the original design completion date: _____
10. Were the Construction Services completed within schedule? _____
11. If not, what was the original construction schedule? _____
12. Location of office performing work: _____
13. Was applicant the prime firm? _____ Or Subconsultant firm? _____
14. Was work performed in-house? _____
15. Type/Scope of services provided: _____
16. Names of key team personnel for this project: _____
17. Which members of your proposed team worked on this project? _____

I hereby certify that the information provided in this response is accurate, complete, and current at the time of submission.

PROFESSIONAL: _____

BY: _____
AUTHORIZED SIGNATURE

TITLE: _____

DATE: _____

SECTION C SCOPE OF SERVICES

Scope of Services

The Consultant shall perform professional services for the County related to conceptual design, preliminary design, final design, permitting, bidding, project management, and construction services for the Dale Mabry AWWTP Headworks Rehabilitation Project.

Project Description

The Dale Mabry Advanced Wastewater Treatment Plant (AWWTP), owned and operated by Hillsborough County Public Utilities Department (Water Resource Division), is a race track type oxidation ditch activated sludge treatment plant that has a design flow of 6.0 mgd. (see attached aerial photo). The plant headworks was originally constructed in 1977 with a single grit chamber. In 1982, a second grit chamber was added and adjacent conditioning tank was constructed. During the service life of the headworks and the conditioning tank, the concrete has deteriorated through aging, oxidation, chemical attack and abrasion.

The initial phase of the refurbishment project would be to conduct a complete structural assessment of the headworks and the conditioning tank and to produce a structural assessment report. McKim & Creed has already made a structural assessment of the grit chamber area and this assessment report is included as Attachment A.

To support the structural assessment, the Water Resource Division (WRD) will provide the services of a construction contractor. The Contractor will assist with removing channel covers, install dams in channels, operate bypass pumps if required, drain and clean tanks, pressure wash tanks and assume responsibility for site safety and confined space entry. ENGINEER will coordinate with the assigned Contractor but Contractor costs shall be paid directly by WRD.

Following completion of the structural assessment, the ENGINEER shall produce a draft conceptual report which will develop a minimum of three alternatives for replacement or refurbishment of the headworks and conditioning tank. The draft report shall discuss advantages and disadvantages of replacement versus refurbishment taking into account the cost for the alternative, expected life for the structures and possible advantages for the treatment process. Community and public relations issues, including odor control, noise and visual impact, shall be considered in all aspects of the project. A new Bioway odor control system was constructed adjacent to the headworks and conditioning tank within the past few years and should be an integral part of the design. The Dale Mabry AWWTP treatment process was recently modeled by Parsons, Inc. and their evaluation report is present as Attachment B to this scope.

A draft conceptual report shall be presented in a meeting to WRD staff for discussion of the alternatives. County staff will work with the Consultant to create a framework for choice of the desired alternative. A financial analysis of alternatives shall be included in the report. Capital cost will be a major consideration in the choice of recommended alternative.

Once the recommended alternative has been finalized, the Consultant will proceed to Preliminary Design (30%) of that alternative. Preliminary design will include 30% cost estimate with contingency that will be suitable for project budgeting.

After the Preliminary Design has been completed and accepted by the County, Consultant will proceed to Final Design. Final Design shall include, but is not limited to, preparation of drawings and specifications, design milestone submittals, review meetings, permitting, agency coordination, survey, geotechnical, cost estimates and field reviews. The recommended alternative may include immediate repair measures for valves and some concrete repairs. ENGINEER will assist WRD with identification of repairs and supervision of WORCS contractor. The construction methodology must take into account need for treatment plant to be operating continuously. It is expected that up to half of the design flow can be exported to the Northwest Advanced Wastewater Treatment Plant via the onsite Brushy Creek Pump Station.

Bidding shall include, but is not limited to, bid package material collection, pre-bid conference, addendum preparation, and review of bids.

Construction Services shall include, but are not limited to, pre-construction conference, shop drawing approval, schedule review, respond to contractor RFI's, change order/AAR's, site visits, progress meetings, construction administration, as-built verification/documentation, pay request review/approval, engineering support, construction inspection, liaison responsibilities and permit compliance.

Closeout Services shall include, but are not limited to, permit closeout requirements, punch lists, record drawing completion and introduction of new asset into PUD asset management database. The County intends to award one contract and the term of the agreement will be until project completion. The exact timing to completion will depend on the alternative chosen.

Hillsborough County intends to award one contract. The term of the Agreement will be until project completion.

Desired Design Schedule

<u>Deliverable</u>	<u>Calendar Days after NTP</u>
Structural Assessment Report	90 days
Conceptual Report	120 days
<u>Deliverable</u>	<u>Calendar Days after Approval of Conceptual Report</u>
30% Design Documents	120 days
90% Design Documents	TBD
Final Design	TBD

SECTION D

AERIAL VIEW OF DALE MABRY ADVANCED WASTEWATER TREATMENT PLANT





3802 Ehrlich Road Suite 306
Tampa, Florida 33624

PH (813) 549-3740
FAX (813) 549-3744

FINAL MEMORANDUM

DATE: July 15, 2010

TO: Gita Iranipour, PhD

FROM: Matthew Love, PE

CC: Kay McKormick, Al Martini

RE: Hillsborough County CIP No. 10745
Dale Mabry AWWTP Grit Classifier Rehabilitation
Grit Chamber #2 (East Unit) Structural Evaluation

Project Background and Purpose

The purpose of this technical memorandum is to summarize the findings of a field investigation conducted by McKim & Creed (Engineer) at the Dale Mabry Advanced Wastewater Treatment Plant (DMAWWTP) for the structural condition of the east grit chamber and to make short-term repair recommendations to extend the service life of the east grit chamber until the headworks can be rehabilitated or replaced.

The screening structure of the headworks was initially constructed in 1977. The west grit chamber is 28 years old, installed in 1982, and the east grit chamber is 22 years old, installed in 1988. Odor control was installed with the 1988 improvements and upgraded as recently as 2005. Over the service life of the grit chambers, the concrete has deteriorated through aging, oxidation, chemical attack and abrasion.

The County currently has a capital improvement plan (CIP) project to replace or rehabilitate the existing headworks. The grit removal mechanism in the east grit chamber failed in 2008. This event validated improving or replacing the existing headworks. McKim & Creed was brought in to evaluate the condition of the grit facility and to make recommendations for a short term 10-year repair to complement the current CIP project. During the preparation of these

recommendations, it was determined that McKim & Creed personnel would be unable to enter into the grit chamber under the County's confined space program. This dictated the structural assessment component of this project to be performed during construction. Since the preparation of the recommended repairs for the short term fix, the grit removal mechanism in Grit Chamber #1 (west grit chamber) has experienced structural equipment support beam failure. Currently, equipment is listing to one side and has been in that condition since late 2009. The equipment has been turned off and taken out of service. However, the upstream grit bypass gate is seized closed and flow can not be diverted from the west grit chamber until the east grit chamber is repaired and returned to service.

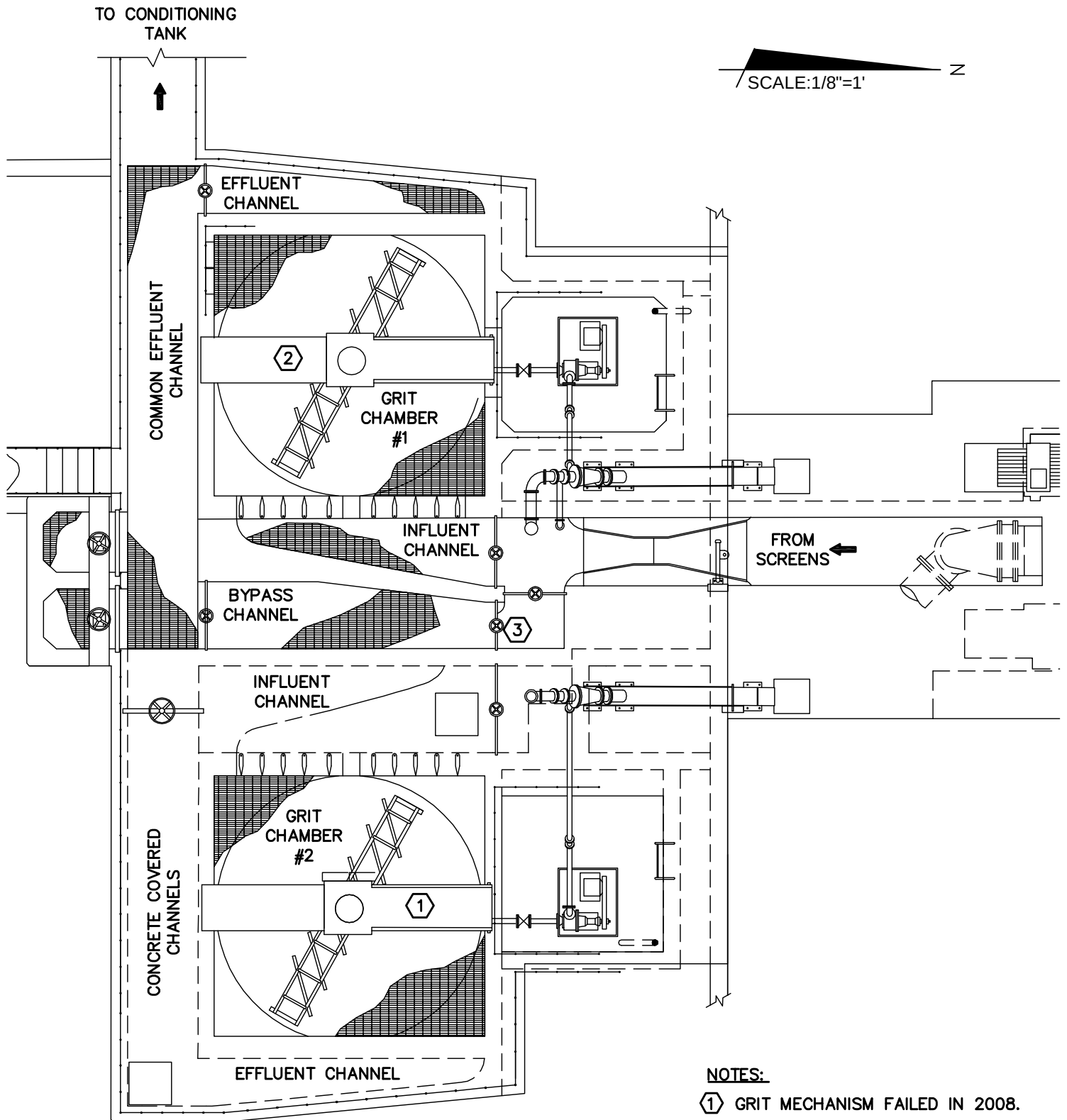
Structural Field Inspection

After the grit tank structure was pressure washed by the on-site Contractor (TLC), the structural condition of the east grit chamber was visually and non-destructively investigated on June 15, 2010 by McKim & Creed personnel. The following paragraphs discuss the condition of the reinforced concrete grit structure and aluminum support structure for the tread plating. Photos and locations within the grit chamber are described using north, south, east and west orientations. See **Figure 1** for illustration of grit chambers and orientation.

Grit Chamber

The condition observed at the east grit chamber is typical for pretreatment structures that have been in service for more than 20 years and that have corrosive service conditions created by the release of hydrogen sulfide from the waste stream. The chamber has a bitumastic coating system that does not provide adequate corrosion resistance from hydrogen sulfide attack. There were signs of chemical attack at the water line, concrete cracks and corrosion of the reinforcement and miscellaneous metals supporting equipment and the walkway platform. The chemical attack was contained within an approximate 2-foot wide strip located above the waterline (see **Photo 1**). The chemical attack is most likely due to the presence of hydrogen sulfide in the wastewater.

FIGURE 1



NOTES:

- ① GRIT MECHANISM FAILED IN 2008.
- ② GRIT MECHANISM FAILED IN 2009.
- ③ GATE IS SEIZED CLOSED.



1365 Hamlet Avenue
Clearwater, FL 33756
Phone: (727)442-7196,
Fax: (727)461-3827

AA0002867 EB0006891
www.mckimcreed.com



HILLSBOROUGH COUNTY
WATER RESOURCE SERVICES
ENGINEERING & ENVIRONMENTAL SERVICES GROUP
925 E. TWIGGS STREET/TAMPA FLORIDA 33602/PH. (813) 272-5977

EXISTING
GRIT CHAMBERS AT
DMAWWTP HEADWORKS

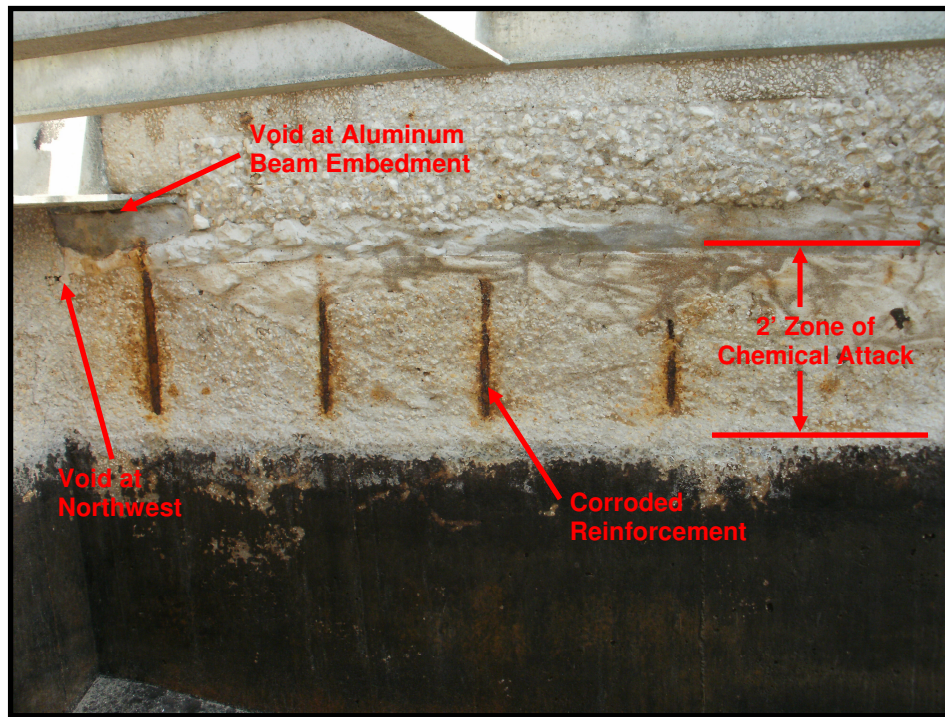


Photo 1: Chemical attack of north wall of the grit chamber toward the west end. Note the reduced concrete section and corroded reinforcement above the waterline.

The record drawings reviewed indicated reinforcing bars (rebar) should have been installed with 3" clear cover of concrete. The chemical attack of the concrete in the grit chamber has caused loss of concrete material up to 3-inches in depth (see **Photo 2**). This band of chemical attack was observed on both the north and south walls. The east and west walls are common to the effluent and influent channels of the structure and are addressed in their respective sections of this memorandum.

The reinforcement corrosion observed was minor rust on the surface of exposed rebar. Bar diameter measurements indicated there has been a minimal loss of the cross sectional area of the rebar. An area where a large section of reduced bar was observed was the west wall at the southwest corner (see **Photos 5 and 6**). Corroded rebar was observed on both the north, south and west walls and was primarily located toward the west side of the structure. The reinforcement corrosion observed on the north wall was within approximately 4-feet of wall starting from the influent channel and the

reinforcement corrosion observed on the south wall was within approximately 5.5-feet of wall from the influent channel (see **Photos 3 – 6**).



Photo 2: Chemical attack and corroded reinforcement of west wall at the northwest corner of the grit chamber. Note the wall is common to the influent channel beyond.

In several areas, small voids in the concrete were observed. At locations in the north wall, an ice pick was inserted and was able to move freely. Depths at which personnel were able to insert the pick in to the concrete varied and were approximately $\frac{1}{2}$ " minimum depth. Corroded rebar could be seen within some of the voids as well (see **Photos 7 and 8**).

The greater level of corrosion is concentrated on the west end of the grit chamber structure due to a drop in velocity as the wastewater enters the chamber through the vanes, resulting in a release of dissolved hydrogen sulfide in the wastewater. The structure walls were checked for subsurface voids using a hammer to strike the wall and listen for changes in tone. With the exception of those areas previously discussed, no additional void areas were detected.



Photo 3: Chemical attack and exposed and corroded reinforcement at the south wall.



Photo 4: Chemical attack and exposed and corroded reinforcement of west wall at the support section of concrete at the approximate center of the opening to the influent channel beyond.



Photos 5 and 6: Exposed and corroded reinforcement of the west wall at the southwest corner of the grit chamber. Note the wall is common to the influent channel beyond.

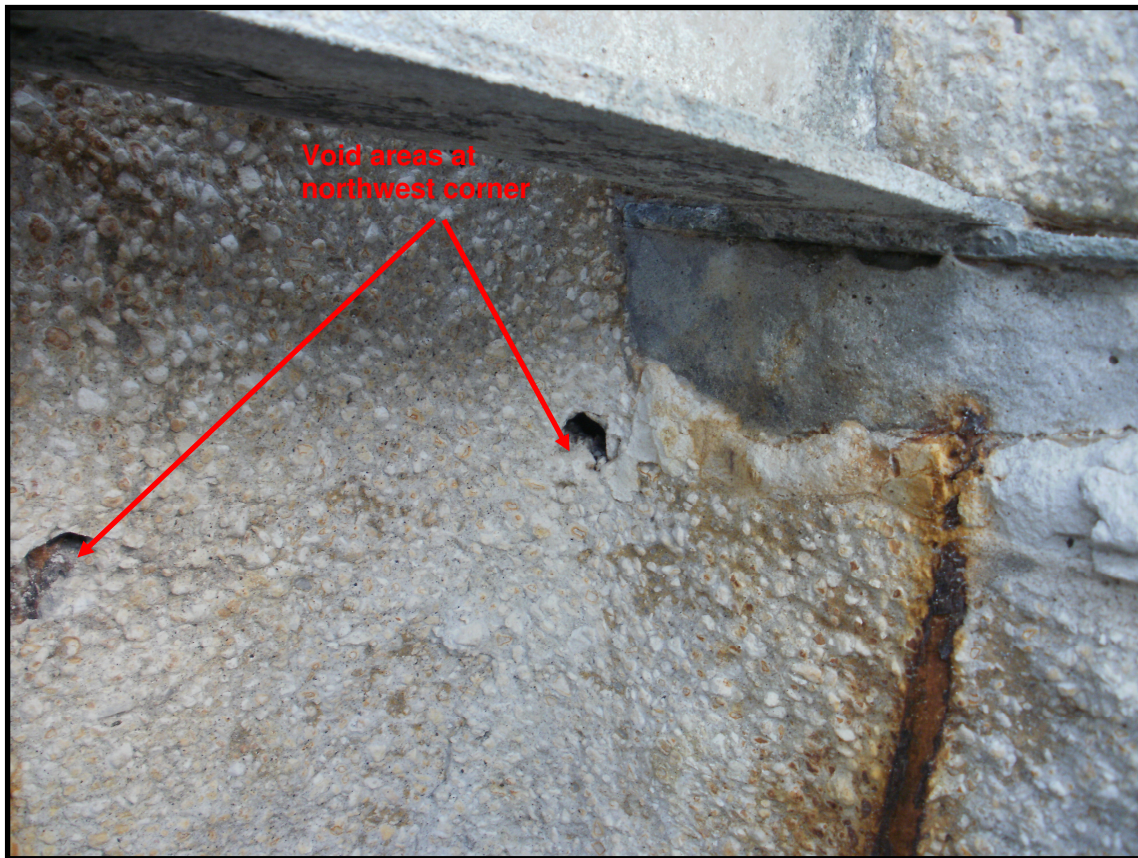


Photo 7: Small voids in the concrete of the north wall at the northwest corner of the grit chamber.



Photo 8: Close-up view of corroded reinforcement within the void.

Additionally, two diagonal cracks were observed near the top of the north wall. These cracks appeared to extend downward and away from the miscellaneous metal aluminum embedments above. (see **Photos 9 and 10**). These cracks were located in the vicinity of equipment support beams. It is our opinion that they are caused by mechanical stresses acting at the embedment rather than the chemical attack described previously. No cracking was observed in the south wall. Some hairline cracks were observed intermittently toward the center of the base slab of the grit chamber.



Photos 9 and 10: Diagonal cracks observed in the north wall at aluminum beam embedment locations.

At many of the embedment locations for the existing aluminum beams, the grout used to level the beams had deteriorated and resulted in voids (see **Photos 11** and **12**). An ice pick was easily inserted into several of these voids up to the handle and rotated freely, suggesting that the grout could be severely deteriorated behind the surface.



Photos 11 and 12: Deterioration of grout and voids at embedment locations of aluminum beams.

Influent Channel

The influent channel wall was beyond the scope of McKim & Creed's review of the Grit Chamber. Based upon its location and sharing a common wall with the grit chamber it was not difficult for McKim & Creed personnel to view those areas where the channel transitioned into the grit chamber. Signs of corrosion were not observed, except in those portions where the channel transitioned through the vanes into the grit chamber (see **Photo 13**). In regard to surface preparation of the concrete, the influent channel area had not been prepared for us to review.



Photo 13: Condition of the influent channel west wall, typical of channel walls observed during our review.

Effluent Channel

The effluent channel wall (similar to the influent channel) was beyond the scope of McKim & Creed's review of the Grit Chamber. Based upon its location and sharing a common wall with the grit chamber, McKim & Creed personnel was able to view those areas, where the channel transitioned from the grit chamber. It should also be noted that in regard to surface preparation of the concrete, the effluent channel area had not been fully prepared for us to review.

We observed a substantial amount of chemical attack on the east effluent channel wall, where the wastewater drops over a short weir into the effluent trough, resulting in a release of dissolved hydrogen sulfide. The loss of concrete has progressed deeper than the first mat of rebar on the channel wall and concrete walkway. Prior to our site review, the Contractor hydro-blasted an approximate 2-foot by 2-foot section of the east wall of the effluent channel, revealing corroded reinforcement in both the wall and the slab above (see **Photo 14**). This corrosion was observed to be more pronounced along the south wall of the effluent trough and at the access hatch (see **Photo 15**).



Photo 14 (left): Exposed and corroded reinforcement in the wall section hydro-blasted by the Contractor.

Photo 15 (right): Exposed and corroded reinforcement at the south end of effluent channel.

Aluminum Framing and Beams

The miscellaneous metals aluminum beams supporting equipment and walkway platforms were in place. Although discoloration and light surface pitting were observed on the webs and bottom flanges, no major signs of deterioration resulting in areas of section loss or distress, were observed on the beams. In regards to the areas of embedment reference the “Grit Chamber” section of this memorandum above.

Recommendations

In general there are two types of concrete surface repair applications recommended. The type of repair is dependent upon the location in the chamber and the severity of the existing degradation and corrosion. The repair materials are summarized below and products listed in **Table 1**.

Type I Repair: Utilize this method at locations where bar reinforcing has not been exposed and concrete section loss is $\frac{1}{2}$ ” depth or less. Existing voids, bug holes and surface cracks should be filled / sealed with an underlayment material after the proper surface preparation has been conducted. In general this work should conform with SSPC-SP13 / NACE 6 “Surface Preparation of Concrete” in addition to any additional work required by the underlayment material vendor.

Type II Repair: Utilize this method at locations where bar reinforcing has been exposed and concrete section loss is greater than ½" depth. All concrete wall and slab surfaces and exposed reinforcement should be sand blasted until a strong, hard, abrasive and roughened concrete material free of voids is achieved. At these locations the concrete voids should be less than ¾" diameter and the concrete surface should be unable to receive penetration from a sharp tool or instrument (i.e. an ice pick). At locations where reinforcement is currently exposed, a minimum of ¾" of concrete is to be removed to expose area all around the bars. At locations where the reinforcing bar has lost a substantial amount of section (greater than 1/8" diameter), a new reinforcing bar is to be installed and anchored to the concrete with a cement based injection adhesive. After reinforcing has been exposed or new reinforcing bars installed, coat all reinforcing with an anti-corrosion coating and bonding agent. Install structural repair cementitious, fiber reinforced high strength shrinkage compensated mortar after the proper surface preparation has been conducted. The wall mortar should then be installed to return the wall to a plumb vertical face condition with a consistent minimum 3" clear cover of concrete of the rebar. In addition the surface condition should be sufficient to provide an adequate base for application of an underlayment material similar to the "Type I Repair" noted above. This underlayment material is to be installed after the repair mortar has cured (see **Attachment No. 1** of this memorandum for additional information).

Regardless of whether Type I or Type II repair procedure the concrete will receive a protective top coating specifically formulated to provide a chemical resistant barrier over the concrete and its reinforcing steel in accordance with the contract documents. This barrier will apply to all interior faces of the grit chamber walls and beams and the exposed face surfaces of the walls and beams common to the grit chamber and the adjacent influent and effluent channels. The limits of this barrier will be the outer face surfaces of the walls and beams common to the exterior grit chamber and the adjacent influent and effluent channels.

Base Slab Repair: The base slab should be grouted to provide a tight seal between the interior top face of the slab and the rake arms and blades using a non-shrink cementitious grout. No coating is recommended for the grit chamber floor as it will be in contact and scraped by the rake assembly.

Aluminum Beam Repair: In regards to the aluminum beams it is recommended the aluminum beams should be supported and shored while the existing grout below the bearing plates is chipped out, removed and the cavities sand blasted. The cavities should be filled using the non-shrink cementitious grout utilized for the top of the base slab and noted above. The shoring system is to be kept in place until the material has cured.

It was previously noted in the “Project Background and Purpose” section above that the Grit Chamber #1 (west grit chamber) has experienced structural equipment support beam failure. To help minimize the potential for future similar occurrences for the gas cover tread plating support framing, it is recommended installing aluminum clip angles to the bottom flange of the existing I9x8.36 aluminum beam. These same angles are to be anchored to the interior face of the existing concrete wall with a cement based injection adhesive (see **Attachment No. 2** of this memorandum for additional information).

Table 1 – Surface Applications

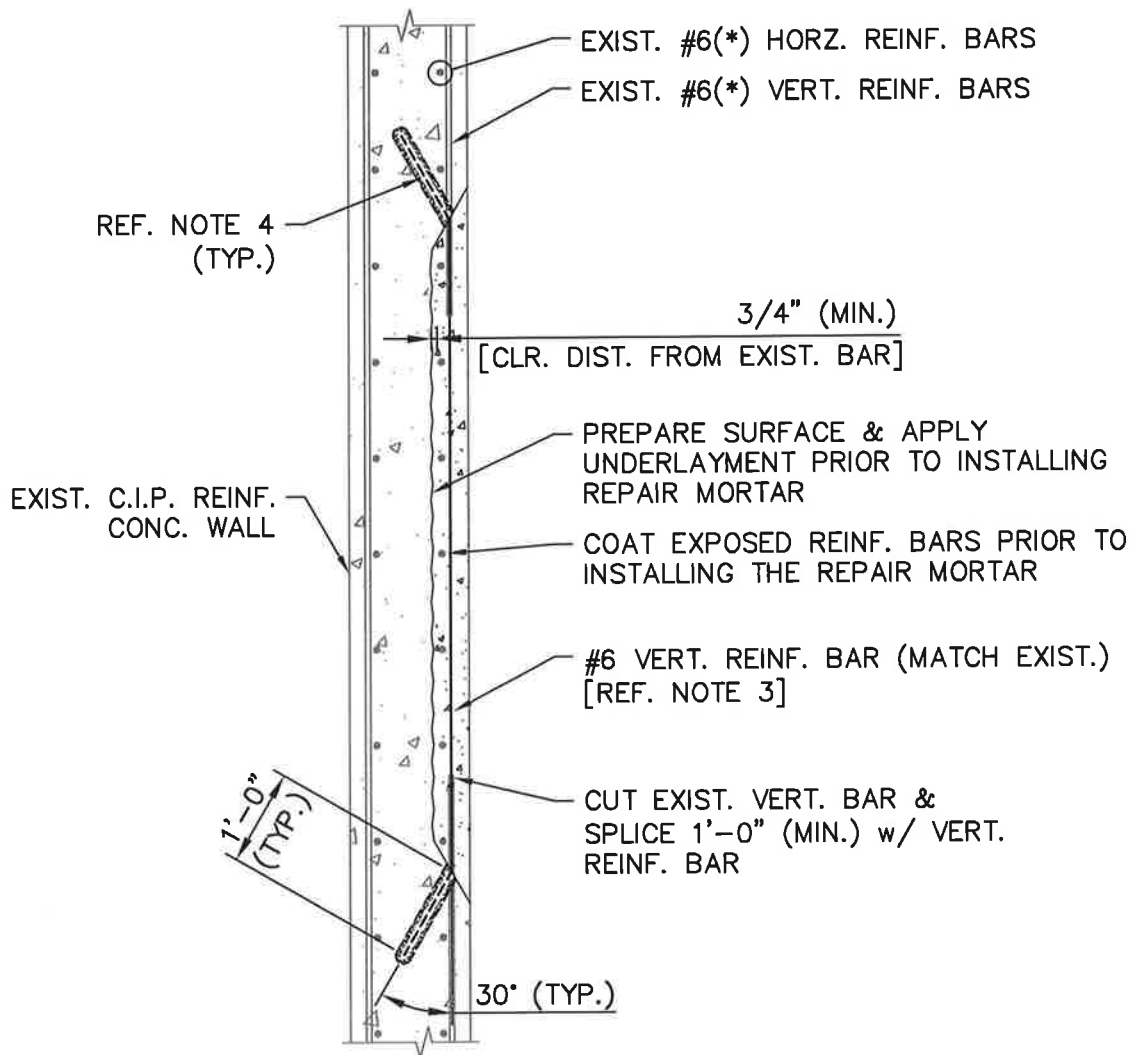
APPLICATION	PRODUCT
Type II Concrete Repair Mortar	SikaRepair 224
Type I/II Repair Coating Underlayment	Sauereisen F-120
Type I/II Repair Top Coating	Sauereisen 210G
Reinforcing Bar Coating	Sika Armatec 110 EpoCem
Non-Shrink Grout	SikaGrout 212
Injection Adhesive Anchors	Hilti HY150

Repair Quantities: The quantities for each type of repair are presented in **Table 2**. Type I Repairs on the north, south, east and west walls will extend 1-foot down from the top of tank. Type II Repairs on the north and south walls will extend 2.5-feet down from the Type I Repair limit to the waterline. Type II Repairs on the east and west walls will extend 2.5-feet down from

the Type I Repair limit to the waterline and wraps into the openings stopping at the influent/effluent channels. Quantities provided are approximate and should be field verified by the Contractor.

Table 2 – Estimated Quantities

REPAIR TYPE	ESTIMATED QUANTITY
Type I	65 sf
Type II	160 sf
Aluminum Repair	4 locations



1 - DETAIL - EXIST. WALL "TYPE II" REPAIR MODIFICATION

SCALE: 1/2"=1'-0"

NOTES:

1. THE (*) SYMBOL NOTED w/ DIMENSIONS & CALL-OUTS REFERS TO EXIST. CONSTRUCTION. THE GENERAL CONTRACTOR (GC) IS RESPONSIBLE FOR VERIFYING ALL EXISTING DIMENSIONS & CONDITIONS PRIOR TO CONSTRUCTION, INCLUDING ORDERING & FABRICATING MATERIALS.
2. IN GENERAL CALL-OUTS ARE FOR NEW CONSTRUCTION U.N.O..
3. THE GC HAS THE OPTION TO INSTALL (1) SINGLE VERTICAL BAR ANCHORED TO WALL AS SHOWN OR INSTALL (2) SEPARATE VERTICAL BARS SPLICED 3'-1" (MIN.) w/ & (1) END OF THE BAR ANCHORED TO THE WALL AS SHOWN.
4. ANCHOR VERTICAL BAR w/ SKEWED LEG TO EXISTING CONCRETE w/ HILTI HY150 INJECTION ADHESIVE & EMBED IN WALL 1'-0". INSTALL ADHESIVE PER MFG.'s RECOMMENDATIONS & ENSURE CORE DRILLED HOLES ARE CLEAR OF ALL LOOSE DIRT & DEBRIS PRIOR TO INSTALLING ADHESIVE.



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GRIT CHAMBER STR. EVALUATION ATTACH. No. 1:
TYPE II WALL REPAIR MOD

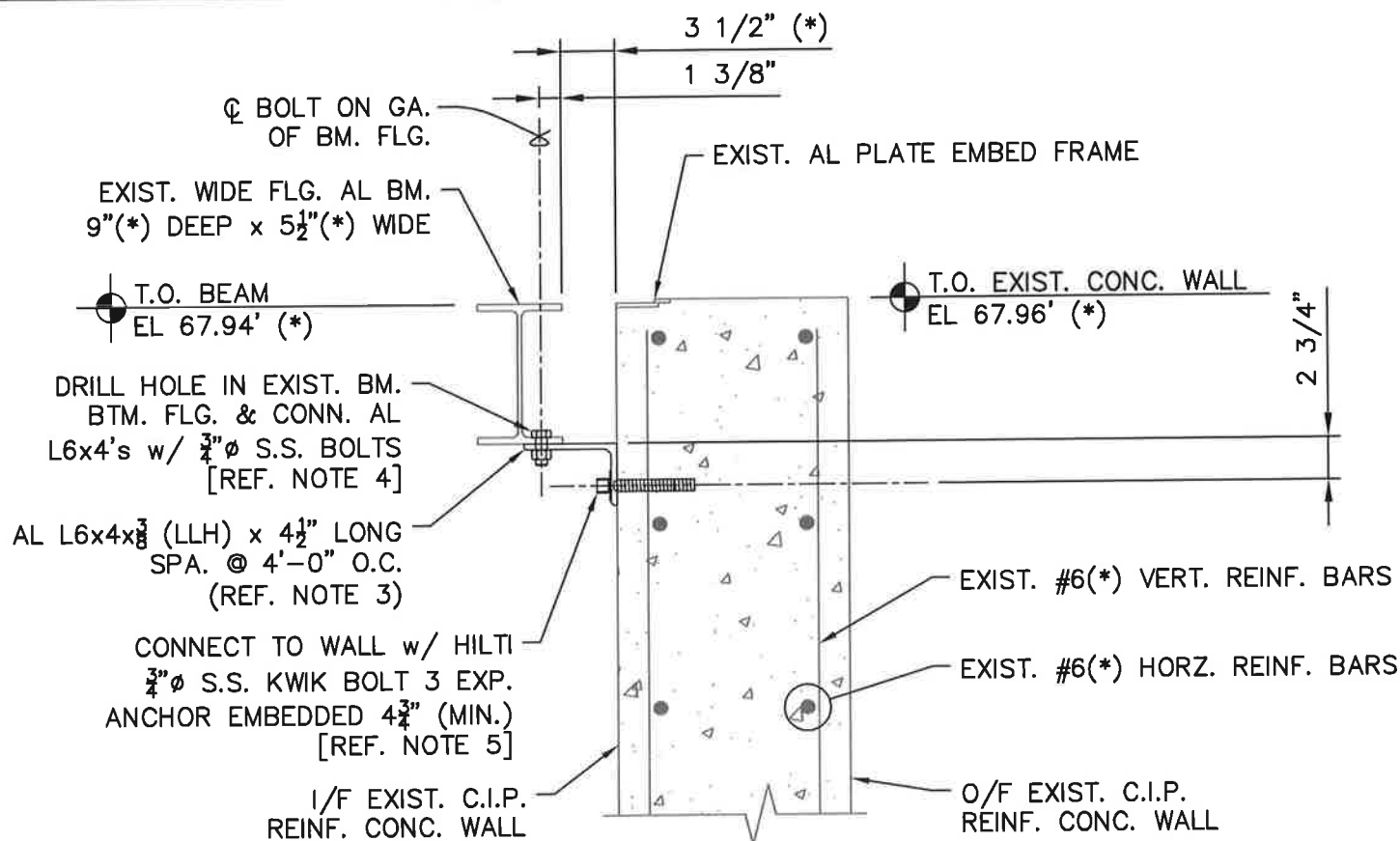
Hillsborough Co., Dale Mabry AWWTP

JOB# 1179-0009

DATE: 07/13/10

SK-S1

SHEET 1 OF 1



1 - DETAIL - EXIST. AL EDGE BEAM MODIFICATION

SCALE: 1"=1'-0"

NOTES:

1. THE (*) SYMBOL NOTED w/ DIMENSIONS & CALL-OUTS REFERS TO EXIST. CONSTRUCTION. THE GENERAL CONTRACTOR (GC) IS RESPONSIBLE FOR VERIFYING ALL EXISTING DIMENSIONS & CONDITIONS PRIOR TO CONSTRUCTION, INCLUDING ORDERING & FABRICATING MATERIALS.
2. IN GENERAL CALL-OUTS ARE FOR NEW CONSTRUCTION U.N.O..
3. THE GC IS TO INSTALL ALUMINUM (AL) L6x4's 2'-0" FROM THE I/F OF CONCRETE WALL EACH END OF THE EXISTING AL I9x8.36 WALKWAY/COVER BEAM. INSTALL AL L6x4's SPA. @ 4'-0" O.C. BETWEEN THE (2) END ANGLES.
4. PRIOR TO CONNECTING AL L6x4's TO EXIST. BEAM COAT ALL SURFACES IN CONTACT w/ PRIMER & COATING IN ACCORDANCE w/ THE CONTRACT DOCUMENTS.
5. CENTER THE 4" LEG BOLT HOLES ALONG THE 4 1/2" LENGTH & PROVIDE STANDARD DIAMETER LONG SLOTTED (LSL) HOLES 1 3/8" WIDE x 1 7/8" LONG. COAT ALL ANCHOR BOLT HOLE EDGES AND AL L6x4 SURFACES IN CONTACT w/ CONCRETE w/ BITUMASTIC OR AN APPROVED EQUAL.



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GRIT CHAMBER STR. EVALUATION ATTACH. No. 2:
GAS COVER ALUMINUM SUPPT. FRMG. MOD

Hillsborough Co., Dale Mabry AWWTP

SK-S2

JOB# 1179-0009

DATE: 07/13/10

SHEET 1 OF 1

Dale Mabry
Advanced Wastewater Treatment Plant
Process Modeling using BioWin™ to
Evaluate the Need for Methanol Feed

Technical Memorandum

Prepared for



Hillsborough County
Florida

Prepared by

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Executive Summary

The Dale Mabry Advanced Wastewater Treatment Plant (AWTP), owned and operated by Hillsborough County, FL, is a race track type oxidation ditch activated sludge treatment plant that has a design flow of 6.0 mgd. The following technical memorandum documents the preparation of an advanced wastewater treatment plant process model using BIOWIN™ 3.0, and provides recommendations to modify existing processes to comply with effluent requirements without the use of a methanol feed system to enhance denitrification. The existing operation of this facility, which has averaged an influent flow of 4.7 mgd for the past 20 months, does not feed methanol as an external carbon source to the deep-bed filters, and it complied with the effluent requirement of 3.0 mg/L TN for all but three of the past 20 months. The model used was first calibrated using the data compiled over the 20 month period from January 1, 2007 through August 31, 2008, and the kinetic and stoichiometric coefficients developed during the calibration were then used to project the performance of the AWTP at higher loadings. It is believed, based upon the results of the modeling study, that with further optimization of the plant to operate with enhanced biological phosphorus removal (EBPR) and with utilization of automatic monitoring systems, the existing treatment facility could reliably comply with all of its effluent requirements up to its design average flow of 6.0 mgd without the addition of methanol to enhance denitrification, and without expansion of the existing reactors.

Based on process model results an additional 150 HP of aerator capacity is required as a minimum to meet the effluent quality requirements reliably and consistently at the design flow and current average wastewater influent characteristics.

Adding a new conditioning/anoxic tank upstream of the ditches will provide a more flexible operation to account for influent quality variations and reduce chemicals used to remove phosphorous from the system.



Section 1

Background and Description of Existing Treatment Plant

Introduction

Parsons Water & Infrastructure, Inc. (Parsons) was selected and authorized by Hillsborough County to model the Dale Mabry AWTP (DMAWTP) current process using BioWinTM software and evaluate whether the methanol feed facility could be abandoned. The model results and recommendations are presented in this Technical Memorandum. The existing biological treatment process was simulated using current influent quality to meet effluent quality permit requirements.

Objective of the Study

The objective of the project is to study process options such as simultaneous nitrification/denitrification that would potentially support abandonment and demolishing of the existing methanol feed system at the DMAWTP, and Enhanced Biological Phosphorous Removal (EBPR) to support reduction/optimization of alum use for phosphorous removal.

Project Background

The DMAWTP is an oxidation ditch process wastewater treatment plant with a design flow of 6.0 million gallons per day (MGD) annual average daily flow (AADF).

The treatment plant consists of the following units: bar screen and degritting equipment, pretreatment tanks for conditioning, oxidation ditches for aeration and mixing, and clarifiers to separate solids from liquid. The effluent from the clarifiers is piped to multi-media deep bed filters, and the filtered effluent flows over a weir to the chlorine contact chamber.

The plant was designed for the utilization of supplemental organic carbon to be added, when needed, to increase the rate of denitrification in the multi-media deep bed filters provided for that purpose. When in use, the organic carbon is diluted and mixed with the wastewater entering the deep bed filters. However, plant personnel have indicated that methanol addition has not been used for, at least, the past 14 years.

Due to the lack of use, the existing methanol feed system has fallen into disrepair and the plant managers would like to abandon and demolish it. It is their contention that the ability to comply with the nitrogen effluent limitation without the addition of a supplemental carbon source has been thoroughly demonstrated, but they concede that further optimization is needed to further safeguard against any future exceedances. As part of this effort a process model of the plants biological process has been developed using BioWin 3.0, to be consistent with the current use of BioWinTM for other wastewater treatment plants operated by the County. The model also allows for an examination of the capability of the biological system to reduce phosphorus biologically, in that it affects the projected average usage of alum for chemical phosphorus removal. However, sizing of a new alum feed system will proceed as if there will be little to no biological removal of phosphorus at the design flow of 6.0 mgd.



Dale Mabry Advanced Wastewater Treatment Plant AWTP Process Modeling Technical Memorandum

This memorandum summarizes the existing process and examines potential options for process and operations modifications that would support abandoning and demolishing the existing methanol feed system at the Dale Mabry AWTP, i.e., enhancement of simultaneous nitrification/denitrification (SND) in the existing biological treatment system.

During this investigation, facilities process design data were reviewed, and operational and performance data for the 20 month period from January, 2007 through August, 2008 were analyzed. In addition, plant visits were conducted and plant operations and County planning and project management staff were interviewed. Also, supplemental influent alkalinity, calcium and magnesium data were collected over the five day period from September 29 through October 3, 2008, analyzed, and utilized during the BioWin™ modeling study.

Section 2 Model Simulations

A computer based activated sludge simulation program, BioWin™ 3.0 was used to perform detailed evaluations of the existing DMAWTP process.

BioWin™ analyses under steady state conditions were simulated using existing unit process and influent data provided by the County. Steady state evaluations were used to predict the ability of the treatment facility to meet long-term performance goals such as monthly effluent limits at critical temperatures.

Influent Characteristics at the DMAWTP

Table 2-1 shows the model input data. The influent water quality data are based on a summary of average monthly data from January, 2007 through August, 2008. The projected performance of the plant was evaluated using the values listed in Table 2-1.

Table 2-1 Average Influent Data used for Modeling

Parameter		Units	Value
1	Flow		
	Average Daily Flow	MGD.	6.0
	Maximum Day Flow	MGD.	9.0
2	Influent Characteristics		
	BOD ₅	mg/L	250
	TSS	mg/L	250
	TKN	mg/L	50
	NH ₃ -N	mg/L	35
	TP	mg/L	7.0
	Alkalinity	mg/L	327.5
3	Effluent Limits		
	BOD ₅	mg/L	5.0
	TSS	mg/L	5.0
	TN	mg/L	3.0
	TP	mg/L	1.0

Unit Treatment Processes at the DMAWTP

Figure 2.1 is an aerial view of the DMAWTP. The Process Flow Diagram is shown in Figure 2.2. Table 2-2 lists the unit process data for the treatment plant biological system.



Figure 2.1. Aerial View of the DMAWTP

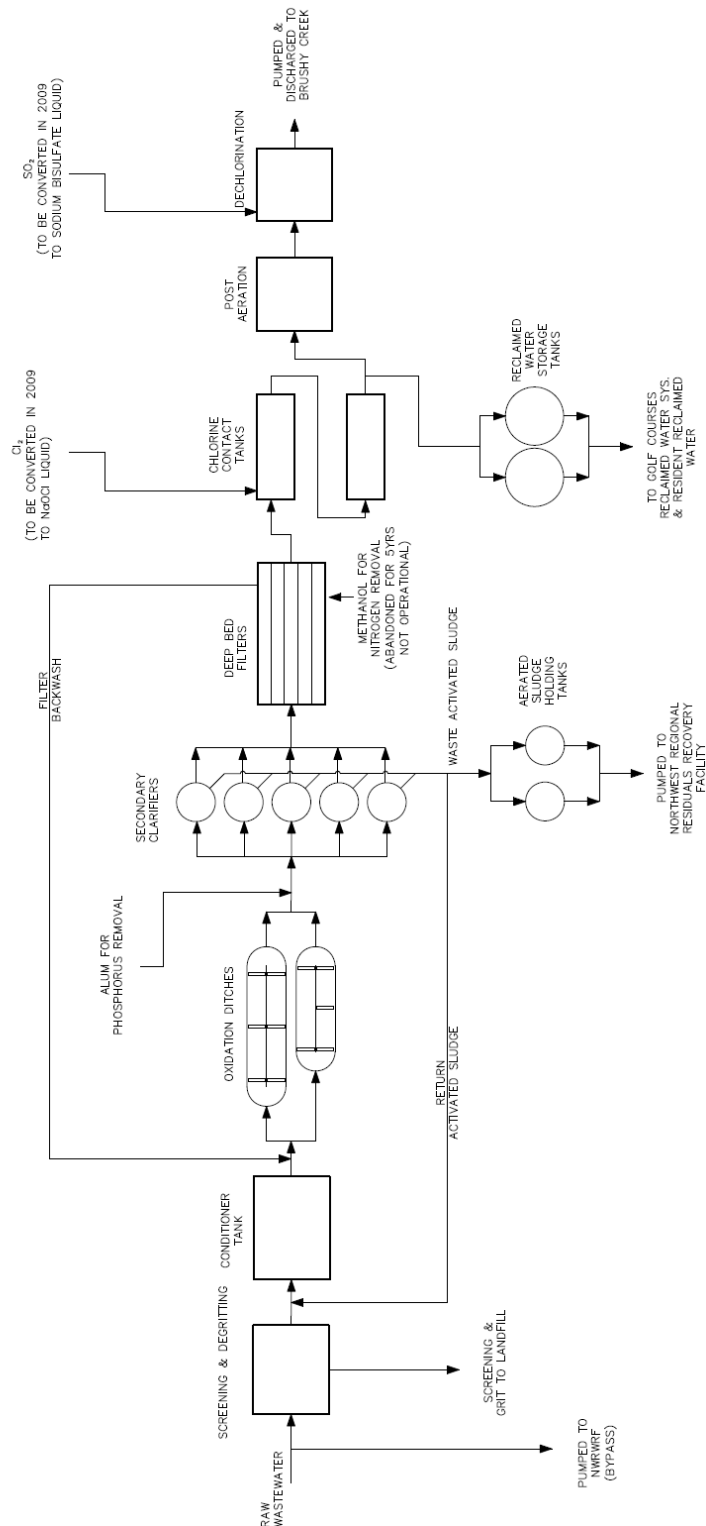


Figure 2.2. Process Flow Diagram of the DMAWTP



Table 2-2 Unit Processes (Used for AWTP Model)

Description		Units	Value
1	Conditioner Tank		
	Number of Compartments in the Tank	Nos.	3
	Volume of Each Compartment	ft ³	6,133
	Total Volume	ft ³	18,399
	Detention Time Based on Design Wastewater Flow	min	30
2	Description of the Activated Sludge Reactors		
	Oxidation Ditch No. 1		
	Length	ft	536
	Width	ft	53
	Side water Depth	ft	13
	Total Volume	ft ³	336,000
	Aeration Capacity, 6x50 HP brush aerators x 3.5 lb O ₂ /HP/hr	Lb O ₂ /d	25,200
	Oxidation Ditch No. 2		
	Length	ft	438
	Width	ft	53
	Side water Depth	ft	13
	Total Volume	ft ³	267,400
	Aeration Capacity, 5x50 HP brush aerators x 3.5 lb O ₂ /HP/hr	Lb O ₂ /d	21,000
	Detention Time, at Ave. Design Flow	hrs	18.0
	Detention Time, at Peak Design Flow	hrs	7.2
	Detention Time, at Ave. Design Flow + RAS	hrs	9.0
	Detention Time, at Peak Design Flow + RAS	hrs	5.1
	RAS Flow (maximum)	MGD	6.0
	Volatile Mixed Liquor Concentration	mg/L	1,730
	Total Mixed Liquor Concentration	mg/L	3,200
	Solids Residence Time, Average	days	9.0
	Solids Residence Time, Peak	days	6.0
3	Final Clarifiers		
	Clarifier No. 1 & 2		
	Diameter	ft	65
	Side Water Depth	ft	12
	Surface Area (each unit)	ft ²	3,318
	Volume (each unit)	ft ³	39,820
	Weir Length (each unit)	ft	200
	Weir Loading at Average Flow	gpd/ft	8,060



**Dale Mabry Advanced Wastewater Treatment Plant
AWTP Process Modeling
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Description		Units	Value
	Weir Loading at Peak Flow	gpd/ft	17,850
	Return Sludge Pumps Active/Standby	nos	2/1
	Return Sludge Pump Capacity/Each Pump	gpm	1,400
	Waste Sludge Pumps Active/Standby	nos	1/1
	Waste Sludge Pump Capacity/Each Pump	gpm	375
Clarifier No. 3 & 4			
	Diameter	ft	58
	Side Water Depth	ft	12
	Surface Area (each unit)	ft ²	2,640
	Volume (each unit)	ft ³	31,700
	Weir Length (each unit)	ft	200
	Weir Loading at Average Flow	gpd/ft	6,420
	Weir Loading at Peak Flow	gpd/ft	14,220
	Return Sludge Pumps Active/Standby	nos	2/1
	Return Sludge Pump Capacity/Each Pump	gpm	1,100
	Waste Sludge Pumps Active/Standby	nos	1/1
	Waste Sludge Pump Capacity/Each Pump	gpm	300
Clarifier No. 5			
	Diameter	ft	65
	Side Water Depth	ft	12
	Surface Area	ft ²	3,320
	Volume	ft ³	39,820
	Weir Length	ft	330
	Weir Loading at Average Flow	gpd/ft	4,880
	Weir Loading at Peak Flow	gpd/ft	10,820
	Return Sludge Pumps Active/Standby	nos	1/1
	Return Sludge Pump Capacity/Each Pump	gpm	1,400
	Waste Sludge Pumps Active/Standby	nos	1/1
	Waste Sludge Pump Capacity/Each Pump	gpm	250
All Clarifiers			
	Clarifier Loadings with Filter Recycle		
	Total Clarifier Loading (all clarifiers)-Average	MGD	6.0
	Total Clarifier Loading (all clarifiers)-Peak	MGD	16.4
	Total Return Flow	MGD	9.0
	Filter Recycle Flow	MGD	1.4
4	Deep Bed Filters		
	Number of Filters-Active/Standby	Nos.	4/1



**Dale Mabry Advanced Wastewater Treatment Plant
AWTP Process Modeling
Technical Memorandum**

Description		Units	Value
	Filtration Rate (Average)	gpm/sf	2.33
	Filtration Rate (Peak)	gpm/sf	5.17
	Wastewater Flow (Average)	MGD	6.0
	Wastewater Flow (Peak)	MGD	14.0
	Recycle Backwash Water Flow	MGD	1.4
	Total Filter Influent Flow (Average)	MGD	6.0
	Total Filter Influent Flow (Peak)	MGD	16.4
	Length of each bed	ft	65.0
	Width of each bed	ft	10.0
	Surface Area of each bed	ft ²	650
	Surface Area of Total Active Beds	ft ²	2,600
	Filter Media Depth (Anthracite)	ft	2.0
	Filter Media Depth (Sand)	ft	4.0
	Filter Media Depth (Gravel 4 Layers)	inches	18.0
	Air-Water backwash Rate	gpm	3,300
	Air-Water backwash Duration	min	15
	Water backwash Rate	gpm	4,400
	Air-Water backwash Duration	min	5
	Backwash Water Pumps Active/Standby	nos	1/1
	Backwash Water Pump Capacity/Each Pump	gpm	4,500
	Waste Backwash Pumps Active/Standby	nos	2/1
	Waste Backwash Pump Capacity/Each Pump	gpm	565
	Backwash Air Blowers Active/Standby	nos	2/1
	Backwash Air Blower Capacity/Each Blower	scfm	2,200

Process Parameters Used for Simulations

Table 2-3 show the process parameters used to model the plant.

Table 2-3 Process Parameters Used

Parameter		Units	Value
	Alpha	-	0.9
	Aeration Zone DO Concentration	mg/L	0.8-0.9
	Brush Aerator Standard Oxygen Transfer Rate	lbO ₂ /HP/hr	3.5
	RAS Ratio (Maximum)	-	100%
	Mixed Liquor Temperature	°C	18-20



The key to effective use of BioWin™ is proper characterization of the wastewater and validation of the model to match current plant operation and performance. For the SND process, historical data and operation information obtained from the DMAWTP operations staff were used to establish the general validity of the model setup.

The first step in ensuring satisfactory model predictions was matching actual unit process parameters with those generated by BioWin™ based on similar conditions of operations. Annual average daily plant influent and effluent flows and pollutant concentrations for DMAWTP were calculated based on monthly Operating Report data (Table A2, Appendix A) obtained from plant operations staff.

Assumptions Made for Simulations

The following assumptions are made for the simulations:

1. **Minimum Temperature** of the MLSS is 18 deg C. This is slightly below the minimum temperature used to simulate the Northwest WRF by CDM in 1995. They sampled the influent temperature at that plant to determine the low design temperature. The NWA WRF is located approximately 5 miles away from the DMAWTP. The County representatives stated that the influent water quality characteristics of the Northwest plant are similar to the Dale Mabry plant. The recent influent temperature (October, 2008) sampling showed an average of 20°C for that month.
2. Recent sampling results (9/29 – 10/03/08) determined that the influent **alkalinity** averages 327.5 mg/L, with a range from 310 to 340 mg/L as CaCO₃. An influent concentration of 327.5 mg/L, determined from a five day sampling period in September and October, 2008, was used to determine when and whether there would be a need for the addition of supplemental alkalinity based on the modeling results. Calcium and magnesium averaged 88.2 and 6.51 mg/L, respectively, for the same sampling period, and these concentrations were used to determine input for the modeling runs. The alkalinity value is well below what NWA WRF used for their process simulations in 1995. This amount should be adequate for biological nutrient removal at average design flow, but might not be adequate for substantial chemical phosphorus removal, or for peak flows.
3. Each of the two **oxidation ditches** was divided into 4 zones for modeling by BioWin 3.0, and operated in parallel (See Figure 2.3 on Page 2-13), to simulate a close representation of the current DMAWTP. To obtain simultaneous nitrification and denitrification during full scale operation of the two ditches, it is necessary to balance the oxygen transfer inputs from the brush aerators with the net oxygen requirements resulting from the oxidation of BOD and ammonium minus the denitrification of nitrites and nitrates. This is a technique that has been used successfully for many years, and the DMAWTP operators have been using this approach successfully for an extended period of time. For high recycle systems like oxidation ditches, this means that the mixed liquor DO concentration will vary along the length of the ditch from near zero to a relatively low concentration, typically less than 1.5 mg/L if SND is being accomplished. Calibration of the simulated system with the actual operating data averaged over the period from January, 2007 through August, 2008, showed that the computer simulation most closely

approximated the actual plant data when the oxygen inputs were applied only to the third section of the oxidation ditch, and the simulation set point DO concentrations were 0.9 mg/L in the larger ditch, and only 0.65 mg/L in the smaller ditch. These values and locations are suitable for constant flow conditions, however, and it should be understood that the oxygen inputs need to be varied in accordance with flows and loads on a real time basis, a technique has been used successfully at Bowie, Maryland since 1988, where effluent concentrations of <0.25 mg/L TP and < 3.0 mg/L TN have been consistently obtained without the addition of chemicals for nutrient removal. While the Dale Mabry plant operating staff has been successful in accomplishing nitrification and denitrification with good results throughout most of the sampling period mentioned above (9/29 – 10/03/08), there were three months during which the effluent limit of 3.0 mg/L TN was exceeded. It is probable that these exceedances could be eliminated by installing an automatic monitoring system that controls the periods of time the various brush aerators operate. This can be reasonably accomplished with automated DO monitoring, but a more precise, and therefore more reliable method would be to automate the monitoring of ammonium and nitrates (NO_x) in the respective ditches. When the ammonium concentration exceeds the set point concentration at the ditch effluent, the oxygen inputs would be increased (i.e., one or more aerators would be turned on), and when the nitrate concentration exceeds the set point concentration, the oxygen inputs would be decreased (one or more aerators would be turned off). The internal recycle rates of the ditches were modeled by setting the forward flows in the two four-reactor systems to 1.0 fps to simulate the high recirculation rates typical of oxidation ditches. Again, note that while the simulation required the input of dissolved oxygen at only one location, it is not likely that this would be the optimum way to operate the actual oxidation ditch systems. At Bowie, MD, where two oxidation ditches are operated in series to treat a flow of 2.2 mgd, one brush aerator in each ditch is operated continuously, while another brush aerator is cycled on and off in accordance with the real time loadings. It is recommended that approach be used at the DMAWT plant, and that the aerators selected for cycling be automated using a real time monitoring system to satisfy real time oxygen demand. The constantly operating aerators would provide the forward velocity of the mixed liquor needed to prevent solids settling plus minimal oxygen transfer, while the other aerators would be turned on or off as needed. Further note that the aerators should be configured so that there is a prolonged low DO zone immediately beginning where the mixed liquor from the anoxic/anaerobic conditioning tank enters the ditches, to further encourage denitrification and ensure compliance with the effluent TN limit.

4. For modeling simplification, the **conditioning tank** was assumed to be a single reactor rather than three separate chambers. However, the existing baffles should not be removed because they tend to enhance the performance of the biological system by ensuring rapid depletion of recycled oxygen and nitrates in the first chamber, and the establishment of anaerobic conditions within the mixed liquor in the second and third chambers. Under most, and probably all, loading conditions, the conditioning tank will function as an anaerobic zone that will stimulate enhanced biological phosphorus removal (EBPR). This will reduce the amount of chemical that needs to be added for phosphorus removal. The efficiency of EBPR will vary in accordance with the influent characteristics and loadings, with higher loads stimulating greater EBPR.

5. During the modeling effort, it was assumed that the **clarifiers** had sufficient capacity to settle the MLSS load that would be sent to them, and the clarification efficiency was set at 99.99% removal of the suspended solids to simulate the combined efficiency of the clarifiers and the effluent filter. This was done because it is clear that effluent sand filtration will be necessary to ensure continuous compliance with the 3.0 mg/L effluent TN limit. Therefore, the settling capacity of the clarifiers will be separately evaluated using the solids loadings predicted by the modeling results, and assuming that the clarifiers will need sufficient capacity to handle the solids loads when one of the larger clarifiers is out of service.

Model Runs

The first phase of the modeling effort, which is summarized in this report, consisted primarily of calibration of the BioWin Model using the plant performance data from the 20 month from January 1, 2007 through August 31, 2008 (Table A2, Appendix A), followed by utilization of the calibrated model for evaluation of projected performance of the plant for influent flows of 6 and 9 mgd, assuming no decrease in the influent concentrations. It was necessary to perform the calibration before the model could be used to project future performance with confidence. First it was necessary to calibrate the kinetic and stoichiometric parameters of the BioWin model using the loading conditions and characteristics, and the operating strategies, of the Dale Mabry plant for the January, 2007 through August, 2008 period. The kinetic and stoichiometric default parameter values were modified as needed to closely approximate the actual performance data of the plant. After calibration, the modified kinetic and stoichiometric parameter values were used for the modeling runs. The calibration results and the results of the modeling runs are given and analyzed in the following tables and text.

Calibration Modeling Results

The average flow treated during the January, 2007 through August, 2008 period was 4.7 mgd. The average influent and effluent data for this period are given in Table 2-4 and compared to the BioWin™ simulation results.

**Table 2-4. BioWin™ Calibration Simulation of Dale Mabry AWT Plant
using Average Plant Performance Data: January 2007 through August 2008
with Average Flow of 4.7 mgd**

Parameter	Units	Average Inf. Conc.	Actual Performance Data	BioWin Simulation Results-20°C
CBOD ₅	mg/L	225	<1.1	1.5
TSS	mg/L	216	<0.5	1.3
TP	mg/L	6.7	0.4	-
SP	mg/L	-	-	3.15
TKN	mg/L	48.3	1.2	1.37
NH ₃ -N	mg/L	35.1	<0.133	0.20
NO ₃ -N	mg/L	0	1.0	0.18
NO ₂ -N	mg/L	0	<0.55	0.36



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Parameter	Units	Average Inf. Conc.	Actual Performance Data	BioWin Simulation Results-20°C
TN	mg/L	48.3	<2.35	1.99
Alkalinity	mg/L	327.5	-	327.5
pH	units	-	7.0-7.3	6.75
SRT	days	-	12	10
MLSS	mg/L	-	3,000	2,532

The data comparison indicates that most of the comparisons were reasonable with the differences between the biological process simulations and full plant data are considered. For example, the effluent suspended solids data from the simulation results from a clarifier removal efficiency percentage put into the model simply to provide good separation for recycle purposes, whereas the TSS value reported for the plant included sand filtration in addition to clarification. Next, the soluble phosphorus concentration calculated by the model was calculated based on biological processes whereas the value reported by the plant included phosphorus removal by alum addition in addition to biological processes. However, it does show that at the present flows and loadings there apparently is not enough readily biodegradable BOD in the wastewater to accomplish robust EBPR, i.e. to concentrations less than 1.0 mg/L. This is in contrast, however, to the results of the modeling runs for design flow, which will be presented and discussed in the next section of this report. One peculiarity of the BioWin™ model for oxidation ditch systems operated to accomplish simultaneous nitrification-denitrification, is its tendency to predict higher concentrations of nitrite than nitrate at the low DO concentrations simulated. This is in contrast to data reported by the plant and to full scale experience at similar plants. The model coefficients were calibrated in an effort to reduce this erroneous peculiarity, but it was only partially successful. Nonetheless, the effluent TN concentrations predicted were reasonable approximations of the actual results. There were two other differences of note. The predicted pH values were somewhat less than the observed values. It is suspected that additional sources of alkalinity are added to the mixed liquor beyond that measured in the influent. However, the simulation uses only the alkalinity in the influent plus the amount that is generated by denitrification. Finally, the MLSS concentration predicted by BioWin™ is somewhat less than the reported value. However, the plant MLSS also contains alum for phosphorus precipitation, and no alum addition was assumed for the model simulation.

All in all, the model simulations were sufficiently close to the plant performance data when all factors were considered to use the information to modify a few of the kinetic coefficient default values used by the BioWin™ model. The values modified were as follows:

- Maximum specific growth rate of the ammonium oxidizers: from 0.90 to 0.95 d⁻¹.
- Half saturation concentration of the ammonium oxidizers: from 0.70 to 0.15 mgN/L.
- Half saturation concentration of the nitrite oxidizers from 0.1 to 0.05 mgN/L.

A few of the wastewater parameter fractions were changed to more nearly characterize the actual wastewater. For example, the inert N fraction of the COD was decreased from 0.70 to 0.68 mgN/mgCOD. Also, the unbiodegradable particulates (f_{up}) was increased from 0.13 to 0.15 gCOD/gTotal COD; and soluble unbiodegradable TKN was decreased from 0.02 to 0.003



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gN/gTKN. The BioWin™ program automatically reduced the non-colloidal, slowly biodegradable COD coefficient from 0.75 to 0.72923.

The BioWin default values were used for all other kinetic and stoichiometric coefficients. However the fraction of ammonium per unit TKN in the influent was calculated from the plant data rather than using the default value used by BioWin™.

Design Flow Simulation Results

The calibrated model was used to simulate performance of the plant at the design loading, i.e. average flow of 6 mgd and the influent characteristics previously listed in Table 2-1. The results of predicted performances at temperatures of 18, 19 and 20°C are compared in Table 2-5 to each other and to the modeling run influent concentrations and the plant's required effluent limitations. The operating parameters used for the plant model are given in Table 2-6.

Table 2-5. BioWin™ 3.0 Modeling of the Dale Mabry AWT Plant: Existing Plant Tankage without chemical addition-SRT 10 days

Parameter	Units	Inf. Conc.	Eff. Limits	6.0 MGD		
				18°C	19°C	20°C
CBOD ₅	mg/L	250	5.0	1.61	1.59	1.58
TSS	mg/L	250	5.0	1.3	1.3	1.3
TP	mg/L	7.0	1.0	0.75	0.77	0.79
Sol. P	mg/L	-	-	0.73	0.72	0.74
TKN/fTKN	mg/L	50.0	-	1.37	1.31	1.28
NH ₃ -N	mg/L	36.3	-	0.24	0.19	0.16
NO _x -N	mg/L	0	-	0.32	0.32	0.32
TN	mg/L	50.0	3.0	1.75	1.71	1.67
Alkalinity	mg/L	327.5	-	327.5	350	350
pH	SU	7.0	6.5 – 9.0	6.64	6.75	6.75

Table 2-6. Operating Parameters and Performance Data for the Dale Mabry AWT Plant BioWin™ Simulation Runs – SRT 10 days

Parameter	Units	6.0 MGD			9.0 MGD
		18°C	19°C	20°C	20°C
MLSS	mg/L	3,287	3,273	3,260	4,892
MLVSS	mg/L	2,174	2,160	2,148	3,236
Set Point DO Ditch #1	mg/L	1.15	1.15	1.15	1.50
Set Point DO Ditch #2	mg/L	1.00	1.00	1.00	1.50
Req'd HP Ditch #1	HP	354	363	373	578
Req'd HP Ditch #2	HP	275	282	289	473
Total HP req'd	HP	629	645	662	1,051

The results given in Table 2-5 clearly project that the Dale Mabry AWT Plant would easily achieve the required effluent limits for all parameters, including phosphorus, without chemical addition, with the possible exception of small amounts of alkalinity, if operated in accordance with the recommendations of this report, i.e. with the conditioning tank used for the stimulation

of EBPR, and the ditches operated to maximize simultaneous nitrification and denitrification and by providing additional aeration capacity for SND requirements listed in Table 2-6. The TN concentrations projected are all below 2.0 mg/L, and the TP phosphorus concentrations predicted are significantly less than 1.0 mg/L. Note that the TSS values and the TP amounts in excess of the SP values are nearly meaningless because they are in reality dependent upon the clarification efficiency of the secondary clarifiers whereas an assumed percentage removal value is used in the model for clarification efficiency. That is to say, the SP values can be approximated during treatment if excellent solids removal is accomplished. As previously noted, the predicted nitrite concentrations are consistently greater than the nitrate concentrations, whereas this would be rare during full-scale treatment. However, it is believed that the sum of the two concentrations is a reasonably accurate estimation of the probable combined concentrations that would be achieved.

The results presented in Table 2-6 show that the most appropriate DO set points were the same for all three temperatures, whereas the required aeration horsepower (HP) predicted increased modestly as the simulation temperature increased. The data also show that the predicted horsepower requirements for aeration consistently exceed the aerator currently available in both ditches. Also note that the projected MLSS concentrations are given, and it is projected that they will be only slightly less than 3,300 mg/L.

The clarification and thickening capacities of the existing clarifiers were evaluated for the MLSS concentration of 3,300 mg/L and an influent flow of 6 mgd with a combined RAS rate of 6 mgd. The results show that when all five clarifiers are in use, the combined capacities are barely adequate for the resulting solids loading of 21.7 lb/ft²/day and surface overflow rate of 394 gpd/ft², assuming the sludge has an SVI of no more than 130 ml/g. Because the clarifiers have a relatively shallow side water depth (SWD), it is likely to be difficult to coax more capacity out of them. The evaluation indicates that it will not be possible to process a flow of 6 mgd with a concentration of 3,300 mg/L if one of the clarifiers is out of service.

The plant configuration used for the BioWin™ simulations is illustrated by Figure 2.3.

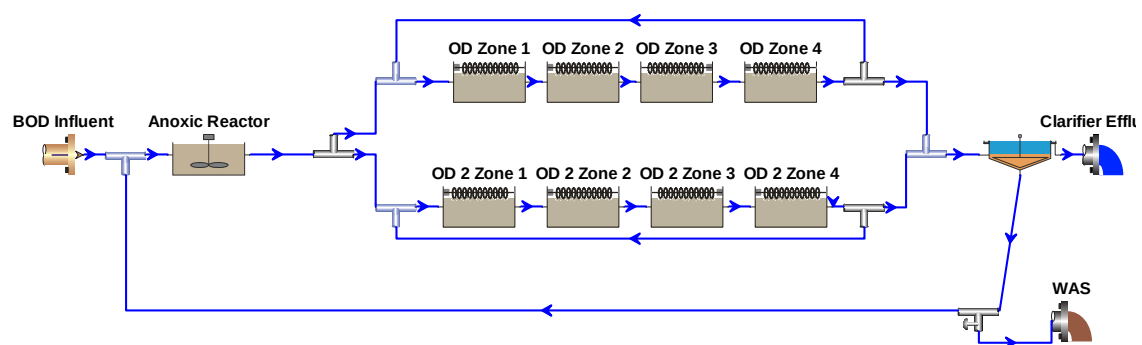


Figure 2.3. Schematic of the Dale Mabry AWT Plant used for the BioWin™ Simulations

A possible option for reducing the solids loading to the activated sludge clarifiers and thereby increasing the capacity of the plant would be to add another anoxic reactor ahead of the oxidation ditches and after the existing conditioning tank. It could be designed with sufficient volume to reduce the MLSS concentration enough so that the remaining four clarifiers could process the solids load at a flow of 6 mgd with one of the large clarifiers out of service.



Figure 2.4. Deep Bed Filters



Figure 2.5. Drive mechanism for Brush Aerators



Figure 2.6. Oxidation Ditches

Section 3

Recommendations

The following recommendations are made to achieve permitted effluent quality on a consistent and reliable basis at the design flow and current average influent characteristics:

- The BioWin™ model developed for the Dale Mabry Plant indicates that the aeration capacity of the current brush aerators is inadequate for complete nitrification at the plant design flow and current average influent characteristics. Unless the aeration capacity is increased, it is likely that ammonia would not be completely removed, and this would result in effluent violations. It is recommended that an additional 150 HP of aerator capacity be added, as a minimum, so that adequate aeration could be provided for design flow conditions and for times when one large aerator is out of service.
- This could be accomplished using floating aerators to provide the additional capacity, similar to those that have been added at other County plants. Other options include a diffused air system for the additional capacity, or replacement of the existing units with new higher capacity units.
- For optimum performance, more reliable compliance with effluent requirements and reduction of energy requirements, it is recommended that the brush aerators be controlled by an automated monitoring system. Because oxidation ditch DO concentrations are typically quite low when simultaneous nitrification-denitrification is practiced, a system based on DO measurements is not recommended. Instead, it is recommended that the system be based on the utilization of ammonium and nitrate probes.
- The brush aerator nearest to the influent flow into the oxidation ditches should be operated only when needed so that a very low DO zone can be developed in the ditches to enhance denitrification. The brush aerator at the end of the low DO zone should be operated at all times to provide both aeration and forward flow velocities.
- The existing methanol system is not needed for treatment of flows up to the design flow of 6 mgd. There is more than adequate tankage to achieve simultaneous nitrification/denitrification as long as complete nitrification is achieved with anticipated influent characteristics at the design flow.
- The existing conditioning tank should be intentionally operated to accomplish enhanced biological phosphorus removal (EBPR). The modeling efforts indicate that operating it thusly will reduce and minimize the alum requirements as the influent flows approach the design flow of 6 mgd. Due to the poor condition of the existing tank, a larger capacity replacement tank should be considered for these purposes in the future. Such a tank would be useful also for reducing the MLSS concentration, resulting in reduced solids loading on the clarifiers. It could provide both anaerobic and an anoxic/aerobic swing zone to allow for a more flexible operation and to account for variations in influent characteristics.



Appendix A BioWin™ Simulation Data

Table A1. BioWin Simulation Results for Design Run: 9 mgd – 10 day SRT @ T=20 C

Element name	Flow	VSS	TSS	T COD	fCOD	T KN	fTKN	NH3 N	NO3 N	Total P	SPO4-P	TCBOD	fCBOD	Vol	Temp
Aoxic Reactor	17.82	3137.04	4565.33	4787.03	79.07	269.40	21.77	19.28	0.00	83.35	3.76	1141.03	35.38	0.14	20.00
BOD Influent	9.00	200.00	250.04	518.58	198.64	50.00	41.86	36.34	0	7.00	3.50	250.03	121.99	0	20.00
Clarifier Effluent	8.82	1.24	1.82	29.97	28.11	1.36	1.26	0.09	0.16	3.83	3.80	1.67	1.25	0	20.00
Ideal clarifier8	8.82	1.24	1.82	29.97	28.11	1.36	1.26	0.09	0.16	3.83	3.80	1.67	1.25	1.07	20.00
RAS Mixer	17.82	3115.54	4544.08	4787.83	114.22	269.40	21.76	18.39	0.08	83.35	3.65	1149.88	62.22	0	20.00
Ditch Effluent Mixer	17.82	3075.42	4507.04	4631.28	28.11	249.71	1.26	0.09	0.16	83.31	3.80	1044.92	1.25	0	20.00
Sidestream Mixer30	445.02	3077.03	4508.56	4635.18	29.26	250.15	1.72	0.52	0.17	83.31	3.80	1047	2.02	0	20.00
Sidestream Mixer33	435.80	3076.23	4507.81	4633.57	29.02	250.06	1.63	0.44	0.14	83.31	3.79	1046.26	1.86	0	20.00
WAS	0.18	6089.35	8923.96	9142.42	28.11	493.19	1.26	0.09	0.16	161.23	3.80	2067.73	1.25	0	20.00
ANA Eff Splitter	7.80	3137.04	4565.33	4787.03	79.07	269.40	21.77	19.28	0.00	83.35	3.76	1141.03	35.38	0	20.00
WAS Splitter	8.82	6089.35	8923.96	9142.42	28.11	493.19	1.26	0.09	0.16	161.23	3.80	2067.73	1.25	0	20.00
Splitter21	10.02	3075.65	4507.25	4631.68	28.12	249.71	1.26	0.09	0.17	83.31	3.80	1045.22	1.25	0	20.00
Splitter20	7.80	3075.13	4506.76	4630.77	28.11	249.71	1.27	0.10	0.14	83.30	3.79	1044.54	1.25	0	20.00
OD Zone 1	445.02	3076.81	4508.34	4634.39	28.85	250.13	1.69	0.52	0.11	83.31	3.80	1046.82	1.69	0.63	20.00
OD Zone 2	445.02	3076.35	4507.87	4633.99	29.15	250.13	1.71	0.58	0.04	83.31	3.81	1046.48	1.77	0.63	20.00
OD Zone 4	445.02	3075.65	4507.25	4631.68	28.12	249.71	1.26	0.09	0.17	83.31	3.80	1045.22	1.25	0.63	20.00
OD 2 Zone 1	435.80	3076.04	4507.62	4632.94	28.72	250.04	1.61	0.44	0.10	83.31	3.79	1045.82	1.62	0.50	20.00
OD 2 Zone 2	435.80	3075.70	4507.26	4632.59	28.90	250.04	1.62	0.49	0.05	83.31	3.80	1045.54	1.65	0.50	20.00
OD 2 Zone 4	435.80	3075.13	4506.76	4630.77	28.11	249.71	1.27	0.10	0.14	83.30	3.79	1044.54	1.25	0.50	20.00
OD Zone 3	445.02	3076.03	4507.59	4632.60	28.36	249.83	1.40	0.24	0.12	83.31	3.80	1045.79	1.42	0.63	20.00
OD 2 Zone 3	435.80	3075.43	4507.04	4631.51	28.30	249.82	1.38	0.23	0.11	83.30	3.79	1045.00	1.39	0.50	20.00

Table A2. Dale Mabry AWT Monthly Average Influent Effluent Data

Year	Month	INFLUENT						EFFLUENT									
		Influent Flow	Influent CBOD	Influent TSS	TP as PO ₄	TKN	Ammonia -N	CBO D	TSS	Total P	TKN	Total N	Ammoni a-N	Nitrate-N	Nitrite-N	pH Min	pH Max
		MG	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU	SU
2007	January	4.2	205.0	183.2	6.6	46.8	33.6	<1.0	<0.41	0.55	1.0	<2.14	<0.050	1.1	<0.060	7.1	7.3
	February	4.7	229.8	209.0	6.9	51.3	36.1	<1.0	<0.29	0.45	1.0	<2.09	<0.054	1.0	<0.060	7.0	7.2
	March	4.6	285.3	394.5	8.7	55.3	35.6	<1.0	<0.35	0.42	1.0	<2.77	<0.055	1.0	<0.060	7.0	7.4
	April	4.8	321.3	425.8	8.4	52.4	33.2	<1.0	<0.35	0.49	1.0	<1.64	<0.050	0.6	<0.060	7.1	7.4
	May	4.7	225.6	291.8	7.8	55.0	35.8	<1.1	<0.32	0.39	1.3	<2.39	<0.171	0.9	<0.060	7.2	7.4
	June	4.6	208.0	166.3	6.3	47.7	37.3	<1.1	<0.29	0.45	1.2	<2.24	0.156	1.0	<0.060	7.2	7.4
	July	4.7	210.3	201.0	6.7	46.8	35.9	<1.2	<0.40	0.39	1.1	<2.21	<0.105	0.8	<0.060	6.9	7.2
	August	5.1	212.8	235.0	6.7	47.5	36.4	<1.0	<0.36	0.43	1.2	<1.55	<1.734	0.5	<0.060	6.9	7.1
	September	5.0	225.0	256.0	6.6	44.3	32.7	<1.0	<0.35	0.40	1.3	<1.80	<0.073	0.6	<0.060	7.0	7.2
	October	4.9	224.4	214.2	5.9	44.1	34.8	<1.1	<0.27	0.34	1.2	<2.74	<0.052	0.7	<0.060	7.1	7.4
	November	4.7	247.8	219.3	6.7	51.0	39.0	<1.0	<0.34	0.27	1.3	<3.07	<0.250	1.7	<0.065	7.0	7.3
	December	4.8	249.0	216.5	6.9	49.8	35.9	<1.1	<0.43	0.27	1.5	<3.23	<0.050	1.7	<0.066	6.8	7.2
2008	January	4.8	248.4	204.8	6.6	49.4	35.8	<1.2	<0.43	0.22	1.5	<2.90	<0.214	1.4	<0.054	6.8	7.2
	February	4.7	215.8	163.0	6.2	48.7	36.7	<1.4	<0.80	0.20	1.2	<2.15	<0.063	0.9	<0.039	6.8	7.3
	March	4.8	205.8	199.8	5.3	47.0	34.2	<1.2	<0.65	0.22	1.3	<2.46	<0.174	1.2	<0.044	6.9	7.3
	April	4.7	208.8	176.4	6.4	46.4	33.7	<1.0	<0.63	0.34	1.4	<2.47	<0.165	1.7	<0.042	6.7	7.1
	May	4.6	229.0	234.0	7.1	47.8	34.8	<1.1	<0.50	0.44	2.0	<3.52	<0.482	1.5	<0.061	6.9	7.1
	June	4.4	193.8	141.5	6.6	48.4	36.6	<1.1	<0.38	0.47	1.4	<2.36	<0.052	1.0	<0.049	7.0	7.4
	July	5.3	162.8	85.0	5.5	44.2	33.2	<1.0	<0.28	0.37	1.0	<1.74	<0.052	0.7	<0.039	6.9	7.3
	August	4.8	186.0	101.5	5.8	42.6	30.9	<1.1	<0.44	0.36	1.2	<1.59	<0.153	0.3	<0.039	6.9	7.3
Average		4.7	224.7	215.9	6.7	48.3	35.1			0.4	1.2			1.0		7.0	7.3



References

1. Conceptual Engineering Report - Northwest Hillsborough Water Reclamation Facility Expansion (1995). Greeley & Hansen/CDM