KENNETH SCHMITT
Town Supervisor

SUZANNE MC DONOUGH
Town Councilwoman
Deputy Supervisor

MICHAEL A. BARILE
Town Councilman
FRANK D. LOMBARDI
Town Councilman
ROBERT F. SCHANIL, JR.
Town Councilman

TOWN OF CARMEL
TOWN HALL

60 McAlpin Avenue
Mahopac, New York 10541
Tel. (845) 628-1500 • Fax (845) 628-6836
www.carmelny.org

ANN SPOFFORD
Town Clerk

KATHLEEN KRAUS
Receiver of Taxes

MICHAEL SIMONE
Superintendent of Highways
Tel. (845) 628-7474

TOWN BOARD VOTING MEETING/WORK SESSION
Wednesday, July 1, 2020 7:00pm

PLEDGE OF ALLEGIANCE - MOMENT OF SILENCE

6:00pm Executive Session:

1. Discussion of 6/24/2020 Vendor Presentations – Downtown Mahopac Concept/Design Proposals
2. Personnel – Police Chief

PUBLIC HEARING: Upon a Certain Map, Plan and Report, Including a Revised Estimate of Cost, in Relation to the Proposed Increase and Improvement of the Facilities of Carmel Water District Nos. 2,9 and 14

1. Res: Public Interest Order in the Matter of the Increase and Improvement of Facilities of Carmel Water Districts Nos. 2, 9 and 14 in the Town of Carmel, Putnam County, New York (Additional Costs)
2. Res: Authorizing the Issuance of an Aggregate $1,262,500 Bonds of the Town of Carmel, Putnam County, New York, to Pay Additional Costs of the Increase and Improvement of Facilities of Carmel Water District #s 2,9, and 14 in the Town of Carmel, Putnam County, New York

Town Board Voting Meeting:

- Accept Town Board Minutes, June 10, 2020

1. Res: Waiving the Notice Requirement in Section 64 of the NYS ABC Law with Respect to a Liquor License – Brooklyn Organic Kitchen
2. Res: Authorizing Mailing of Lake Mahopac Park District Newsletter
3. Res: Authorizing A Partnership Between the Town of Carmel and Town of Kent for Submission of an Application - East of Hudson Community Wastewater Planning Assistance Grant Program
4. Res: Authorizing Request for Proposals Pursuant to Property Maintenance Law
5. Res: Acknowledgment of Emergency Repairs – Town of Carmel Highway Department
6. Res: Accepting Donation of Sick Time by Town of Carmel Highway Employees
7. Res: Acknowledging Performance of Emergency Repairs Carmel Water District #8
8. Res: Authorizing Amendment of Contract Carmel Water and Sewer District Operations and Maintenance
9. Res: Authorizing Scheduling of Public Hearing on Local Law Amending Chapter 156 of the Town Code of the Town of Carmel, entitled, “Zoning” (July 22, 2020) (Petitioner: Willow Wood Country, Inc. d/b/a Willow Wood Gun Club)

Special Work Session:

1. John Robert Folchetti & Associates – Presentation of CSD#5 Facility Plan

- **Public Comment (Three (3) Minutes on Agenda Items Only)**
- **Town Board Member Comments**

Open Forum:

- **Public Comments on New Town Related Business (Three (3) Minutes Maximum for Town Residents, Property Owners & Business Owners Only)**
- **Town Board Member Comments / Adjournment**

NOTICE OF PUBLIC HEARING

NOTICE IS HEREBY GIVEN that the Town Board of the Town of Carmel, Putnam County, New York, will meet at the Town Hall, 60 McAlpin Avenue, in Mahopac, New York, on July 1, 2020, at 7:00 o'clock P.M., Prevailing Time, for the purpose of conducting a public hearing upon a certain map, plan and report, including a revised estimate of cost, in relation to the proposed increase and improvement of the facilities of Carmel Water Districts Nos. 2, 9 and 14 in said Town, consisting in each district of the construction of improvements to the district water tank or shared water tank and related equipment and site improvements, including original furnishings, equipment, machinery, apparatus, appurtenances, and incidental improvements and expenses in connection therewith, at a revised maximum estimated cost of $2,762,615 to Carmel Water District No. 2, (an increase of $1,200,000), $40,184 to Carmel Water District No. 9, (an increase of $22,500), and $431,063 to Carmel Water District No. 14, (an increase of $40,000).

Said capital projects have been determined to be a Type II Action pursuant to the regulations of the New York State Department of Environmental Conservation promulgated pursuant to the State Environmental Quality Review Act ("SEQRA"), the implementation of which as proposed, said regulations provide will not result in any significant adverse environmental impacts. The map, plan and report are available in the office of the Town Clerk, where they may be inspected during regular office hours.

At said public hearing said Town Board will hear all persons interested in the subject matter thereof. The Town Board will make every effort to assure that the Public Hearing is accessible to persons with disabilities. Anyone requiring special assistance and/or reasonable accommodations should contact the Town Clerk.

Dated: Mahopac, New York,
June 11, 2020

BY ORDER OF THE TOWN BOARD OF THE TOWN OF CARMEL, PUTNAM COUNTY, NEW YORK

Ann Spofford
Town Clerk

RESOLUTION #1

PUBLIC INTEREST ORDER

IN THE MATTER OF THE INCREASE AND IMPROVEMENT OF FACILITIES OF CARMEL WATER DISTRICT # 2, 9 & 14, IN THE TOWN OF CARMEL, PUTNAM COUNTY, NEW YORK

WHEREAS, by Order heretofore adopted, the Town Board of the Town of Carmel, Putnam County, New York, authorized an increase and improvement of the facilities of Carmel Water District Nos. 2, 9, and 14 in said Town, consisting in each district of the construction of improvements to the district water tank or shared water tank and related equipment and site improvements, including original furnishings, equipment, machinery, apparatus, appurtenances, and incidental improvements and expenses in connection therewith, at a maximum estimated cost of $1,562,615 to Carmel Water District No. 2, $17,684 to Carmel Water District No. 9, and $391,063 to Carmel Water District No. 14; and

WHEREAS, by Order dated June 10, 2020, said Town Board called a public hearing for July 1, 2020 at 7:00 o'clock, P.M., on the question of the increase in the maximum estimated costs thereof to $2,762,615 for Carmel Water District No. 2 (an increase of $1,200,000), $40,184 for Carmel Water District No. 9, (an increase of $22,500), and $431,063 for Carmel Water District No. 14, (an increase of $40,000); and

WHEREAS, notice of said public hearing was duly published in the manner and within the time provided by law and such public hearing was duly held at the time and place specified in said notice at which all persons interested in the subject matter thereof were duly heard; and

WHEREAS, said Town Board has duly considered the evidence given at said public hearing; NOW, THEREFORE, BE IT

ORDERED, by the Town Board of the Town of Carmel, Putnam County, New York, as follows:

Section 1. Upon the evidence given at the aforesaid public hearing, it is hereby found and determined that it is in the public interest to make the increase and improvement of the facilities of Carmel Water District Nos. 2, 9, and 14, in the Town of Carmel, Putnam County, New York, in the manner described in the preamble hereof, at

a new maximum estimated cost of $2,762,615 for Carmel Water District No. 2, $40,184 for Carmel Water District No. 9, and $431,063 for Carmel Water District No. 14

Section 2. This Order shall take effect immediately.

Resolution

Offered by: _____

Seconded by:_____

Roll Call Vote	YES	NO
Robert Schanil	___	___
Michael Barile	___	___
Frank Lombardi	___	___
Suzanne McDonough	___	___
Kenneth Schmitt	___	___

RESOLUTION #2

RESOLUTION AUTHORIZING THE ISSUANCE OF AN AGGREGATE $1,262,500 BONDS OF THE TOWN OF CARMEL, PUTNAM COUNTY, NEW YORK, TO PAY ADDITIONAL COSTS OF THE INCREASE AND IMPROVEMENT OF FACILITIES OF CARMEL WATER DISTRICT # 2, 9 & 14, IN THE TOWN OF CARMEL, PUTNAM COUNTY, NEW YORK

WHEREAS, pursuant to the provisions heretofore duly had and taken in accordance with the provisions of Section 202-b of the Town Law, and more particularly an Order dated the date hereof, said Town Board has determined it to be in the public interest to improve the facilities of Carmel Water District Nos. 2, 9 and 14, in the Town of Carmel, Putnam County, New York, being in each such district, the construction of improvements to the district water tank or shared water tank and related equipment and site improvements, including original furnishings, equipment, machinery, apparatus, appurtenances, and incidental improvements and expenses in connection therewith, at a revised aggregate maximum estimated cost of $1,262,500 allocated between such districts as described therein; and

WHEREAS, the capital project hereinafter described, as proposed, has been determined to be a Type II Action pursuant to 6 NYCRR Part 617.5(c) (2) of the regulations of the New York State Department of Environmental Conservation promulgated pursuant to the State Environmental Quality Review Act, which as such will not have any significant adverse impacts on the environment; and

WHEREAS, it is now desired to authorize such capital project and its financing; NOW, THEREFORE, BE IT

RESOLVED, by the Town Board of the Town of Carmel, Putnam County, New York, as follows:

Section 1. For the class of objects or purposes of paying the additional costs of the increase and improvement of Carmel Water District Nos. 2, 9, and 14, in the Town of Carmel, Putnam County, New York, consisting in each district of the construction of improvements to the district water tank or shared water tank and related equipment and site improvements, including original furnishings, equipment, machinery, apparatus, appurtenances, and incidental improvements and expenses in connection therewith,

there are hereby authorized to be issued $1,262,500 bonds of said Town pursuant to the provisions of the Local Finance Law.

Section 2. It is hereby determined that the aggregate maximum estimated cost of the aforesaid class of objects or purposes is now determined to be $3,233,862, which class of objects or purposes is hereby authorized at said maximum estimated cost, and that the plan for the financing thereof is (a) by the issuance of the $1,971,362 bonds of $2,728,390 bonds of said Town heretofore authorized to be issued pursuant to bond resolution dated and duly adopted August 21, 2019; and (b) by the issuance of the $1,262,500 bonds of said Town authorized to be issued pursuant to this bond resolution.

Section 3. It is hereby determined that the period of probable usefulness of the aforesaid class of objects or purposes is forty years pursuant to subdivision 1 of paragraph a of Section 11.00 of the Local Finance Law, calculated from the date of issuance for the first obligations therefor. It is hereby further determined that the maximum maturity of the serial bonds herein authorized will exceed five years.

Section 4. The faith and credit of said Town of Carmel, Putnam County, New York, are hereby irrevocably pledged for the payment of the principal of and interest on such bonds as the same respectively become due and payable. An annual appropriation shall be made in each year sufficient to pay the principal of and interest on such bonds becoming due and payable in such year. To the extent not paid from monies raised from said Carmel Water District Nos. 2, 9, and 14 in the manner provided by law, there shall annually be levied on all the taxable real property of said Town, a tax sufficient to pay the principal of and interest on such bonds as the same become due and payable.

Section 5. Subject to the provisions of the Local Finance Law, the power to authorize the issuance of and to sell bond anticipation notes in anticipation of the issuance and sale of the serial bonds herein authorized, including renewals of such notes, is hereby delegated to the Supervisor, the chief fiscal officer. Such notes shall be of such terms, form and contents, and shall be sold in such manner, as may be prescribed by said Supervisor, consistent with the provisions of the Local Finance Law.

Section 6. The powers and duties of advertising such bonds for sale, conducting the sale and awarding the bonds, are hereby delegated to the Supervisor, who shall advertise such bonds for sale, conduct the sale, and award the bonds in such manner as

he shall deem best for the interests of said Town, including, but not limited to, the power to sell said bonds to the New York State Environmental Facilities Corporation; provided, however, that in the exercise of these delegated powers, the Supervisor shall comply fully with the provisions of the Local Finance Law and any order or rule of the State Comptroller applicable to the sale of municipal bonds. The receipt of the Supervisor shall be a full acquittance to the purchaser of such bonds, who shall not be obliged to see to the application of the purchase money.

Section 7. All other matters except as provided herein relating to the serial bonds herein authorized including the date, denominations, maturities and interest payment dates, within the limitations prescribed herein and the manner of execution of the same, including the consolidation with other issues, and also the ability to issue serial bonds with substantially level or declining annual debt service, shall be determined by the Supervisor, the chief fiscal officer of such Town. Such bonds shall contain substantially the recital of validity clause provided for in Section 52.00 of the Local Finance Law, and shall otherwise be in such form and contain such recitals, in addition to those required by Section 51.00 of the Local Finance Law, as the Supervisor shall determine consistent with the provisions of the Local Finance Law.

Section 8. The Supervisor is hereby further authorized, at his sole discretion, to execute a project finance and/or loan agreement, and any other agreements with the New York State Department of Health and/or the New York State Environmental Facilities Corporation, including amendments thereto, and including any instruments (or amendments thereto) in the effectuation thereof, in order to effect the financing or refinancing of the specific object or purpose described in Section 1 hereof, or a portion thereof, by a bond, and/or note issue of said Town in the event of the sale of same to the New York State Environmental Facilities Corporation.

Section 9. The power to issue and sell notes to the New York State Environmental Facilities Corporation pursuant to Section 169.00 of the Local Finance Law is hereby delegated to the Supervisor. Such notes shall be of such terms, form and contents as may be prescribed by said Supervisor consistent with the provisions of the Local Finance Law.

Section 10. The validity of such bonds and bond anticipation notes may be contested only if:

1) Such obligations are authorized for an object or purpose for which said Town is not authorized to expend money, or

2) The provisions of law which should be complied with at the date of publication of this resolution are not substantially complied with, and an action, suit or proceeding contesting such validity is commenced within twenty days after the date of such publication, or

3) Such obligations are authorized in violation of the provisions of the Constitution.

Section 11. This resolution shall constitute a statement of official intent for purposes of Treasury Regulations Section 1.150-2. Other than as specified in this resolution, no monies are, or are reasonably expected to be, reserved, allocated on a long-term basis, or otherwise set aside with respect to the permanent funding of the object or purpose described herein.

Section 12. This resolution, which takes effect immediately, shall be published in summary form in the official newspaper, together with a notice of the Town Clerk in substantially the form provided in Section 81.00 of the Local Finance Law.

Resolution

Offered by: _____

Seconded by: _____

Roll Call Vote	YES	NO
Robert Schanil	___	___
Michael Barile	___	___
Frank Lombardi	___	___
Suzanne McDonough	___	___
Kenneth Schmitt	___	___

RESOLUTION #1

RESOLUTION WAIVING THE NOTICE REQUIREMENT IN SECTION 64 OF THE NEW YORK STATE ABC LAW WITH RESPECT TO A LIQUOR LICENSE FOR BROOKLYN ORGANIC KITCHEN

WHEREAS, the representatives and/or proprietors of Brooklyn Organic Kitchen 890 South Lake Boulevard, NY 10541, have advised of the intention to apply for an on-premises liquor license for which thirty days advance notice of such application must be sent to the municipality, and

WHEREAS, the notice required by Article 5 of the Alcohol Beverage Control Law may be waived by the Town Board, and

WHEREAS, the Town of Carmel Town Board does not intend to comment upon the application referred to herein;

NOW, THEREFORE BE IT RESOLVED, that the Town Board of the Town of Carmel hereby waives the thirty-day notice requirement contained in Article 5 of the Alcoholic and Beverage Control Law, and states that it does not intend to offer any comments regarding said application, for a liquor license at the premises referred to herein; and

BE IT FURTHER RESOLVED that Town Clerk Ann Spofford is hereby authorized to sign a Waiver of Said Notice on behalf of the Town of Carmel.

Resolution

Offered by: _____

Seconded by:_____

Roll Call Vote	YES	NO
Robert Schanil	___	___
Michael Barile	___	___
Frank Lombardi	___	___
Suzanne McDonough	___	___
Kenneth Schmitt	___	___

RESOLUTION #2

RESOLUTION AUTHORIZING MAILING OF LAKE MAHOPAC PARK DISTRICT NEWSLETTER

RESOLVED that the Town Board of the Town of Carmel, acting as the Commissioners of the Lake Mahopac Park District, hereby authorizes the mailing of the 2020 newsletter as prepared by the Lake Mahopac Park District Committee to all properties within the district and further directs that the cost thereof be charged as a district expense.

Resolution

Offered by: _____

Seconded by:_____

Roll Call Vote	YES	NO
Robert Schanil	___	___
Michael Barile	___	___
Frank Lombardi	___	___
Suzanne McDonough	___	___
Kenneth Schmitt	___	___

RESOLUTION #3

RESOLUTION AUTHORIZING A PARTNERSHIP BETWEEN THE TOWN OF CARMEL AND THE TOWN OF KENT FOR SUBMISSION OF AN APPLICATION – EAST OF HUDSON COMMUNITY WASTEWATER PLANNING ASSISTANCE GRANT PROGRAM

WHEREAS, the Town of Carmel will partner with the Town of Kent to apply to the New England Interstate Water Pollution Control Commission (NEIWPCC) for a grant under the 2020 - 2021 East of Hudson Community Wastewater Planning Assistance Grant Program to seek funding to finance an engineering study that will evaluate wastewater solutions for Palmer Lake; and

WHEREAS, the Town of Kent will be designated as the lead municipality and will produce the required engineering report for Palmer Lake; and

WHEREAS, the application requires dual authorization by both appropriate governing bodies in order to submit the application.

NOW, THEREFORE, BE IT RESOLVED that the Town Board for the Town of Carmel does hereby approve and endorse the Town of Kent's application for a $375,000 Community Wastewater Planning Assistance Grant to finance an engineering study that will evaluate wastewater solutions for Palmer Lake, and

BE IT FURTHER RESOLVED that, upon approval of the grant request, the Town of Kent will serve as the designated lead municipality and will provide the funded engineering study to NEIWPCC, in partnership with the Town of Carmel.

Resolution

Offered by: _____

Seconded by:_____

Roll Call Vote	YES	NO
Robert Schanil	___	___
Michael Barile	___	___
Frank Lombardi	___	___
Suzanne McDonough	___	___
Kenneth Schmitt	___	___

RESOLUTION #4

RESOLUTION AUTHORIZING REQUEST FOR PROPOSALS PURSUANT TO PROPERTY MAINTENANCE LAW

RESOLVED that the Town Board of the Town of Carmel, in accordance with Chapter 114 of the Town of Carmel Town Code titled "Property Maintenance" hereby authorizes Town of Carmel Director of Codes Enforcement Michael Carnazza to solicit/request proposals for the cleanup and correction of Town Code violations existing for the properties located at 112 Wixon Pond Road (Town of Carmel Tax Map # 65.5-1-51) and 105 Longdale Road (Town of Carmel Tax Map # 65.14-1-24).

Resolution

Offered by: _____

Seconded by:_____

Roll Call Vote	YES	NO
Robert Schanil	___	___
Michael Barile	___	___
Frank Lombardi	___	___
Suzanne McDonough	___	___
Kenneth Schmitt	___	___

RESOLUTION #5

RESOLUTION ACKNOWLEDGMENT OF EMERGENCY REPAIRS TOWN OF CARMEL HIGHWAY DEPARTMENT

RESOLVED, that the Town Board of the Town of Carmel, hereby acknowledges the emergency repairs performed upon Highway Department Truck #53 from Stronghold Industries, Holmes, NY as fully detailed in the memorandum from Town Highway Superintendent, Michael Simone to the Town Board dated June 11, 2020, which is attached hereto and made a part thereof.

Resolution

Offered by: _____

Seconded by:_____

Roll Call Vote	YES	NO
Robert Schanil	___	___
Michael Barile	___	___
Frank Lombardi	___	___
Suzanne McDonough	___	___
Kenneth Schmitt	___	___

TOWN OF CARMEL HIGHWAY DEPARTMENT

Carmel Highway Department
55 McAlpin Avenue
Mahopac, NY 10541

MICHAEL SIMONE
Superintendent of Highways

845.628.7474
FAX 845.628.1471
MSimone@bestweb.net

FROM THE DESK OF: *Michael Simone*

TO: SUPERVISOR KENNETH SCHMITT
TOWN BOARD

DATE: JUNE 11, 2020

RE: EMERGENCY PURCHASE REPORT

This is to report an emergency purchase as follows ~

VENDOR	Stronghold Industries	# 10313
AMOUNT	$5,700.91	
PURCHASE	Lift Service	
VEHICLE	Truck #53 – 2009 Int'l Bucket Truck VIN 1HTMKAAN19H046742	
REASON FOR PURCHASE	Change out & service pins/hardware	

Tree truck was out of service and needed ASAP

cc Comptroller MaryAnn Maxwell

Stronghold Industries
5 Sybil Court
Holmes, NY 12531
aaron@strongholdny.com
914-235-8280

Invoice: 3212
Date: 4/20/2020

#53

Bill To
Town of Carmel Highway Department
55 McAlpin Ave
Mahopac, NY 10541
P: 845-628-7474 F: 845-628-1471

Remit Payment To
Stronghold Industries
5 Sybil Court
Holmes, NY 12531

Service Order	Terms	Due Date	Authorizer	Customer PO	Unit #
3358	Net 30	5/20/2020			Altec Bucket Truck

Item	Description	Quantity	Rate	Amount
	Complaint: Metal-to-metal noise coming from scissor lift. **Cause:** Unknown			
Labor	**Correction:** Crane / Hardware / Set up and run unit to try and diagnose and recreate noise that operator was hearing. Find during diagnosis, small oil pan leak, passenger side fuel tank leak neak bracket, slight play n u-joint and bed support bracket has a crack. Rig boom to remove and hoist off of unit. Disconnect housing, hydraulic lines and electrical. Set boom on horses, and weld crack in bed support bracket. Cap and plug all hydraulic lines.	10.00000	$125.00	$1,250.00
Parts	Can brake klean	1.00000	$3.47000	$3.47
Parts	Zip Tie	10.00000	$0.50000	$5.00
Parts	¼" JIC fitting	1.00000	$5.71000	$5.71
	Complaint: Remove scissor lift assembly. **Cause:** To assess where noise is coming from. (Inspection)			
Labor	**Correction:** Crane / Hardware / Work to remove pins to get the scissor lift off of the unit. Disconnect hydraulic lines to scissor, rig to be removed and hoist off unit and bring in shop. Begin to disassemble scissor unit. Remove pins and separate sections to inspect. Inspect pins and bushings for wear, all O.K. Start to reassemble.	10.00000	$125.00	$1,250.00
	Complaint: Reassemble scissor unit. **Cause:** To put back on truck. (Inspection)			
Labor	**Correction:** Crane / Hardware / Assemble scissor, prep and install back onto unit. Reinstall cylinder, connect all piston hydraulic lines to run and test. Run and test function, all O.K. Rig and hoist the boom back onto the scissor lift unit. Line up boom with base and bolt rotation bearing down. Fix start/stop wire from upper controls.	6.00000	$125.00	$750.00
Parts	½"- 13x1.5 Bolt	1.00000	$0.80000	$0.80
Parts	½" Flat Washer	2.00000	$0.27000	$0.54

Item	Description	Quantity	Rate	Amount
Parts	½" Nut	1.00000	$0.43000	$0.43
Parts	Can brake klean	1.00000	$3.47000	$3.47
	Complaint: Finish assembly. **Cause:** Complete. (Inspection)			
Labor	**Correction:** Crane / Hardware / Change out rotation gear bolts and torque down. Powerwash uniit to asses and leaks, none found. Grease unit nd check start/stop function from upper controls. Top off unit with hydraulic fluid and fix bad ground wire on back-up alarm. Run and test, all O.K.	16.00000	$125.00	$2,000.00
Parts	Grade 9 Hex screws 3/4" c 3"	20.00000	$11.21000	$224.20
Parts	freight	1.00000	$12.99000	$12.99
Parts	ATF fluid /gal	1.00000	$17.00000	$17.00
Parts	Tube grease /ea	1.00000	$8.63000	$8.63
Parts	Butt connector /ea	5.00000	$1.00000	$5.00
Parts	12 Wire /ft	3.00000	$1.00000	$3.00

Unit: Altec Bucket Truck **VIN:** 1HTMKAAN19H046742
2009 International 4400
Chassis: 74,048 Miles

Shop Supplies	$160.67
Pre Tax Total	$5,700.91
Municipality/GOV (0.0000% of $5,700.91)	$0.00
Total	$5,700.91
Payments & Credits	$0.00
Balance Due	$5,700.91

RESOLUTION #6

RESOLUTION ACCEPTING DONATION OF SICK TIME BY TOWN OF CARMEL HIGHWAY EMPLOYEES

RESOLVED that the Town Board of the Town of Carmel approves the donation of eighty (80) hours of sick leave accruals from Employee No. 1765 to Employee No. 2791.

Resolution

Offered by: _____

Seconded by:_____

Roll Call Vote	YES	NO
Robert Schanil	___	___
Michael Barile	___	___
Frank Lombardi	___	___
Suzanne McDonough	___	___
Kenneth Schmitt	___	___

RESOLUTION #7

RESOLUTION ACKNOWLEDGING PERFORMANCE OF EMERGENCY REPAIRS CARMEL WATER DISTRICT #8

RESOLVED, the Town Board of the Town of Carmel, acting as Commissioners of the various water and sewer districts of the Town of Carmel, hereby acknowledges the emergency performance of water district collection system/distribution system and treatment facilities repairs, specifically those performed in Carmel Water District #8, as fully detailed in the memorandum of Town Engineer Richard J. Franzetti, P.E. to the Town Board dated June 15, 2020, which is attached hereto and made a part thereof.

Resolution

Offered by: _____

Seconded by:_____

Roll Call Vote	YES	NO
Robert Schanil	___	___
Michael Barile	___	___
Frank Lombardi	___	___
Suzanne McDonough	___	___
Kenneth Schmitt	___	___

Richard J.Franzetti, P.E.
Town Engineer

(845) 628-1500
(845) 628-2087
Fax (845) 628-7085

Office of the Town Engineer
60 McAlpin Avenue
Mahopac, New York 10541

MEMORANDUM

To: Carmel Town Board

From: Richard J. Franzetti P.E. Town Engineer

Date: June 15, 2020

Re: Emergency Repairs/Services

This memorandum is being presented to the Town Board to advise the Board of emergency invoices that were submitted for payment in excess of $5,000.00 for services rendered. The following provides a brief a summary of the work that was performed.

- Carmel Water District 8 Curb Box Replacement

  On June 4, 2020, Bee and Jay, the operator for the CWD 8 alerted the Engineering Department that there was a report of low water volume at the above address. Ed Kuck Excavating was called in to dig up the main, wet tap the saddle, run the service line to the curb box, backfill and restore the area. Attached is the invoice in the amount of $5,897.24.00.

We request that this memorandum be put into the agenda as a matter of record.

Ed Kuck Excavating Inc
20 Day Road
Carmel, NY 10512

INV # TOC -040-20
CWD # 8
REQ #
Vendor 0670
Tax ID - 133851002

Attention: Rob Vera

EMERGENCY: LOW VOLUME WATER

Respond as per: BEE & JAY
Job Location: 23 KINGS RIDGE ROAD
Work Completed on: 6/4/2020
Start time: End Time: 8 HOURS

Job Description:
DUG UP MAIN
WET TAP NEW SADDLE CONNECTION FOR HOUSE
RAN SERVICE LINE TO CURB BOX AND CONNECTED TO HOMEOWNERS SIDE
BACKFILLED, COMPACTED AND RESTORED AREA

Materials / Equipment/ Labor	Total Hrs,yds,qty	Price per yd, qty, day	Total
Track Hoe MR55	8	$85.00 per hour	680.00
Dump Truck	8	$90.00 per hour	720.00
Support Vehicle	Day rate	$155.00	155.00
Chop Saw	Day rate	$ 70.00	
Jumping Jack	Day rate	$70.00	70.00
Plate tamper	Day rate	$70.00	
Mud Sucker	Day rate	$70.00	
Locater	Day rate	$70.00	
Machine Hammer	Day rate	$250.00	250.00
Machine operator	8 Hrs X 1 man	$184.18	1473.44
Laborers	8 Hrs X 2 men	$159.30	2548.80
Item 4		$40.00 per yard	
Seed	1/8 BAG	$96.00 bag	
Top soil	1 YARD	$50.00	
Blacktop		$114.00 per ton	
Cold Patch		$140.00 per ton	
Hay	½ BAG	$15.36 bag	
Total			5,897.24

RESOLUTION #8

RESOLUTION AUTHORIZING AMENDMENT OF CONTRACT CARMEL WATER AND SEWER DISTRICT OPERATIONS AND MAINTENANCE

WHEREAS the Town Board of the Town of Carmel, acting as Commissioners of the various water and sewer districts of the Town of Carmel, has previously entered into a contract with Inframark, LLC for the operation and maintenance of Carmel Sewer Districts #1, #2, #3, #4, #5, #6, #7, #8 and Carmel Water Districts #2, #3 and #12 dated March 5, 2018;

NOW THEREFORE BE IT RESOLVED, that the Town Board of the Town of Carmel, acting as Commissioners of the aforementioned sewer and water districts hereby authorizes amendment of the referenced contract with respect to payment of prevailing wage rates for all public work performed under said contract, said amendment to be in form as attached hereto and made a part hereof; and

BE IT FURTHER RESOLVED, that Town Supervisor Kenneth Schmitt is hereby authorized to sign the aforesaid contract amendment.

Resolution

Offered by: _____

Seconded by:_____

Roll Call Vote	YES	NO
Robert Schanil	___	___
Michael Barile	___	___
Frank Lombardi	___	___
Suzanne McDonough	___	___
Kenneth Schmitt	___	___

RESOLUTION #9

RESOLUTION AUTHORIZING THE SCHEDULING OF PUBLIC HEARING

RESOLVED, that the Town Board of the Town of Carmel hereby authorizes the re-scheduling of a Public Hearing, to be held on the 22nd of July 2020 at 7:00 p.m. or as soon thereafter that evening as possible, on a Local Law amending Chapter 156 of the Town Code of the Town of Carmel, entitled "Zoning"; and

BE IT FURTHER RESOLVED that Town Clerk Ann Spofford is hereby authorized and instructed to publish and post the necessary notices in the official newspapers of the Town and on the Town bulletin board regarding this Public Hearing.

Resolution

Offered by: _____

Seconded by:_____

Roll Call Vote	YES	NO
Robert Schanil	___	___
Michael Barile	___	___
Frank Lombardi	___	___
Suzanne McDonough	___	___
Kenneth Schmitt	___	___

J. ROBERT FOLCHETTI & ASSOCIATES, LLC
CIVIL/ENVIRONMENTAL ENGINEERS

Carmel Sewer District 5 Wastewater Treatment Plant Engineering Report

Executive Summary

Designed and Constructed Early 70's

- Serves +/- 67 homes
- Originally a secondary treatment plant
- Town took over 1979
- Original plant failure 1999- Bioclere units installed 2000
- DEC modified permit 2009 to include ammonia as an effluent parameter
- Notice Of Violation November 2016

Plant no longer meets original design parameters

- Notice Of Violation March 2020 for all basic parameters and flow

Assessed Plant and Collection System

- Plant in failure
- CS: Piping good - Manhole issues in backlot sewers (1 fixed; 1 in process)

Alternatives

- Custom vs. Package plant
- Package selected as most cost effective approach

Reviewed 3 types of wastewater treatment processes

- Activated Sludge
- Membrane Bio Reactor
- Moving Bed Bio Reactor

31 Sodom Road
Brewster, New York 10509
845-363-1560
Fax 845-582-0485
www.jrfa.com

Because: Fit in packages
Operationally Common
Offer operational Simplicity
Generally low Operation & Maintenance costs

Five (5) Criteria:

- Process reliability;
- Operational complexity/Ease of maintenance;
- Site constraints;
- Construction cost;
- Annual operating cost.

Two vendors each process; Six Vendors Total

- All meet design & process criteria
- 5/6 require building and limited excavation
- 6th require burial

Package plant proposals ranged from $200,000 to $450,000

Construction Estimates ranged from $550,000-$1,100,000

MBR by Dynatec & MBBR by Earthtek very competitive

- $559,000 and $574,000, respectively

MBBR seems more economical to operate by ~ $3,000/yr

Table 8.1 Annualized cost

- 20 Year Bond Average $580/yr/HH
- 30 Year Bond Average $440/yr/HH

Next Steps

- Submit to NYSDEC by July 3, 2020
- Upon approval, procure design services - Approval + 120 days
- Design - NTP +270 days
- Bid - Design Application + 150 days
- Construction - Bid Award + 270 days

TOWN OF CARMEL
60 McALPIN AVENUE
MAHOPAC, NEW YORK 10541

CARMEL SEWER DISTRICT NO. 5
HILLSDALE WASTEWATER TREATMENT PLANT
SPDES PERMIT # NY0030678
ENGINEERING REPORT

PUTNAM COUNTY, NEW YORK

JUNE 2020

J. ROBERT FOLCHETTI & ASSOCIATES, L.L.C.
CIVIL / ENVIRONMENTAL ENGINEERS
31 SODOM ROAD
BREWSTER, NEW YORK 10509
T. (845) 363-1560

TABLE OF CONTENTS

List of Figures

List of Tables

Appendices

Appendix-C	Carmel Sewer District No. 5 Bioclere Wastewater Treatment Units Engineers Report, May 2000
Appendix-D	New York State Department of Environmental Conservation Notice of Violation Carmel Sewer District #5 Hillsdale STP, dated November 6, 2015
Appendix-E	New York State Department of Environmental Conservation Order on Consent, dated July 3, 2019
Appendix-F	New York State Department of Environmental Conservation Annual Comprehensive Inspection - Notice of Violation dated March 19, 2020
Appendix-G	Unit Process Sampling Analytical Results
Appendix-H	Carmel Sewer District No. 5 Collection System Television Inspection Report, October 2019
Appendix-I	Extended Aeration Preliminary Manufacturer Proposal and Process Calculations I-1 Legacy Environmental Process, LLC I-2 Pollution Control Systems, Inc.
Appendix-J	Membrane Bio-Reactor Preliminary Manufacturer Proposal and Process Calculations J-1 Dynatec Systems, Inc. J-2 Smith and Loveless, Inc.
Appendix-K	Moving Bed Bio-Reactor Preliminary Manufacturer Proposal and Process Calculations K-1 Earthtek Environmental, LLC K-2 Pollution Control Systems, Inc.

References

Wastewater Engineering: Treatment and Resource Recovery; Metcalf & Eddy/AECOM; 5th Edition; McGraw-Hill Education, 2014

1.0 BACKGROUND

1.1 District Formation

Originally known as Hillsdale Estates, Carmel Sewer District No. 5 was formed by unanimous vote of the Town Board on November 14, 1979. Refer to Appendix A. Purchased from a local, private Sewage Works Corporation for $67,000.00, the original plant was designed and constructed in the early 1970's to meet secondary effluent treatment standards.

1.2 District and Facilities Description

The District currently serves sixty seven (67) residential tax parcels. See Figure 1. The State Pollution Discharge Elimination System (SPDES) permitted flow to the plant is 27,200 gallons per day (0.0272 MGD). Refer to Appendix B.

Potable water to the district is provided by SUEZ North America, a private water corporation.

1.2.1 The original Hillsdale Estates WWTP consisted of a 15,000 gallon septic tank as primary treatment, a subsurface sand filter as secondary treatment, and a chlorine contact tank for disinfection prior to discharge. These unit processes were designed to meet secondary effluent parameters that were consistent with discharge to a Class D stream. The sand filter failed in 1999 and required replacement. The new secondary treatment was a pair of BioClere trickling filter/settling tank type processes constructed in 2000 and placed online in 2001. The 2000 plant upgrade was designed to meet the secondary treatment permit conditions in existence at that time. Refer to Appendix C.

1.2.2 The collection system consists entirely of PVC gravity sewer and precast concrete manholes. The system has approximately 6,250 lf of main and 25 manholes ranging from 4 to 12 feet deep. See Figure-1.

1.2.3 In 2009 the New York State Department of Environmental Conservation (DEC) notified the Town that the SPDES permit was being modified to include ammonia as a discharge parameter. Initially modified for seasonal monitoring of effluent concentration and load, the final modification establishing seasonal effluent limits for both went into effect on June 1, 2009. See Appendix B.

1.3 Notice of Violation and Order on Consent

On November 6, 2015 the NYSDEC issued a Notice of Violation (NOV) to the Town. See Appendix D. The NOV cited violations of seasonal concentration-based ammonia limits and violations of seasonal load-based ammonia limits for 2014 and 2015.

Between December 2015 and July 2019, the Town and the DEC engaged in a series of meetings and exchanged several memoranda and draft Orders on Consent. These meetings, memoranda and drafts were focused on various proposed remedial and preventative measures. The final Order on Consent (Consent Order) was signed into effect on July 3, 2019. See Appendix E.

The order requires that the following items be addressed within twelve (12) months of the effective date:

1.3.1 Assess and evaluate the Hillside WWTP and its ability to comply with the effluent limits in the SPDES permit;
1.3.2 Discuss process control optimization, corrective actions and capital improvements necessary to bring the plant into compliance;
1.3.3 Discuss design considerations for future upgrades to the WWTP and the collection system.

1.4 Subsequent Notice of Violation

On March 19, 2020 the NYSDEC issued an additional Notice of Violation. The NOV cited violations for:

- monthly average flow;
- ammonia concentration and load;
- BOD concentration and load;
- suspended solids average;
- BOD percent removal;
- and fecal coliform totals.

See Appendix F. The NOV noted the Consent Order schedule and reiterated the necessity of completing the required report by July 2020.

This report is prepared in compliance with that NOV, the Consent Order and the requirements of the NYSDEC Design Standards for Intermediate Sized Wastewater Treatment Systems and the Ten State Standards.

2.0 PROBLEM EVALUATION AND EXISTING FACILITY REVIEW

2.1 Service Area, Planning Period and Population

2.1.1 The service area is Carmel Sewer District 5. It remains unchanged from its original date of formation and is expected to remain that way for the duration of the planning period.
2.1.2 There is no projected population change or expansion of the District expected for the foreseeable future. Therefore, in accordance with Chapter 10 of the 10 State Standards, the planning period for this District is the design life of the plant, or 20 years.
2.1.3 The District contains 67 single family homes. According to the U.S. Census Bureau, the average household in Carmel contains 2.85 persons. The projected population for the planning period is therefore 191 people.

2.2 Existing WWTP Description

The original Hillsdale WWTP consisted of a 15,000 gallon septic tank as primary treatment, a 4,500 gallon dosing chamber, a subsurface sand filter as secondary treatment, and a chlorine contact tank for disinfection prior to discharge. After more than 20 years in operation, the sand filter failed in 1999 and

required replacement. The septic tank was left in place as primary treatment and the selected process for secondary treatment was a pair of BioClere trickling filter/settling tank units. These processes were constructed in 2000 and placed online in 2001. The plant upgrade was designed to meet the original secondary treatment permit conditions in existence at that time. Refer to Appendix C.

2.3 Unit Process Description

Primary Treatment consists of the original septic tank now used as a settling tank. Primary effluent flows to the dosing chamber where it is pumped to secondary treatment in the BioClere units. From the BioClere units, secondary effluent flows by gravity to the chlorine contact tank for disinfection and is ultimately discharged into NYS Wetland A-4.

2.3.1 Primary Treatment: Septic Tank

Operating Volume:	15,000 gallons
No. of Units:	1
Process Volume:	15,000 gallons

Primary Effluent Pumps	
Pump Rate:	50 gpm
No. of Units:	2

2.3.2 Secondary Treatment:

2.3.2.1 Biological: Modified Trickling Filter

No. of Units:	2
Filter Media Depth:	6 ft.
Filter Media Volume (ea.):	636 cf
Process Media Volume:	1,272 cf
Specific Surface Area:	66.2 sf / cf
Process Media Surface Area:	84,206.4 sf

2.3.2.2 Secondary Clarification

No. of Units:	2
Diameter:	10 ft.
Side Water Depth:	8.5 ft.
Surface Area:	78.5 ft.2
Secondary Sludge (i.e. recycle) Pumps	
Pump Rate:	50 gpm
No. of Units (ea.):	1
Filter Media Dosing Pumps	
Pump Rate:	25 gpm
No. of Units (ea.):	2

2.3.3 Disinfection: Chlorine Contact Tank

No. of Units:	1
Length:	10 ft
Width:	6 ft
Depth:	6 ft

2.3.4 Dechlorination: Tablet Dispenser

No. of Units:	1

2.4 Existing WWTP Treatment Efficiency

The Town's WWTP operator, Inframark, LLC, collected samples from each unit process across the plant and analyzed them for constituent wastewater characteristics including: BOD, TSS, Ammonia, and TKN. The analytical data collected was used to evaluate and assess plant performance in order to:

- determine the capability of existing equipment to remove ammonia and;
- to assess the need for additional processes to meet the new ammonia limits.

Preliminary hydraulic and mass balances were developed from average analytical and flow data collected during the period of 2/3/16 through 10/5/16. See Appendix G for analytical results. See below for a summary of analytical data. See Figure 2 for PFD with hydraulic and mass balance information. The hydraulic and mass balances were prepared in an effort to assess the removal efficiencies across each unit process in the system. Existing plant design information was also consulted to establish baseline loading parameters for the various equipment. The data collected reveals no evidence of significant or excessive hydraulic or mass loadings to the unit process equipment. All of the hydraulic and mass loads appear to be within the standard design parameters for the installed equipment. The hydraulic and mass balances did reveal however, that the plant is not meeting conventional secondary treatment standards through the combined primary and secondary treatment processes. Once data evaluation revealed this fact, the plant processes and controls were reviewed to determine what, if any, operational changes could be made to improve performance. The only operational change that offered the potential to improve BOD & TSS removal was adjusting the sludge recycle rate. This was done over the month of December 2016. The changes had no visible effect on either BOD or TSS removals.

2.5 Collection System

2.5.1 As stated above, the collection system consists of conventional gravity sewerage. Constructed in the mid 1970's, the mains are 8" diameter SDR 35 PVC pipe and the manholes are precast concrete. Depth ranges from 4 feet to 12 feet. To avoid the use of on-lot individual residential pumping stations, multiple back lot sewers were installed. See Figure 1 for sewer layout.

2.5.2 To assess the need for capital improvement in the collection system, it was inspected using TV equipment in the fall of 2019. The sewers are in very good shape, as are the majority of the connections to the manholes. One broken run of pipe and a displaced manhole top were discovered on one backlot sewer run. This was repaired on April 16. 2020. Additionally, one manhole was buried and not located. See Appendix H for inspection results.

2.6 Flow and Loads

2.6.1 The SPDES permitted flow for the plant is 0.0272 MGD. Historically, the plant has generally met this permit limit. Recorded flows over the study period are as follows:

Period	Flow (MGD)		
	Avg	Min	Max
Feb 2016-Oct 2016	0.0203	0.0073	0.0612

The recent NOV cites the facility for sixteen (16) violations of this permit parameter over the 36 month period from January 2017 through January 2020. The repair made to the broken pipe and manhole identified in 2.5.2 does not appear to have made an impact on influent flow. This will be monitored through the design period to determine if additional I&I work is necessary. The recommended design flow for the plant will remain 0.0272 MGD.

2.6.2 Constituent concentrations and loads recorded at plant influent during the sampling period are presented below. Full analytical results for each sampling event is provided in Appendix G.

Parameter	Concentration (mg/l)			Load (#/D)		
	Min	Avg	Max	Min	Avg	Max
BOD_5	61	180	380	11.1	27.3	56.1
TSS	37	156	400	2.8	24.1	68.1
NH_3	6	28	59	1.2	4.1	16.1
TKN	18	44	94	1.8	6.6	16.9

For comparison, Metcalf & Eddy offers the following domestic values for each parameter at low, medium, and high strength:

Parameter	Concentration (mg/l)		
	Low	Med	High
BOD5	133	200	400
TSS	130	195	389
NH3	14	20	41

As can be seen, influent concentrations at the CSD 5 plant are consistent with typical values. As a result, the sampling averages presented for each constituent will be the design parameters for the upgraded facility.

2.7 Site Conditions

The plant is located on a 5.44 acre Town-owned parcel off Carey Street in Mahopac, NY. The parcel is bounded by residences to the east, business fronting Route 6N to the north and west, and New York State Wetland A-4 to the south. The south property line is also the County line separating Putnam County from Westchester County.

3.0 ALTERNATIVE EVALUATION

The 10 State Standards require the evaluation of the No Action alternative. Given the existence of the Consent Order, No Action is not considered to be a viable alternative and will not be discussed further.

3.1 Existing Process Summary

The existing facility is primarily an attached growth process. The primary settling tank is undersized. The BioClere units, composed of trickling filters mounted directly over secondary settling tanks, are underperforming at their primary task. Secondary sludge is returned to the undersized primary settling tanks, complicating plant operations. The plant in its existing configuration was never sized, nor intended, to nitrify the waste stream.

Based on the Consent Order and the most recent NOV, the plant is generally failing to meet its permit requirements from influent to effluent. As has been discussed, the existing plant consists of unit processes that were designed to meet old discharge parameters and were not sized for current permit criteria. An attempt was made to optimize the treatment processes through operational changes with no discernible results. The process combination represents best efforts to meet increasingly stringent effluent parameters using as much of the pre-existing unit processes as possible. This approach has led to multiple citations of violation and a current enforcement action by the State. The process options considered here will include addressing the primary and secondary treatment requirements as well as nitrification.

3.2 Alternative Unit Process Screening

Due to the small size of the facility, the limited size of the District and the improbability of future growth, the recommended upgrade will be a package wastewater treatment plant. All plants will include equalization and disinfection. Types of treatment processes considered are as follows:

3.2.1 Suspended Growth (Activated Sludge)
3.2.2 Membrane Bio-Reactor (MBR)
3.2.3 Moving Bed Biofilm Reactor (MBBR)

Evaluation criteria considered here include:

- Process reliability;
- Operational complexity/Ease of maintenance;
- Site constraints;
- Construction cost;
- Annual operating cost.

3.2.1 Activated Sludge

3.2.1.1 Description

The Activated Sludge Process is one of the most flexible biological treatment processes in existence, and has been extensively employed. The process employs a suspension of flocculent microorganisms to treat the wastewater. In the process, wastewater and sludge solids are mixed and aerated in a reactor vessel. The contents of the reactor (commonly referred to as mixed liquor) consist of the wastewater under

treatment, living and dead microorganisms, and suspended and colloidal matter. The particulate portion of the mixed liquor is typically called the mixed liquor suspended solids (MLSS).

Following a sufficient time for biological action, the mixed liquor in the reactor vessel is transferred to a separate settling basin, where the biosolids are separated from the treated wastewater. The settled (or clarified wastewater) then exits the settling basin and flows to the next unit process for further treatment, while the settled solids are either:

- Returned to the reactor vessel to maintain the required microbial concentration or;
- Removed from the system in a process called wasting.

Although there are many variations of the activated sludge process, all variations employ the following systems or components:

- A reactor vessel or vessels sized to provide a hydraulic retention time of 0.5 to 24 hours depending on the process variation;
- An oxygen source and equipment to disperse it into the reactor vessel;
- A means of mixing the reactor vessel contents, commonly the same equipment used to disperse the oxygen in the vessel;
- A means of separating the MLSS from the treated wastewater, typically a settling basin;
- A means of controlling the MLSS in the system.

The typical activated sludge system is designed to operate on a continuous basis.

Based on the treatment requirements of the plant, the activated sludge process determined to be the most suitable for use is Extended Aeration Activated Sludge Process. This process employs both higher solids and longer (greater than 24 hours) hydraulic retention times. Typically, primary clarifiers are not employed and secondary clarifiers may be designed at lower hydraulic loading rates than conventional to handle wider flow variations. For this reason, we will employ equalization. Per Metcalf and Eddy, extended aeration is extensively used for package plants to treat wastewater from small communities.

3.2.1.2 Process Diagram and Mass Balance

Legacy Environmental Process, of Odenville, AL and Pollution Control Systems, Inc. of Milford, OH manufacture package extended aeration plants. Each has provided a proposal with a preliminary plant layout and effluent calculations. Refer to Appendix I.

3.2.2 Membrane Bio-Reactor (MBR)

3.2.2.1 Description

Membrane bioreactor (MBR) treatment combines the activated sludge process with membrane filtration. Membranes may be submerged directly in the aeration tank or

employed as a side steam process following the aeration tank. The MBR process can produce a significantly higher quality effluent than that obtainable from a conventional activated sludge process. The mixed liquor suspended solids concentration (MLSS) and the solids retention time (SRT) are limited in a conventional activated sludge process by the need to produce a sludge with good settling characteristics in the secondary clarifier. The MBR process does not suffer from this requirement because the final effluent is produced by filtration rather than by sedimentation. Thus, the MLSS concentration can be higher and the SRT can be longer for MBR processes than the typical values used for conventional activated sludge. Higher MLSS and longer SRT allows for smaller aeration tank volume. The need to keep membranes clean requires either a fairly high rate of aeration in a submerged application or a Clean-In-Place (CIP) process for a sidestream application.

Internal/submerged
The filtration element is installed in either the main bioreactor vessel or in a separate tank. The membranes can be flat sheet or tubular or a combination of both, and can incorporate an online backwash system which reduces membrane surface fouling by pumping membrane permeate back through the membrane. Where the membranes are submerged in the main reactor, membrane modules must be removed from the vessel for cleaning.

External/sidestream
The filtration elements are installed externally to the reactor. The biomass is either pumped directly through a number of membrane modules in series and back to the bioreactor, or the biomass is pumped to a bank of modules, from which a second pump circulates the biomass through the modules in series. Cleaning and soaking of the membranes can be undertaken in place with use of an installed cleaning tank, pump, and pipework.

3.2.2.2 Process Diagram and Mass Balance

Dynatec Systems, Inc. of Burlington, NJ and Smith and Loveless, Inc. of Lenaxa, KS manufacture package MBR plants. Each has provided a proposal with a preliminary plant layout and effluent calculations. Refer to Appendix J.

3.2.3 Moving Bed Biofilm Reactor (MBBR)

3.2.3.1 Description

The MBBR process is an attached growth biological wastewater treatment process similar to trickling filter or Rotating Biological Contactor systems. The MBBR process utilizes small plastic carrier media upon which the microorganisms are attached. The MBBR treatment processes typically take place in a tank similar to an activated sludge aeration tank. The carrier media may be kept suspended by diffused aeration (for an aerobic process) or by a mechanical mixing system. A sieve is typically used at the MBBR tank exit to keep the carrier media in the tank. Primary clarification is typically used ahead of the MBBR tank. Secondary clarification is also typically used, but there is no return activated sludge sent back into the process, because an adequate microorganism population is maintained attached to the media.

MBBR plastic media support carriers are typically designed to have a high surface area per unit volume, so that there is a lot of surface area on which the microorganisms attach and grow. These carriers are available from numerous vendors.

The MBBR wastewater treatment process is quite flexible and can be used for BOD removal only or for BOD removal and nitrification. Note that primary clarification and secondary clarification are required for both, but there is no sludge recycle as in a conventional activated sludge process.

Per Metcalf & Eddy (5th Ed, pp 1016-1019), the MBBR process is able to provide BOD and nitrogen removals similar to conventional activated sludge. It requires comparatively less space, is simpler to operate, does not generate as much sludge, and is more flexible under peak wet weather conditions. It is also more flexible than comparative fixed growth processes (trickling filters, RBC's). Conversely, it may require the use of proprietary media, requires better screening and may generate higher energy demand to maintain required dissolved oxygen levels.

3.2.3.2 Process Diagram and Mass Balance

Earthtek Environmental, LLC, of Batesville, IN and Pollution Control Systems, Inc. of Milford, OH manufacture package MBBR plants. Each has provided a proposal with a preliminary plant layout and effluent calculations. Refer to Appendix K.

4.0 PROCESS EVALUATION

4.1 Activated Sludge Process

4.1.1 Advantages

4.1.1.1	Capable of removing 97% of suspended solids, thereby providing a very high quality effluent
4.1.1.2	All process variations are highly flexible and able to adapt to a wide variety of operating conditions and loads
4.1.1.3	Process equipment and components are located outside of the reactor vessel, and are readily accessible for maintenance
4.1.1.4	Cost effective

4.1.2 Disadvantages

4.1.2.1	Process requires a high degree of operator attention and expertise
4.1.2.2	Sludge bulking can be an issue (see 4.1.2.1)
4.1.2.3	Aeration tanks are typically large due to MLSS concentration & SRT requirements
4.1.2.4	Temperature changes affect the tank greatly

4.2 Membrane Bio Reactor (MBR) Process

4.2.1 Advantages

4.2.1.1 Exhibits high waste removal efficiency thereby providing a very high quality effluent

4.2.1.2 Process is simpler to operate without sludge bulking concerns of the activated sludge process

4.2.1.3 Produces lower sludge volume than the activated sludge process

4.2.1.4 Occupies less space than the activated sludge process. Literature sources cite footprint as 50% smaller than activated sludge

4.2.2 Disadvantages

4.2.2.1 Energy costs may be high compared to fixed growth process but are similar to activated sludge process

4.2.2.2 Membrane replacement may increase maintenance costs

4.2.2.3 Requires CIP process to keep membranes functional

4.2.2.4 Additional chemicals required for CIP

4.3 Moving Bed Biofilm Reactor (MBBR) Process

4.3.1 Advantages

4.3.1.1 MBBR process itself is straightforward; does not require sophisticated operator or excessive attention

4.3.1.2 Offers a small footprint

4.3.1.3 No need for return sludge flows, CIP or backwashing when system is in continuous operation

4.3.1.4 System is flexible and self-moderates to provide optimum amount of productive biofilm

4.3.1.5 System is exceptionally efficient and offers a low hydraulic retention time

4.3.2 Disadvantages

4.3.2.1 Operator must periodically collect and analyze samples to ensure bacteria condition

4.3.2.2 Requires attention to Dissolved Oxygen concentration

4.3.2.3 Energy costs may be high compared to fixed growth process but are similar to activated sludge process

4.3.2.4 Media may be proprietary

4.3.2.5 Media removal required to maintain diffusors

5.0 MANUFACTURER EVALUATION

5.1 A minimum of two (2) packaged WWTP manufacturers for each process type were contacted to provide preliminary unit sizing and price quotes for plants suitable to meet the CSD 5 requirements. Each manufacturer was provided with a brief plant history, problem description,

copy of JRFA's mass balance and sampling results (see Fig. 2), and a copy of the SPDES permit (see Appendix B).

5.2 Activated Sludge Vendors

5.2.1 Legacy Environmental Process, of Odinville, AL (Legacy) was requested to supply a quote for their packaged activated sludge WWTP. Legacy proposed a skid mounted complete mix activated sludge (extended aeration) plant.

5.2.1.1 Legacy's proposal includes the following processes:

- Primary Screening
- Flow Equalization
- Aeration Chamber
- Clarifier
- Aerated Sludge Tank
- All blowers, diffusers and ancillary equipment required for the skid mounted processes to operate
- Control Panel
- Available in carbon or stainless steel

5.2.1.2 Legacy's proposal excludes the following

- Flow Meter
- Disinfection
- All construction upon delivery
- Start up and testing services
- Detailed engineering plans and specifications

5.2.1.3 Additional construction required upon delivery includes the following:

- 8 inch reinforced concrete pad with attendant excavation, crushed stone foundation, etc.
- Pole barn or other structure to house the unit
- Crane and other equipment necessary to set the unit
- Flow meter and connection
- Connection to the existing chlorine contact tank
- Connection to the influent sewer
- All electrical connections

5.2.1.4 Legacy's FOB quote was $380,853.00 for the stainless steel variant.

5.2.2 Pollution Control Systems, Inc. of Milford, OH (PCS) was requested to supply a quote for their packaged activated sludge WWTP. PCS proposed a skid mounted complete mix activated sludge (extended aeration) plant.

5.2.1.1 PCS's proposal includes the following processes

- Primary Screening
- Flow Equalization
- Aeration Chamber
- Clarifier
- Aerated Sludge Tank
- Flow Meter
- UV Disinfection
- Control Panel

- All blowers, diffusers and ancillary equipment required for the skid mounted processes to operate
- Available in carbon or stainless steel

5.2.1.2 PCS's proposal excludes the following

- All construction upon delivery
- Start up and testing services
- Detailed engineering plans and specifications

5.2.1.3 Additional construction required upon delivery includes the following:

- 8 inch reinforced concrete pad with attendant excavation, crushed stone foundation, etc.
- Pole barn or other structure to house the unit
- Crane and other equipment necessary to set the unit
- Connection to the influent sewer
- All electrical connections

5.2.1.4 PCS's FOB quote was $390,000.00 for the stainless steel variant.

5.3 MBR Vendors

5.3.1 Dynatec Systems, Inc. of Burlington, NJ (Dynatec) was requested to supply a quote for their packaged MBR WWTP. Dynatec proposed a skid mounted external tubular membrane bioreactor plant.

5.3.1.1 Dynatec 's proposal includes the following processes

- Primary Screening
- Aerated Bioreactor
- Side-stream Ultra-Filter
- CIP storage tank
- Sludge Tank
- Control Panel
- All blowers, diffusers and ancillary equipment required for the skid mounted processes to operate
- Available with HDPE tankage

5.3.1.2 Dynatec's proposal excludes the following

- Equalization
- Flow meter
- Disinfection
- All construction upon delivery
- Start up and testing services
- Detailed engineering plans and specifications

5.3.1.3 Additional construction required upon delivery includes the following:

- Equalization tank, including tank, excavation, foundation, etc.
- 8 inch reinforced concrete pad with attendant excavation, crushed stone foundation, etc.
- Pole barn or other structure to house the unit
- Crane and other equipment necessary to set the unit
- Flow meter and connection
- Connection to the existing chlorine contact tank

- Connection to the influent sewer
- All electrical connections

5.3.1.4 Dynatec's FOB quote was $200,000.00.

5.3.2 Smith and Loveless, Inc of Lenaxa, KS (S&L) was requested to supply a quote for their packaged MBR WWTP. S&L proposed a skid mounted submerged membrane bioreactor plant.

5.3.2.1 S&L's proposal includes the following processes

- Primary Screening
- Flow equalization
- Two zone anoxic tank
- Aerated, Submerged flat sheet membranes
- CIP storage tank
- Sludge Tank
- Flow Meter
- Disinfection
- Control Panel
- All blowers, diffusers and ancillary equipment required for the skid mounted processes to operate
- Available with carbon steel tankage

5.3.2.2 S&L's proposal excludes the following

- All construction upon delivery
- Start up and testing services
- Detailed engineering plans and specifications

5.3.2.3 Additional construction required upon delivery includes the following:

- 8 inch reinforced concrete pad with attendant excavation, crushed stone foundation, etc.
- Pole barn or other structure to house the unit
- Crane and other equipment necessary to set the unit
- Connection to the existing chlorine contact tank
- Connection to the influent sewer
- All electrical connections

5.3.2.4 S&L's FOB quote was $493,500.00.

5.4 MBBR Vendors

5.4.1 Earthtek Environmental, LLC of Batesville, IN (Earthtek) was requested to supply a quote for their packaged MBBR WWTP. Earthtek proposed a buried moving bed biofilm reactor plant.

5.4.1.1 Earthtek's proposal includes the following processes:

- Flow equalization
- Three stage MBBR tankage
- Clarifier
- Flow Meter
- UV Disinfection
- Control Panel

- All blowers, diffusers and ancillary equipment required for the skid mounted processes to operate
- 5 days onsite construction assistance
- 5 additional days onsite startup and testing assistance
- Available with fiberglass reinforced plastic (FRP) tankage

5.4.1.2 Earthtek's proposal excludes the following

- Primary screening
- Sludge Tank
- All construction upon delivery
- Detailed engineering plans and specifications

5.4.1.3 Additional construction required upon delivery includes the following:

- Installation, including excavation, crushed stone foundation, yard piping, etc
- Pole barn or other structure to house the controls
- Equipment necessary to set the unit
- Connection to the influent sewer
- All electrical connections

5.4.1.4 Earthtek's FOB quote was $375,000.00.

5.4.2 Pollution Control Systems, Inc. of Milford, OH (PCS) was requested to supply a quote for their packaged activated sludge WWTP. PCS proposed a skid mounted moving bed biofilm reactor plant.

5.4.2.1 PCS's proposal includes the following processes:

- Primary screening
- Flow equalization
- Two stage MBBR tankage
- Clarifier
- Aerated Sludge Tank
- Flow Meter
- UV Disinfection
- Control Panel
- All blowers, diffusers and ancillary equipment required for the skid mounted processes to operate
- Available with fiberglass reinforced plastic (FRP) tankage

5.4.2.2 PCS's proposal excludes the following

- All construction upon delivery
- Detailed engineering plans and specifications

5.4.2.3 Additional construction required upon delivery includes the following:

- 8 inch reinforced concrete pad with attendant excavation, crushed stone foundation, etc.
- Pole barn or other structure to house the unit
- Crane and other equipment necessary to set the unit
- Connection to the influent sewer
- All electrical connections

5.4.2.4 PCS's FOB quote was $390,000.00.

5.5 Treatment and Construction Requirement Comparison

Table 5.1 provides a side by side comparison of the proposals, with inclusions and exclusions, as provided by each manufacturer. It also identifies preliminary additional construction requirements such as slab, structure and excavation necessary to install each plant.

6.0 CONSTRUCTION COST COMPARISON

6.1 Given the 5.4 acre site, there is more ample space for a new plant to be constructed and started up alongside the existing plant. No disruption of existing plant operations is envisioned during construction of the new facility.

A subsurface investigation was conducted on April 28, 2020 for the twin purposes of determining depth to groundwater and foundation conditions for any new plant. Two test pits were excavated with the assistance of the Town Highway Department. See Figure 3 for test pit locations.

6.1.1 Test Pit 1 Profile:

0 - 6":	Top soil and organics
6"- 54":	Old subsurface sand filter
	6" coarse crushed stone distribution layer
	24" sand filter layer
	12" fine crushed stone collection layer
	6" crushed stone bedding layer
54"- 96"	Native till material
96"- 132"	Native hard pan. Excavation terminated at 11 feet.

Some ground water bled out from 72" for about 5 minutes while excavating between 96"-132"

6.1.2 Test Pit 2 Profile:

0 - 6":	Top soil and organics
6"- 54":	Old subsurface sand filter
	6" coarse crushed stone distribution layer
	24" sand filter layer
	12" fine crushed stone collection layer
	6" crushed stone bedding layer
54"- 60"	Native till material
60"- 108"	Native hard pan. Excavation terminated at 9 feet.

Some ground water bled out from 60" while excavating between 72"-108". Once excavation reached 108" work was terminated and the groundwater allowed to continue to bleed out. Over 30 minutes the flow visibly ebbed until it nearly ceased.

Conclusions: Groundwater does not appear to present a flotation issue for buried tankage or structures. The site should be reexamined during design to confirm these findings. The old sand filter offers excellent foundation opportunities and easy excavation.

6.2 Estimated construction costs were developed based on each manufacturer's submittal. Items not included in the submittal, as identified above, were estimated based on recent construction bids. Table 6.1 provides total estimated construction cost for each plant, including manufacturers FOB costs plus installation of the various items necessary to provide an operating plant.

7.0 OPERATIONS AND MAINTENANCE EVALUATION

7.1 Estimated operation and maintenance (O&M) costs were developed based on each manufacturer's submittal combined with existing electrical utility charges and contract costs for operations and sludge hauling. Where noted, manufacturer's estimates are included. Table 7.1, below, provides annual estimated O & M costs for each plant.

TABLE 7.1
Estimated Annual Operation and Maintenance Costs

Process Type	Manufacturer	ANNUAL OPERATING EXPENSE						
		Operator	Chemicals	Electric	Solids	SubT	Cont.	Total
Activated Sludge								
	Legacy Environmental Process	$4,800		$1,698	$8.060	$14,558	5%	$15,286
	Pollution Control Systems	$4,800		$2,123	$6,680	$13,603	5%	$14,283
MBR								
	Dynatec Systems (side stream)	$4,800		$3,185	$4,230	$12,215	5%	$12,826
	Smith and Loveless (submerged)	$4,800	$500	$2,335	$34,956	$42,591	5%	$44,721
MBBR	Earthtek Environmental	$4,800		$1,868	$7,793	$14,461	5%	$15,184
	Pollution Control Systems	$4,800		$1,720	$7,793	$14,312	5%	$15,028

Operator = Current Inframark Contract
Chemicals = Manufacturer Estimate
Electric = BHP x 0.7457 x Hrs/D x $/kWH x 365
Current Electric Cost = 365*$/G
Solids = G/D x 365*$/G
Current Contract $0.122/gal through 6/2021

8.0 ANNUALIZED COSTS AND RECOMMENDED ALTERNATIVE

All three treatment processes evaluated will meet the effluent criteria required by the SPDES permit. Based on the manufacturer submittals and associated construction and O&M costs, the Dynatec MBR and the Earthtek MBBR proposals are nearly identical. The Town Comptroller has developed debt service costs for 20 and 30 year bonding options. These are shown in Table 8.1. Table 8.2 compares the combined annual debt service plus O&M costs for each.

TABLE 8.1
Estimated Debt Service

Fund	20-Year		30-Year	
Manufacturer	**Dynatec**	**Earthtek**	**Dynatec**	**Earthtek**
Estimated Construction Cost	$558,900	$574,200	$558,900	$574,200
Estimated Soft Costs at 15%	$83,835	$86,130	$83,835	$86,130
Total Cost of Capital Project	$642,735	$660,330	$642,735	$660,330
Total Debt Service Cost	$776,128	$799,397	$883,861	$907,116
Principal	$642,735	$660,330	$642,735	$660,330
Interest	$133,393	$139,067	$241,126	$246,786
Estimated Annual Debt Service Cost	$38,806	$39,970	$29,462	$30,237
Number of Parcels	67	67	67	67
Total District Taxable Value	$22.05	$22.05	$22.05	$22.05
Average Assessed Value	0.33	0.33	0.33	0.33
Rate Per Thousand	$1,759.927438	$1,812.691610	$1,336.146636	$1,371.301587
Estimated Annual Debt Service Per Parcel	$579.20	$596.56	$439.73	$451.30
Formulas				
Average Assessed Value = Total Assessed Value/ # of Parcels				
Rate Per Thousand = Estimated Annual Debt/Total Assessed Value				
Estimated Annual Debt Per Parcel = Rate Per Thousand x Average Assessed Values				

TABLE 8.2 Estimated Total Annual Cost		
Fund	**20-Year**	
Manufacturer	Dynatek	Earthtek
Type Plant	MBR	MBBR
Estimated Total Capital Cost	$642,735.00	$660,330.00
Estimated Annual Debt Service Cost	$38,806.00	$39,970.00
Estimated Annual O & M Cost	$12,850.00	$15,200.00
Estimated Total Annual Cost	$51,656.00	$55,170.00

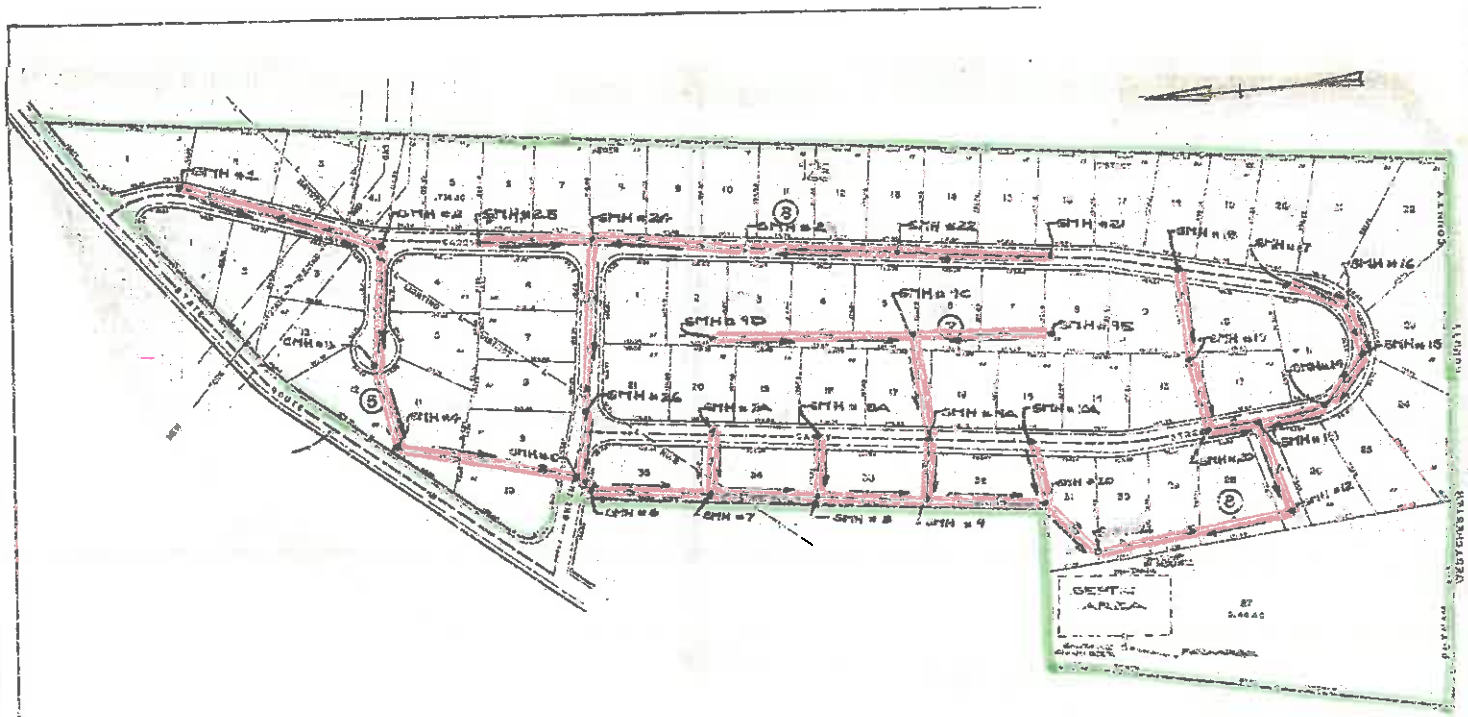
8.1 Recommendation

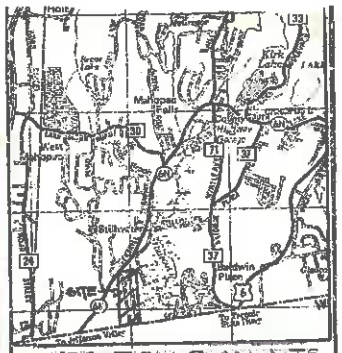
Based on the analysis of the treatment alternatives and comparison of estimated construction and O&M costs presented above, the Recommended Alternative is the Dynatec MBR plant.

FIGURES

FIGURE -1

Sewer Distribution System for Carmel Sewer District No. 5





TOWN OF CARMEL

LEGEND:

- SEWER DISTRICT LIMIT
- TAX MAP LIMIT
- TAX MAP NUMBER
- TAX BLOCK NUMBER (5)
- TAX LOT NUMBER 3
- SEWER MAIN
- MANHOLE

NOTE:

THIS MAP IS BASED UPON THE FOLLOWING; PRELIMINARY TOWN OF CARMEL TAX MAP

MAP NUMBER	MOST RECENT REVISION
125	MARCH 1, 1989

SEWER DISTRIBUTION SYSTEM FOR CARMEL SEWER DISTRICT NO. 5 ALSO KNOWN AS HILLSDALE SEWER DISTRICT TOWN OF CARMEL PUTNAM COUNTY NEW YORK MARCH 1992

FIGURE-2

Carmel Sewer District No. 5 Existing Hydraulic and Mass Balance

Figure-2

Town of Carmel - Sewer District #6

Hydraulic & Mass Balance

Raw Wastewater		
Qavg.	20,293	GPD
BOD	180.1	30.48
TSS	155.5	26.32
NH3	27.8	4.72
	(mg/l)	(#/day)

Septic Tank (i.e. primary) Effluent		
Qavg.	20,293	GPD
BOD	135.2	22.88
TSS	65.2	11.04
NH3	37.4	6.32
	(mg/l)	(#/day)

	NH3 In (mg/l)	NH3 Out (mg/l)	NH3 Oxidized (mg/l)	NH3 Oxidized (#/day)
NO2	0.07	1.45	1.4	0.59
NO3	0.21	7.04	6.8	1.16
Nox	0.28	8.48	8.20	1.39

Secondary Effluent		
Qavg.	20,293	GPD
BOD	45.9	7.76
TSS	41.7	7.06
NH3	17.6	2.97
	(mg/l)	(#/day)

Solids to Disposal **		
Qavg.	5	GPD
BOD	---	3.28
TSS	75,398	3.14
NH3	---	0.52
	(mg/l)	(#/day)

Sludge to Disposal *		
Qavg.	0	GPD
BOD	---	22.72
TSS	#DIV/0!	16.27
NH3	---	0.38
	(mg/l)	(#/day)

Recycle (i.e. secondary sludge)		
Qavg.	0	GPD
BOD	#DIV/0!	15.12
TSS	#DIV/0!	3.99
NH3	#DIV/0!	1.86
	(mg/l)	(#/day)

Final Effluent		
Qavg.	20,288	GPD
BOD	28.4	4.47
TSS	23.1	3.91
NH3	14.6	2.45
	(mg/l)	(#/day)

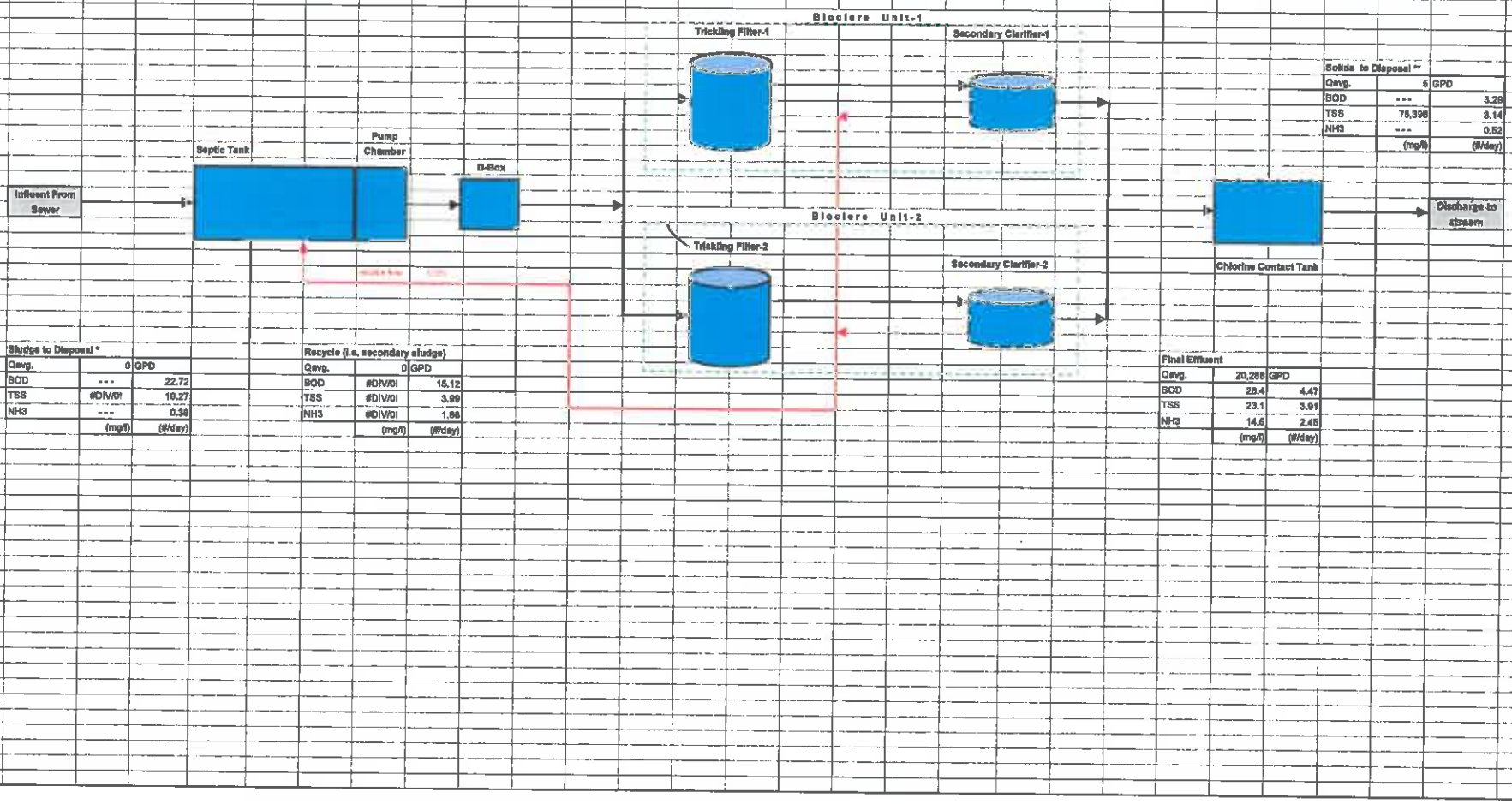


FIGURE-3

Carmel Sewer District No. 5 Test Pit Locations April 2020

REVISIONS			
NO.	BY	DATE	REMARKS

DES. _____
DWG. _____
CHK. _____

J R F A | J. ROBERT FOLCHETTI & ASSOCIATES, L.L.C.
CIVIL / ENVIRONMENTAL ENGINEERS
www.jrfa.com
33 RODINE ROAD
BREWSTER, NY 10509
845-363-1300

CARMEL SEWER DISTRICT NO. 5

TEST PIT LOCATIONS
28 APRIL 2020
SCALE: 1"= 20'

DATE MAY 2020
SHEET 1 OF 1
DWG. NO.

APPENDIX-A

Carmel Sewer District No. 5 Formation Resolution dated November 14 1979

APPENDICES

Town Hall
Mahopac, New York
November 14, 1979
7:30 P. M.

A regular meeting of the Town Board of the Town of Carmel was called to order, by Supervisor Barrett, at 7:30 P. M.

The members of the Board present were: Supervisor N. Dean Barrett, Councilwoman Lynda Berrigan and Councilmen Charles Terhune, William Koehler and Morton Bien. Also present, Town Attorney John Arons.

A salute to the flag preceded the regular order of business.

A moment of prayer observed.

PUB. HEAR. HELD - HILLDALE SEWER

Notice of public hearing, as advertised, posted and called for at 7:30 P. M. on November 14, 1978, to consider a sewer district for the Hilldale Estates development, read by the Clerk. No objections were filed regarding the form of the notice.

NOTICE OF PUBLIC HEARING

At a Meeting of the Town Board of the Town of Carmel, Putnam County, New York, held at the Town Hall, McAlpin Avenue, Mahopac, in the Town of Carmel, County of Putnam, State of New York on October 17, 1979.

Present: N. Dean Barrett, Supervisor; Councilman Terhune; Councilman Bien; Councilwoman Berrigan; and Councilman Koehler, comprising the Town of Carmel Town Board.

X----------X

In the Matter of the Petition for the Establishment of a Sewer District in the Town of Carmel, Putnam County, New York

X----------X

WHEREAS, a written Petition dated August 31, 1979, has been presented to and filed with the Town Board of the Town of Carmel, Putnam County, New York, for the establishment of a sewer district in the Town, encompassing certain properties located on the southerly side of Route 6N, as shown on a certain subdivision map entitled, "Subdivision Map of Hilldale Estates, situate in the Town of Carmel, Putnam County, New York," which map was prepared by Alexander S. Bunney, and completed on July 2, 1968, and filed in the Putnam County Clerk's Office on April 7, 1972, as Map No. 1259 totally within the Town of Carmel; and

WHEREAS, it is proposed that the sewer improvement district be created by acquiring and improving the system, mains and appurtenances of the Hillside Estates Sewer Disposal Corp.; and

WHEREAS, the maximum amount proposed to be expended in the acquisition of the sewer system and the land on which it is located is $67,000. In addition, an estimated $6,700 is proposed to be expended for engineering and legal expenses and for contingencies. It is proposed that the costs of acquisition and the expenses to be incurred in connection therewith be financed over a period of fifteen (15) years, and that the estimated aggregate interest to be paid will be $39,000 over said fifteen (15) years; therefore it is hereby

ORDERED, that a Public Hearing of the Town Board of the Town of Carmel, Putnam County, New York, shall be held at the Town Hall, McAlpin Avenue, Mahopac, New York, on the 14th day of November, 1979, at 7:30 P.M., to consider the Petition and to hear all persons interested in the subject thereof.

Dated: Mahopac, New York
October 17, 1979

By Order of the Town Board
of the Town of Carmel
Putnam County, New York
Anne T. Crookston,
Town Clerk

P-10-31

The following persns spoke:

Town Attorney Arons explained the purpose of the hearing and noting that all owners would be benefited.

A letter of protest of the creation of the sewer improvement district was submitted by Huber, Magill, Lawrence & Farrell, attorneys representing the New York State Electric & Gas Corporation, objecting to the formation of the proposed district on the grounds that the property of the N. Y. S. E. & G. will be subject to the lien of the bonds to be issued and their interest. The benefits derived from the improvement are far outweighed by its cost. The cost is unreasonable and the distribution of the costs is inequitable. The petitioner would derive no direct benefit and the property should not be included. The value of petitioner's property will not be enhanced. It is not in the public interest to approve the establishment.

No one further wishing to be heard, for or against, upon a

[illegible] FOR ESTABLISHMENT OF
CARMEL SEWER DISTRICT #5

WHEREAS, a petition dated August 31, 1979, has been duly presented to the Town Board of the Town of Carmel, with the necessary map and plan attached thereto according to law, requesting that a sewer district, as hereinafter described, be established in the Town of Carmel, and

WHEREAS, said Town Board duly adopted on the 17th day of October, 1979, an order reciting in general terms the filing of said petition, the boundaries of the proposed district, the improvements proposed, the maximum amount proposed to be expended for the improvement, and specifying that said Town Board shall meet at the Town Hall, corner of McAlpin Avenue and Croton Falls Road, Mahopac, New York, on the 14th day of November, 1979, at 7:30 o'clock P.M., to consider said petition and hear all persons interested in the subject thereof, concerning the same, and

WHEREAS, certified copies of said order were duly published and posted according to law, and said Town Board did, at the time and place specified in said order, duly meet and consider the matter of the establishment of said sewer district, and heard all persons interested in the subject thereof who appeared at such time and place, concerning the same, and

WHEREAS, the evidence offered at such time and place requires that the Town Board make the determinations hereinafter made;

NOW, THEREFORE, BE IT RESOLVED, by the Town Board of the Town of Carmel in the County of Putnam, that it be and hereby is determined as follows:

(1) The aforesaid petition is signed and acknowledged as provided by law and is otherwise sufficient.

(2) That all of the property and property owners, within the proposed Sewer District are benefited thereby.

(3) That all of the property and property owners benefited are included within the proposed Sewer District.

(4) It is in the public interest to establish the proposed Sewer District as hereinafter described, and be it

FURTHER RESOLVED, that the Town Board does hereby approve the establishmen of a Sewer District as hereinafter to be known as Carmel Sewer District #5, encompassing certain properties located on the southerly side of Route 6N, as shown on a certain subdivision map entitled, "Subdivision Map of Hilldale Estates, situate in the Town of Carmel, Putnam County, New York", which map was prepared by Alexander S. Bunney, and completed on July 2, 1968, and filed in the Putnam County Clerk's Office on April 7, 1972, as Map No. 1259, totally within the Town of Carmel; and be it

FURTHER RESOLVED, that the sewer improvement district be created by acquiring and improving the system, mains, and appurtenances, including real property and rights-of-way of the Hilldale Estates Sewer Disposal Corp., at a maximum amount of $67,000, plus an additional $6,700 for engineering and legal expenses and contingencies; and be it

8 233

PUTNAM COUNTY

Clerk

PUB. HEAR. - HILLDALE SEWER (cont.)

motion by Councilwoman Berrigan, seconded by Councilman Bien, with all members of the Board present voting Aye, the public hearing was declared closed at 8:05 P. M.

SEWER DISTRICT CREATE - DIST. # 5 -HILLDALE R 518-79

A resolution offered by Councilwoman Berrigan, seconded by Councilman Bien, to create Carmel Sewer District No. 5 (Hilldale Estates).

A roll call vote of the Board as follows:

Councilman Terhune	Aye
Councilman Koehler	Aye
Councilwoman Berrigan	Aye
Councilman Bien	Aye
Supervisor Barrett	Aye

All members of the Board present voting Aye, the resolution was declared adopted.

Attorney Arons will prepare the formal resolution and same to be a part of these minutes.

PUB. HEAR. - LOC. LAW - INCREASE ECB - NOT HELD

Supervisor Barrett explained that the notice for a hearing on a Local Law to increase the members of the Environmental Conservation Board had not been properly published and a new date for a hearing will be set.

PUB. HEAR. SET - ECB - INCREASE MEMBERS R 519-79

A resolution offered by Councilman Bien, seconded by Councilwoman Berrigan, with all members of the Board present voting Aye, that a public hearing be scheduled on November 28, 1979 at 7:30 P. M. to consider an amendment to Local Law No. 5 of 1976 (Freshwaters Wetlands Local Law) as amended by Local Law No. 8 of 1976 and Local Law No. 6 of 1979, by increasing the Environmental Conservation Board from 5 to 7 members.

PET. TO REZONE - LEVINE -TO PLAN. BD. R 520-79

A resolution offered by Councilman Terhune, seconded by Councilman Koehler, with all members of the Board present voting Aye, that a petition to rezone a parcel on Buckshollow Road, as presented by Nathan Levine, be referred to the Planning Board.

APPOINT MEMBER ETHICS BD. -GENNARO - WITHDRAW

A resolution offered by Councilman Bien, seconded by Councilman Koehler, that Richard Gennaro be appointed as a member of the Town of Carmel Board of Ethics.

After a discussion among the Board, Councilman Bien withdrew his motion and Councilman Koehler withdrew his second.

ETHICS BD. - SET INTERVIEWS FOR MEMBERS R 521-79

A resolution offered by Councilwoman Berrigan, seconded by Councilman Bien, with all members of the Board present voting Aye, that interviews for members of the Ethics Board be held on December 5.

PUB. HEAR SET - FIRE CONTRACTS R 522-79

A resolution offered by Councilman Bien, seconded by Councilman Koehler, with all members of the Board present voting Aye, that a public hearing be scheduled to consider Fire Contracts, for the year 1980, for Carmel Fire Protection Districts Nos. 1, 2 and 3, on December 12, 1979 at 7:30 P. M. at the Town Hall.

APPENDIX-B

Carmel Sewer District No. 5 (Carmel Hillsdale Estates)
State Pollution Discharge Elimination Permit

New York State Department of Environmental Conservation
Division of Environmental Permits, 4th Floor
625 Broadway, Albany, New York 12233-1750
Phone: (518) 402-9167 • **FAX:** (518) 402-9168
Website: www.dec.ny.gov

Alexander B. Grannis
Commissioner

April 29, 2009

Mr. Kenneth Schmitt
Supervisor
Town of Carmel
60 McAlpin Ave
Mahopac, NY 10541

Re: Carmel Hillsdale Estates STP
DEC# : 3-3720-00006/00002 SPDES #: NY 003 0678

Dear Mr. Schmitt:

Enclosed is a final modified State Pollutant Discharge Elimination System (SPDES) permit for the above referenced facility. This permit has been modified and renewed in accordance with the Environmental Benefit Permit Strategy. No comments were received on this modification.

Should you have questions on the administration of this modification, please feel free to contact me at the address or phone number listed above. Should you have technical questions on permit content, please contact the permit writer, Aparna Roy, at (914) 428-2505 ext 362, or the Regional Water Engineer, Dixon Rollins, at (914) 428-2505 ext 350.

Sincerely,

Teresa Diehsner
Division of Environmental Permits

Enclosure

cc: M. Duke, RPA
T. Rudolph, RWE
A. Roy, Permit Writer
DOW-BWP Permit Coordinator
M. Josilo, EPA Reg II
N. Regels, NYSEFC
Putnam Co DOH

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

State Pollutant Discharge Elimination System (SPDES)
DISCHARGE PERMIT

First3.spj

Industrial Code: 4952
Discharge Class (CL): 07
Toxic Class (TX): N
Major Drainage Basin: 13
Sub Drainage Basin: 01
Water Index Number: H-55-12-P182-2
Compact Area:

SPDES Number: NY 003 0678
DEC Number: 3-3720-00006/00002
Effective Date (EDP): 06/01/2009
Expiration Date (ExDP): 05/31/2014
Modification Dates:(EDPM)

This SPDES permit is issued in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and in compliance with the Clean Water Act, as amended, (33 U.S.C. §1251 et.seq.)(hereinafter referred to as "the Act").

PERMITTEE NAME AND ADDRESS

Name: Town of Carmel
Attention: Supervisor
Street: 60 Mc Alpin Ave
City: Mahopac
State: NY
Zip Code: 10541

is authorized to discharge from the facility described below:

FACILITY NAME AND ADDRESS

Name: Carmel Hillsdale Estates STP
Location (C,T,V): (T) Carmel
County: Putnam
Facility Address: Carey St. E. of Rte 6N
City: Mahopac
State: NY
Zip Code: 10541
NYTM -E:
NYTM - N:
From Outfall No.: 001 at Latitude: 41 ° 20 ' 37 " & Longitude: 73 ° 45 ' 59 "
into receiving waters known as: Tributary to Trib.2 of Osceola Lake
Class: D

and; (list other Outfalls, Receiving Waters & Water Classifications)

in accordance with: effluent limitations; monitoring and reporting requirements; other provisions and conditions set forth this permit; and 6 NYCRR Part 750-1.2(a) and 750-2.

DISCHARGE MONITORING REPORT (DMR) MAILING ADDRESS

Mailing Name: Seven Trent Services
Street: 1961 Route 6, R3
City: Carmel
State: NY
Zip Code: 10512
Responsible Official or Agent: William Brooks
Phone: (845) 228-0460

This permit and the authorization to discharge shall expire on midnight of the expiration date shown above and the permittee shall not discharge after the expiration date unless this permit has been renewed, or extended pursuant to law. To be authorized to discharge beyond the expiration date, the permittee shall apply for permit renewal not less than 180 days prior to the expiration date shown above.

DISTRIBUTION:

CO BWP - Permit Coordinator
RWE/RPA
EPA Region II - Michelle Josilo
NYSEFC

Deputy Chief Permit Administrator: Stuart M. Fox

Address: Division of Environmental Permits
625 Broadway
Albany, NY 12233-1750

Signature: Stuart M. Fox
Date: 4/29/09

PERMIT LIMITS, LEVELS AND MONITORING DEFINITIONS

OUTFALL	WASTEWATER TYPE	RECEIVING WATER	EFFECTIVE	EXPIRING
	This cell describes the type of wastewater authorized for discharge. Examples include process or sanitary wastewater, storm water, non-contact cooling water.	This cell lists classified waters of the state to which the listed outfall discharges.	The date this page starts in effect. (e.g. EDP or EDPM)	The date this page is no longer in effect. (e.g. ExDP)

PARAMETER	MINIMUM	MAXIMUM	UNITS	SAMPLE FREQ.	SAMPLE TYPE
e.g. pH, TRC, Temperature, D.O.	The minimum level that must be maintained at all instants in time.	The maximum level that may not be exceeded at any instant in time.	SU, °F, mg/l, etc.		

PARA-METER	EFFLUENT LIMIT	PRACTICAL QUANTITATION LIMIT (PQL)	ACTION LEVEL	UNITS	SAMPLE FREQUENCY	SAMPLE TYPE
	Limit types are defined below in Note 1. The effluent limit is developed based on the more stringent of technology-based standards, required under the Clean Water Act, or New York State water quality standards. The limit has been derived based on existing assumptions and rules. These assumptions include receiving water hardness, pH and temperature; rates of this and other discharges to the receiving stream; etc. If assumptions or rules change the limit may, after due process and modification of this permit, change.	For the purposes of compliance assessment, the analytical method specified in the permit shall be used to monitor the amount of the pollutant in the outfall to this level, provided that the laboratory analyst has complied with the specified quality assurance/quality control procedures in the relevant method. Monitoring results that are lower than this level must be reported, but shall not be used to determine compliance with the calculated limit. This PQL can be neither lowered nor raised without a modification of this permit.	Type I or Type II Action Levels are monitoring requirements, as defined below in Note 2 that trigger additional monitoring and permit review when exceeded.	This can include units of flow, pH, mass, Temperature, concentration. Examples include µg/l, lbs/d, etc.	Examples include Daily, 3/week, weekly, 2/month, monthly, quarterly, 2/yr and yearly.	Examples include grab, 24 hour composite and 3 grab samples collected over a 6 hour period.

Note 1: DAILY DISCHARGE: The discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for the purposes of sampling. For pollutants expressed in units of mass, the 'daily discharge' is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the 'daily discharge' is calculated as the average measurement of the pollutant over the day. DAILY MAX: The highest allowable daily discharge. DAILY MIN: The lowest allowable daily discharge. MONTHLY AVG (daily avg): The highest allowable average of daily discharges over a calendar month, calculated as the sum of each of the daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

RANGE: The minimum and maximum instantaneous measurements for the reporting period must remain between the two values shown.

7 DAY ARITHMETIC MEAN (7 day average): The highest allowable average of daily discharges over a calendar week. 12 MRA (twelve month rolling avg): The average of the most recent twelve month's monthly averages.

30 DAY GEOMETRIC MEAN (30 d geo mean): The highest allowable geometric mean of daily discharges over a calendar month, calculated as the antilog of : the sum of the log of each of the daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

7 DAY GEOMETRIC MEAN (7 d geo mean): The highest allowable geometric mean of daily discharges over a calendar week

Note 2: ACTION LEVELS: Routine Action Level monitoring results, if not provided for on the Discharge Monitoring Report (DMR) form, shall be appended to the DMR for the period during which the sampling was conducted. If the additional monitoring requirement is triggered as noted below, the permittee shall undertake a short-term, high-intensity monitoring program for the parameter(s). Samples identical to those required for routine monitoring purposes shall be taken on each of at least three consecutive operating and discharging days and analyzed. Results shall be expressed in terms of both concentration and mass, and shall be submitted no later than the end of the third month following the month when the additional monitoring requirement was triggered. Results may be appended to the DMR or transmitted under separate cover to the same address. If levels higher than the Action Levels are confirmed, the permit may be reopened by the Department for consideration of revised Action Levels or effluent limits. The permittee is not authorized to discharge any of the listed parameters at levels which may cause or contribute to a violation of water quality standards. TYPE I: The additional monitoring requirement is triggered upon receipt by the permittee of any monitoring results in excess of the stated Action Level. TYPE II: The additional monitoring requirement is triggered upon receipt by the permittee of any monitoring results that show the stated action level exceeded for four of six consecutive samples or for two of six consecutive samples by 20 % or more or for any one sample by 50 % or more.

PERMIT LIMITS, LEVELS AND MONITORING

OUTFALL No.	LIMITATIONS APPLY:	RECEIVING WATER	EFFECTIVE	EXPIRING
001	All year unless otherwise noted	Tributary to Trib. 2 of Osceola Lake	06/01/2009	05/31/2014

PARAMETER	EFFLUENT LIMIT					MONITORING REQUIREMENTS				FN
	Type	Limit	Units	Limit	Units	Sample Frequency	Sample Type	Location		
								Influent	Effluent	
Flow	Monthly Average	0.0272	MGD			Instantaneous	Totalizer	X		
$CBOD_5$	Monthly Average	20	mg/l	4.5	lbs/d	1/Quarter	Grab	X	X	(1)
$CBOD_5$	7 Day Average	30	mg/l	6.8	lbs/d	1/Quarter	Grab			
Solids, Suspended	Monthly Average	30	mg/l	6.8	lbs/d	1/Quarter	Grab	X	X	(1)
Solids, Suspended	7 day Average	45	mg/l	10.2	lbs/d	1/Quarter	Grab		X	
Solids, Settleable	Daily Maximum	0.1	ml/l			1/Day	Grab		X	
pH	Range	6.0-9.0	SU			1/Day	Grab		X	
Nitrogen, Ammonia (as NH_3) (June-October)	Monthly Average	8.0	mg/l	1.8	lbs/d	1/Month	Grab		X	
Nitrogen, Ammonia (as NH_3) (November – May)	Monthly Average	Monitor	mg/l	Monitor	lbs/d	1/Month	Grab		X	
Phosphorus, Total (as P) (May- October)	Monthly Average	Monitor	mg/l			1/Month	Grab		X	
Temperature	Daily Maximum	Monitor	Deg C			1/Day	Grab		X	
Effluent Disinfection required: [ ] All Year [X] Seasonal from May 1 to October 31										
Coliform, Fecal	30 Day Geometric Mean	200	No./ 100 ml			1/Month	Grab		X	
Coliform, Fecal	7 Day Geometric Mean	400	No./ 100 ml			1/Month	Grab		X	
Chlorine, Total Residual	Daily maximum	0.1	mg/l			1/Day	Grab		X	(2)

FOOTNOTES: (1) and effluent shall not exceed 15 % and 15 % of influent concentration values for BOD_5 & TSS respectively.
(2) An interim Total Residual Chlorine limit of 2.0 mg/l is in effect until the disinfection system is upgraded to meet the final effluent limit of 0.1 mg/l in accordance with the Schedule of Compliance on page 5 of this permit.

SPECIAL CONDITIONS:

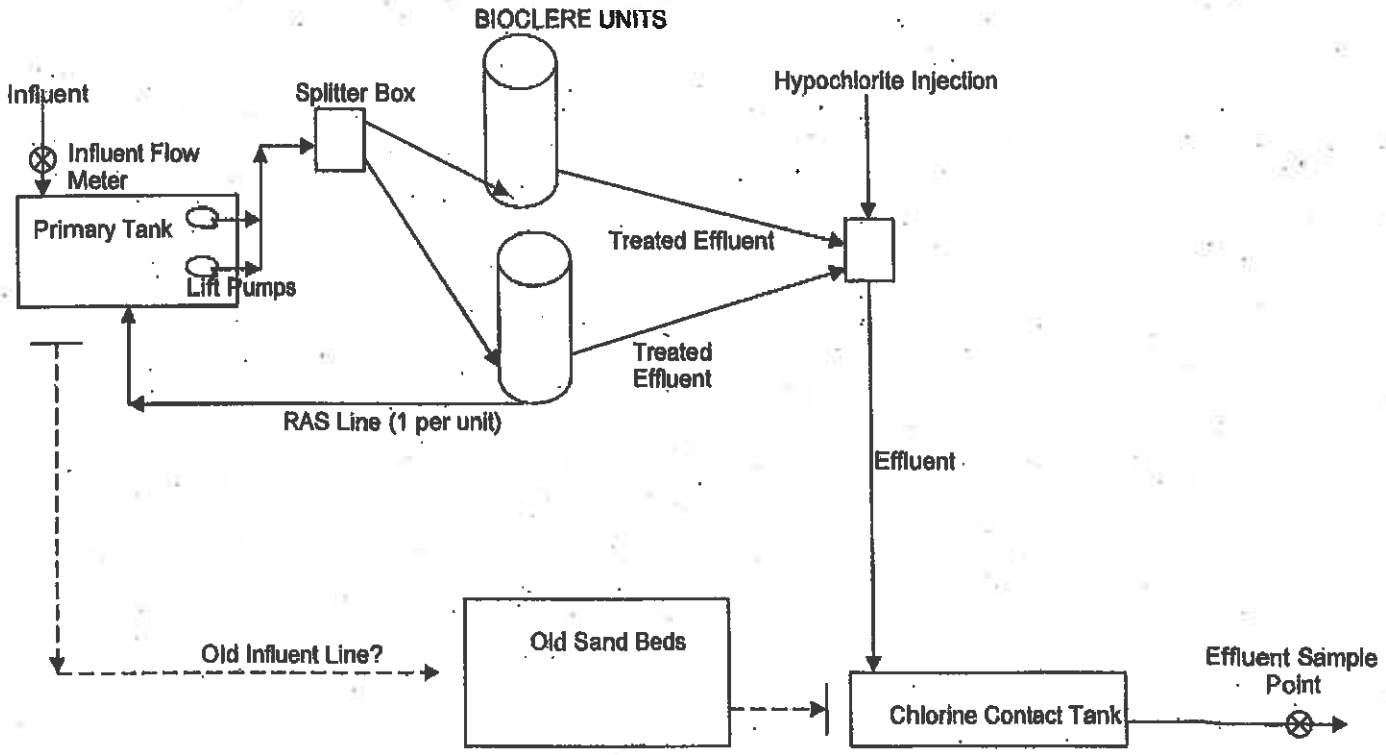
DISCHARGE NOTIFICATION REQUIREMENTS

1. *Sign Maintenance:* The permittee shall periodically inspect the outfall identification sign(s) in order to ensure they are maintained, are still visible, and contain information that is current and factually correct. Signs that are damaged or incorrect shall be replaced within 3 months of inspection.

2. *Data Retention:* The permittee shall retain records for a minimum period of 5 years in accordance with 6NYCRR Part 750-1.12(b)(2) and Part 750-2.5(c)(1). These records, which include discharge monitoring reports (DMRs) and annual reports, must be retained at a repository accessible to the public. This repository shall be open to the public, at a minimum, during normal daytime business hours. The repository may be the business office, wastewater treatment plant, village, town, city, or county clerk's office, the local library, or other location approved by the Department.

MONITORING LOCATIONS

The permittee shall take samples and measurements, to comply with the monitoring requirements specified in this permit, at the location(s) specified below:



SCHEDULE OF COMPLIANCE

The permittee shall comply with the following schedule:

a) Short-term Hi-Intensity Sampling (by EPA Method)

Action Code	Outfall Number(s)	Compliance Action	Due Date
	001	The permittee shall conduct sampling for the following parameters detected in the WWTP effluent and listed in the permit application. Sampling shall be once per week for a period of 3 months. The permittee submit the results of the analyses along with the daily flow: Parameter — EPA Method of Analysis Required — Sample Type Copper, Total — 200.7 — Grab Phenol, Total — 420.1 — Grab After review of the results, the Department may reopen the permit to add additional limits or action levels for these parameters.	11/01/2009

Total Residual Chlorine

Action Code	Outfall Number(s)	Compliance Action	Due Date
	001	The Permittee shall submit an approvable Engineering Report that identifies the facilities necessary to achieve compliance with the water quality based effluent limitation of 0.1 mg/l for total residual chlorine.	06/01/2010
		The Permittee shall submit approvable final plans and specifications, as well as a schedule of construction, for the facilities described in the approved Engineering Report. The Permittee shall commence construction of the facilities described in the approved report, plans and specifications in accordance with the approved schedule of construction.	DEC Approval of Engineering Report + 12 Months
		The Permittee shall submit a progress report every 3 months detailing the work done in accordance with the approved engineering report and schedule of construction. The schedule of construction contained in the approved report shall, by this reference, be made part of the permit. The Permittee shall complete construction in accordance with the approved schedule, but no later than May 1, 2012.	DEC Approval of Schedule of Construction + 6 Months

The above compliance actions are one time requirements. The permittee shall comply with the above compliance actions to the Department's satisfaction once. When this permit is administratively renewed by NYSDEC letter entitled "SPDES NOTICE/RENEWAL APPLICATION/PERMIT", the permittee is not required to repeat the submission. The above due dates are independent from the effective date of the permit stated in the letter of "SPDES NOTICE/RENEWAL APPLICATION/PERMIT."

b) The permittee shall submit a written notice of compliance or non-compliance with each of the above schedule dates no later than 14 days following each elapsed date, unless conditions require more immediate notice in accordance with 6NYCRR Part 750-2.7. All such compliance or non-compliance notification shall be sent to the locations listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS. Each notice of non-compliance shall include the following information:

1. A short description of the non-compliance;
2. A description of any actions taken or proposed by the permittee to comply with the elapsed schedule requirements without further delay and to limit environmental impact associated with the non-compliance;

3. A description or any factors which tend to explain or mitigate the non-compliance; and
4. An estimate of the date the permittee will comply with the elapsed schedule requirement and an assessment of the probability that the permittee will meet the next scheduled requirement on time.

c) The permittee shall submit copies of any document required by the above schedule of compliance to NYSDEC Regional Water Engineer and to the Bureau of Water Permits, 625 Broadway, Albany, N.Y. 12233-3505, unless otherwise specified in this permit or in writing by the Department.

RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS

) The permittee shall also refer to 6 NYCRR Part 750-1.2(a) and 750-2 for additional information concerning monitoring and reporting requirements and conditions.

b) The monitoring information required by this permit shall be summarized, signed and retained for a period of five years from the date of the sampling for subsequent inspection by the Department or its designated agent. **Also, monitoring information required by this permit shall be summarized and reported by submitting;**

[X] (if box is checked) completed and signed Discharge Monitoring Report (DMR) forms for each 1 month reporting period to the locations specified below. Blank forms are available at the Department's Albany office listed below. The first reporting period begins on the effective date of this permit and the reports will be due no later than the 28th day of the month following the end of each reporting period.

[ ] (if box is checked) an annual report to the Regional Water Engineer at the address specified below. The annual report is due by February 1 and must summarize information for January to December of the previous year in a format acceptable to the Department.

[X] (if box is checked) a monthly "Wastewater Facility Operation Report..." (form 92-15-7) to the:
[X] Regional Water Engineer and/or [X] County Health Department or Environmental Control Agency specified below

Send the DMRs with **original signatures** to:

Department of Environmental Conservation
Division of Water
Bureau of Water Compliance Programs
625 Broadway
Albany, New York 12233-3506

Phone: (518) 402-8177

Send a **copy** of each DMR page to:

Department of Environmental Conservation
Regional Water Engineer
100 Hillside Avenue-Suite 1W
White Plains, NY 10603-2860

Phone: (914) 428-2505

Send an **additional copy** of each DMR page to:

Putnam County Health Department
1 Geneva Rd.
Brewster, New York 10509-2339

c) Noncompliance with the provisions of this permit shall be reported to the Department as prescribed in 6 NYCRR Part 750-1.2(a) and 750-2.

d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

e) If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculations and recording of the data on the Discharge Monitoring Reports.

f). Calculation for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

g) Unless otherwise specified, all information recorded on the Discharge Monitoring Report shall be based upon measurements and sampling carried out during the most recently completed reporting period.

h) Any laboratory test or sample analysis required by this permit for which the State Commissioner of Health issues certificates of approval pursuant to section five hundred two of the Public Health Law shall be conducted by a laboratory which has been issued a certificate of approval. Inquiries regarding laboratory certification should be sent to the Environmental Laboratory Accreditation Program, New York State Health Department Center for Laboratories and Research, Division of Environmental Sciences, The Nelson A. Rockefeller Empire State Plaza, Albany, New York 12201.

SPDES FACT SHEET NARRATIVE
For S.D. #5 - Hillsdale
March 2009

The Department of Environmental Conservation has initiated a modification of the State Pollutant Discharge Elimination System (SPDES) permit for the S.D. #5 - Hillsdale. This modification is undertaken pursuant to 6 NYCRR Part 750-1.18(b) (1), New York State's Environmental Benefit Permit Strategy (EBPS). The following permit has been modified:

Facility	SPDES Permit Number	DEC Number
S.D. #5 - Hillsdale	NY 003 0678	3-3720-00006/00002

In response to the Department's April 15, 2008 Request for Information under the EBPS system, S.D. #5-Hillsdale provided sampling data and a SPDES Permit application packet on October 23, 2008 and sampling results on February 9, 2009. Based upon the review of this information and the discharge monitoring results from September, 2005 to November 2008, a revised SPDES permit has been drafted. This draft permit has been modified from the existing SPDES Permit in the following ways:

Draft Permit Pages

- Updated permit pages and conditions reflect current Department guidance, format and nomenclature.
- Permit pages and conditions have been renumbered and reordered.
- Permit Limits, Levels and Monitoring Definitions Page has been added.
- The monitoring locations for the Permit Limits, Levels and Monitoring pages have been updated.
- The footnotes for the Permit Limits, Levels and Monitoring pages have been updated and reordered.
- Discharge Notification Requirement section has been added to address the maintenance of identification sign of outfall to surface water.
- Monitoring location Section has been added to show the effluent sampling location.

Draft Permit Limits, Levels and Monitoring

- pH range at Outfall 001 has been changed from 6.0-9.5 to 6.0-9.0 based on technology based standards.
- Effluent Disinfection requirement has been changed from All Year to Seasonal from May 1 to October 31 based on water quality standards.
- Ammonia was detected at a level of 4.6 mg/l in the pollutant scan submitted in the application package. Therefore, water quality based effluent limit of 8.0 mg/l from June to October and monitoring only requirement from November to May for Ammonia Nitrogen (as NH3) have been added in the permit.
- Phosphorus was detected at a level of 2.18 mg/l in the pollutant scan submitted in the application package. Therefore, monitoring requirement for Total Phosphorus (as P) has been added in the permit based on water quality based standards.
- The total residual chlorine (TRC) limit at Outfall 001 was changed from a technology based limit of 0.5-2.0 mg/l to a limit of 0.1 mg/l based on a regulatory standard for TRC for protection of aquatic life. The existing limit of 2.0 mg/l will remain in effect as an interim limit until upgrades are completed in accordance with the schedule of compliance.
- A short term high intensity monitoring schedule for Total Copper and Total Phenol detected in the pollutant scan submitted in the application package has been added in the permit. Sampling will be required 1/week for a 3 month period to gather enough data to determine whether the pollutants are consistently present in the effluent and need to be limited.

APPENDIX-C

Carmel Sewer District No. 5 Bioclere Wastewater Treatment Units
Engineers Report May 2020

JOHN KARELL, Jr., P.E.
Town Engineer

OFFICE OF THE TOWN ENGINEER
Town Hall
Mahopac, New York 10541

(914) 628 - 1500
(914) 628 - 2087
Fax (914) 628 - 7085

BIOCLERE WASTEWATER TREATMENT UNITS
ENGINEERS REPORT
TECHNICAL SPECIFICATIONS
AND CALCULATIONS

STATE OF NEW YORK
JOHN KARELL, JR.
53277
LICENSED PROFESSIONAL ENGINEER

Jack Karell, Jr., P.E.

May 1, 2000

JOHN KARELL, Jr., P.E.
Town Engineer

OFFICE OF THE TOWN ENGINEER
Town Hall
Mahopac, New York 10541

(914) 628 - 1500
(914) 628 - 2087
Fax (914) 628 - 7085

May 1, 2000

Engineering Report
Sewer Plant Rehabilitation
Carmel WD # 5
Hillsdale Estates
Carmel (T)

History

The Hillsdale Estates subdivision is served by a sewage treatment plant consisting of two subsurface sand filters preceded by a 15,000 gallon septic tank , and 4500 gallon dosing chamber. The effluent from the sand filters is chlorinated in a chlorine contact tank prior to discharge to the receiving stream.

Over the years the sand filters have clogged and various remedial measures were undertaken to replace the sand and distribution piping. The filters are again in failure and at this time it is not considered appropriate to remediate the sand filters but to install a package sewage treatment plant.

Proposal

It is proposed to install a BIOCLERE package plant which consists of a trickling filter, final settling tank and appurtenances. Septic tank effluent will be pumped to the BIOCLERE units utilizing the existing pumps in the dosing chamber at 15 gpm.

Effluent from the BIOCLERE unit will flow by gravity to the existing chlorine contact tank.

Future

The existing sand filter will be rested for a year and depending on the Operating characteristics of the plant an attempt will be made to utilize the sand filters for polishing of the effluent.

Reference is made to the attached technical specifications and calculations for more detailed engineering information.

Jacks copy

JOHN KARELL, Jr., P.E.
Town Engineer

OFFICE OF THE TOWN ENGINEER
Town Hall
Mahopac, New York 10541

(914) 628 - 1500
(914) 628 - 2087
Fax (914) 628 - 7085

February 1, 2000

Mike Budzenski
Putnam County Health Department
1 Geneva Road
Brewster, NY 10509

Re: Carmel Sewer District # 5

Dear Mr. Budzenski:

Attached herewith please find copies of information and specifications on a sewage treatment unit know as "BIOCLERE" which we are considering to remediate the problem at the captioned District.

The manufacture and STE believe that this unit will meet the SPDES permit effluent standards without having to utilize the clogged sand bed.

Please review these matters and provide me with your comments. It may be appropriate to use this unit for a period of time without the sand bed, letting the bed rest for a period of approximately one year and then use the bed as a polishing filter after solids in the bed have biodegraded.

If you have any questions please call me at (914) 628-2087

Very truly yours,

John Karell, Jr., P.E.
Town Engineer

/gmf

cc: Larry Wayne
Bruce Foley
Dale Post

May 1, 2000

Engineering Report
Sewer Plant Rehabilitation
Carmel WD # 5
Hillsdale Estates
Carmel (T)

History

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Reference is made to the attached technical specifications and calculations for more detailed engineering information.

AWT ENVIRONMENTAL, INC.
241 Duchaine Blvd.
New Bedford, MA 02745

COMMENTS TO RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES
(1997 Edition of 10 State Standards)

CARMEL SEWER DISTRICT #5 – NY STATE: Bioclere packaged wastewater treatment plant design and sizing calculations.

A Bioclere package treatment plant is proposed to treat the wastewater from the Carmel Sewer District. The Bioclere consists of a trickling filter that is situated over a final settling tank. The following details the secondary settling component of the Bioclere system. Two Model 30/32 Bioclere units operated in parallel are capable of treating the daily design wastewater flow with the following maximum influent characteristics.

	Raw influent	Effluent
Design flow (gpd)	27,200	27,200
pH	6.0-9.5	6.0-9.5
BOD5 (mg/l)	250	-
CBOD5 (mg/l)	-	20
TSS (mg/l)	250	30
Settleable Solids		<0.1

CHAPTER 70, SETTLING

71.1 Number of Units (Not applicable)

71.2 Flow Distribution (Not applicable)

72. DESIGN CONSIDERATIONS

72.1 Dimensions

The diameter of the settling tank is 10 feet with 60-degree sloping sides and a liquid depth of 8.5 feet. The vertical side water depth is less than the recommended 10 feet, however internal baffling is provided in the secondary settling tank to prevent short-circuiting of wastewater and biological solids. Furthermore, the biological solids generated in the filter are returned to the sludge storage facility at regular intervals, typically every hour. Therefore the sludge shall not collect in the secondary settling tank and a sludge blanket will not form. The efficiency of the Bioclere secondary settling tank has been proven by numerous installations and successful operating experience.

72.2 Surface Overflow Rates

72.21 Primary Settling Tank

Please refer to the engineering report for the primary settling design.

72.22 Intermediate Settling Tanks (Not applicable)

72.23 Final Settling Tanks

72.231 Final Settling Tanks - Fixed Film Biological Reactors

A surface overflow rate will not exceed 1200 gpd/ft^2 based on design peak hourly flow.

Each Bioclere settling tank will receive one half of the daily flow (13,600 gpd) and has the following characteristics:

Tank Diameter	10.0 feet
Surface Area	78.5 ft^2
Tank Volume	2300 gallons

Surface overflow rate (SOR) at peak hourly flow:

Daily flow to each Bioclere = 13,600 gpd
Average hourly flow = 567 gph
Peak hourly flow = average hourly flow * 4
= 567 gph * 4 = 2268 gph
= 54,432 gal/day / 78.5 (ft^2) = **693 gal/day/ft^2**

Hence, the SOR based on the design peak hourly flow is conservatively designed and will not exceed the recommended SOR of 1200 gal/day/ft^2.

72.232 Final Settling Tanks - Activated Sludge (Not applicable)

72.3 Inlet Structures

The inlet to the Bioclere settling tank is designed to dissipate velocity and to prevent short-circuiting. The influent is directed to an oval center baffle from which dosing to the media is initiated. After trickling through the filter, wastewater is directed to another baffled area in the settling tank located 180 degrees from the outlet.

72.4 Weirs

The design of the Bioclere settling tank does not incorporate an overflow weir. However, the tank is baffled to prevent short-circuiting of wastewater and biological solids, and maximizes the actual hydraulic detention time. In addition, the lower

surface settling rates assist in preventing short-circuiting. Clarified water exits through a sanitary tee 180 degrees opposite the inlet.

72.5 Submerged Surface
There are no submerged construction elements in the Bioclere settling tank.

72.6 Unit Dewatering
The design engineer shall address this subject. Please refer to the engineering report.

72.7 Freeboard (Not applicable)

73. SLUDGE AND SCUM REMOVAL

73.1 Scum Removal
Scum removal occurs in the primary treatment tank(s) and is described in the engineering report. The Bioclere settling tank contains the necessary baffling for scum separation.

73.2 Sludge Removal
Sludge withdrawal is accomplished using a stainless steel submersible pump. Operation is automatic and fully adjustable by the operator. The pump shall operate every hour to remove sludge and recirculate wastewater to the head of the plant. This frequency will keep the settling tank clear of accumulating sludge and the formation of a sludge blanket. The settling tank shall have a separate sludge withdrawal line.

73.21 Sludge Hopper
The slope of the settling tank sludge hopper shall be 60 degrees. The interior surfaces are smooth and are made with rounded corners to aid in sludge removal. The circular hopper bottom shall have a maximum diameter of 1.5 feet.

73.22 Cross-Collectors (Not applicable)

73.23 Sludge Removal Pipeline (Not applicable)

73.24 Sludge Removal Control
The recirculation rate is a function of the total head loss through the system. Typically a recirculation rate of approximately 25 gpm is realized. A fully adjustable timer controls the recirculation pump; therefore, the total daily recirculation volume may be calculated. A recirculation rate of approximately 50 percent shall be employed upon commissioning.

74. PROTECTIVE AND SERVICE FACILITIES

74.1 Operator Protection

There shall exist no hazardous situations during routine operation of the Bioclere settling tank.

74.2 Mechanical Maintenance

All mechanical maintenance required for the settling tank shall be accessible from the top surface of the Bioclere unit that is located above ground level.

74.3 Electrical Fixtures and Control

There shall be no electrical fixtures enclosed in the Bioclere settling tank.

AWT ENVIRONMENTAL, INC.
241 Duchaine Blvd.
New Bedford, MA 02745

COMMENTS TO RECOMMENDED STANDARDS FOR WASTEWATER FACILITIES (1997 Edition of 10 State Standards)

CARMEL SEWER DISTRICT #5 – NY STATE: Bioclere packaged wastewater treatment plant, design and sizing calculations.

A Bioclere package treatment plant is proposed to treat the wastewater from the Carmel Sewer District. The Bioclere consists of a trickling filter that is situated over a final settling tank. The following details the trickling filter portion of the Bioclere treatment plant. Two model 30/32 Bioclere units operated in parallel are capable of treating the daily design wastewater flow with the following maximum influent characteristics.

	Raw influent	Effluent
Design flow (gpd)	27,200	27,200
pH	6.0-9.5	6.0-9.5
BOD5 (mg/l)	250	-
CBOD5 (mg/l)	-	20
TSS (mg/l)	250	30
Settleable Solids		<0.1

CHAPTER 91: TRICKLING FILTERS

91.2 Hydraulics

91.21 Distribution

91.211 Uniformity
In the Bioclere the wastewater is uniformly distributed over the entire surface area of the filter by means of fixed nozzles that are constructed of nylon. A model 30/32 Bioclere contains a PVC dosing array and six nozzles located above the filter media and equidistant from the center of unit.

91.212 Head Requirements (Not Applicable)

91.213 Clearance
The nozzles spray the wastewater vertically up towards the cover; therefore a minimum clearance of 12 inches between media and fixed nozzles is not relevant.

91.22 Dosing

Wastewater is supplied to each filter by means of two alternating stainless steel submersible pumps. In case of pump failure, the remaining pump automatically takes over the failed pump's cycle. Dosing is practically continuous and controlled using fully adjustable timers. Recirculation of sludge and wastewater is also accomplished in each unit using a submersible stainless steel pump and fully adjustable timers. The operator may easily adjust the timers after consultation with AWT Environmental, Inc.

91.23 Piping System

The Bioclere unit is sized based on the design peak hourly flow, therefore the piping system provides adequate capacity.

91.3 Media

91.31 Quality

The filter media consists of manufactured PVC randomly packed media. The media has a void ratio of >95% and is UV resistant and resistant to a wide range of aqueous solutions, acids, alkalis, oxidizing agents, oils, fats and alcohols.

91.32 Depth

The Bioclere has a minimum filter media depth of 6 feet above the underdrain.

91.32 Size, Grading, and Handling of Media

91.331 Not Applicable

91.332 A randomly packed PVC media with a specific surface area of 220 m^2/m^3 is used in the Bioclere unit. The media loading rates are based on over 10,000 municipal, commercial and industrial installations throughout the world. Media with a specific surface area of 220 m^2/m^3 is used for residential strength wastewater carbonaceous reduction and nitrification.

91.333 The media is delivered to the site in bags and placed in the filter upon arrival.

91.4 Underdrainage System

91.41 Arrangement

The underdrain system in each Bioclere covers the entire floor of the filter.

91.42 Hydraulic Capacity

The underdrain has a minimum slope of 1 percent.

91.43 Ventilation
Forced air ventilation is provided in the Bioclere since it is a covered trickling filter. Each Bioclere contains an axial fan with an airflow capacity of 106 cfm. The fan is exposed to the atmosphere due to its enclosure location on top of the Bioclere. Air flows subsequently through the filter, underdrain, and is discharged through the effluent pipe. A PVC vent is installed after each Bioclere.

91.44 Flushing
High rate recirculation is utilized.

91.5 Special Features

91.51 Flooding (Not Applicable)

91.52 Freeboard (Not Applicable)

91.53 Maintenance
All mechanical components are installed so they can be properly and safely maintained.

91.54 Winter Protection
The Bioclere is covered and locked. In addition, the filter is manufactured with fiberglass inner and outer skins with the cavity between filled with polyurethane foam insulation for maximum treatment efficiency.

91.55 Recirculation
The Bioclere units are designed for recirculation as required to achieve the design efficiency. Recirculation is achieved with a stainless steel pump and is adjustable by the operator at the range of 0.5:1 to 4:1.

91.56 Recirculation Measurement
A fully adjustable automatic timer will be provided for each recirculation pump to permit measurement of the recirculation rate.

91.6 Rotary Distributor Seals (Not Applicable)

91.7 Unit Sizing
The media loading rates are based on over 10,000 municipal, commercial and industrial installations throughout the world and approximately 200 in the Northeastern United States. The loading rates conform with those that are accepted by the United States Environmental Protection Agency and Metcalf & Eddy, 1991.

The trickling filter design considers the average daily BOD5 load to the filter. There will be no concentrated recycled waste flows introduced to the primary tank (i.e. heat treatment supernatant, vacuum filtrate or anaerobic digester supernatant). Recirculation of sludge and effluent will occur on an hourly basis. This recycle flow will contain a small volume of secondary sludge and will be comprised primarily of effluent quality wastewater with dissolved oxygen levels >2 mg/l. The recirculation will tend to eliminate anaerobic conditions in the primary tank needed for anaerobic digestion. Additionally, successful anaerobic digestion requires strict environmental conditions including: 1) temperature range >85 degrees F, 2) bicarbonate alkalinity of 2000-2500 mg/l CaCO3 to offset the production of volatile fatty acids, 3) adequate mixing, and 3) environment void of dissolved oxygen or molecular oxygen (anoxic).

91.71 Filter Media Loading Rates

The filter media organic loading rates are based on the design criteria outlined on page one of this document. The randomly packed manufactured PVC media will have a specific surface area of 220 m^2/m^3. The flow will be distributed equally to two Bioclere model 30/32's operated in parallel.

Organic Loading:

The following assumes a BOD5 reduction of at least 20 percent in the primary clarification tank(s). Assuming a 50% recirculation rate, the system will receive 24.4 lbs. BOD_5/day based on the design flow of 27,200 gpd. Note that each Bioclere train will receive one half of the daily flow (13,600 gpd) and organic load.

BOD5 (lbs./day) = Influent from primary tank + Recirculation

$$= \frac{(13{,}600 \text{ gpd} \times 8.34 \text{ (lbs./gal)} \times 200 \text{ (mg/l)})}{1\times10^6} + \frac{(0.5*13{,}600 \text{ (gpd)})*8.34 \text{ (lbs./gal.)} *30\text{(mg/l)}}{1\times10^6}$$

= 24.4 lbs. of BOD_5/day

Each model 30/32 Bioclere unit contains 18.0 m^3 of PVC media (636 ft^3). The specific surface area is 220 m^2/m^3 (66.2 ft^2/ft^3) in and the void ratio is >95%. Therefore, the media organic loading rate in each Bioclere unit will be:

= (24.4 lbs. BOD_5/day-unit) / (636 ft^3 media units) = **0.038 lbs. BOD_5/ft^3-day/Bioclere**

This loading rate will reduce the $CBOD_5$ to 20 mg/l.

AWT ENVIRONMENTAL, INC.
241 Duchaine Blvd.
New Bedford, MA 02745

TO: Design Engineers

RE: Bioclere System Design Checklist

The following is a checklist for the design of an onsite wastewater treatment system that includes **Model 22, 24 or 30 Series Bioclere Unit(s).**

NOTE: ***The following details should be shown on the site plan to facilitate installation.***

Bioclere unit must be installed on a contractor supplied concrete mounting pad (dwg. AWTE 3014 revision C). The pad should be installed on 12 inches of crushed stone.

The recycle line is a 1.5" diameter PVC coupling originating over the Bioclere inlet (dwg. AWTE 1012, revision C).

Inlet and outlet on the Bioclere unit(s) are 6" diameter PVC couplings located 180 degrees apart. Any changes in direction between tanks should be made with pipe couplings.

A 4" diameter PVC vent must be installed after each Bioclere (dwg. AWTE 1003, revision F).

Volume of concrete to be poured around the base of the Bioclere must be specified on the site plan if the unit(s) is installed in groundwater (see appropriate clarifier displacement curve). For a Bioclere model 24 series and 30 series, the concrete must extend 4 feet and 5 feet above the top of the mounting pad respectively.

Provide 4 feet of backfill (minimum) above the recycle line outlet on the Bioclere. Backfill to grade must be clean sand or pea stone.

If necessary provide provisions for sampling the septic tank effluent and/or the effluent D-box/ final pump chamber.

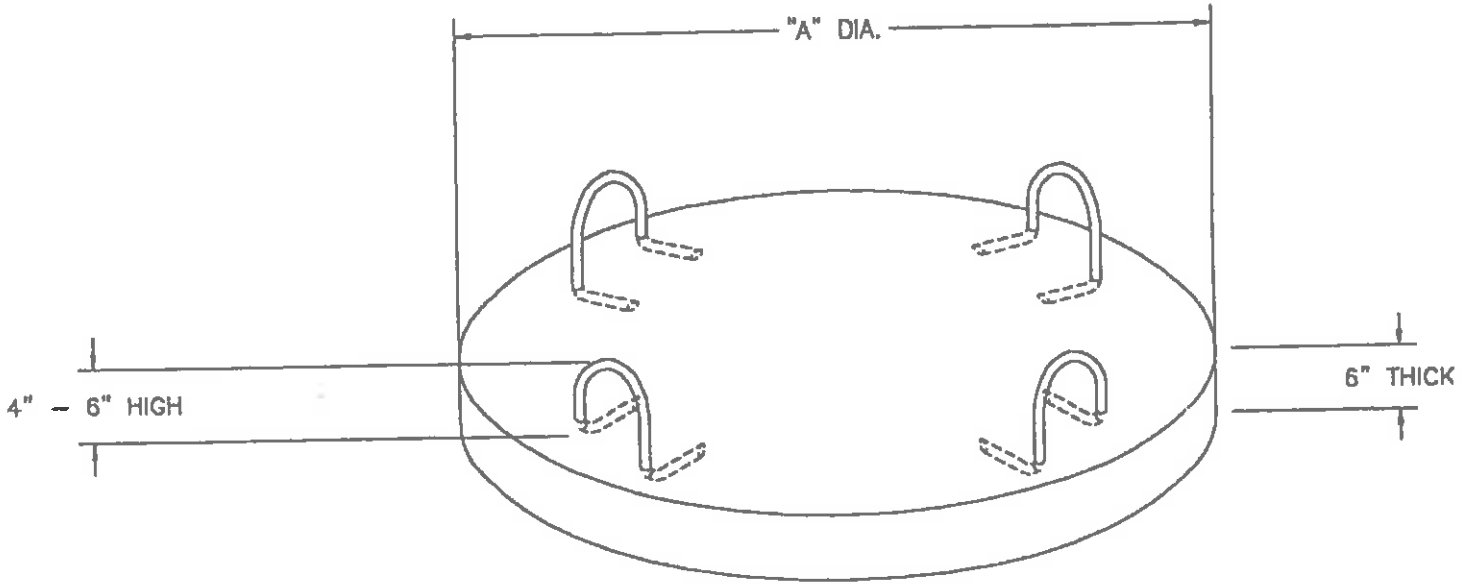
Finally, AWTE would appreciate reviewing the site plan as it becomes available. Please send a copy of the local permits applicable to this installation. Feel free to contact office personnel if you have questions or need additional information. Drawings of the Bioclere system are available on Autocad LT 2000 for Windows (Version 14 compatible).

Sincerely,

AWT Environmental, Inc.

NOTES: UNLESS OTHERWISE SPECIFIED:

1. CONCRETE MINIMUM STRENGTH: 4,000 PSI @ 28 DAYS.
2. STEEL REINFORCEMENT: 6 X 6 10 GAUGE STEEL WIRE MESH.
3. EYES: (4): 1/2" DIAMETER RE-BAR CAST IN PLACE AS SHOWN 6" FROM O.D., EQUALLY SPACED.



MODEL	"A"
19/22	7'
24	8'
30	10'

AWT0003	
AWT0002	
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES:
ANGLES ± —
FRACTIONS ± —
2 PLACE DEC ± —
3 PLACE DEC ± —
MATERIAL:

AMA
CONCRETE PRODUCTS DIVISION

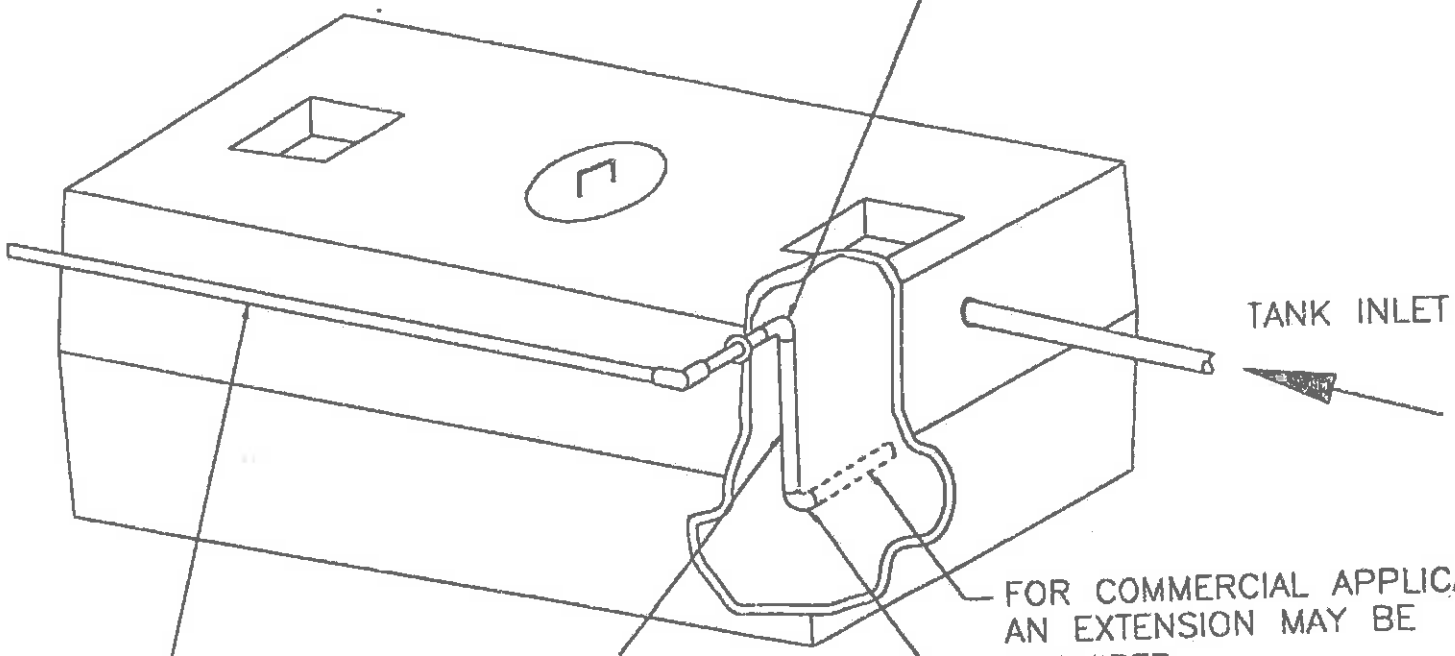
DATE	3-16-87
DWN BY	A.BARBATO
CHKR	K.AMARAL
PROJ ENGR	S.GRAY
APPVD	

241 DUCHAINE BLVD.
P.O. BOX 50120
NEW BEDFORD, MA 02745
(508) 998-7577 FAX (508) 998-7177

TITLE: PRECAST MOUNTING PAD (MODELS 19 & UP)

SIZE	REVISION	DRAWING NO.
C	B	AWT3014

SCALE: NONE | FILE: 3014.DWG | SHEET #: 1 OF 1



NOTES: 1) SLOPE PIPE BACK TO SEPTIC TANK WITH NO LOW POINTS

2) USE PRESSURE FITTINGS ONLY

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
ANGLES ± XX°
FRACTIONS ± —
2 PLACE DEC ± .XX
3 PLACE DEC ± .XXX
MATERIAL:

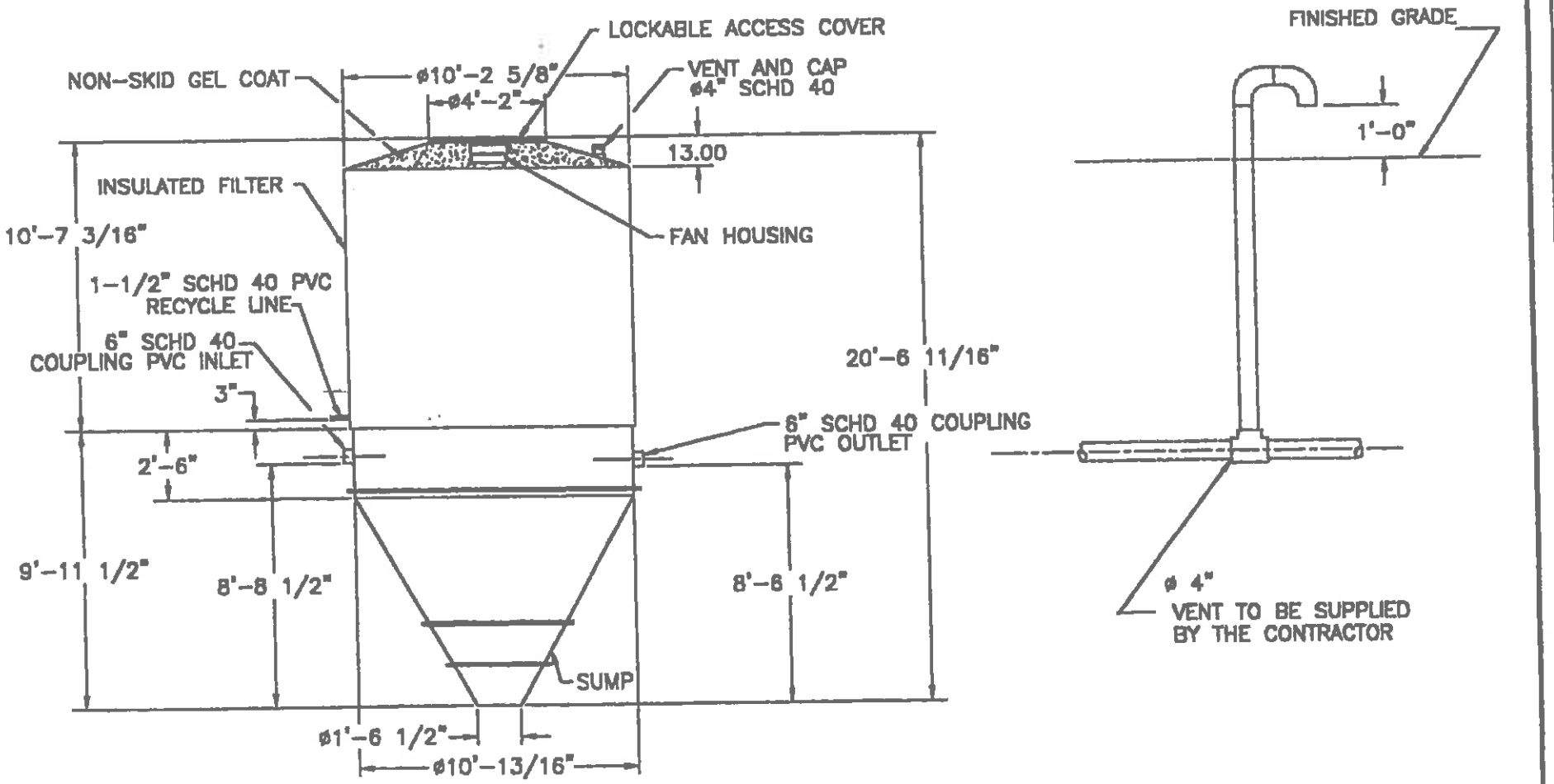
AMA
CONSOLIDATED CAN DIVISION

DATE	3-19-97
DRN BY	A.BERARDO
CHKR	K.AMARAL
ENGR CHKR	S.GREY
APPVD	

AWT
241 DUCHAINE BLVD.
P.O. BOX 50120
NEW BEDFORD, MA 02745
(508) 998-7577 FAX (508) 998-7177

TITLE: RECYCLE LINE INSTALLATION (PRIMARY TANK)

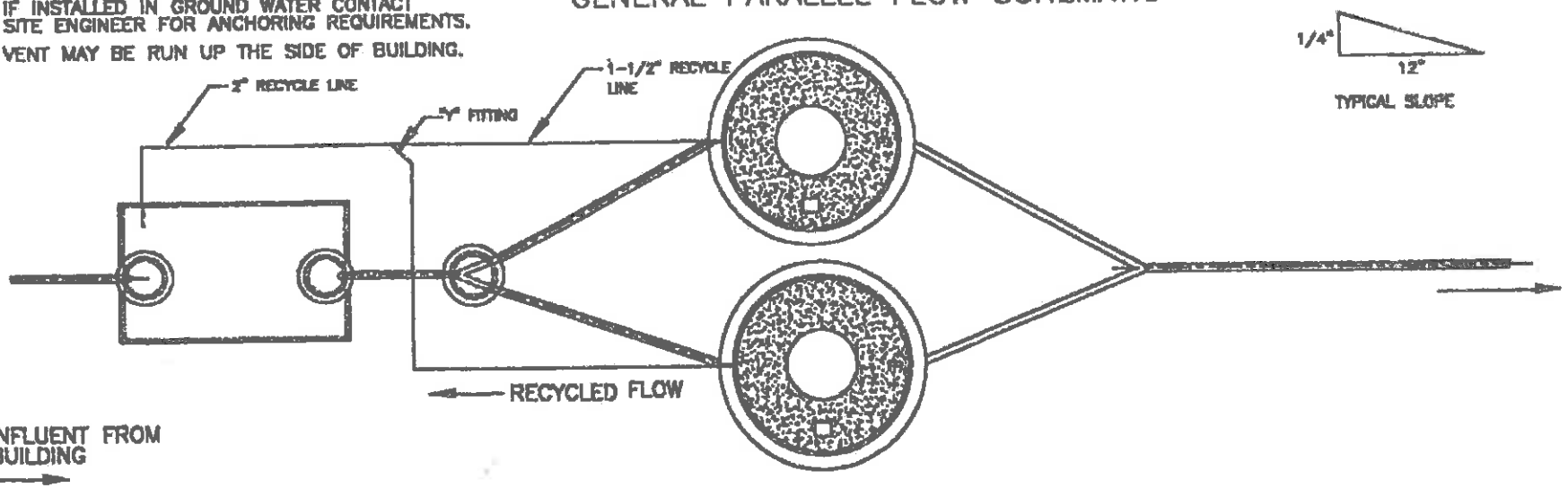
SIZE	REVISION	DRAWING NO.:	AWT1012
C	C		
SCALE: NONE		SHEET #	1 OF 1


LOCKABLE ACCESS COVER
NON-SKID GEL COAT
ø10'-2 5/8"
ø4'-2"
VENT AND CAP
ø4" SCHD 40
13.00
INSULATED FILTER
FAN HOUSING
10'-7 3/16"
1-1/2" SCHD 40 PVC
RECYCLE LINE
6" SCHD 40
COUPLING PVC INLET
3"
2'-6"
20'-6 11/16"
6" SCHD 40 COUPLING
PVC OUTLET
9'-11 1/2"
8'-8 1/2"
8'-6 1/2"
SUMP
ø1'-6 1/2"
ø10'-13/16"
FINISHED GRADE
1'-0"
ø 4"
VENT TO BE SUPPLIED
BY THE CONTRACTOR

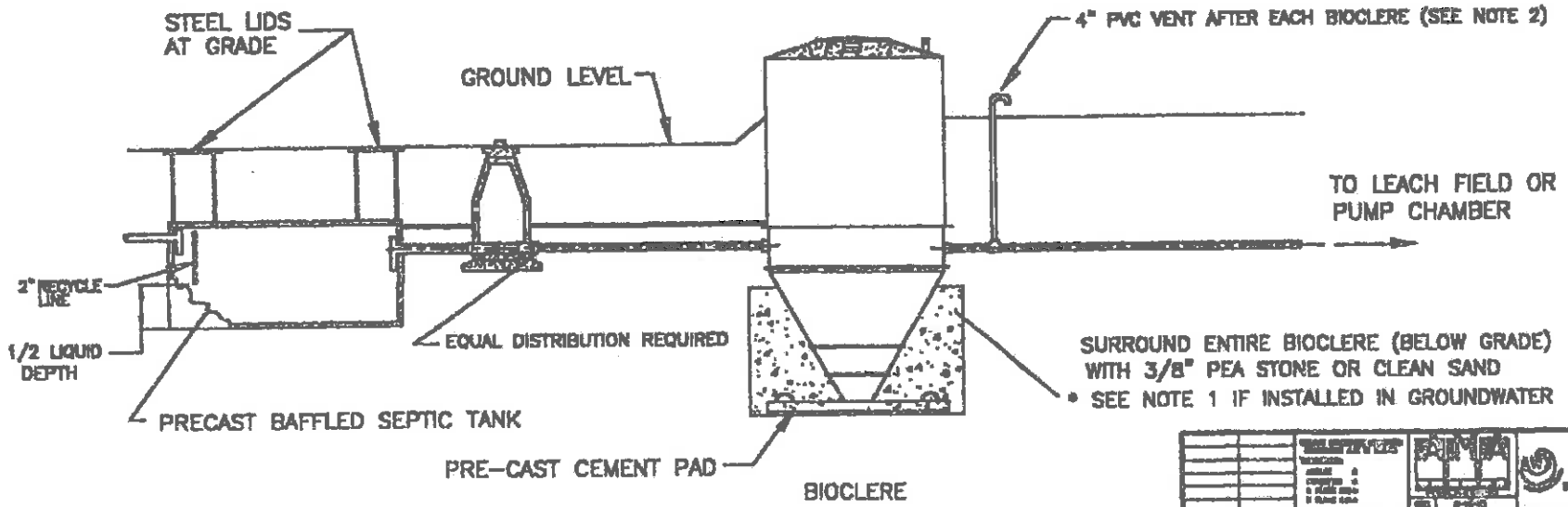
MODEL 30/32

NOTES:
1. IF INSTALLED IN GROUND WATER CONTACT SITE ENGINEER FOR ANCHORING REQUIREMENTS.
2. VENT MAY BE RUN UP THE SIDE OF BUILDING.

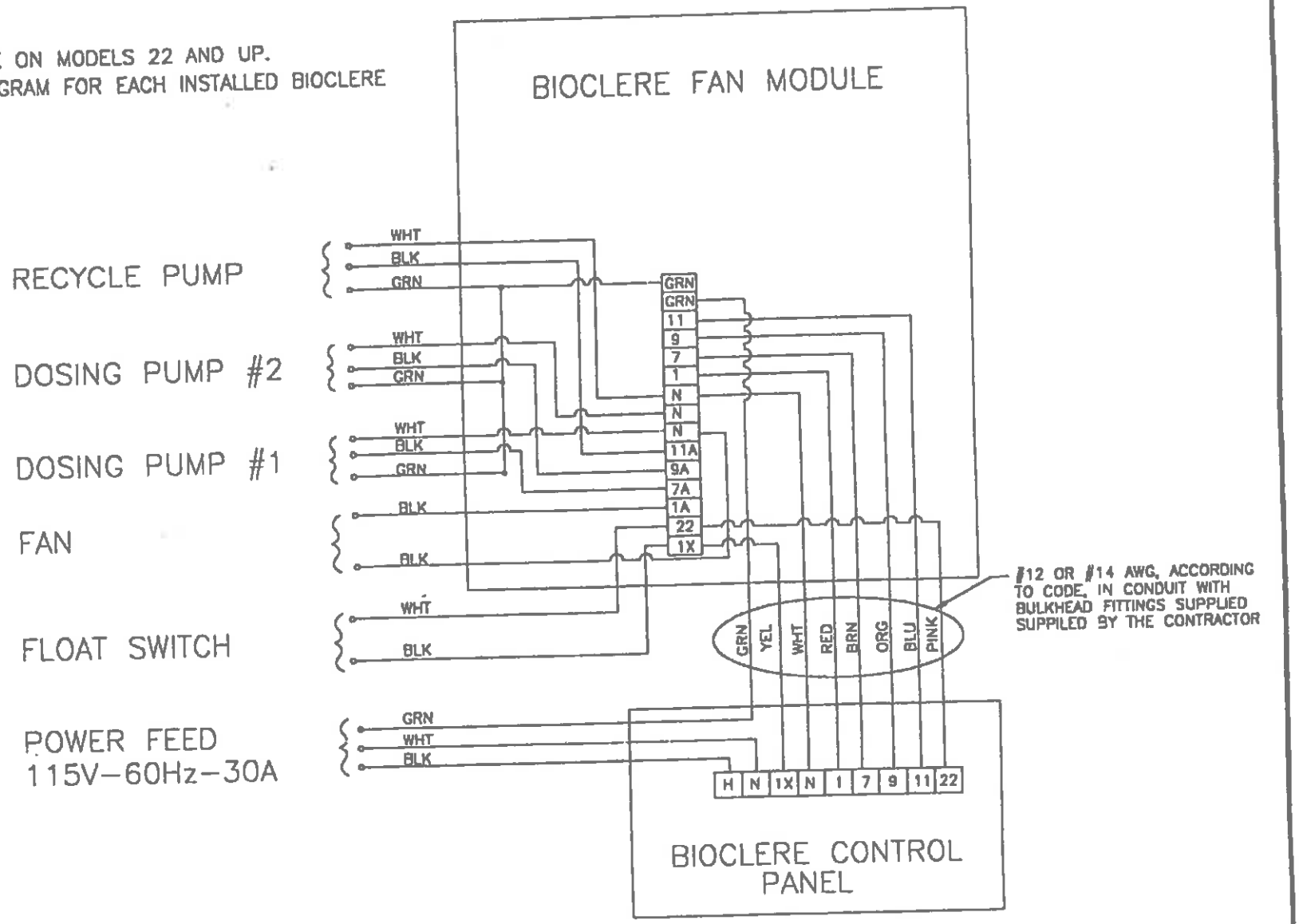
GENERAL PARALLEL FLOW SCHEMATIC



TYPICAL SLOPE



NOTES:
1. FOR USE ON MODELS 22 AND UP.
2. THIS DIAGRAM FOR EACH INSTALLED BIOCLERE



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
ANGLES ±
FRACTIONS ±
2 PLACE DEC ±
3 PLACE DEC ±
MATERIAL:

AWT1007
AWT1008
AWT1001
NEXT ASSY | USED ON
APPLICATION

AMA
COMPU-CAD DIVISION
DATE 8-10-99
DWN BY A.MARRATO
CHKD K.AMARAL
ENGR
APPVD

AWT
241 DUCHAINE BLVD.
P.O. BOX 50120
NEW BEDFORD, MA 02745
(508) 998-7577 FAX (508) 998-7177

TITLE: DUAL DOSING PUMP ELEC. SCHEMATIC
SIZE C | REVISION D | DRAWING NO.: AWT1
SCALE: 1:1 | WEIGHT | SHEET #

BIOCLERE SPECIFICATION

General

There shall be furnished and installed an AWT Environmental Inc. (AWTE) factory built, fixed film aerobic process type sewage treatment plant(s) with all needed equipment for efficient operation. The unit shall include a trickling filter situated over a final settling tank.

Construction

The unit shall be delivered complete from supplier and shall include: random packed PVC manufactured media, ventilation fan, dosing pumps, sludge return pump, internal piping, wiring and controls. The trickling filter portion of the tank shall have fiberglass inner and outer skins with the cavity between filled with polyurethane foam insulation. The remainder of the plant shall be constructed of FRP or plastic. All internal piping shall be schedule 40 PVC plastic pipe. The treatment plant shall withstand normal pressures from the interior hydrostatic load and from the soil.

Filter Media

The PVC randomly packed filter media has a void ratio of >95%. It is UV resistant and resistant to a wide range of aqueous solutions, acids, alkalis, oxidizing agents, oils, fats, and alcohols.

Final Settling Tank

A cone shaped settling tank shall have 60 degree sloped sides to prevent the accumulation of biological and inorganic suspended solids and shall contain the necessary internal baffling to prohibit short-circuiting of the wastewater.

Electrical Components

The unit shall have a ventilation fan, two alternating dosing pumps, a sludge return pump, and a low level float switch with the following characteristics.

The ventilation fan shall be a 115v/1ph/60hz, painted metal, ball bearing fan capable of delivering 106 cfm of air.

The two alternating dosing pumps and recycle pump shall be 115v/1ph/60hz stainless steel submersible pumps. All pumps shall have an internal high temperature shut off switch. The alternating dosing pumps shall be controlled such that when one pump fails the remaining will complete both dosing cycles.

The low level 115v/1ph/60hz float switch shall be installed to prevent the dosing pumps from operating when water levels are abnormally low in the Bioclere (i.e. during primary tank pumping).

Power Supply

The unit shall have a dedicated 30 amp, 115v/1ph/60hz, power supply.

Wiring
The electrical contractor shall complete the wiring between the Bioclere control panel and the terminal strip within the Bioclere fan module meeting all local, state, and federal codes.

All fittings, connections, etc. shall be weatherproof and water tight construction. Ground terminals are provided in both the main panel and the junction box for each unit. Each ground terminal shall be wired to an earth ground.

Care shall be taken to match the wires between the control panel and the terminal strip within the Bioclere fan module located on each unit.

Control Panel
A control panel shall be furnished with an audio and visual alarm for pump failure and tripped circuit breaker conditions, an exterior alarm silence button, and an on/off/test power/alarm toggle switch. Within the NEMA4 enclosed panel individual pump timers, relays, terminal strip, on/off/test switches, run lights, dosing pump alternator, circuit breakers and current sensors shall be provided.

Warrantee
All equipment provided shall be warranted against defects in materials and workmanship for a period of one year from the date of installation.

Services Provided
AWTE or an approved manufacturer's representative shall provide the following services for each project: Note that all Bioclere unit(s) and ancillary equipment supplied by AWTE is to be installed by the general contractor.

- Review the design criteria, size and provide specifications for the AWTE supplied equipment.
- Review and comment on the site-specific site plan prior to manufacturing.
- Provide a Technical Manual that includes and is not limited to installation instructions; equipment specifications and operation and maintenance procedures for the AWTE supplied equipment.
- Provide onsite technical assistance for the handling and positioning of the Bioclere unit(s) the day of installation.
- Return to the site for testing and/or commissioning of the Bioclere unit(s) upon substantial completion of site work by the general contractor (piping, electrical, grading, etc.). AWTE will install the randomly packed PVC media and pumps into the Bioclere unit(s), which will complete unit setup. AWTE will be available to train the operator(s) and instruct the owner on Bioclere operation the day of commissioning/testing.
- Test and/or commission the ancillary equipment supplied by AWTE the day of Bioclere commissioning and/or testing.
- Remain accessible to the owner and/or operator for phone consultation.
- Be available on a contract basis for additional site visits or consultation.

APPENDIX-D

New York State Department of Environmental Conservation Notice of Violation Carmel Sewer District #5 Hillsdale STP dated November 6 2015

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water, Region 3
100 Hillside Avenue, Suite 1W, White Plains, NY 10603
P: (914) 428-2505 | F: (914) 428-0323
www.dec.ny.gov

November 06, 2015

Supervisor and Town Board
Town of Carmel
Town Hall
60 McAplain Ave
Mahopac NY 10541

Re: Notice of Violation: Comprehensive Compliance Inspection, Carmel SD # 5 Hillsdale STP, (T) Carmel, SPDES # NY 00306678

Dear Town Officials:

On November 4, 2015, a compliance inspection of the above referenced facility was performed for the purpose of evaluating compliance with the State Pollutant Discharge Elimination System (SPDES) Permit and Article 17 of the Environmental Conservation Law. Please refer to the attached copy of the inspection report for detailed information and note the unsatisfactory rating.

A review of your Discharge Monitoring Reports (DMR) for 2015 and 2014 indicates that the facility violated the seasonal concentration based Ammonia limits seven times and load based ammonia limits four times during this time period. Failure to meet the SPDES limit are violations of Article 17 Environmental Conservation Law (ECL). Violations of Article 17 of the ECL are subject to penalties of up to $ 37,500 per day, per violations. This NOV is being referred to our office of general counsel for appropriate enforcement action.

Please submit an engineering report with a schedule by December 15, 2015. The report should explain the reasons for these violations, recommendation for preventing future violations, and addressing how the permittee can consistently meet all permit limits.

Your cooperation in operating and maintaining this facility, in compliance with your SPDES Permit and the protection of New York's waters is appreciated. Should you have any questions, please contact me at (914) 428-2505, Ext 359.

Sincerely,

Meena George, P.E.
Environmental Engineer 2

Ecc: V. Maggio, Chief Operator
S. Karimipour, RWE
Putnam County Health

APPENDIX-E

New York State Department of Environmental Conservation
Schedule of Compliance Order on Consent dated July 3 2019

STATE OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

---X

In the Matter of the Violations of Article 17 of the New York State Environmental Conservation Law and Parts 700 and 750 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York,

ORDER ON CONSENT

-by-

NYSDEC Case No. R3-20151120-112

Town of Carmel,

Respondent.

---X

WHEREAS:

1. The New York State Department of Environmental Conservation (the "Department" or "NYSDEC") is an executive agency of the State of New York with jurisdiction to enforce the environmental laws of the state pursuant to New York State Environmental Conservation Law ("ECL") section 3-0301;
2. It is the Department's responsibility to conserve, improve and protect New York State's natural resources and environment, and control pollution to enhance the health, safety, welfare and overall economic and social well-being of the people of the state;
3. The Department is responsible for the administration and enforcement of laws, regulations and management of Water Pollution Control and the State Pollutant Discharge Elimination System ("SPDES") and permits issued thereunder, pursuant to ECL Article 17 and 6 NYCRR Parts 700 et seq. and 750 et seq.

4. The Respondent, Town of Carmel, maintains offices at 60 McAlpain Avenue, Mahopac, NY, and is the owner of the Hillsdale Sewage Treatment Plant ("STP") for Carmel Sewer District #5, located at Carey Street, East of Route 6N, Carmel, NY, with SPDES #NY0030678 (the "Facility").

5. By inspection of November 4, 2015, the Department of Environmental Conservation documented several violations by Respondent at the Facility. Specifically, Respondent violated:

   a. ECL 17-0501, as Respondent's Facility violated the seasonal concentration based Ammonia limits seven times during the 2014/2015 season (June-October 2014 and June-October 2015), thus violating ECL 17-0501, which prohibits discharge into waters of the state that causes or contributes to a condition in contravention of water quality standards.

   b. ECL 17-0803, as Respondent's Facility violated the seasonal concentration based Ammonia limits seven times during the 2014/2015 season (June-October 2014 and June-October 2015), thus violating ECL 17-0803, which prohibits discharge of pollutants to waters of the state in a manner other than as prescribed by a SPDES permit.

6. ECL § 71-1929 provides that any person who violates the provisions of Article 17 of the ECL or any rule, regulation or order promulgated thereunder is liable for penalties of up to $37,500 per day for each violation.

7. The Respondent admits the violations set forth above, waives the right to a hearing in this matter, consents to the issuing and entering of this Order, agrees to be bound by its terms, provisions and conditions, and waives the right to a public hearing in any matter that may arise under the terms of this Order.

NOW, having considered this matter and being duly advised, it is ORDERED that:

I. Civil Penalty

A. The Respondent is hereby assessed a civil penalty in the amount of thirty-three thousand dollars ($33,000). Of that amount, ten thousand dollars ($10,000) is payable to the Department with the Respondent's executed original of this Order. The civil penalty shall be paid by check or money order payable to the New York State Department of Environmental Conservation, with the NYSDEC case number appearing on the first page of this Order endorsed on the face, and forwarded to the Regional Attorney, NYSDEC Region 3, 21 South Putt Corners Road, New Paltz, New York 12561. The remaining amount, twenty-three thousand dollars ($23,000), is suspended provided the Respondent complies strictly with the terms of this Order. If the Respondent violates any term of this Order, the whole amount of the suspended penalty shall be due within 15 days of receiving a notice of noncompliance from the Department.

B. Payment shall be either by electronic transfer at the following web address: http://www.dec.ny.gov/about/61016.html or by check or money order payable to the "New York State Department of Environmental Conservation" with the NYSDEC case number of this Order written in the memo section of the check, and sent to

NYSDEC, Division of Management and Budget, 625 Broadway, 10th Floor, Albany, NY 12233-4900 along with the enclosed invoice.

C. The executed original of this Order shall be forwarded to the Regional Attorney, NYSDEC Region 3, 21 South Putt Corners Road, New Paltz, NY 12561.

II. Compliance

The requirements of this Order, the Schedule of Compliance, and any approved submissions are incorporated into this Order and are fully enforceable as such. Compliance with this Order shall be the sole determination of the Department, and shall not excuse, nor be a defense to, charges of any violations of law, regulation or permit that may occur after the date of this Order. Compliance with this Order shall be in full settlement of all claims for civil penalties by the Department against the Respondent for the above-referenced violations.

III. Submissions

Any assertion of fact in a submission shall be considered an affirmative representation by the Respondent of its truth. The Respondent shall be in violation of this Order if any submission is of such poor quality that it does not constitute a good faith effort to comply with the provisions of this Order.

IV. Remedial Plans and Proposals

If the Department approves a submission, the Respondent shall implement it in accordance with its schedule and terms. If the Department disapproves a submission, the Respondent shall submit a revision that fully responds to each of the Department's grounds for disapproval within 15 days after receiving notice of disapproval. If the Department approves the revised submission, the Respondent shall implement it in

accordance with its schedule and terms as approved. If the revised submission is not approvable, the Department may approve it on condition that the Respondent accept such modifications as may be specified by the Department. If the Respondent does not accept such modifications, and the Department disapproves the revised submission, the Respondent shall be in violation of this Order.

V. Notice of Work

The Respondent shall provide at least five days' notice to the Department of any excavating, drilling, sampling, demolition, construction or equipment startup to be conducted pursuant to this Order.

VI. Inspections

Department representatives shall be permitted access to the subject site and facility upon reasonable notice to the Respondent, including overhead flights by Department owned unmanned aircraft systems, and to relevant records during reasonable hours to inspect and/or perform such tests and other activities to insure compliance with this Order and applicable law.

VII. Conveyance

If the Respondent proposes to convey the whole or any part of its ownership interest in the subject site or facility, the Respondent shall, not less than 30 days prior to the consummation of such proposed conveyance, notify the Department in writing of the identity of the transferee and of the nature and date of the proposed conveyance. In advance of such proposed conveyance, the Respondent shall notify the transferee in writing, with a copy to the Department, of the applicability of this Order.

VIII. Other Approvals

This Order is not a permit, or a modification of a permit, under any federal, state or local laws or regulations. Unless otherwise allowed by law or regulation, the Respondent is responsible for complying with all applicable federal, state and local laws, regulations and permits. The Respondent shall obtain whatever permits, easements, rights of entry, approvals or authorizations that may be necessary to comply with this Order.

IX. Other Remedies; Natural Resource Damages

A. Nothing in this Order shall be construed as barring, diminishing, adjudicating or in any way affecting (1) any legal, administrative or equitable rights or claims, actions, suits, causes of action or demands that the Department may have against anyone other than the Respondent; (2) the Department's right to enforce, administratively or at law or in equity, the terms, provisions and conditions of this Order against the Respondent, its directors, officers, employees, servants, agents, successors and assigns in the event that the Respondent shall be in breach of its provisions; (3) the Department's right to bring any action, administratively or at law or in equity, against the Respondent, its directors, officers, employees, servants, agents, successors and assigns which the Department could otherwise maintain with respect to areas or resources that may have been affected or contaminated as a result of the release or migration of wastes from the site or its vicinity, or to require that the Respondent take such additional measures as may be necessary for the protection of public health or the environment, including interim remedial measures; (4) the Department's right to commence any action or proceeding relating to or arising out of any disposal of

hazardous wastes at or from the site, as those wastes are defined by applicable regulation; or (5) the Respondent's right to challenge any such action by the Department, whether by administrative hearing or otherwise, to the extent otherwise permitted by law.

B. Nothing in this Order shall be construed as barring, diminishing, adjudicating or in any way affecting the Department's rights or authorities, including the right to recover natural resource damages, against any party including the Respondent.

C. This Order shall not be construed to prohibit the Commissioner or the Commissioner's authorized representative from exercising any summary abatement powers, either at common law or as granted pursuant to statute or regulation.

X. Indemnification

The Respondent or any successors, assigns or transferees, shall indemnify and hold harmless the Department, the State of New York, and their representatives and employees, for all claims, suits, actions, damages and costs of every name and description arising out of or resulting from the fulfillment or attempted fulfillment of this Order by the Respondent, its directors, officers, employees, servants, agents, successors or assigns.

XI. Force Majeure

The Respondent shall not be in default of this Order if unable to comply because of the action of a national or local government body or court, war, strike, riot or natural disaster, not caused by the negligence or willful misconduct of the Respondent; provided, however, that the Respondent shall use best efforts to comply. The Respondent shall provide written notice to the Department immediately upon obtaining

knowledge of such event and shall, within twenty-one days of such event, provide written request to the Department for an extension or modification to this Order, along with documentation evidencing entitlement to such relief. Relief under this clause shall not be available if the Respondent fails to provide timely notice of such event. The Respondent shall have the burden of proving entitlement to relief under this clause by clear and convincing evidence.

XII. Default of Payment

The penalty assessed in the Order is a debt owed to the State of New York. Failure to pay the penalty, or any part thereof, in accordance with the requirements of this Order, may result in referral to the New York State Attorney General for collection of the entire amount owed (including the assessment of interest, and a charge to cover the cost of collecting the debt), and/or referral to the New York State Department of Taxation and Finance, which may offset any tax refund or other monies that may be owed to the Respondent by the State of New York. Any suspended and/or stipulated penalty provided for in this Order will constitute a debt owed to the State of New York when and if such penalty becomes due.

XIII. Entire Agreement

The provisions hereof constitute the complete and entire Order between the Respondent and the Department concerning the violations set forth above. No change or modification shall be effective except as may be specifically set forth in writing by the Department. No informal advice, guidance, suggestion or comment by the Department shall be construed as relieving the Respondent of its obligations to obtain such formal approvals required by this Order.

XIV. Binding Effect

This Order shall bind the Respondent, its officers, directors, agents, employees, contractors, successors and assigns, and all persons, firms and corporations acting under or for the Respondent including any subsequent operator of the facility, and any successor in title to the facility or any interest therein. The Respondent shall ensure that all work performed under this Order is done in compliance with its terms.

XV. Effective Date and Termination

This Order shall become effective when signed by the Regional Director on behalf of the Commissioner, and shall terminate when its requirements are completed to the Department's satisfaction.

Dated: New Paltz, New York
July 3, 2019

BASIL SEGGOS
Commissioner, NYSDEC

By: _____
JOHN W. PETRONELLA
Acting Regional Director
NYSDEC Region 3

CONSENT BY RESPONDENT

The Respondent, TOWN OF CARMEL hereby consents to the issuance and entry of this Order without further notice, waives its right to a hearing in this matter, and agrees to be bound by the terms, conditions and provisions of this Order. The undersigned represents and affirms the legal authority to bind Respondent to the terms and conditions of this Order.

TOWN OF CARMEL

By: _____

Name: TOWN SUPERVISOR

Title: KENNETH SCHMITT

Date: JUNE 25, 2019

ACKNOWLEDGMENT

STATE OF NEW YORK)
) ss:
COUNTY OF Putnam)

On the 25th day of June, 2019, before me, the undersigned, personally appeared Kenneth Schmitt, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he/she executed the same in his/her capacity as shown in the instrument, and that by his/her signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

Anna Pasquerello
NOTARY PUBLIC

Anna Pasquerello
Notary Public, State of New York
Qualified in Westchester County
No. 01PA6345323
Commission Expires July 25, 2020
Certificate Filed in Putnam County

Schedule of Compliance

NYSDEC Case No. R3-20151120-112

Respondent: **Town of Carmel**
Site or Facility: **Hillsdale STP, NY0030678, Carey Street, Carmel, New York**

1. Within 30 days of the effective date of this Order, the Respondent shall submit an approvable SPDES NY-2A application form to:

   NYSDEC Region 3
   Attn: Regional Permit Administrator
   21 South Putt Corners Road
   New Paltz, New York 12561

   Please note that the receiving water is Class C and Section VII should be revised accordingly.

2. Within 1 year of the effective date of this Order, the Respondent shall submit to the Department for approval an Engineering Report and implementation schedule, certified by a Professional Engineer licensed in the State of New York, that assesses and evaluates the Hillside STP and its ability to comply with the effluent limits in the SPDES permit for the Facility. The Engineering Report shall also discuss process control optimization, corrective actions, and capital improvements needed to bring the Hillside STP into compliance. The Engineering Report shall also discuss design considerations for future upgrades to the Hillside STP and Town of Carmel collection systems. Upon receiving written approval from the Department, the Engineering Report and schedule shall be incorporated into and enforceable under this Order.

3. All submissions pursuant to this Schedule of Compliance shall be made to Department staff: Division of Water, NYSDEC Region 3, 100 Hillside Avenue, Suite 1W, White Plains, New York, 10603-2860.

4. All submissions pursuant to this Schedule of Compliance are incorporated into this Order, upon approval by the Department if such approval is required, and shall be fully enforceable.

32-01-3 (8/90)—10f

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

RECEIPT

NUMBER 631638

Region Number 3

Date 7/2/19

Location New Paltz Division Legal Affairs

Received of Town of Carmel

In the amount of Ten Thousand 00/100 $ 10,000

For Civil Penalty - Article 17

R3-20151120-112

☐ Cash Department Representative Donna Holmes

☒ Check Number 0083718 Title Cash Receipts Clerk

☐ Money Order

ORIGINAL

APPENDIX-F

New York State Department of Environmental Conservation
Annual Comprehensive Inspection - Notice of Violation dated March 19 2020

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water, Region 3
100 Hillside Avenue, Suite 1W, White Plains, NY 10603
P: (914) 428-2505 | F: (914) 428-0323
www.dec.ny.gov

March 19, 2020

Kenneth Schmitt
Supervisor
Town of Carmel
60 McAlpin Avenue
Mahopac NY 10541

Re: Annual Comprehensive Inspection-Notice of Violation
Carmel SD # 5 Hillsdale Estates STP (NY 0030678)
Carey St E. of Rte 6 N
Mahopac NY 10541

Dear Permittee:

A comprehensive inspection at Carmel SD # 5, Hillsdale Estates was performed on January 31, 2020 for the purpose of evaluating the compliance with the State Pollutant Discharge Elimination System (SPDES) Permit and Article 17 of the Environmental Conservation Law (ECL). Please refer to the attached copy of the inspection report for detailed information. The following violations were noted:

1. A review of monthly Discharge Monitoring Reports for the period January 2017 to February 2020 indicates the facility violated the following SPDES effluent limitations at Outfall 001:
   - Monthly average for flow a total of sixteen times
   - Monthly average for Nitrogen ammonia (mg/l and/or lbs/day) a total of twenty-one times
   - Monthly average for $cBOD_5$ (mg/l and/or lbs/day) a total of nine times
   - Monthly average for total suspended solids a total of three times
   - cBOD percent removal a total of six times
   - total suspended solids percent removal a total of nine times
   - 30-day and 7-day fecal coliform twice.

   These are contraventions of 6 NYCRR § 750-2.1(e).
2. The flow meter was last calibrated on October 2018. This is a violation of 6 NYCRR § 750-2.5.

Please note that the Schedule of Compliance in Order on Consent (R3-20151120-112) requires that you submit an Engineering Report and implementation schedule that discusses process control optimization, corrective actions, and capital improvements

required to bring the facility into compliance. This must be submitted to the Department by July 3, 2020.

Your cooperation in operating and maintaining this facility, complying with your SPDES permit, and the protection of New York's water is anticipated. If you have any questions, please call me at 914-803-8134.

Sincerely,

Manoara Begum, P.E.
Assistant Engineer

ecc: Meena George, P.E. NYSDEC
Tom Bran, Inframark

APPENDIX-G

Unit Process Sampling Analytical Results

BOD5 CONCENTRATION									
		Flow	Influent	Septic Tank	BC-1	BC-2	Avg. BC's	Post Chlor.	Effluent
Date	Sample I.D.	(mgd)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
2/3/2016	CSD5-1	0.0453	87	80	37	40	39	23	23
2/12/2016	CSD5-2	0.033	130	57	23	24	24	15	14
2/19/2016	CSD5-3	0.0387	89	66	19	31	25	25	16
2/24/2016	CSD5-4	0.0612	61	73	25	49	37	27	18
3/2/2016	CSD5-5	0.0343	96	77	31	53	42	37	30
3/11/2016	CSD5-6	0.0241	230	110	36	55	46	31	20
3/18/2016	CSD5-7	0.0232	33*	96	---	59	59	44	39
3/25/2016	CSD5-8	0.0273	170	92	27	35	31	25	22
3/30/2016	CSD5-9	0.0181	270	91	19	42	31	19	12
4/8/2016	CSD5-10	0.0351	130	55	57	22	40	10	8
4/22/2016	CSD5-11	0.0164	310	120	45	36	41	28	23
5/6/2016	CSD5-12	0.0189	110	75	26	45	36	29	27
5/18/2016	CSD5-13	0.02	200	98	19	49	34	17	26
6/3/2016	CSD5-14	0.0116	---	---	---	---	---	---	---
6/15/2016	CSD5-15	0.0092	160	110	36	37	37	22	21
6/17/2016	CSD5-16	0.0104	230	120	32	30	31	14	19
6/22/2016	CSD5-17	0.0115	200	130	40	49	45	33	27
6/30/2016	CSD5-18	0.0098	150	210	51	40	46	15	27
7/8/2016	CSD5-19	0.0103	210	240	91	68	80	41	36
7/12/2016	CSD5-20	0.009	150	200	57	35	46	18	23
7/21/2016	CSD5-21	0.0116	240	240	97	51	74	32	30
7/28/2016	CSD5-22	0.0094	240	190	56	41	49	30	31
8/3/2016	CSD5-23	0.0102	130	160	67	37	52	46	41
8/10/2016	CSD5-24	0.0204	310	160	130	25	78	68	45
8/17/2016	CSD5-27	0.0177	380	120	28	29	29	9	12
8/25/2016	CSD5-28	0.0073	190	130	43	35	39	11	12
9/7/2016	CSD5-29	0.0177	140	190	85	37	61	50	43
9/14/2016	CSD5-30	0.0112	130	150	50	40	45	33	30
9/22/2016	CSD5-31	0.0122	---	---	---	---	---	---	---
9/29/2016	CSD5-32	0.015	190	280	54	47	51	22	18
10/5/2016	CSD5-33	---	110	200	130	49	90	56	74
	Average	0.0203	180	135	50	41	46	29	26
	Min.	0.0073	61	55	19	22	24	9	8
	Max.	0.0612	380	280	130	68	90	68	74

TSS CONCENTRATION									
		Flow	**Influent**	**Septic Tank**	**BC-1**	**BC-2**	**Avg. BC's**	**Post Chlor.**	**Effluent**
Date	Sample I.D.	(mgd)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
2/3/2016	CSD5-1	0.0453	120	52	55	55	55	29	27
2/12/2016	CSD5-2	0.033	140	51	24	26	25	16	16
2/19/2016	CSD5-3	0.0387	61	44	16	25	21	18	10
2/24/2016	CSD5-4	0.0612	49	47	88	31	60	13	14
3/2/2016	CSD5-5	0.0343	110	41	94	29	62	20	18
3/11/2016	CSD5-6	0.0241	220	58	37	45	41	28	26
3/18/2016	CSD5-7	0.0232	11*	60	---	42	42	25	18
3/25/2016	CSD5-8	0.0273	180	40	21	24	23	19	17
3/30/2016	CSD5-9	0.0181	170	39	23	34	29	9	9
4/8/2016	CSD5-10	0.0351	57	45	50	28	39	7	4
4/22/2016	CSD5-11	0.0164	160	80	34	40	37	30	22
5/6/2016	CSD5-12	0.0189	58	50	22	32	27	22	20
5/18/2016	CSD5-13	0.02	180	64	33	44	39	23	23
6/3/2016	CSD5-14	0.0116	---	---	---	---	---	---	---
6/15/2016	CSD5-15	0.0092	37	93	41	47	44	32	36
6/17/2016	CSD5-16	0.0104	260	74	44	51	48	27	28
6/22/2016	CSD5-17	0.0115	230	86	86	45	66	16	15
6/30/2016	CSD5-18	0.0098	80	84	49	49	49	28	35
7/8/2016	CSD5-19	0.0103	120	110	74	62	68	38	45
7/12/2016	CSD5-20	0.009	93	60	30	59	45	21	12
7/21/2016	CSD5-21	0.0116	260	55	60	35	48	22	23
7/28/2016	CSD5-22	0.0094	240	74	60	20	40	31	25
8/3/2016	CSD5-23	0.0102	160	73	55	32	44	26	35
8/10/2016	CSD5-24	0.0204	400	74	49	27	38	26	31
8/17/2016	CSD5-27	0.0177	220	53	35	14	25	13	12
8/25/2016	CSD5-28	0.0073	200	120	38	25	32	16	18
9/7/2016	CSD5-29	0.0177	230	53	69	36	53	28	45
9/14/2016	CSD5-30	0.0112	110	68	47	41	44	20	26
9/22/2016	CSD5-31	0.0122	---	---	---	---	---	---	---
9/29/2016	CSD5-32	0.015	130	460*	30	29	30	20	23
10/5/2016	CSD5-33	---	80	78	51	39	45	22	36
	Average	0.0203	156	65	47	37	42	22	23
	Min.	0.0073	37	39	16	14	21	7	4
	Max.	0.0612	400	120	94	62	68	38	45

NH3									
CONCENTRATION									
		Flow	Influent	Septic Tank	BC-1	BC-2	Avg. BC's	Post Chlor.	Effluent
Date	Sample I.D.	(mgd)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
2/3/2016	CSD5-1	0.0453	8	27	11	14	13	8	9
2/12/2016	CSD5-2	0.033	13	25	8	8	8	7	5
2/19/2016	CSD5-3	0.0387	50	17	12	7	10	8	8
2/24/2016	CSD5-4	0.0612	8	20	12	12	12	12	10
3/2/2016	CSD5-5	0.0343	6	14	12	5	9	10	9
3/11/2016	CSD5-6	0.0241	21	23	14	13	14	8	9
3/18/2016	CSD5-7	0.0232	14	29	---	16	16	14	15
3/25/2016	CSD5-8	0.0273	24	34	10	14	12	11	10
3/30/2016	CSD5-9	0.0181	19	43	9	12	10	9	10
4/8/2016	CSD5-10	0.0351	19	36	25	15	20	12	11
4/22/2016	CSD5-11	0.0164	15	32	10	15	12	12	14
5/6/2016	CSD5-12	0.0189	14	19	13	15	14	12	12
5/18/2016	CSD5-13	0.02	14	30	11	13	12	11	10
6/3/2016	CSD5-14	0.0116	---	---	---	---	---	---	---
6/15/2016	CSD5-15	0.0092	22	32	8	12	10	9	10
6/17/2016	CSD5-16	0.0104	33	34	7	9	8	7	7
6/22/2016	CSD5-17	0.0115	---	---	---	---	---	---	---
6/30/2016	CSD5-18	0.0098	19	33	12	14	13	13	11
7/8/2016	CSD5-19	0.0103	22	52	24	20	22	21	20
7/12/2016	CSD5-20	0.009	37	57	18	14	16	13	13
7/21/2016	CSD5-21	0.0116	44	33	38	19	29	22	23
7/28/2016	CSD5-22	0.0094	39	46	34	25	30	17	19
8/3/2016	CSD5-23	0.0102	14	47	37	24	31	24	24
8/10/2016	CSD5-24	0.0204	59	44	51	14	33	27	26
8/17/2016	CSD5-27	0.0177	51	51	21	16	19	13	14
8/25/2016	CSD5-28	0.0073	58	42	13	22	18	14	14
9/7/2016	CSD5-29	0.0177	29	53	47	30	39	28	29
9/14/2016	CSD5-30	0.0112	31	57	51	22	37	31	29
9/22/2016	CSD5-31	0.0122	---	---	---	---	---	---	---
9/29/2016	CSD5-32	0.015	52	47	11	15	13	13	9
10/5/2016	CSD5-33	---	46	69	39	27	33	25	27
	Average	0.0203	28	37	21	16	18	15	14
	Min.	0.0073	6	14	7	5	8	7	5
	Max.	0.0612	59	69	51	30	39	31	29

TKN									
CONCENTRATION									
		Flow	Influent	Septic Tank	BC-1	BC-2	Avg. BC's	Post Chlor.	Effluent
Date	Sample I.D.	(mgd)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
2/3/2016	CSD5-1	0.0453	32	33	66	22	44	13	12
2/12/2016	CSD5-2	0.033	33	34	9	11	10	9	8
2/19/2016	CSD5-3	0.0387	52	27	14	11	12	10	11
2/24/2016	CSD5-4	0.0612	22	27	14	15	15	14	11
3/2/2016	CSD5-5	0.0343	22	27	16	9	13	13	12
3/11/2016	CSD5-6	0.0241	43	33	17	18	18	12	13
3/18/2016	CSD5-7	0.0232	18	34	---	21	21	17	17
3/25/2016	CSD5-8	0.0273	42	40	13	24	19	19	17
3/30/2016	CSD5-9	0.0181	30	46	14	17	16	13	12
4/8/2016	CSD5-10	0.0351	27	41	27	18	23	14	12
4/22/2016	CSD5-11	0.0164	28	38	14	22	18	15	15
5/6/2016	CSD5-12	0.0189	24	22	14	18	16	14	14
5/18/2016	CSD5-13	0.02	24	34	14	17	15	14	13
6/3/2016	CSD5-14	0.0116	---	---	---	---	---	---	---
6/15/2016	CSD5-15	0.0092	30	37	13	16	15	13	15
6/17/2016	CSD5-16	0.0104	45	38	13	14	13	11	12
6/22/2016	CSD5-17	0.0115	78	46	20	23	21	16	15
6/30/2016	CSD5-18	0.0098	30	34	18	19	19	18	17
7/8/2016	CSD5-19	0.0103	28	53	27	21	24	22	23
7/12/2016	CSD5-20	0.009	43	56	24	17	21	17	17
7/21/2016	CSD5-21	0.0116	59	52	41	21	31	25	25
7/28/2016	CSD5-22	0.0094	48	47	36	26	31	19	21
8/3/2016	CSD5-23	0.0102	21	47	40	27	33	26	25
8/10/2016	CSD5-24	0.0204	78	46	51	16	33	28	25
8/17/2016	CSD5-27	0.0177	77	53	22	18	20	15	16
8/25/2016	CSD5-28	0.0073	94	46	17	23	20	16	16
9/7/2016	CSD5-29	0.0177	51	55	47	31	39	28	29
9/14/2016	CSD5-30	0.0112	58	58	53	23	38	32	28
9/22/2016	CSD5-31	0.0122	---	---	---	---	---	---	---
9/29/2016	CSD5-32	0.015	63	69	17	19	18	15	14
10/5/2016	CSD5-33	---	63	70	40	29	34	27	29
	Average	0.0203	44	43	25	19	22	17	17
	Min.	0.0073	18	22	9	9	10	9	8
	Max.	0.0612	94	70	66	31	44	32	29

APPENDIX-H

Carmel Sewer District No. 5 Collection System
Television Inspection Report October 2019

TAM ENTERPRISES INC.
WATER & WASTE WATER SPECIALISTS

114 Hartley Road
Goshen, NY 10924
Phone (845)-294-8882
Fax: (845)-294-8883

DATE: 1/09/20
SUBJECT / JOB:
Carmel Project

To: J. Robert Folchetti & Associates
31 Sodom Rd.
Brewster, NY 10509

Attention: J. E. Folchetti, P.E.

Included / Attached are the following items:

QUANTITY	DESCRIPTION	INSTRUCTIONS
1	TV Video Inspection- USB	As Requested
1	TV Inspection	As Requested

Please contact us right away if the above items are not enclosed.

Please contact us with any questions or concerns.

Thank you,

Amy Aldebot
Administrative Assistant

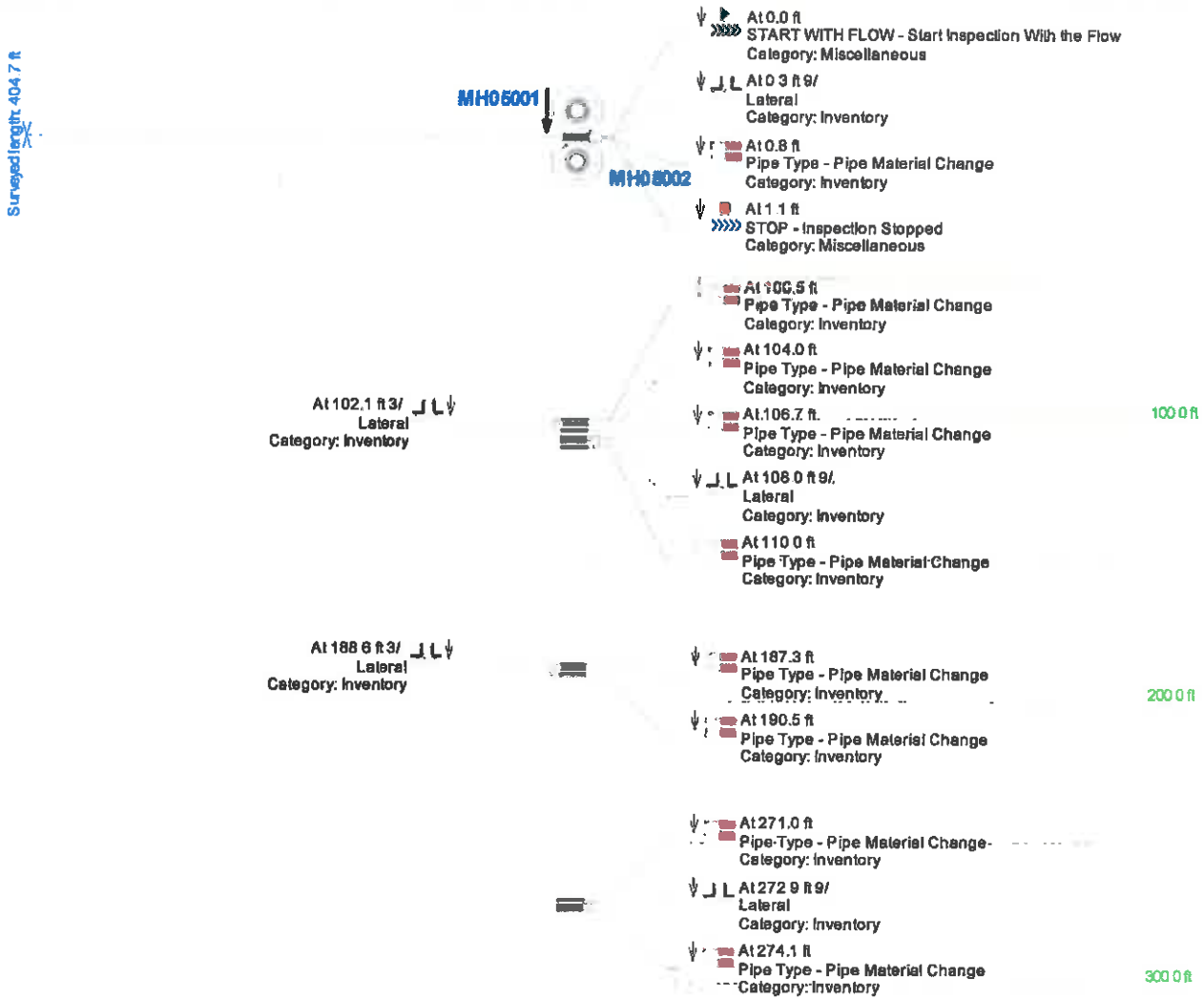
TAM ENTERPRISES INC.
114 HARTLEY ROAD
GOSHEN, N.Y. 10924
Phone 845-294-8882 , Fax 845-294-8883
E-MAIL:TONY@TAMENTINC.COM

Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/30/2019-8:28	Mahopac	Carey

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/30/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	404.7	Joe Kata	



TAM ENTERPRISES INC.
114 HARTLEY ROAD
GOSHEN, N.Y. 10924
Phone 845-294-8882 , Fax 845-294-8883
E-MAIL:TONY@TAMENTINC.COM

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/30/2019-8:28	Mahopac	Carey

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/30/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	404.7	Joe Kata	

At 297.8 ft
Sag - Sag in the pipe
Category: Structural

300.0 ft

At 311.3 ft
CONT WITH FLOW - Continue Inspection With the Flow
Category: Miscellaneous

At 394.0 ft
Sag - Sag in the pipe
Category: Structural

400.0 ft

At 404.7 ft
End Of Inspection @ MH
Category: Inventory

TAM ENTERPRISES INC.
114 HARTLEY ROAD
GOSHEN, N.Y. 10924
Phone 845-294-8882 , Fax 845-294-8883
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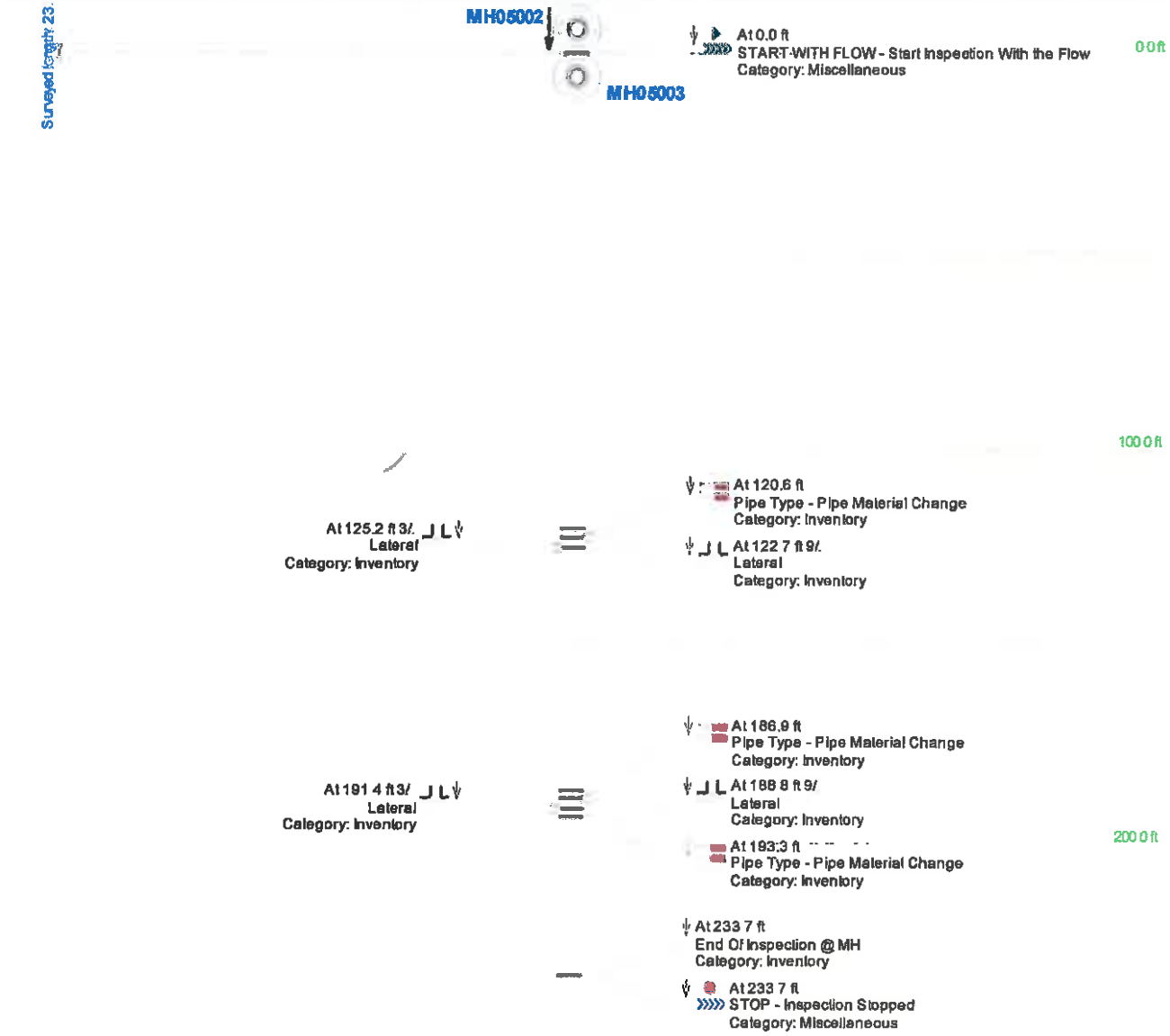
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/30/2019-10:19	Mahopac	Carey

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/30/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	233.7	Joe Kata	



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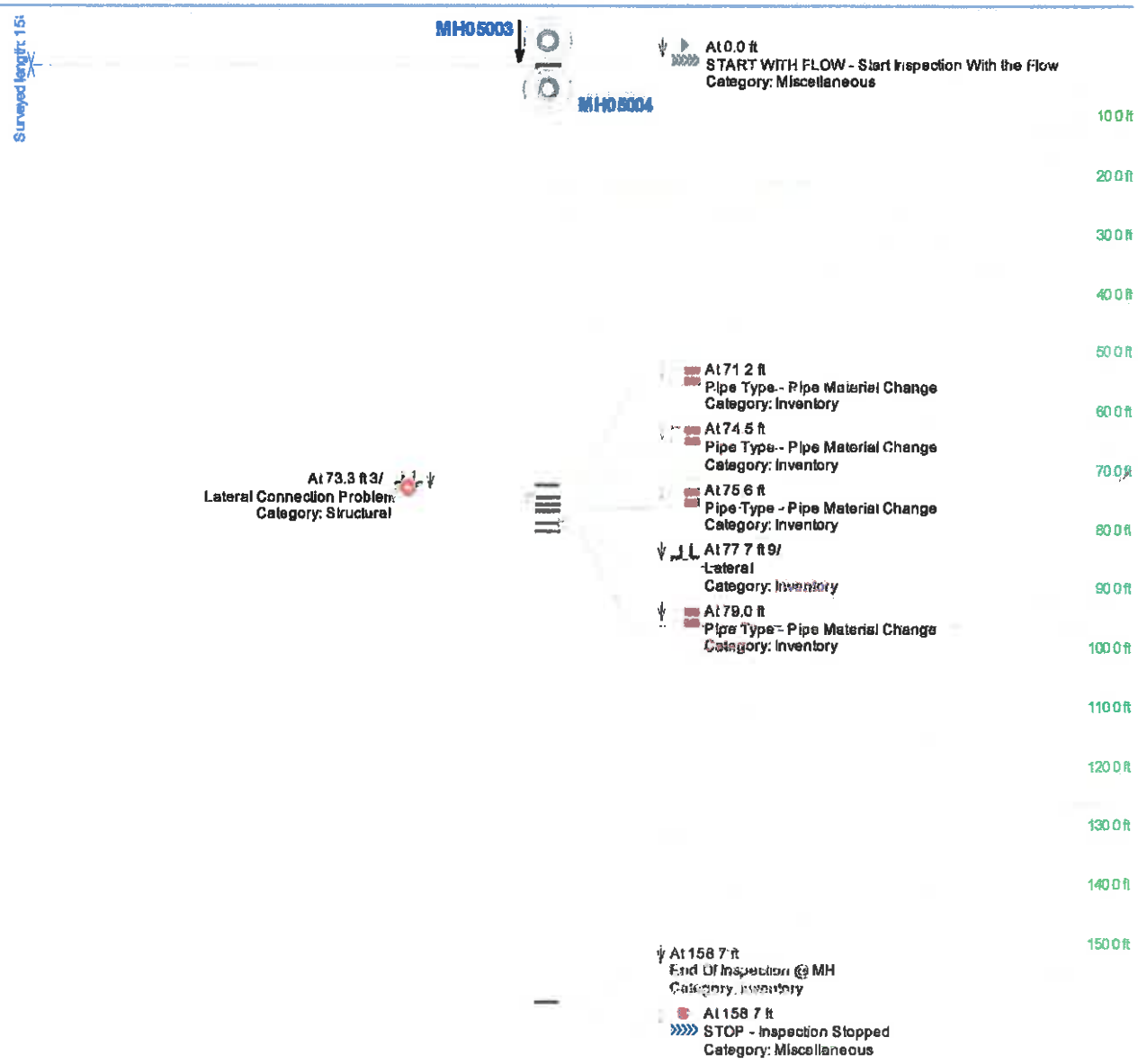
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/30/2019-10:31	Mahopac	Richard St

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/30/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	158.7	Joe Kata	



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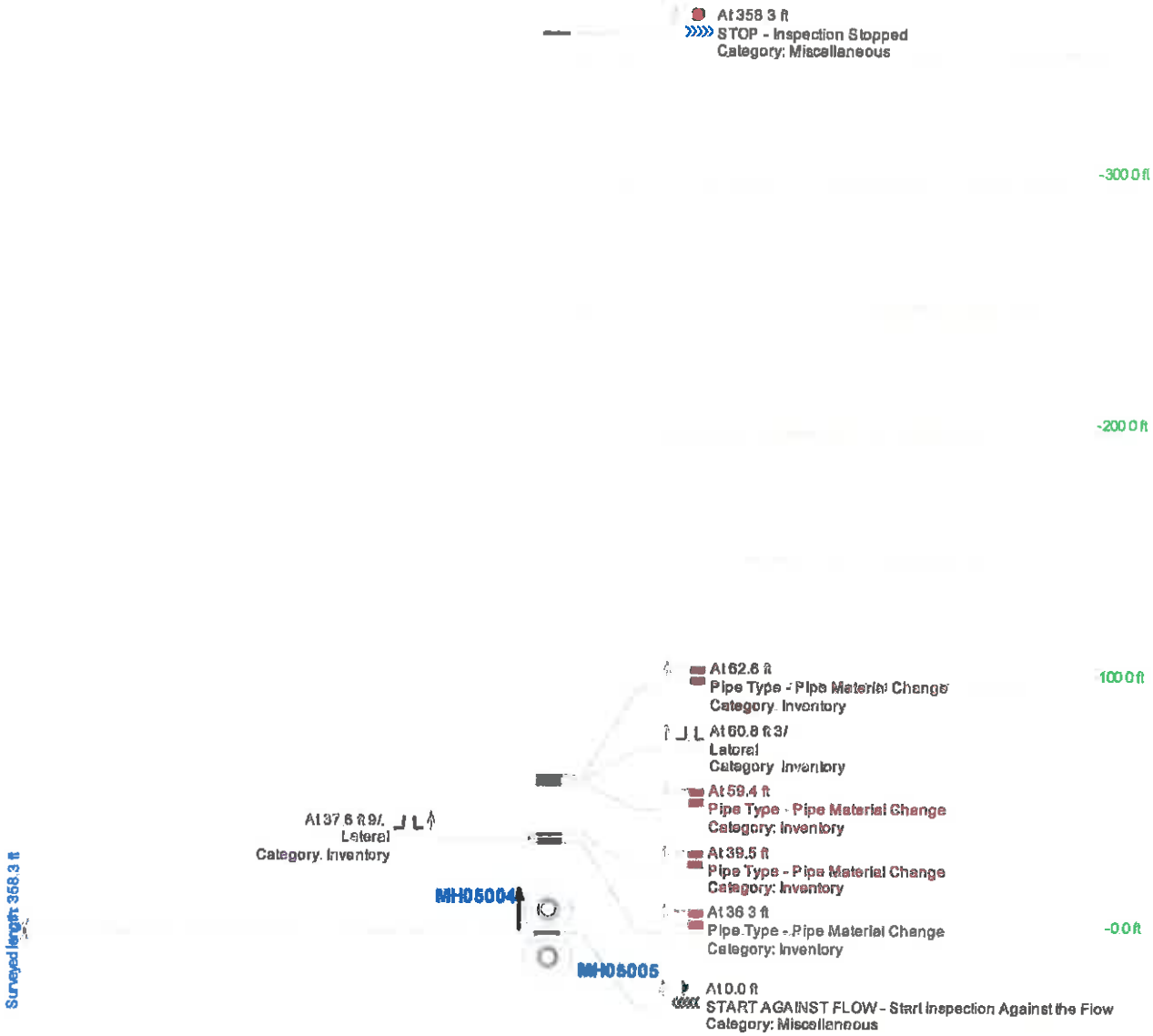
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/30/2019-11:15	Mahopac	Carey

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/30/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Upstream	358.3	Joe Kata	



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GOSHEN, N.Y. 10924
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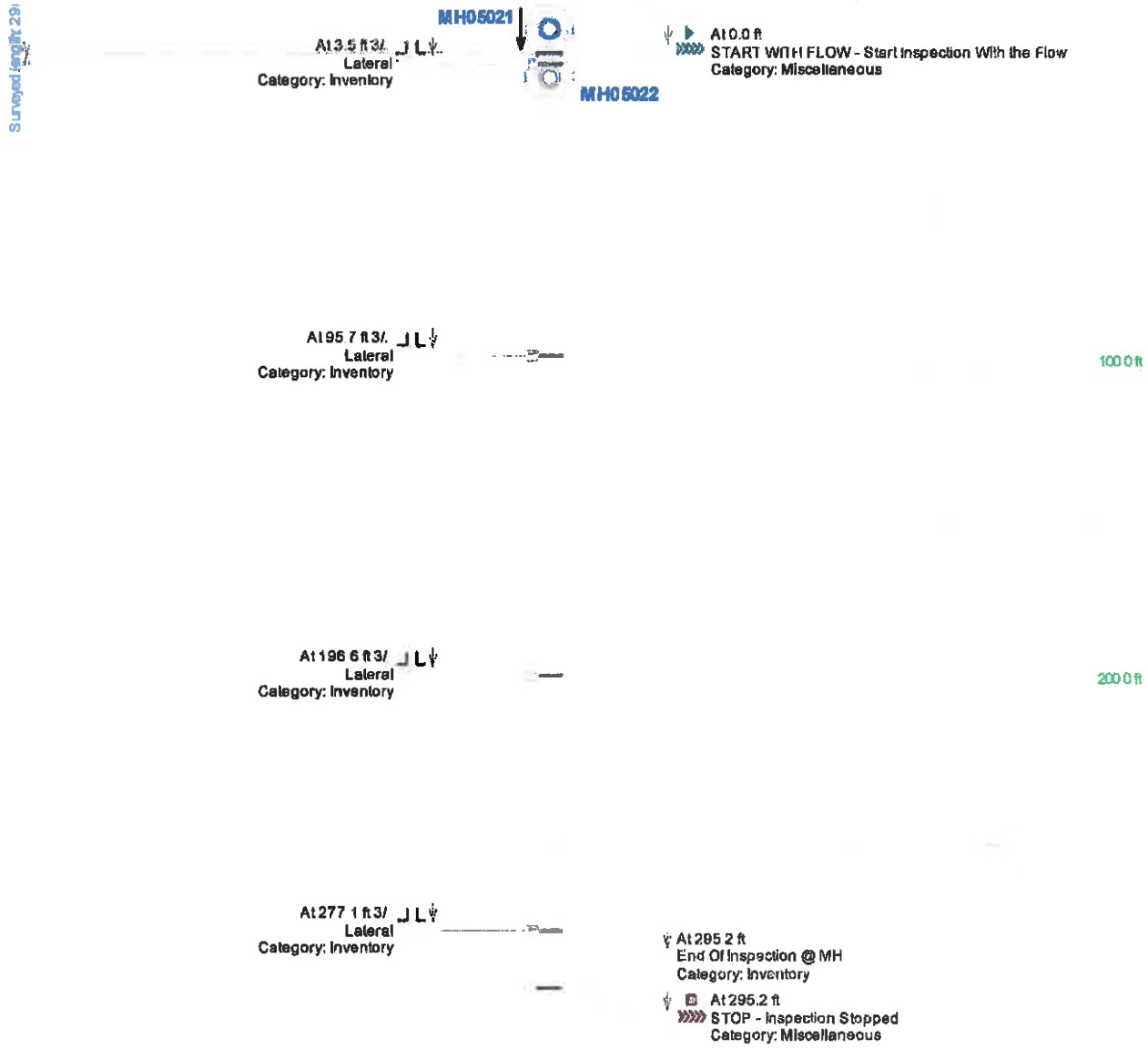
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/30/2019-12:12	Mahopac	Carey

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/30/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	295.2	Joe Kata	



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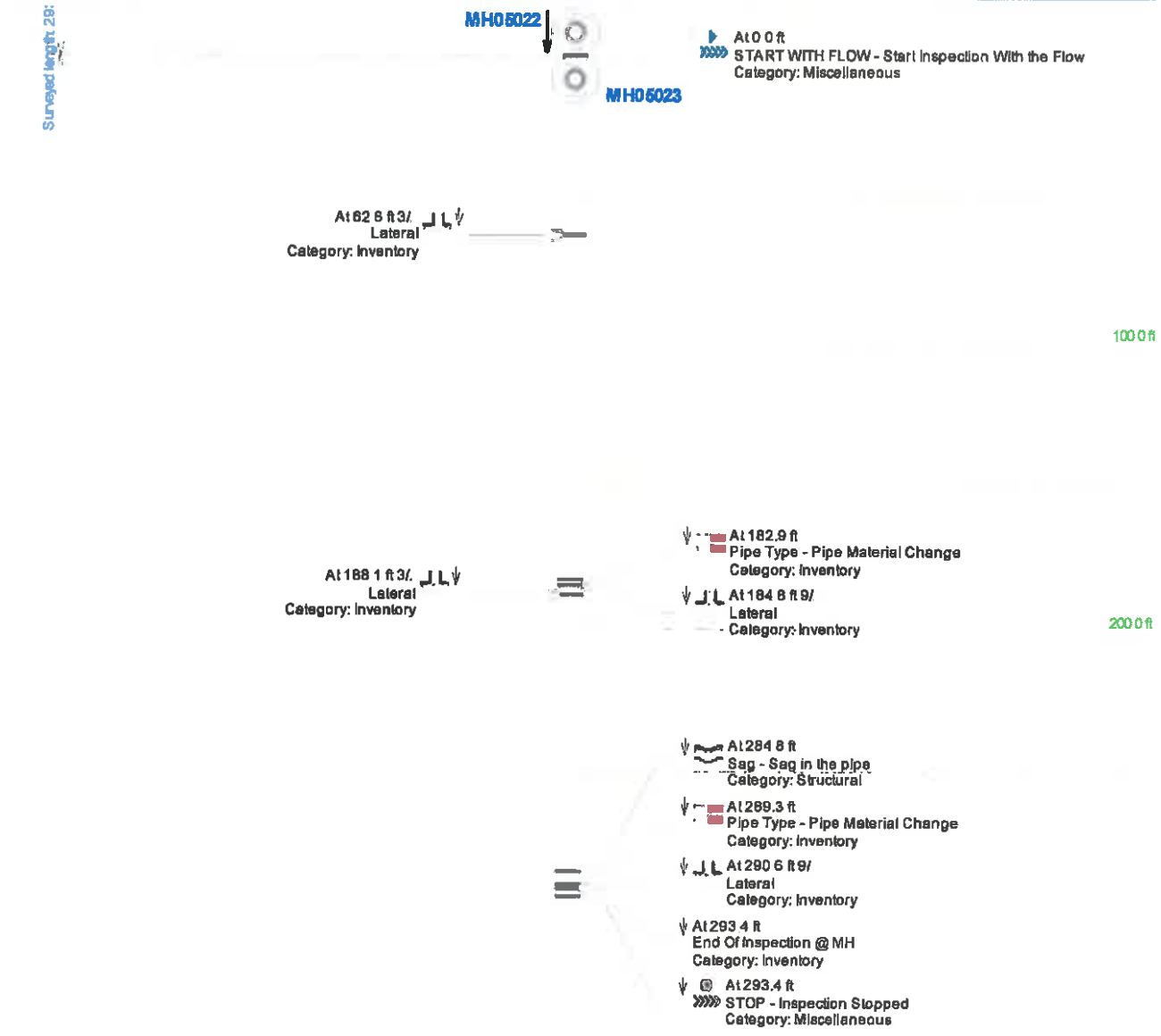
114 HARTLEY ROAD
GOSHEN, N.Y. 10924
Phone 845-294-8882 , Fax 845-294-8883
E-MAIL:TONY@TAMENTINC.COM

Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/30/2019-12:59	Mahopac	Carey st

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/30/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	293.4	Joe Kata	



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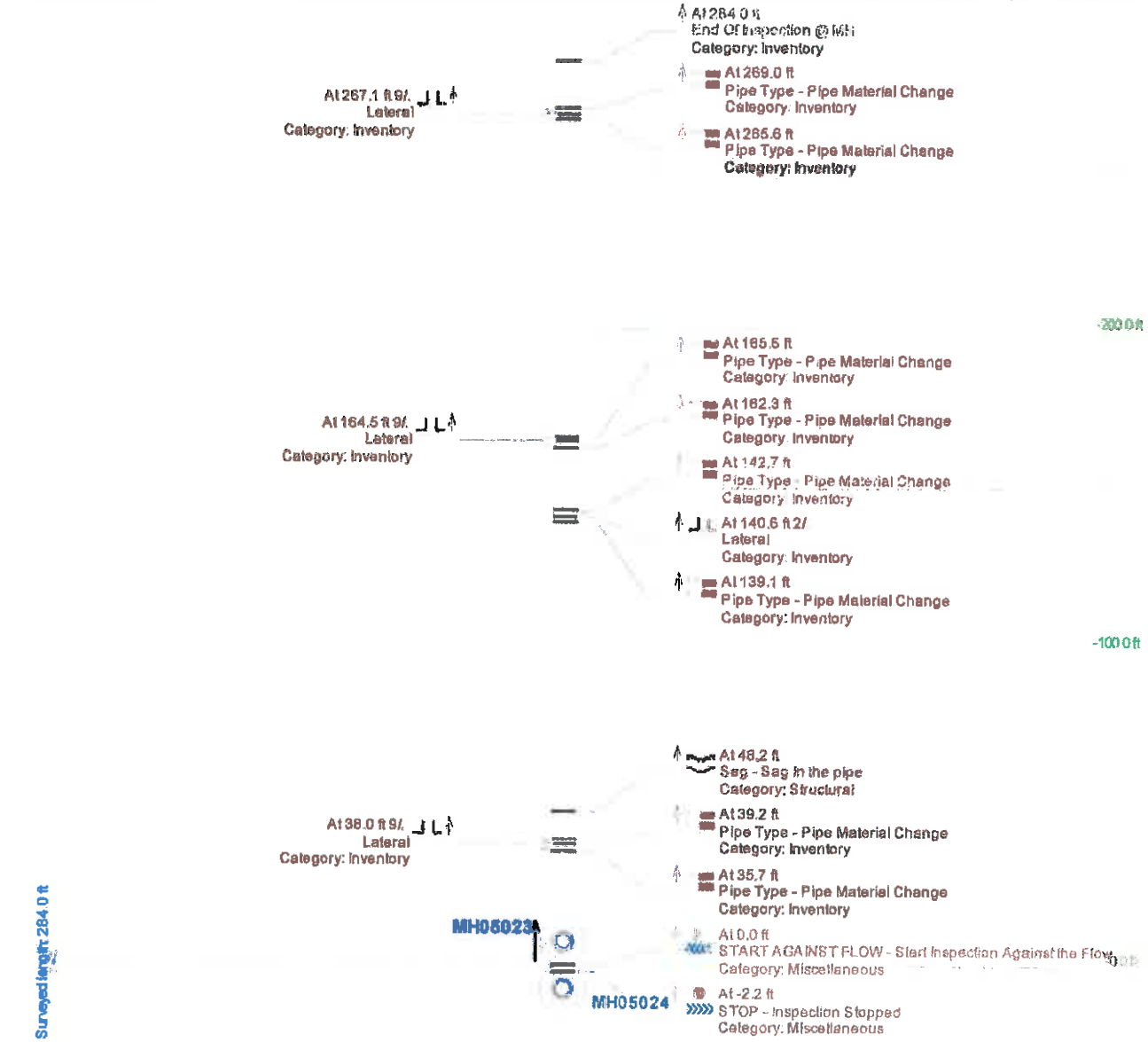
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/30/2019-1:11	Mahopac	Carey

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/30/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Upstream	284.0	Joe Kata	



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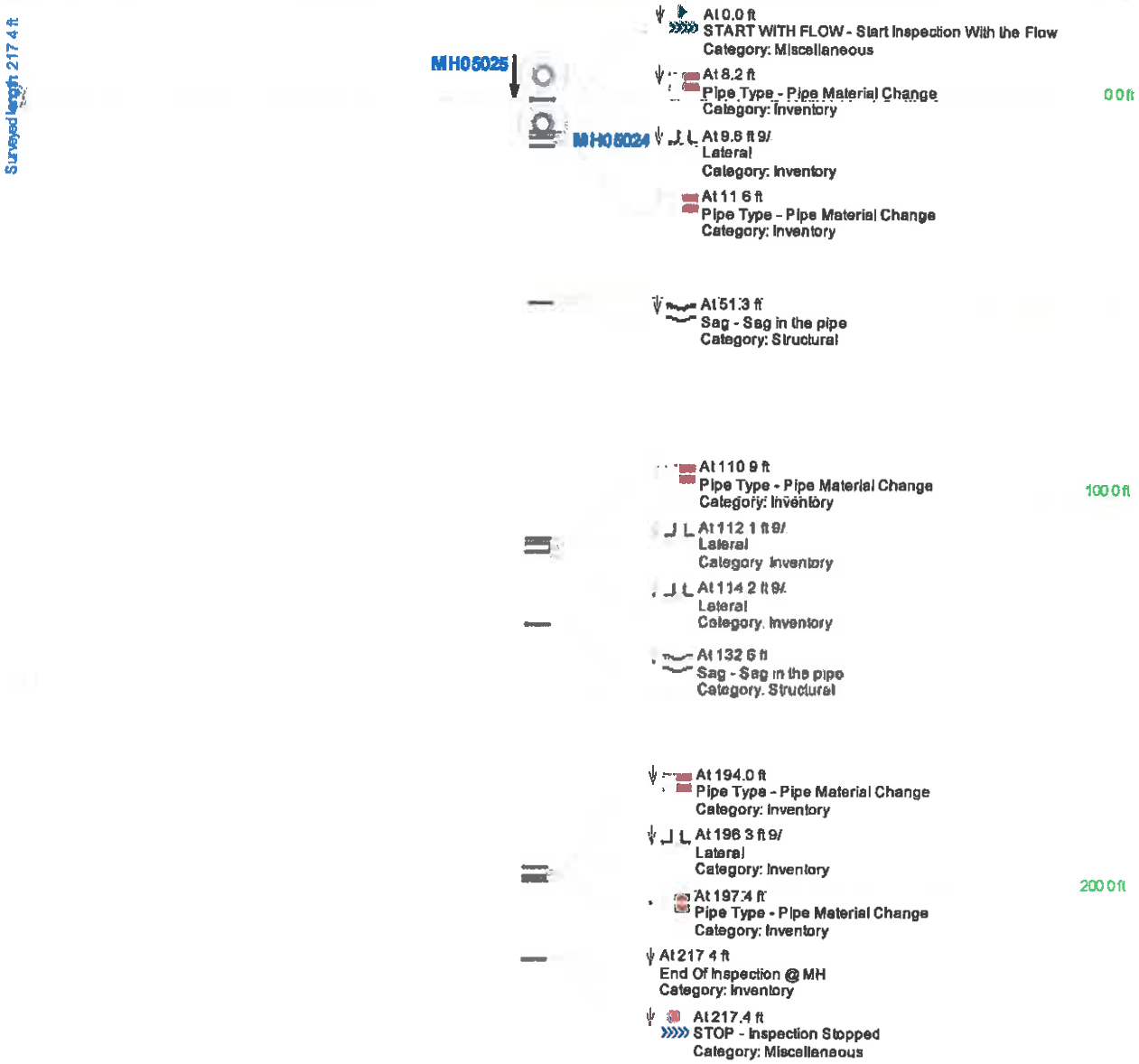
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/30/2019-1:55	Mahopac	Carey

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/30/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	217.4	Joe Kata	



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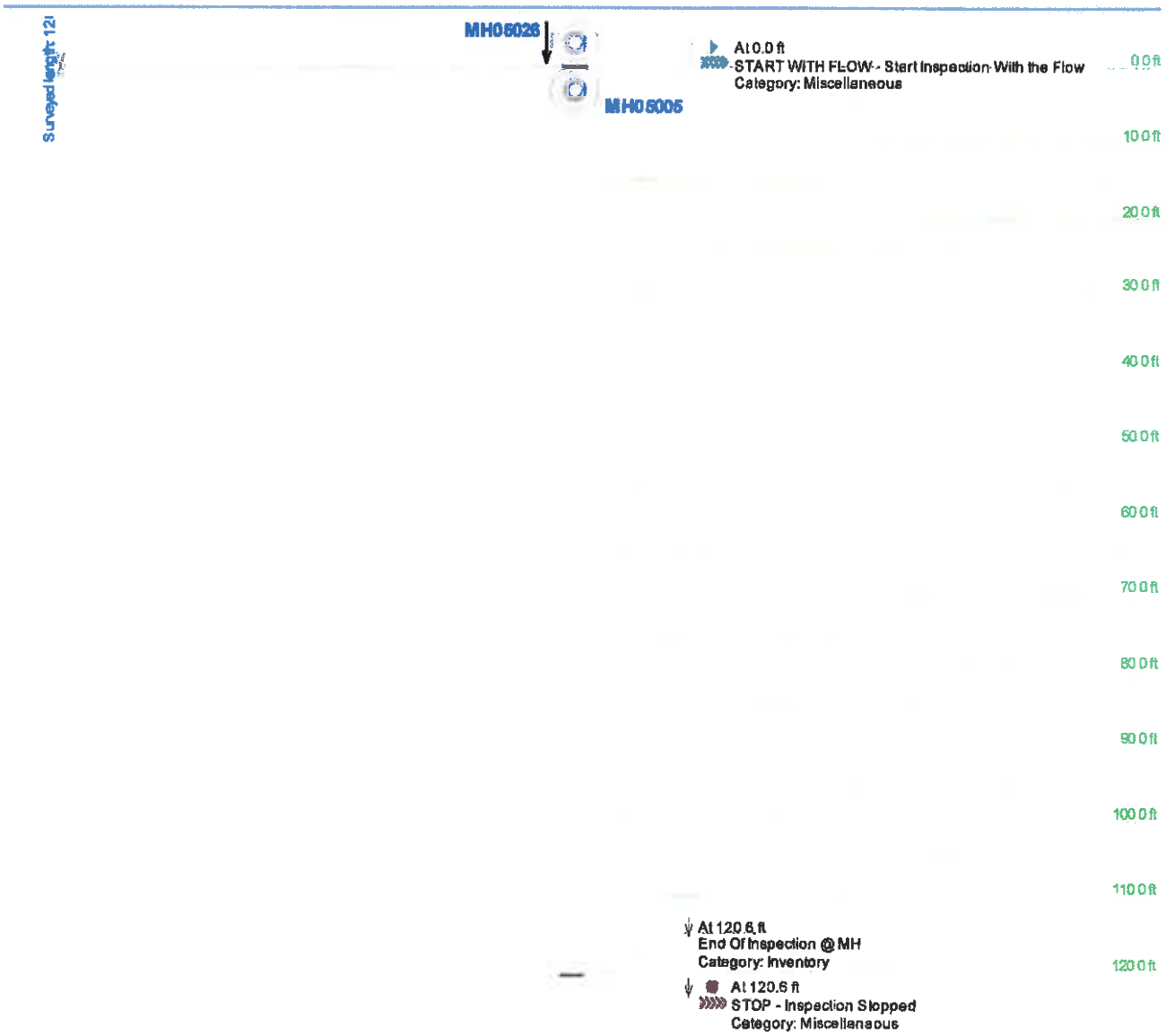
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/30/2019-2:37	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/30/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	120.6	Joe Kata	



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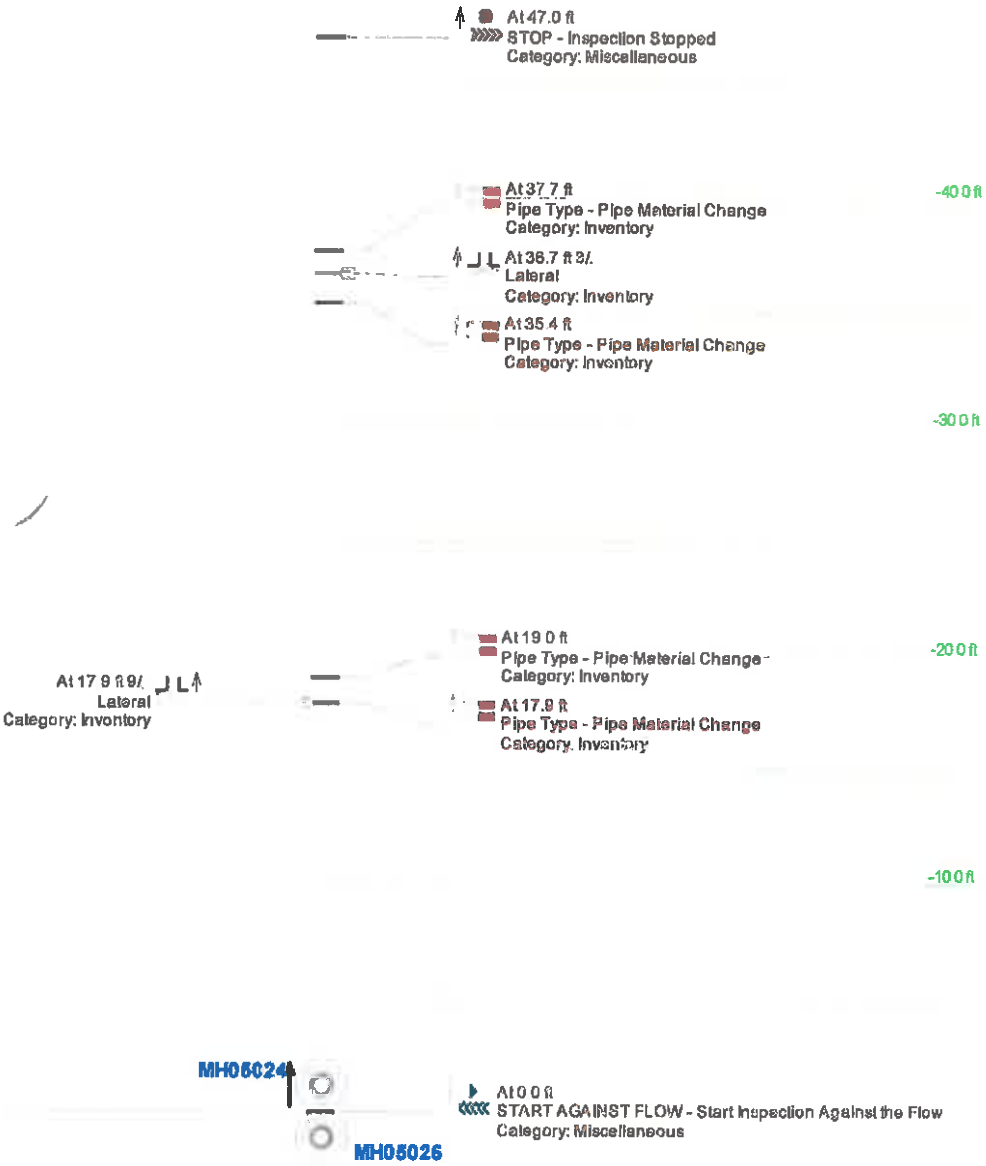
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/30/2019-2:46	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/30/2019		8	Plastic	Asphalt	Light Rain

Direction:	Surveyed footage:	Operator:	Comments
Towards Upstream	47.0	Joe Kata	



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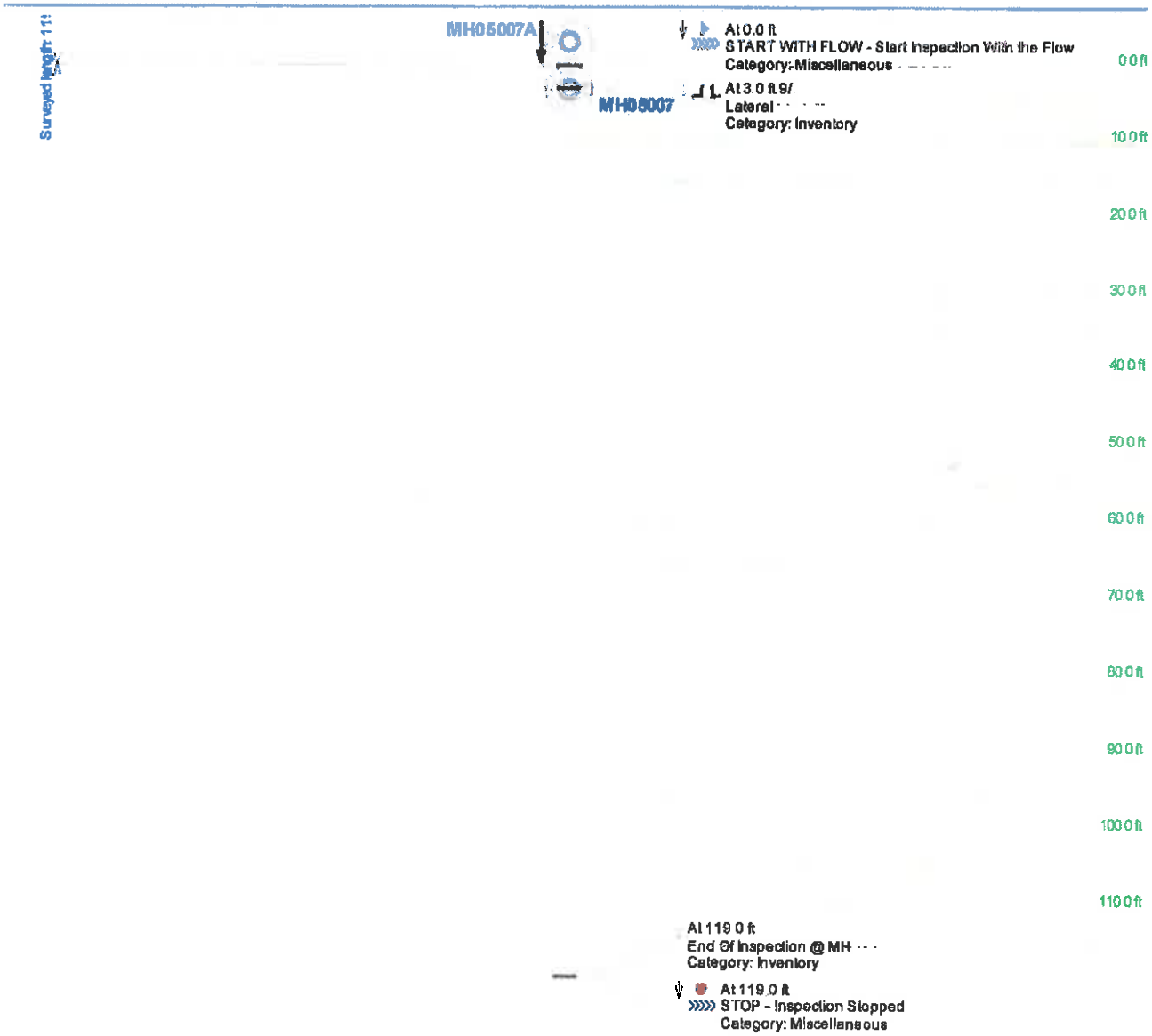
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/30/2019-2:59	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/30/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	119.0	Joe Kata	



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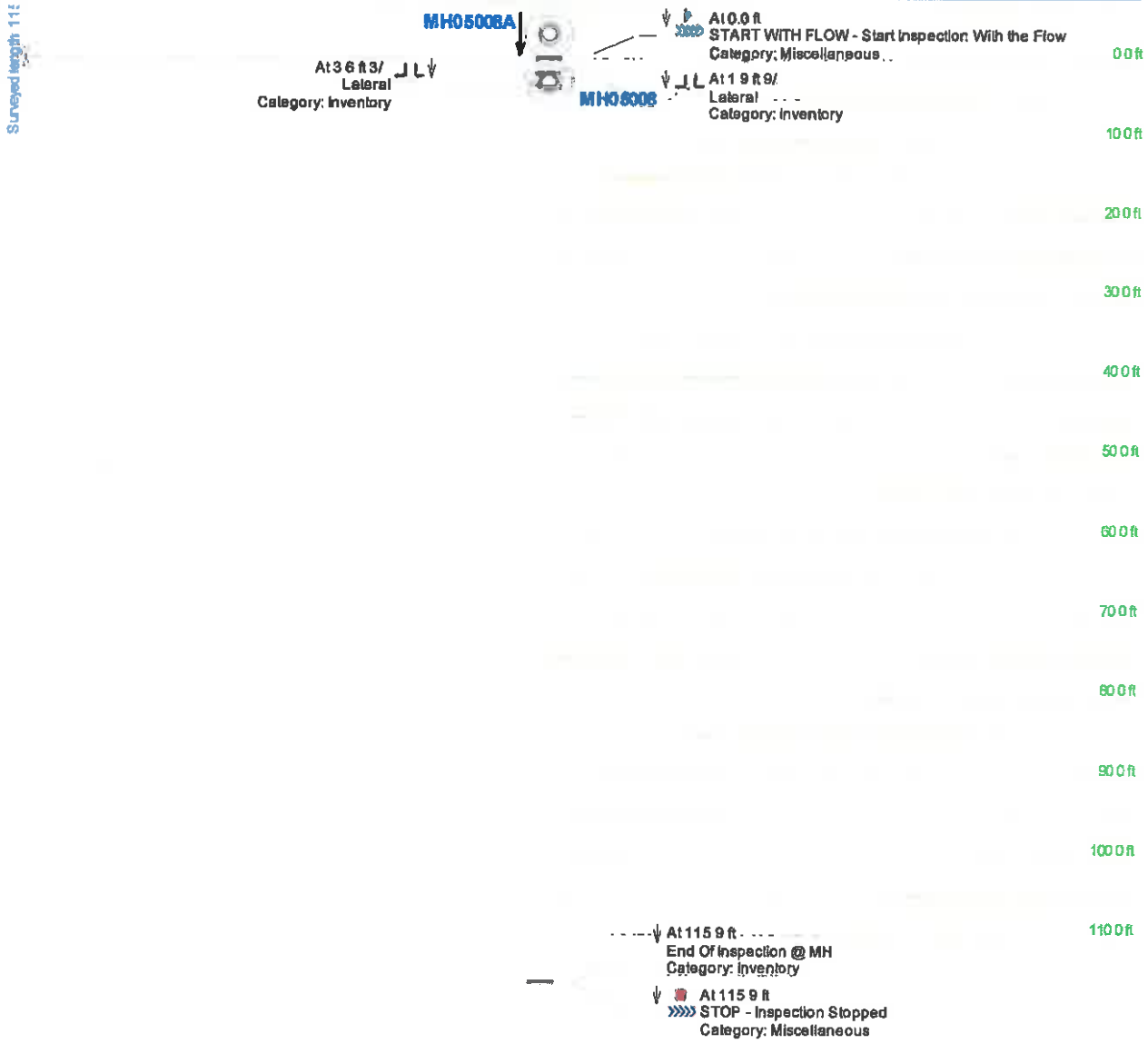
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-8:27	Mahopac	Carey

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Asphalt	Showers

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	115.9	Joe Kata	



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Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-8:45	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Upstream	0.0	Joe Kata	

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Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-8:47	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Asphalt	Showers

Direction:	Surveyed footage:	Operator:	Comments
Towards Upstream	153.6	Joe Kata	

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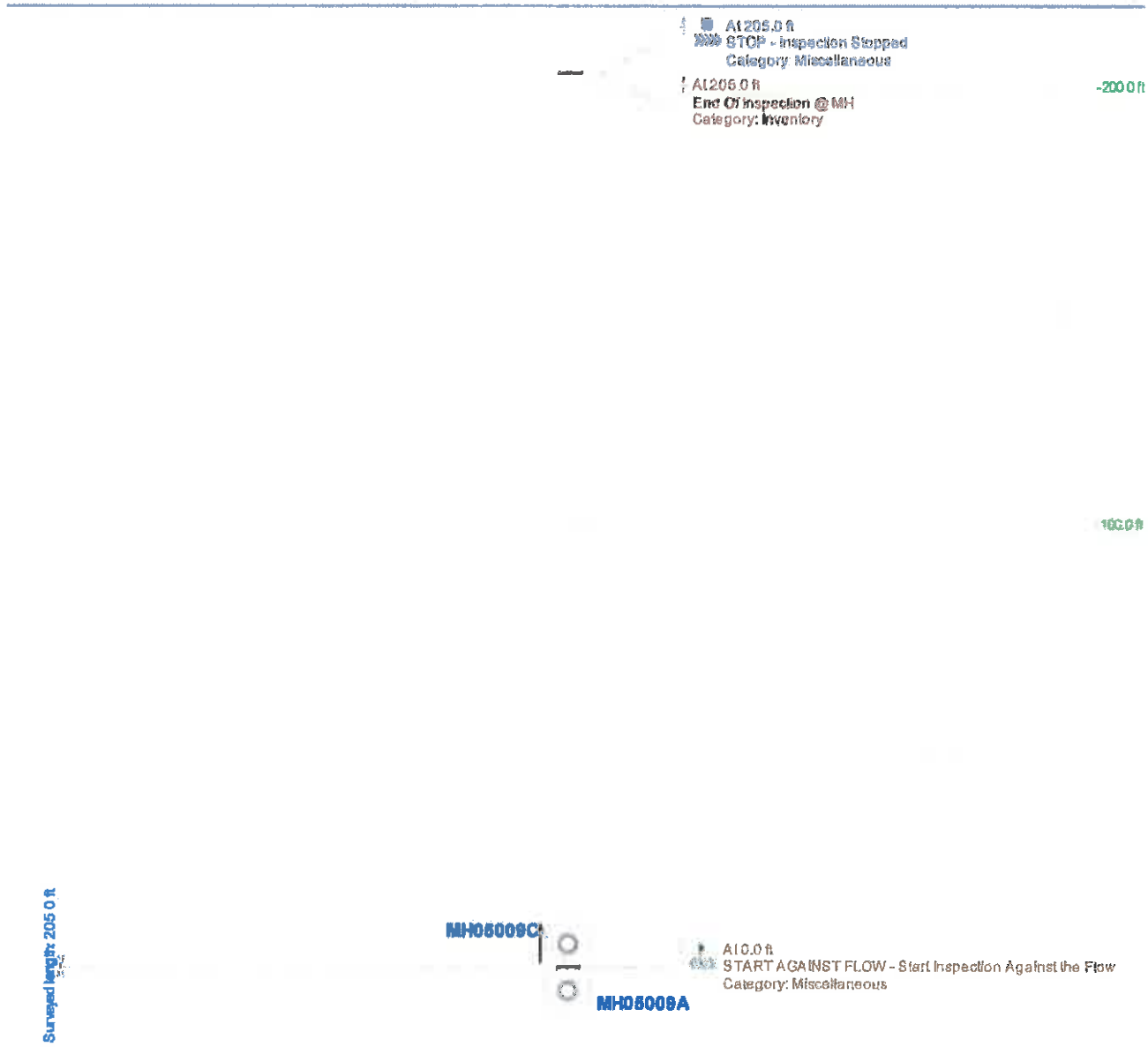
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-8:47	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Asphalt	Showers

Direction:	Surveyed footage:	Operator:	Comments
Towards Upstream	205.0	Joe Kata	



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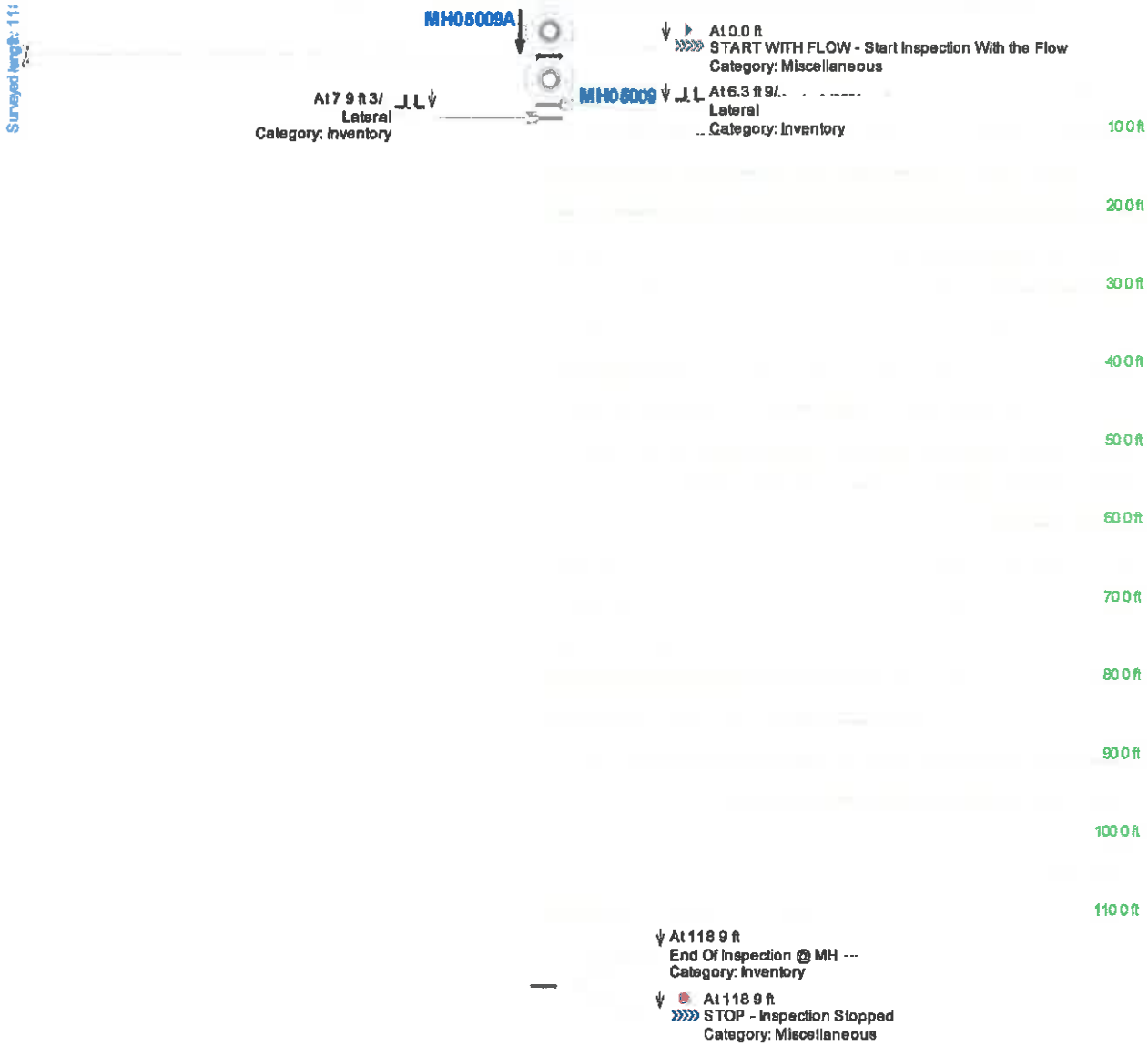
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-9:39	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Asphalt	Light Rain

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	118.9	Joe Kata	



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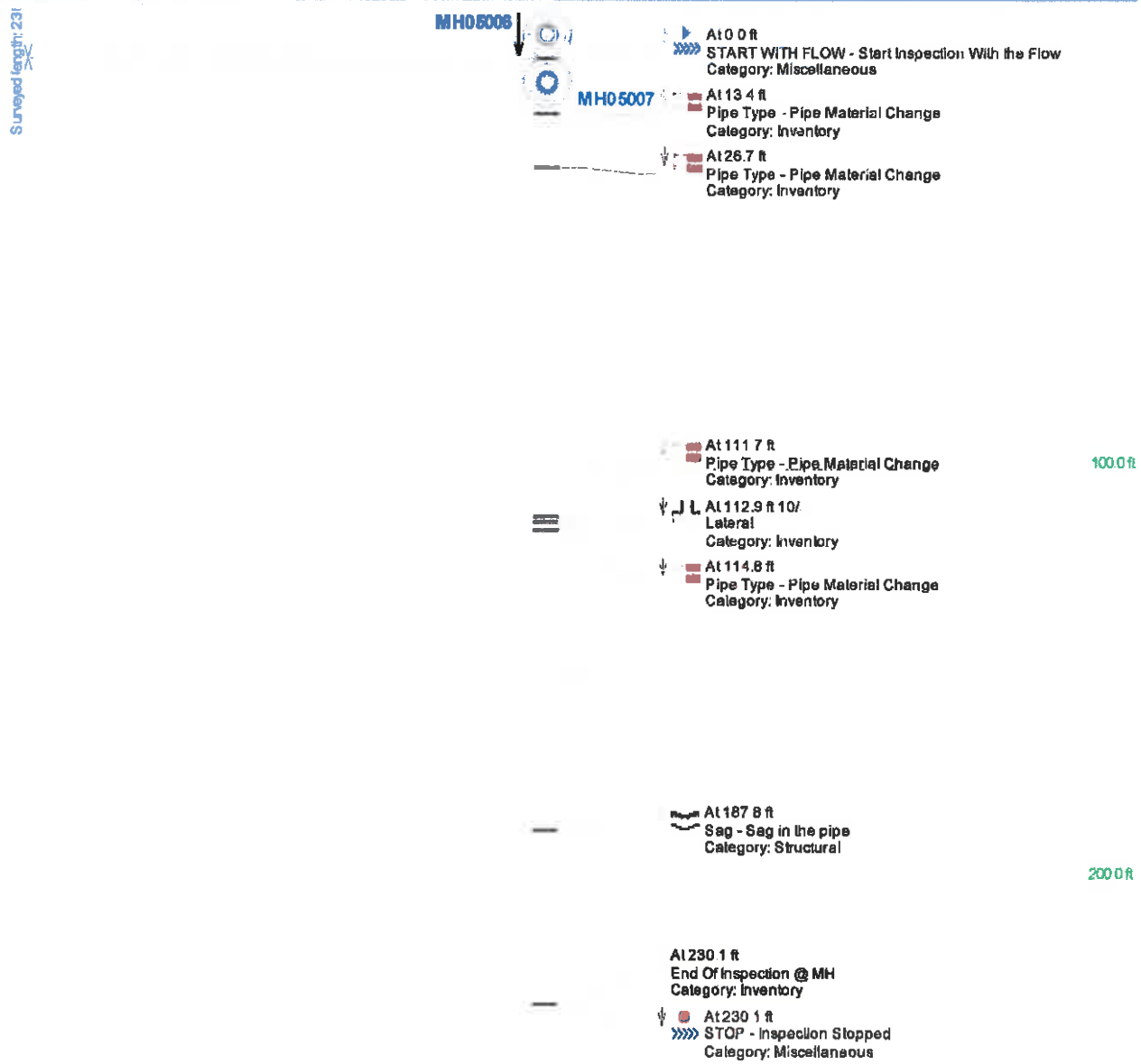
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-10:16	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Dirt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	230.1	Joe Kata	



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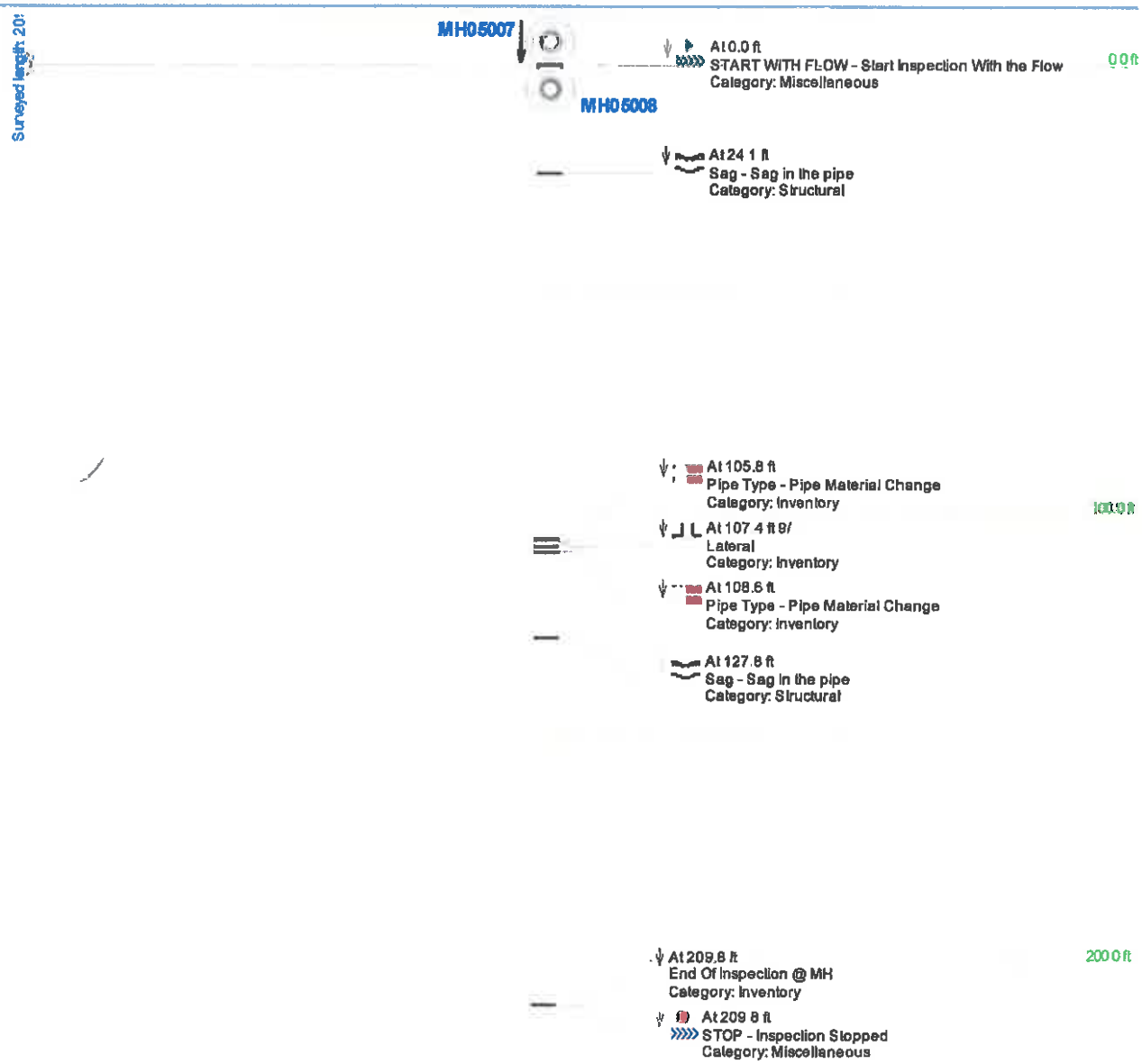
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-10:36	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Dirt	Light Rain

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	209.8	Joe Kata	



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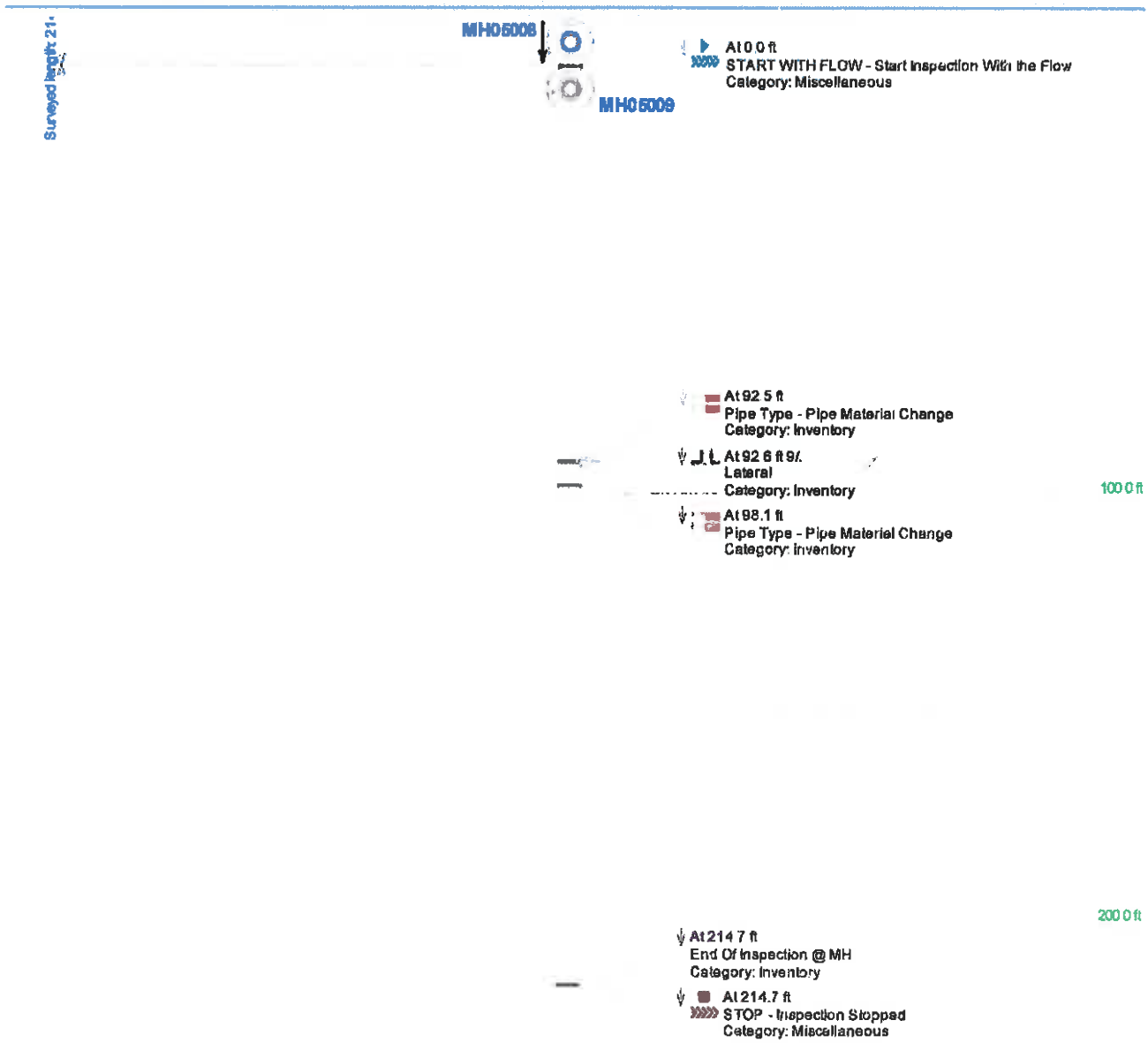
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-11:04	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Dirt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	214.7	Joe Kata	



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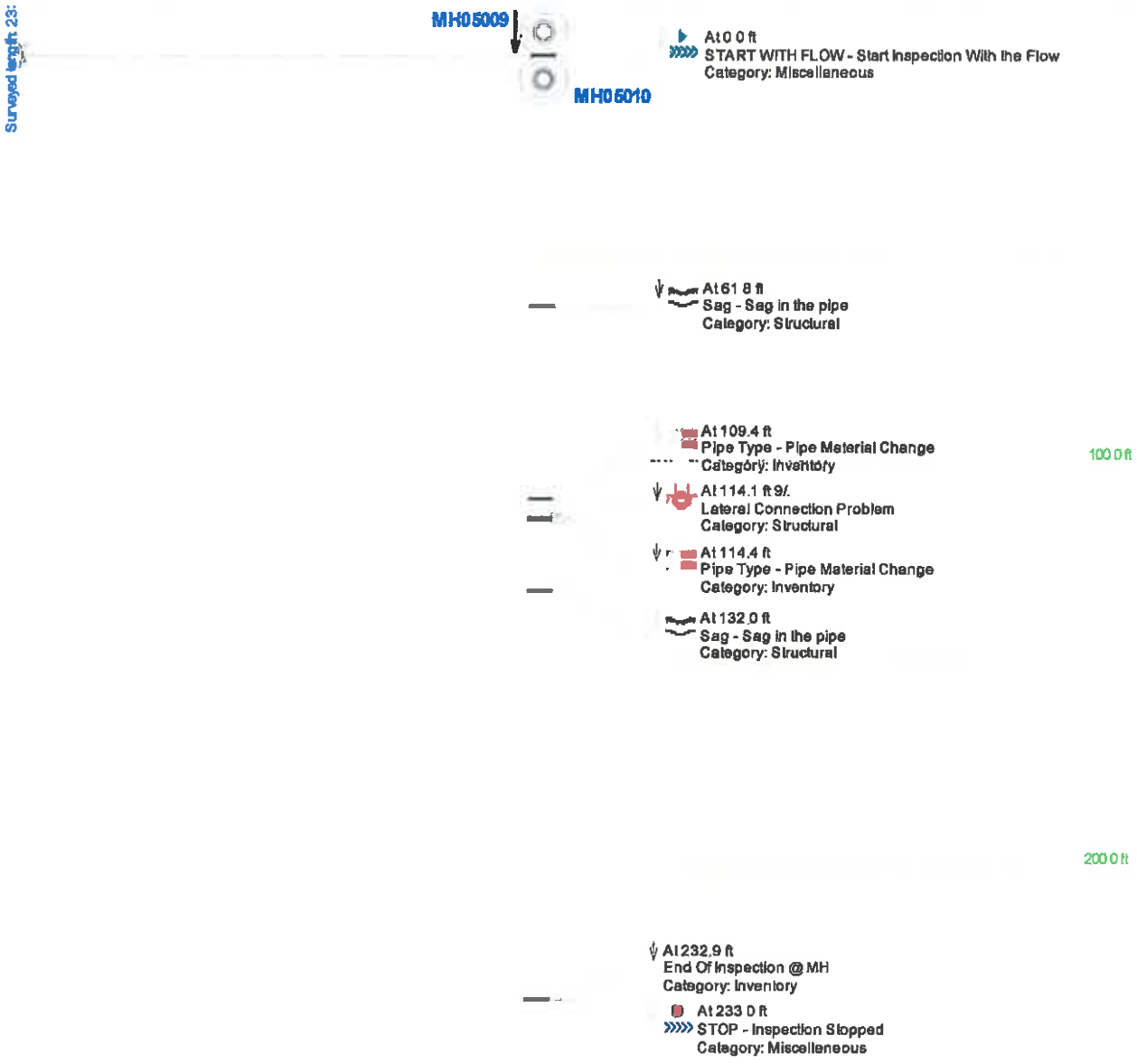
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-11:18	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Dirt	Showers

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	233.0	Joe Kata	



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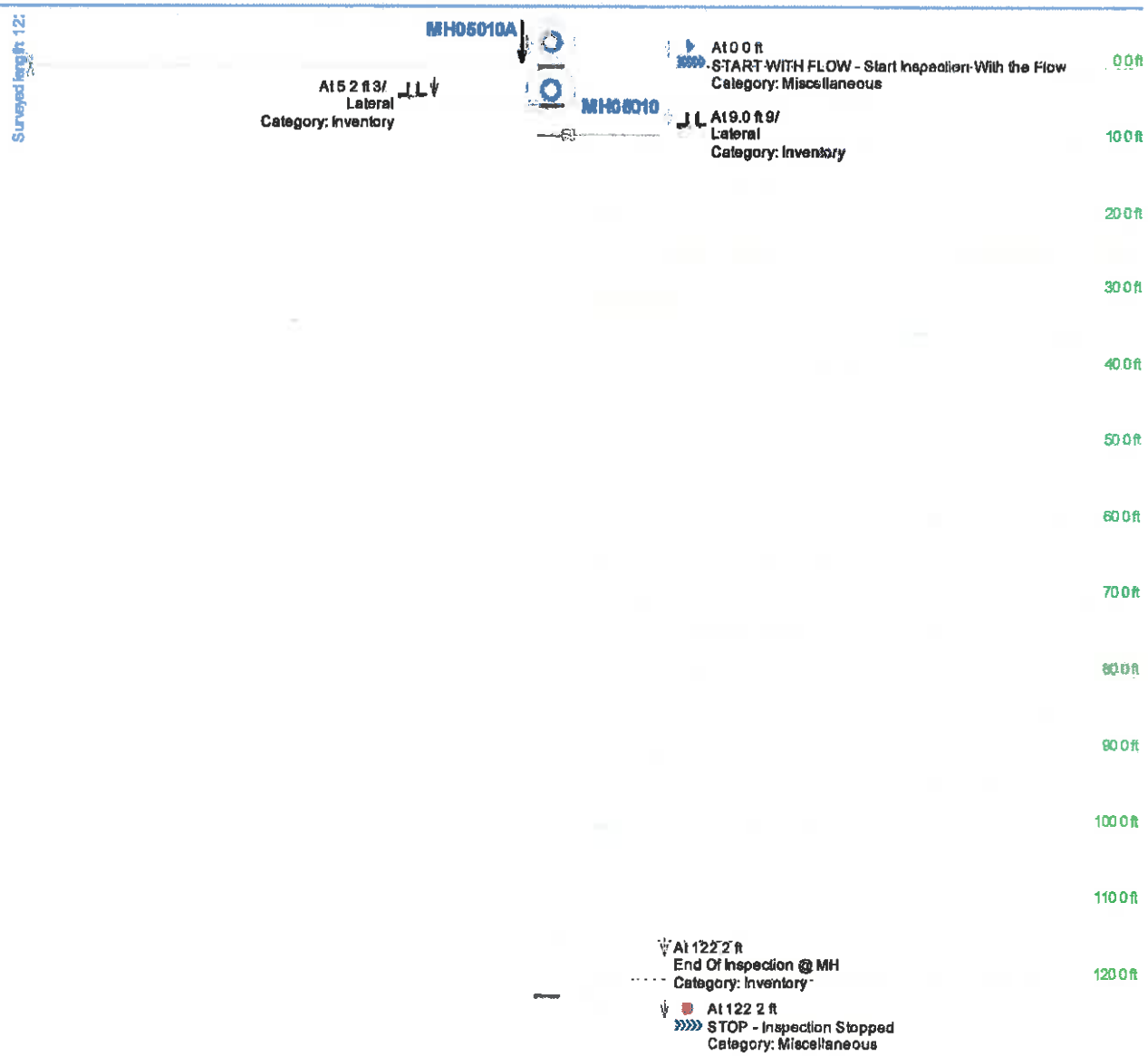
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-12:52	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Asphalt	Heavy Rain

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	122.2	Joe Kata	



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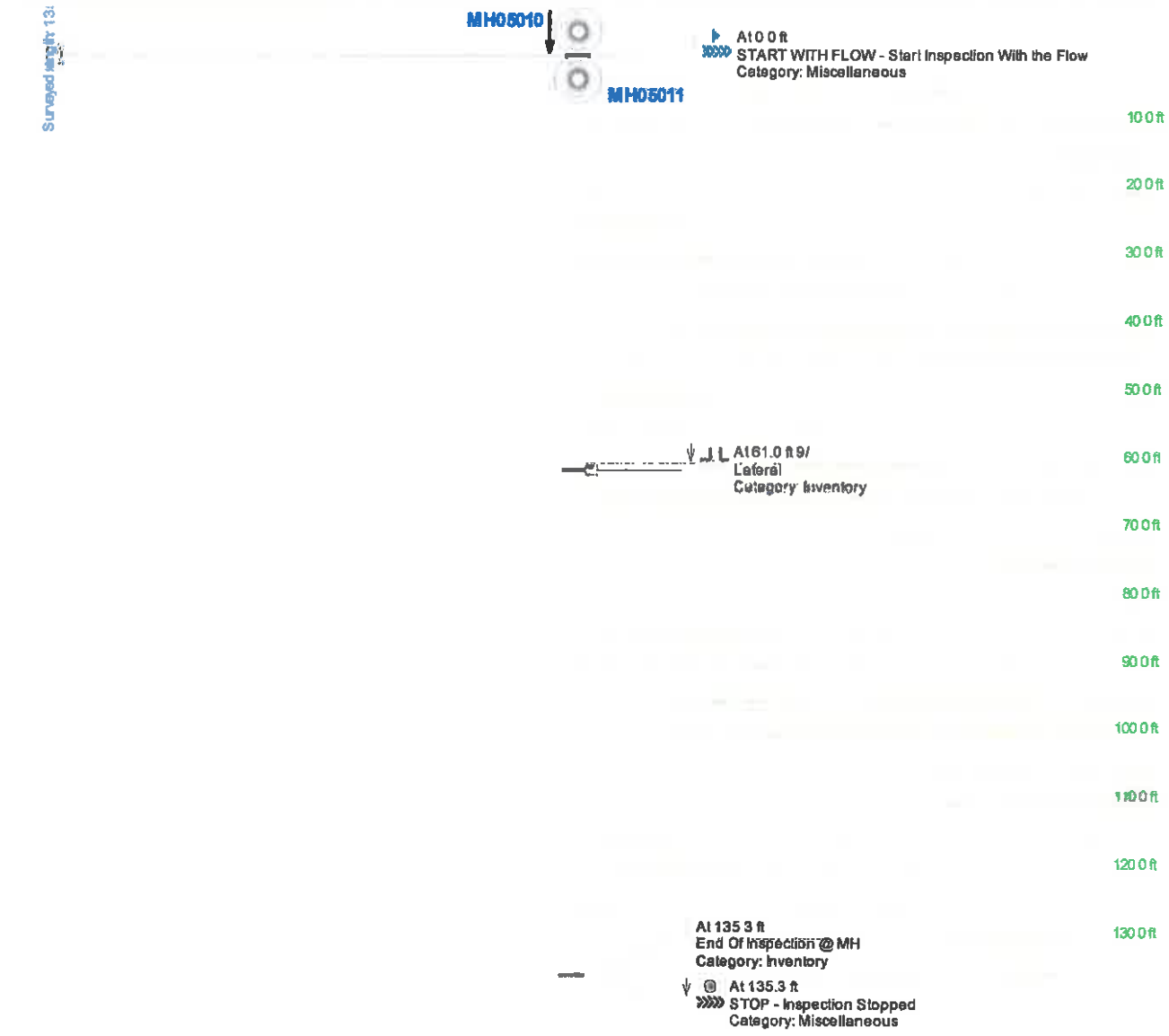
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-12:57	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	135.3	Joe Kata	



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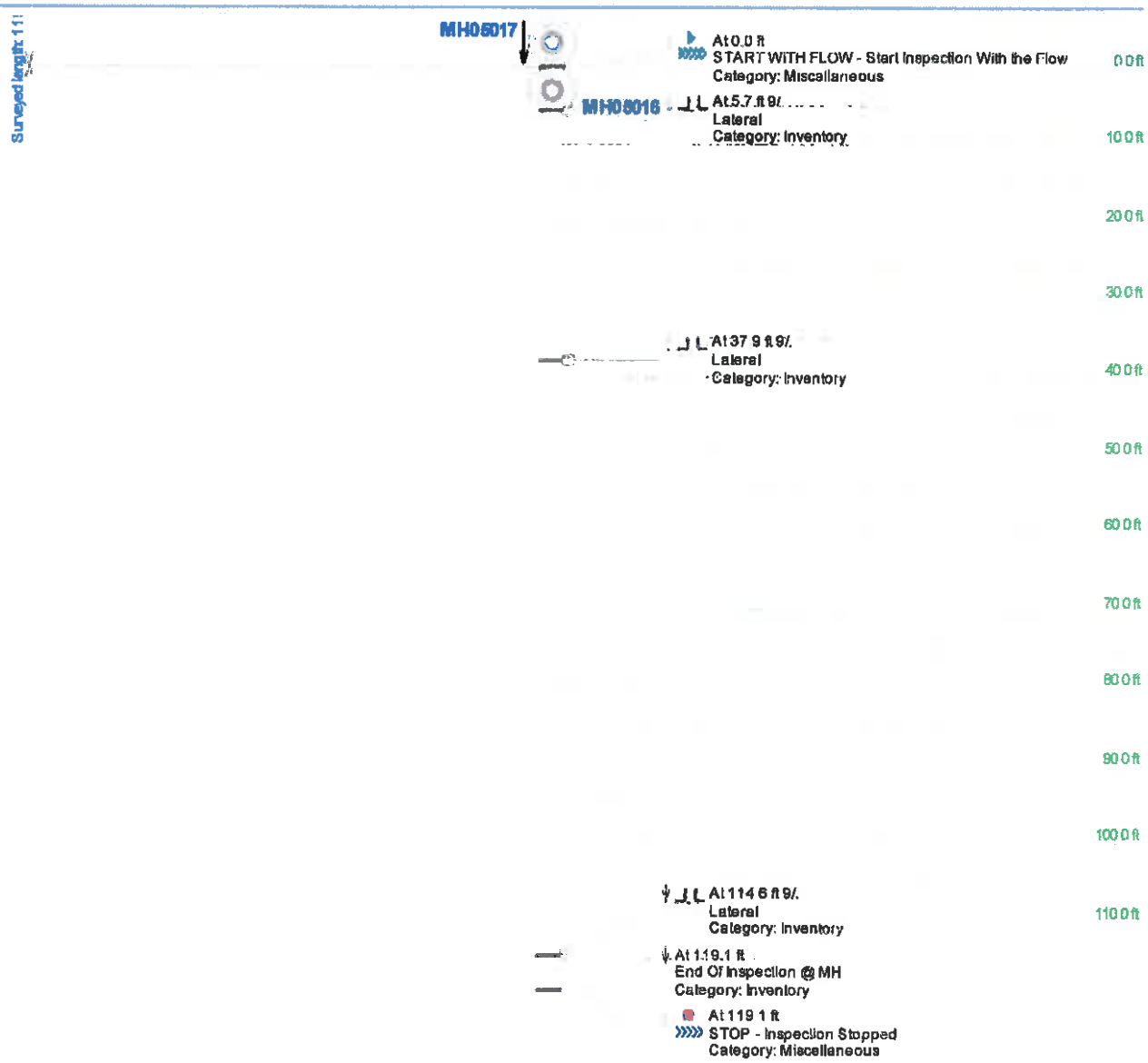
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-1:17	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Asphalt	Heavy Rain

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	119.1	Joe Kata	



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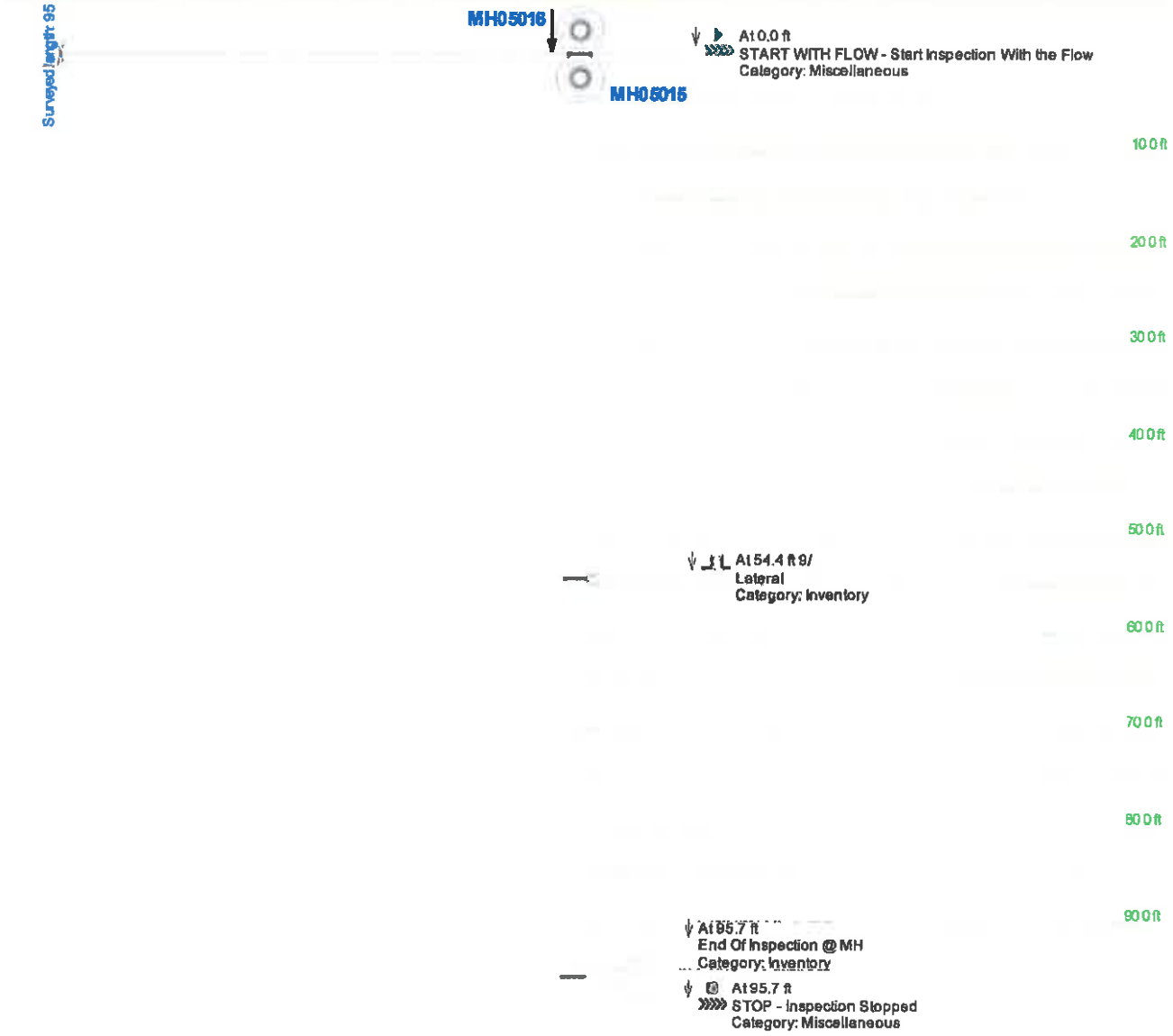
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-1:54	mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Asphalt	Light Rain

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	95.7	Joe Kata	



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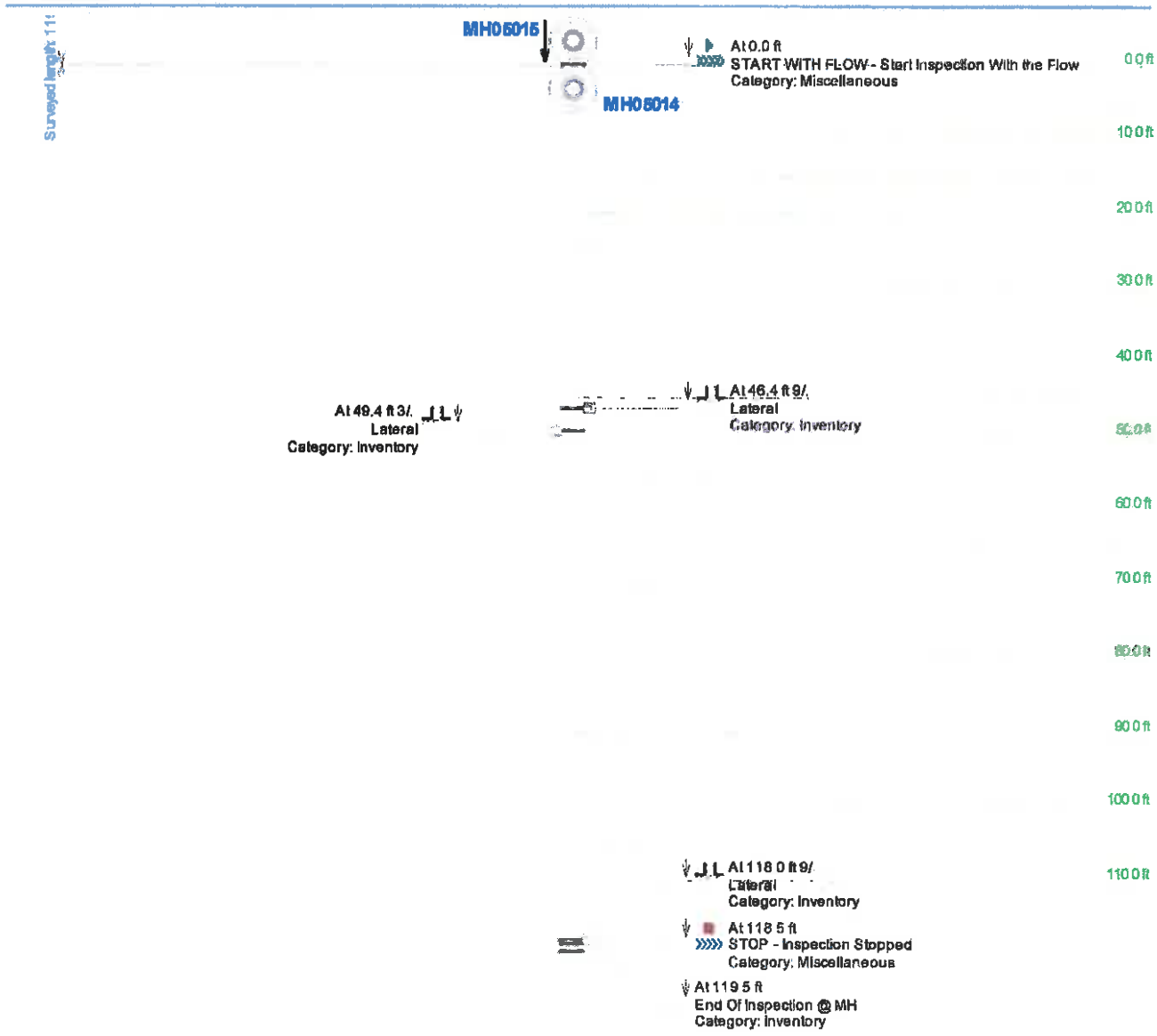
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-1:59	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Asphalt	Light Rain

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	119.5	Joe Kata	



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Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-2:35	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Asphalt	Light Rain

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	129.9	Joe Kata	

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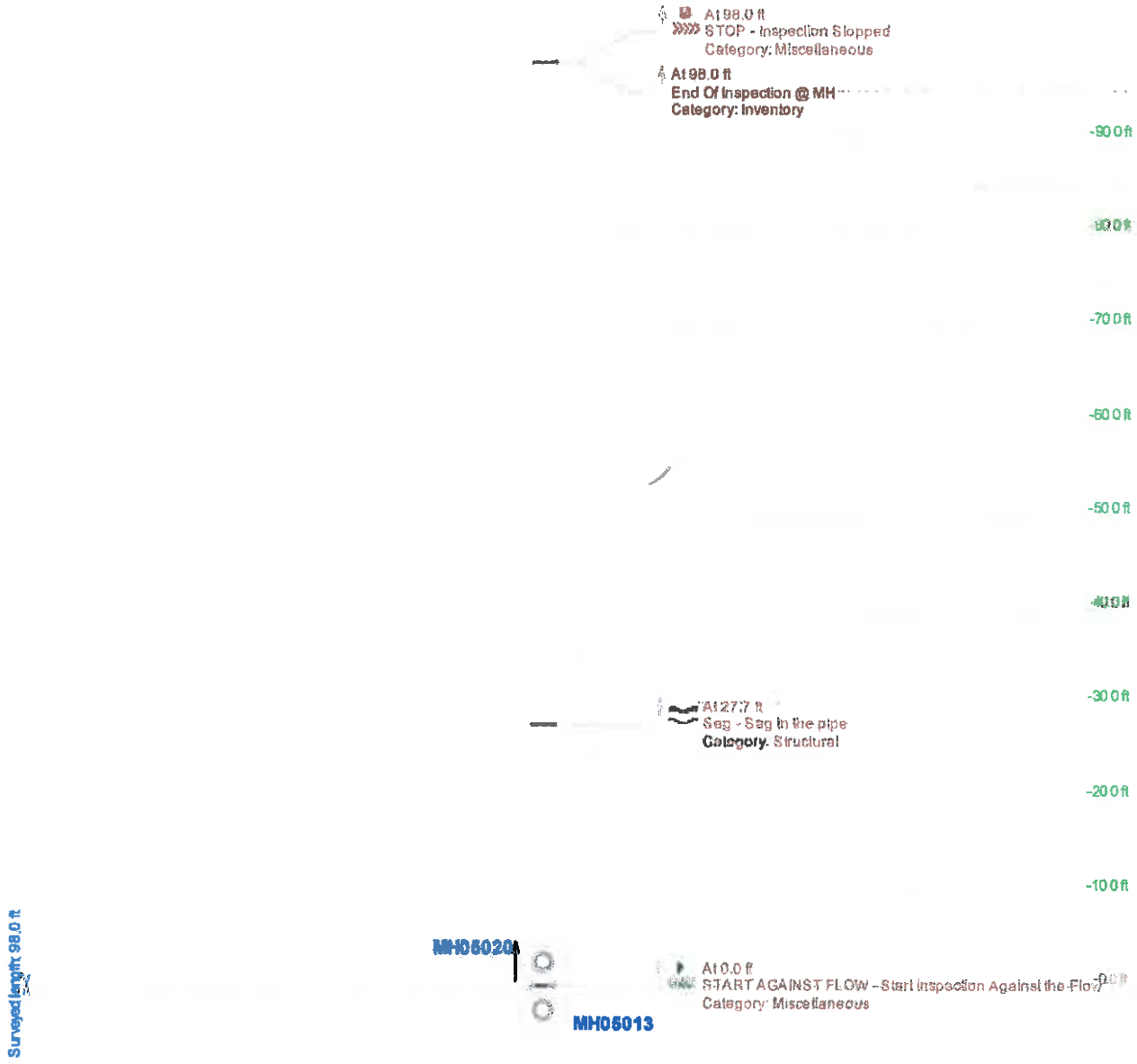
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-2:42	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Asphalt	Light Rain

Direction:	Surveyed footage:	Operator:	Comments
Towards Upstream	98.0	Joe Kata	



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Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/31/2019-3:00	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
10/31/2019		8	Plastic	Asphalt	Showers

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	179.7	Joe Kata	

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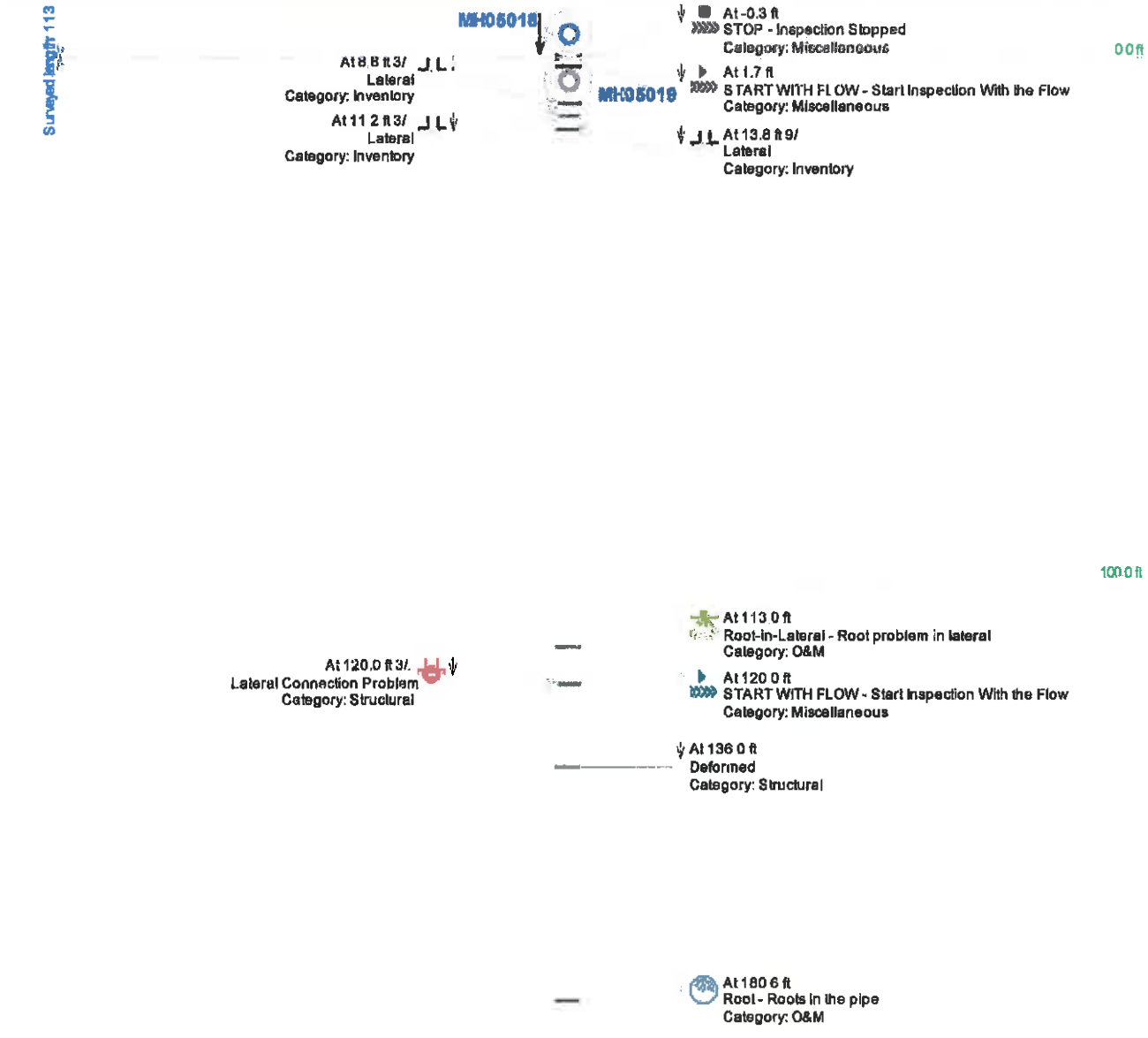
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	11/1/2019-8:35	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
11/1/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	113.0	Joe Kata	



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Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	11/1/2019-9:59	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
11/1/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Upstream	1.1	Joe Kata	

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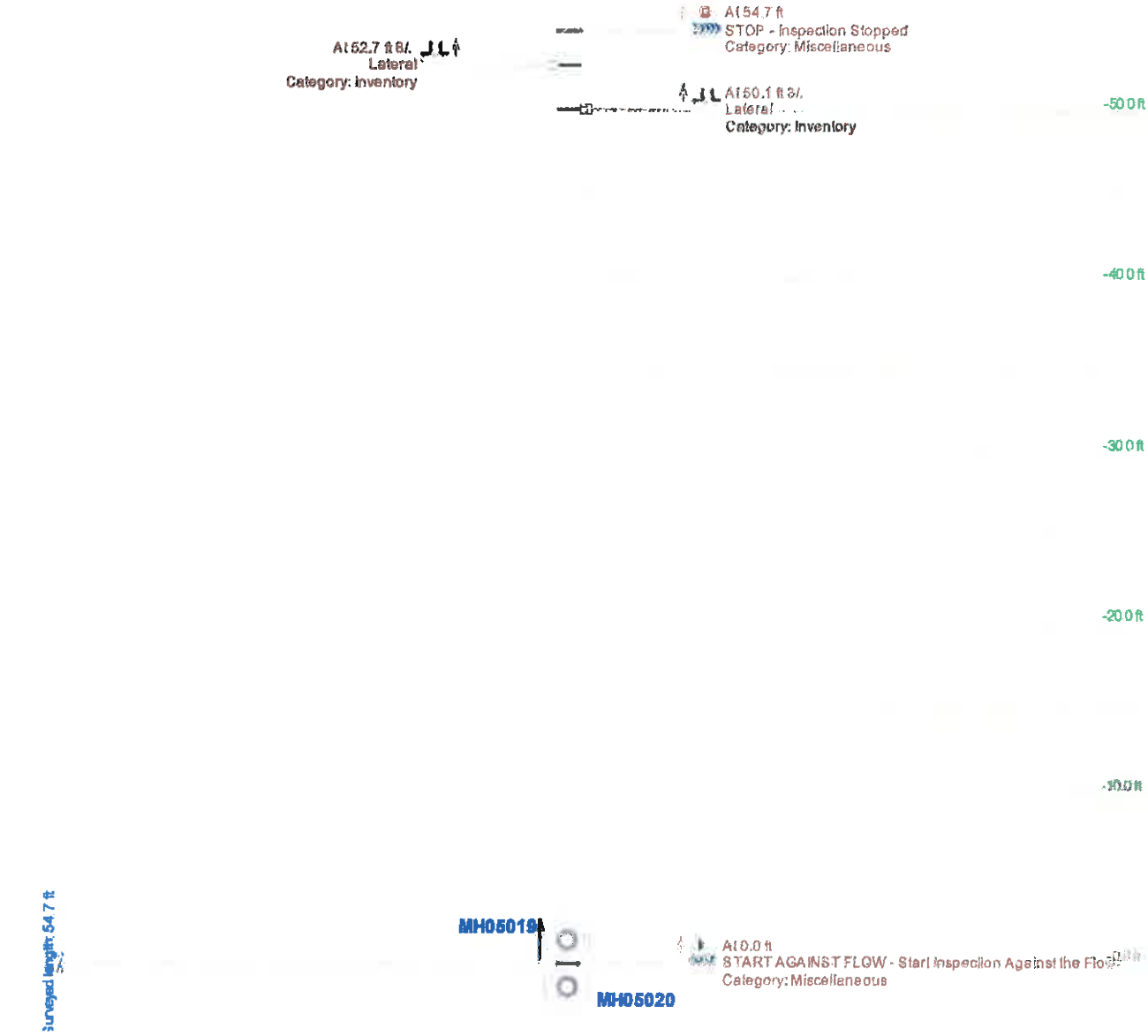
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	11/1/2019-9:59	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
11/1/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Upstream	54.7	Joe Kata	



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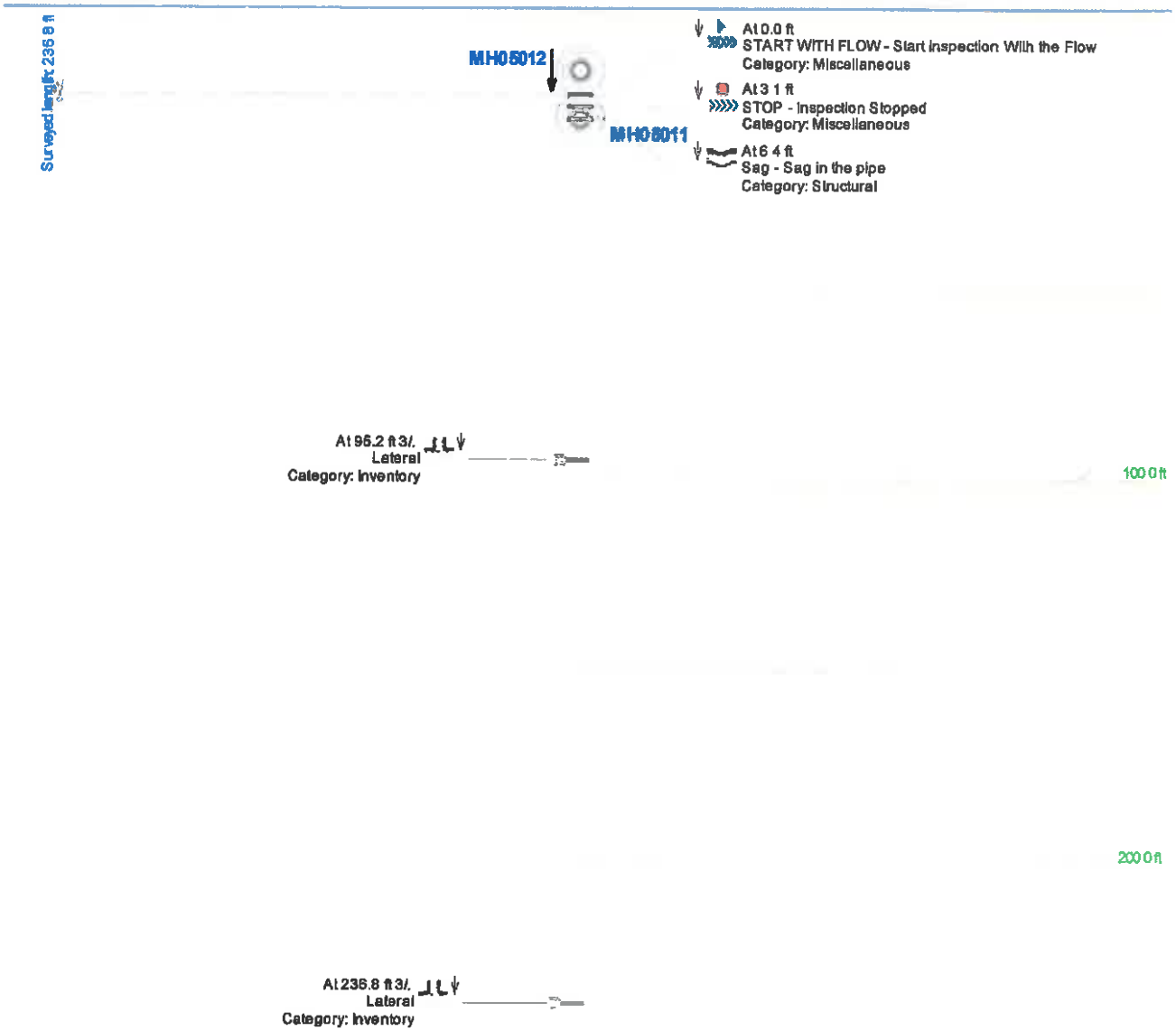
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	11/1/2019-10:51	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
11/1/2019		8	Plastic	Dirt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	236.8	Joe Kata	



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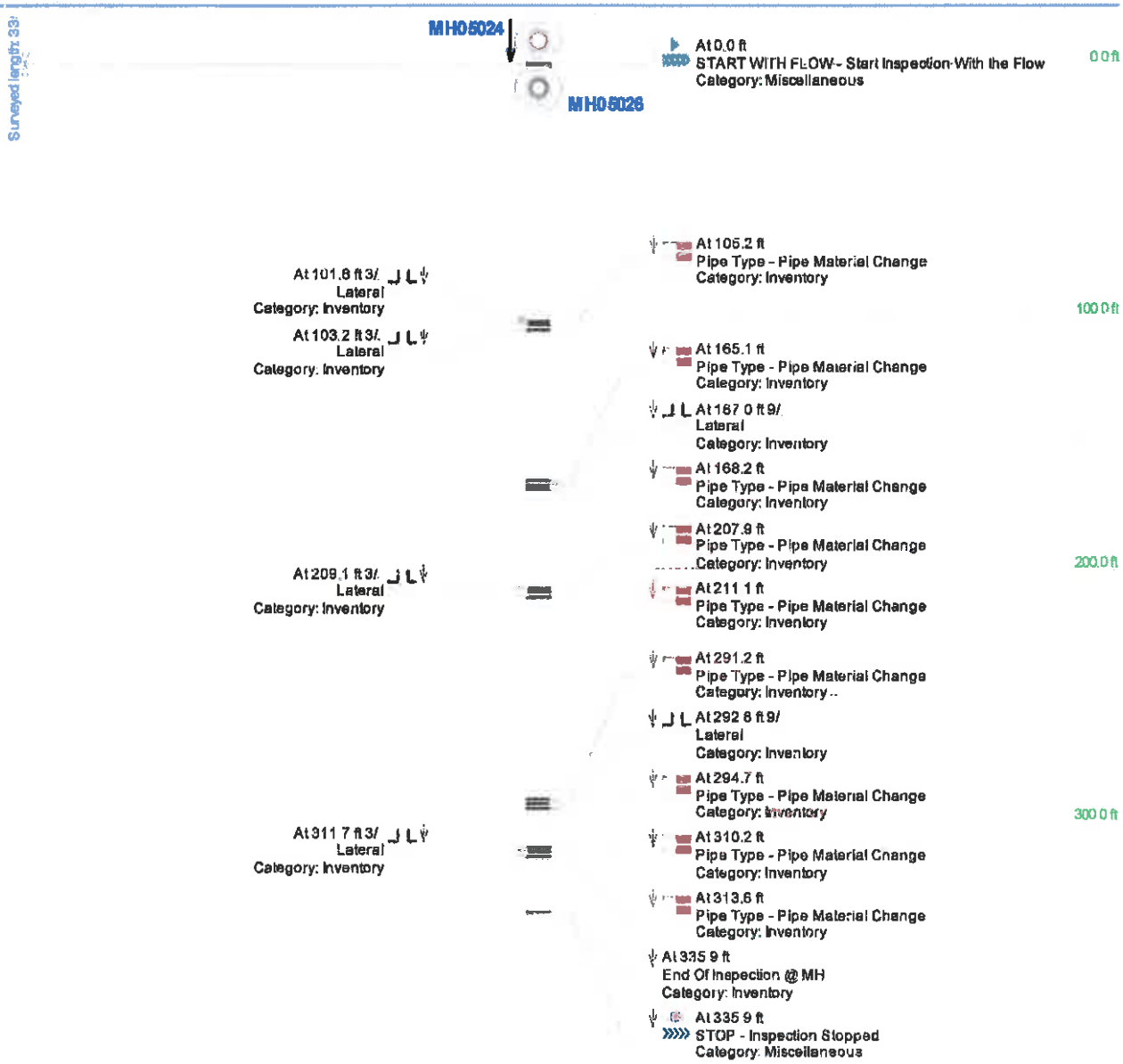
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	10/30/2019-2:46	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
11/1/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	335.9	Joe Kata	



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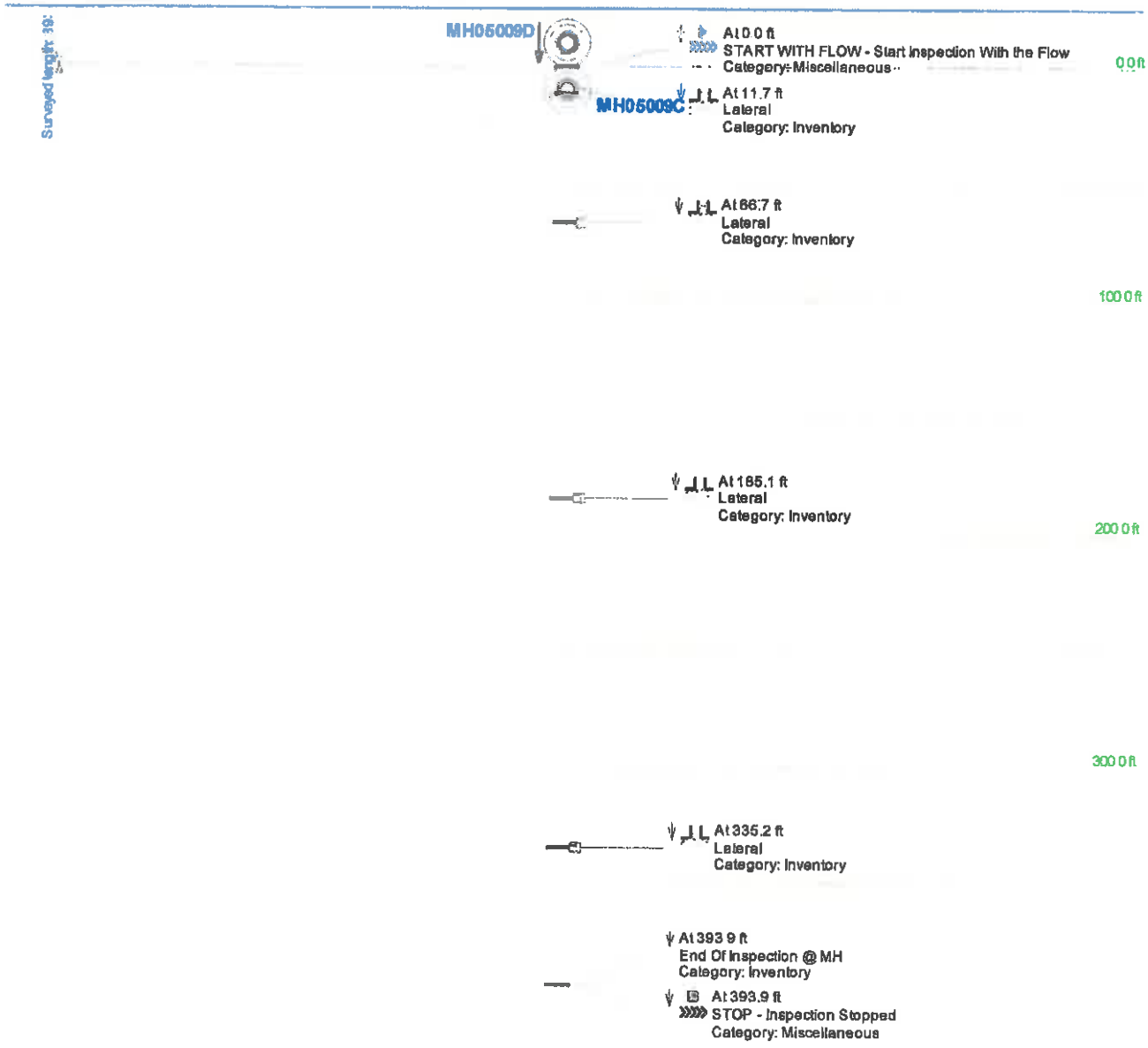
Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	11/1/2019-1:00	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
11/1/2019		8	Plastic	Asphalt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	393.9	Joe Kata	



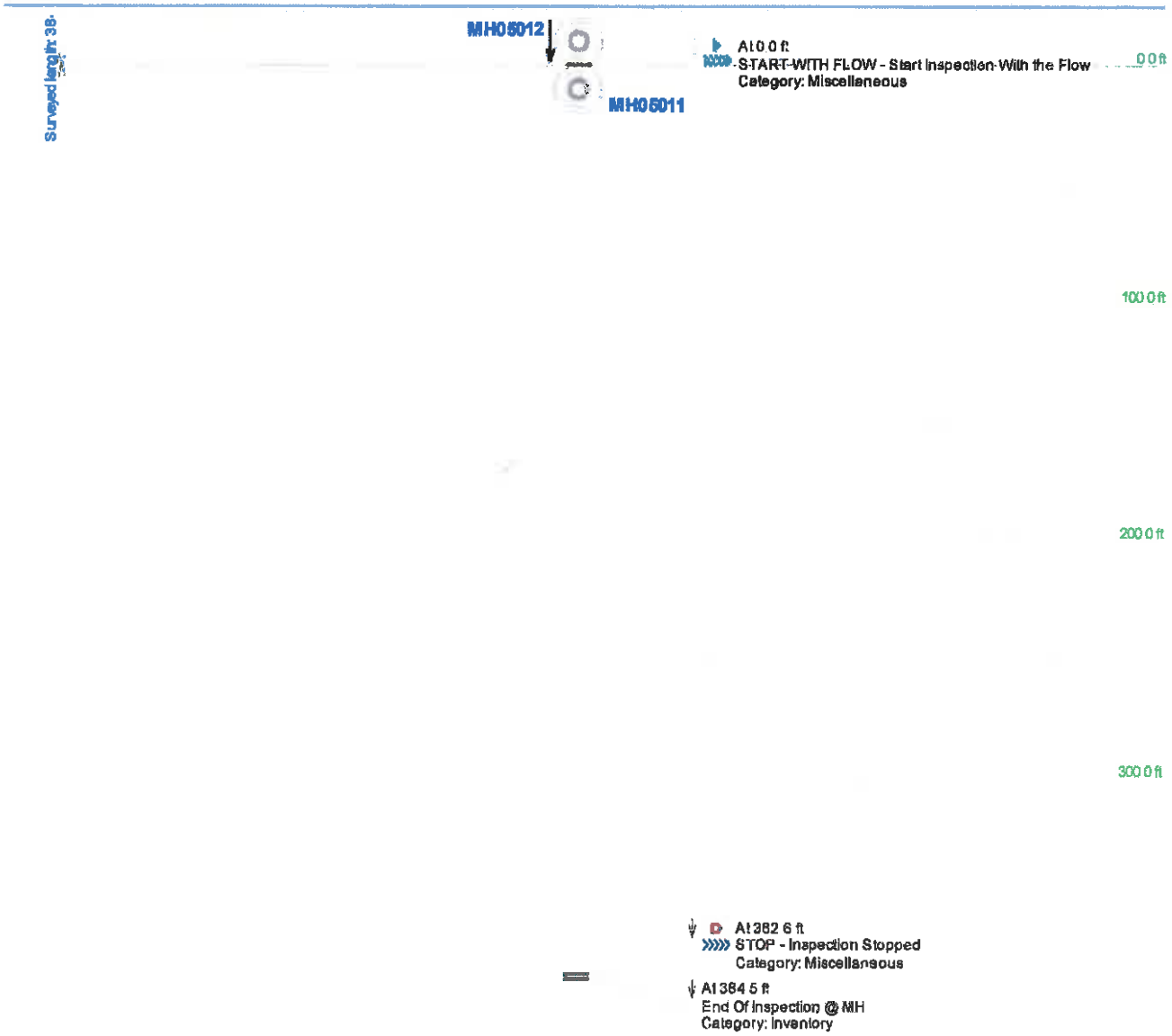
TAM ENTERPRISES INC.
114 HARTLEY ROAD
GOSHEN, N.Y. 10924
Phone 845-294-8882 , Fax 845-294-8883
E-MAIL:TONY@TAMENTINC.COM

Main Inspection with Pipe-Run Graph

Project Name:	Mainline ID:	City:	Address:
Mahopac 10/19	11/1/2019-10:51	Mahopac	

Start date/time:	Pipe width:	Pipe height:	Pipe type:	Surface condition:	Weather:
11/1/2019		8	Plastic	Dirt	Dry

Direction:	Surveyed footage:	Operator:	Comments
Towards Downstream	384.5	Joe Kata	



APPENDIX-I

Membrane Bio-Reactor Preliminary Manufacturer Layout and Process Calculations

APPENDIX I-1 Legacy Environmental Process, LLC
APPENDIX I-2 Pollution Control Systems, Inc.

APPENDIX I-1

Legacy Environmental Process, LLC

March 23, 2020

To: J. Robert Folchetti & Associates
31 Sodom Road
Brewster, New York 10509

Attn: J.E. Folchetti, P.E.

Project: Carmel Hillsdale Estates STP
Mahopic, New York 10541

Quote No.: 2020-2296 Rev.1

Legacy Environmental Process, LLC
45 Kelly Creek Drive
Odenville, Alabama
35120

In USA 1-205-640-1035
Fax: 1-205-640-1039

www.legacyenvpro.com

CONFIDENTIAL PROPOSAL

We are pleased to propose one (1) Legacy Environmental Process model LEP-27.2M24-SUSH prefabricated 304 stainless steel extended aeration/complete mix activated sludge wastewater treatment system as manufactured by Legacy Environmental Process, LLC, Odenville, Alabama. This proposal has been prepared based on request for quotation, SPDES discharge permit No. NY 003 0678 dated April 29, 2009, the wastewater treatment system will have a design flow of up to 27,200 gallons per day of domestic wastewater and will include all necessary vessels, internal piping, weirs, baffles, fabricated from 304 stainless steel and items of equipment as indicated below:

March 23, 2020

Basis of Design

Average Daily Flow Rate:	27,200 (GPD)
Peak Daily Flow Rate:	68,000 (GPD)

Parameters	Unit	Influent	Projected Effluent
BOD_5:	(mg/L)	240	≤ 30 mg/L
TSS:	(mg/L)	240	≤ 30 mg/L
TKN:	(mg/L)	40	N/A
Ammonia-N:	(mg/L)	25	≤ 3 mg/L
Phosphorus-P	(mg/L)	8	N/A

Scope of Supply

Primary Screening Devices

One (1) 6 inch diameter 150# inlet flange
One (1) Manual bar screen, inclined with drying rack, integral with the flow equalization chamber

Flow Equalization Chamber

One (1) 6,800 gallon aerated flow equalization chamber
One (1) Flow proportioning box, with overflow weirs and outlet trough with v-notch weir
Two (2) Submersible grinder pumps, Zoeller model 7011, powered by 2 hp, 230/480 volt, 60 Hz, 3 phase motors, rated at 30 gpm @ 15' TDH, mounted on slide rail assemblies
Five (5) Liquid Level Sensors, float control, Certified Labs model #PK30NOW20
One (1) Flow EQ blower motor unit, model BM-20-R22-5, with the capacity of 20 SCFM @ 5 psig, 3174 RPM, 81 dBa, Fiberglass mounting base with housing, Roots Blower model URAI-22, Motor, ODP 1 HP, 230/480 Volt, 3 Phase, Inlet filter silencer with paper element, Techno check valve, 1" NPT, spring loaded, 15' liquid tight conduit with wiring, Items shipped loose for field installation: Vibration mounts, Flexible hose connection with clamps, 1"
One (1) Coarse bubble diffused aeration system designed for 14 scfm
One (1) Pressure relief valve, spring loaded, 1" NPT and pressure gage, 0-15 PSIG, ¼" NPT mounted in air manifold

Sludge Holding Chamber / Aerobic Digester

One (1) 2,720 gallon sludge chamber, integral to the aeration tank, aerated with air from the main blowers
One (1) 2 inch diameter supernatant decant airlift assembly
One (1) Coarse bubble diffused aeration system designed for 11 scfm

Aeration Chamber

One (1)	27,200 gallon aeration chamber
Two (2)	Main Aeration blower motor units, model BM-150-R33-5, each with the capacity of 150 SCFM @ 5 psig, 3174 RPM, 81 dBa, Fiberglass mounting base with housing, Roots Blower model URAI-33, Motor, ODP 5 HP, 230/480 Volt, 3 Phase, Inlet filter silencer with paper element, Techno check valve, 1" NPT, spring loaded, 15' liquid tight conduit with wiring, Items shipped loose for field installation: Vibration mounts, Flexible hose connection with clamps, 2"
One (1)	Coarse bubble diffused aeration system designed for 109 scfm
One (1)	Pressure relief valve, spring loaded, 2" NPT and pressure gage, 0-15 PSIG, ¼" NPT mounted in air manifold
One (1)	Treatment Plant control panel, mounted in NEMA 4X Fiberglass (30x24x12), 12" Steel leg kit, 230/480 Volt, 3 Phase 60 Hz., Two (2) EQ pumps, One (1) EQ Blower, two (2) main aeration blower units Main circuit breaker, with interlocking door handle, Individual circuit breakers, Starters with 3 leg overload protection, IEC rated, 120 Volt control transformer with circuit breaker protection, Level control system, Motor overtemp indicator lights, door mounted, Seal fail indicator lights, door mounted, Run indicating lights, door mounted, Hand-Off-Auto selector switches, door mounted, Run indicator lights, door mounted, Elapsed time meters, door mounted, Alternator, with lead/lag selector switch, door mounted, Enclosure mounted alarm light for high-level alarm, Alarm horn with silence button, Alarm/Telemetry dry contact and relays, Terminals for field connections, UL508A Listed

Clarifier

One (1)	4,533 gallon dual hopper bottom gravity clarifiers
Two (2)	3 inch diameter airlift sludge return pumps and piping
Two (2)	2 inch diameter airlift scum return pumps and piping
One (1)	Clarifier outlet trough, equipped with adjustable v-notched weir plates
One (1)	6 inch diameter 150# outlet flange

Service Walkway

One (1)	Lot of grating to cover 3' walkway down the length of the tank and service areas, 18 gauge galvanized, non-skid, approximately 344 ft^2.
One (1)	Lot of aluminum schedule 40 pipe handrail 2 rail with kick-plate, to enclose grating, approximately 151 linear ft.
One (1)	45 degree access stairway with checker-plate stair treads, and aluminum handrail

Notes, Clarifications & Exceptions

1. All Items below are EXCLUDED from this proposal and are the responsibility of the CUSTOMER. These are to be completed by others or specifically agreed to in writing by LEGACY and included in the pricing section of the final version of the proposal.

2. Price Validity and Steel Cost: Due to the current volatility in the steel market, material escalation (if any) will be based on AMM (American Metal Markets) published price index for hot rolled carbon steel and on the North American Stainless published price index stainless steel. Pricing included in this proposal is based on today's published index. Any increase in steel cost between date of proposal and material procurement above this benchmark will be customer's account. (Example: if steel increases $0.03/per pound, this would increase the cost of a 30,000 lb. tank as follows: 30,000 X $0.03 = $900.00). (Note: Steel is typically procured 2 weeks after submittal drawings are returned as "Approved as Noted").

The following equipment and services are not provided as part of this proposal

1. Crane off-loading, touch-up paint, plumbing to the plant, installation of grating, handrail and component equipment, electrical wiring, and filling of the tank for testing are to be done by the general contractor.

2. All field wiring is to be done by the installing contractor.

3. There is no provision included in this quoted price, unless noted, for field erection supervision, tests, inspections or adjustments of equipment. If factory representative is required for any of these services, please refer to "Service Terms" enclosed. The equipment offered by Legacy Environmental Process, LLC is our standard design, materials and manufacture. In the event that these items of equipment are subject to any alteration in design or materials or manufacture by the contractor, owner, owner's agent or engineer, such alterations shall be subject to change in the contract price and/or delivery schedule.

4. Detail civil engineering, mechanical and electrical design are excluded from the above proposal.

5. All piping outside of the reactor basins is to be done by the installing contractor.

6. Cost of performance testing and analytical work associated with start-up, commissioning and testing are excluded from the above proposal.

7. The equipment offered by Legacy Environmental Process, LLC is our standard design, materials and manufacture. In the event that these items of equipment are subject to any alteration in design or materials or manufacture by the contractor, owner, owner's agent or engineer, such alterations shall be subject to change in the contract price and/or delivery schedule.

8. Power Requirements: 230/480, 3 phase, 60 Hz.

9. Dimensions and Weights (Approximate):
   - Length x Width x Height: 59'-3" x 12'-0" x 11'-0"
   - Empty Weight (shipping): 36,000 lbs.

Pricing:

Price, F.O.B. factory, with freight allowed to Project Site, Carmel, New York, off-loading to be by others ..... $380,853.00 USD

Documentation

Legacy includes three (3) hard bound copies and one (1) electronic copy of submittals, Legacy allows for two (2) revisions and 30 days review period by the customer, after the 3rd revision customer will be charged for engineering fees, based upon Legacy's schedule of fees. Three (3) installation, operation and maintenance manuals will be provided upon time of shipment of equipment, unless CUSTOMER has delayed payments.

Prices

Unless otherwise specified in this proposal, all prices are in U.S. Dollars.

Taxes and Fees

The above prices does not include any local, state, federal or country taxes, permits or fees, clearance through customs and custom duties, fees or charges for permits, letters of credit, nor any finance or related charges and fees. All these costs will be added to the total price and paid by the CUSTOMER.

Proposal Acceptance

This proposal is offered for acceptance within thirty (30) days from date of this quotation. Prices are subject to review thereafter. Prices become fixed, upon receipt of a signed copy of the CUSTOMER Acceptance Page (at the end of this proposal) and/or a Purchase Order. Prices may be extended for another thirty (30) days upon receipt of a signed copy of a Letter of Intent by the CUSTOMER. Delays caused by slow return of submittals or other manufacturing delays attributable to the contractor retained by Buyer for the project, Buyer, Buyer's agent or engineer will result in additional charges of 1% per month for such delays or part thereof.

Sub-Contract Conditions & Retentions and Liquidated Damages

LEGACY does not accept Sub-Contract Conditions, Retentions, nor Liquidated damages. Liquidated damages are not accepted, unless specifically agreed in writing by Company.

Starting on a Project

LEGACY will NOT start working on a project until both, the CUSTOMER and LEGACY, have fully executed and signed an order and all transfer of monies have been satisfactorily completed.

Completion of Submittal Drawings

In general, completion of the submittal documents takes two (2) to four (4) weeks after the CUSTOMER and LEGACY have fully executed and signed an order and all transfer of monies have been satisfactorily completed. NOTE: A purchase order signed by both Legacy and the purchase order originator (i.e., buyer) must be executed prior to any submittal being forwarded to Buyer. Legacy shall not commence or consider project start-date until a purchase order has been fully executed and signed by both parties, and all transfers of monies connected therewith has been completed.

Completion of Manufacturing of Equipment

In general, completion of manufacturing of the equipment listed above will take around ten (10) to fourteen (14) weeks after receipt of Company of approved submittal documents. However, actual number of weeks may increase or decrease depending on volume production at the time of receipt of the approved submittal documents.

Act of God, Force Majeure

LEGACY shall not be liable for delays caused by fires, acts of God, strikes, labor difficulties, and acts of governmental or military authorities, delays in transportation or procuring materials, or causes of any kind beyond the LEGACY's control.

The terms "we", "Our", and the like used herein shall refer to Company

The terms "Proposal" and "Quotation" as used herein shall mean this proposal.

March 23, 2020

Customer Acceptance Page

For pricing and information pertaining to the equipment contained in this proposal, please contact our office:

Submitted By:		**Accepted By:**
Michael Combs Vice President 45 Kelly Creek Drive Odenville, Alabama 35120 Office: (205) 640-1035 Fax: (205) 640-1039 Cell: (205) 903-6009 Email: mike@legacyepro.com www.legacyenvpro.com		Purchaser Authorized Signature Purchaser Authorized Printed Name Company/Organization with complete address & phone number
Date: March 23, 2020		Date:

Attachment: Terms of Quotation

PAYMENT TERMS AND CONDITIONS

Subject to the approval of the LEGACY Credit Department, the following apply: Standard Terms and Conditions shall apply and form part of the within quotation except as expressly otherwise agreed by an officer of Legacy Environmental Process, LLC

ACCEPTANCE: Unless otherwise expressly stated herein, this quotation shall expire thirty (30) days after its date.

DELIVERY: Time of Delivery is an estimate only and is based upon the receipt of all information and necessary approvals. The company shall in no event be liable for delays caused by fires, acts of God, strikes, labor difficulties, and acts of governmental or military authorities, delays in transportation or procuring materials, or causes of any kind beyond the company's control.

WARRANTIES: The equipment offered is warranted in accordance with the terms of Legacy Environmental Process, LLC's standard warranty, which is hereby made part of this proposal.

PRICES: All prices, in U.S. Dollars exclude sales, use, occupation, license, excise and other taxes in respect to manufacture, sale or delivery, all of which shall be paid by the buyer unless a proper exemption certificate is furnished.

TERMS OF PAYMENT

Subject to the approval of the LEGACY Credit Department, the following apply:

1. Ten percent (10%) down payment required with order
2. Thirty percent (30%) due upon customer's approval of engineering submittal, release to productions and ordering of major materials
3. Balance net cash within thirty (30) days after date of shipment/invoice, whichever occurs first
4. All payments other than initial payments shall be made pro rata as principal items are shipped.
5. In the event delay in making shipment is caused by buyer, payment for such shipment shall be due fifteen (15) days from date LEGACY notifies buyer that LEGACY is prepared to make such shipment. If buyer delays completion of manufacture, LEGACY may elect to require payment according to percentage of completion. Machinery held for buyer shall be at buyer's risk and expense. Interest in the amount of one and one-half percent (1-1/2%) per month will be added to all invoices not paid within scheduled dates as listed above.
6. In the event delay in making shipment is caused by buyer, from original LEGACY scheduled delivery, payment for storage fees shall also apply and must be received prior to release of equipment for shipment. Storage fees in the amount of one and one-half percent (1-1/2%) per month of total contract price will be added to all invoices.

7. Legacy Environmental Process, LLC shall not commence or consider project start-date until an order by both parties have been fully executed and signed by both parties, and all transfer of monies have been completed.

CANCELLATION CHARGES: Buyer may cancel its purchase order at any time by written notice to Company, subject to Buyer's payment of the cancellation charges as set forth below. Company may cancel the purchase order by written notice to Buyer if (i) any proceeding is instituted by or against Buyer under any bankruptcy or insolvency law or (ii) prior to delivery of any unshipped item, Company in its judgment determines that Buyer's financial condition is reasonably likely to prevent Buyer from making the payments required hereunder. In any event of cancelation, at minimum, Buyer will reimburse LEGACY for all costs associated plus 20% administrative fee with the project, or the milestone attained, which ever may be greater. In the event Company intends to cancel the purchase order pursuant to the preceding in this paragraph, it may, at its option, demand or require payment in advance from Buyer in order to continue performance under the purchase order or proceed with cancellation via written notice, in which case Buyer shall pay to Company the cancellation charges set forth below. In the event of cancellation of the purchase order by Company, Buyer shall be entitled to retain any equipment for which it has already paid in full. Any cancellation of the purchase order shall be without prejudice to a party's rights and remedies for breach of or default hereunder by the other party.

Milestone	***% of Purchase Order Value***
After Order Acceptance	5%
After submittal are sent and Approval is received from Customer	30%
Prior to Shipment, one Customer has been notified that equipment is ready to ship	90%
Prior to completion of commissioning, start-up, and testing	100%

BACKCHARGE(S)/CHANGE ORDER(S): LEGACY shall not accept any back charges unless approved in writing by an authorized LEGACY representative prior to work/task commencement. No change order shall be valid unless prior to the commencement of any work thereunder the change under has been executed by an LEGACY representative.

TITLE, LIEN RIGHTS AND RIGHT OF LOSS: The equipment shall remain personal property of Company, regardless of how affixed to any realty or structure until the price (including any notes given therefore) of the equipment has been fully paid, at which time title to such equipment shall pass to Buyer. The Company shall, in the event of Customer's default, have the right to repossess such equipment. Risk of loss associated with the equipment supplied hereunder shall pass from Company to Buyer upon delivery of the equipment.

March 23, 2020

SERVICE TERMS

1. **Rates**

Service rates are as follows per 8-hour man-day during normal working hours:

	Monday-Friday	Saturday	Sunday & Holidays
Service Technicians	$1,250.00/day	$1,500.00/day	$1,750.00/day

Overtime service rates on an hourly basis in excess of 8 hours worked are as follows:

	Monday-Friday	Saturday	Sunday & Holidays
Service Technicians	$175.00/hr.	$215.00/hr.	$275.50/hr.

All above rates are in U.S. dollars. Travel time is included as working time. Parts and expenses are additional.

2. **Minimum Billing**

A minimum charge of 1/2 day's time will be made. Billing will be made in 1/2 day increments for time each day at job and/or traveling during normal working hours. Thus, five hours spent on job and/or traveling is billed as one full day.

3. **Normal Working Time**

Eight hours per day with one hour for lunch, Monday - Friday, except observed holidays.

4. **Travel**

Travel arrangements are made with 14-day advance purchase. Should the agreed travel dates change due to no fault of Legacy Environmental Process, LLC and additional costs be levied, such costs shall be chargeable.

These Include:

- Plane, Train and/or Automobile rental cost from Legacy Environmental Process, LLC, Birmingham, Alabama, to the customer's plant or construction site and return.
- Private Automobile travel at the rate of 52.5 cents/mile.
- Expenses also include all local travel.
- Living expenses for lodging, meals and incidental costs.
- Telephone calls and wires, as required in connection with the details of the job.
- When our service representative goes from job to job rather than returning to his headquarters, an equitable distribution or travel charge will be made.
- A 20% charge will be added to cover administration costs on all travel and living expenses.

5. **Parts**

All parts supplied will be billed at selling prices. Service work by others under our authorization will be billed at our cost plus 20% overhead.

6. **Limits of Liability**
   As our representatives are authorized to work on Legacy Environmental Process, LLC equipment, all responsibility for operation rests with the customer. Legacy Environmental Process, LLC shall not be liable for any claims, losses, labor, expenses, or damages, direct or consequential, resulting directly or indirectly from the service performed hereunder or for other consequential loss or damage of any nature arising from any cause.

7. **Authorization**
   Legacy Environmental Process, LLC will not commence any service work until an official Purchase Order for the work has been received.

EQUIPMENT WARRANTY

LEGACY ENVIRONMENTAL PROCESS, LLC warrants for a period of ***twenty-four (24) months from start up, not to exceed thirty (30) months from date of shipment***, the new equipment of its own manufacture to be free from defects in material and workmanship under normal use and service when used and maintained in accordance with Operation and Maintenance Instruction Manual supplied by Legacy Environmental Process, LLC. Legacy Environmental Process, LLC's obligation under this warranty being limited to repairing or replacing, at its option, any part found to its satisfaction to be defective, providing that such part is, upon request, returned to Legacy Environmental Process, LLC's factory, freight prepaid. This warranty does not cover parts damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, accident, neglect or from improper operation, maintenance, installation, modification, or adjustment.

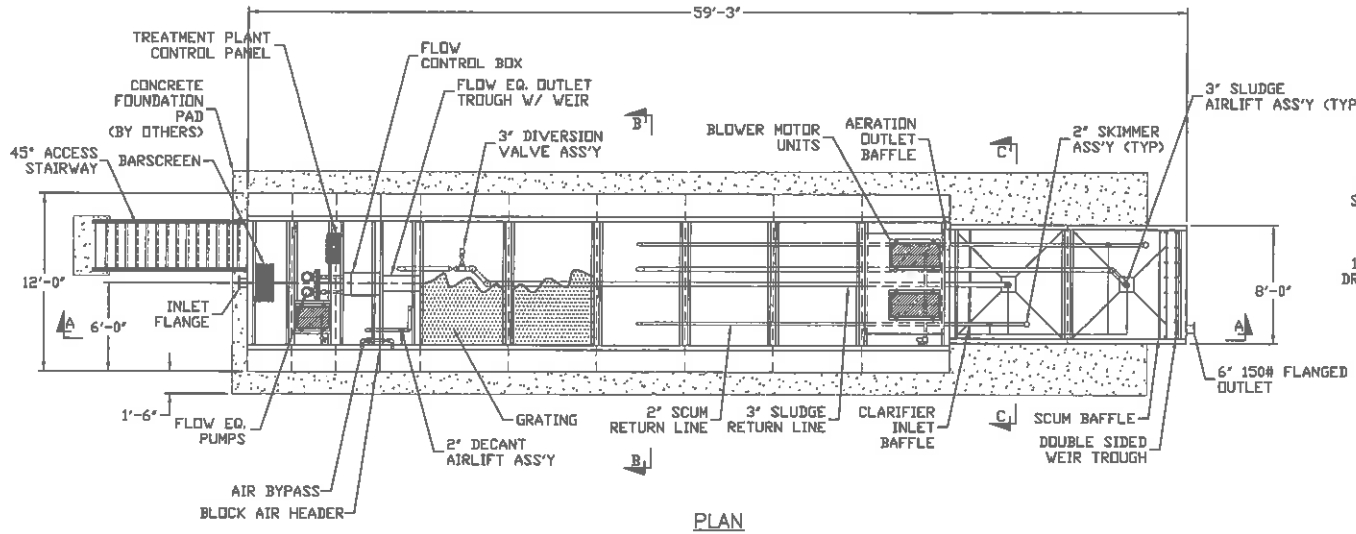
Legacy Environmental Process, LLC shall not be liable for indirect or consequential damages, whether or not caused by seller's neglect. Consequential damages for the purposes of this agreement shall include, but not be limited to, loss of use, income or profit, or loss of or damage to property occasioned by or arising out of the operation, use, installation, repair or replacement of the equipment or otherwise.

"Start up" for the purpose of this agreement shall be the date when the equipment is first placed into operation regardless of the status of other items.

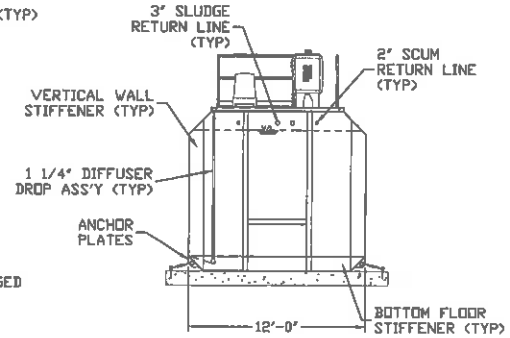
All parts repaired or replaced under this warranty will continue coverage on a prorated basis of the original warranty.

The company shall in no event be liable for damage caused by acts of force majeure, including but not limited to acts of war, fires, acts of God, strikes, and labor difficulties, acts of governmental or military authorities, civil unrest, or causes of any kind beyond the company's control.

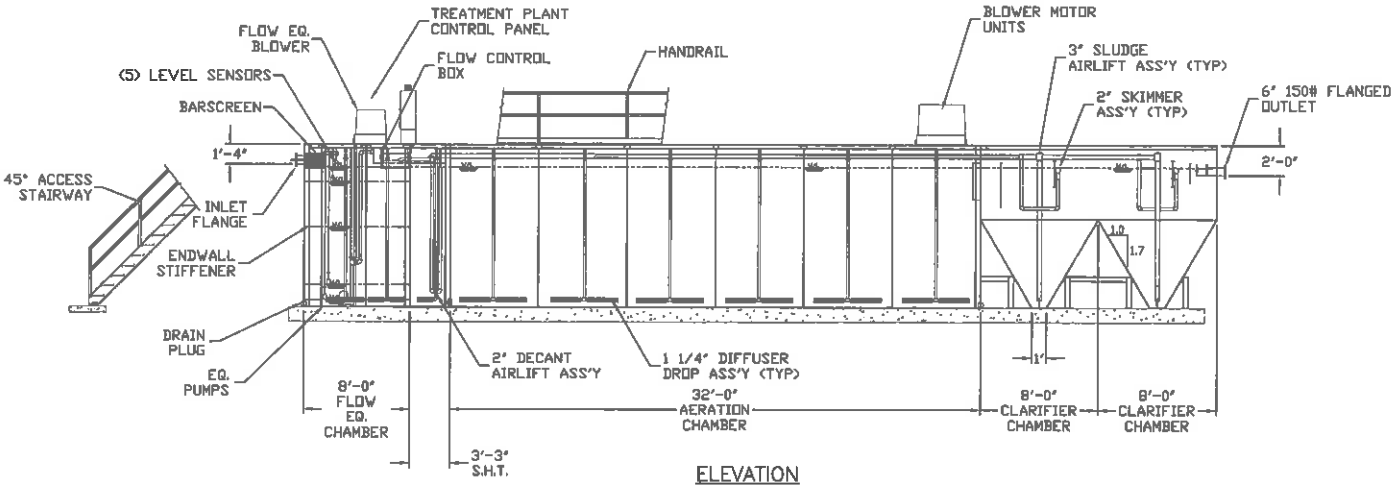
Service may be refused to any area designated as High Risk by the company. This refusal will take precedence over any other agreed terms.



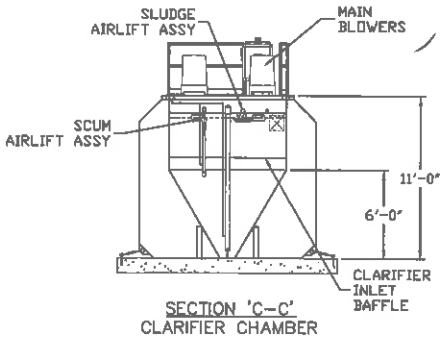
PLAN



SECTION 'B-B'
AERATION CHAMBER



ELEVATION
SECTION 'A-A'



SECTION 'C-C'
CLARIFIER CHAMBER

NOTES

1. ALL EXTERNAL ELECTRICAL & INTERCONNECTING PIPING IS TO BE SUPPLIED BY OTHERS.
2. SERVICE GRATING & HANDRAIL SUPPLIED BY LEGACY (UNLESS NOTED OTHERWISE).
3. COMPONENTS IN SECTION "A-A" MAY BE SHOWN OUT OF LOCATION FOR CLARITY.
4. LEGACY ASSUMES NO RESPONSIBILITY FOR DESIGN OF CONCRETE STRUCTURES.
5. CORRECTIONS OF MINOR MISFITS AND FIELD TOUCH UP TO BE PROVIDED BY FIELD CONTRACTOR AFTER RECONNECTION.
6. DRAWING FOR ILLUSTRATION ONLY UNLESS STAMPED "CERTIFIED FOR CONSTRUCTION".

REV	DATE	DESCRIPTION	BY	APP'D
1				
2				
3				
4				
5				
6				

UNLESS OTHERWISE NOTED:
ALL DIMENSIONS IN INCHES.
BREAK ALL SHARP EDGES
FRACTIONAL ± 1/32"
ANGLES ± 0 1/2°
DECIMAL .XXX ± .015
.XX ± .03 .X ± .1
MACH. SURFACE 125 MAX.

DRAWN	[illegible]	DATE 3/13/20
CHECKED	[illegible]	DATE 3/13/20
APPROVED	[illegible]	DATE 3/13/20
NEXT ASSY		SHEET

mike@legacyepro.com

LEGACY ENVIRONMENTAL PROCESS L.L.C.
45 Kelly Creek Drive
Odenville, AL 35120 U.S.A.
Phone: 205-640-1035
FAX: 205-640-1039

TITLE: 27,200 GPD PREFABRICATED STEEL WASTEWATER SYSTEM FOR CARMEL HILLSDALE ESTATES, NY

SCALE	DWG. NO.	REV
1:112	202296-201	0

CUSTOMER

Carmel Hillsdale Estates STP

Deign Confirmation

Design Assumptions				
Influent/Effluent Composition				
Parameter	Influent		Effluent	
BOD5	240	mg/l	30	mg/l
TSS	240	mg/l	30	mg/l
TKN	40	mg/l	3	mg/l
Assumptions	S.I.		U.S.	
Flow	102,963	L/d	27,200	gal/day
Maximum Operating Temperature:	25.0	deg C	77	deg F
Site elevation above sea level:	142	m	466	ft
Net sludge yield (lbs MLSS/lbs BOD5):	0.6		0.6	
DO mixed liquor concentration (C0)	2	mg/l	2	mg/l
Oxygen Coefficients:				
kg O2/kg BOD5	1.28		1.28	
kg O2/kg NH3-N	4.6		4.6	
Transfer Factors:				
alpha (typical for coarse bubble)	0.85		0.85	
beta (typical for domestic wastewater)	0.95		0.95	
Sludge settling zone overflow rate:	< 10	m^3/m^2/d	< 600	gal/ft^2/day
Aeration Tank detention time:	24	hours	24	hours
Typical O2 transfer rate for coarse bubble diffusers:	30	kg O2/kW-d	48	lb O2/hp-d
Solids Retention:			18	days

a. Aerobic Volume

$$BOD_5 \text{ Removed (kg/d)} = \frac{\text{Flow (L/d)}}{10^6 \text{ (mg/kg)}} \times (BOD_{influent} - BOD_{effluent}) \text{ (mg/L)}$$

BOD5 removed (US) =	47.6	lb/day
BOD5 removed (SI) =	22	kg/day

$$\text{Sludge Production (kg/d)} = \text{Net Sludge Yield (kg MLSS/kg } BOD_5) \times BOD_5 \text{ Removed (kg/d)}$$

Sludge Production (US) =	28.6	lb/day
Sludge Production (SI) =	12.97	kg/day

$$\text{System Mass (kg)} = \text{Sludge Production (kg/d)} \times \text{Solids Retention (d)}$$

System Mass (US) =	514.49	lbs
System Mass (SI) =	233.52	kg

$$NH_3 - N_{oxidized} = TKN_{influent} - \text{Synthesis } N - TKN_{effluent}$$

$$\text{Synthesis } N = 5\% \text{ waste activated sludge of total daily sludge production}$$

Synthesis N (US) =	1.4	lb/day
Synthesis N (SI) =	0.6	kg/day
Synthesis N (mg/l) =	6.3	mg/l
NH3-N oxidized =	30.7	mg/l
NH3-N kg/d =	3.16	kg/day
NH3-N lb/d =	6.97	lb/day

$$AOR = 1.28\ (kgO_2/kgBOD_5) \times Synthesis\ N\ (kgBOD_5/d) + 4.6\ (kgO_2/kg\ NH_3\text{-}N) \times NH_3\text{-}N_{oxidized}\ (kg/d)$$

$$AOR = 1.28\ (kgO_2/kgBOD_5) \times 1.1\ (kgBOD_5/d) + 4.6\ (kgO_2/kg\ NH_3\text{-}N) \times 3.28\ (kgNH_3\text{-}N/d)$$

AOR = 15.37 **kgO2/day** or 33.89 **lbO2/day**

AOR = Actual Oxygen Requirements (kg O_2/d)

$$SAOR = AOR \times \frac{C_S\ (mg/L) \times \Theta^{(20-T)}}{\alpha \times (\beta \times C_{SW} - C_O)}$$

where:

SAOR = Standard Actual Oxygen Requirements (kg O_2/d)
Θ (temperature correction factor) = 1.024
C_S (O_2 saturation concentration at standard temperature and pressure) = 9.02 mg/L
C_{SW} = correction factor for elevation (i.e., 450 ft) = 9.02 - 0.0003 × elevation
C_{SW} = 9.02 - 0.0003 × 450 = 8.88 mg/L (NOTE: 0.0003 may be used as rule-of-thumb describing a 0.0003 mg/L rise/drop in DO saturation concentration per every foot of elevation increase/decrease.)
C_O = 2 mg/L
α = 0.85; β = 0.95; T = 17°C (62°F)

SAOR = 22.5 kgO2/d or 49.62 lbO2/day

$$Motor\ Requirements\ (kW) = \frac{SAOR\ (kgO_2/d)}{O_2\ Transfer\ Rate\ (kgO_2/kW\text{-}d)}$$

Motor Requirements (kW) = 0.8 **kW** or 1.0 **hp**

Since blowers typically have an efficiency of 50% or less, select 2 aerators with 4 hp motors (minimum).

b. SRT/MLSS Calculations:

Activated Sludge Operational Parameters - Typical Ranges

Activated Sludge Process	SRT days	MLSS mg/L	F:M lb BOD/day / lb MLVSS	Q_r / Q_o %
Conventional Plug Flow	3 - 15	1000 - 3000	0.2 - 0.4	25 - 75
Complete Mix	3 - 15	1500 - 4000	0.2 - 0.6	25 - 100
Extended Aeration	20 - 40	2000 - 5000	0.04 - 0.1	50 - 150

Solids Retention Time (SRT) sets the growth rate of microorganisms in an activated sludge process, thereby selecting the microbial composition of the mixed liquor. For consistent wastewater treatment, SRT must be controlled at a level that oxidizes pollutants, e.g. nitrifies, while providing "bugs" that flocculate and settle.

SRT = Mass of bugs in aeration / (Mass WAS SS + Mass of Effluent SS)
Enter parameters:
Design Min. SRT: 18 days
Design Max. SRT: 25 days
Design MLSS, Low: 2,500 mg/l
Design MLSS, High: 3,500 mg/l

Calculate Quantity of Waste Sludge:

Mass of Effluent SS = 4.56 lbs or 2.07 kg

18 day SRT

MLSS	WAS (lbs/day)	WAS (kg/day)
2,500	26.95	12.22
2,750	30.10	13.65
3,000	33.25	15.08
3,250	36.40	16.51
3,500	39.55	17.94

25 day SRT

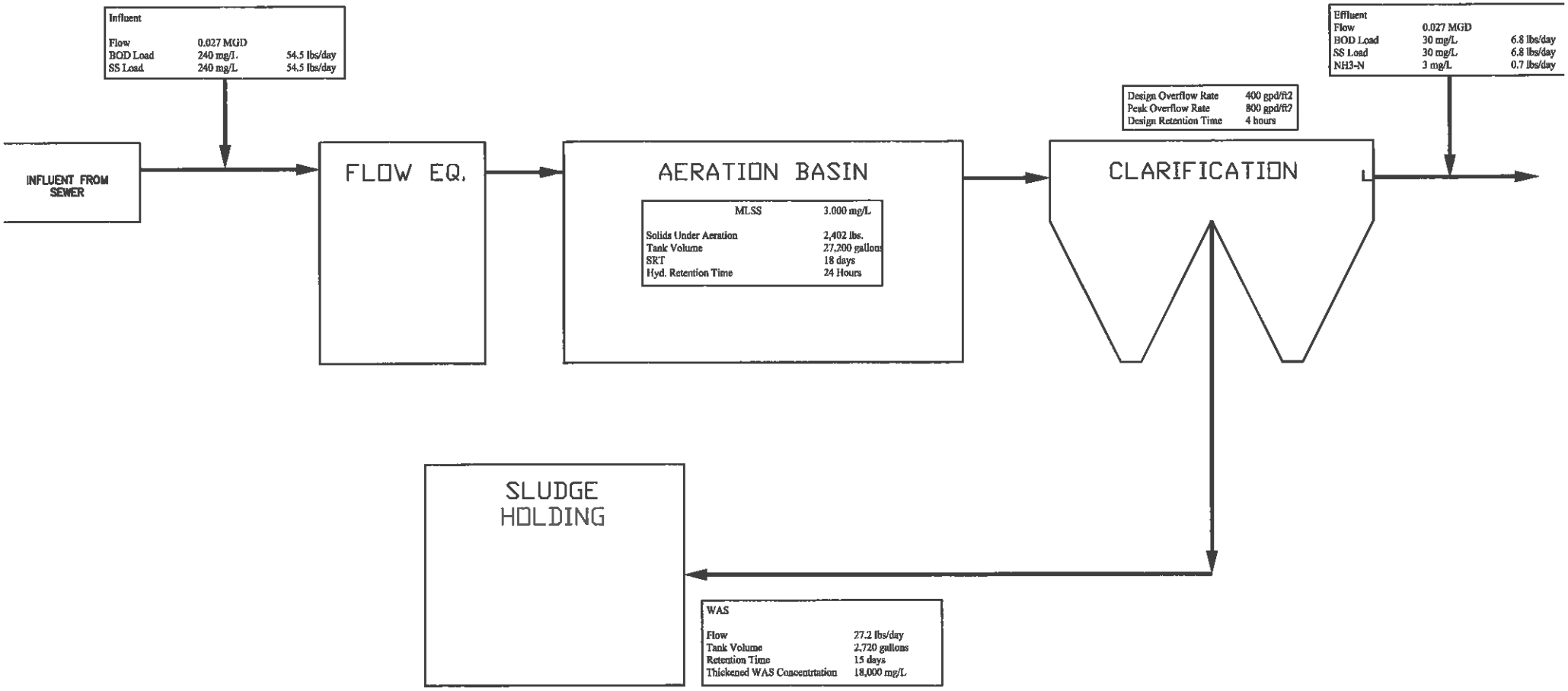
MLSS	WAS (lbs/day)	WAS (kg/day)
2,500	18.13	8.22
2,750	20.39	9.25
3,000	22.66	10.28
3,250	24.93	11.31
3,500	27.20	12.34

c. Digestion

The sludge holding/digestion tank is sized for 15 days retention time with decant pump to thicker contents from 0.8% solids to 1.8% solids

Solids to Digesters

Mass Primary Sludge to Digesters	0	#/day
Mass WAS to Digesters	158	#/day
Total Solids to Digesters	158	#/day
Volatile Portion	127	#/day
Inert Portion	32	#/day
Assumed Volatile Solids Reduction	20	%
Reduction of Mass of Volatiles	25	#/day
Net Solids to Digesters	133	#/day
Total Primary Digester Volume	48,000	Gallons
Clarifier Underflow Concentration	1.0	%
Net Flow (Clar. to Dig.) @ Assumed Concentrat	1,593	GPD
Hydraulic Retention Time w/o decant	30.1	Days
Volatile Solids Loading (design 70-200)	20	#/kcf


Influent
Flow 0.027 MGD
BOD Load 240 mg/L 54.5 lbs/day
SS Load 240 mg/L 54.5 lbs/day
INFLUENT FROM SEWER
FLOW EQ.
AERATION BASIN
MLSS 3,000 mg/L
Solids Under Aeration 2,402 lbs.
Tank Volume 27,200 gallons
SRT 18 days
Hyd. Retention Time 24 Hours
Design Overflow Rate 400 gpd/ft2
Peak Overflow Rate 800 gpd/ft2
Design Retention Time 4 hours
CLARIFICATION
Effluent
Flow 0.027 MGD
BOD Load 30 mg/L 6.8 lbs/day
SS Load 30 mg/L 6.8 lbs/day
NH3-N 3 mg/L 0.7 lbs/day
SLUDGE HOLDING
WAS
Flow 27.2 lbs/day
Tank Volume 2,720 gallons
Retention Time 15 days
Thickened WAS Concentrtation 18,000 mg/L

APPENDIX I-2

Pollution Control Systems, Inc.

Pollution Control Systems, Inc

5827 Happy Hollow Rd. Suite 1-B
Milford, OH 45150-1830
Tel: (513) 831-1165 Fax: (513) 965-4812
E-mail: Polconsys@aol.com
www.PollutionControlSystem.com

PACKAGE WASTEWATER TREATMENT PLANT SPECIFICATIONS

CITY OF CARMEL, NEW YORK
CONVENTIONAL EXTENDED AERATION SYSTEM

Pollution Control Systems, Inc. (PCS) is pleased to provide the following equipment specifications for your consideration.

One (1) prefabricated carbon steel packaged wastewater treatment plant and related equipment designed and constructed in accordance with the plans and specifications stated herein. The package plant will be Model PP-27.2-ESC. The package plant will be the activated sludge type, specifically known as "Extended Aeration", designed for treating 27,200 GPD of 230 mg/l BOD_5 and TSS, and an average incoming Ammonia Nitrogen of 27 mg/l wastewater down to 20 mg/l BOD5, 30 mg/l TSS; and 8 mg/l Ammonia Nitrogen.

The system will be furnished for above grade installation.

A. General Specifications

Equalization Chamber Volume:	9,041 Gallons
Sludge Holding Chamber Volume:	6,090 Gallons
Aeration Chamber Volume:	40,800 Gallons
Flow Measurement & UV Sensor Chamber:	Not Applicable
Overall Length/Width/Height:	87'-9" x 12' x 11'
Shipping Weight:	62,000# (approximate)

B. Materials of Construction

All tank vessels will be fabricated of 1/4" structural grade ASTM designation A-36 steel plates joined by arc welding with fillets of adequate section for the joint involved. All walls will be continuous and watertight and will be supported by structural reinforcing members where required. Connections will conform to the requirements of the American Welding Society's Code and will develop the full strength of the member.

All piping within the plant will be Schedule 40 steel pipe except as may be noted otherwise in other sections of the specifications or called for on the plans.

C. Surface Preparation and Coating

All vessel surfaces to be painted will be properly prepared in a workmanlike manner so as to obtain a smooth, clean and dry surface. All rust, dust, and mill scale, as well as other extraneous matter, will be removed from the interior surfaces by means of near white sandblast SSPC-SP10. All external surfaces will be commercial sandblasted to SSPC-SP6. All interior and exterior vessel surfaces will be painted with 8-10 mils total dry film thickness (TDFT) of a coal tar epoxy type coating.

D. Inlet Bar Screen

A bar screen will be provided at the influent port to remove any unusually large solids from the incoming raw sewage. The bar screen will be fabricated from 1/2" diameter bars spaced 1" apart and arranged as shown on the drawings. The bars shall be sloped to permit easy cleaning of accumulating debris. A deck will be furnished for drying this debris. The bar screen shall have the same protective coating as specified for the plant.

E. Flow Equalization Chamber

A flow equalization chamber will be supplied with a volume designed to handle 25% to 100% of the daily design flow. The flow equalization chamber allows for a constant flow through the plant by equalizing flow surges that may be incurred during peak flow times.

Flow control will be accomplished by pumping the plant influent to a flow control box containing an adjustable overflow broad weir and a v-notch discharge weir. The overflow broad weir will be adjustable so that a measured amount of pumped influent will discharge through the V-notch weir to the aeration chamber, while recycling the remaining pumped influent back to the equalization chamber.

A duplex set of equalization pumps will be furnished and installed within the chamber. The pumps will be rated .5 HP. An emergency overflow will be provided between the equalization and aeration chamber.

A blower/motor unit mounted in a fiberglass housing will be supplied to meet the air requirements of the equalization chamber. The blower unit will be capable of delivering 20 CFM when operating at 4 PSI. The motor will be 1 HP, ODP type. Liquid level sensors will regulate the pumps and blower/motor unit. Controls will be provided in the plant control panel.

F. Sludge Holding Chamber

The chamber will be of the aerated type. The volume of the sludge holding chamber is based on 3 cu. ft. per capita. Diffused air will be supplied by the plant blower system supplying 30 CFM of air per 1000 cubic feet of volume. The diffusers will be located parallel to and near the bottom of the tank. All piping and valves within the chamber will be factory installed. A fixed supernatant decant pipe will be provided within this chamber.

G. Aeration Chamber / Nitrification Zone

The aeration chamber will be of sufficient capacity to provide a minimum of 36 hours retention of the average daily flow. The extended aeration time will aide in further reduction of the BOD and will enhance the natural Nitrification process for Ammonia Nitrogen reduction.

To insure maximum retention, enhance spiral rotation and eliminate short-circuiting of raw sewage, the aeration chamber will be constructed with fillets top and bottom, air diffusers will be placed longitudinally along one side of the chamber, and flow control baffles will be provided. To insure adequate circulation velocity, the proportion of chamber width to depth, in the direction of rotation will not exceed 1.33 to 1. The velocity of rotation will be sufficient to scour the chamber bottom and prevent sludge filleting as well as to prevent the escape to the surface of minuscule air diffusion bubbles, causing their entrapment to provide maximum oxygenation efficiency.

H. Clarifier Chamber

The clarifier chamber will be sized to provide a minimum of 4 hours retention, based upon the same design flow rates governing the aeration chamber, and will have proper baffling to prevent short circuiting and to provide maximum uniform retention.

The total settling volume will include the volume of the upper one-third of the sludge hopper. The bottom of the chamber will be formed into an inverted pyramidal hopper or hoppers. The flat bottom area of the hopper will in no case be greater than one square foot. The slope of the hopper walls will not be less than 1.7 vertical to 1.0 horizontal.

Settled sludge will be returned from the clarifier sludge hopper to the aeration chamber by the positive sludge return system, consisting of one or more airlift pumps. The clarifier effluent will pass over the edge of the baffled effluent weir into the effluent trough and then out of the chamber. The effluent weir trough will be equipped with an adjustment to permit precise leveling of the serrated weir after plant installation.

I. Sludge Recirculation System

There will be installed within the clarifier chamber a positive sludge recirculation system consisting of airlift sludge return assembly(s) per hopper. The airlift pump will have the recirculation capacity ranging from 0% to 150% of the design flow. The airline supplying air to the pump will be equipped with a cock valve to vary the amount of air supplied to each pump, thus varying the capacity of the pump. The airlift pump will be firmly supported and equipped with a clean-out plug to allow for easy cleaning and maintenance.

J. Scum Recirculation System

There will be installed within each clarifier chamber a positive scum and skimming

recirculation system consisting of 2" diameter airlift skimming devices. The skimming device will be a positive airlift pump type, located in a position to skim and return floating material to the aeration chamber. The airline supplying air to the skimming device will be equipped with a valve to regulate the rate of return. The scum intake will have an adjustment assembly that will enable exact positioning of the skimmer at water level.

K. Ultra-Violet Disinfection

Trojan Ultra-Violet Disinfection units provide effluent disinfection. An Ultra Violet Light disinfection (horizontal tube configuration) unit Model 3025K-PTP will be supplied to disinfect the wastewater without the use of chemicals.

For above grade installations, the UV module will be provided with inlet and outlet transition connection boxes. This will produce a freestanding structure to be located off the plant structure on a concrete pad. These boxes will contain connections for flanged inlet and outlet piping.

L. Air Diffusion System

An air distribution manifold constructed of rectangular hollow steel tubing with diffuser drop assemblies will be installed longitudinally on one side along the entire length of the plant.

Each diffuser drop assembly will be equipped with an air regulation and/or shut-off cock valve, a disconnecting union and a diffuser bar with air diffuser nozzles mounted thereon. The diffusers will be parallel to and near the base of the vessel sidewall and at the proper elevation providing optimum diffusion and mixing of the vessel contents.

Each air diffuser will be constructed with an integral air check diaphragm designed to handle a wide range of airflow. The oxygen transfer capacity of each diffuser will be such that an adequate supply of oxygen will be maintained in the aeration chamber to meet treatment requirements of the design sewage load.

M. Blower/Motor Units

To meet the air requirements of this wastewater treatment system, two (2) positive displacement blower/motor units will be supplied. The blower/motor units shall be mounted on the plant as indicated on the plans. The blower/motor units will be capable of providing a minimum of 2050 cubic feet of air per pound of BOD5 plant loading.

Each blower unit will be capable of delivering 180 CFM when operating at 4 PSI. The motor will be 5 HP, ODP type.

The blower/motor unit assembly will be mounted on a molded fiberglass base. The base structure will be adequately reinforced to support the blower/motor unit.

The blower/motor will be enclosed within a molded fiberglass weatherproof hood mounted to

the base. The fiberglass-locking hood is designed for easy access to service the unit.

To help reduce blower vibration and noise, the blower/motor base will be mounted on vibration dampeners.

For easy adjustment of the V-belt drive connection between the blower and motor, the motor will be mounted on an adjustable motor mounting base. The blower will be fitted with a dry type filter/silencer at the air intake. Each blower discharge will be fitted with a check valve, and a flexible rubber discharge coupling.

For purposes of determining the blower performance and/or diffuser condition, a pressure relief valve and pressure gauge will be mounted in the air manifold.

N. Central Control Panel

A central control system installed within a weatherproof enclosure will be provided. The enclosure will be rated NEMA 4X-F Fiberglass. The electrical controls will consist of magnetic starters, program timers and switches necessary to automatically control all electrical devices and/or motors on the sewage treatment system.

M-O-A selector switches and magnetic starters in conjunction with the program timer will control the blower/motor. The program timers will have the capability to operate the treatment system when required as determined by the variation in the daily flow rate. Properly sized circuit breakers and fuses will protect all electrical equipment and circuitry. The control system will be designed to operate all duplex or standby equipment.

O. Effluent Flow Meter

For measurement of the effluent of the wastewater treatment system, a v-notch weir plate will be at the outlet end of the system. This v-notch will be used with the ultrasonic flow meter and circular chart recorder to record, indicate and totalize the flow through the wastewater system. Both the flow meter and recorder are mounted within the same NEMA 4X enclosure

The flow meter consists of an ultrasonic transducer remotely mounted above the liquid surface and a microprocessor based electronic control unit. The control unit will be mounted within a NEMA 4X control panel directly above the transducer at the tertiary filter outlet.

The circular chart recorder will record flows on circular unit charts that are 10" in diameter. The unit includes one box of 24-hour circular charts, and one (1) felt tipped pen for recording.

P. Access Stairway / Service Walkways / Handrails

A Painted steel access stairway fabricated using two 10" channels and galvanized bolt-on stair-treads will be provided. Two upper support angles with mounting holes will be provided.

Stairway handrails will be provided on both stair stringers. Handrails are will be welded in place. The rails and posts are fabricated from 1-1/4" diameter schedule 40 carbon steel pipe. Carbon steel handrails are painted with enamel paint, safety yellow. Stringers and stairs will be painted the same as the tank surfaces.

A service walkway will be provided to service the plant equipment. Grating panels will each consist of one-piece skid resistant steel plank. All grating panels will be constructed of 18 gauge, galvanized steel sheet. Each grating panel has a standard 6" or 9" surface width and a 2 1/2 " rib depth. Each panel will be supported to insure a safe uniform load carrying capacity" of 80 pounds per square foot. On doublewide plants, the service walkways will be provided with handrails.

Handrails are supplied with mounting flanges for bolting into place. The rails and posts are fabricated from 1-1/4" diameter schedule 40 carbon steel pipe. Longer sections of hand railing are spliced to allow for easier handling and installation. Carbon steel handrails are painted with enamel paint, black or safety yellow. Due to shipping limitations, handrails are shipped loose for field mounting by the field contractor.

Q. Guarantee

PCS will guarantee for one (1) year from the date of shipment that the vessel and all component equipment will be free from defective materials and workmanship. PCS will furnish replacement parts for any component considered in the opinion of PCS to be defective, whether of his or other manufacturer during the guarantee period.

R. Delivery Schedule

Equipment drawings will be submitted 2-3 weeks after the receipt and approval of the purchase order. The equipment would be ready for shipment 8-12 weeks after the receipt of approved submittals.

S. Budget Pricing Standard Tank: $210,000.00 plus freight and any taxes
Budget Price 304SS Tank & Pipe: $390,000.00 plus freight and any taxes

Factory Start up can be provided at an additional charge under separate contract.

Taxes are the responsibility of the purchaser.

Payment Terms: 30% Deposit with Order, 30% Payment with Release to Production, 35% Upon Inspection and Approval for Shipment, 5% Net 30 Days from Shipment. A Purchase Order will be subject to Pollution Control Systems, Inc. Terms and Conditions and approved by an Officer of PCS. Cost increases, if any, will be based on cost increases incurred by PCS.

PCS takes exception and excludes any equipment and services not stated on this proposal. This proposal is valid for 45 days.

Attachment 1: Contract Exclusions

The following items and services are not included as a part of this equipment proposal and are the responsibility of the owner or installing contractor:

- Foundation pad design, foundation pad, design calculations, or construction
- Structural calculations and loads
- Seismic calculations
- Engineered / Certified / Stamped Drawings
- *Land or Ocean Freight IS THE RESPONSIBILITY OF THE PURCHASER*
- Construction and Discharge Permit(s)
- Installation Supervision / Field Erection Supervision
- Crane for offloading
- Field welding
- Clarifier grout material and installation
- Installation of ancillary equipment not mounted in tank due to shipping limitations
- Main power conduit and wiring to system control panel(s)
- Electrical power connection to plant
- All interconnecting piping outside of plant walls
- Inlet plant piping
- Remote located blower piping to tank structure
- Effluent piping
- Remote located field piping connections from blower unit(s) to plant air manifold
- Access stairs, blower skids, control panels, grating, and handrail.
- No substances should be introduced to the system in quantities which are toxic to biological organisms.

STANDARD TERMS AND CONDITIONS OF POLLUTION CONTROL SYSTEMS, INC.

ENTIRE CONTRACT: The Proposal and any documents specifically incorporated herein shall constitute the entire agreement and understanding between the parties. The terms of the contract documents or specifications between Customer and any other person, including the Owner of the project, the Engineer or Regulatory Authorities, shall NOT be incorporated into this agreement unless PCS specifically consents thereto in a writing signed by it. PCS shall not be responsible for design of the system or treatment process nor for compliance with any regulatory requirements, including effluent requirements. No modification or addition to the Proposal shall be binding unless PCS specifically consents to such modification or addition in writing signed by it.

EXCEPTIONS: Regardless of the terms of the contract documents or specifications between the Customer and any other person including the Owner of the project, the Engineer or Regulatory Authorities, this contract excludes all items not specifically listed on the Proposal.

PAYMENT: Payments terms shall be as shown on the Proposal or as specifically agreed by PCS in a subsequent writing signed by it. Invoicing will be made on all partial shipments and payments for it shall be due according to said terms. Regardless of the terms of the contract documents or specifications between Customer and any other person no retainer shall be allowed against payments by Customer to PCS unless authorized in writing by PCS. Customer authorizes PCS to execute and file on its behalf a financing statement to conform to the Uniform Commercial Code in those public offices deemed necessary. Customer is responsible for collection costs including legal fees if litigation is required to collect.

TIME OF DELIVERY: PCS will set up and coordinate the shipment of all equipment unless otherwise specified by Customer. Partial shipments may be required in PCS's sole discretion. If PCS suffers delay in performance due to any cause beyond its control, including acts of God, war, act of government, act of Customer, priorities to allocations, fire, strike or labor trouble, sabotage, shipping delays, delays in obtaining labor, material, equipment or transportation, the time of performance shall be extended for a period of time equal to the delay and its consequences.

SUBMITTALS: Complete approval of PCS submittals must be received within 90 days after date of Order Acknowledgment or PCS reserves the right to review and adjust the price accordingly. No production will begin until approval of submittals.

TITLES AND INSURANCE: Security title and right of possession of equipment shall remain with PCS, regardless of mode of attachment to realty and other property until the full price (including deferred payments, notes, interest, back charges, set offs) has been made. No assignment of this equipment can be made until title has been transferred. Upon delivery (at f.o.b. point) of equipment all risk of loss or damage shall pass to Customer, who shall procure and maintain for the benefit of PCS and himself as their interests may appear. adequate insurance on the equipment against damage by vandalism, or other casualty. Acceptance of equipment from carrier constitutes a waiver of any claim against PCS for delay or damage in transit.

WARRANTY: PCS warrants equipment described to be free of defects in workmanship and material, when properly installed and operated under normal use and service for a period of One Year From Date Of Shipment of equipment unless PCS specifically agrees to other terms in a writing signed by it. NO OTHER WARRANTY SHALL BE IMPLIED, AND ANY STATUTORY WARRANTIES INCLUDING MERCHANTABILITY SHALL BE DEEMED WAIVED. Customer shall install the equipment per any instructions given by PCS. Failure to do so voids all warranties. PCS's obligation under this warranty is limited to furnishing or repairing without charge (f.o.b. factory) replacement part(s) for those items which within the warranty period have proven to be defective, provided the customer has given PCS immediate notice upon discovery of such defect. PCS shall have the option of requiring the return of the defective material (transportation prepaid) to establish the claim. Any repairs and/or replacement of equipment or accessories covered by this contract (except when actual defects of material and/or workmanship are evident as determined by PCS) will be paid for by Customer and such repairs will be made only on Customer's written order. The Customer will pay for any and all labor furnished by PCS and said labor will be supplied only on Customer's request and approval. Motors are not guaranteed against damage resulting from interruption or irregularity of current supply or substitution of other fuses or connections for those furnished by PCS. PCS's liability to Customer whether in contract or in tort arising out of warranties, representations, instructions or defects from any cause, shall be limited to correcting the equipment under the conditions aforesaid. PCS assumes no responsibility for consequential damage and PCS shall in no event be held liable for damages or delays caused by defective material and shall not be liable for consequential damage in case of any failure to meet the conditions of any warranty. PCS will make no allowances for repairs unless made with its written consent of approval.

TESTS: PCS shall be notified of and may witness any acceptance tests. If such tests are performed they shall be conducted within the warranty period of this contract unless otherwise agreed.

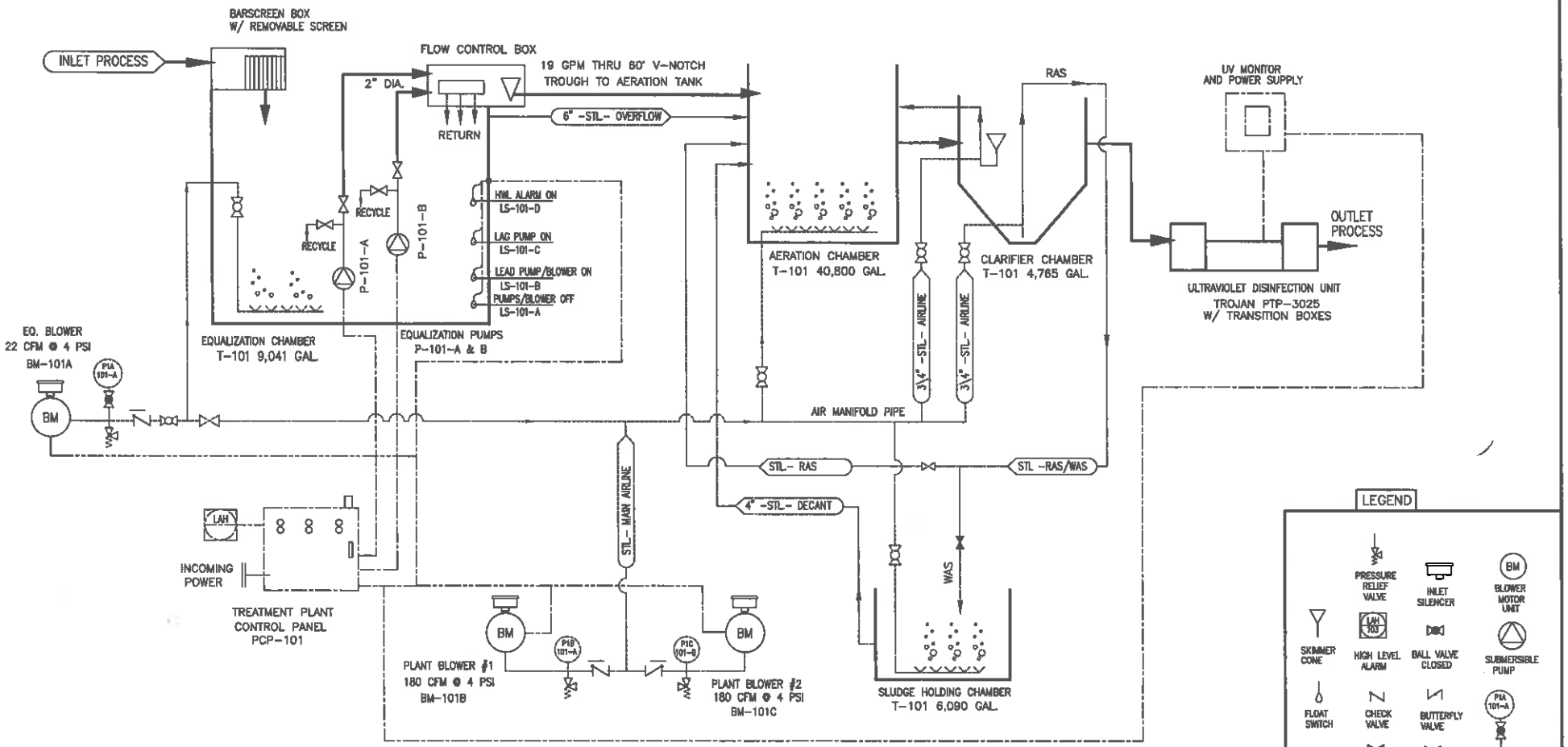
STORAGE: Equipment on which manufacturing has been completed but shipment held up at Customer's request will be placed in storage. Customer agrees to pay all cost of placing equipment in storage plus a daily storage fee to be determined by PCS.

TAXES: Sales and use tax will be the responsibility of the Purchaser except in the State of Ohio (if tax exempt in the State of Ohio: exemption certificate must be provided).

INSTALLATION: The purchase price as herein quoted DOES NOT include any installation unless specifically noted in the Proposal. PCS assumes no responsibility for any trouble caused by improper setting or assembly in the field. Customer agrees that if the equipment is subjected to weather or excessive dampness or other abnormal conditions, the Customer will pay for any repairs to equipment or accessories covered by this contract.

ARBITRATJON: Any controversy or claim arising out of or relating to the Agreement or breach thereof shall be settled by arbitration in accordance with the construct ion industry arbitration rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof. The decision of the arbitrators on such matters shall be a condition precedent to any right of legal action that either party may have against the other. The arbitrators shall fix their own compensation and shall assess the costs and charges of the proceedings upon either or both of the parties. All arbitration proceedings shall be conducted in Cincinnati Ohio

CANCELLATION CHARGE: in event of cancellation of the contract by Customer, Customer shall pay to PCS a cancellation charge equal to all charges, expenditures and commitments made by PCS up to the date of cancellation. This cancellation charge shall be in addition to any other remedies at law or equity for breach of contract.



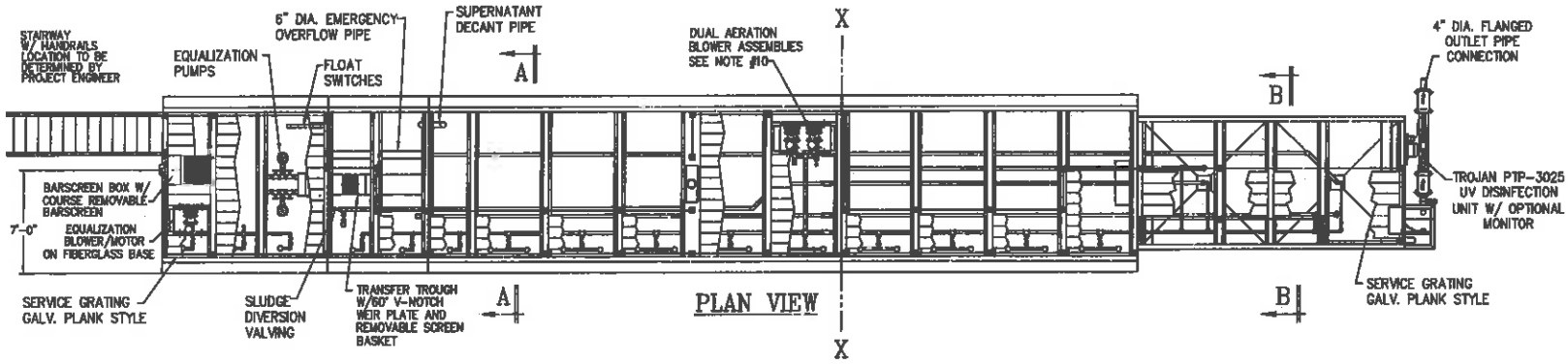
REV.	DATE	DESCRIPTION	APPROV.

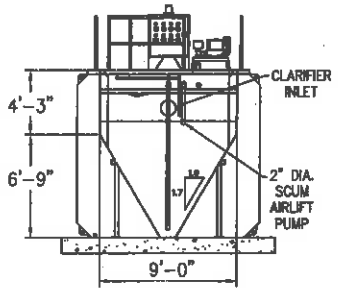
PCS Pollution Control Systems, Inc.
5827 Happy Hollow Rd., Suite 1B
Milford, Ohio 45105
(513) 831-1165
WEB: POLLUTIONCONTROLSYSTEM.COM

TOWN OF CARMEL, NY

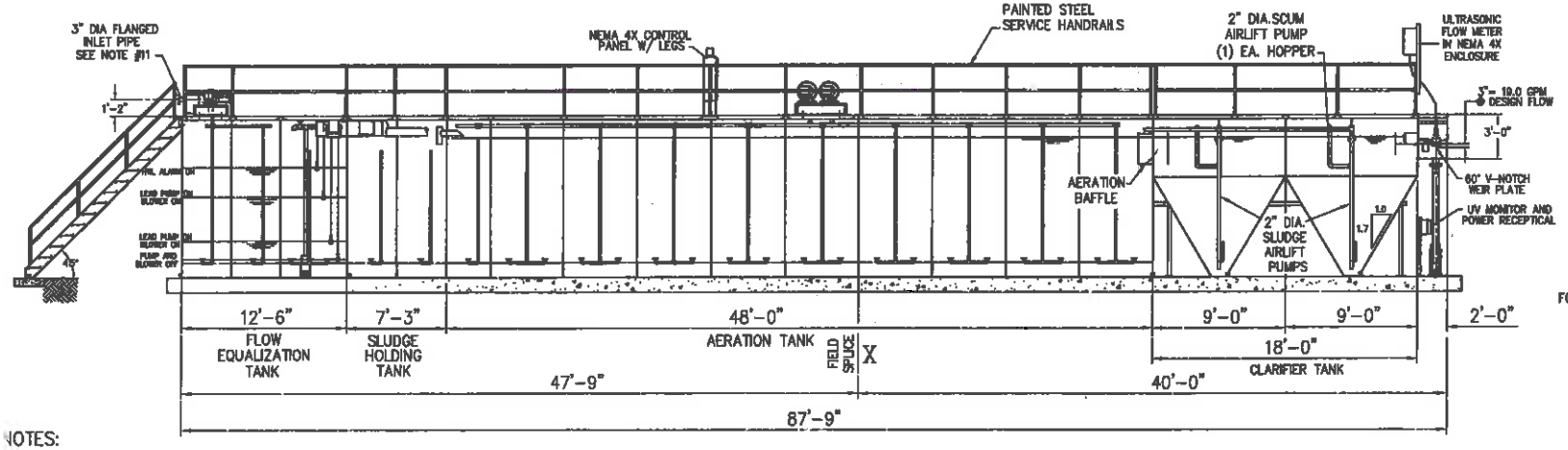
PROCESS FLOW DIAGRAM FOR 27.2 K/DAY
TYPICAL EXTENDED AERATION TREATMENT PLANT

SCALE:	NTS	QUOTE NO.		PROJECT NO.	
DRAWN BY:	JJM	DATE:	4/21/20	SHEET	DRAWING NO.
CHECKED BY:	MAC	DATE:	4/21/20	1 OF 1	16051-11

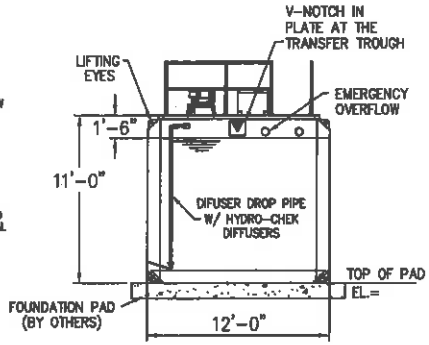




VIEW B-B



ELEVATION VIEW W/O SIDE WALL



VIEW A-A

NOTES:

1.) ALL EXTERNAL PIPING TO THE TANK IS TO BE SUPPLIED AND INSTALLED BY THE INSTALLATION CONTRACTOR.
2.) FOUNDATION PAD MATERIALS AND DESIGN IS DETERMINED BY THE PROJECT ENGINEER AFTER SOIL ANALYSIS IS COMPLETED
3.) MATERIALS FOR ANCHORING OF TANK TO THE FOUNDATION PAD IS TO BE SUPPLIED BY OTHERS
4.) INCOMING ELECTRICAL POWER AND CONNECTION TO THE CONTROL PANEL IS BY THE ELECTRICAL CONTRACTOR.
5.) TANK TO BE SURFACE PREPED PER THE PAINT MANUFACTURES RECOMMENDATIONS FOR THE SERVICE INTENDED AND PAINTED W/ 8-12 MILS DFT OF COAL TAR EPOXY PAINT SYSTEM
7.) DUE TO SHIPPING RESTRICTIONS TANKS ARE TO BE FIELD CONNECTED AT THE SHOP X-X SPLICE JOINT. INSTALLING CONTACTOR TO FIELD WELD WATERTIGHT AROUND WALL PORTS AND MAKE INTERCONNECTING PIPE CONNECTIONS.
8.) DUE TO SHIPPING RESTRICTIONS HANDRAILS, STAIRWAY, BLOWERS, CONTROL PANEL, FLOWMETER, UV SYSTEM AND MBBR MEDIA TO BE SHIPPED LOOSE FOR FIELD INSTALLATION BY THE INSTALLING CONTRACTOR
9.) SERVICE GALV. PLANK STYLE GRATING AND SERVICE HANDRAILS TO BE SUPPLIED FER SERVICING AND MAINTENANCE OF PLANT
10.) TYPE AND SIZE OF BLOWERS WILL BE VERIFIED ON APPROVED SUBMITTALS
11.) INLET PIPE SIZE TO BE VERIFIED BY PROJECT ENGINEER

PLANT MODEL NUMBER	DESIGN FLOW GPD	AERATION TANK VOLUME	CLARIFIER TANK VOLUME	SLUDGE TANK VOLUME	FLOW EQ. TANK VOLUME	FLOW EQ. BLOWER		MAIN AERATION BLOWER	
						HP	CFM	HP	CFM
P-27-ESUV	27,200	40,800	4,765	6,090	9,041	1.0	22	5.0	180

REV.	DATE	DESCRIPTION	APPROV.

*PLOT SCALE IS SET FOR PLOTING ON A B-SIZE SHEET.

PCS Pollution Control Systems, Inc.
5827 Happy Hollow Ln. Suite 1B
Milford, Ohio 45150
(513) 831-1165
Website: PollutionControlSystem.com

CARMEL HILLSDALE ESTATES, NY

27,200 GPD PACKAGED WASTEWATER PLANT
EXTENDED AERATION PROCESS
MODEL PP-27-ESUV

SCALE: *PLOT 1/8"=1'		PROJECT NO.			
DRAWN BY: JJM	DATE: 4/20/20	SHEET	DRAWING NO.		
CHECKED BY: JJM	DATE: 4/20/20	1 OF 1	16051-02		

APPENDIX-J

Membrane Bio-Reactor Preliminary Manufacturer Layout and Process Calculations

APPENDIX J1 Dynatec Systems, Inc.
APPENDIX J2 Smith and Loveless, Inc.

APPENDIX J-1

Dynatec Systems, Inc.

PROPOSAL 220039

For

J. Robert Folchetti & Associates

For

Carmel Hillsdale Estates

Date: 22 April 2020

Proposal by: Mike Butler

DYNATEC

PROPRIETARY AND CONFIDENTIAL

This document contains proprietary and confidential information that is the property of Dynatec Systems, Inc. This document is provided to the receiving party on the understanding that the receiving party:

- Acknowledges and accepts the proprietary nature of the information contained herein.
- Agrees that it will not directly or indirectly disclose the information contained herein to a third party.
- Agrees to limit the exposure of the information contained herein to as few people as possible, and only to those personnel and others who are directly involved in the project.

If these conditions are not acceptable to the receiving party, all copies of the document are to be immediately returned to Dynatec Systems, Inc. and any electronic copies are to be purged.

TIME LIMIT

This proposal is valid for a period of ninety (90) days from the date of the proposal.

INTRODUCTION

The project proposal is for the design and supply of a MBR wastewater treatment system. The proposed system is designed to receive 27,000gpd of sanitary wastewater. The proposed system includes the necessary major system components along with the associated engineering.

Dynatec has more than forty-one (41) years of experience in the application of membrane systems. During this time, the company has provided all categories of membrane systems, including Microfiltration (MF), Ultrafiltration (UF), Nanofiltration (NF) and Reverse Osmosis (RO) systems.

We approach the MBR projects as an end user, searching for the most reliable, cost effective and safest systems to operate. Dynatec is able to supply membrane products from a wide range of suppliers, and therefore can always select the best membrane for any particular application.

Dynatec provides a number of membrane configurations for MBR applications. The decision as to which configuration to supply for any particular project is based on the job-specific requirements, and the wastewater composition.

All Dynatec products offered for use in MBR applications use the external tubular UF membrane configuration. These products have proven through 40 years of experience to be more rugged, longer lasting and easier to control than alternative products. In addition, external modules make them safer to control, operate and maintain.

The MBR process uses the same robust tubular membranes that have been used in cross-flow applications for many years. The advantages of using an external tubular membrane configuration are:

- Long membrane life
- Ease of operation
- Consistent high quality permeate
- Simple operational control
- No requirements for annual draining of the membrane chamber
- Easy to troubleshoot alarm modes
- Enhanced operator safety
- Low maintenance requirements

External tubular membranes do not move in process. High velocity liquid scours the boundary layer from the membrane. The MBR is provided with a skid-mounted clean-in-place (CIP) system, which is used to clean the system in a matter of a few hours.

The MBR membrane arrangement does not expose the operator to off-gases and does not required annual draining of the membrane chamber for a visual inspection.

The infrequent replacement of membranes modules is a simple process, not requiring confined-space entry. Connections at each end of the membrane modules allow the old modules to be removed and the new modules place into service easily, using the same fittings.

The proposed wastewater treatment system is based on using a tubular ultrafiltration membrane process that has been successfully used in this application by Dynatec for almost twenty years. The Ultrafilter membrane provides a consistent, high quality effluent without the addition of chemicals or constant operator attention. The filter provides a positive barrier the effectively separates the oils and other solids from the discharge ensuring the project discharge limits are consistently met.

The benefits of the treatment system are:

- Automatic Operation
- Consistent Effluent Quality
- Low Operator Cost
- Low Chemical Cost
- Minimal Disposal Cost
- Remote Monitoring Capability

DESIGN BASIS

The following details the design basis of the equipment proposed:

Wastewater Source

Sanitary wastewater

Pre-Treatment

Prior to influent being delivered to the MBR process, the following pre-treatment shall have been carried out where necessary by Others:

- Flow equalization
- Wastewater transfer
- Removal of large solids

Additional Criteria

The design of the MBR system is based on the influent wastewater satisfying the following additional criteria:

- The wastewater must not contain contaminants that may be toxic to the process, or inhibit the removal of BOD and/or COD and/or nitrogen compounds (i.e. toxic, intractable or recalcitrant substances).
- The wastewater must not contain contaminants that are damaging to, or will cause blinding of, the membrane system. Any chemicals used in the wastewater feed should be submitted to Dynatec for review and approval. Any chemicals proposed for future use should also be reviewed by Dynatec prior to use.
- The wastewater must contain sufficient trace nutrients required to support the biology during the treatment of the organic contaminants
- The MBR system design is based on the temperature noted in the Influent Specifications. Lower temperatures will have an inhibitory effect on the biological process, and will affect the membrane system performance. Temperatures higher than the specified range will cause changes to the biomass that may adversely affect the process.

Design Influent to WWTP Wastewater Characteristics

The following table provides the data used in the proposed system design:

Influent	Value	Unit	Notes
Design Flow	27,000	gpd	
Min Reactor Temp	25	C	
Max Reactor Temp	40	C	
BOD	180	mg/L	
TSS	156	mg/L	
TKN/NH3	28	mg/L	
pH	7	SU	Assumed
Site Elevation	<500	feet	Assumed

Table 1: Influent Water Quality Specifications

Plant Performance after MBR Treatment

The following table provides the estimated quality of the UF permeate:

MBR Permeate	Value	Unit
BOD	<10	mg/L
TSS	<10	mg/L
pH	6-9	SU

Table 2: UF Permeate Estimated Water Quality Specifications

The following equipment is proposed for the treatment system:

Influent Screen							
Qty	Description	Capacity	Unit	Type	Material	HP	Notes
1	Screen/compactor	50	gpm	Rotary	SS	0.5	Supplied loose for field installation

Tanks - Bioreactor & Sludge							
Qty	Description	Capacity	Unit	Type	Material	Dimensions	Notes
1	Tank - Bioreactor	2,500	gal	Cone bottom, closed top	HDPE	91"x120"	Shipped loose for filed installation
4	Diffuser	0-35	cfm	Fine bubble	SS		Supplied loose for field installation
1	Level Transmitter	0-15	ft	Hydrostatic	SS		Supplied loose for field installation
1	DO sensor	0-20		Immersion, luminescent			Supplied loose for field installation
1	DO transmitter	4-20	ma				Supplied loose for field installation

Aeration						
Qty	Description	Capacity	Unit	Type	Material	Notes
2	Blowers	100	cfm	Positive Displacement	CI	Supplied loose for field installation

MBR Ultrafilter								
Qty	Description	Capacity	Unit	Type	Material	Installed HP	BHP @ design	Notes
1	Ultrafiltration System	805	ft^2	Tubular Ultrafiltration	PVDF	60	9	Membrane Skid supplied as a unit with CIP
1	Automatic Strainer	6	inch	Basket	CI & SS	0.25	0.22	Supplied loose for field installation
1	Chemical Pump, cleaning	0-8	gph	Diaphragm	Teflon	0.1		Supplied mounted on a rack
1	Chemical Pump, caustic	0-4.5	gph	Diaphragm	Teflon	0.1		Supplied mounted on a rack
1	pH sensor	0-14	SU					Supplied loose for field installation
1	pH transmitter	4-20	ma					Supplied loose for field installation

Control				
Qty	Description	Description	Material	Notes
1	Control Panel (CP)	NEMA 4X	FRP	
1	Motor Control (MC)	NEMA 12	Steel	

DETAILED SCOPE OF SUPPLY:

Screens and Wastewater Transfer

Wastewater will be transferred from an existing collection tank by **Others** to a rotary screen. Filtrate from the screen will be transferred to the EQ tank.

EQ Tank

The tank is a pre-cast concrete tank by **Others**. Wastewater transfer from the EQ tank to the bioreactor is by **Others**. A level transmitter is included for the tank to monitor the tank level, control wastewater transfer and provide alarms for high level. A regenerative blower will be provided to provide air to the EQ tank with coarse bubble diffusers.

Aerobic (Oxic) Bioreactor

The bioreactor is a 2,500 gallon HDPE tank. A level transmitter is included for the tank to monitor the tank level, control wastewater transfer and provide alarms for high level.

The dissolved oxygen (DO) level within the tank is monitored and controlled. Two (2) 100 cfm PD blowers, 1 duty and 1 standby, will be driven by a VFD responding to the DO signal.

Air is distributed within the tank using fine bubble diffusers.

MBR UF Membrane System

One UF membrane systems containing wide channel tubular membranes, 6" diameter by four meter long each one containing 161 square feet of membrane area. Each membrane housing contains eight millimeter diameter membrane tubes. The UF unit has five (5) modules installed.

A permeate recycle valve is installed which will automatically return permeate to the process (feed) tank when there is a low influent flow volume. This is done in order to prevent the system from shutting down "dirty" and allowing the waste fluid to sit in the membranes.

Valves 3" and larger will be Butterfly valves. Valves 2" and smaller will be true union ball valves.

The membrane rack is constructed of carbon steel with a galvanized coating.

UF Circulation Pump

Mill duty stainless steel circulation pumps manufactured by Sulzer Pumps will be provided. The circulation pumps are designed in order to provide the correct velocity and pressure within the membrane tube in order to maximize permeate reduction and minimize fouling potential. The pump is provided with a dynamic seal configuration to provide long seal life.

System Controls

Process control and alarm notification is provided through a pre-programmed PLC based control system, fully factory pre-wired and installed in NEMA 4X panel. The HMI allows the operator to control and monitor the complete system operation through operator inputs within pre-set limits. All functions are controlled via the processor, which receives data from the system instrumentation. Diagnostic functions are also included, as well as the automatic membrane cleaning sequence, if supplied. The control panel houses:

PROCESS CONTROL & ALARM NOTIFICATION

A pre-programmed PLC (Programmable Logic Controller) based control system will control all functions of the system. Optionally, the PLC is capable of allowing remote monitoring through an owner supplied telephone line or Ethernet connection. All process functions are controlled via the processor, which receives data from the system instrumentation. The processor controls the system based on preset treatment strategy. Many functions are field adjustable to meet changing conditions. Diagnostic functions are also included, as well as the membrane sequence function, and the automated cleaning functions. The control panel will house:

1. AB PLC
2. Input and output racks
3. Discrete and digital I/O's
4. Uninterrupted power supply (UPS)
5. C-more HMI
6. Outputs for remote monitoring

Motor Control

A separate NEMA 12 rated enclosure, suitable for indoor installation is provided to house all motor starters, soft starts, variable frequency drives, power transformers, etc.

ENGINEERING:

Dynatec provides the engineering required to provide an integrated operating system, with each of the supplied components operating as required within the overall context of the system operation. Please note that drawings are provided in standard Dynatec format (details upon request). If formats other than this are required, an extra charge may be applied.

Submittal Information will be provided electronically:

- System and Unit Process and Instrumentation Diagrams
- Regen Blower General Arrangement
- Membrane System General Arrangement Drawing
- Single Line Electrical Drawing
- Manufacturer supplied information sheets for major system components

EQUIPMENT COMMISSIONING AND STARTUP

Commissioning

Dynatec can include the services of a field engineer at the job site for equipment commissioning and testing. The testing consists of filling tanks with clean water, and testing the system for leaks, as well as ensuring correct operation of pumps, blowers, instrumentation, and controls, etc. The work is to be carried out by the customer, supervised by Dynatec. Any field piping leaks are to be corrected by the installing contractor prior to startup. After these procedures have been carried out to the satisfaction of the Dynatec representative, the equipment can be started.

Process Startup

Owner's operator will then carry out the startup procedures, supervised by the Dynatec field engineer. This proposal assumes that a suitable biomass will be available, be acclimated, and be suitable for the MBR. We do not recommend the use of a biomass from a conventional biological treatment system, unless this has been screened to five hundred (500) micron and has been evaluated by Dynatec as being suitable for the application. Optionally, Dynatec can provide a bacteria source for initial seeding of the reactor.

Operator Training

Dynatec assumes that suitable operators will be made available for training. The minimum recommended qualifications for operators are that they are familiar with operations of biological treatment system and are capable of making informed decisions on the operation of a biological treatment system.

Technical Service

Dynatec has not included time for commissioning, startup and training. Time will be charged at the daily rates shown in the Pricing section of the proposal.

UTILITIES

The following utilities are required for correct operation of the system, unless specifically provided for elsewhere in the proposal:

1. Three-phase continuous power supply, 460/3/60 100 A
2. Supply of soft (less than 3 gr/gallon) clean water for membrane system cleaning.
3. Phone line connection where a phone dialer or other external system control or monitoring is to be installed.

SCOPE OF SUPPLY BY OTHERS

The following are specifically excluded from Dynatec's Scope of Supply, unless specifically included in other sections of this proposal:

Interconnection of the Proposed Equipment Exclusions

1. Utilities for the proposed system
2. Site civil work
3. UF Shelter
4. Placement and installation of the equipment
5. Wastewater delivery to the system and purified water discharge

Miscellaneous Exclusions

1. Lubricants for normal equipment maintenance
2. Process chemicals
3. Cleaning chemicals
4. Spare Parts: a list of recommended spare parts is available from Dynatec upon request
5. Analytical equipment required for either compliance or system maintenance requirements
6. Any and all compliance permits that may be required
7. Any taxes or bonding.
8. Any items not specifically included in this proposal

OPERATION AND MAINTENANCE REQUIREMENTS

1. The operation of the membrane system is automatic. Routine monitoring and testing is required, along with normal maintenance of the equipment. The operating personnel will also periodically initiate the system cleaning that will be required.
2. An Operations and Maintenance Manual will be provided electronically, which includes the details necessary for startup and operation of the system and a set of electrical and P&ID drawings.
3. There are periodic PM requirements for the installed equipment. This information is generally available in the supplied manufacturer's literature. If in any doubt about the requirements, please consult Dynatec in writing with specific requests.

WARRANTY

Materials and Workmanship

The equipment is warranted for a period of one (1) year from startup, or eighteen (18) months from delivery, whichever occurs first. Please refer to the attached Terms and Conditions for further details of this warranty.

PRICE SUMMARY

Validity

Pricing is valid for ninety (90) days

Terms of Payment:

Final pricing as quoted in this proposal is based on the following terms of payment:

- 20% upon submission of drawings
- 75% payment due prior to shipment
- 5% upon startup, not to exceed 120 days from shipment

Price:

MBR SYSTEM PRICE $200,000.00

DYNATEC DAILY BILLING RATES:

SENIOR ENGINEER	$1,250.00
PROJECT ENGINEER	$1,050.00
TECHNICIAN	$950.00

Supporting Commercial Information

TAXES:
Pricing does not include any taxes

FREIGHT:
Estimated Interconnection Pricing includes freight

BONDING:
Pricing does not include bonding.

ON-GOING TECHNICAL SUPPORT
If required, Dynatec can offer an after-sales maintenance service contract upon terms to be agreed.

OTHER TERMS AND CONDITIONS
This proposal is subject to the attached Dynatec Systems, Inc. Terms and Conditions.

DELIVERY

Equipment delivery from the factory will be approximately fourteen (14) weeks from receipt of PO, The final delivery schedule will be determined after receipt of a Purchase Order or Notice to Proceed.

TERMS AND CONDITIONS:

TIME LIMIT. All quotations are valid for a period of thirty (30) calendar days.

FOB POINT. Prices included herein are FOB point of manufacture. Transportation and Insurance charges, if any, to be prepaid by Dynatec Systems, Inc. (hereinafter referred to as "DYNATEC") will be invoiced at actual cost to the purchaser. Claims for shortages in shipments will be deemed waived unless made in writing to DYNATEC within ten (10) days after delivery.

PAYMENT TERMS. Payments will be made in accordance with the specified payment schedule. All payments are due thirty (30) net days from date of invoice unless noted otherwise. If in the judgment of DYNATEC the financial condition of the purchaser does not justify the terms of payment specified DYNATEC may require full or partial payment prior to shipment of the goods. Purchaser agrees to furnish DYNATEC with the required credit information. A service charge of one and one-half percent (1.5%) per month may be assessed against any purchaser on any amount due and not paid when due.

If the owner cannot accept delivery of the equipment within a period of thirty (30) days of being notified that the equipment is ready for shipment, the amounts due at shipment, or upon receipt of the equipment by the owner immediately become due and payable. Additional charges may also be applied for storage and shipping of the equipment to another location.

TAXES. Federal, state or local sales and/or use taxes are not included in the price set forth herein.

WARRANTY. DYNATEC warrants that all goods supplied by DYNATEC shall be free from defects in material and workmanship; provided however, that this warranty shall be limited to goods found to be defective within one (1) year from initial use or fifteen (15) months from date of shipment, whichever occurs first, and as qualified in the following paragraph. Resale products shall carry the warranty offered by the original manufacturer.

There are standard maintenance/wear items that are not covered by the standard one (1) year material and workmanship warranty. These items include but are not limited to: fuses, pump seals, pH probes, ORP probes, pressure gauges, temperature gauges, light bulbs, cartridge filter elements, diaphragms, etc.. These parts may not and in some cases will not last one (1) year.

The sole and exclusive remedy of the Purchaser for any liability of DYNATEC of any kind, including (a) warranty expressed or implied whether contained in the terms and conditions or in any terms additional or supplemental herein, (b) contract, (c) negligence, (d) tort, or (e) otherwise is limited to the repair or replacement FOB point of manufacture by DYNATEC of those goods which an examination reveals to be defective during the warranty period, or at DYNATEC's option to refund to the Purchaser the money paid to DYNATEC for such goods. Purchaser and DYNATEC may mutually agree to acceptance of the goods "as is" with an agreed upon reduction in price. Before DYNATEC undertakes any obligation to remedy defects, the Purchaser must give DYNATEC written notice of its claim and return the defective goods after receipt of shipping instructions from DYNATEC to return such goods. Purchaser will ship the goods to DYNATEC freight prepaid and DYNATEC will return the goods to the Purchaser freight prepaid. All goods returned for repair or replacement pursuant to this section are to be packaged in accordance with the instructions received from DYNATEC.

In no event shall DYNATEC be obligated to repair or replace goods, which are determined, by DYNATEC to be defective due to customer misuse or due to use not in accordance with specified operating conditions and operating and maintenance instructions. DYNATEC retains the option to witness the operation of the goods to verify operating conditions. DYNATEC shall not incur any obligation hereunder with respect to goods, which are repaired or modified in any way without DYNATEC's prior written approval. Installation by the Purchaser during regular intervals of normal maintenance of parts supplied by DYNATEC shall not constitute such modifications.

The warranty outlined herein is based upon the premise that the system is properly installed in accordance with installation instructions provided by DYNATEC. Further, start-up must be completed by a qualified DYNATEC technical service representative. The system must be operated and maintained as outlined in the Operating Manual.

DYNATEC shall be responsible for the work specified and outlined in the proposal, contract documents, plans, and specifications. DYNATEC's responsibility shall be limited to that work specifically outlined. If there is work related to the project but not specifically included as part of the contract the costs for that work shall be considered an extra to the project. In all cases, the cost of travel and living expenses shall be invoiced at cost for warranty and non-warranty work.

EXCEPT FOR THE EXPRESS WARRANTY STATED HEREIN DYNATEC DISCLAIMS ALL WARRANTIES WITH RESPECT TO THE GOODS INCLUDING ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE.

EXTENDED MEMBRANE LIFE WARRANTY. When an extended membrane warranty is offered, the standard warranty for material and workmanship provides for replacement at no cost during the first year and cost pro-rated for the remaining months of the extended warranty period. The warranty is based upon treatment of water that is consistent with the original guarantee conditions. The system must also be operated and maintained in strict accordance with the guidelines outlined in the operating and maintenance manual provided with the system.

The guaranteed throughput capacity of the system supplied is based upon processing wastewater consistent with the original wastewater conditions in terms of contaminants present and their concentration. Representative samples of the customer's wastewater must be processed by DYNATEC prior to offering this guarantee.

Also, in order to maintain the extended warranty a DYNATEC technical service representative must visit the site at least once during the first year and again at least once during the second year. The technical service representative will complete the following during his visit.

- - Review system performance log sheets
- - Review system maintenance log sheets
- - Clean the system and determine the clean water flux
- - Evaluate operating procedures
- - Make recommendations to enhance performance and improve system cleaning
- - Evaluate system performance

The cost for the technical service will be billed at the current rate at the time of the visit. Travel expense will be billed at cost.

CONFIDENTIAL INFORMATION. The information, drawings, plans and specifications furnished by DYNATEC have been developed at DYNATEC's expense and shall not be used or disclosed by Purchaser other than to install, maintain and operate the goods supplied hereunder.

PERFORMANCE WARRANTY. Performance shall be defined only from the pilot test by the quantitative and qualitative characteristics of the wastewater and purified water. Pilot testing must be completed prior to offering a performance warranty. Analytical testing will be completed for a composite sample of the wastewater and also for the purified water. The parameters tested shall be those identified by the project objectives. This work shall be completed whenever a performance guarantee is extended and the work shall be completed before the order is processed. The wastewater characteristics of the operating system shall be consistent with both the wastewater characteristics that form the basis of any guarantee and the discharge limits guaranteed.

If the waste water characteristics at the time of testing are consistent with the original waste water characteristics and the purified water does not meet the qualitative characteristics guaranteed DYNATEC will make appropriate changes to produce water that does meet the guarantee conditions. DYNATEC shall bear the cost of the changes necessary. If equipment only was supplied then only the equipment necessary to make the system comply shall be provided. If the equipment was supplied on an installed basis then DYNATEC shall supply the equipment and the installation thereof. DYNATEC will select and choose the required changes.

If the quantitative performance of the operating system is not consistent with the guarantee and the waste water characteristics are similar to those that form the basis of the design and the system has been operated and maintained as outlined in the DYNATEC Operating & Maintenance Manual the appropriate changes will be made to make the quantitative performance consistent with the guarantee. These changes will be made at DYNATEC's cost. If DYNATEC's original scope of supply included equipment only then the equipment necessary shall be supplied at no cost. If DYNATEC supplied the equipment on an installed basis the change will be made on an installed basis.

If the qualitative or quantitative characteristics of the purified water are not consistent with the guaranteed limits and the wastewater characteristics are different from the original analysis used as the basis for design any changes required to make the system produce water that complies with standards shall be the responsibility of the customer. DYNATEC reserves the right to approve any changes. DYNATEC reserves the right to complete the changes as long as the work can be completed at a competitive price by DYNATEC.

INSURANCE Dynatec Systems, Inc. shall provide the insurance outlined below with insurance companies lawfully authorized to do business in the state of New Jersey. The insurance shall be maintained from the commencement of performance of any work until final completion of all work. Dynatec will arrange to name AWM and the Owner named as also insured.

I.) Workers Compensation and Employers Liability:

a.) Workers Compensation Coverage: Statutory requirements

b.) Employers Liability Coverage:

$1,000,000 Each Accident Limit
$1,000,000 Disease Policy Limit
$1,000,000 Disease Each Employee

II.) Commercial General Liability covering for bodily injury and property damage including premises operations, products completed operations, contractual liability, personal and advertising injury:

a.) Occurrence Form with the following limits:

$1,000,000 Each Occurrence
$1,000,000 Personal & Advertising Injury
$2,000,000 General Aggregate
$2,000,000 Products/Completed Operations Aggregate

III.) Automobile Liability:

a.) Coverage to include all owned, hired and non-owned vehicles with the following limits:
$1,000,000 Combined Single Limit Bodily Injury and Property Damage

IV.) Umbrella Liability

a.) $5,000,000 Each Occurrence Limit
$5,000,000 Aggregate Limit

DELIVERIES. The delivery dates quoted are based on DYNATEC's best estimate of a realistic time when delivery to the carrier can be made and are subject to confirmation at the time of acceptance of any resulting order. DYNATEC reserves the right to make early or partial shipments and invoice Purchaser accordingly.

EXCUSABLE DELAYS. DYNATEC shall not be liable for loss, damages, detention or delays resulting from delays beyond its reasonable control or caused by but not limited to strikes, restrictions of the United States Government or other governments having jurisdiction, delays in transportation, inability to obtain necessary labor, materials or manufacturing facilities.

PAYMENTS. The purchaser shall indemnify and hold DYNATEC harmless against any expense or loss or other damage resulting from infringement of patents or trademarks arising from DYNATEC's compliance with any designs, specifications or instructions of the Purchaser.

TITLE AND RISK OF LOSS OR DAMAGE. Risk of loss and/or damage shall pass to the Purchaser upon delivery of the goods to the FOB point. Title shall pass to the Purchaser upon receipt of final payment by DYNATEC.

CANCELLATION. Cancellation of any order must be with the prior written consent of DYNATEC and will be subject to cancellation charges.

LAWS, CODES, AND STANDARDS. Except as expressly stated herein, the terms, price and schedule included herein are based on United States laws, codes, and standards in effect as of the date of this order. Should such laws, codes, and standards change, and increase or decrease the cost of performing the work, and/or impact the schedule, DYNATEC shall advise Purchaser of such. Purchaser and DYNATEC shall mutually agree to any modification of the order resulting from such change or changes.

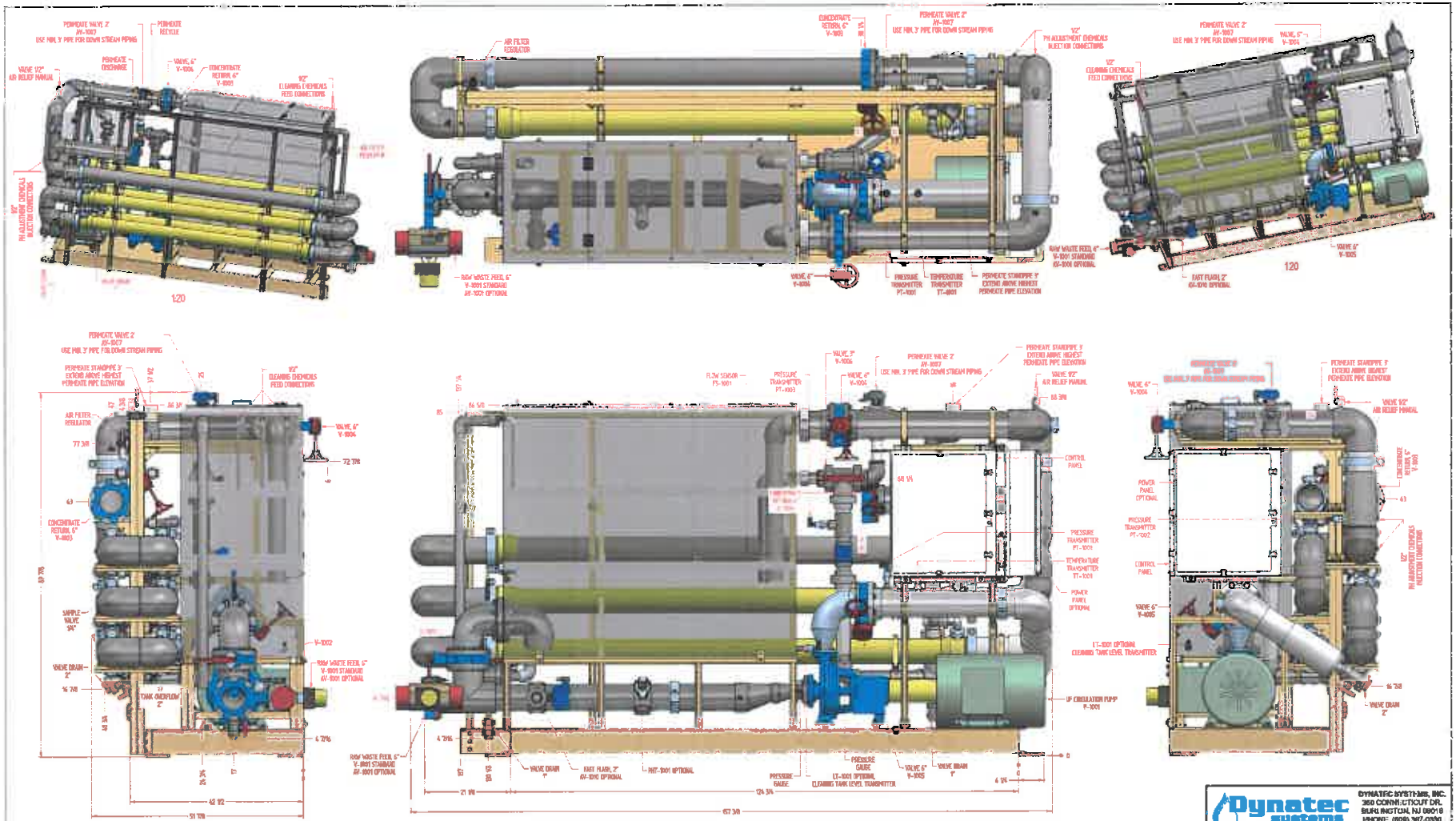
CONSEQUENTIAL DAMAGES/LIMIT OF LIABILITY. DYNATEC shall not in any case whatsoever be liable for special, incidental, indirect or consequential damages of any kind. In no case shall DYNATEC's liability exceed the amount paid to DYNATEC by the purchaser for the specific goods giving rise to such liability. Purchaser agrees to indemnify and hold DYNATEC harmless from and against all liabilities, claims and demands of third parties of any kind relating to the goods and their use after shipment of the goods.

MODIFICATION. No modification or waiver of any part of these Terms and Conditions shall be valid unless it is in writing and signed by an authorized representative of the Purchaser, and an officer of DYNATEC.

ASSIGNMENT. These Terms and Conditions may not be assigned or transferred by operation of law or otherwise without the prior express written consent of DYNATEC. Any transfer or assignment of any rights, duties, or obligations hereunder without such consent shall be void.

GOVERNING LAW. All matters governing the validity, interpretation and application of these Terms and Conditions shall be controlled by the laws of the State of New Jersey, United States of America.

ENTIRE AGREEMENT. Purchaser by acceptance of DYNATEC's offer does acknowledge and agree to the terms and conditions contained herein. Only representations, promises, conditions or understandings subsequently reduced to writing and signed by an authorized representative of the Purchaser and officer of DYNATEC shall be binding on either party.



UNIT CONFIGURATION (OPTIONS INSTALLED):

1. 6 MODULES
2. AV-1001 RAW WASTE FEED
3. AV-1010 FAST FLUSH
4. PHT-1001
5. LT-1001 CLEANING TANK LEVEL TRANSMITTER

NOTES:

2. DIMENSIONS FOR REFERENCE.
3. PIPING CONNECTED TO THE UNIT MUST BE INSTALLED AND SUPPORTED SO THAT THE FORCES, VIBRATION AND WEIGHT OF THE PIPING ARE NOT DIRECTED TO THE UNIT. WHEN PLANNING THE SUPPORT LOCATIONS REMEMBER THE ALLOWANCE FOR THERMAL EXPANSION.

Dynatec systems
DYNATEC SYSTEMS, INC.
350 CONNECTICUT DR.
BURLINGTON, NJ 08016
PHONE: (609) 387-0300
FAX: (609)-239-2081

TITLE: UF UNIT MECHANICAL ARRANGEMENT

CUSTOMER:			JOB NO. --
SIZE D	DWG. NO. UF-B8-63-6-5-610		REV. -
DRAWN BY: ASH	DATE: 10-26-17	CHECKED BY:	SCALE: 1:10	SHEET: 1 OF 1

APPENDIX J-2

Smith and Loveless, Inc.

Smith & Loveless, Inc.

14040 Santa Fe Trail Dr.
Lenexa, KS 66215-1284
Phone: (913) 888-5201
Fax: (913) 888-2173

TITAN™ MBR

TITAN MBR™ Budget Proposal:

Packaged Membrane Bioreactor
April 23rd, 2020

Project:

Carmel Hillsdale Estates

Consultant:

J. Robert Folchetti & Associates

Represented by:

Hydra-Numatic Sales Company

Smith & Loveless Inc.

Proposal Table of Contents

Understanding Your Treatment System Needs

The water characteristics you provided are summarized below:

Flow Conditions	
Flow (Average):	30,000 GPD
Flow (Peak Day):	30,000 GPD
Primary Source / Type:	Domestic

Site	
Elevation:	1,000 ft.
Process Blowers:	10 HP (approx.)
Flow Eq Blower (optional):	3 HP (approx.)

Influent Waste Characteristics	
BOD5:	63 lbs/day
TSS:	63 lbs/day
TKN:	9 lbs/day
TP:	N/A lbs/day
pH:	6 to 8 pH units
Alkalinity:	300 mg $CaCo_3$/L
Min. Water Temperature:	13° C

Effluent Requirements	
BOD5:	5 mg/L
TSS:	5 mg/L
TN:	8 mg/L
TP:	N/A mg/L*
pH:	6 to 8 pH units
Alkalinity (No Less Than):	75 mg $CaCo_3$/L

chemical addition required

Online: smithandloveless.com • Phone: 913.888.5201 • FAX: 913.888.2173

Achieving Results

To address the treatment system needs we recommend our **TITAN MBR™** system. This system will arrive in a factory-built tank(s) design ready for installation with minor field assembly.

TITAN MBR™ Features

1. **MBR (Aeration) Zone** (with S&L Membrane Modules)
2. **Submerged S&L Flat-Plat Membranes**
3. **Anoxic Zones for Nutrient Removal with Submersible Mixers**
4. **LIQUIDLIFT™ Automatic Anoxic Recycle System**
5. **Flow Equalization Zone** (Optional)
6. **OBEX™ Automatic Fine Screening**
7. **QUICKSMART™ PLC Touchscreen Controls**

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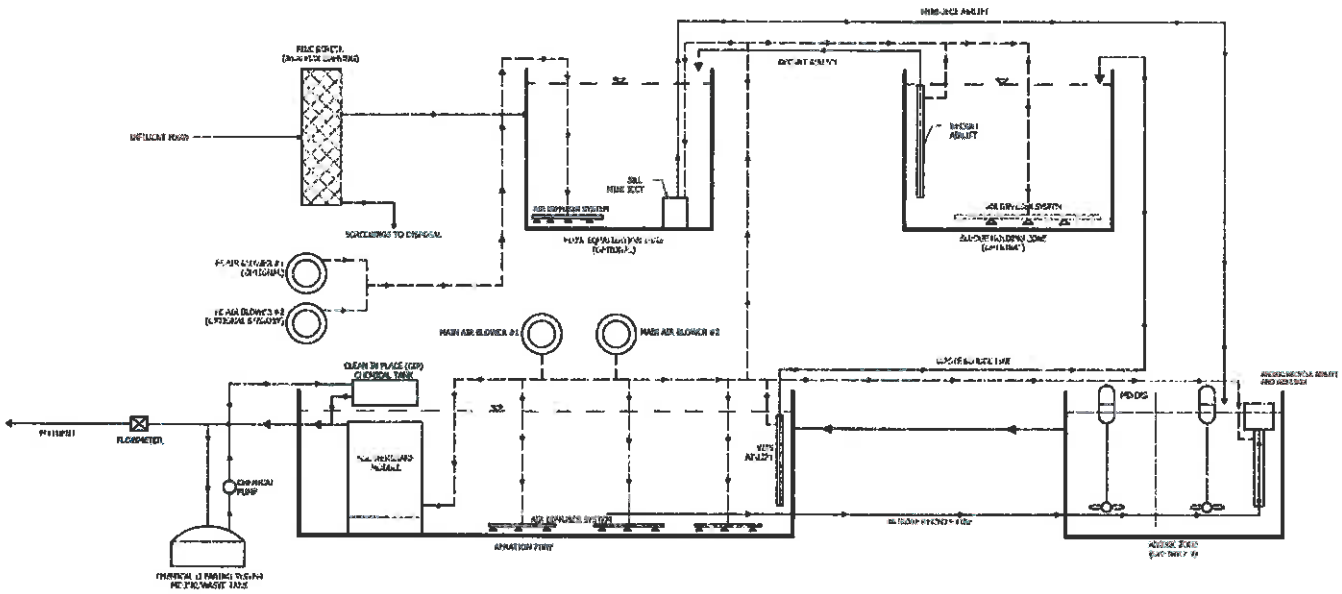
Process Flow Scheme & Executive Summary



The treatment plant structure shall be completely factory-built, with bottom, side walls, end plates, partitions and other shell tankage of not less than 1/4" (6 mm) thick structural grade steel plate reinforced to withstand all hydrostatic pressures. The structural reinforcing shall be accomplished by forming the sides, partitions and end plates with V-shapes.

An automatic **OBEX™** Spiral Fine Screen shall be mounted on the optional flow equalization zone. The screen shall consist of perforated metal trough with mesh a maximum of 3 mm opening. The fine screen components shall be of 304 stainless steel with the conveying screw of high tensile steel.

The optional flow equalization zone shall be equipped with coarse bubble diffusers with a Smith & Loveless **MINI-JECT®** pneumatic ejector provided and capable of delivering wastewater into the process train(s).

The first step in the process to consist of an anoxic zone properly equipped with submersible mixers with stainless steel guiderails. The anoxic zone to be followed by the aeration MBR process zone. Gravity to be used to pass flow through the membranes. A 316 stainless steel **LIQUIDLIFT™** airlift shall be installed in the first anoxic compartment, capable of delivering recycle from the MBR zone to the anoxic zone. Aeration zones shall be equipped with medium bubble diffusers.

The optional sludge holding zone shall be used for further digestion of wasted sludge and increased operator flexibility.

The factory-built **TITAN MBR™** shall have the air supply and wire management system included.

A **QUICKSMART™** PLC Controller shall be included.

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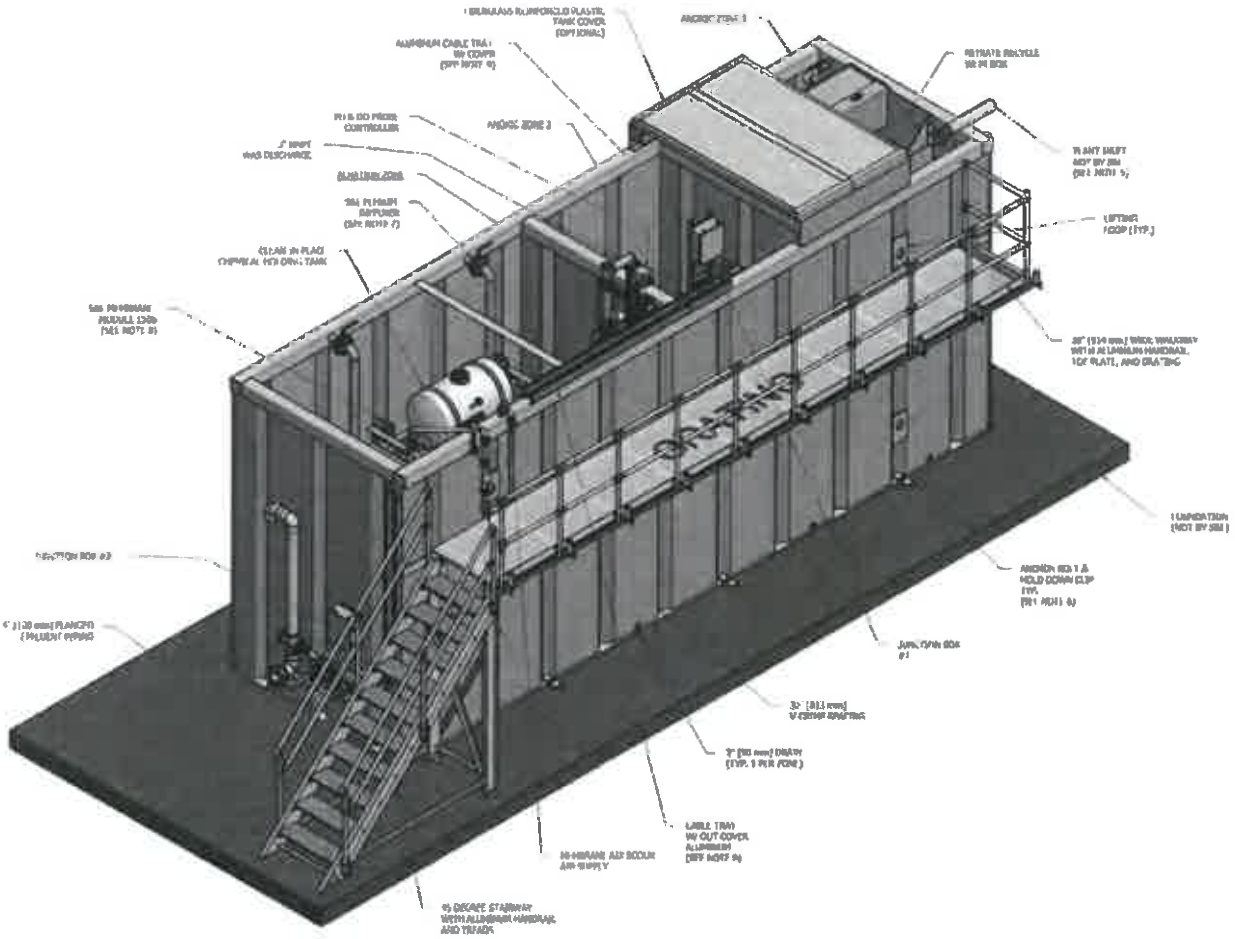
Drawings

Isometric View



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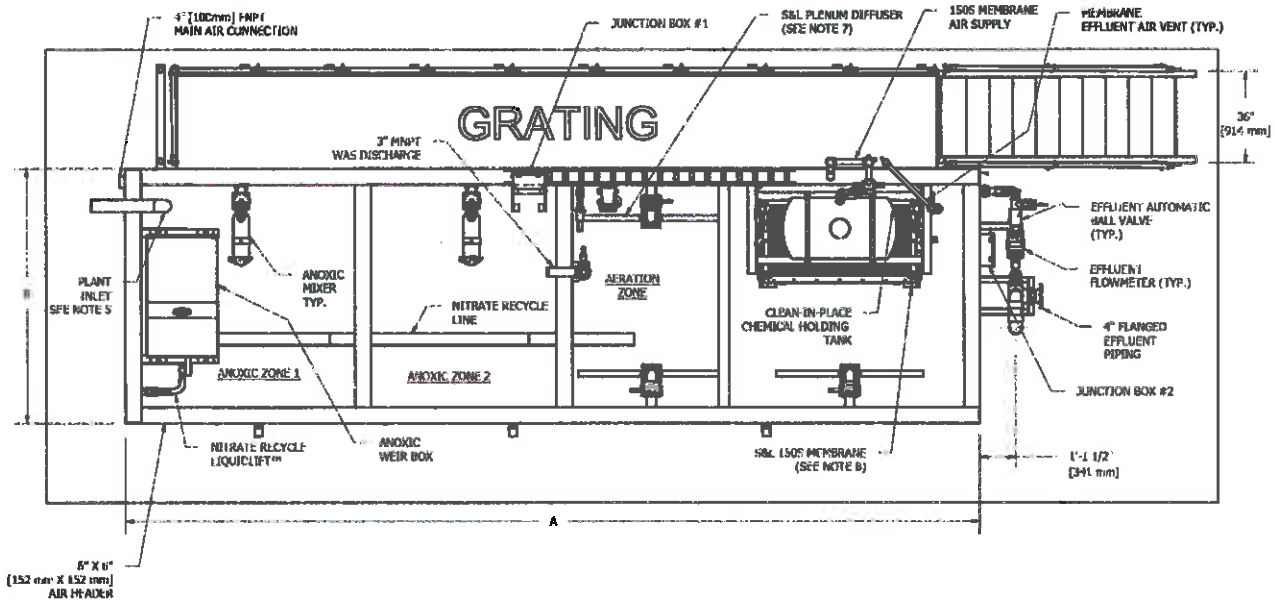
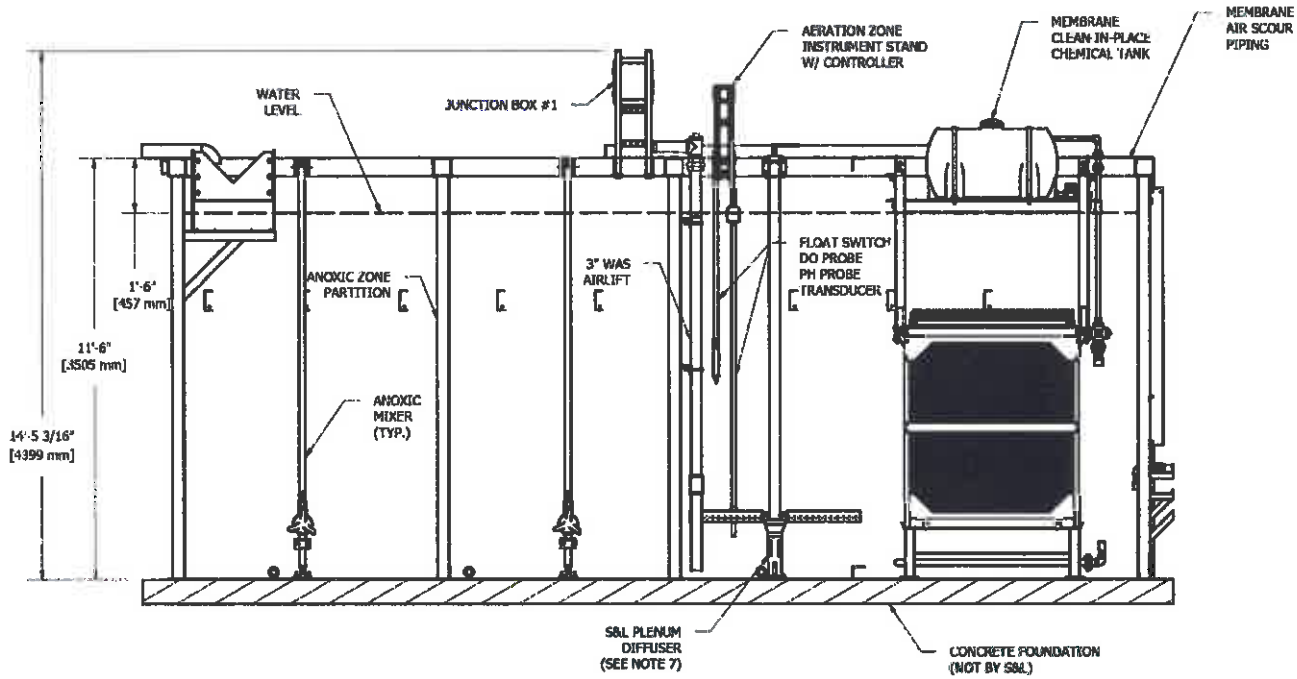
Drawings (Continued)

Plan View

B = 8'-0"
A = 27'-0"

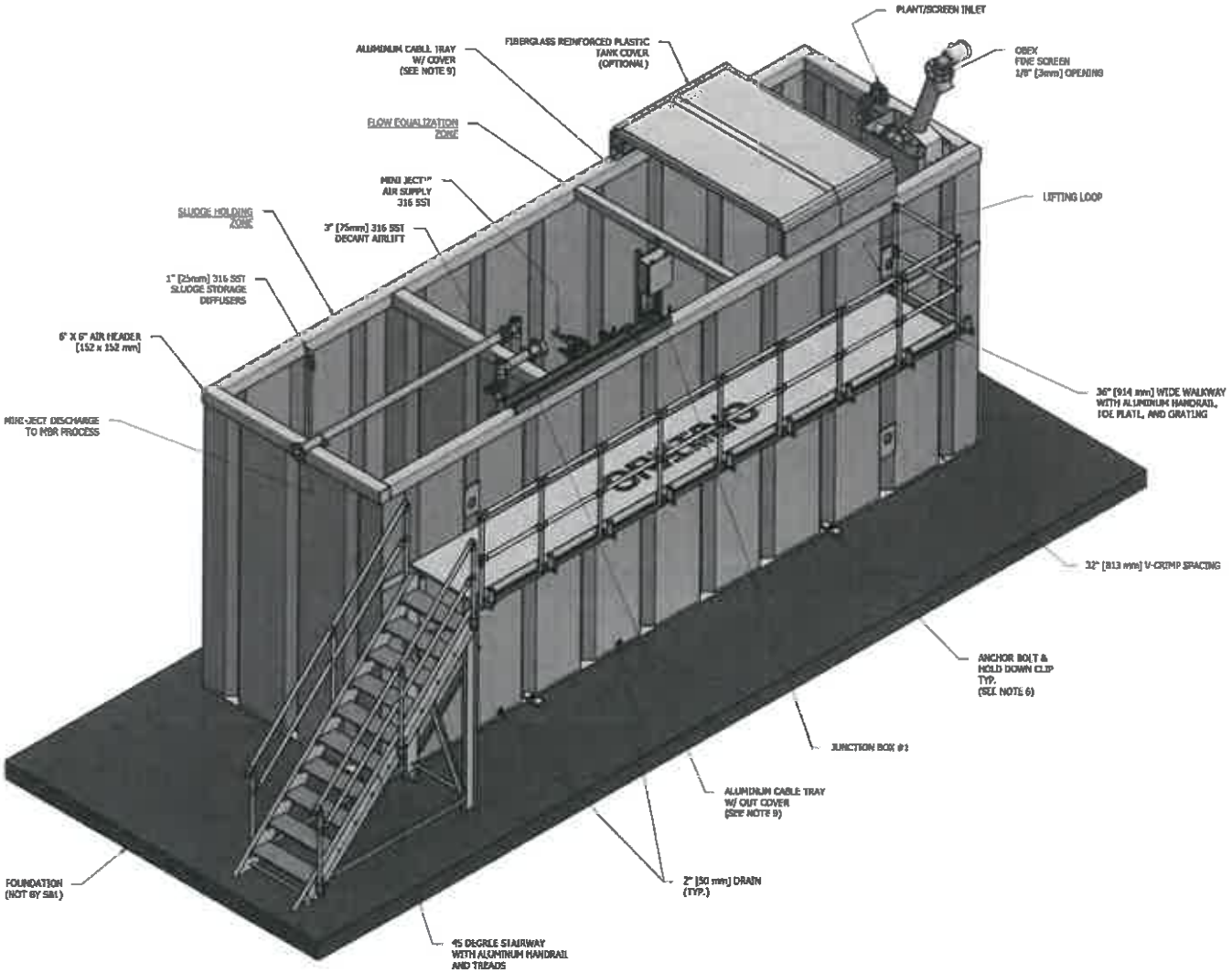


Elevation View



Drawings (Continued)

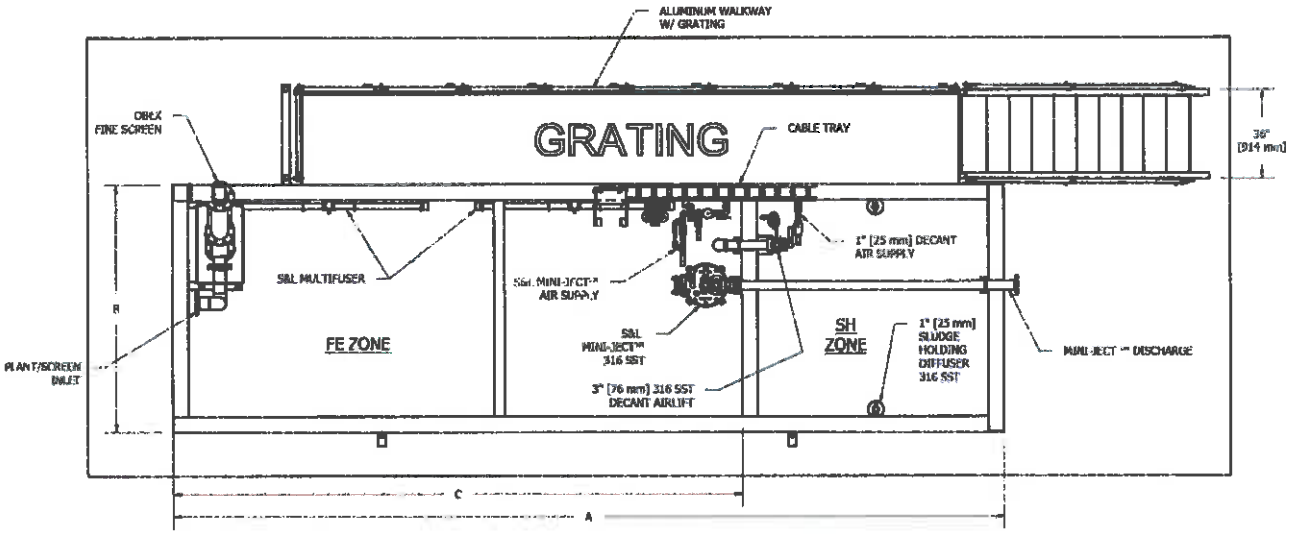
Optional Flow Equalization and Sludge Holding Tank (Isometric View)



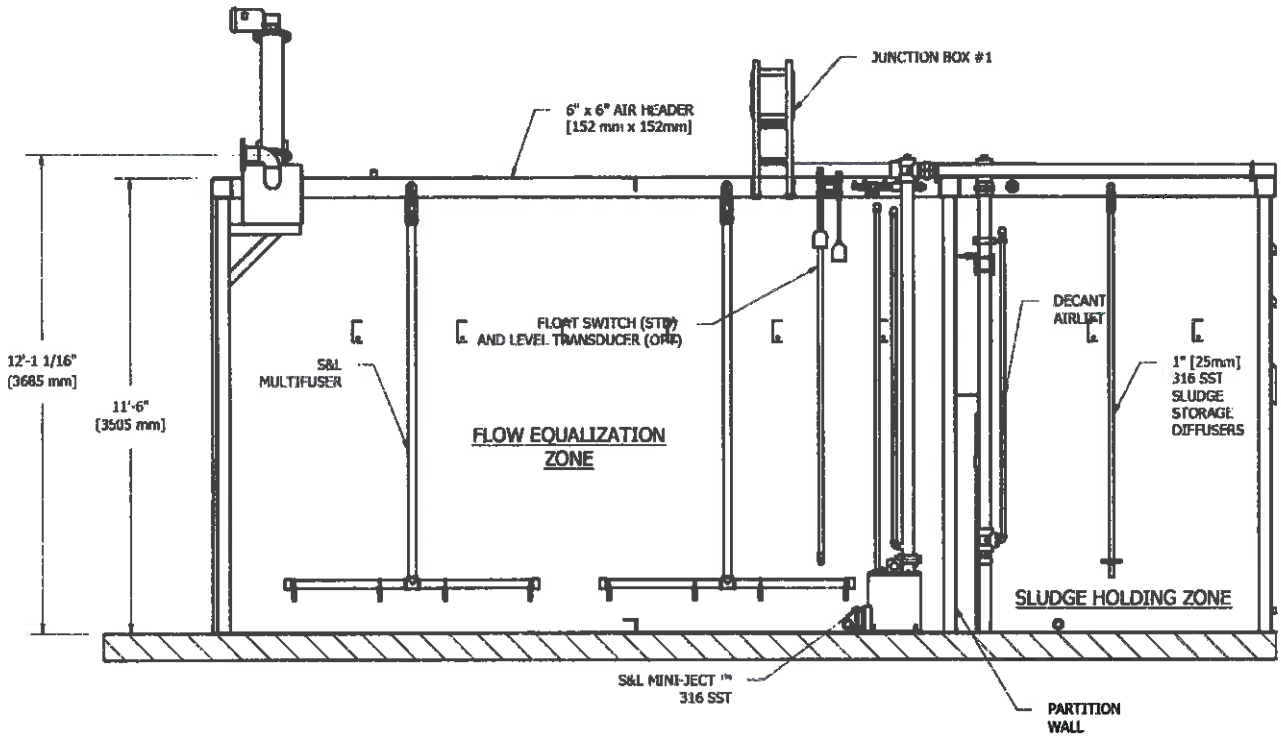
Drawings (Continued)

Optional Flow Equalization and Sludge Holding Tank (Plan View)

B = 8'-0"
A = 27'-0"



Optional Flow Equalization and Sludge Holding Tank (Elevation View)



Scope of Supply

Process Items Included:

- **MINI-JECT®** pneumatic ejector with adjustment valves.
- Flat-sheet membrane module(s) (Title 22 Approved)
- Medium bubble diffusers with 316 stainless steel drop pipes
- Air distribution headers integral to factory-built tank
- Air supply piping to MBR modules
- 316 stainless steel **LIQUIDLIFT™** anoxic recycle system
- Wasting/decanting sludge airlift
- Valves for diffuser drop pipes
- Flow meter
- Chemical clean in place constant head tank
- DO, pH, temperature sensors
- 525 gallons chemical holding/mixing/spent chemical tank
- 304 stainless steel, 3 mm fine screen

Tankage, Mechanical & Miscellaneous Items Included:

- Factory built, epoxy coated tank
- Access staircase and walkway
- Anoxic mixers
- Process warranty
- 10 days start-up services
- Flow Equalization (1 duty) and Main Process Air Blowers (1 duty / 1 standby)

Electrical Items Included:

- NEMA 4X Control Panel with **QUICKSMART™** HMI and PLC
- Wire management system via cable trays and factory wiring
- Junction boxes

Items Not Included:

- Unloading and setting of tank(s)
- Interconnecting piping and wiring (outside of tank)
- Any civil work
- Any lighting of the site
- Excavation
- Turbidity meter (OPTIONAL)
- Total Organic Carbon Analyzer for BOD/ TSS (OPTIONAL)
- Nitrate Analyzer (OPTIONAL)
- Main Process Air Blower VFDs (OPTIONAL)

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Investment and Timeline:

Total Equipment Cost:	$449,500 (one tank 54'L x 8'W x 11.5'H) $60,000 (two tanks, each 27"L x 8'W x 11.5'H)
Startup Cost:	Included
Freight:	Included
Submittal Timeline:	6-8 Weeks (after receipt of complete details)
Mfg. Timeline:	20-24 Weeks (after receipt in Seller's office of approved Submittal Data)
Delivery Timeline:	1 Week (after Manufacturing Completion)

Additional Price Details:

The estimated cost of this budget proposal constitutes a non-binding estimate for certain goods and/or services and is exclusive of applicable taxes.

F.O.B. factory plus any taxes, which may apply. Truck/Rail freight allowed to the job site, rail siding or nearest unloading area-unloading to be by Buyer.

Ten days of field services included for inspection of field installed components and initial start-up and operation of MBR system, spread over two (2) trips. If additional days and trips are required, Seller will furnish a factory-trained supervisor at additional cost.

Smith & Loveless, Inc. will provide one electronic copy of the O&M on CD in PDF format and four hard copies of the O&M.

Installation List

Installation	State	Flow (GPD)	BOD (mg/L)	De-Nitrification	Year Shipped
Napa	CA	7,500	7,700	No	2006
Centerville	MA	22,300	350	Yes	2008
Rochester	WA	100,000	350	Yes	2008
Indian Beach	NC	80,000	250	Yes	2010
Acton	MA	35,000	250	Yes	2013
San Antonio	TX	22,000		No	2013
Middleborough	MA	15,300	350	Yes	2014
Anne Arundel Co.	MD	6,000	300	Yes	2018
Preston	MD	20,000	300	Yes	2016
Lampe	MO	20,000	250	Yes	2016
Branson	MO	140,000	250	Yes	2018
Denton Co.	TX	200,000	216	No	2018

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Installation Overviews:

Residential

Application:	Private Development
Requirements:	Minimal Land Usage, Water Reuse / Reclamation
Peak Flow:	101,000 GPD (382 CMD)

Residential

Application:	Private Development
Requirements:	Minimal Land Usage, Water Reuse / Reclamation
Peak Flow:	101,000 GPD (382 CMD)

Residential

Application:	Housing Development
Requirements:	Minimal Land Usage, Simplified Maintenance
Peak Flow:	35,000 GPD (132 CMD)

Recreational

Application:	Youth Camp
Requirements:	Minimal Land Usage, Strict Effluent Requirements
Peak Flow:	18,500 GPD (70 CMD)

Casino

Application:	Lucky Eagle Casino
Requirements:	Effluent Quality
Peak Flow:	100,000 GPD (378.5) CMD)

Personal Health Care

Application:	Health Care / Nursing Home
Requirements:	Minimal Land Usage, Nitrogen Reduction
Peak Flow:	22,000 GPD (83 CMD)

Installation Overviews:

Food Processing

Application:	Food Processing – Noodle Production
Requirements:	Strict Effluent Requirements, Water Reuse
Peak Flow:	22,000 GPD (83 CMD)

Food Processing

Application:	Food Processing – Nut Processing
Requirements:	Minimal Land Usage, High Quality Effluent
Peak Flow:	10,000 GPD (38 CMD)

Beverage

Application:	Beverage - Winery
Requirements:	Water Reuse / Reclamation
Peak Flow:	9,500 GPD (36 CMD)

Beverage

Application:	Beverage - Winery
Requirements:	High Quality Effluent Water Reuse / Reclamation
Peak Flow:	5,000 GPD (19 CMD)

Beverage

Application:	Beverage – Winery
Requirements:	High Quality Effluent Water Reuse / Reclamation
Peak Flow:	12,500 GPD (47 CMD)

Beverage

Application:	Beverage – Bottling Facility
Requirements:	High Quality Effluent Water Reuse / Reclamation
Peak Flow:	15,000 GPD (56 cmd) Total

Smith & Loveless Inc.

Understanding Your Effluent Goals: TITAN MBR™

Project Name: 30,000 gpd MLE TITAN STD
Process Enginee S. Alimoradi
Project Manager: M. Kasi

Units: US Customary

Date: 9/11/2019

Flow Conditions	
Avg. Flow	30.0 kGPD
Peak Flow	30.0 kGPD
Primary Source / Type	#N/A
Data Parameter 4	#N/A

Site	
Elevation	1,000 ft
Summer Air Temperature	30 °C
Winter Air Temperature	11 °C
Available Footprint / Area	#N/A $ft.^2$

Influent Waste Characteristics	
Design Flow Rate	30.0 kGPD
BOD	250 mg/L
TSS	250 mg/L
NH_3-N	#N/A
TKN	35 mg/L
TP	10 mg/L
pH	6.5-8 pH units
Alkalinity	300 mg $CaCO_3$/L
Min. Water Temperature	12 °C
Max. Water Temperature	30 °C

Effluent Requirements	
BOD	5 mg/L
TSS	5 mg/L
NH_3-N	2 mg/L
TN	8 mg/L
TP	1 mg/L
pH	6.5-8 pH units
Alkalinity	75 mg $CaCO_3$/L

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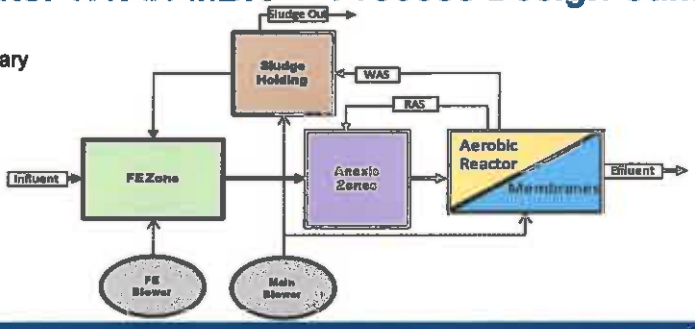
Achieving Results: TITAN MBR™ Process Design Summary

Units: US Customary



Flow Equalization

Flow enters the FE or Flow Equalization zone and is mixed with coarse bubble diffusers to keep solids in suspension. At average flow condition, the FE zone can hold the water for the retention time, that can help the maintenance and improve the consistency of flow to the system.

Design Goals	
Number of Zones	1 Zones
Peak Flow*	30.0 kGPD
Equalized Design Flow	30.0 kGPD
Volume Each Zone	1,586 ft^3
Retention Time at Design Flow	7.7 hrs

*Duration of PK Flow: #N/A

Anoxic Zones

Flow enters the Anoxic Zone it is combined with a recycle flow from the Aerobic reactor. The aerobic reactor contains oxydized nitrogen in the form a nitrate. Under anoxic conditions, the biomass converts nitrate to nitrogen gas while reducing BOD.

Design Goals	
Number Of Zones	1 Zones
Volume Each Zone	1,127 ft^3
Design Anoxic Recycle Ratio	4.4 QIR/Q
Design Denitrification Rate	10.57 lb NO_3-N/d
Design Effluent Nitrate (Final)	6 mg/L

Aerobic Reactor

The flow will be transferred to the aerobic zone from the anoxic zone. In Aerobic conditions the biomass reduces BOD and oxidizes ammonia to nitrate. This zone is designed based on the characteristics listed at right.

Design Goals	
Number of Zones	1 Zones
Volume each Zone	1,137.4 ft^3
Solids Retention Time	11 days
Hydraulic Retention Time	6.8 hours
Mixed Liquor Concentration	10,000 mg TSS/L
Volatile Mixed Liquor Concentration	5,598 mg VSS/L
F/M Ratio MLVSS Basis	0.079
BOD Loading Rate	27.62 lb/kft^3-d

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Achieving Results: TITAN MBR™ Process Design Summary

Membrane(s)

Mixed liquor suspended solids will be filtered from the water using membranes. The membranes contain very small pores that allow only water to flow through, removing virtually all solids. The solids will be recycled with a pump back to the head of the anoxic zone. The Membranes were design based on the physical parameters listed at right.

	Design Goals	
Total Membranes	2	S&L 150 unit
Design Average Flux at 20 C	14.5	gpd/ft^2
Membrane Area	4,521	ft^2
Total Air Scour Required	106.0	scfm

Sludge Holding

As the waste is treated, and solids removed from the water, the amount of MLSS in the aeration zone will increase. Solids must be removed from the aeration zone as to keep the concentration near the design mixed liquor concentration. The **TITAN MBR®** is equipped with a sludge holding zone to transfer and hold the excess solids until they can be properly dealt with. This zone has the capabilities to further concentrate the solids and decant the supernatant back to the FE zone. The sludge holding zone was designed based the values listed at right.

	Design Goals	
Number of Zones	1	Zones
Volume each Zone	678.7	ft^3
Estimated Solids Production	65.4	lb TSS/d
Waste Sludge Concentration	10,000	mg TSS/L
Volume of WAS per Day	783	gpd
% Solids After Concentration (Est.)	2.0	%
Solids Holding Time with Decanting	13	days

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Achieving Results: TITAN MBR™ Process Design Summary

Aeration Requirements

To supply the system with the required dissolved oxygen for BOD removal, air diffusers are installed in the aeration zone. A main blower is used to provide air to aerated zones except FE zone. A FE blower is used to provide air to mix the FE zone. The aeration requirements were designed as follows.

Diffuser Design	
Coarse Bubble Diffusers	
Actual O_2 Requirement (AOR)	103.4 lbs O_2/d
O_2 Credit From Air Scour	75.8 lbs O_2/d
Alpha	0.57
Beta	0.95
Coarse Bubble Air	32 scfm
Total Aerobic Zone Air	32 scfm

Additional Operational Air Requirements	
Mixing in the SH Zone(s)	20.4 scfm
Air For Airlifts	55.0 scfm
Mixing in the FE Zone(s)	23.8 scfm

Total Air Requirements	
Main Blower	204 scfm
FE Blower	24 scfm

Power Requirements

Main Blower Design	
Main - Gauge Pressure	7.2 psi
Calculated Power Req'd	9.3 BHP

Flow Equalization Blower Design	
FE Blower Gauge Pressure	7.2 psi
Calculated Power Req'd	1.1 BHP

Supplemental Chemical Addition

MacroNutrients	
N Req'd. for BOD Removal	8.2 mg N/L
P Req'd. for BOD Removal	1.8 mg P/L

Phosphorus (P) Removal Design	
P to be Removed Chemically	7.2 mg TP/L
Chemical to Use	Ferric Chloride
Dosing (Est.)	15.2 lbs/d

Alkalinity Addition	
INF Alkalinity (Client Verify)	300 mg $CaCO_3$/L
Supplimental Alk Required?	No
Alkalinity to be Added	0 lb $CaCO_3$/d

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APPENDIX-K

Moving Bed Bio-Reactor Preliminary Manufacturer Layout and Process Calculations

APPENDIX K1 Earthtek Environmental, LLC
APPENDIX K2 Pollution Control Systems, Inc.

APPENDIX K-1

Earthtek Environmental, LLC

Town of Carmel, NY Wastewater Treatment Plant Equipment Proposal Dated March 26, 2020

A. Background

Earthtek Environmental, LLC was approached by John Folchetti, P.E. with J. Robert Folchetti & Associates to discuss upgrading or replacing the existing wastewater plant design for the municipality of Carmel, New York 10512. After reviewing the existing process and running computer simulations of adding treatment to the existing plant, it was determined that the most cost-effective option would be to replace the existing plant. This should eliminate the pumps required to feed the existing plant and simplify maintenance and operations. Based on the requested design flow and effluent requirements of this project, Earthtek is providing a budget quote for its Amber® moving bed biofilm reactor (MBBR) attached-growth treatment process.

Per the request, the estimated average daily design flow for the facility is 27,200 gpd. The estimated influent design concentrations provided by the engineer are as follows:

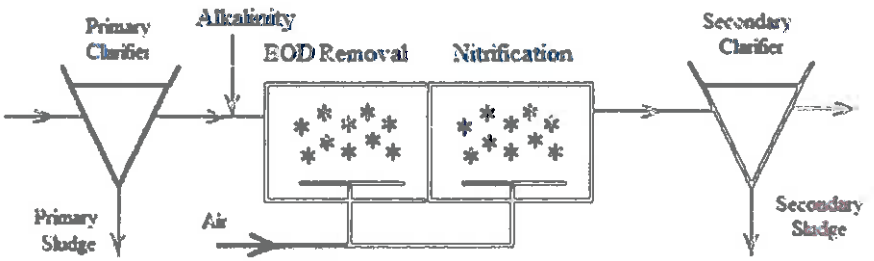
CBOD = 180 mg/l
TSS = 156 mg/l
Ammonia = 28 mg/l

The requested monthly effluent requirements for wastewater discharge are as follows:

CBOD < 20 mg/l
TSS < 30 mg/l
Ammonia < 8 mg/l (June – October)
pH = 6-9
Fecal Coliform < 200/100ml

B. MBBR Treatment Process

This proposal is based on using an Earthtek Amber Moving Bed Biofilm Reactor (MBBR) attached-growth biofilm treatment process. The proposed MBBR process provides BOD reduction and nitrification. A schematic of the process is shown below.



Two-Stage BOD/COD Removal and Nitrification 7/7/2

The Amber MBBR reactors consist of tanks filled with plastic media having specific gravity slightly less than one. The large surface area of the media provides abundant contact area for bacterial attachment. Biomass grows on the surfaces of the media as a thin film. Medium or coarse bubble diffusers placed at the bottom of the reactor maintain a dissolved oxygen (DO) concentration suitable for BOD reduction and nitrification.

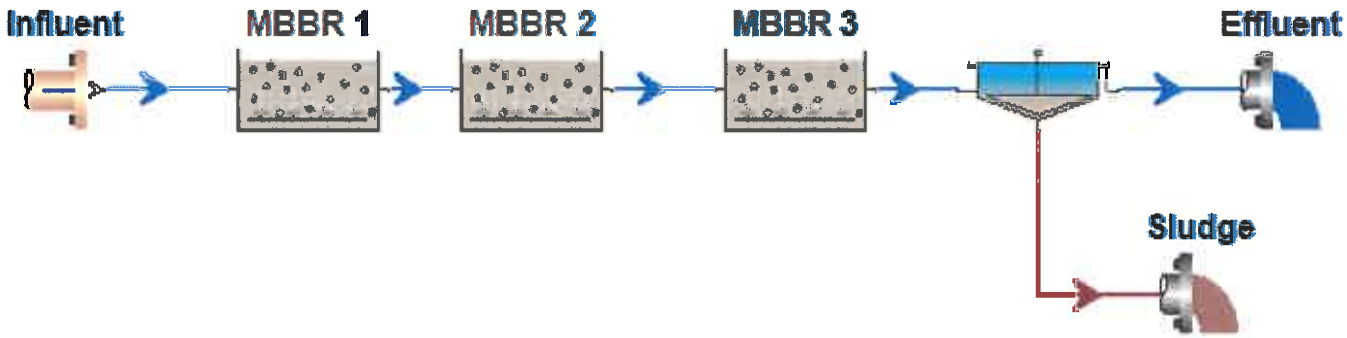
To keep the media from leaving the tank, a check valve is installed on the inlet pipe and a screen is placed on the discharge outlet pipe of the MBBR tanks. A clarifier is placed downstream of the MBBRs to separate sloughed solids from the treated effluent. The settled solids are sent back to the primary tank for digestion and no sludge recycle is required for this process.

MBBR technology employs thousands of polyethylene biofilm carriers operating in mixed motion within the wastewater treatment basin. Each individual biocarrier increases treatment capacity by providing protected surface area to support the growth of heterotrophic and autotrophic bacteria within its walls. It is this high-density population of bacteria that achieves high-rate biodegradation within the system, while also offering process reliability and ease of operation.

This technology provides cost-effective treatment with minimal maintenance since the MBBR process self-maintains an optimum level of productive biofilm. The biofilm thickness automatically increases or decreases in response to load fluctuations.

C. MBBR Equipment and Functional Description

This treatment process consists of a buried primary fiberglass (FRP) treatment tank, three buried FRP MBBR tank for secondary treatment, a buried FRP clarifier tank for solids separation and sludge removal, followed by UV disinfection and flow monitoring.



The primary treatment tank is a two-compartment, 10' diameter, 30,000-gallon FRP tank with hold-down hardware, access openings at the ground surface, and effluent screens with a smart filter high-level alarm switch. The primary tank will provide initial treatment and screening as well as anaerobic digestion of the waste sludge.

The MBBR tanks are 6.9' x 12' deep buried FRP tanks with coarse bubble aeration, SS outlet screens, two blowers (one active and one standby), with access openings at the ground surface. The tanks will contain approximately 55% fill volume of plastic media and provide an attached-growth biofilm treatment process for BOD reduction and ammonia reduction (nitrification). Three smaller MBBR tanks in series have been proposed as these are generally more cost effective than two larger ones. However, Earthtek can supply two larger MBBR tanks instead of three smaller tanks if desired.

Even though this system is not required to nitrify in the winter, a computer model was run to simulate cold weather conditions with an influent water temperature of 41° F. Based on this cold water temperature, the ammonia was reduced in the effluent to about 4 mg/l, well below the warm weather discharge requirements. The expected discharge BOD was 6 mg/l, and TSS was about 8 mg/l. The complete modeling data is available upon request.

The MBBR tank will be followed by a 6.9' diameter x 12' deep buried FRP clarifier tank to settle the sloughed solids from the MBBR process. This will include a floating scum skimmer and waste sludge pump with time-based control to periodically send the settled waste sludge back to the primary tank for anaerobic digestion.

Effluent from the clarifier will flow by gravity through an ultraviolet (UV) disinfection unit to remove pathogens. The UV unit is designed for vertical or horizontal flow and is designed to treat the peak plant flow.

A magnetic flow meter follows the media filtration system to measure decant flows. The meter sends flow data to the PLC where it is totalized and stored for reporting and operational purposes.

D. Budget Costs

The budget cost for ***MBBR Treatment*** which includes a primary tank, three MBBR tanks, clarifier, sludge pump, blowers, controls, UV disinfection, flow monitoring and one-year warranty for the equipment described above is **$375,000** delivered to the project site. This cost also includes one trip of up to 5 days on site for installation assistance, and one trip of up to 5 days on site for system startup and operator training. A list of the equipment included in the budget cost is shown on **Appendix 1**.

Additionally, Earthtek shall provide at least one day of system review and training at both six months and one year after startup. Earthtek will also provide submittals, an operation and maintenance manual, and free online system operational consultation if the system is provided with an internet connection. The free operator assistance is provided for as long as the owner and operator want it. Earthtek will provide a performance guarantee for one year in accordance with its standard terms.

This cost does not include sales tax, installation of the tanks, site piping outside the tanks, driveways, fencing, wiring, electrical installation, standby power generation, water, seeding, lighting or control building.

It is not required, but Earthtek recommends to install the control panel and blowers in a small building to protect them from the weather, increase equipment life, and to make operations simpler. A recommended minimum building is a 16' x 20' wood frame

structure with metal siding for the equipment and controls. A typical building from another site is shown below.

E. Experience and References

Earthtek has completed several similar size treatment plants that have been in operation for many years. Please refer to our web site at www.packageplants.com for more information about us and our package wastewater systems. We can provide treatment plant operational data, owner and operator references upon request.

F. Summary

The main advantage of a package wastewater system is that all the tanks and equipment are included and system performance is guaranteed by the provider. Since all components are provided by a single source, the owner has just one point of contact for operation and maintenance.

Using FRP tanks eliminates corrosion of steel tanks and cracking and deterioration of precast concrete tanks. FRP tanks are also warranted against leakage and structural failure and typically last a lifetime with no maintenance required. The tanks are buried so the temperature stays constant year-round, eliminates odors and unsightliness, and with no noise, keeps neighbors happy.

We work hard to make our plants simple to operate, maintain, and service. Our goal is to provide you with a quality plant and to provide you good service for the life of that plant.

Appendix 1 – Equipment List

Primary Tank

Item	Description	Quantity	Units
1	30,000 gallon, two-compartment, 10' dia. tank	1	ea.
2	FRP hold-down straps	8	ea.
3	Hold-down strap turnbuckles	8	ea.
4	1/2" galvanized wire rope deadman straps	160	lft.
5	1/2" galvanized wire rope clips	96	ea.
6	Deadman	4	ea.
7	24" risers	8	lft.
8	24" lids	4	ea.
9	36" risers - HDPE pipe	2	lft.
10	36" lids	1	ea.
11	Fiberglass epoxy resin part A	1	ea.
12	Fiberglass epoxy activator part B	1	ea.
13	Effluent filter	2	ea.
14	Smart Filter Switch	1	ea.
15	1" sch. 80 PVC pipe	10	lft.
16	1" sch. 80 PVC tee	2	ea.

MBBR Tank

Item	Description	Quantity	Units
1	6.9' diameter x 12' deep MBBR tank	3	ea.
2	30" tank risers	12	lft.
3	30" tank lids	6	ea.
4	Carbon filter lid vents	3	ea.
5	4" pipe grommets for vents	3	ea.
6	2" pipe grommets for air lines	3	ea.
7	MBBR media	28	m^3
8	24" 316 SS closed bottom air diffusers	30	ea.
9	Diffuser pipe welding and hole coring	3	ea.
10	Outlet screen	3	ea.
11	Overflow mesh screen	3	ea.
12	4" sch. 80 PVC pipe	6	lft.
13	4" sch. 80 Van Stone flange	3	ea.
14	5/8" x 4" 316 SS bolts	36	ea.
15	5/8" 316 SS washers	72	ea.

16	5/8" 316 SS nuts	36	ea.
17	4" x 2" sch. 80 PVC reducer bushing	3	ea.
18	2" sch. 80 CPVC Van Stone Flange	6	ea.
19	2" SS butterfly valve	3	ea.
20	2" sch. 80 CPVC pipe	30	lft.
21	5/8" x 5" 316 SS bolts	12	ea.
22	5/8" 316 SS washers	24	ea.
23	5/8" 316 SS nuts	12	ea.
24	2" sch. 80 CPVC elbow	3	ea.
25	2-1/2" SS pipe coupling	3	ea.
26	4" check valve	3	ea.
27	Float bracket	3	ea.
28	Alarm float, NO, 30' cable	3	ea.
29	Float weight	3	ea.
30	Control panel with alarms	1	ea.
31	Blowers	2	ea.

Clarifier Tank

Item	Description	Quantity	Units
1	6.9' diameter x 12' deep clarifier tank	1	ea.
2	30" tank risers	2	lft.
3	30" tank lids	1	ea.
4	36" risers - HDPE pipe	2	lft.
5	36" lids	1	ea.
6	Carbon filter lid vents	2	ea.
7	2" pipe grommets for vents	2	ea.
8	Waste sludge pump	2	ea.
9	1/4" SS lifting chain	15	lft.
10	1/4" SS shackles	3	ea.
11	3/8" x 1" SS chain bracket bolt (5/box)	2	ea.
12	3/8" SS chain bracket sealing washer (10/box)	1	ea.
13	3/8" SS chain bracket nut (25/box)	1	ea.
14	Silicone sealant for chain bracket bolt	1	ea.
15	Alarm float, NO, 30' cable	2	ea.
16	Float weight	1	ea.
17	J-Hooks for wire bundles	3	ea.
18	Float and chain bracket	3	ea.
19	2" sch. 80 PVC male adapter	1	ea.
20	2" sch. 80 PVC pipe	20	lft.
21	2" sch. 80 PVC elbow	4	ea.
22	2" sch. 80 PVC 45 elbow	2	ea.
23	2" sch. 80 PVC 22.5 elbow	2	ea.
24	2" sch. 80 PVC true union check valve	1	ea.
25	2" sch. 80 PVC tee	1	ea.

26	2" sch. 80 PVC socket x 1" FPT reducer coupling	1	ea.
27	1" air/vacuum valve	1	ea.
28	2" sch. 80 Van Stone flange	1	ea.
29	5/8" x 3" 316 SS bolts	4	ea.
30	5/8" x 4" 316 SS bolts	16	ea.
31	5/8" 316 SS washers	40	ea.
32	5/8" 316 SS nuts	20	ea.
33	4" sch. 80 PVC pipe	10	lft.
34	4" sch. 80 PVC tee	2	ea.
35	4" sch. 80 Van Stone flange	2	ea.
36	Floating scum pump	1	ea.

Tertiary Equipment

Item	Description	Quantity	Units
1	UV disinfection unit	1	ea.
2	Spare UV lamps	8	ea.
3	Spare UV quartz sleeves	8	ea.
4	Magnetic flow meter	1	ea.

BioWin Tankage Summary
Volume Units: gallons

Reactors	Name	Volume
	MBBR 1	2,482.0
	MBBR 2	2,482.0
	Primary Upper	13,340.0
	Group Total	**18,304.1**

Secondary Clarifiers	Name	Volume
	Clarifier	2,482.0
	Primary Lower	15,010.0
	Group Total	**17,492.0**

Total Volume for All Units **35,796.1**

BioWin Summary Report

Project Details

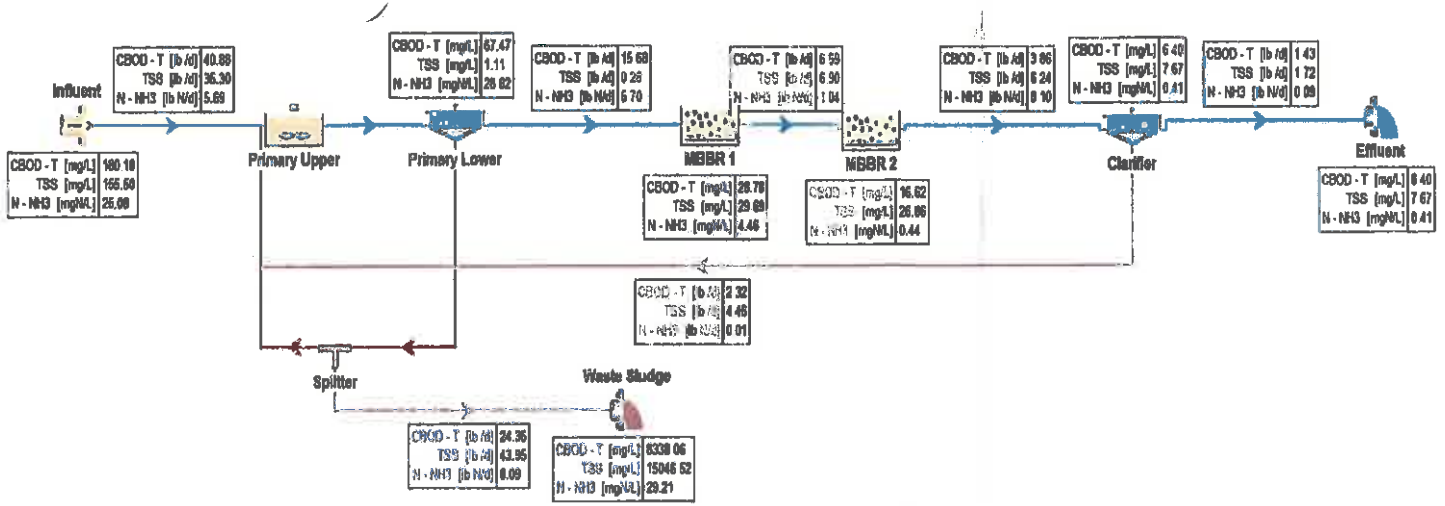
Plant Name	Unknown	**Flow Units**	gal/d
Project Name	Carmel NY primary, MBBR and clarifier	**Volume Units**	gallons
Project Number	BW1	**Area Units**	ft2
User Name	Kevin Chaffee	**Length/Depth Units**	ft

File Created	4/22/2020 0:00
File Last Saved	4/22/2020 15:20
Simulation Reference Date	4/22/2020
Simulation Reference Time	12:00:00 AM
Steady state solution	Yes

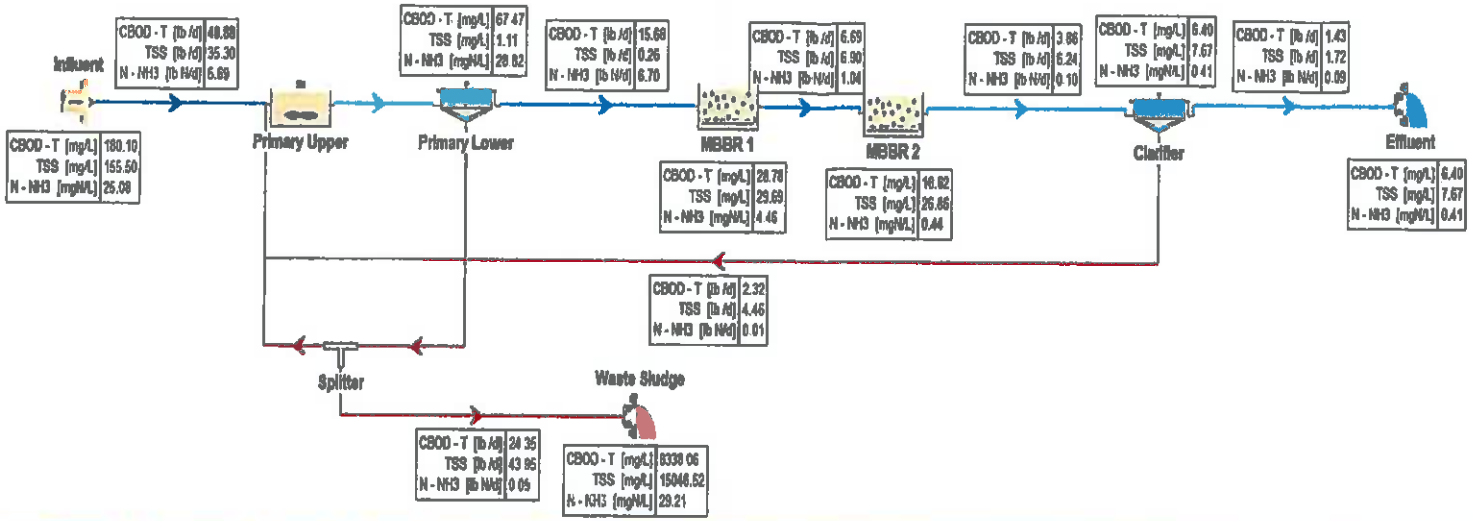
Site Conditions

Liquid Temperature (deg C)	10
Ambient Air Temperature (deg C)	20
Ambient Air Relative Humidity (%)	20
Global Surface Pressure (kPa)	101.325

Process Summary



BioWin Mass Balance Summary



PARAMETER	UNITS	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10
FLOW	gal/d	27,200.0	55,050.0	27,850.0	27,850.0	27,850.0	26,850.0	1,000.0	27,200.0	26,850.0	350.0
COD	mg/L	367	9,531	129	74	57	32	699	19,158	19,158	19,158
	lb/d	83	4,379	30	17	13	7	6	4,349	4,293	56
BOD	mg/L	180	4,154	67	29	17	8	278	8,338	8,338	8,338
	lb/d	41	1,909	16	7	4	1	2	1,893	1,868	24
TSS	mg/L	156	7,434	1	30	27	9	534	15,047	15,047	15,047
	lb/d	35	3,415	0	7	6	2	4	3,415	3,372	44
VSS	mg/L	120	6,023	1	27	24	7	476	12,192	12,192	12,192
	lb/d	27	2,767	0	6	6	2	4	2,768	2,732	36
TKN	mg/L	38	360	30	8	4	2	48	697	697	697
	lb/d	9	165	7	2	1	1	0	158	156	2
NH_4-N	mg/L	25	29	29	4	0	0	1	29	29	29
	lb/d	6	13	7	1	0	0	0	7	7	0
NO_x-N	mg/L	0	0	0	14	17	17	13	0	0	0
	lb/d	0	0	0	3	4	4	0	0	0	0
TP	mg/L	10	210	3	3	3	3	19	420	420	420
	lb/d	2	97	1	1	1	1	0	95	94	1
PO_4-P	mg/L	5.00	5.14	5.14	4.39	4.44	4.46	4.53	5.21	5.21	5.21
	lb/d	1	2	1	1	1	1	0	1	1	0

APPENDIX K-2

Pollution Control Systems

Pollution Control Systems, Inc

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PACKAGE WASTEWATER TREATMENT PLANT SPECIFICATIONS

TOWN OF CARMEL, NY
MBBR – BOD & NITRIFICATION SYSTEM

Pollution Control Systems, Inc. (PCS) is pleased to provide the following preliminary equipment specifications for your consideration.

One (1) Model PP-27.2-MBBR-ESUV prefabricated carbon steel packaged wastewater treatment plants. The package plants will use the MBBR aeration/nitrification version of the activated sludge process and will be capable of treating 27,200 GPD of 230 mg/l BOD_5 and TSS, and an average incoming Ammonia Nitrogen of 27 mg/l wastewater down to 20 mg/l BOD_5 and TSS; and 8 mg/l Ammonia Nitrogen.

A. General Specifications

Equalization Chamber Volume:	9,041 gallons
Sludge Holding Chamber Volume:	3,178 gallons
MBBR-1st Stage Chamber Volume:	4,238 gallons
MBBR-2nd Stage Chamber Volume:	8,475 gallons
Clarifier Chamber Volume:	3,395 gallons
Overall Length/Width/Height:	39.25' x 12' x 11'
Shipping Weight:	28,000 lbs. (approximate)

B. Materials of Construction

All tank vessels will be fabricated of 1/4" structural grade ASTM designationA-36 steel plates. All walls will be continuous and watertight and will be supported by structural reinforcing members where required. Fabrication and erection would conform to the appropriate requirements of "AISC Specification for Buildings". Connections will conform to the requirements of the American Welding Society's Code and will develop the full strength of the member. All piping within the plant will be Schedule 40 steel pipe.

C. Surface Preparation and Coating

All vessel surfaces to be painted will be properly prepared in a workmanlike manner so as to obtain a smooth, clean and dry surface. All rust, dust and mill scale, as well as other extraneous matter, will be removed by cleaning by wire brushing or whatever means necessary.

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All interior surfaces will be blasted to a SSPC-SP-10 and all exterior surfaces will be blasted to a SSPC-SP-6 finish.

All interior and exterior surfaces will be painted with 8-10 mils of a coal tar epoxy type coating.

D. Inlet Bar Screen

A bar screen will be provided at the influent port to remove any unusually large solids from the incoming raw sewage. The bar screen will be fabricated from ½" diameter bars spaced 1" apart and arranged as shown on the drawings. The bars shall be sloped to permit easy cleaning of accumulating debris. A deck will be furnished for drying this debris. The bar screen shall have the same protective coating as specified for the plant.

E. Flow Equalization Chamber

A flow equalization chamber will be supplied with a volume designed to handle 25% to 100% of the daily design flow. The flow equalization chamber allows for a constant flow through the plant by equalizing flow surges that may be incurred during peak flow times.

Flow control will be accomplished by pumping plant influent to a flow control box containing an adjustable overflow broad weir and a V-notch discharge weir. The overflow broad weir will be adjustable so that a measured amount of pumped influent will discharge through the V-notch weir to the 1st Stage MBBR chamber, while overflowing the remaining pumped influent back into the equalization chamber.

A duplex set of equalization pumps will be furnished and installed within the chamber. The pumps will be rated at 0.5-HP. An emergency overflow will be provided between the equalization and 1st Stage MBBR chambers.

F. Sludge Holding Chamber

The chamber will be of the aerated type. The volume of the sludge holding chamber is based on 1.5 cu.ft. per capita. Diffused air will be supplied by the plant blower system supplying 30 CFM of air per 1000 cubic feet of volume. The diffusers will be located parallel to and near the bottom of the tank. All piping and valves within the chamber will be factory installed. A fixed supernatant decant pipe will be provided within this chamber.

G. MBBR – 1st Stage Chamber

This 1st Stage of MBBR aeration is used for BOD_5 removal. This chamber will be loaded with Kontakt 500 MBBR media. The design value of BOD surface area loading rate (SALR) is 10 g/m2/d. The carrier surface area is 500 m2/m3 and the required area needed is 2160.8 m2 at 30% fill. A total of 152.6 cu.ft. of media is required. The

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detention time at average daily flow is 3.74 hours. Diffused air will be supplied by two alternating blower/motor units supplying 75 cfm to the chamber.

H. MBBR – 2nd Stage Chamber

This 2nd Stage of MBBR aeration is used for the nitrification process. This chamber will be loaded with Kontakt 500 MBBR media. The design value of NH_3-N surface area loading rate (SALR) is 0.75 g/m2/d. The carrier surface area is 500 m2/m3 and the required area needed is 5175.1 m2 at 35% fill. A total of 365.5 cu.ft. of media is required. The detention time at average daily flow is 7.48 hours. Diffused air will be supplied by two alternating blower/motor units supplying 50 cfm to the chamber.

I. Clarifier Chamber

The clarifier chamber will be of such size as to provide a minimum of 3 hours retention and will have proper baffling to prevent short circuiting and to provide maximum uniform retention. The clarifier will have a surface overflow rate at peak flow of 567 gpd/sq.ft., it will have a peak solids loading rate of 1.11 lbs./day/sq.ft., and will also have a weir loading at peak flow of 6,800 gpd/lin.ft. The total settling volume will include the volume of the upper 1/3 of the sludge hopper or hoppers. Flat bottom area of hopper will in no case be greater than one square foot. The slope of the hopper walls will not be less than 1.7 vertical to 1.0 horizontal. Settled sludge will be returned from the sludge hopper to the 1st Stage MBBR chamber or wasted to the sludge holding chamber by use of an airlift pump. The clarifier effluent will pass over the edge of the baffled effluent weir into the effluent trough and then out of the chamber. The effluent weir trough will be equipped with adjustment to permit precise leveling of the serrated weir after plant installation.

J. Sludge Recirculation System

There will be installed within the clarifier chamber a positive sludge recirculation system consisting of one (1) airlift sludge return assembly per hopper with a recirculation capacity ranging from 0% to 150% of the design flow. The airline supplying air to the pumps will be equipped with a valve to vary the amount of air supplied to each pump, thus varying the capacity of the pump. The airlift pump will be firmly supported and will be equipped with a clean-out plug to allow for easy cleaning and maintenance.

K. Scum Recirculation System

There will be installed within the clarifier chamber a positive scum and skimming recirculation system consisting of one (1) airlift skimming device located in a position to skim and return floating material to the 1st Stage MBBR chamber. The airline supplying air to the skimming device will be equipped with a valve to regulate the rate of return. The scum intake will be equipped with an adjustment assembly, which will enable exact positioning of the skimmer at water level.

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L. Ultra-Violet Disinfection

An ultra-violet disinfection (horizontal tube configuration) Unit, Model 3025K-PTP will be supplied to disinfect the wastewater without the use of chemicals. For above grade installations, the UV module will be provided with inlet and outlet transition connection boxes. This will produce a free-standing structure to be located off the plant structure and on a concrete pad. These boxes will contain connections for flanged inlet and outlet piping.

M. Air Diffusion System

Air distribution manifold piping from the 1st Stage MBBR blower/motor will feed air to both the sludge holding chamber and the 1st Stage MBBR chamber. The manifold will feed a series of diffuser drop assemblies in the chambers. Each diffuser drop assembly will be equipped with an air regulation and/or shut-off valve, union and an air diffuser header. The diffusers will be parallel to and near the base of the vessel's sidewall, at an elevation, which will provide the optimum diffusion and mixing.

Air distribution manifold piping from the 2nd Stage MBBR blower/motor will feed air to both the clarifier airlifts and the 2nd Stage MBBR chamber. The manifold will feed a series of diffuser drop assemblies in the chamber. Each diffuser drop assembly will be equipped with an air regulation and/or shut-off valve, union and an air diffuser header. The diffusers will be parallel to and near the base of the vessel's sidewall, at an elevation, which will provide the optimum diffusion and mixing.

N. Blower/Motor Units

One (1) equalization blower/motor unit will be supplied for the equalization chamber. The blower/motor unit will be capable of providing 22 CFM minimum when operating at 4 PSI. The motors will be 1.0 HP.

Two (2) blower/motor units will be supplied for the SHT and 1st Stage MBBR. The blower/motor units will be capable of providing 1.25 lb. O_2/lb BOD and air required for the SHT. Each blower will be capable of delivering a minimum of 90 CFM when operating at 4.5 PSI. Each motor will be 3.0 HP.

The blower will be fitted with a dry type filter/silencer at the air intake. Each blower discharge will be fitted with a check valve, and a flexible rubber discharge coupling. For purposes of determining the blower performance and/or diffuser condition, a pressure relief valve and pressure gauge will be mounted in the air manifold.

Two (2) blower/motor units will be supplied for the 2nd Stage MBBR and the clarifier airlifts. The blower/motor units will be capable of providing 4.57 lb. O_2/lb NH_3-N and air

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required for the airlifts. Each blower will be capable of delivering a minimum of 65 CFM when operating at 4.5 PSI. Each motor will be 2.0 HP.

The blower will be fitted with a dry type filter/silencer at the air intake. Each blower discharge will be fitted with a check valve, and a flexible rubber discharge coupling. For purposes of determining the blower performance and/or diffuser condition, a pressure relief valve and pressure gauge will be mounted in the air manifold.

O. Central Control Panel

A central control system installed within a fiberglass NEMA 4X weatherproof enclosure will be provided. The electrical controls will consist of magnetic starters, program timers and switches necessary to automatically control all electro-mechanical components on the treatment system. M-O-A selector switches and magnetic starters in conjunction with the programmable timer will control the blower motors. The programmable timers will have the capability to operate the aeration system as required by the variation in the daily flowrate. Properly sized circuit breakers and fuses will protect all electrical equipment and circuitry. All duplex or standby equipment will be designed so devices in the control system can operate them.

P Effluent Flow Meter

For measurement of the effluent of the wastewater treatment system, a v-notch weir plate will be at the outlet end of the system. This v-notch will be used with the ultrasonic flowmeter and circular chart recorder to record, indicate and totalize the flow through the wastewater system. Both the flow meter and recorder are mounted within the same NEMA 4X enclosure.

The flow meter consists of an ultrasonic transducer remotely mounted above the liquid surface and a microprocessor based electronic control unit. The control unit will be mounted within a NEMA 4X control panel directly above the transducer at the tertiary filter outlet.

The circular chart recorder will record flows on circular unit charts that are 10" in diameter. The unit includes on box of 24-hour circular charts and one (1) felt tipped pen for recording.

Q. Access Stairway / Service Walkways / Handrails

A painted steel access stairway fabricated using two 10" channels and galvanized bolt-on stair-treads will be provided. Two upper support angles with mounting holes will be provided.
Stairway handrails will be provided on both stair stringers. Handrails are welded in place. The rails and posts are fabricated from 1-1/4" diameter schedule 40 carbon steel

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pipe. Carbon steel handrails are painted with enamel paint, safety yellow. Stringers and stairs will be painted the same as the tank surfaces.

A service walkway will be provided to service the plant equipment. Grating panels will each consist of one-piece skid resistant steel plant. All grating panels will be constructed of 18-gauge, galvanized steel sheets. Each grating panel has a standard 6" or 9" surface width and a 2-1/2" rib depth. Each panel will be supported to ensure a safe uniform load carrying capacity of 80 pounds per square foot.

Handrails are supplied with mounting flanges for bolting into place. The rails and posts are fabricated for 1-1/4" diameter schedule 40 carbon steel pipe. Longer sections of hand railing are spliced to allow for easier handling and installation. Carbon steel handrails are shipped loose for field mounting by the field contractor.

R. Guarantee

PCS will guarantee for one (1) year from the date of shipment that the vessel and all component equipment will be free from defective materials and workmanship. PCS will furnish replacement parts for any component considered in the opinion of PCS to be defective, whether of his or other manufacturer during the guarantee period.

S. Delivery Schedule

Equipment drawing will be submitted 2-3 weeks after the receipt and approval of the purchase order. The equipment would be ready for shipment 8-12 weeks after the receipt of approval submittals.

T. Budget Pricing Standard Tank: $220,000.00 plus freight and any taxes
Budget Price 304 SS Tank & Pipe: $390,000.00 plus freight and any taxes

Factory Start-up can be provided at and additional charge and under separate contract.

Taxes are the responsibility of the purchaser.

Payment Terms: 30% Deposit with Order, 30% Payment with Release to Production, 35% Upon Inspection and Approval for Shipment, 5% Net 30 Days from Shipment. A Purchase Order will be subject to Pollution Control Systems, Inc. Terms and Conditions and approved by an Officer of PCS. Cost increases, if any, will be based on cost increases incurred by PCS.

PCS takes exception and excludes any equipment and services not stated on this proposal.

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Attachment 1: Contract Exclusions

The following items and services are not included as a part of this equipment proposal and are the responsibility of the owner or installing contractor:

- Foundation pad design, foundation pad, design calculations, or construction
- Structural calculations and loads
- Seismic calculations
- Engineered / Certified / Stamped Drawings
- Land or Ocean Freight unless otherwise noted
- Construction and Discharge Permit(s)
- Installation Supervision / Field Erection Supervision
- Crane for offloading
- Field welding
- Clarifier grout material and installation
- Installation of ancillary equipment not mounted in tank due to shipping limitations
- Main power conduit and wiring to system control panel(s)
- Electrical power connection to plant
- All interconnecting piping outside of plant walls
- Inlet plant piping
- Remote located blower piping to tank structure
- Effluent piping
- Remote located field piping connections from blower unit(s) to plant air manifold
- Access stairs, blower skids, control panels, grating, and handrail – Mounting hardware is provided – installation by others
- The extended aeration package wastewater treatment system is for treating domestic sewage (human waste) from the customer's facilities. This system is not intended for direct food disposal treatment.
- No substances should be introduced to the system in quantities which are toxic to biological organisms.

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STANDARD TERMS AND CONDITIONS OF POLLUTION CONTROL SYSTEMS, INC.

ENTIRE CONTRACT: The Proposal and any documents specifically incorporated herein shall constitute the entire agreement and understanding between the parties. The terms of the contract documents or specifications between Customer and any other person, including the Owner of the project, the Engineer or Regulatory Authorities, shall NOT be incorporated into this agreement unless PCS specifically consents thereto in a writing signed by it. PCS shall not be responsible for design of the system or treatment process nor for compliance with any regulatory requirements, including effluent requirements. No modification or addition to the Proposal shall be binding unless PCS specifically consents to such modification or addition in writing signed by it.

EXCEPTIONS: Regardless of the terms of the contract documents or specifications between the Customer and any other person including the Owner of the project, the Engineer or Regulatory Authorities, this contract excludes all items not specifically listed on the Proposal.

PAYMENT: Payments terms shall be as shown on the Proposal or as specifically agreed by PCS in a subsequent writing signed by it. Invoicing will be made on all partial shipments and payments for it shall be due according to said terms. Regardless of the terms of the contract documents or specifications between Customer and any other person, no retainer shall be allowed against payments by Customer to PCS unless authorized in writing by PCS. Customer authorizes PCS to execute and file on its behalf a financing statement to conform to the Uniform Commercial Code in those public offices deemed necessary. Customer is responsible for collection costs including legal fees if litigation is required to collect.

TIME OF DELIVERY: PCS will set up and coordinate the shipment of all equipment unless otherwise specified by Customer. Partial shipments may be required in PCS's sole discretion. If PCS suffers delay in performance due to any cause beyond its control, including acts of God, war, act of government, act of Customer, priorities to allocations, fire, strike or labor trouble, sabotage, shipping delays, delays in obtaining labor, material, equipment or transportation, the time of performance shall be extended for a period of time equal to the delay and its consequences.

SUBMITTALS: Complete approval of PCS submittals must be received within 90 days after date of Order Acknowledgment or PCS reserves the right to review and adjust the price accordingly. No production will begin until approval of submittals.

TITLES AND INSURANCE: Security title and right of possession of equipment shall remain with PCS, regardless of mode of attachment to realty and other property until the full price (including deferred payments, notes, interest, back charges, set offs) has been made. No assignment of this equipment can be made until title has been transferred. Upon delivery (at f.o.b. point) of equipment all risk of loss or damage shall pass to Customer, who shall procure and maintain for the benefit of PCS and himself as their interests may appear, adequate insurance on the equipment against damage by vandalism, or other casualty. Acceptance of equipment from carrier constitutes a waiver of any claim against PCS for delay or damage in transit.

WARRANTY: PCS warrants equipment described to be free of defects in workmanship and material, when properly installed and operated under normal use and service for a period of One Year From Date Of Shipment of equipment unless PCS specifically agrees to other terms in a writing signed by it. NO OTHER WARRANTY SHALL BE IMPLIED, AND ANY STATUTORY WARRANTIES INCLUDING MERCHANTABILITY SHALL BE DEEMED WAIVED. Customer shall install the equipment per any instructions given by PCS. Failure to do so voids all warranties. PCS's obligation under this warranty is limited to furnishing or repairing without charge (f.o.b. factory) replacement part(s) for those items which within the warranty period have proven to be defective, provided the customer has given PCS immediate notice upon discovery of such defect. PCS shall have the option of requiring the return of the defective material (transportation prepaid) to establish the claim. Any repairs and/or replacement of equipment or accessories covered by this contract (except when actual defects of material and/or workmanship are evident as determined by PCS) will be paid for by Customer and such repairs will be made only on Customer's written order. The Customer will pay for any and all labor furnished by PCS and said labor will be supplied only on Customer's request and approval. Motors are not guaranteed against damage resulting from interruption or irregularity of current supply or substitution of other fuses or connections for those furnished by PCS. PCS's liability to Customer whether in contract or in tort arising out of warranties, representations, instructions or defects from any cause, shall be limited to correcting the equipment under the conditions aforesaid. PCS assumes no responsibility for consequential damage and PCS shall in no event be held liable for damages or delays caused by defective material and shall not be liable for consequential damage in case of any failure to meet the conditions of any warranty. PCS will make no allowances for repairs unless made with its written consent of approval.

TESTS: PCS shall be notified of and may witness any acceptance tests. If such tests are performed they shall be conducted within the warranty period of this contract unless otherwise agreed.

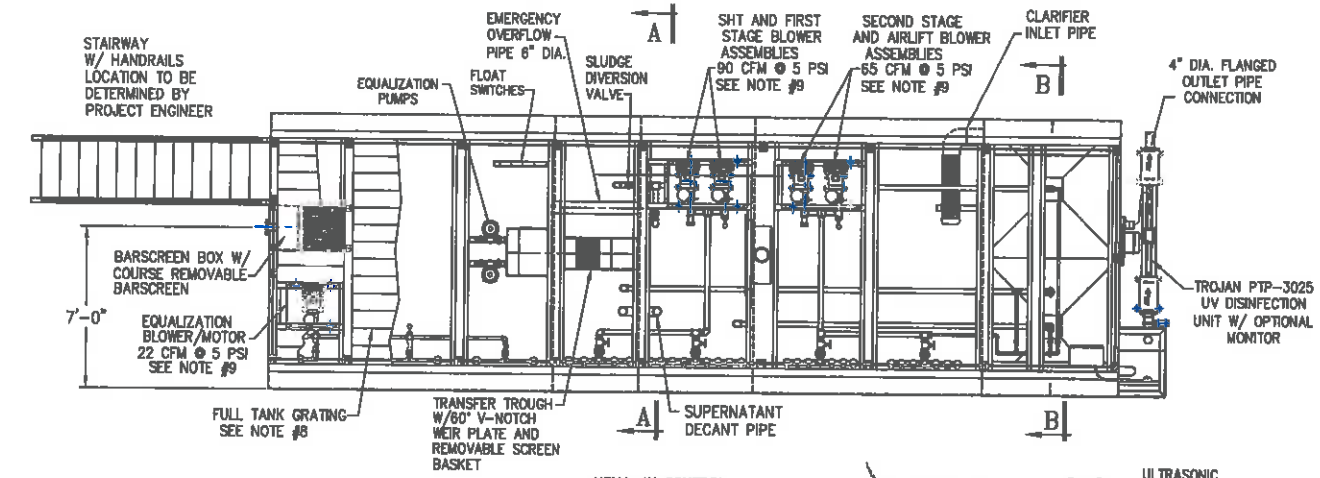
STORAGE: Equipment on which manufacturing has been completed but shipment held up at Customer's request will be placed in storage. Customer agrees to pay all cost of placing equipment in storage plus a daily storage fee to be determined by PCS.

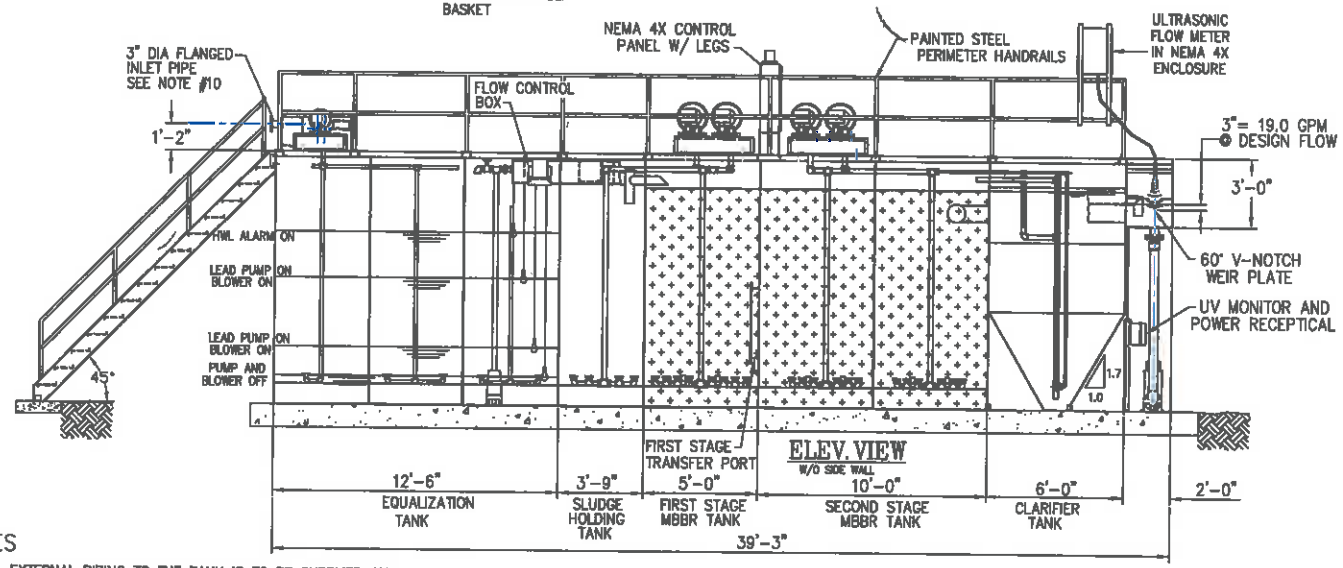
TAXES: Sales and use tax will be the responsibility of the Purchaser except in the State of Ohio (if tax exempt in the State of Ohio: exemption certificate must be provided).

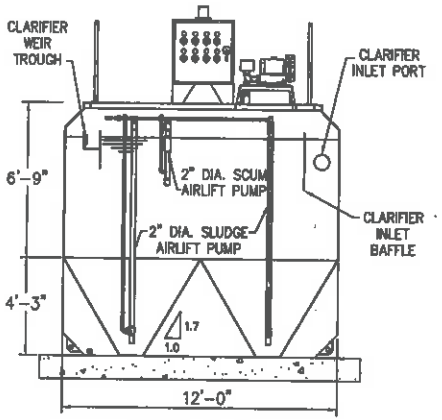
INSTALLATION: The purchase price as herein quoted DOES NOT include any installation unless specifically noted in the Proposal. PCS assumes no responsibility for any trouble caused by improper setting or assembly in the field. Customer agrees that if the equipment is subjected to weather or excessive dampness or other abnormal conditions, the Customer will pay for any repairs to equipment or accessories covered by this contract.

ARBITRATION: Any controversy or claim arising out of or relating to the Agreement or breach thereof shall be settled by arbitration in accordance with the construction industry arbitration rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof. The decision of the arbitrators on such matters shall be a condition precedent to any right of legal action that either party may have against the other. The arbitrators shall fix their own compensation and shall assess the costs and charges of the proceedings upon either or both of the parties. All arbitration proceedings shall be conducted in Cincinnati, Ohio.

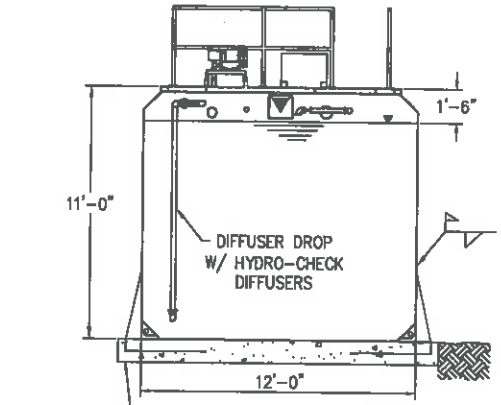
CANCELLATION CHARGE: In event of cancellation of the contract by Customer, Customer shall pay to PCS a cancellation charge equal to all charges, expenditures and commitments made by PCS up to the date of cancellation. This cancellation charge shall be in addition to any other remedies at law or equity for breach of contract.







VIEW B-B



VIEW A-A

NOTES

1.) ALL EXTERNAL PIPING TO THE TANK IS TO BE SUPPLIED AND INSTALLED BY THE INSTALLATION CONTRACTOR.
2.) FOUNDATION PAD MATERIALS AND DESIGN IS DETERMINED BY THE PROJECT ENGINEER AFTER SOIL ANALYSIS IS COMPLETED
3.) MATERIALS FOR ANCHORING OF TANK TO THE FOUNDATION PAD IS TO BE SUPPLIED BY OTHERS
4.) INCOMING ELECTRICAL POWER AND CONNECTION TO THE CONTROL PANEL IS BY THE ELECTRICAL CONTRACTOR.
5.) PROJECT ENGINEER TO VERIFY LOCATION OF ACCESS STAIRWAY..
6.) DUE TO SHIPPING RESTRICTIONS HANDRAILS, STAIRWAY, BLOWERS, CONTROL PANEL, FLOWMETER, UV SYSTEM AND MBBR MEDIA TO BE SHIPPED LOOSE FOR FIELD INSTALLATION BY THE INSTALLING CONTRACTOR
7.) REGENERATIVE BLOWERS TO BE BE SHIPPED MOUNTED ON FIBERGLASS BASES FOR MOUNTING ON TOP OF TANK BY INSTALLING CONTRACTOR
8.) FULL TANK GALV. PLANK STYLE GRATING AND PERIMETER HANDRAILS TO BE SUPPLIED FOR SERVICING AND MAINTENANCE OF PLANT
9.) TYPE AND SIZE OF BLOWERS WILL BE VERIFIED ON APPROVED SUBMITTALS
10.) INLET PIPE SIZE TO BE VERIFIED BY PROJECT ENGINEER

PLANT MODEL NUMBER	DESIGN FLOW GPD	EQUAL. TANK VOLUME	FIRST STAGE MBBR TANK VOLUME	SECOND STAGE MBBR TANK VOLUME	SLUDGE TANK VOLUME	CLARIFIER TANK VOLUME	FIRST STAGE AIR BLOWERS		SECOND STAGE AIR BLOWERS		EQUAL. TANK AIR BLOWER	
							HP	CFM	HP	CFM	HP	CFM
P-27-ES-MBBR-UV	27,200	9,041	4,238	8,475	3,178	3,395	3.0	90	2.0	65	1.0	22

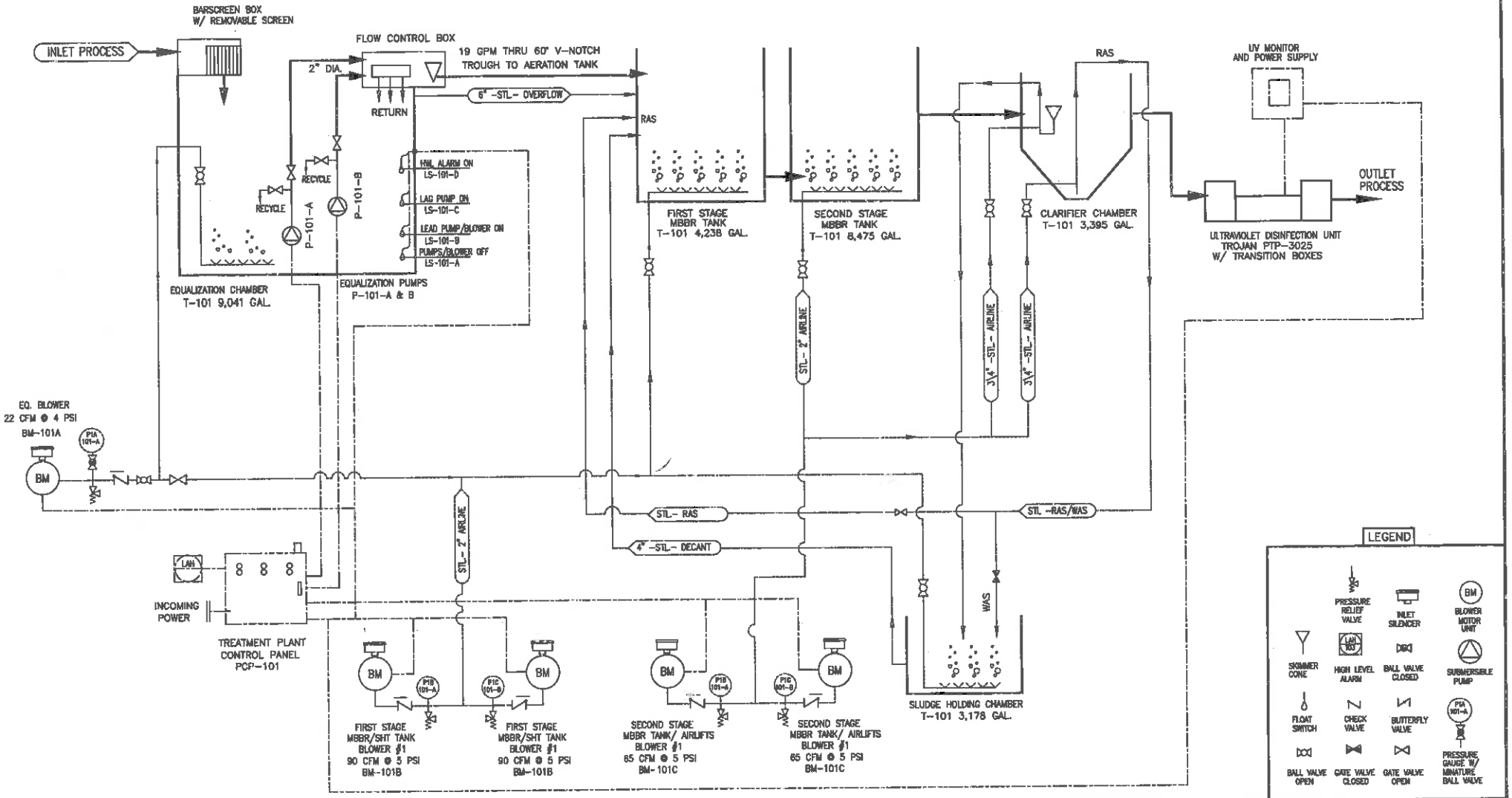
REV.	DATE	DESCRIPTION	APPROV.

PCS Pollution Control Systems, Inc.
5827 Happy Hollow Ln, Suite 1B
Milford, Ohio 45150
(513) 831-1165
Website: PollutionControlSystem.com

CARMEL HILLSDALE ESTATES, NY

27,200 GPD PACKAGED WASTEWATER PLANT
MODEL PP-27-ES-MBBR-UV

SCALE: PLOT: 3/16"=1'	PROJECT NO.		
DRAWN BY: JJM	DATE: 4/17/20	SHEET	DRAWING NO.
CHECKED BY: MAC	DATE: 4/17/20	1 OF 1	16051-01



REV.	DATE	DESCRIPTION	APPROV.

PCS Pollution Control Systems, Inc.
5827 Happy Hollow Rd., Suite 1B
Milford, Ohio 45105
(513) 831-1163
WEB: POLLUTIONCONTROLSYSTEM.COM

TOWN OF CARMEL, NY

PROCESS FLOW DIAGRAM FOR 27.2 K/DAY TWO STAGE MBBR TREATMENT PLANT

SCALE:	NTS	QUOTE NO.		PROJECT NO.	
DRAWN BY:	JJM	DATE:	4/21/20	SHEET	DRAWING NO.
CHECKED BY:	MAC	DATE:	4/21/20	1 OF 1	16051-10

MBBR Process Design Calculations - U.S. units

Tertiary Nitrification Process

Instructions: *Enter values in blue boxes. Spreadsheet calculates values in yellow boxes*

1. General Inputs

Design ww Flow Rate, Q =	0.027	MGD	Ave. Influent BOD, S_o =	25	mg/L
Ave. Influent NH_3-NConc. =	40	mg/L	Design Value of NH_3-N Surface Area Loading Rate (SALR) =	0.75	$g/m^2/d$
Target Effl. NH_3-N Conc. =	2	mg/L	See information on typical design values for SALR below right.		
Peak Hour Factor =	1.5				

2. Calculation of Carrier Volume and Required Tank Volume & Dimensions

Inputs

Carrier Spec. Surf. Area =	500	m^2/m^3	Liquid Depth in Tank =	10	ft
Carrier Specific Wt. =	144	kg/m^3	Tank L:W ratio =	1.3	
(both above from carrier mfr/vendor)			(target L:W - only used if tank is rectangular)		
Design Carrier Fill % =	35%		Click on green box and then on arrow to Select Tank Shape:	rectangular	
(Carrier fill % is typically between 30% and 70%. Lower values are more conservative, allowing future capacity expansion or reduction of SALR by adding more carrier.)			Carrier % Void Space = (from carrier mfr/vendor - only needed to calculate hydraulic detention time)	74%	

Calculations

NH_3-N Daily Loading =	8.6	lb/day	Calculated Tank Volume =	29.6	m^3
	3881	g/day	=	1044.3	ft^3
			=	7811	gal
Carrier Surf. Area needed =	5175.1	m^2			
Calculated Carrier Volume =	10.350	m^3	Calculated Tank Width =	9.2	ft
	365.5	ft^3	Calculated Tank Length =	12.0	ft
Actual Tank Liquid Volume =	1035.5	ft^3	Not Used for Rectangular shape:		ft
Detention Time at			Enter Actual Tank Width:	11.9	ft
Design Average Flow =	413	min	Enter Actual Tank Length:	10.0	ft
Peak Hourly Flow =	275	min	Actual Tank Volume =	1130.5	ft^3

Check on BOD Surf. Loading Rate (SALR): 0.49 $g/m^2/d$

(should be < 0.5 $g/m^2/d$ in order to achieve a good nitrification rate)

3. Air Requirement

Inputs: **(Values of "Rule of Thumb" Constants to be used in Calculations - See below right)**

O_2 needed per lb NH_3-N =	4.57	lb O_2/lb NH_3-N	Depth of Diffusers =	8.5	ft
SOTE as Function of Depth =	0.75%	% per ft depth	Standard Temperature =	68	°F
AOTE/SOTE =	0.5		Standard Pressure =	14.7	psi
Press. Drop across Diffuser =	12.0	in W.C.	Atmospheric Pressure =	14.7	psi
(from mfr/vendor)			Air Density at STP =	0.075	lbm/SCF
			O_2 Content in Air =	0.017	lbm/SCF

Calculations

Oxygen Requirement =	39.1	lb/day	AOTE =	3.2%	
SOTE =	6.4%		Air Requirement =	49.2	SCFM
Blower Outlet Pressure =	18.8	psia			

cylindrical
rectangular

References for additional background Information:

1. McQuarrie, J.P. and Boltz, J.P., *Moving Bed Biofilm Reactor Technology: Process Applications, Design and Performance*, Water Environment Research, Vol 83, No. 6. June 2011.

available at:
http://www.researchgate.net/publication/51488125_Moving_bed_biofilm_reactor_technology_process_applications_design_and_performance

2. Odegaard, H., "The Moving Bed Biofilm Reactor," in Igasrashi, T, Watanabe, Y., Asano, T. and Tambo, N.. Water Environmental Engineering and Reuse of Water. Hokkaido Press 1999, p 250-305.

Available at:
http://netedu.xauat.edu.cn/jpkc/netedu/jpkc2009/szylyybh/content/wlzy/7/3/The%20Moving%20Bed%20Biofilm%20Reactor.pdf

3. Steichen & Phillips, H., M, Black & Veach, Process and Practical Design Considerations for IFAS and MBBR Technologies, Headworks International Presentation, 03/18/2010

Available at:
http://www.headworksinternational.com/userfiles/file/Webinar/BV_Webinar_Slides.pdf

Typical Design Values for Carrier Surface Area Loading Rate (SALR):

(from References (1) above)

Carrier Surface Loading Rate (SALR) for Nitrification, g NH^3/m^2-day

	min	max	typical
Low Rate Bioreactor	0.5	1.5	1

Also, from the second reference above:

Typical Design Values for MBBR reactors at 15°C		
Purpose	Treatment Target % Removal	Design SALR g/m^2-d
Nitrification		
NH_3-N > 3 mg/L[2]	90 (NH_3-N)	1.00 (NH_3-N)
NH_3-N < 3 mg/L[3]	90 (NH_3-N)	0.45 (NH_3-N)

Rules of Thumb for Estimating Oxygen/Air Requirements - Coarse Bubble Diffusers:

Source: Sanitaire, "Diffused Aeration Design Guide"
http://www.xylemwatersolutions.com/scs/sweden/sv-se/produkter/cirkulationspumpar/documents/san3.pdf

1. The typical AOR/SOR (or AOTE/SOTE) is 0.50 for a coarse bubble aertion system.
2. The typical SOTE is 0.75% per foot of diffuser submergence for a coarse bubble system
3. I SCF of air weighs 0.075 lb/ft^3 and contains 23% oxygen by weight, thus:
4. 1 SCF of air contains 0.0173 lbm of oxygen.
5. For biological treatment with SRT from 5 to 10 days, lb oxygen required /lb BOD removed is typically in the range from 0.92 - 1.1 lb O_2/lb BOD. Higher SRT results in a higher value of lb O_2 required/lb BOD removed.
6. The oxidation of 1 lb of ammonia nitrogen typically requires 4.1 to 4.6 lb of oxygen.