

Company Name D & E Construction

Project Pipe

Site Name Moore



AMDTREAT

**AMD TREAT**

**AMD TREAT MAIN COST FORM**

Costs

<u>Passive Treatment</u>	<u>A</u>	<u>S</u>	
Vertical Flow Pond	1	0	\$22,018
Anoxic Limestone Drain			\$0
Anaerobic Wetlands			\$0
Aerobic Wetlands	1	0	\$40,003
Manganese Removal Bed			\$0
Oxic Limestone Channel			\$0
Limestone Bed			\$0
BIO Reactor			\$0
<b>Passive Subtotal:</b>			<b>\$62,021</b>
<b>Active Treatment</b>			
Caustic Soda			\$0
Hydrated Lime			\$0
Pebble Quick Lime			\$0
Ammonia			\$0
Oxidants			\$0
Soda Ash			\$0
<b>Active Subtotal:</b>			<b>\$0</b>
<b>Ancillary Cost</b>			
Ponds	1	0	\$5,000
Roads			\$0
Land Access			\$0
Ditching			\$0
Engineering Cost	1	0	\$13,404
<b>Ancillary Subtotal:</b>			<b>\$18,404</b>
<b>Other Cost (Capital Cost)</b>			<b>\$0</b>
<b>Total Capital Cost:</b>			<b>\$80,425</b>
<b>Annual Costs</b>			
Sampling	1	0	\$674
Labor	1	0	\$837
Maintenance	1	0	\$620
Pumping			\$0
Chemical Cost			\$0
Oxidant Chem Cost			\$0
Sludge Removal			\$0
<b>Other Cost (Annual Cost)</b>			<b>\$0</b>
<b>Land Access (Annual Cost)</b>			<b>\$0</b>
<b>Total Annual Cost:</b>			<b>\$2,131</b>
<b>Other Cost</b>			

**Water Quality**

Calculated Acidity  mg/L

Alkalinity  mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity)  mg/L

Design Flow  gpm

Typical Flow  gpm

Total Iron  mg/L

Aluminum  mg/L

Manganese  mg/L

pH  su

Ferric Iron  mg/L

Ferrous Iron  mg/L

Sulfate  mg/L

Filtered Fe  mg/L

Filtered Al  mg/L

Filtered Mn  mg/L

Specific Conductivity  uS/cm

Total Dissolved Solids  mg/L

Dissolved Oxygen  mg/L

**Total Annual Cost: per  
1000 Gal of H2O Treated \$0.405**

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### AMD TREAT VERTICAL FLOW POND (VFP)

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VFP Name

Opening Screen Water Parameters

#### Influent Water Parameters that Affect VFP

Calculated Acidity  mg/L  
Alkalinity  mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity)  mg/L

Design Flow  gpm

Typical Flow  gpm

Total Iron  mg/L

Aluminum  mg/L

Manganese  mg/L

Record Number

1 of 1

#### SIZING METHODS Select One

- 1. Tons of Limestone Needed
- 2. Tons of Limestone Needed
- 3. Tons of Limestone Needed
- 4. Tons of Limestone Needed
- 5. Tons of Limestone Needed

- VFP Based on Acidity Neutralization
- VFP Based on Retention Time
- VFP Based on Alkalinity Generation Rate
- VFP Based on Tons Limestone Entered
- VFP Based on Dimensions
- 6. Retention Time  hours
- 7. Alkalinity Generation Rate  g/m2/day
- 8. Limestone Needed  tons
- 9. Length at Top of Freeboard  ft
- 10. Width at Top of Freeboard  ft

- 11. % Void Space of LS. Bed  %
- 12. System Life  years
- 13. Limestone Purity  %
- 14. Limestone Efficiency  %
- 15. Density of Loose Limestone  lbs/ft3
- 16. Limestone Unit Cost  \$/ton
- 17. LS Placement Unit Cost  \$/yd3
- 18. Slope of Pond Sides  :  (Run of Slope : Rise of Slope)
- 19. Freeboard Depth  ft
- 20. Free Standing Water Depth  ft
- 21. Organic Matter Depth  ft
- 22. Organic Matter Unit Cost  \$/yd3
- 23. Organic Matter Spreading Unit Cost  \$/yd3
- 24. Limestone Depth  ft
- 25. Excavation Unit Cost  \$/yd3

#### Liner Cost

- No Liner
- Clay Liner
  - 11. Clay Liner Unit Cost  \$/yd3
  - 12. Thickness of Clay Liner  ft
- Synthetic Liner
  - 13. Synthetic Liner Unit Cost  \$/yd2

29. Clearing and Grubbing?

- 30a. Land Multiplier  ratio
- 30b. Clear/Grub Acres  acres
- 31. Clear and Grub Unit Cost  \$/acre

- 32. Nbr. of Valves  nbr
- 33. Unit Cost of Valves  \$ ea.

#### AMD Treat Piping Costs

- 34. Total Length of Effluent / Influent Pipe  ft
- 35. Pipe Install Rate  ft/hr
- 36. Labor Rate  \$/hr
- 37. Segment Len. of Trunk Pipe  ft/pipeline seg.
- 38. Trunk Pipe Cost  \$/ft
- 39. Trunk Coupler Cost  \$/coupler
- 40. Spur Cost  \$/ft
- 41. Spur Coupler Cost  \$/spur
- 42. "T" Connector Cost  \$/T coupler
- 43. Segment Len. of Spur Pipe  ft/pipeline seg.
- 44. Spur Pipe Spacing  ft

#### Custom Piping Costs

- |             | Length                  | Diameter                | Unit Cost               |
|-------------|-------------------------|-------------------------|-------------------------|
| 45. Pipe #1 | <input type="text"/> ft | <input type="text"/> in | <input type="text"/> \$ |
| 46. Pipe #2 | <input type="text"/> ft | <input type="text"/> in | <input type="text"/> \$ |
| 47. Pipe #3 | <input type="text"/> ft | <input type="text"/> in | <input type="text"/> \$ |

#### VFP Sizing Summaries

- 48. Length at Top of Freeboard  ft
- 49. Width at Top of Freeboard  ft
- 50. Freeboard Volume  yd3
- 51. Water Surface Area  ft2
- 52. Total Water Volume  yd3
- 53. Organic Matter Volume  yd3
- 54. Limestone Surface Area  ft2
- 55. Limestone Volume  yd3
- 56. Excavation Volume  yd3
- 57. Clear and Grub Area  acr.
- 58. Liner Area  ft2
- 59. Theoretical Retention Time  hrs

#### VFP Cost Summaries

- 60. Organic Matter Cost  \$
- 61. Limestone Cost  \$
- 62. Limestone and Organic Matter Placement Cost  \$
- 63. Excavation Cost  \$
- 64. Liner Cost  \$
- 65. Clear and Grub Cost  \$
- 66. Valve Cost  \$
- 67. Pipe Cost  \$

68. Total Cost  \$

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# AMD TREAT

## AEROBIC WETLANDS

Aerobic Wetlands Name

Opening Screen Water Parameters

SIZING METHODS Select One

- Aerobic Wetland Based on Metal Removal Rates
  - 1. Iron Removal Rate  g/m2/day
  - 2. Mn Removal Rate  g/m2/day
- Aerobic Wetland Based on Dimensions
  - 3. Top Length at Freeboard  ft
  - 4. Top Width at Freeboard  ft
- Aerobic Wetland Based on Iron Oxidation Kinetics
  - 5. Rate Constant  moles/sec
  - 6. Effluent Fe Concentration  mg/l
  - 7. Dissolved Oxygen  mg/l
  - 8. H2O Temperature  °C

**Influent Water Parameters that Affect Aerobic Wetlands**

Calculated Acidity  mg/L  
 Alkalinity  mg/L

Calculate Net Acidity (Acid-Alkalinity)  
 Enter Net Acidity manually  
 Net Acidity (Hot Acidity)  mg/L

Design Flow  gpm  
 Typical Flow  gpm  
 Total Iron  mg/L  
 Aluminum  mg/L  
 Manganese  mg/L  
 pH  su

- 9. Length to Width Ratio  : 1.000
- 10. Slope of Wetland Sides  : 
  - Run of Slope
  - Rise of Slope
- 11. Freeboard Depth  ft
- 12. Free Standing Water Depth  ft
- 13. Organic Matter Depth  ft
- 14. Organic Matter Unit Cost  \$/yd3
- 15. Organic Matter Spreading Unit Cost  \$/yd3
- 16. Excavation Unit Cost  \$/yd3
- 17. Wetland Planting Unit Cost  \$/acre

Liner Cost

- No Liner
- Clay Liner
  - 18. Clay Liner Unit Cost  \$/yd3
  - 19. Thickness of Clay Liner  ft
- Synthetic Liner
  - 20. Synthetic Liner Unit Cost  \$/yd2

21. Clearing and Grubbing?

- 22. Land Multiplier  ratio
- 23. Clear/Grub Acres  acres
- 24. Clear and Grub Unit Cost  \$/acre

**Aerobic Wetland Sizing Summaries**

25. Length at Top of Freeboard	285.99	ft
26. Width at Top of Freeboard	145.99	ft
27. Freeboard Volume	2,248	yd3
28. Water Surface Area	39,199	ft2
29. Water Volume	718	yd3
30. Organic Matter Volume	1,390	yd3
31. Excavation Volume	2,108	yd3
32. Clear and Grub Area	0.0	acres
33. Liner Area	0	ft2
34. Retention Time	120	hrs

**Aerobic Cost Summaries**

35. Organic Matter Cost	31,281	\$
36. Excavation Cost	5,271	\$
37. Liner Cost	0	\$
38. Clear and Grub Cost	0	\$
39. Wetland Planting Cost	3,451	\$

40. Total Cost  \$

Record Number 1 of 1

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# AMD TREAT PONDS

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Pond Name

### Pond Design Based On:

Retention Time

1. Desired Retention Time  hours

2. Include Sludge Removal?

3. Sludge Removal Frequency  times/year

4. Titration?

5. Sludge Rate  gal sludge/  
gal H2O

6. Percent Solids  %

7. Sludge Density  lbs./gal

Pond Size

8. Pond Length at Top of Freeboard  ft

9. Pond Width at Top of Freeboard  ft

	Run	Rise	
10. Slope Ratio of Pond Sides	<input type="text" value="2.0"/>	:	<input type="text" value="1"/>
11. Freeboard Depth	<input type="text" value="2.0"/>		ft
12. Water Depth	<input type="text" value="5.5"/>		ft
13. Excavation Unit Cost	<input type="text" value="2.50"/>		\$/yd3
14. Total Length of Effluent / Influent Pipe	<input type="text" value="0.00"/>		ft
15. Unit Cost of Pipe	<input type="text" value="0.00"/>		\$/ft

Liner Cost

No Liner

Clay Liner

16. Clay Liner Unit Cost  \$/yd3

17. Thickness of Clay Liner  ft

Synthetic Liner

18. Synthetic Liner Unit Cost  \$/yd2

19. Clearing and Grubbing?

20. Land Multiplier  ratio

21. Clear/Grub Acres  acres

22. Clear and Grub Unit Cost  \$/acre

23. Revegetation Cost  \$/acre

24. Number of Ponds for this Design  number

25. Cost of Baffles  \$

### Calculated Pond Dimensions per Pond

26. Length at Top of Freeboard  ft

27. Width at Top of Freeboard  ft

28. Freeboard Volume  yd3

29. Water Volume  yd3

30. Estimated Annual Sludge  yd3/yr

31. Volume of Sludge per Removal  yd3/removal

32. Excavation Volume  acre ft

33. Excavation Volume  yd3

34. Clear and Grub Area  acres

35. Liner Area  yd2

36. Calculated Retention Time  hours

### Ponds Sub-Totals per Pond

37. Excavation Cost  \$

38. Pipe Cost  \$

39. Liner Cost  \$

40. Clearing and Grubbing Cost  \$

41. Revegetation Cost  \$

42. Baffle Cost  \$

43. Estimated Cost  \$

44. Accept Minimum Pond Cost?

The Recommended Minimum Construction Cost of Building a Pond is \$ 5,000

45. Recommended Minimum Cost  \$

46. Total Cost  \$

Opening Screen Water Parameters

### Influent Water Parameters that Affect Ponds

Calculated Acidity  mg/L

Alkalinity  mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity)  mg/L

Design Flow  gpm

Typical Flow  gpm

Total Iron  mg/L

Aluminum  mg/L

Manganese  mg/L

Record Number  
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**AMD TREAT  
ENGINEERING COST**



**AMDTREAT**

1. Capital Cost \*  \$

2. Per Cent of Capital Cost  %

3. Actual Engineering Cost  \$

4. Total Engineering Cost  \$

**\* Total Capital Cost minus Engineering and  
Land Access Capital Cost**

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## AMD TREAT SAMPLING

Sampling Name

### Estimate Sampling Cost

1. Unit Labor Cost  \$/hr

2. Collection Time per Sample  hours/sample

3. Travel Time  hr

4. Sample Frequency  samples/mo

5. Lab Cost Per Sample  \$/sample

6. Number of Sample Points  points

### Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost  \$

### Sampling Sub-Totals

8. Yearly Sample Analysis Cost  \$

9. Yearly Travel Cost  \$

10. Yearly Collection Cost  \$

11. Sampling Cost  \$

Record Number 1 of 1

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## AMD TREAT

### LABOR



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Labor Name

#### Estimate Labor Cost

1. Site Visits per Week

2. Site Labor Time per Visit  hours

3. Travel Time per Visit  hours

4. Unit Labor Cost  \$/hour

#### Enter Established Annual Labor Cost

5. Actual Annual Labor Cost  \$

6. Total Cost  \$

Record Number 1 of 1

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**AMDTREAT**

## AMD TREAT

### MAINTANENCE

**☞ Estimate Maintenance Cost**

- 1. Percent of Active Cost  %
- 2. Percent of Passive Cost  %
- 3. Percent of Ancillary Cost \*  %
- 4. Percent of Other Capital Cost  %

**☞ Enter Established Annual Maintenance Cost**

5. Annual Maintenance Cost  \$

#### Maintenance Sub-Totals

- 6 Total Maintenance Active Cost  \$
- 7. Total Maintenance Passive Cost  \$
- 8. Total Maintenance Ancillary Cost  \$
- 9. Total Maintenance Other Capital Cost  \$

**10. Total Maintenance Cost  \$**

\* Ancillary Cost does int include Cost for  
Land Access and Engineering Cost



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## AMD TREAT RECAPITIALIZATION COST

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Calculation Period  yrs    Inflation Rate  %    Net Return Rate  %

Recapitalization Name

A. Description of Item	B. Unit Cost Per Item	C. Quantity	D. Total Item Cost	E. Life Cycle	F. Number of Periods	G. Total PV
1. replace VFP	22,018	1	22,018	7	10	88,000
2. replace aerobic wetland	40,003	1	40,003	15	5	67,841
3. replace settling pond	5,000	1	5,000	20	3	5,466
4.	0	0	0	0	0	0
5.	0	0	0	0	0	0
6.	0	0	0	0	0	0
7.	0	0	0	0	0	0
8.	0	0	0	0	0	0
9.	0	0	0	0	0	0
10.	0	0	0	0	0	0
11.	0	0	0	0	0	0
12.	0	0	0	0	0	0
13.	0	0	0	0	0	0
14.	0	0	0	0	0	0
15.	0	0	0	0	0	0
16.	0	0	0	0	0	0
17.	0	0	0	0	0	0
18.	0	0	0	0	0	0
19.	0	0	0	0	0	0
20.	0	0	0	0	0	0

Total Capital Cost  \$    PV Grand Total  \$

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### AMD TREAT

#### Costs AMD TREAT MAIN COST FORM

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<u>Passive Treatment</u>	<u>A</u>	<u>S</u>	
Vertical Flow Pond	1	0	\$20,273
Anoxic Limestone Drain			\$0
Anaerobic Wetlands			\$0
Aerobic Wetlands			\$0
Manganese Removal Bed			\$0
Oxic Limestone Channel			\$0
Limestone Bed			\$0
BIO Reactor			\$0
<b>Passive Subtotal:</b>			<b>\$20,273</b>
<u>Active Treatment</u>			
Caustic Soda			\$0
Hydrated Lime			\$0
Pebble Quick Lime			\$0
Ammonia			\$0
Oxidants			\$0
Soda Ash			\$0
<b>Active Subtotal:</b>			<b>\$0</b>
<u>Ancillary Cost</u>			
Ponds	1	0	\$5,000
Roads			\$0
Land Access			\$0
Ditching			\$0
Engineering Cost	1	0	\$5,055
<b>Ancillary Subtotal:</b>			<b>\$10,055</b>
Other Cost (Capital Cost)			\$0
<b>Total Capital Cost:</b>			<b>\$30,328</b>
<u>Annual Costs</u>			
Sampling	1	0	\$674
Labor	1	0	\$837
Maintenance	1	0	\$203
Pumping			\$0
Chemical Cost			\$0
Oxidant Chem Cost			\$0
Sludge Removal	1	0	\$43
Other Cost (Annual Cost)			\$0
Land Access (Annual Cost)			\$0
<b>Total Annual Cost:</b>			<b>\$1,757</b>
Other Cost			

#### Water Quality

Calculated Acidity  mg/L

Alkalinity  mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity)  mg/L

Design Flow  gpm

Typical Flow  gpm

Total Iron  mg/L

Aluminum  mg/L

Manganese  mg/L

pH  su

Ferric Iron  mg/L

Ferrous Iron  mg/L

Sulfate  mg/L

Filtered Fe  mg/L

Filtered Al  mg/L

Filtered Mn  mg/L

Specific Conductivity  uS/cm

Total Dissolved Solids  mg/L

Dissolved Oxygen  mg/L

**Total Annual Cost: per  
1000 Gal of H2O Treated \$0.334**

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### AMD TREAT VERTICAL FLOW POND (VFP)

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VFP Name

**Opening Screen  
Water Parameters**

**Influent Water  
Parameters  
that Affect VFP**

Calculated Acidity  
 mg/L  
Alkalinity  
 mg/L

Calculate Net  
Acidity  
(Acid-Alkalinity)  
 Enter Net Acidity  
manually  
Net Acidity  
(Hot Acidity)  
 mg/L

Design Flow  
 gpm  
Typical Flow  
 gpm  
Total Iron  
 mg/L  
Aluminum  
 mg/L  
Manganese  
 mg/L

**Record Number**  
1 of 1

**SIZING METHODS Select One**

- |                             |                                    |  |                                  |                                  |          |
|-----------------------------|------------------------------------|--|----------------------------------|----------------------------------|----------|
| 1. Tons of Limestone Needed | <input type="text" value="117"/>   | <input checked="" type="radio"/> VFP Based on Acidity Neutralization | 6. Retention Time                | <input type="text"/>             | hours    |
| 2. Tons of Limestone Needed | <input type="text" value="394"/>   | <input type="radio"/> VFP Based on Retention Time                    | 7. Alkalinity Generation Rate    | <input type="text"/>             | g/m2/day |
| 3. Tons of Limestone Needed | <input type="text" value="548"/>   | <input type="radio"/> VFP Based on Alkalinity Generation Rate        | 8. Limestone Needed              | <input type="text" value="511"/> | tons     |
| 4. Tons of Limestone Needed | <input type="text" value="511"/>   | <input checked="" type="radio"/> VFP Based on Tons Limestone Entered | 9. Length at Top<br>of Freeboard | <input type="text"/>             | ft       |
| 5. Tons of Limestone Needed | <input type="text" value="1,921"/> | <input type="radio"/> VFP Based on Dimensions                        | 10. Width at Top<br>of Freeboard | <input type="text"/>             | ft       |

11. % Void Space of LS. Bed  %
12. System Life  years
13. Limestone Purity  %
14. Limestone Efficiency  %
15. Density of Loose Limestone  lbs/ft3
16. Limestone Unit Cost  \$/ton
17. LS Placement Unit Cost  \$/yd3
18. Slope of Pond Sides  Run of Slope :  Rise of Slope
19. Freeboard Depth  ft
20. Free Standing Water Depth  ft
21. Organic Matter Depth  ft
22. Organic Matter Unit Cost  \$/yd3
23. Organic Matter Spreading Unit Cost  \$/yd3
24. Limestone Depth  ft
25. Excavation Unit Cost  \$/yd3

**Liner Cost**

- No Liner
- Clay Liner
11. Clay Liner Unit Cost  \$/yd3
12. Thickness of Clay Liner  ft
- Synthetic Liner
13. Synthetic Liner Unit Cost  \$/yd2

29. Clearing and Grubbing?

- 30a. Land Multiplier  ratio
- 30b. Clear/Grub Acres  acres
31. Clear and Grub Unit Cost  \$/acre

32. Nbr. of Valves  nbr
33. Unit Cost of Valves  \$ ea.

AMDTreat Piping Costs

34. Total Length of Effluent / Influent Pipe  ft
35. Pipe Install Rate  ft/hr
36. Labor Rate  \$/hr
37. Segment Len. of Trunk Pipe  ft/pipe seg.
38. Trunk Pipe Cost  \$/ft
39. Trunk Coupler Cost  \$/coupler
40. Spur Cost  \$/ft
41. Spur Coupler Cost  \$/spur
42. "T" Connector Cost  \$/T coupler
43. Segment Len. of Spur Pipe  ft/pipe seg.
44. Spur Pipe Spacing  ft

Custom Piping Costs

- |             | Length                  | Diameter                | Unit Cost               |
|-------------|-------------------------|-------------------------|-------------------------|
| 45. Pipe #1 | <input type="text"/> ft | <input type="text"/> in | <input type="text"/> \$ |
| 46. Pipe #2 | <input type="text"/> ft | <input type="text"/> in | <input type="text"/> \$ |
| 47. Pipe #3 | <input type="text"/> ft | <input type="text"/> in | <input type="text"/> \$ |

**VFP Sizing Summaries**

- |                                |                                     |      |
|--------------------------------|-------------------------------------|------|
| 48. Length at Top of Freeboard | <input type="text" value="112.55"/> | ft   |
| 49. Width at Top of Freeboard  | <input type="text" value="68.27"/>  | ft   |
| 50. Freeboard Volume           | <input type="text" value="738"/>    | yd3  |
| 51. Water Surface Area         | <input type="text" value="5,659"/>  | ft2  |
| 52. Total Water Volume         | <input type="text" value="374"/>    | yd3  |
| 53. Organic Matter Volume      | <input type="text" value="155"/>    | yd3  |
| 54. Limestone Surface Area     | <input type="text" value="3,921"/>  | ft2  |
| 55. Limestone Volume           | <input type="text" value="352.45"/> | yd3  |
| 56. Excavation Volume          | <input type="text" value="882.0"/>  | yd3  |
| 57. Clear and Grub Area        | <input type="text" value="0.0"/>    | acr. |
| 58. Liner Area                 | <input type="text" value="0.0"/>    | ft2  |
| 59. Theoretical Retention Time | <input type="text" value="20.76"/>  | hrs  |

**VFP Cost Summaries**

- |   |                                     |    |
|---|-------------------------------------|----|
| 60. Organic Matter Cost                         | <input type="text" value="2,950"/>  | \$ |
| 61. Limestone Cost                              | <input type="text" value="11,256"/> | \$ |
| 62. Limestone and Organic Matter Placement Cost | <input type="text" value="1,600"/>  | \$ |
| 63. Excavation Cost                             | <input type="text" value="2,205"/>  | \$ |
| 64. Liner Cost                                  | <input type="text" value="0"/>      | \$ |
| 65. Clear and Grub Cost                         | <input type="text" value="0"/>      | \$ |
| 66. Valve Cost                                  | <input type="text" value="0"/>      | \$ |
| 67. Pipe Cost                                   | <input type="text" value="2,262"/>  | \$ |

68. Total Cost  \$

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# AMD TREAT

## PONDS

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Pond Name

### Pond Design Based On:

Retention Time

1. Desired Retention Time  hours

2. Include Sludge Removal?

3. Sludge Removal Frequency  times/year

4. Titration?

5. Sludge Rate  gal sludge/  
gal H2O

6. Percent Solids  %

7. Sludge Density  lbs./gal

Pond Size

8. Pond Length at Top of Freeboard  ft

9. Pond Width at Top of Freeboard  ft

Run Rise

10. Slope Ratio of Pond Sides  :

11. Freeboard Depth  ft

12. Water Depth  ft

13. Excavation Unit Cost  \$/yd3

14. Total Length of Effluent / Influent Pipe  ft

15. Unit Cost of Pipe  \$/ft

Liner Cost

No Liner

Clay Liner

16. Clay Liner Unit Cost  \$/yd3

17. Thickness of Clay Liner  ft

Synthetic Liner

18. Synthetic Liner Unit Cost  \$/yd2

19. Clearing and Grubbing?

20. Land Multiplier  ratio

21. Clear/Grub Acres  acres

22. Clear and Grub Unit Cost  \$/acre

23. Revegetation Cost  \$/acre

24. Number of Ponds for this Design  number

25. Cost of Baffles  \$

### Calculated Pond Dimensions per Pond

26. Length at Top of Freeboard  ft

27. Width at Top of Freeboard  ft

28. Freeboard Volume  yd3

29. Water Volume  yd3

30. Estimated Annual Sludge  yd3/yr

31. Volume of Sludge per Removal  yd3/removal

32. Excavation Volume  acre ft

33. Excavation Volume  yd3

34. Clear and Grub Area  acres

35. Liner Area  yd2

36. Calculated Retention Time  hours

### Ponds Sub-Totals per Pond

37. Excavation Cost  \$

38. Pipe Cost  \$

39. Liner Cost  \$

40. Clearing and Grubbing Cost  \$

41. Revegetation Cost  \$

42. Baffle Cost  \$

43. Estimated Cost  \$

44. Accept Minimum Pond Cost?

The Recommended Minimum Construction Cost of Building a Pond is \$ 5,000

45. Recommended Minimum Cost  \$

46. Total Cost  \$

Opening Screen Water Parameters

### Influent Water Parameters that Affect Ponds

Calculated Acidity

mg/L

Alkalinity

mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity)

mg/L

Design Flow

gpm

Typical Flow

gpm

Total Iron

mg/L

Aluminum

mg/L

Manganese

mg/L

Record Number

1 of 1

Company Name D & E Construction

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**AMDTREAT**

**AMD TREAT  
ENGINEERING COST**

1. Capital Cost *	25,273	\$
☛ 2. Per Cent of Capital Cost	20.00	%
☛ 3. Actual Engineering Cost		\$
4. Total Engineering Cost	5,055	\$

**\* Total Capital Cost minus Engineering and  
Land Access Capital Cost**

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## AMD TREAT SAMPLING



Sampling Name Quarterly - raw, final, upstr, downstr

### Estimate Sampling Cost

1. Unit Labor Cost  \$/hr

2. Collection Time per Sample  hours/sample

3. Travel Time  hr

4. Sample Frequency  samples/mo

5. Lab Cost Per Sample  \$/sample

6. Number of Sample Points  points

### Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost  \$

### Sampling Sub-Totals

8. Yearly Sample Analysis Cost  \$

9. Yearly Travel Cost  \$

10. Yearly Collection Cost  \$

11. Sampling Cost  \$

Record Number 1 of 1

Company Name D & E Construction

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AMDTREAT

## AMD TREAT

### LABOR

Labor Name

#### Estimate Labor Cost

1. Site Visits per Week

2. Site Labor Time per Visit  hours

3. Travel Time per Visit  hours

4. Unit Labor Cost  \$/hour

#### Enter Established Annual Labor Cost

5. Actual Annual Labor Cost  \$

6. Total Cost  \$

Record Number 1 of 1

Company Name D & E Construction

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AMD TREAT

## AMD TREAT

### MAINTANENCE

**Estimate Maintenance Cost**

- 1. Percent of Active Cost  %
- 2. Percent of Passive Cost  %
- 3. Percent of Ancillary Cost \*  %
- 4. Percent of Other Capital Cost  %

**Enter Established Annual Maintenance Cost**

5. Annual Maintenance Cost  \$

#### Maintenance Sub-Totals

- 6 Total Maintenance Active Cost  \$
- 7. Total Maintenance Passive Cost  \$
- 8. Total Maintenance Ancillary Cost  \$
- 9. Total Maintenance Other Capital Cost  \$

**10. Total Maintenance Cost**  \$

\* Ancillary Cost does int include Cost for  
Land Access and Engineering Cost



Company Name D & E Construction

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**AMDTREAT**

**AMD TREAT  
SLUDGE REMOVAL**

Opening Screen Water Parameters

Sludge Removal Name

**Influent Water Parameters that Affect Sludge Removal**

Calculated Acidity  mg/L

Alkalinity  mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually  
Net Acidity (Hot Acidity)  mg/L

Design Flow  gpm

Typical Flow  gpm

Total Iron  mg/L

Aluminum  mg/L

Manganese  mg/L

1. Select One Selection for Method of Removing Sludge

Sludge Removal by \$ per Gallon

2. Sludge Removal Unit Cost  \$/gal

Sludge Removal by Vacuum Truck

3. Vacuum Truck Unit Cost  \$/hr

4. Mobilization Cost  \$

5. Hours to be Used  hr

Sludge Removal by Mechanical Excavation

6. Mechanical Excavation Unit Rate  \$/hr

7. Mobilization Cost  \$

8. Hours to be Used  hr

Sludge Removal by Lagoon Cleaner

9. Lagoon Cleaning Unit Rate  \$/hr

10. Mobilization Cost  \$

11. Hours to be Used  hr

Actual Sludge Removal Cost

12. Actual Sludge Removal Cost  \$

13. Off Site Disposal Cost  \$

14. Iron Concentration  mg/L

15. Manganese Concentration  mg/L

16. Aluminum Concentration  mg/L

17. Total Miscellaneous Concentration  mg/L

18. Percent Solids  %

19. Sludge Density  lbs/gal

20 Titration?

21. Gal. of Sludge per Gal of Water Treated  gal

22. Estimated Sludge Volume  yd3/yr

**Cost for Sludge Removal Types**

23. Removal by \$ per Gallon  \$

24. Removal by Vacuum Truck  \$

25. Removal by Mechanical Excavation  \$

26. Removal by Lagoon Cleaner  \$

27. Actual Sludge Removal Cost  \$

**Sludge Removal Sub-Totals**

28. Currently Selected Removal Cost Plus Off Site Disposal Cost  \$

Company Name D & E Construction

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### AMD TREAT RECAPITIALIZATION COST

**AMDTREAT**

Calculation Period  yrs Inflation Rate  % Net Return Rate  %

Recapitalization Name

A.	B	C	D	E	F	G
Description of Item	Unit Cost Per Item	Quantity	Total Item Cost	Life Cycle	Number of Periods	Total PV
1. replace VFP	20,273	1	20,273	7	10	81,026
2. replace settling pond	5,000	1	5,000	20	3	5,466
3.	0	0	0	0	0	0
4.	0	0	0	0	0	0
5.	0	0	0	0	0	0
6.	0	0	0	0	0	0
7.	0	0	0	0	0	0
8.	0	0	0	0	0	0
9.	0	0	0	0	0	0
10.	0	0	0	0	0	0
11.	0	0	0	0	0	0
12.	0	0	0	0	0	0
13.	0	0	0	0	0	0
14.	0	0	0	0	0	0
15.	0	0	0	0	0	0
16.	0	0	0	0	0	0
17.	0	0	0	0	0	0
18.	0	0	0	0	0	0
19.	0	0	0	0	0	0
20.	0	0	0	0	0	0

Total Capital Cost  \$ PV Grand Total  \$

Company Name D & E Construction

Project SEEP 2

Site Name Moore



### AMD TREAT

#### Costs AMD TREAT MAIN COST FORM

AMDTREAT

<u>Passive Treatment</u>	<u>A</u>	<u>S</u>	
Vertical Flow Pond			\$0
Anoxic Limestone Drain			\$0
Anaerobic Wetlands			\$0
Aerobic Wetlands			\$0
Manganese Removal Bed	1	0	\$22,878
Oxic Limestone Channel			\$0
Limestone Bed			\$0
BIO Reactor			\$0
Passive Subtotal:			<b>\$22,878</b>
<u>Active Treatment</u>			
Caustic Soda			\$0
Hydrated Lime			\$0
Pebble Quick Lime			\$0
Ammonia			\$0
Oxidants			\$0
Soda Ash			\$0
Active Subtotal:			<b>\$0</b>
<u>Ancillary Cost</u>			
Ponds	1	0	\$5,000
Roads			\$0
Land Access			\$0
Ditching			\$0
Engineering Cost	1	0	\$5,576
Ancillary Subtotal:			<b>\$10,576</b>
Other Cost (Capital Cost)			\$0
Total Capital Cost:			<b>\$33,454</b>
<u>Annual Costs</u>			
Sampling	1	0	\$674
Labor	1	0	\$837
Maintenance	1	0	\$229
Pumping			\$0
Chemical Cost			\$0
Oxidant Chem Cost			\$0
Sludge Removal	1	0	\$80
Other Cost (Annual Cost)			\$0
Land Access (Annual Cost)			\$0
Total Annual Cost:			<b>\$1,820</b>
Other Cost			

#### Water Quality

Calculated Acidity  mg/L

Alkalinity  mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity)  mg/L

Design Flow  gpm

Typical Flow  gpm

Total Iron  mg/L

Aluminum  mg/L

Manganese  mg/L

pH  su

Ferric Iron  mg/L

Ferrous Iron  mg/L

Sulfate  mg/L

Filtered Fe  mg/L

Filtered Al  mg/L

Filtered Mn  mg/L

Specific Conductivity  uS/cm

Total Dissolved Solids  mg/L

Dissolved Oxygen  mg/L

Total Annual Cost: per  
1000 Gal of H2O Treated \$0.346

Company Name

Project

Site Name



AMDTREAT

# AMD TREAT MANGANESE REMOVAL BED

MN Removal Bed Name

### SIZING METHODS Select One

- Tons of Limestone Needed   Based on Retention Time
- Tons of Limestone Needed   Based on Tons of Limestone
- Tons of Limestone Needed   Based on Dimensions
- Tons of Limestone Needed   Based on Kinetics

- 1. Retention Time  days
- 2. Limestone Needed  tons
- 3. Length at Top of Freeboard  ft
- 4. Width at Top of Freeboard  ft
- 5. Rate Constant (k)  hr/ft

### Opening Screen Water Parameters

#### Influent Water Parameters that Affect MN Removal Bed

Calculated Acidity  
 mg/L

Alkalinity  
 mg/L

Calculate Net  
Acidity  
(Acid-Alkalinity)

Enter Net Acidity  
manually  
Net Acidity  
(Hot Acidity)  
 mg/L

Design Flow  
 gpm

Typical Flow  
 gpm

Total Iron  
 mg/L

Aluminum  
 mg/L

Manganese  
 mg/L

- 6. Stone Diameter  inches
- 7. Effluent Mn Concentration  mg/l
- 8. % Void Space of Limestone Bed  %
- 9 Density of Loose Limestone  lbs/ft3
- 10. Limestone Unit Cost  \$/ton
- 11. Limestone Placement Unit Cost  \$/yd3
- 12. Freeboard Depth  ft
- 13. Limestone Depth  ft
- 14. Excavation Unit Cost  \$/yd3
- 15. Slope of Pond Sides Run  : Rise

### Liner Cost

- No Liner
- Clay Liner
  - 16. Clay Liner Unit Cost  \$/yd3
  - 17. Thickness of Clay Liner  ft
- Synthetic Liner
  - 18. Synthetic Liner Unit Cost  \$/yd2

19. Clearing and Grubbing?

- 20. Land Multiplier  ratio
- 21. Clear/Grub Acres  acres
- 22. Clear and Grub Unit Cost  \$/acre

### Manganese Removal Bed Sizing Summaries

- 23. Top Length at Freeboard  ft
- 23. Top Width at Freeboard  ft
- 25. Freeboard Volume  yd3
- 26. Limestone Surface Area  ft2
- 27. Limestone Volume  yd3
- 28. Tons of Limestone  tons
- 29. Excavation Volume  yd3
- 30. Clear and Grub Area  acres
- 31. Liner Area  ft2
- 32. Theoretical Retention Time  days

### Manganese Removal Bed Sub-Totals

- 33. Limestone Cost  \$
- 34. Limestone Placement Cost  \$
- 35. Excavation Cost  \$
- 36. Liner Cost  \$
- 37. Clear and Grub Cost  \$

38. Total Cost  \$

Record Number 1 of 1

Company Name  
Project  
Site Name

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# AMD TREAT PONDS

AMDTREAT

Pond Name

### Pond Design Based On:

Retention Time

1. Desired Retention Time  hours

2. Include Sludge Removal?

3. Sludge Removal Frequency  times/year

4. Titration?

5. Sludge Rate  gal sludge/  
gal H2O

6. Percent Solids  %

7. Sludge Density  lbs./gal

Pond Size

8. Pond Length at Top of Freeboard  ft

9. Pond Width at Top of Freeboard  ft

	Run	Rise
10. Slope Ratio of Pond Sides	<input type="text" value="2.0"/>	<input type="text" value="1"/>
11. Freeboard Depth	<input type="text" value="2.0"/>	ft
12. Water Depth	<input type="text" value="5.5"/>	ft
13. Excavation Unit Cost	<input type="text" value="2.50"/>	\$/yd3
14. Total Length of Effluent / Influent Pipe	<input type="text" value="0.00"/>	ft
15. Unit Cost of Pipe	<input type="text" value="0.00"/>	\$/ft

#### Liner Cost

No Liner

Clay Liner

16. Clay Liner Unit Cost  \$/yd3

17. Thickness of Clay Liner  ft

Synthetic Liner

18. Synthetic Liner Unit Cost  \$/yd2

19. Clearing and Grubbing?

20. Land Multiplier  ratio

21. Clear/Grub Acres  acres

22. Clear and Grub Unit Cost  \$/acre

23. Revegetation Cost  \$/acre

24. Number of Ponds for this Design  number

25. Cost of Baffles  \$

### Calculated Pond Dimensions per Pond

26. Length at Top of Freeboard  ft

27. Width at Top of Freeboard  ft

28. Freeboard Volume  yd3

29. Water Volume  yd3

30. Estimated Annual Sludge  yd3/yr

31. Volume of Sludge per Removal  yd3/removal

32. Excavation Volume  acre ft

33. Excavation Volume  yd3

34. Clear and Grub Area  acres

35. Liner Area  yd2

36. Calculated Retention Time  hours

### Ponds Sub-Totals per Pond

37. Excavation Cost  \$

38. Pipe Cost  \$

39. Liner Cost  \$

40. Clearing and Grubbing Cost  \$

41. Revegetation Cost  \$

42. Baffle Cost  \$

43. Estimated Cost  \$

44. Accept Minimum Pond Cost?

The Recommended Minimum Construction Cost of Building a Pond is \$ 5,000

45. Recommended Minimum Cost  \$

46. Total Cost  \$

Opening Screen Water Parameters

### Influent Water Parameters that Affect Ponds

Calculated Acidity  mg/L

Alkalinity  mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity)  mg/L

#### Design Flow

gpm

Typical Flow  gpm

Total Iron  mg/L

Aluminum  mg/L

Manganese  mg/L

Record Number  
1 of 1

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AMDTREAT

**AMD TREAT  
ENGINEERING COST**

1. Capital Cost \*  \$

☛ 2. Per Cent of Capital Cost  %

☛ 3. Actual Engineering Cost  \$

4. Total Engineering Cost  \$

**\* Total Capital Cost minus Engineering and  
Land Access Capital Cost**

Company Name D & E Construction

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Project SEEP 2

Site Name Moore



AMDTREAT

## AMD TREAT SAMPLING

Sampling Name

### Estimate Sampling Cost

1. Unit Labor Cost  \$/hr

2. Collection Time per Sample  hours/sample

3. Travel Time  hr

4. Sample Frequency  samples/mo

5. Lab Cost Per Sample  \$/sample

6. Number of Sample Points  points

### Enter Established Annual Sampling Cost

7. Actual Annual Sampling Cost  \$

### Sampling Sub-Totals

8. Yearly Sample Analysis Cost  \$

9. Yearly Travel Cost  \$

10. Yearly Collection Cost  \$

11. Sampling Cost  \$

Record Number 1 of 1

Company Name D & E Construction

Printed on 03/20/2008

Project SEEP 2

Site Name Moore



AMDTREAT

## AMD TREAT

### LABOR

Labor Name

#### Estimate Labor Cost

- 1. Site Visits per Week
- 2. Site Labor Time per Visit  hours
- 3. Travel Time per Visit  hours
- 4. Unit Labor Cost  \$/hour

#### Enter Established Annual Labor Cost

5. Actual Annual Labor Cost  \$

6. Total Cost  \$

Record Number 1 of 1



Company Name D & E Construction

Project SEEP 2

Site Name Moore



**AMD TREAT**

## AMD TREAT

### MAINTANENCE

**☛ Estimate Maintenance Cost**

- 1. Percent of Active Cost  %
- 2. Percent of Passive Cost  %
- 3. Percent of Ancillary Cost \*  %
- 4. Percent of Other Capital Cost  %

**☛ Enter Established Annual Maintenance Cost**

5. Annual Maintenance Cost  \$

**Maintenance Sub-Totals**

- 6 Total Maintenance Active Cost  \$
- 7. Total Maintenance Passive Cost  \$
- 8. Total Maintenance Ancillary Cost  \$
- 9. Total Maintenance Other Capital Cost  \$

**10. Total Maintenance Cost  \$**

\* Ancillary Cost does int include Cost for  
Land Access and Engineering Cost

Company Name D & E Construction

Project SEEP 2

Site Name Moore



**AMDTREAT**

**AMD TREAT  
SLUDGE REMOVAL**

Opening Screen  
Water Parameters

Sludge Removal Name

**Influent Water Parameters that Affect Sludge Removal**

Calculated Acidity  mg/L

Alkalinity  mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity)  mg/L

Design Flow  gpm

Typical Flow  gpm

Total Iron  mg/L

Aluminum  mg/L

Manganese  mg/L

Selection for Method of Removing Sludge

1. Select One

Sludge Removal by \$ per Gallon

2. Sludge Removal Unit Cost  \$/gal

Sludge Removal by Vacuum Truck

3. Vacuum Truck Unit Cost  \$/hr

4. Mobilization Cost  \$

5. Hours to be Used  hr

Sludge Removal by Mechanical Excavation

6. Mechanical Excavation Unit Rate  \$/hr

7. Mobilization Cost  \$

8. Hours to be Used  hr

Sludge Removal by Lagoon Cleaner

9. Lagoon Cleaning Unit Rate  \$/hr

10. Mobilization Cost  \$

11. Hours to be Used  hr

Actual Sludge Removal Cost

12. Actual Sludge Removal Cost  \$

13. Off Site Disposal Cost  \$

14. Iron Concentration  mg/L

15. Manganese Concentration  mg/L

16. Aluminum Concentration  mg/L

17. Total Miscellaneous Concentration  mg/L

18. Percent Solids  %

19. Sludge Density  lbs/gal

20 Titration?

21. Gal. of Sludge per Gal of Water Treated  gal

22. Estimated Sludge Volume  yd<sup>3</sup>/yr

**Cost for Sludge Removal Types**

23. Removal by \$ per Gallon  \$

24. Removal by Vacuum Truck  \$

25. Removal by Mechanical Excavation  \$

26. Removal by Lagoon Cleaner  \$

27. Actual Sludge Removal Cost  \$

**Sludge Removal Sub-Totals**

28. Currently Selected Removal Cost Plus Off Site Disposal Cost  \$

Company Name D & E Construction

Project SEEP 2

Site Name Moore



### AMD TREAT RECAPITIALIZATION COST

**AMDTREAT**

Calculation Period  yrs Inflation Rate  % Net Return Rate  %

Recapitalization Name

A.	B	C	D	E	F	G
Description of Item	Unit Cost Per Item	Quantity	Total Item Cost	Life Cycle	Number of Periods	Total PV
1. replace Mn removal bed	22,878	1	22,878	10	7	61,297
2.	0	0	0	0	0	0
3.	0	0	0	0	0	0
4.	0	0	0	0	0	0
5.	0	0	0	0	0	0
6.	0	0	0	0	0	0
7.	0	0	0	0	0	0
8.	0	0	0	0	0	0
9.	0	0	0	0	0	0
10.	0	0	0	0	0	0
11.	0	0	0	0	0	0
12.	0	0	0	0	0	0
13.	0	0	0	0	0	0
14.	0	0	0	0	0	0
15.	0	0	0	0	0	0
16.	0	0	0	0	0	0
17.	0	0	0	0	0	0
18.	0	0	0	0	0	0
19.	0	0	0	0	0	0
20.	0	0	0	0	0	0

Total Capital Cost  \$ PV Grand Total  \$