

Company Name **ED HANSLOVAN**

Project **KEATING TRUST**

Site Name **KEATING K5**



AMDTREAT

AMD TREAT

Costs

AMD TREAT MAIN COST FORM

<u>Passive Treatment</u>	<u>A</u>	<u>S</u>	
Vertical Flow Pond	1	0	\$19,910
Anoxic Limestone Drain	1	0	\$7,013
Anaerobic Wetlands			\$0
Aerobic Wetlands			\$0
Manganese Removal Bed			\$0
Oxic Limestone Channel	1	0	\$3,540
Limestone Bed			\$0
BIO Reactor			\$0
Passive Subtotal:			\$30,463
<u>Active Treatment</u>			
Caustic Soda			\$0
Hydrated Lime			\$0
Pebble Quick Lime			\$0
Ammonia			\$0
Oxidants			\$0
Soda Ash			\$0
Active Subtotal:			\$0
<u>Ancillary Cost</u>			
Ponds	2	0	\$10,000
Roads			\$0
Land Access			\$0
Ditching			\$0
Engineering Cost			\$0
Ancillary Subtotal:			\$10,000
Other Cost (Capital Cost)			\$0
Total Capital Cost:			\$40,463
<u>Annual Costs</u>			
Sampling			\$0
Labor			\$0
Maintenance	1	0	\$1,416
Pumping			\$0
Chemical Cost			\$0
Oxidant Chem Cost			\$0
Sludge Removal	1	0	\$1,060
Other Cost (Annual Cost)			\$0
Land Access (Annual Cost)			\$0
Total Annual Cost:			\$2,476
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
 Typical Acid Loading tons/yr

**Total Annual Cost: per
 1000 Gal of H2O Treated \$0.915**

Company Name ED HANSLOVAN

Project KEATING TRUST

Site Name KEATING K5

Printed on 06/04/2008



AMDTREAT

AMD TREAT VERTICAL FLOW POND (VFP)

RECEIVED TIME JUN. 5. 11:52AM

PRINT TIME JUN. 5. 11:59AM

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 Retention Time 6. Retention Time hours
- VFP Based on Alkalinity Generation Rate 7. Alkalinity Generation Rate g/m2/day
- VFP Based on Tons Limestone Entered 8. Limestone Needed tons
- VFP Based on Dimensions 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
- Run of Slope Rise of Slope
- 18. Slope of Pond Sides :
- 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/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" value=""/> ft	<input type="text" value=""/> in	<input type="text" value=""/> \$
46. Pipe #2	<input type="text" value=""/> ft	<input type="text" value=""/> in	<input type="text" value=""/> \$
47. Pipe #3	<input type="text" value=""/> ft	<input type="text" value=""/> in	<input type="text" value=""/> \$

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 ac.
- 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 \$

Company Name ED HANSLOVAN
 Project KEATING TRUST
 Site Name KEATING K5



AMD TREAT ANOXIC LIMESTONE DRAIN (ALD)

AMDTREAT

ALD Name

SIZING METHODS Select One

- | | | | |
|-----------------------------|-------|----------------------------------|-------------------------------------|
| 1. Tons of Limestone Needed | 321 | <input checked="" type="radio"/> | ALD Based on Acidity Neutralization |
| 2. Tons of Limestone Needed | 554 | <input checked="" type="radio"/> | ALD Based on Retention Time |
| 3. Tons of Limestone Needed | 0 | <input checked="" type="radio"/> | ALD Based on Tons Limestone Entered |
| 4. Tons of Limestone Needed | 4,301 | <input checked="" type="radio"/> | ALD Based on Dimensions Entered |

- | | | |
|---------------------|-----|-------|
| 5. Retention Time | [] | hours |
| 6. Limestone Needed | [] | tons |
| 7. Top Length ALD | [] | ft |
| 8. Top Width ALD | [] | ft |

Opening Screen Water Parameters

Influent Water Parameters that Affect ALD

Calculated Acidity
0.00 mg/L

Alkalinity
0.00 mg/L

- Calculate Net Acidity (Acid-Alkalinity)
- Enter Net Acidity manually
 Net Acidity (Hot Acidity)
176.4800 mg/L

Design Flow
30.00 gpm

Typical Flow
5.14 gpm

Total Iron
2.74 mg/L

Aluminum
13.45 mg/L

Manganese
39.09 mg/L

- | | | | |
|--|--------|----------------|---|
| 9. System Life | 15.0 | years | |
| 10. Limestone Purity | 90.00 | % | |
| 11. Limestone Efficiency | 60.00 | % | |
| 12. % Void Space of Limestone Bed | 35.00 | % | |
| 13. Limestone Depth | 4.00 | ft | |
| 14. Density of Loose Limestone | 107.53 | lbs/ft3 | |
| 15. Limestone Unit Cost | 12.00 | \$/ton | |
| 16. Limestone Placement Unit Cost | 0.00 | \$/yd3 | |
| 17. Soil Cover Depth | 2.00 | ft | |
| 18. Length to Width Ratio | 4.00 | Length : Width | 1 |
| 19. Excavation Unit Cost | 4.50 | \$/yd3 | |
| 20. Soil Replacement Unit Cost | 4.50 | \$/yd3 | |
| 21. Liner Unit Cost | 2.60 | \$/yd2 | |
| 22. Total Length of Effluent / Influent Pipe | 0.00 | ft | |
| 23. Unit Cost of Pipe | 0.00 | \$/ft | |

24. Clearing and Grubbing?

- 25a. Land Multiplier [] ratio
- 25b. Clear/Grub Acres [] acres
26. Clear and Grub Unit Cost [] \$/acre

ALD Sizing Summaries

- | | | |
|--------------------------------|---------|-------|
| 27. Top Width | 19.34 | ft |
| 28. Top Length | 77.37 | ft |
| 29. Limestone Surface Area | 1,496.6 | ft2 |
| 30. Limestone Volume | 221 | yd3 |
| 31. Excavation Volume | 332.5 | yd3 |
| 32. Clear & Grub Area | 0.00 | acres |
| 33. Liner Area | 444 | ft2 |
| 34. Theoretical Retention Time | 8.70 | hrs |

ALD Cost Summaries

- | | | |
|------------------------------|-------|----|
| 35. Limestone Cost | 3,862 | \$ |
| 36. Excavation Cost | 1,496 | \$ |
| 37. Limestone Placement Cost | 0 | \$ |
| 38. Pipe Cost | 0 | \$ |
| 39. Liner Cost | 1,155 | \$ |
| 40. Clear and Grub Cost | 0 | \$ |
| 41. Soil Replacement Cost | 498 | \$ |

42. Total Cost 7,013 \$

Record Number 1 of 1

Company Name ED HANSLOVAN

Printed on 06/04/2008

Project KEATING TRUST

Site Name KEATING K5



AMD TREAT

Oxic Limestone Channel (OLC)

AMDTREAT

Oxic Limestone Channel Name

- 1. Ditch Length Rock ft
- 2. Bottom Width of the Ditch ft
- 3. Ditch Depth ft
- 4. Geo Textile Unit Cost \$/yd2
- 5. Length of GeoTextile ft
- 6. Slope Ratio of Ditch Sides

Run	Rise
<input type="text" value="2.00"/>	<input type="text" value="1.00"/>
- 7. Surveying?
- 8. Survey Rate acres/day
- 9. Survey Unit Cost \$/day
- 10. Clearing and Grubbing?
- 11. Clear and Grub Cost \$/acre

- 12. Ditch Depth of Limestone ft
- 13. Cost of Limestone \$/yd3
- 14. Cost to Place Limestone \$/yd3
- 15. Excavation Unit Cost \$/yd3
- 16. Revegetation Unit Cost \$/acre

OLC Sub-Totals

- 17. Excavation Cost \$
- 18. Survey Cost \$
- 19. Clear and Grub Cost \$
- 20. Limestone Cost \$
- 21. Filter Fabric Cost \$
- 22. Revegetation Cost \$

23. Total Cost \$

Record Number 1 of 1



AMD TREAT

PONDS

AMDTREAT

Pond Name Settling Pond

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 90.000 ft

9. Pond Width at Top of Freeboard 60.000 ft

Run Rise

10. Slope Ratio of Pond Sides 2.0 : 1

11. Freeboard Depth 2.0 ft

12. Water Depth 4.0 ft

13. Excavation Unit Cost 4.50 \$/yd3

14. Total Length of Effluent /
Influent Pipe 150.00 ft

15. Unit Cost of Pipe 14.22 \$/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 1500.00 \$/acre

24. Cost of Baffles 0 \$

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard 90 ft

26. Width at Top of Freeboard 60 ft

27. Freeboard Volume 842 yd3

28. Water Volume 485 yd3

29. Estimated Annual Sludge 0 yd3/yr

30. Volume of Sludge
per Removal 0 yd3/
removal

31. Excavation Volume 0.30 acre ft

32. Excavation Volume 485 yd3

33. Clear and Grub Area 0.18 acres

34. Liner Area 0 yd2

35. Calculated Retention Time 54 hours

Ponds Sub-Totals per Pond

36. Excavation Cost 2,184 \$

37. Pipe Cost 2,133 \$

38. Liner Cost 0 \$

39. Clearing and Grubbing Cost 0 \$

40. Revegetation Cost 92 \$

41. Baffle Cost 0 \$

42. Estimated Cost 4,411 \$

43. Accept Minimum Pond Cost?

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

44. Recommended Minimum Cost 5,000 \$

45. Total Cost 5,000 \$

Opening Screen
Water Parameters

Influent Water Parameters that Affect Ponds

Calculated Acidity

0.00 mg/L

Alkalinity

0.00 mg/L

Calculate Net
Acidity
(Acid-Alkalinity)

Enter Net Acidity
manually

Net Acidity
(Hot Acidity)

176.48 mg/L

Design Flow

30.00 gpm

Typical Flow

5.14 gpm

Total Iron

2.74 mg/L

Aluminum

13.45 mg/L

Manganese

39.09 mg/L

Record Number

1 of 2



AMD TREAT

PONDS

AMDTREAT

Pond Name Flushing Pond

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 60.000 ft

9. Pond Width at Top of Freeboard 40.000 ft

Run Rise

10. Slope Ratio of Pond Sides 2.0 : 1

11. Freeboard Depth 2.0 ft

12. Water Depth 4.0 ft

13. Excavation Unit Cost 4.50 \$/yd³

14. Total Length of Effluent / Influent Pipe 0.00 ft

15. Unit Cost of Pipe 14.22 \$/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 1500.00 \$/acre

24. Cost of Baffles 0 \$

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard 60 ft

26. Width at Top of Freeboard 40 ft

27. Freeboard Volume 309 yd³

28. Water Volume 159 yd³

29. Estimated Annual Sludge 0 yd³/yr

30. Volume of Sludge per Removal 0 yd³/removal

31. Excavation Volume 0.09 acre ft

32. Excavation Volume 159 yd³

33. Clear and Grub Area 0.08 acres

34. Liner Area 0 yd²

35. Calculated Retention Time 17 hours

Ponds Sub-Totals per Pond

36. Excavation Cost 718 \$

37. Pipe Cost 0 \$

38. Liner Cost 0 \$

39. Clearing and Grubbing Cost 0 \$

40. Revegetation Cost 41 \$

41. Baffle Cost 0 \$

42. Estimated Cost 760 \$

43. Accept Minimum Pond Cost?

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

44. Recommended Minimum Cost 5,000 \$

45. Total Cost 5,000 \$

Opening Screen Water Parameters

Influent Water Parameters that Affect Ponds

Calculated Acidity

0.00 mg/L

Alkalinity

0.00 mg/L

Calculate Net Acidity (Acid-Alkalinity)

Enter Net Acidity manually

Net Acidity (Hot Acidity)

176.48 mg/L

Design Flow

30.00 gpm

Typical Flow

5.14 gpm

Total Iron

2.74 mg/L

Aluminum

13.45 mg/L

Manganese

39.09 mg/L

Record Number

2 of 2

Company Name ED HANSLOVAN

Project KEATING TRUST

Site Name KEATING K5



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 ED HANSLOVAN
Project KEATING TRUST
Site Name KEATING K5



AMDTREAT

AMD TREAT SLUDGE REMOVAL

Opening Screen Water Parameters

Sludge Removal Name

RECEIVED TIME JUN. 5. 11:52AM

PRINT TIME JUN. 5. 11:59AM

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 \$

Concentrations from Main Water Quality Screen

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 \$

Record Number 1 of 1

Company Name ED HANSLOVAN

Project KEATING TRUST

Site Name KEATING K5



AMD TREAT RECAPITILATION 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. Organic Matter (VFP)	3,349	1	3,349	15	5	5,680
2. Replacement Ls (VFP)	7,097	1	7,097	15	5	12,036
3. 3 Gate Valves	1,424	3	4,272	30	2	2,667
4. Pipe Cost (VFP)	4,330	1	4,330	15	5	7,343
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 ED HANSLOVAN

Project KEATING TRUST

Site Name KEATING K29



AMD TREAT

Costs

AMD TREAT MAIN COST FORM

AMDTREAT

Passive Treatment	A	S	
Vertical Flow Pond			\$0
Anoxic Limestone Drain	1	0	\$2,236
Anaerobic Wetlands			\$0
Aerobic Wetlands			\$0
Manganese Removal Bed			\$0
Oxic Limestone Channel			\$0
Limestone Bed			\$0
BIO Reactor			\$0
Passive Subtotal:			\$2,236
Active Treatment			
Caustic Soda			\$0
Hydrated Lime			\$0
Pebble Quick Lime			\$0
Ammonia			\$0
Oxidants			\$0
Soda Ash			\$0
Active Subtotal:			\$0
Ancillary Cost			
Ponds			\$0
Roads			\$0
Land Access			\$0
Ditching			\$0
Engineering Cost			\$0
Ancillary Subtotal:			\$0
Other Cost (Capital Cost)			\$0
Total Capital Cost:			\$2,236
Annual Costs			
Sampling			\$0
Labor			\$0
Maintenance	1	0	\$78
Pumping			\$0
Chemical Cost			\$0
Oxidant Chem Cost			\$0
Sludge Removal			\$0
Other Cost (Annual Cost)			\$0
Land Access (Annual Cost)			\$0
Total Annual Cost:			\$78
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
 Typical Acid Loading tons/yr

**Total Annual Cost: per
 1000 Gal of H2O Treated \$0.049**

Company Name ED HANSLOVAN

Project KEATING TRUST

Site Name KEATING K29



AMD TREAT ANOXIC LIMESTONE DRAIN (ALD)

AMD TREAT

ALD Name

SIZING METHODS Select One

- 1. Tons of Limestone Needed ALD Based on Acidity Neutralization
- 2. Tons of Limestone Needed ALD Based on Retention Time
- 3. Tons of Limestone Needed ALD Based on Tons Limestone Entered
- 4. Tons of Limestone Needed ALD Based on Dimensions Entered

- 5. Retention Time hours
- 6. Limestone Needed tons
- 7. Top Length ALD ft
- 8. Top Width ALD ft

Opening Screen Water Parameters

Influent Water Parameters that Affect ALD

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

- 9. System Life years
- 10. Limestone Purity %
- 11. Limestone Efficiency %
- 12. % Void Space of Limestone Bed %
- 13. Limestone Depth ft
- 14. Density of Loose Limestone lbs/ft³
- 15. Limestone Unit Cost \$/ton
- 16. Limestone Placement Unit Cost \$/yd³
- 17. Soil Cover Depth ft
- 18. Length to Width Ratio Length : Width
- 19. Excavation Unit Cost \$/yd³
- 20. Soil Replacement Unit Cost \$/yd³
- 21. Liner Unit Cost \$/yd²
- 22. Total Length of Effluent / Influent Pipe ft
- 23. Unit Cost of Pipe \$/ft

24. Clearing and Grubbing?

- 25a. Land Multiplier ratio
- 25b. Clear/Grub Acres acres
- 26. Clear and Grub Unit Cost \$/acre

ALD Sizing Summaries

- 27. Top Width ft
- 28. Top Length ft
- 29. Limestone Surface Area ft²
- 30. Limestone Volume yd³
- 31. Excavation Volume yd³
- 32. Clear & Grub Area acres
- 33. Liner Area ft²
- 34. Theoretical Retention Time hrs

ALD Cost Summaries

- 35. Limestone Cost \$
- 36. Excavation Cost \$
- 37. Limestone Placement Cost \$
- 38. Pipe Cost \$
- 39. Liner Cost \$
- 40. Clear and Grub Cost \$
- 41. Soil Replacement Cost \$

42. Total Cost \$

Record Number 1 of 1

Company Name ED HANSLOVAN

Project KEATING TRUST

Site Name KEATING K29



AMDTREAT

AMD TREAT

MAINTENANCE

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 not include Cost for Land Access and Engineering Cost

Company Name ED HANSLOVAN

Project KEATING TRUST

Site Name KEATING K29



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. ALD Ls	800	1	800	15	5	1,357
2. ALD Liner	311	1	311	15	5	527
3. ALD Pipes	711	1	711	15	5	1,206
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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Company Name **ED HANSLOVAN**

Project **KEATING TRUST**

Site Name **KEATING K14, K6, K8**



AMD TREAT

Costs

AMD TREAT MAIN COST FORM

AMDTREAT

<u>Passive Treatment</u>	<u>A</u>	<u>S</u>	
Vertical Flow Pond	1	0	\$39,864
Anoxic Limestone Drain			\$0
Anaerobic Wetlands			\$0
Aerobic Wetlands			\$0
Manganese Removal Bed			\$0
Oxic Limestone Channel	1	0	\$5,856
Limestone Bed			\$0
BIO Reactor			\$0
Passive Subtotal:			\$45,720
Active Treatment			
Caustic Soda			\$0
Hydrated Lime			\$0
Pebble Quick Lime			\$0
Ammonia			\$0
Oxidants			\$0
Soda Ash			\$0
Active Subtotal:			\$0
Ancillary Cost			
Ponds	2	0	\$10,785
Roads			\$0
Land Access			\$0
Ditching			\$0
Engineering Cost			\$0
Ancillary Subtotal:			\$10,785
Other Cost (Capital Cost)			\$0
Total Capital Cost:			\$56,505
Annual Costs			
Sampling			\$0
Labor			\$0
Maintenance	1	0	\$1,978
Pumping			\$0
Chemical Cost			\$0
Oxidant Chem Cost			\$0
Sludge Removal	1	0	\$1,060
Other Cost (Annual Cost)			\$0
Land Access (Annual Cost)			\$0
Total Annual Cost:			\$3,038
Other Cost			

<u>Water Quality</u>	
Calculated Acidity	0.00 mg/L
Alkalinity	0.00 mg/L
<input checked="" type="checkbox"/> Calculate Net Acidity (Acid-Alkalinity)	
Enter Net Acidity manually	
Net Acidity (Hot Acidity)	100.63 mg/L
Design Flow	55.00 gpm
Typical Flow	10.00 gpm
Total Iron	3.32 mg/L
Aluminum	7.19 mg/L
Manganese	22.33 mg/L
pH	4.19 su
Ferric Iron	0.00 mg/L
Ferrous Iron	0.00 mg/L
Sulfate	685.48 mg/L
Filtered Fe	0.00 mg/L
Filtered Al	0.00 mg/L
Filtered Mn	0.00 mg/L
Specific Conductivity	0.00 uS/cm
Total Dissolved Solids	0.00 mg/L
Dissolved Oxygen	0.00 mg/L
Typical Acid Loading	2.2 tons/yr
TOTALS	
\$ 99,204	
Recap \$ 96,628	

K5
 40,463 2,236
 Total Annual Cost: per 1000 Gal of H2O Treated \$0.577
 2.476 178 \$ 5,592

Company Name ED HANSLOVAN

Project KEATING TRUST

Site Name KEATING K14, K6, K8

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AMDTREAT

AMD TREAT VERTICAL FLOW POND (VFP)

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/FP 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

Run of Slope Rise of Slope

18. Slope of Pond Sides :

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 / Inlet 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

45. Pipe #1 ft in \$

46. Pipe #2 ft in \$

47. Pipe #3 ft in \$

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 \$

Company Name ED HANSLOVAN

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Project KEATING TRUST

Site Name KEATING K14, K6, K8



AMD TREAT

Oxic Limestone Channel (OLC)

AMDTREAT

Oxic Limestone Channel Name

- 1. Ditch Length Rock ft
- 2. Bottom Width of the Ditch ft
- 3. Ditch Depth ft
- 4. Geo Textile Unit Cost \$/yd2
- 5. Length of GeoTextile ft
- 6. Slope Ratio of Ditch Sides

Run		Rise
<input type="text" value="2.00"/>	:	<input type="text" value="1.00"/>
- 7. Surveying?
- 8. Survey Rate acres/day
- 9. Survey Unit Cost \$/day
- 10. Clearing and Grubbing?
- 11. Clear and Grub Cost \$/acre

- 12. Ditch Depth of Limestone ft
- 13. Cost of Limestone \$/yd3
- 14. Cost to Place Limestone \$/yd3
- 15. Excavation Unit Cost \$/yd3
- 16. Revegetation Unit Cost \$/acre

OLC Sub-Totals

- 17. Excavation Cost \$
- 18. Survey Cost \$
- 19. Clear and Grub Cost \$
- 20. Limestone Cost \$
- 21. Filter Fabric Cost \$
- 22. Revegetation Cost \$

23. Total Cost \$

Record Number 1 of 1

Company Name **ED HANSLOVAN**
 Project **KEATING TRUST**
 Site Name **KEATING K14, K6, K8**

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AMD TREAT PONDS

AMDTREAT

Pond Name **Pond 1**

Pond Design Based On:

Retention Time
 1. Desired Retention Time hours

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 200.000 ft
 9. Pond Width at Top of Freeboard 50.000 ft

Run Rise
 10. Slope Ratio of Pond Sides 2.0 : 1
 11. Freeboard Depth 2.0 ft
 12. Water Depth 4.0 ft
 13. Excavation Unit Cost 4.50 \$/yd3
 14. Total Length of Effluent / Influent Pipe 200.00 ft
 15. Unit Cost of Pipe 7.14 \$/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

Opening Screen Water Parameters

Influent Water Parameters that Affect Ponds

Calculated Acidity 0.00 mg/L
 Alkalinity 0.00 mg/L

Calculate Net Acidity (Acid-Alkalinity)
 Enter Net Acidity manually
 Net Acidity (Hot Acidity) 100.63 mg/L

Design Flow 55.00 gpm
 Typical Flow 10.00 gpm
 Total Iron 3.32 mg/L
 Aluminum 7.19 mg/L
 Manganese 22.33 mg/L

Record Number
1 of 2

23. Revegetation Cost 1500.00 \$/acre
 24. Cost of Baffles 0 \$

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard 200 ft
 26. Width at Top of Freeboard 50 ft
 27. Freeboard Volume 1,598 yd3
 28. Water Volume 929 yd3
 29. Estimated Annual Sludge 2 yd3/yr
 30. Volume of Sludge per Removal 2 yd3/removal
 31. Excavation Volume 0.57 acre ft
 32. Excavation Volume 929 yd3
 33. Clear and Grub Area 0.34 acres
 34. Liner Area 0 yd2
 35. Calculated Retention Time 56 hours

Ponds Sub-Totals per Pond

36. Excavation Cost 4,184 \$
 37. Pipe Cost 1,428 \$
 38. Liner Cost 0 \$
 39. Clearing and Grubbing Cost 0 \$
 40. Revegetation Cost 172 \$
 41. Baffle Cost 0 \$

42. Estimated Cost 5,785 \$

Company Name ED HANSLOVAN
 Project KEATING TRUST
 Site Name KEATING K14, K6, K8

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AMD TREAT

PONDS

AMDTREAT

Pond Name Final Pond

Pond Design Based On:

Retention Time

1. Desired Retention Time 24.0 hours

2. Include Sludge Removal?

3. Sludge Removal Frequency 0.20 times/year

4. Titration?

5. Sludge Rate gal sludge/
gal H2O

6. Percent Solids 30.00 %

7. Sludge Density 8.35 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 2.0 : 1

11. Freeboard Depth 2.0 ft

12. Water Depth 4.0 ft

13. Excavation Unit Cost 4.50 \$/yd3

14. Total Length of Effluent /
Influent Pipe 0.00 ft

15. Unit Cost of Pipe 14.22 \$/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 1500.00 \$/acre

24. Cost of Baffles 0 \$

Calculated Pond Dimensions per Pond

25. Length at Top of Freeboard 93 ft

26. Width at Top of Freeboard 50 ft

27. Freeboard Volume 719 yd3

28. Water Volume 406 yd3

29. Estimated Annual Sludge 2 yd3/yr

30. Volume of Sludge
per Removal 14 yd3/
removal

31. Excavation Volume 0.25 acre ft

32. Excavation Volume 406 yd3

33. Clear and Grub Area 0.16 acres

34. Liner Area 0 yd2

35. Calculated Retention Time 24 hours

Ponds Sub-Totals per Pond

36. Excavation Cost 1,828 \$

37. Pipe Cost 0 \$

38. Liner Cost 0 \$

39. Clearing and Grubbing Cost 0 \$

40. Revegetation Cost 82 \$

41. Baffle Cost 0 \$

42. Estimated Cost 1,911 \$

43. Accept Minimum Pond Cost?

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

44. Recommended Minimum Cost 5,000 \$

45. Total Cost 5,000 \$

Opening Screen
Water Parameters

Influent Water Parameters that Affect Ponds

Calculated Acidity

0.00 mg/L

Alkalinity

0.00 mg/L

Calculate Net
Acidity
(Acid-Alkalinity)

Enter Net Acidity
manually

Net Acidity
(Hot Acidity)

100.63 mg/L

Design Flow

55.00 gpm

Typical Flow

10.00 gpm

Total Iron

3.32 mg/L

Aluminum

7.19 mg/L

Manganese

22.33 mg/L

Record Number

2 of 2

Company Name ED HANSLOVAN
Project KEATING TRUST
Site Name KEATING K14, K6, K8



AMDTREAT

AMD TREAT

MAINTENANCE

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 ED HANSLOVAN
 Project KEATING TRUST
 Site Name KEATING K14, K6, K8



AMDTREAT

**AMD TREAT
 SLUDGE REMOVAL**

Opening Screen Water Parameters

Sludge Removal Name

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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 \$

Concentrations from Main Water Quality Screen

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 \$

Record Number 1 of 1

Company Name ED HANSLOVAN

Project KEATING TRUST

Site Name KEATING K14, K6, K8



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. VFP Organic Matter	5,755	1	5,755	15	5	9,760
2. VFP Ls	13,011	1	13,011	15	5	22,065
3. VFP Liner	5,677	1	5,677	15	5	9,628
4. VFP Pipes	6,515	1	6,515	15	5	11,049
5. OLC Ls	4,064	1	4,064	10	7	10,889
6. Pond/ Misc Pipes	1,428	1	1,428	15	5	2,422
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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