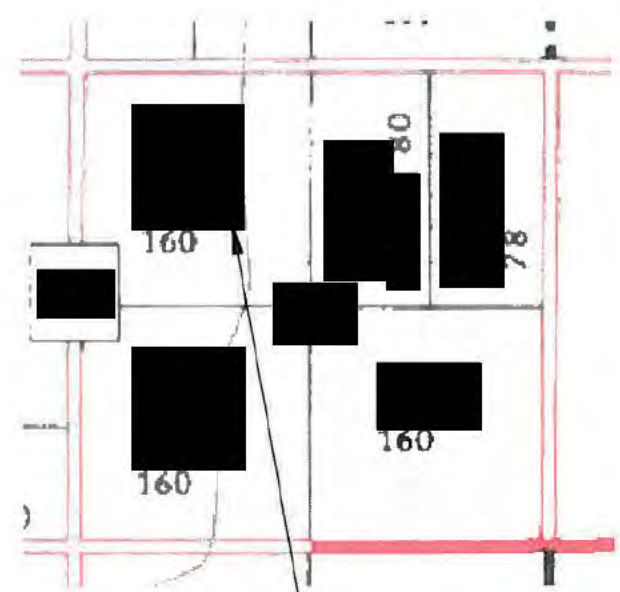
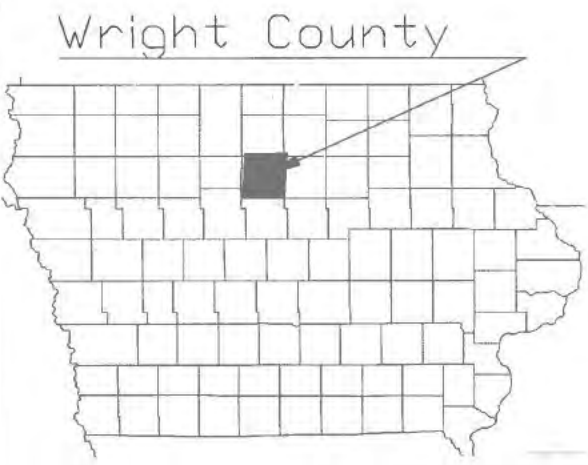


Saturated Buffer 1W
Section █████ Lake
Wright County, Iowa
Job Class III

Site 1 SB1W



Construction Benchmark		
No.	Elev.	Description
1		To be set at precon meeting

Important Contacts	
NRCS/IDALS for Questions	Sean McCoy
Phone	515-322-0619
Landowner Contact	
Phone	

Page 1	Cover Page
Page 2	Plan View
Page 3	WCS
Page 4	Outlet Pipe
Page 5	Profile

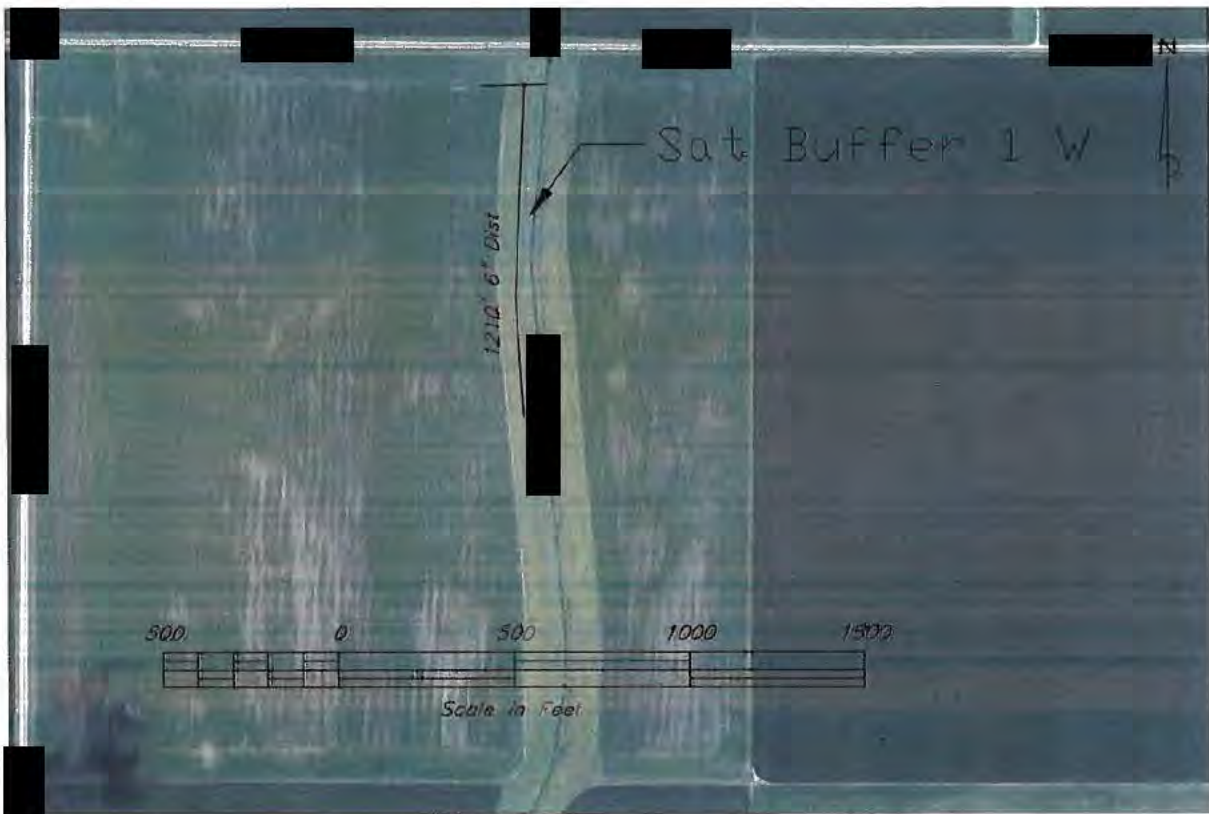
I have reviewed and agree with the content of the plans and specifications prepared by the NRCS.

Landowner: _____ Date: _____

I certify that this practice has been constructed in accordance with the plans and specifications.

Contractor: _____ Date: _____

NRCS Rep.: _____ Date: _____



Construction Specifications	
IA-1	Site Prep
IA-5	Pollution Control
IA-6	Seeding and Mulching for Cover
IA-9	Subsurface Drainage Inves
IA-11	Removal of Water
IA-21	Excavation
IA-23	Earthfill
IA-26	Salvaging Spreading Topsoil
IA-45	Plastic Pipe
IA-46	Tile Drains for Land
IA-51	Corrugated Metal Pipes
IA-604	Saturated Buffer

If a cultural resource is identified during construction, stop immediately and notify the local Natural Resources Conservation Service office.

Contractor is required to follow Iowa One Call law.
IowaOneCall.com or Call 811
Ticket # _____

Date 2/21/23
Designed S. McCoy
Drawn S. McCoy
Checked M. Grove
Approved [Signature] 10/25

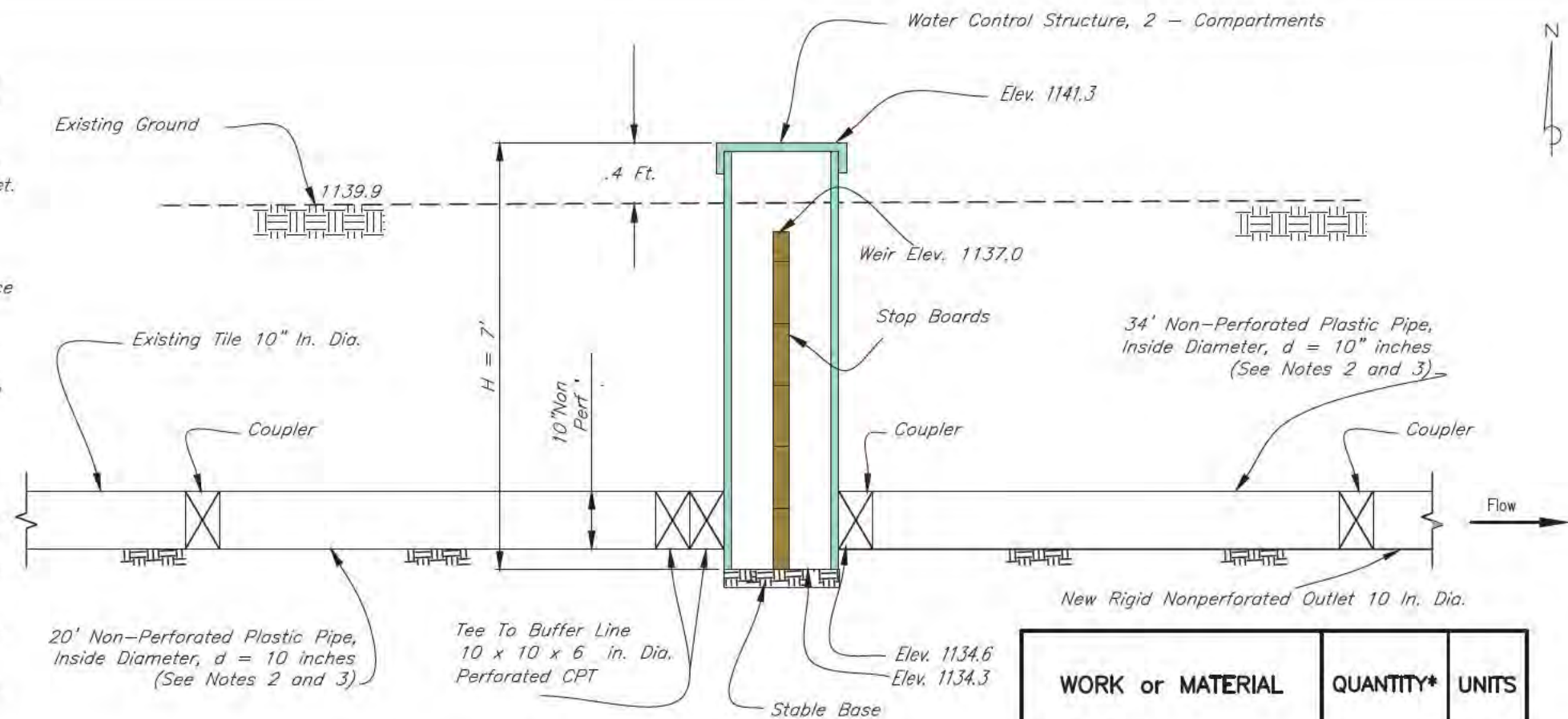
Site 1
SB 1W

Sat Buffer 1 West
Job Class III
PLAN VIEW
T 92 N, R 25, W
Sec. 1

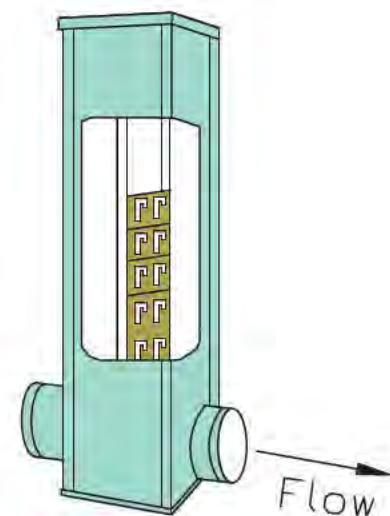


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Drawing No. 9/25/23 3:33 PM
Sheet 1 of 4

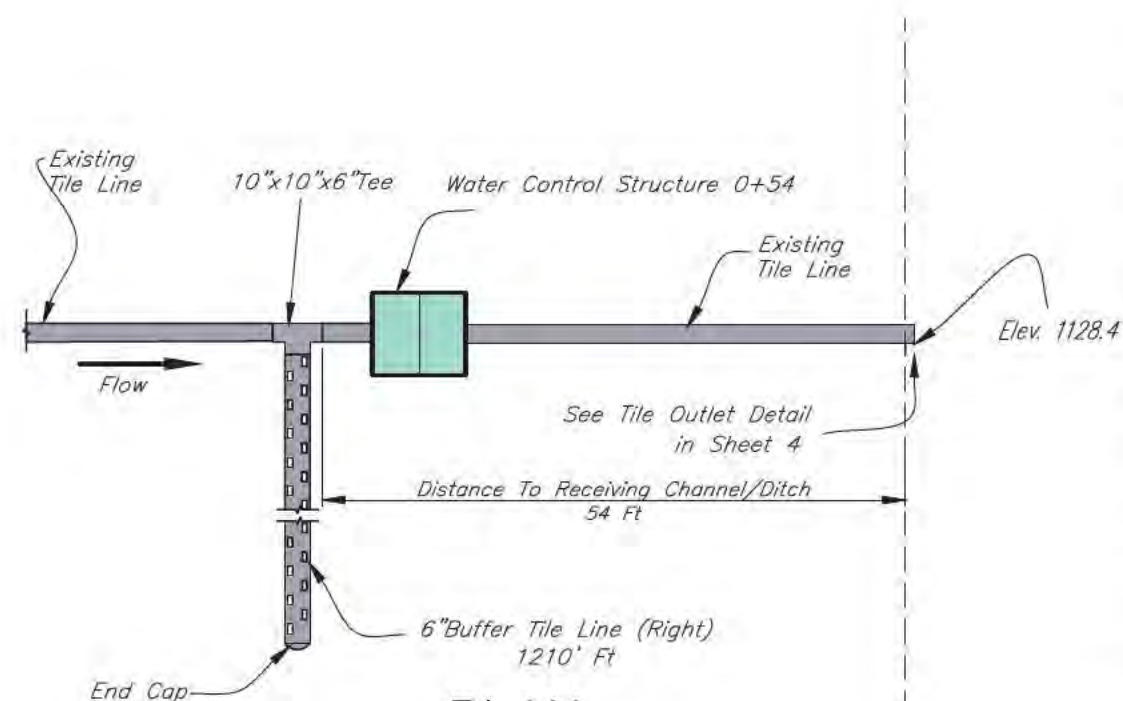
- NOTES:
1. Install perforated buffer tile parallel to ditch.
 2. Install a minimum of 20 feet of non-perforated pipe adjacent to the water control structure, both upstream and downstream.
 3. Pipe must be PVC or PE. Pipe, pipe sizes, fittings and other appurtenances shall conform to the "Materials" section of Iowa NRCS Construction Specification (CS) IA-620, Underground Outlet.
 4. Saturated Buffer installation shall be in conformance with CS IA-604, Saturated Buffer.
 5. Water Control Structure (WCS) materials shall be in conformance with CS IA-45, Plastic (PVC, PE) Pipe.
 6. Place structure and pipe coupler on a minimum 4 inch stable base. A stable base may be compacted earth, compacted fill gravel, or a concrete pad. Extend the stable base no less than 1 foot around structure.
 7. Stop board removal tool shall be provided.
 8. Structure lid shall be provided with locking mechanism.
 9. Normal stop board operation shall be verified following backfill.
 10. Stop boards must provide water tight seals under a minimum of 4 foot pressure head.
 11. Mark location of structure using post or manufactured marker lag for safety in the field.
 12. Refer to Operation and Maintenance (O&M) Plan for adjusting WCS weir settings.
 13. Seeding and Mulching shall be performed in accordance with attached IA-CPA-4, Seeding Plan and Construction Specification IA-6, Seeding and Mulching for Protective Cover.



TYPICAL SECTION



IN-LINE CONTROL STRUCTURE



PLAN
NOT TO SCALE

WORK or MATERIAL	QUANTITY*	UNITS
Water Control Structure 2 - Compartment (H = 7 FT) (d = 10 In)	1	Job
10 inch Diam., Non-Perforated Plastic Pipe (Upstream)	20	Lin.Ft.
10 inch Diam., Non-Perforated Plastic Pipe (Downstream)	34	Lin.Ft.
6 inch Diam., Perforated Plastic Pipe, Buffer Line (Right)	1210	Lin.Ft.
Seeding	.1	Ac
10 in. x 10 in. x 6 in. T Connection	1	Each
6 inch Diam., End Caps	1	Each
Tile Investigation	1	Hrs.
10 inch Diam., Rigid, Non-Perforated Conduit w/Animal Guard	20	Lin.Ft.
Fiberglass Marking Flags	1	ea

Date
6/14/22
Designed S. McCoy
Drawn S. McCoy
Checked
Approved

Site 1
SB1W

Saturated Buffer Iwest
Job Class III

Wright County, Iowa

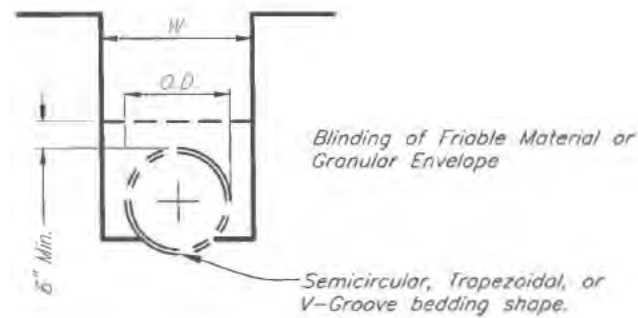
Sec. T 92 N. R 25. W WCS

United States
Department of
Agriculture
USDA
Natural Resources
Conservation Service

File No.
1W

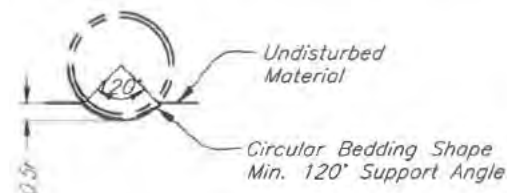
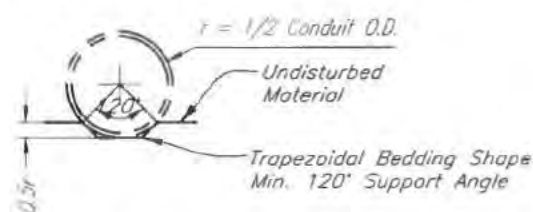
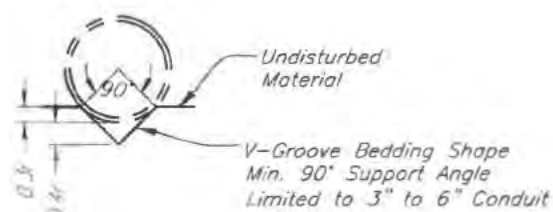
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Sheet .2 of 4

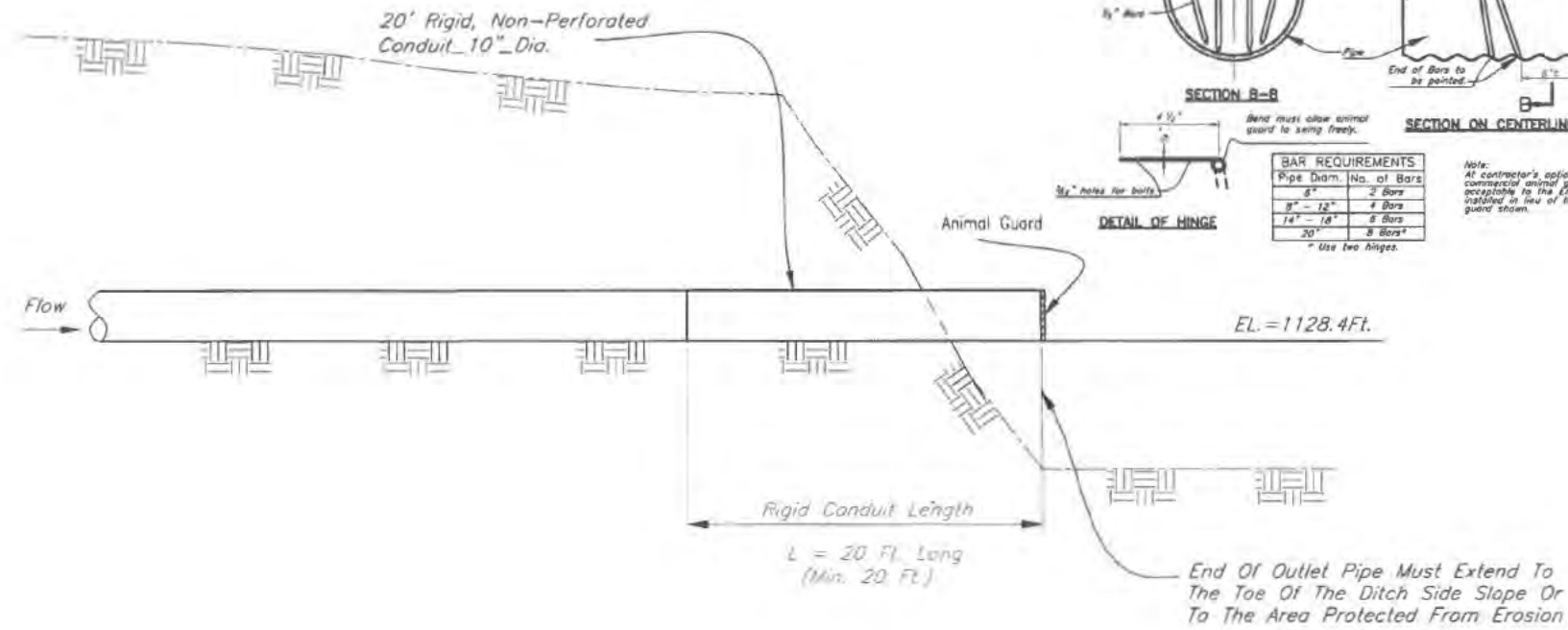


1. W = trench width at top of conduit
2. $W = O.D. + 6"$ min. for trench installation;
 $W = O.D. + 4"$ min. for plow installation.
3. Where $W > O.D. + 12"$, hand compact the blinding or use a granular envelope.

TRENCH DETAIL

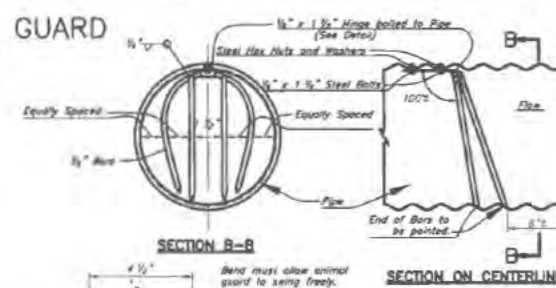


BEDDING DETAIL



TILE OUTLET DETAIL

DETAILS OF ANIMAL GUARD FORK TYPE



NOTES:

1. Connection with outlet pipe shall be made watertight.
2. Maximum fill over conduit installed in a trench condition ($w < O.D. + 24"$) shall be 11 feet or as specified by the manufacturer.
3. The fill height over the underground outlet conduit or pipe shall not exceed the values shown in Table 2 or 3 of IA NRCS Conservation Standard 620, Underground Outlet.
4. Outlet pipe shall be a continuous section of non-perforated conduit at least 20 feet long.
5. All changes must be approved by person approving the original plans prior to change.

Date 2/21/23
Designed S. McCoy
Drawn S. McCoy
Checked M. Grov
Approved

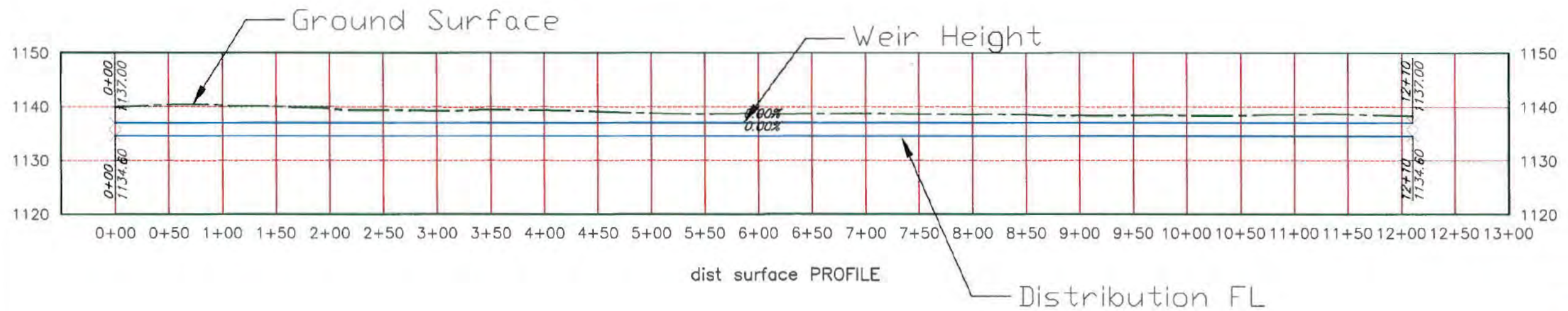
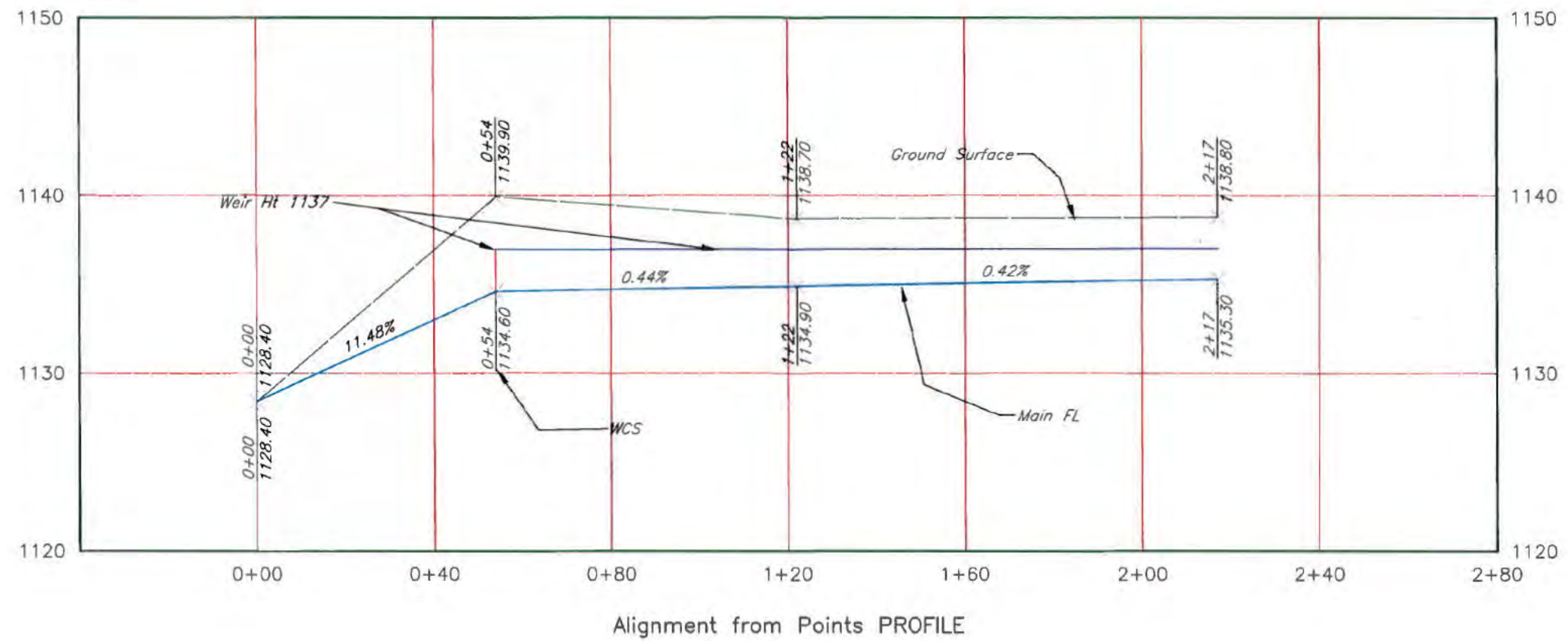
Site 1
SB1W

Saturated Buffer1 West
Job Class III

Wright County, Iowa
T 92 N, R 25, W
OUTLET PIPE

USDA
Department of Agriculture
Natural Resources
Conservation Service

File No. 1 W
Drawing No.
Sheet 3 of 4



Date: 6/14/22
 Designed: S. McCoy
 Drawn: S. McCoy
 Checked: M. Grove
 Approved: 9/23

Site 1
SB1W

Saturated Buffer 1W
 Job Class III
 Cross Section Wright County, Iowa

T 92 N, R 25 W
 Sec. 1

United States
 Department of
 Agriculture
 Natural Resources
 Conservation Service

File No. 1w_2_21.dwg

Drawing No.

9/28/23 12:16 PM
 Sheet 4 of 4

[Redacted]

Saturated Buffer 2W
Section [Redacted] Lake
Wright County, Iowa
Job Class II

Site 1 SB2W



Date	9/12/23
Designed	S. McCoy
Drawn	M. Grove
Checked	M. Grove
12/23	1711812

Site 1
SB2W

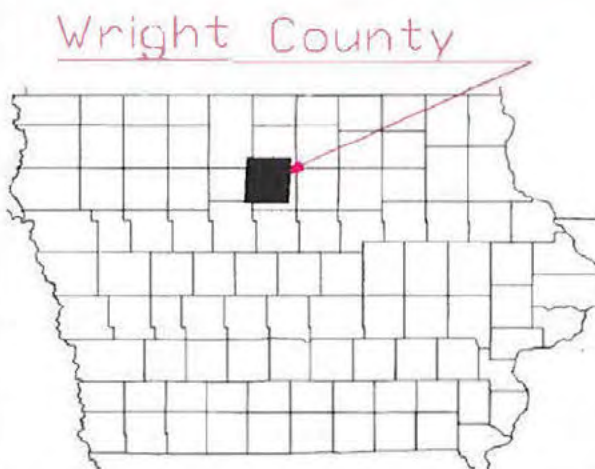
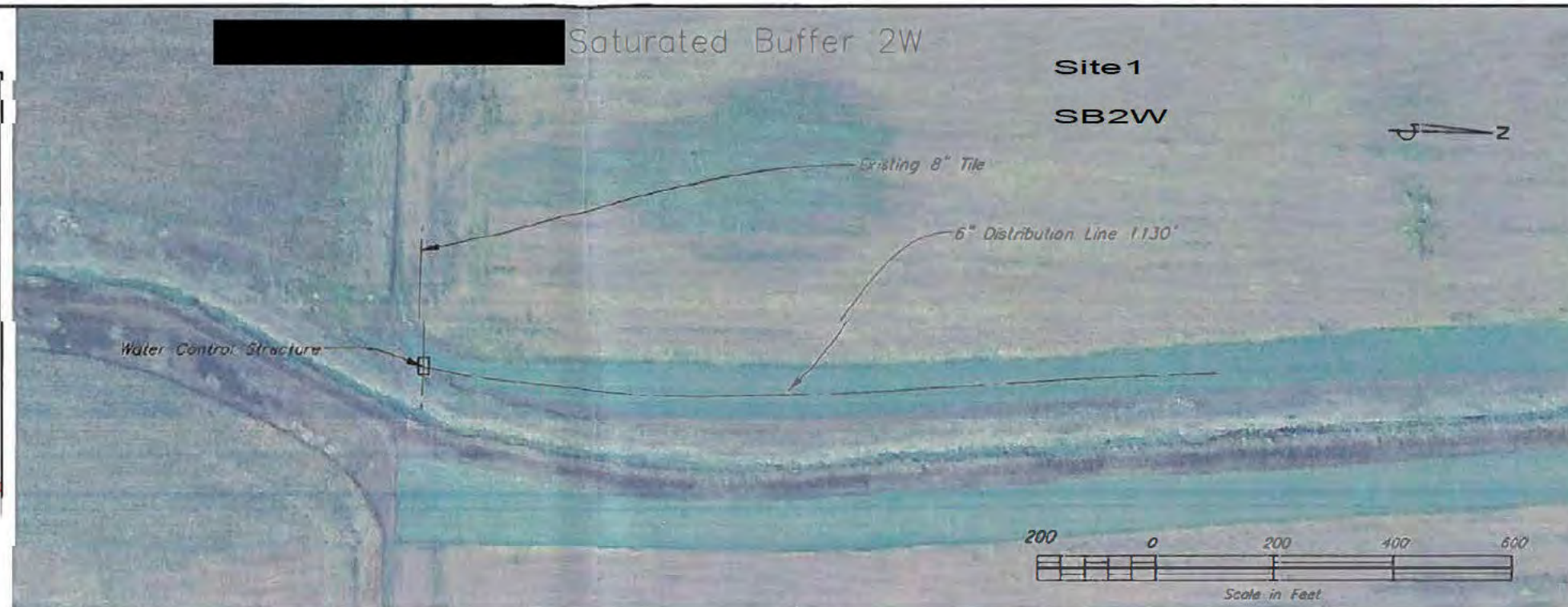
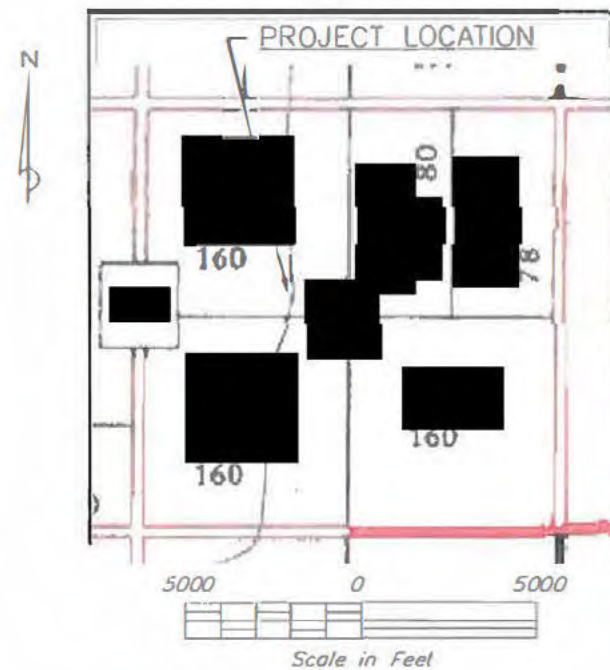
Plan View
Saturated Buffer 2w
[Redacted]

United States
Department of
Agriculture
USDA
Natural Resources
Conservation Service

File No.
[Redacted] W_12_18_2

Drawing No.

12/18/23 10:16
Sheet 11 of 5



BENCHMARK	
Elevation	Description
	To be set at stakeout

NRCS CONTACT FOR QUESTIONS:	SEAN MCCOY
NRCS CONTACT PHONE:	515-322-0619
LANDOWNER CONTACT:	
LANDOWNER CONTACT PHONE:	

I have reviewed and agree with the content of the plans and specifications prepared by the NRCS.

Landowner: _____ Date: _____

I certify that this practice has been constructed in accordance with the plans and specifications.

Contractor: _____ Date: _____

NRCS Rep.: _____ Date: _____

If a cultural resource is identified during construction, stop immediately and notify the local Natural Resources Conservation Service office.

Contractor is required to follow Iowa One Call law. IowaOneCall.com or Call 811
Ticket # _____

Construction Specifications

IA-1	Site Prep
IA-5	Pollution Control
IA-6	Seeding and Mulching for Cover
IA-9	Subsurface Drain Inves
IA-11	Removal of Water
IA-21	Excavation
IA-23	Earthfill
IA-26	Salvaging, Spreading Topsoil
IA-45	Plastic Pipe
IA-46	Tile Drains For Land Drainage
IA-51	Corrugated Metal Pipes
IA-95	Geotextile
IA-604	Saturated Buffer

Page 1	Cover Page
Page 2	Plan View
Page 3	WCS
Page 3	Profile
Page 5	Outlet Pipe

Date 9/12/23
Designed S. McCoy
Drawn
Checked M. Grove 12/23

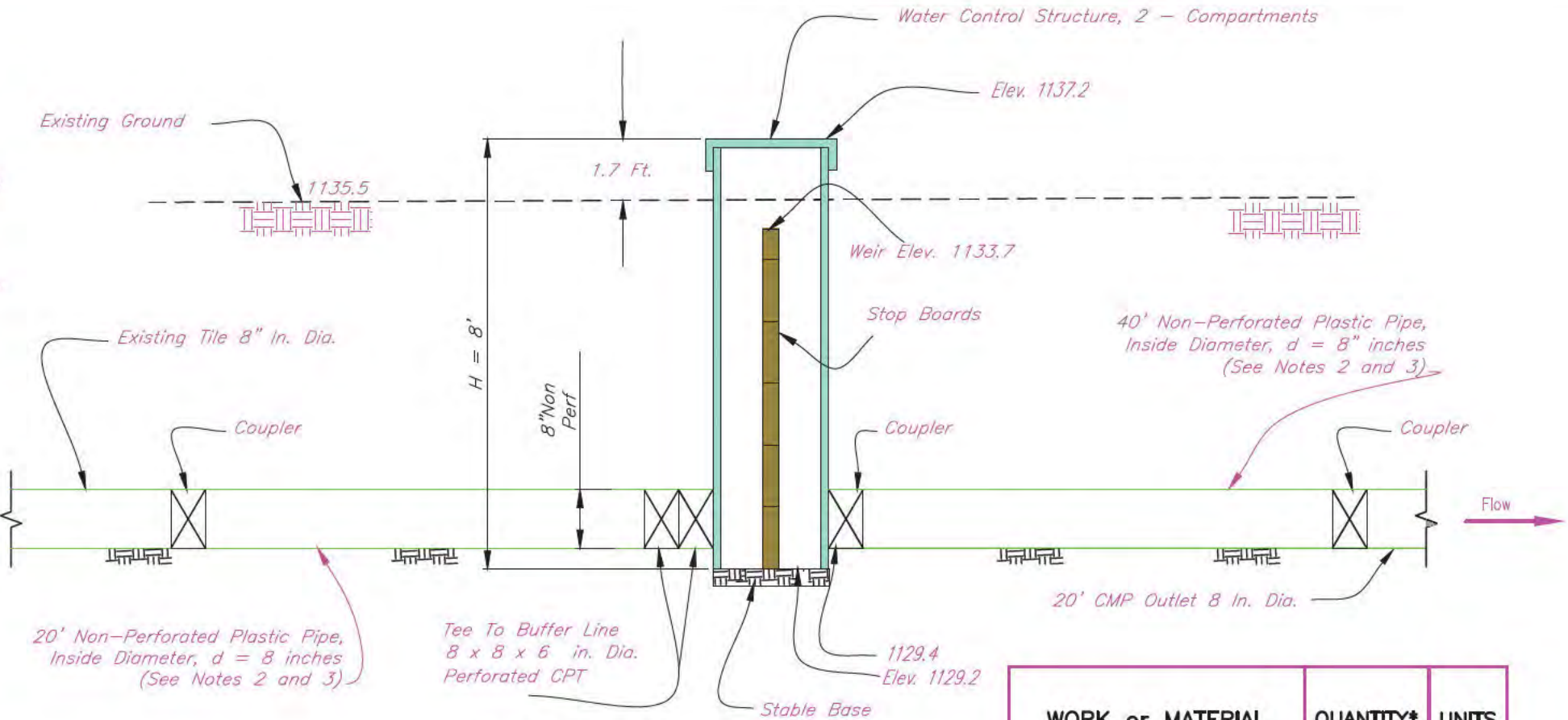
Site 1
SB 2W

COVER SHEET
Saturated Buffer 2W

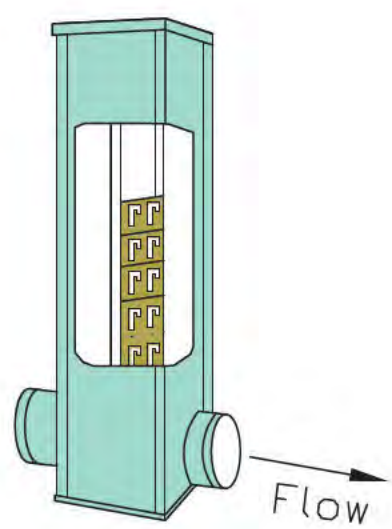


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Drawing No.
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Sheet 2M of .5

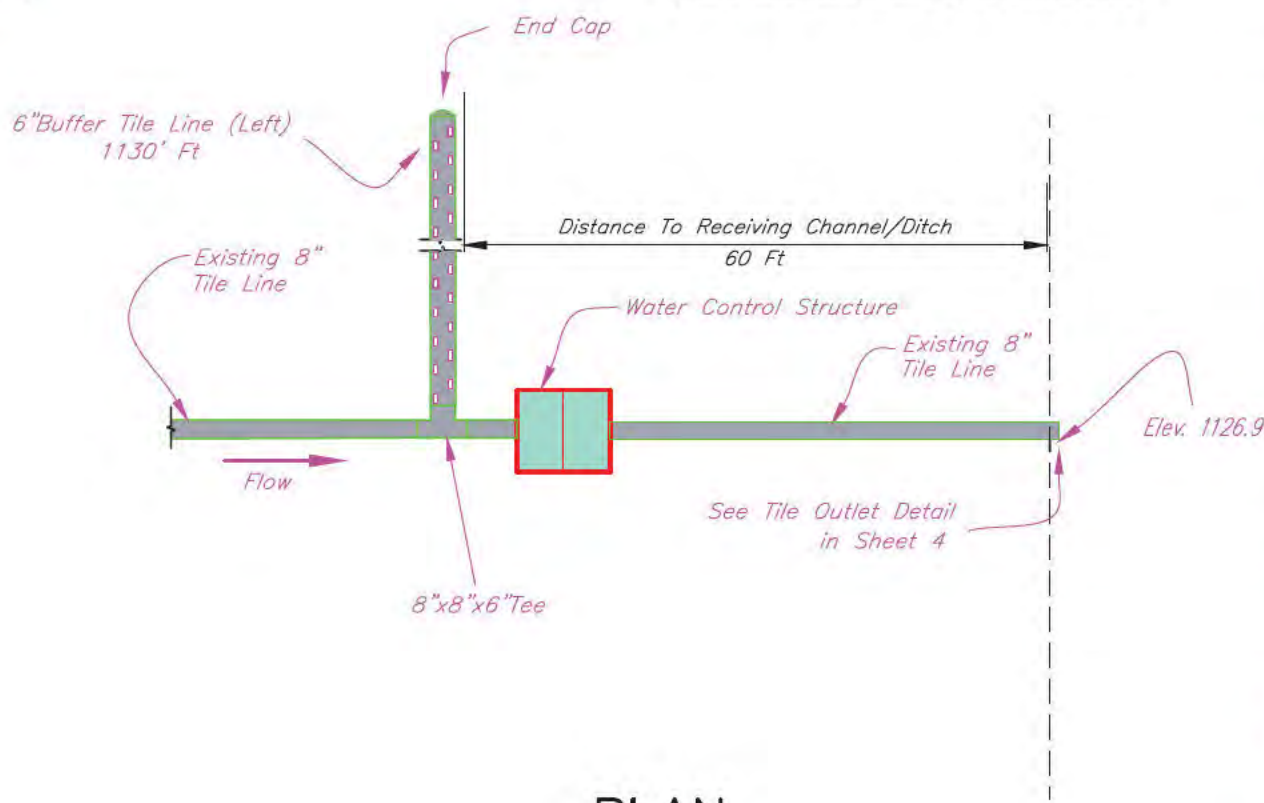
- NOTES:
1. Install perforated buffer tile parallel to ditch.
 2. Install a minimum of 20 feet of non-perforated pipe adjacent to the water control structure, both upstream and downstream.
 3. Pipe must be PVC or PE. Pipe, pipe sizes, fittings and other appurtenances shall conform to the "Materials" section of Iowa NRCS Construction Specification (CS) IA-620, Underground Outlet.
 4. Saturated Buffer installation shall be in conformance with CS IA-604, Saturated Buffer.
 5. Water Control Structure (WCS) materials shall be in conformance with CS IA-45, Plastic (PVC, PE) Pipe.
 6. Place structure and pipe coupler on a minimum 4 inch stable base. A stable base may be compacted earth, compacted fill gravel, or a concrete pad. Extend the stable base no less than 1 foot around structure.
 7. Stop board removal tool shall be provided.
 8. Structure lid shall be provided with locking mechanism.
 9. Normal stop board operation shall be verified following backfill.
 10. Stop boards must provide water tight seals under a minimum of 4 foot pressure head.
 11. Mark location of structure using post or manufactured marker lag for safety in the field.
 12. Refer to Operation and Maintenance (O&M) Plan for adjusting WCS weir settings.
 13. Seeding and Mulching shall be performed in accordance with attached IA-CPA-4, Seeding Plan and Construction Specification IA-6, Seeding and Mulching for Protective Cover.



TYPICAL SECTION



IN-LINE CONTROL STRUCTURE



PLAN

NOT TO SCALE

WORK or MATERIAL	QUANTITY*	UNITS
Water Control Structure 2 - Compartment (H = <u> 8 </u> FT) (d = <u> 8 </u> In)	1	Job
<u> 8 </u> inch Diam., Non-Perforated Plastic Pipe (Upstream)	20	Lin.Ft.
<u> 8 </u> inch Diam., Non-Perforated Plastic Pipe (Downstream)	40	Lin.Ft.
Fiberglass Marking Flags	1	Ea.
<u> 6 </u> inch Diam., Perforated Plastic Pipe, Buffer Line (Left)	1130	Lin.Ft.
<u> 8 </u> in. x <u> 8 </u> in. x <u> 6 </u> in. T Connection	1	Each
<u> 6 </u> inch Diam., End Caps	1	Each
Seeding	0.1	Ac.
<u> 8 </u> inch Diam., Rigid, Non-Perforated CMP/Animal Guard	20	Lin.Ft.
Tile Investigation	1	Hr.

Date
9/12/23

Designed
S. McCoy

Drawn

Checked

Approved
###

Site1
SB2W

WCS
Mack Saturated Buffer 2W

Wright County, IA

United States
Department of
Agriculture

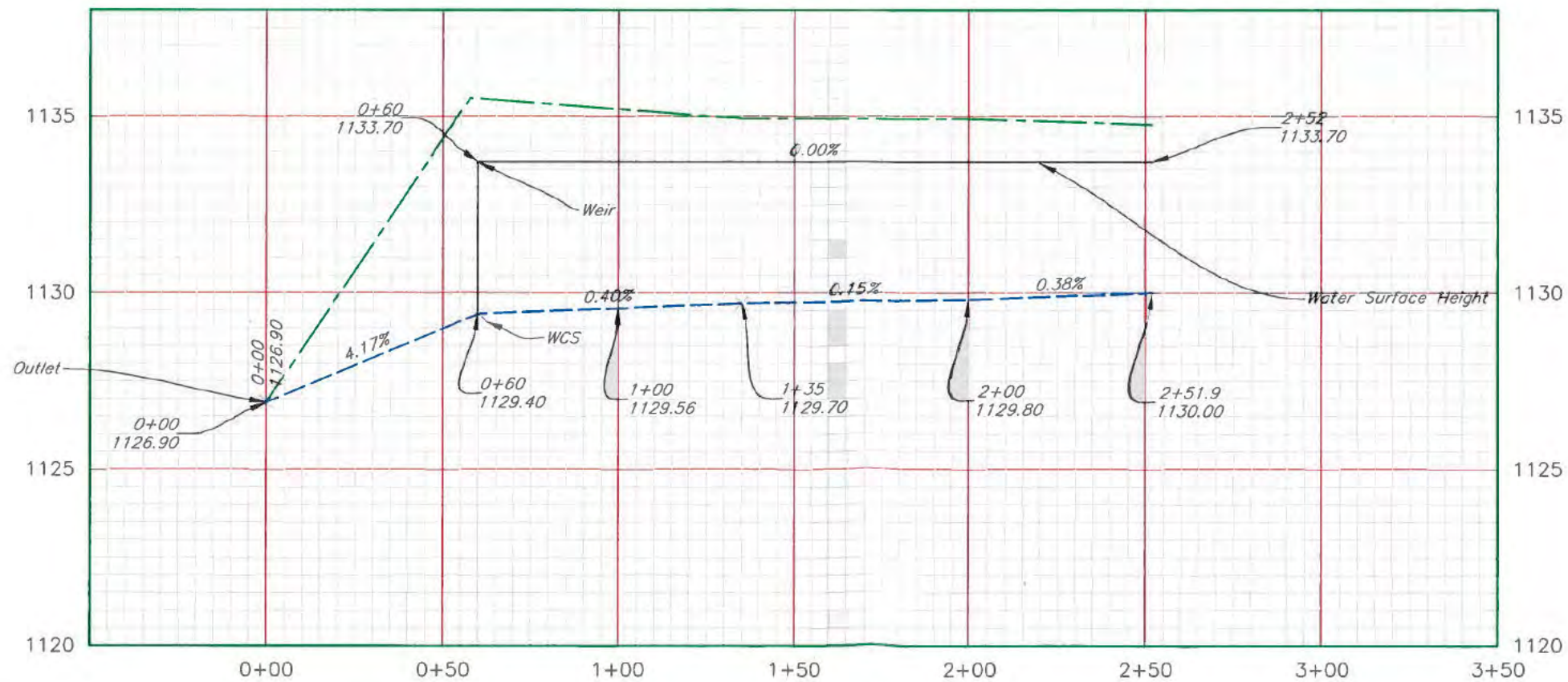
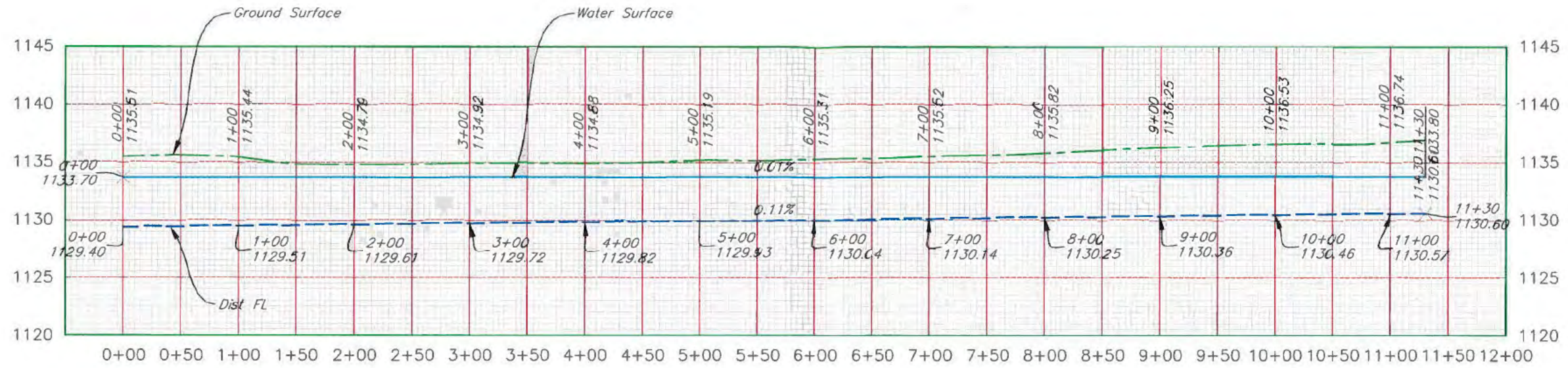
USDA

Natural Resources
Conservation Service

File No.
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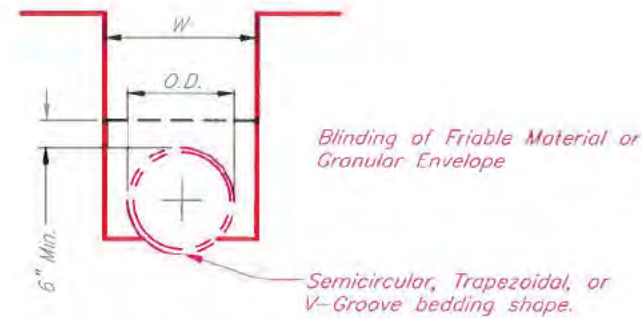
1/22/26 10:16 AM
Sheet 3 of .5



Date: 9/12/23
 Designed: S. McCoy
 Drawn: M. Grove
 Checked: M. Grove
 Approved: [Signature]

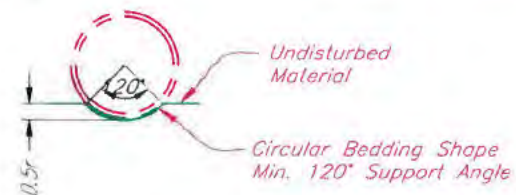
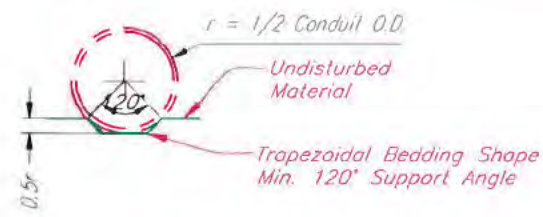
Site1
 SB2W
 PROFILE
 Saturated Buffer 2W
 [Redacted]
 Lake T-92N R-25W

United States
 Department of
 Agriculture
 Natural Resources
 Conservation Service
 File No. [Redacted]
 Drawing No. [Redacted]
 12/18/23 10:16
 Sheet 4M of 5

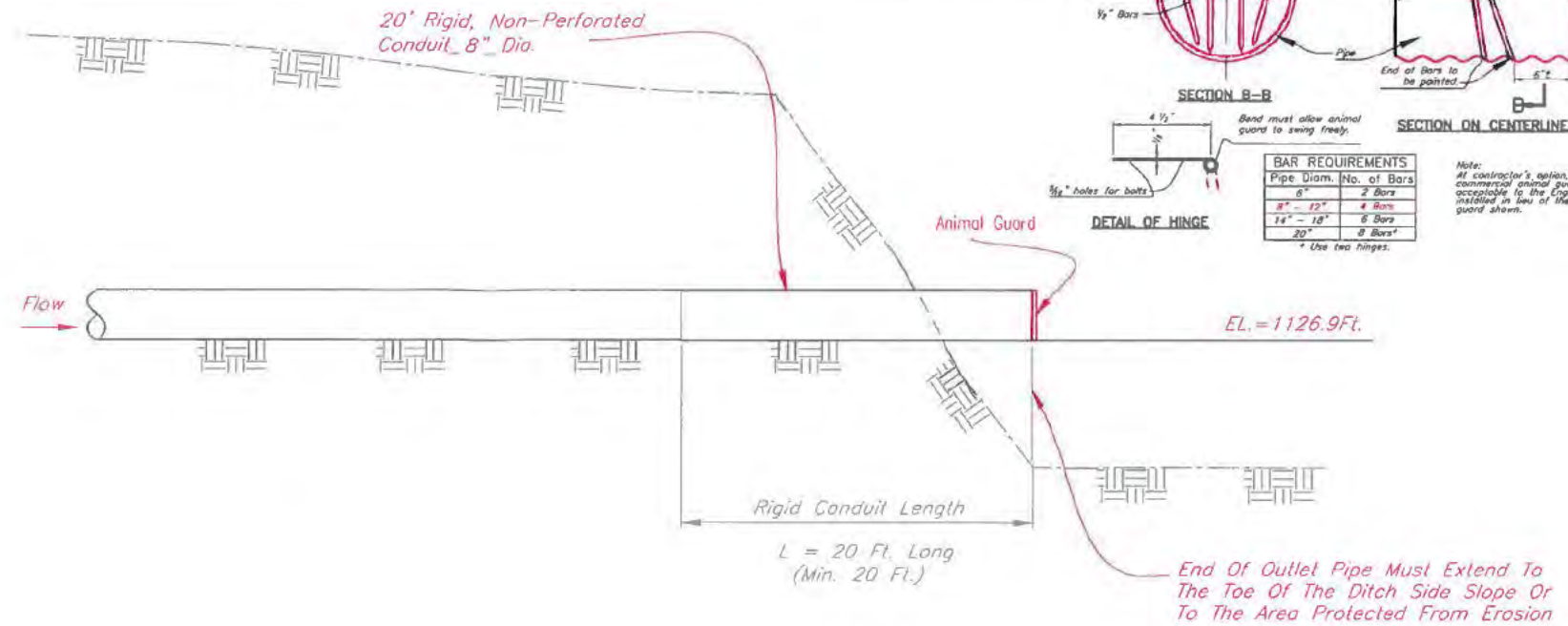


1. W = trench width at top of conduit
2. $W = O.D. + 6"$ min. for trench installation;
 $W = O.D. + 4"$ min. for plow installation.
3. Where $W > O.D. + 12"$, hand compact the blinding or use a granular envelope.

TRENCH DETAIL



BEDDING DETAIL

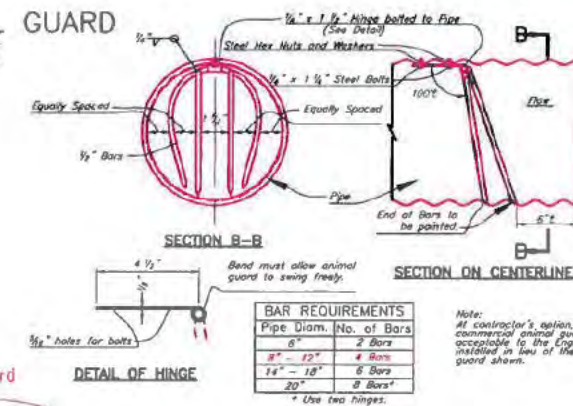


TILE OUTLET DETAIL

NOTES:

1. Connection with outlet pipe shall be made watertight.
2. Maximum fill over conduit installed in a trench condition ($w < O.D. + 24"$) shall be 11 feet or as specified by the manufacturer.
3. The fill height over the underground outlet conduit or pipe shall not exceed the values shown in Table 2 or 3 of IA NRCS Conservation Standard 620, Underground Outlet.
4. Outlet pipe shall be a continuous section of non-perforated conduit at least 20 feet long.
5. All changes must be approved by person approving the original plans prior to change.

DETAILS OF ANIMAL GUARD FORK TYPE



Date 9/12/23
Designed S. McCoy
Drawn M. Groves
Checked M. Groves
12/23

Site1
SB2W

Outlet Saturated Buffer 2W

Lake T-92N R-25W

United States
Department of
Agriculture
USDA
Natural Resources
Conservation Service

File No. W-12-18-2

Drawing No.

12/18/23 10:16
Sheet 5 of 5

Bioreactor 3E
 Wright County, Iowa
 Lake Section
 Job Class II
 Technical Plans and
 Specifications
 July 2023

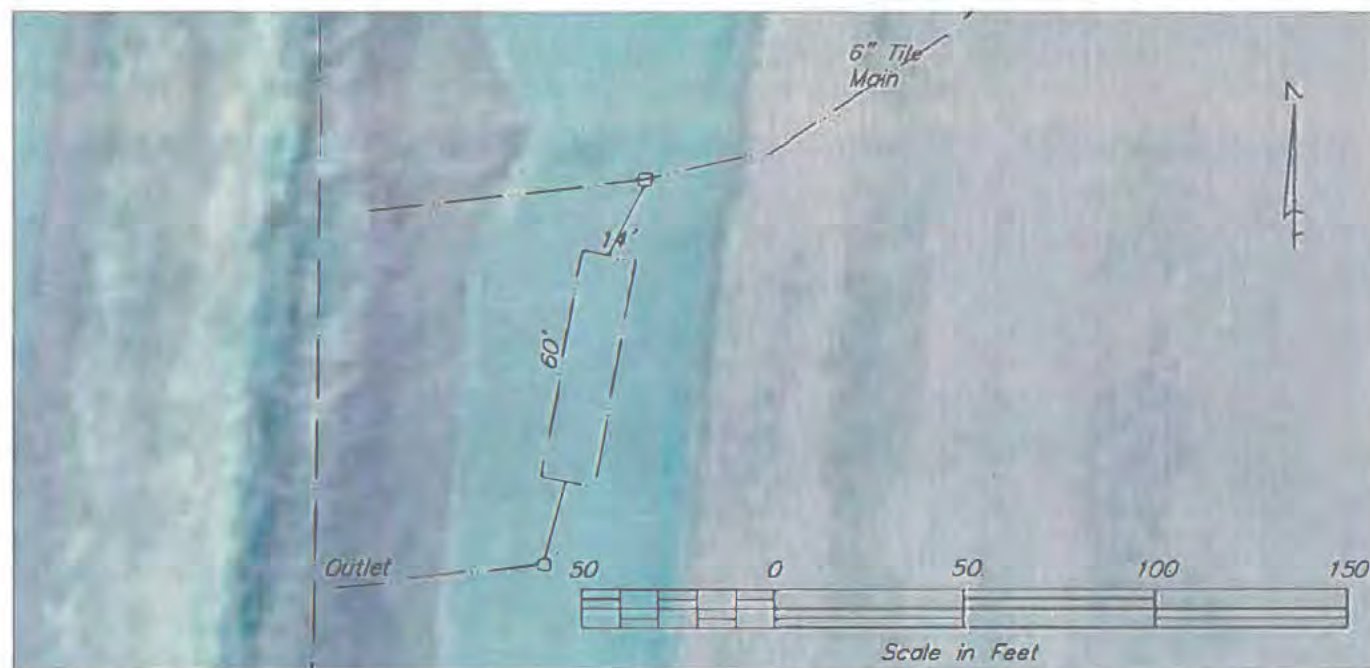
Site 1
Bio 3E

 United States Department of Agriculture Natural Resources Conservation Service	File No. SE Bio	T 92 N, R 25, W 	Denitrifying Bio-reactor Class II COVER PAGE	Site 1 Bio 3E Wright County, Iowa	Date 2/16/23		
	Designed .S. McCoy				Drawn .S. McCoy	Checked VAK	Approved Nicholas Magary CE 8/21/23

Denitrifying Bioreactor 3E
Section Lake Twshp
Wright County
Job Class II



Project Site



BENCH MARK		
NO.	ELEV.	DESCRIPTION
1		To be set at the Pre-Construction Meeting

Index of Sheets	
Page 1	Cover Page
Page 2	Location
Page 3	Plan View
Page 4	WCS
Page 5	Outlet Pipe

I have reviewed and agree with the content of the plans and specifications prepared by the NRCS.

Landowner: _____ Date: _____

I certify that this practice has been constructed in accordance with the plans and specifications.

Contractor: _____ Date: _____

NRCS Rep.: _____ Date: _____

Important Contacts	
NRCS/IDALS for Questions	Sean McCoy
Phone	515-322-0619
Landowner Contact	
Phone	

Contractor is required to follow
Iowa One Call law.
IowaOneCall.com or Call 811
Ticket # _____

If a cultural resource is
identified during construction,
stop immediately and notify the
Natural Resources Conservation
Service Archeologist at
(515) 284-4370.

Construction Specifications	
IA-1	Site Prep
IA-5	Pollution Control
IA-6	Seeding and Mulching for Cover
IA-9	Subsurface Drain Inves
IA-11	Removal of Water
IA-21	Excavation
IA-23	Earthfill
IA-26	Slavaging Spreading Topsoil
IA-45	Plastic Pipe,
IA-46	Tile Drains for Land Drainage
IA-51	Corrugated Metal Pipes
IA-605	Denitrifying Bioreactor

Date	2/16/23
Designed	S. McCoy
Drawn	S. McCoy
Checked	NATK
Approved	8/23

Site1
Bio 3E

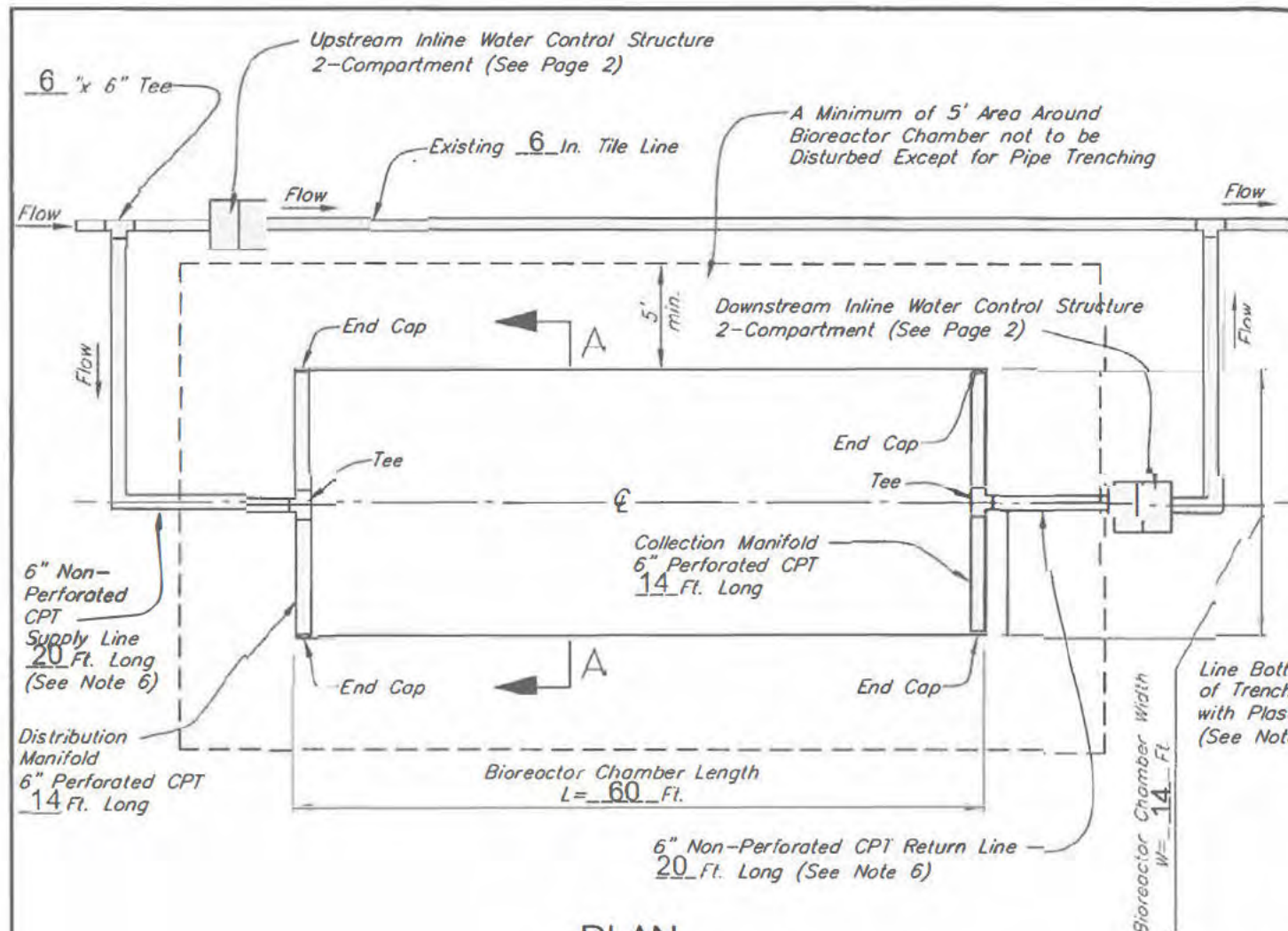
Denitrifying Bio-reactor

Wright County, Iowa

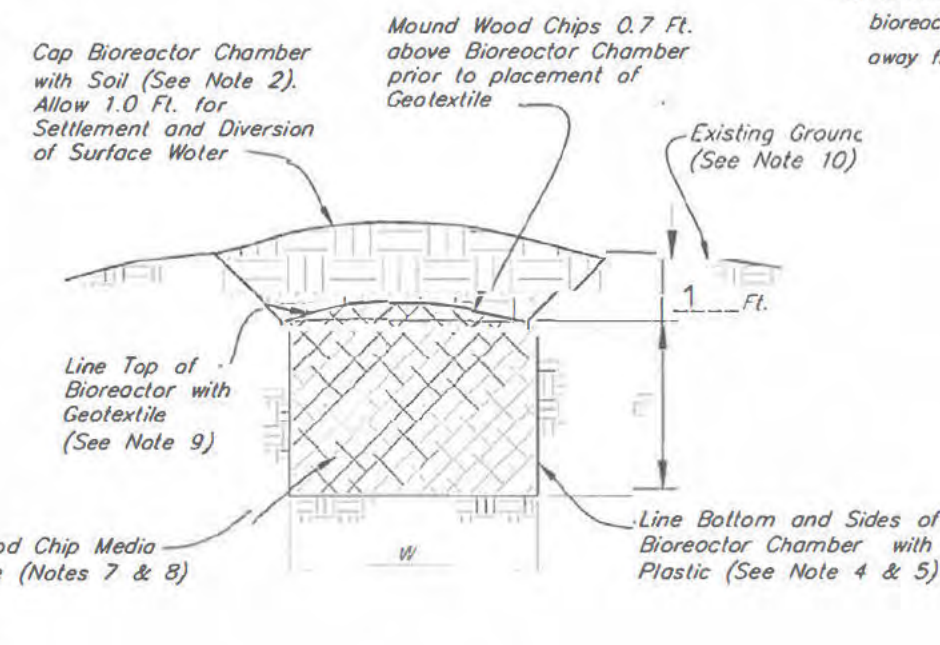
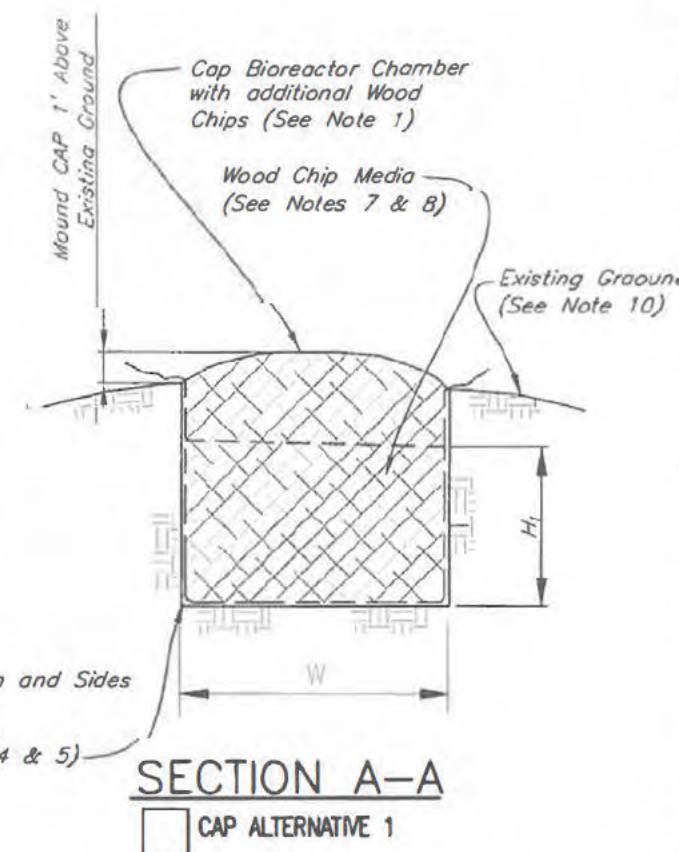
LOCATION

Sec. 10 N 41 E W

United States Department of Agriculture USDA	Natural Resources Conservation Service
File No.	SE Bio
Drawing No.	8/18/23 8:30 AM
11	2 .5



PLAN

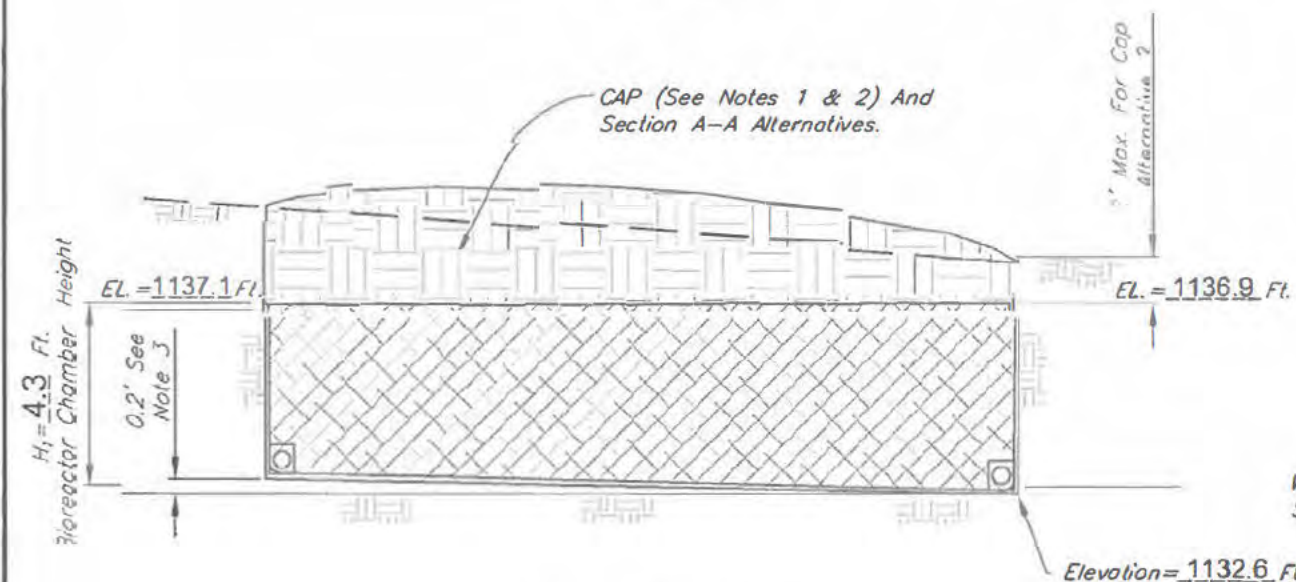


SECTION A-A

✓ CAP ALTERNATIVE 2

NOTES:

1. Utilize CAP ALTERNATIVE 1 for the bioreactor chamber unless traffic over the top is anticipated.
2. For CAP ALTERNATIVE 2, fill the area above the bioreactor chamber with compacted soil. Use topsoil for at least the top 6" Vegetate according to Conservation Practice Standard 342, Critical Area Planting.
3. Set bottom of bioreactor chamber to drain towards exit end.
4. Line bottom and sides of bioreactor chamber with plastic, minimum 4 mil thickness. Overlap any splices at least 6 inches. Wrap plastic carefully around tiles that enter/exit the chamber; no need to seal around tiles.
5. If bioreactor is located in glacial till soil and has Unified Soil Classification System designation of CL or CH and no sand is encountered during construction chamber sides and bottom do not need to be lined.
6. Route supply line to centerline of entrance end and return line from centerline of exit end of bioreactor chamber.
7. Wood chip media must meet requirements in Iowa Construction Specification IA-605, Denitrifying Bioreactor.
8. Obtain approval of engineer on the wood chips / media prior to installation.
9. Geotextile must be non-woven, class II, and meet the requirements of Iowa Construction Specification IA-95, Geotextile. Overlap splices at least 6 inches.
10. Grade site for positive drainage away from the bioreactor chamber. Spread spoil in designated location away from bioreactor.



ELEVATION

NOT TO SCALE

IOWA STANDARD DWG. NO. 1555

DATE June 2022 SHEET 1 OF 3

Date 8/23
Designed by M. C. Orr
Drawn
Checked NAK
Approved

Site 1
Bio 3E
DENITRIFYING BIOREACTOR
TYPE 2 (Page 1 of 3)

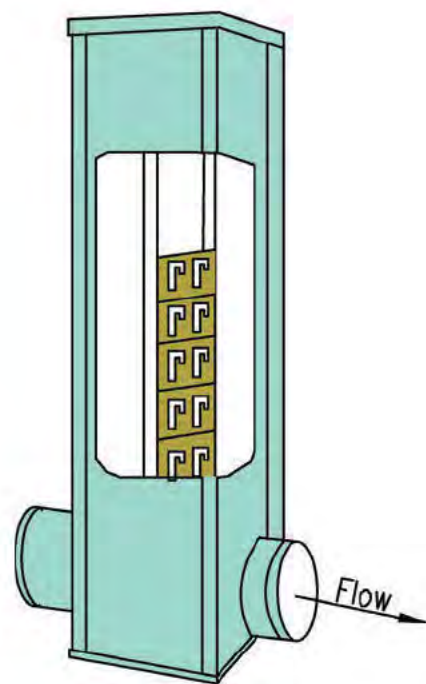
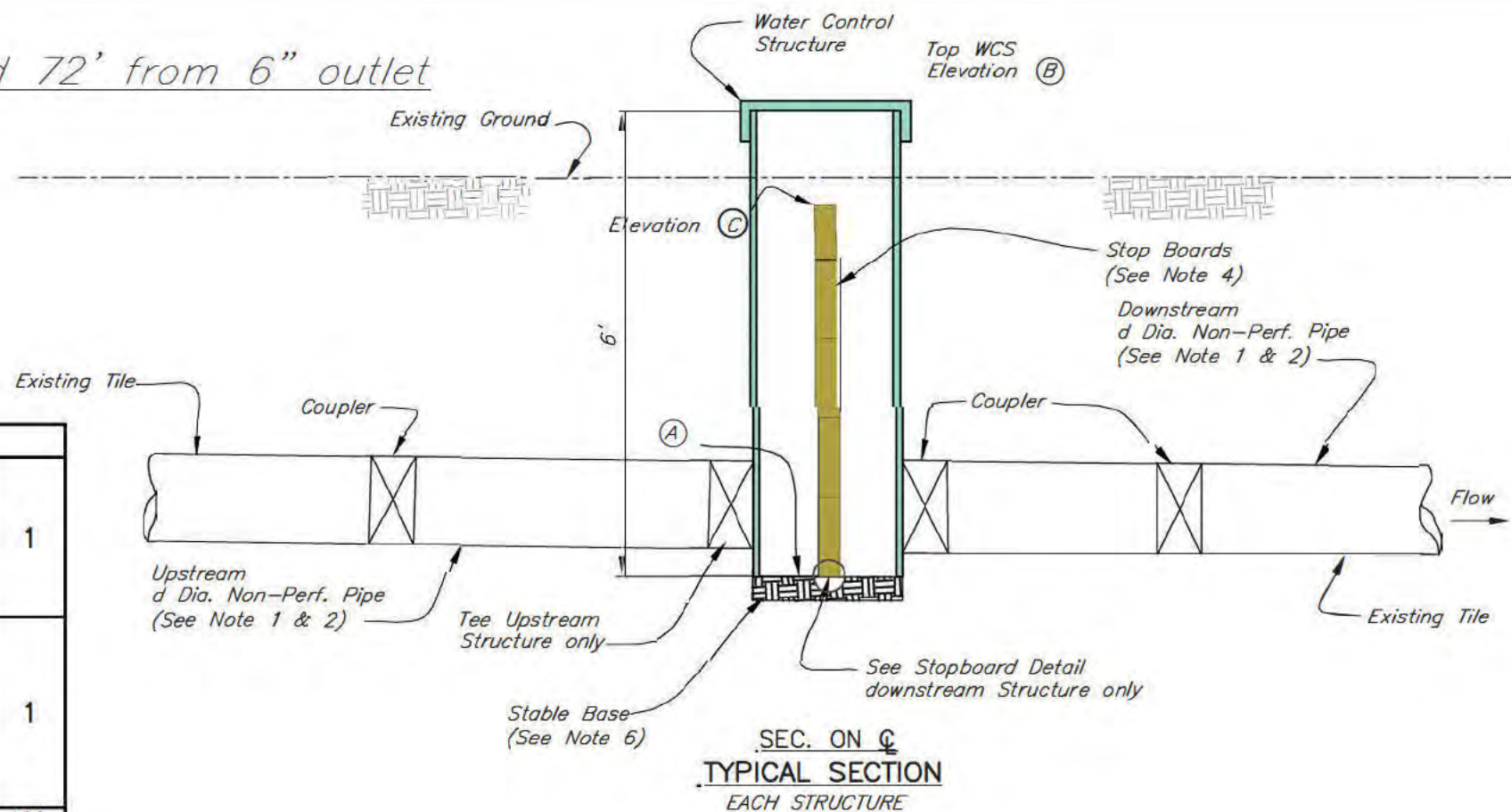
United States
Department of
Agriculture
USDA
Natural Resources
Conservation Service

File No.
Drawing No.

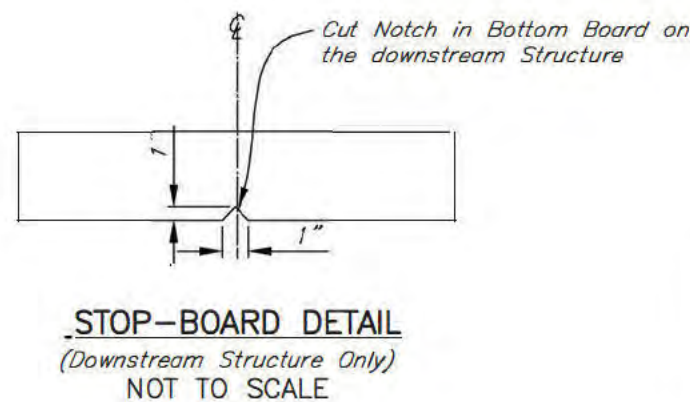
Sheet 3 of 5

WCS is located 72' from 6" outlet

QUANTITIES*	
Upstream Water Control Structure (Inlet WCS) 2 - Compartment	1
H ₂ = 6 ft.	
d = 6 in	
Downstream Water Control Structure (Outlet WCS) 2 - Compartment	1
H ₂ = 6 ft.	
d = 6 in	
6" Non-perforated Pipe (ft)	100
6" CMP w/ Animal Guard (ft)	20
6" Perforated CPT (ft)	28
Tee 6"x 6"x 6"	4
Elbows 6"	
6" End Caps	4
Wood Chips (cu. yd.)	165
4 Mil Plastic (sq. yd.)	173
Geotextile (sq. yd.)	124
Excavation (cu. yd.)	194
Earthfill (cuyd.)	160
Seeding (ac.)	.1
Fiberglass Marker Flags (Eo.)	6
Tile Investigation (Hr)	1



IN-LINE CONTROL STRUCTURE



NOTES:

1. Install a minimum of 20 feet of non-perforated pipe adjacent to the water control structure, both upstream and downstream.
2. Pipe must be PVC or PE. Pipe, pipe sizes, fittings and other appurtenances shall conform to the "Materials" section of Iowa NRCS Construction Specification (CS) IA-620, Underground Outlet.
3. Bioreactor installation shall be in conformance with CS IA-605, Denitrifying Bioreactor.
4. Water Control Structure (WCS) materials shall be in conformance with CS IA-45, Plastic (PVC, PE) Pipe.
5. Place structure and pipe coupler on a minimum 4 inch stable base. A stable base may be compacted earth, compacted fill gravel, or a concrete pad. Extend the stable base no less than 1 foot around structure.
6. Stop board removal tool shall be provided.
7. Structure lid shall be provided with locking mechanism.
8. Normal stop board operation shall be verified following backfill.
9. Stop boards must provide water tight seals under a minimum of 4 foot pressure head (except notched board).
10. Mark location of structure using post or manufactured marker flag for safety in the field.
11. Refer to Operation and Maintenance (O&M) Plan for adjusting WCS weir settings.
12. Seeding and Mulching shall be performed in accordance with attached IA-CPA-4, Seeding Plan and Construction Specification IA-6, Seeding and Mulching for Protective Cover.

	Inlet WCS	Outlet WCS
WCS Box Bottom El. (A)	1132.7	1132.5
WCS Box Top El. (B)	1137.0	1138.6
WCS Ht Above EG, H ₃	1.7	1.5
Designed Weir El. (C)	1136.5	1135.5
US Non-Perforated Pipe Length, (ft)	20	
DS Non-Perforated Pipe Length, (ft)		60

* Quantities Do Not Include Tile/Pipe Couplers or Extra Material For Geotextile/Plastic Overlap

Date2/16/232/16/23

DesignedS. McCoyS. McCoy

DrawnS. McCoy

Checked

Approved

Site 1

Bio 3E

Denitrifying Bioreactor

WCS Job Class II

Wright County, Iowa

United States

Department of

Agriculture

USDA

Natural Resources

Conservation Service

File No.

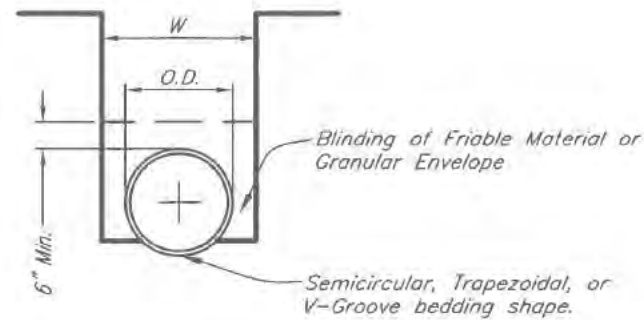
JE Bio

Drawing No.

1/26/26 1:26 PM

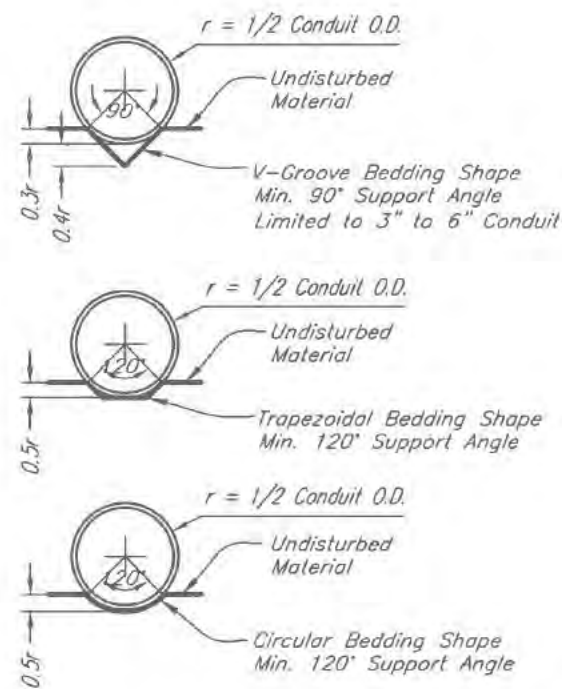
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13 4 of 5

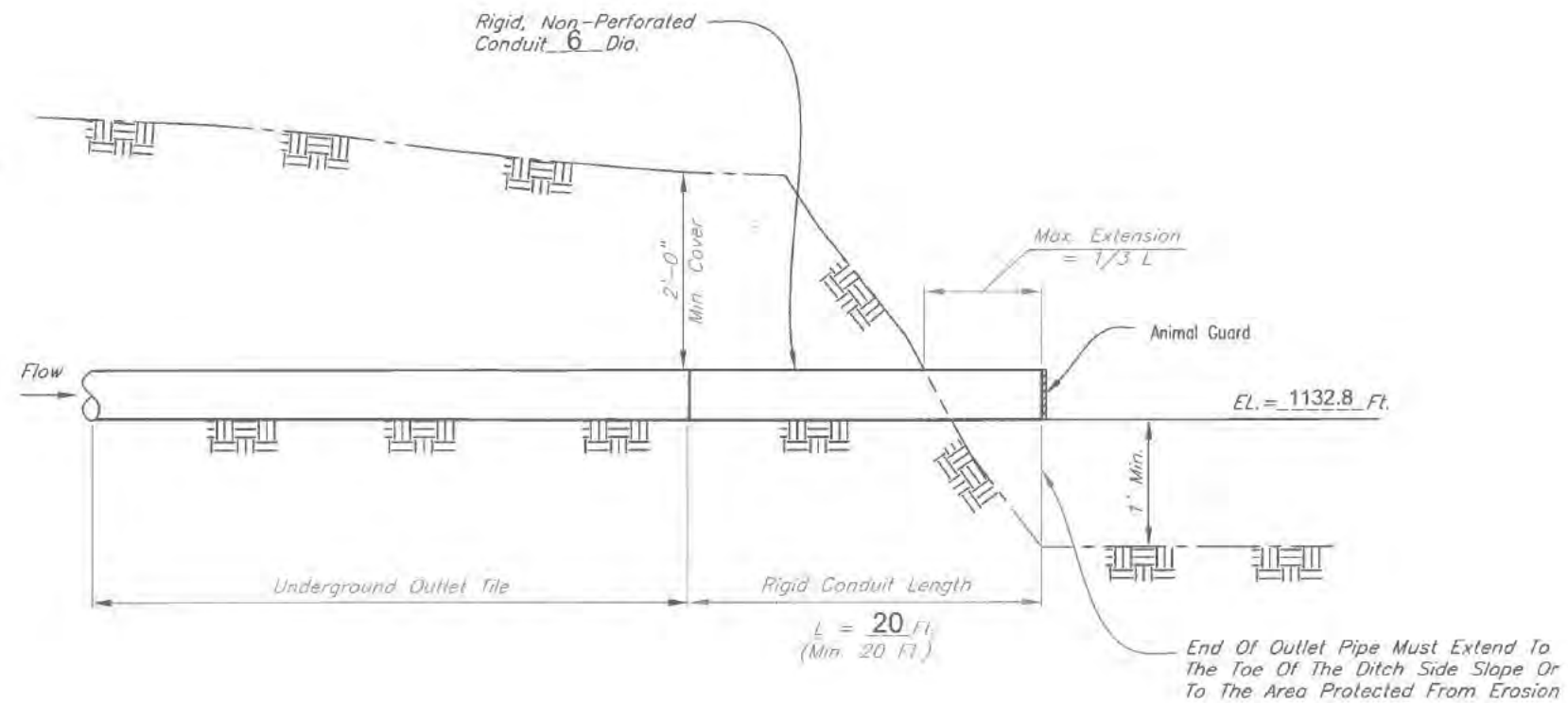


1. W = trench width at top of conduit
2. $W = O.D. + 6"$ min. for trench installation;
 $W = O.D. + 4"$ min. for plow installation.
3. Where $W > O.D. + 12"$, hand compact the blinding or use a granular envelope.

TRENCH DETAIL



BEDDING DETAIL



TILE OUTLET DETAIL

NOTES:

1. Connection with outlet pipe shall be made watertight.
2. Maximum fill over conduit installed in a trench condition ($w < O.D. + 24"$) shall be 11 feet or as specified by the manufacturer.
3. The fill height over the underground outlet conduit or pipe shall not exceed the values shown in Table 2 or 3 of IA NRCS Conservation Standard 620, Underground Outlet.
4. Outlet pipe shall be a continuous section of non-perforated conduit at least 20 feet long.
5. All changes must be approved by person approving the original plans prior to change.

IOWA STANDARD DWG. NO. 1555

DATE June 2022 SHEET 3 OF 3

Date 8/23
Designed S. McCov
Drawn
Checked MAK

Site 1
Bio 3E

DENITRIFYING BIOREACTOR
TYPE 2 (Page 3 of 3)

United States
Department of
Agriculture
USDA
Natural Resources

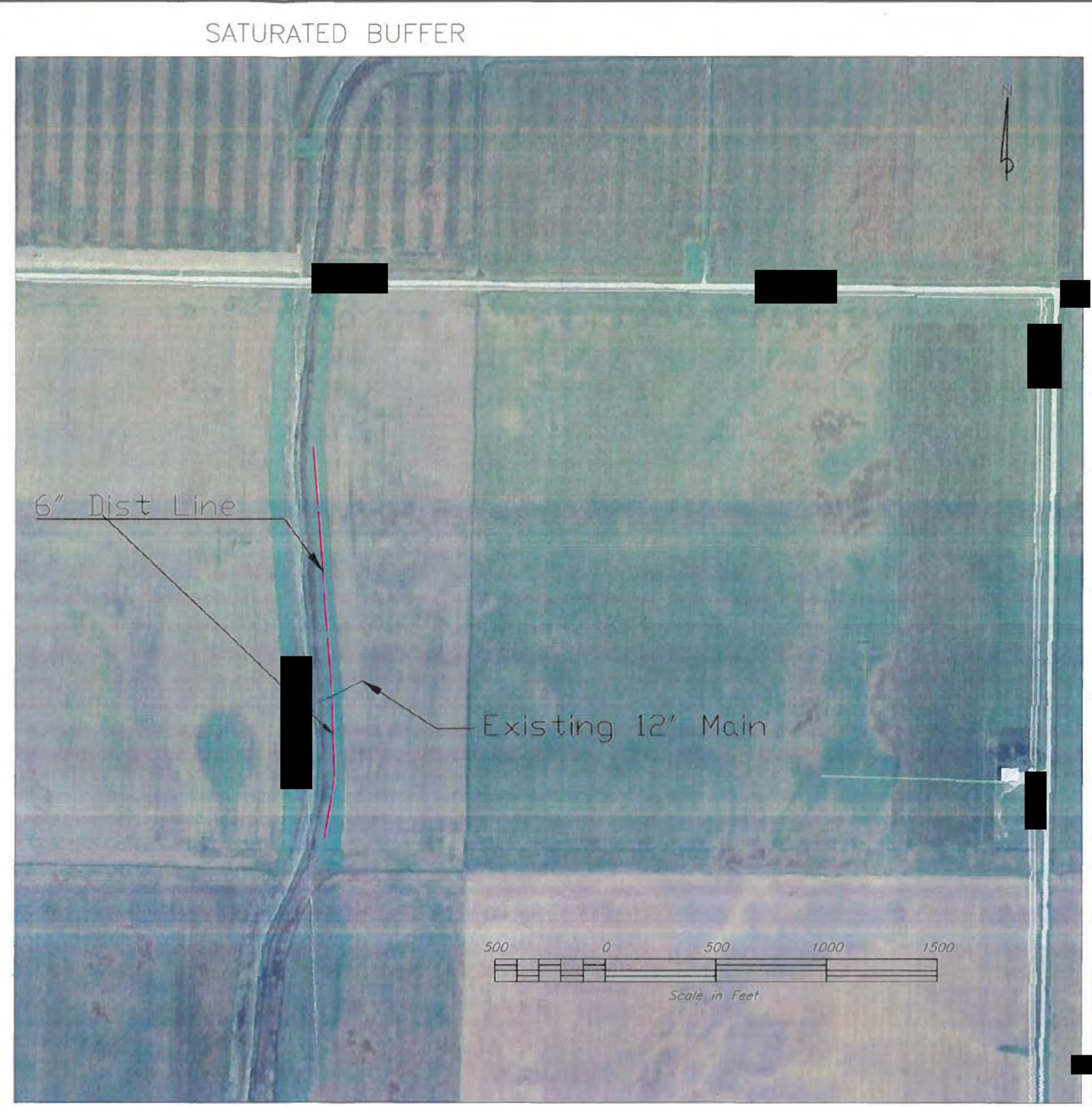
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Drawing No.

Sheet 5 of 5

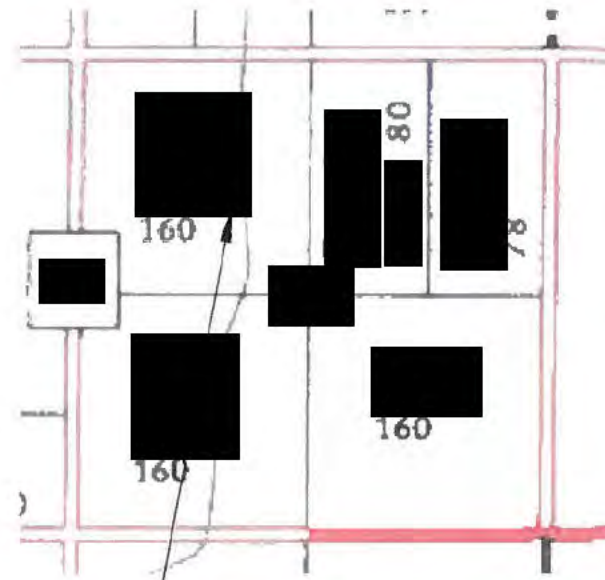
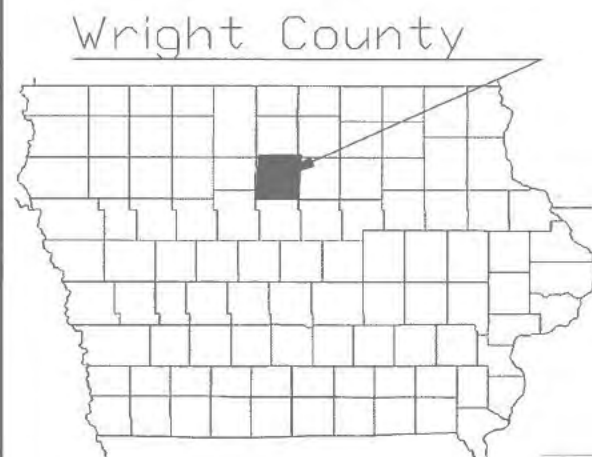
██████████ Saturated Buffer 4E
Wright County, Iowa Lake Section ██████████
T-92-N R-25-W ██████████
Engineering Job Class III
Located West of Intersection
██████████

Site 1 SB 4E



Date 6/14/22	
Designed S. McCoy	6/14/22
Drawn S. McCoy	6/14/22
Checked M. Grove	1/24
Approved ██████████	6/14/24
Site 1 SB 4E	
Saturated Buffer 4E	
Sec. 7 92 N, R 25 W	
Wright County, Iowa	
United States Department of Agriculture Natural Resources Conservation Service	
File No. e_1_18_24.dwg	
Drawing No.	
Sheet 1 of 5.	

Saturated Buffer 4E
Section Lake
Wright County, Iowa
Job Class III



Benchmark		
No.	Elev.	Description
1		To be set at precon meeting

Important Contacts	
NRCS/IDALS for Questions	Sean McCoy
Phone	515-322-0619
Landowner Contact	
Phone	

Page 1	Cover Page
Page 2	Plan View
Page 3	WCS
Page 4	Profile
Page 5	Outlet Pipe

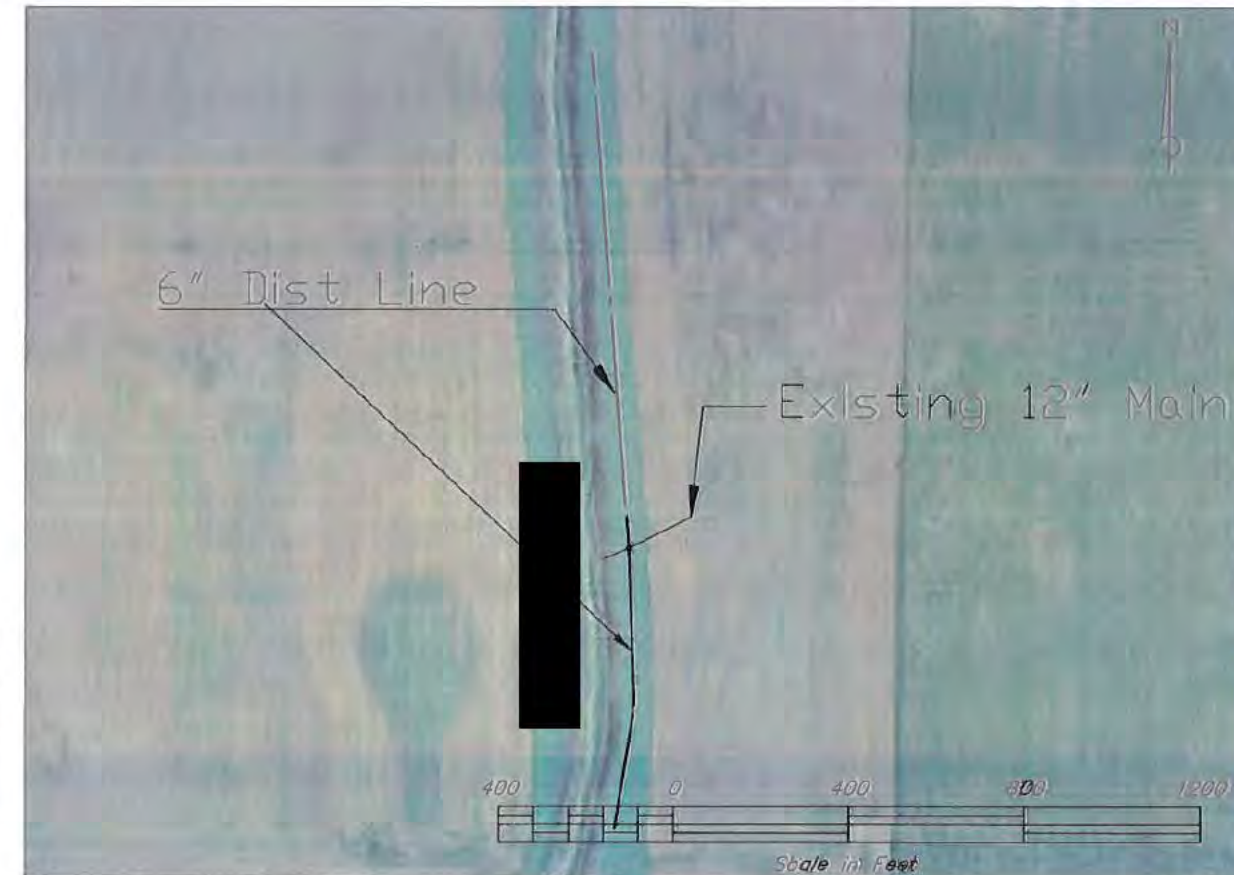
I have reviewed and agree with the content of the plans and specifications prepared by the NRCS.

Landowner: _____ Date: _____

I certify that this practice has been constructed in accordance with the plans and specifications.

Contractor: _____ Date: _____

NRCS Rep.: _____ Date: _____



Construction Specifications	
IA-1	Site Prep
IA-5	Pollution Control
IA-6	Seeding and Mulching for Cover
IA-9	Subsurface Drain Inves
IA-11	Removal of Water
IA-21	Excavation
IA-23	Earthfill
IA-26	Slavaging Spreading Topsoil
IA-45	Plastic Pipe
IA-46	Tile Drains for Land Drainage
IA-51	Corrugated Metal Pipes
IA-604	Saturated Buffer

If a cultural resource is identified during construction, stop immediately and notify the local Natural Resources Conservation Service office.

Contractor is required to follow Iowa One Call law.
IowaOneCall.com or Call 811
Ticket # _____

Date 2/21/23
Designed S. McCoy
Drawn S. McCoy
Checked M. Grose
Approved 1124

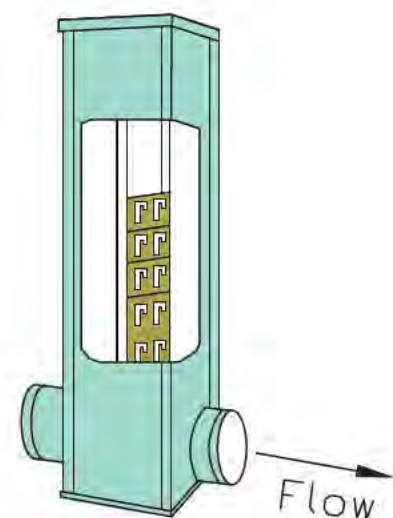
Site 1
SB 4E

Sat Buffer 4 East
Job Class III
T 92 N, R 25, W
Sec. 11
PLAN VIEW

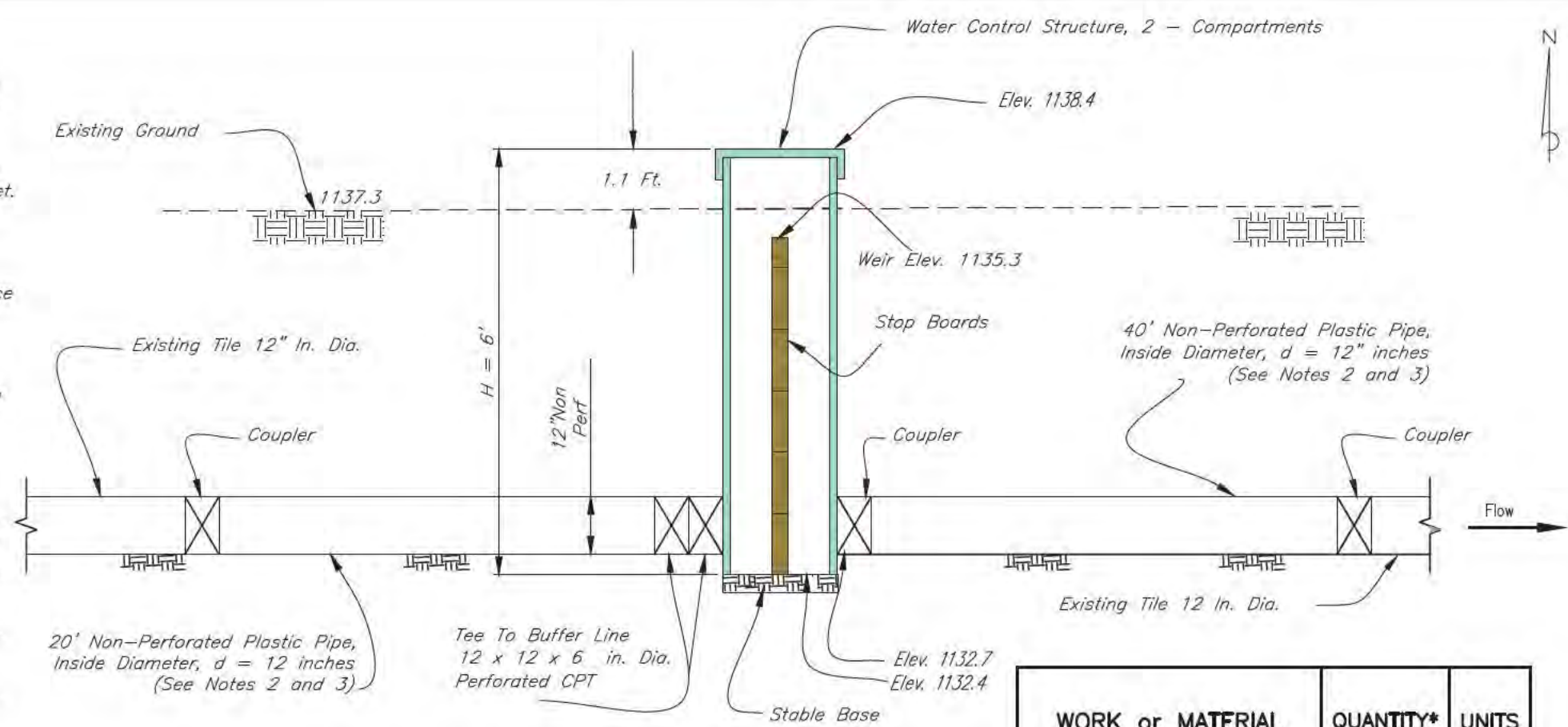
United States
Department of
Agriculture
USDA
Natural Resources
Conservation Service

File No. 4E
Drawing No. 1/19/24 8:56 AM
Sheet 2 of .5

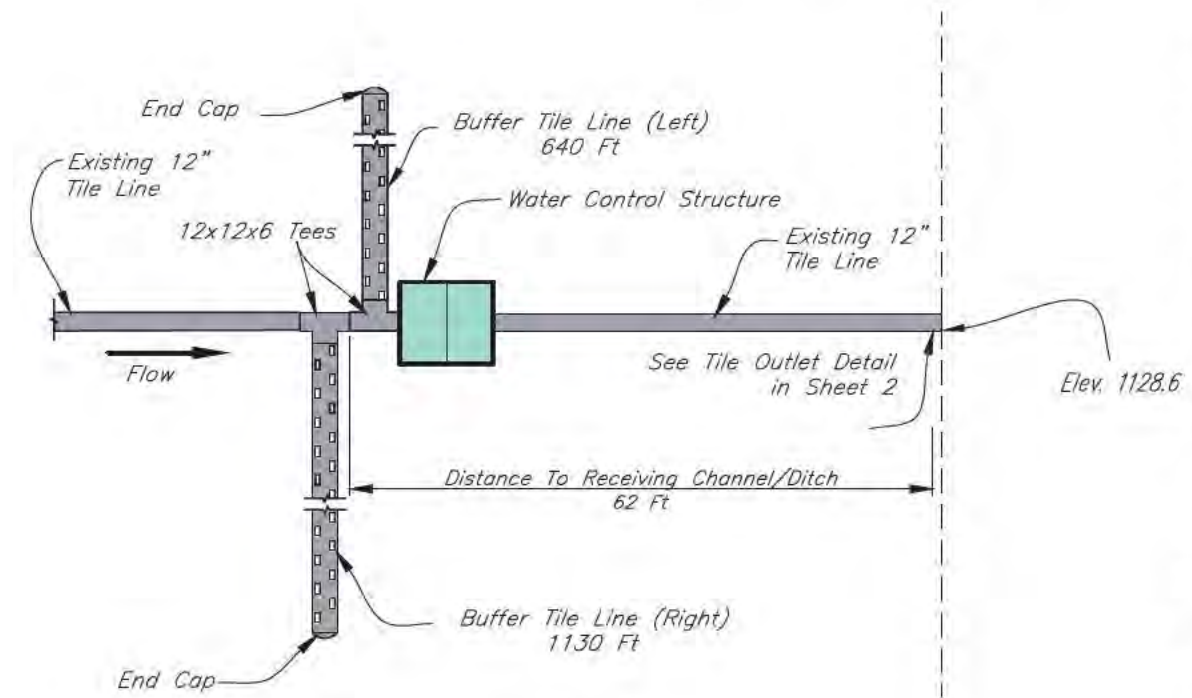
- NOTES:
1. Install perforated buffer tile parallel to ditch.
 2. Install a minimum of 20 feet of non-perforated pipe adjacent to the water control structure, both upstream and downstream.
 3. Pipe must be PVC or PE. Pipe, pipe sizes, fittings and other appurtenances shall conform to the "Materials" section of Iowa NRCS Construction Specification (CS) IA-620, Underground Outlet.
 4. Saturated Buffer installation shall be in conformance with CS IA-604, Saturated Buffer.
 5. Water Control Structure (WCS) materials shall be in conformance with CS IA-45, Plastic (PVC, PE) Pipe.
 6. Place structure and pipe coupler on a minimum 4 inch stable base. A stable base may be compacted earth, compacted fill gravel, or a concrete pad. Extend the stable base no less than 1 foot around structure.
 7. Stop board removal tool shall be provided.
 8. Structure lid shall be provided with locking mechanism.
 9. Normal stop board operation shall be verified following backfill.
 10. Stop boards must provide water tight seals under a minimum of 4 foot pressure head.
 11. Mark location of structure using post or manufactured marker lag for safety in the field.
 12. Refer to Operation and Maintenance (O&M) Plan for adjusting WCS weir settings.
 13. Seeding and Mulching shall be performed in accordance with attached IA-CPA-4, Seeding Plan and Construction Specification IA-6, Seeding and Mulching for Protective Cover.



**IN-LINE CONTROL
STRUCTURE**



TYPICAL SECTION



PLAN
NOT TO SCALE

WORK or MATERIAL	QUANTITY*	UNITS
Water Control Structure 2 - Compartment (H = <u>6</u> FT) (d = <u>12</u> in)	1	Job
<u>12</u> inch Diam., Non-Perforated Plastic Pipe (Upstream)	20	Lin.Ft.
<u>12</u> inch Diam., Non-Perforated Plastic Pipe (Downstream)	42	Lin.Ft.
<u>6</u> inch Diam., Perforated Plastic Pipe, Buffer Line (Right)	1130	Lin.Ft.
<u>6</u> inch Diam., Perforated Plastic Pipe, Buffer Line (Left)	640	Lin.Ft.
<u>12</u> in. x <u>12</u> in. x <u>6</u> in. T Connection	2	Each
<u>6</u> inch Diam., End Caps	2	Each
<u>12</u> inch Diam., Rigid, Non-Perforated Conduit w/Animal Guard	20	Lin.Ft.
Seeding	.1	ac
Tile Investigation	1	hr
Fiberglass Marker Flags	1	ea

United States
Department of
Agriculture
USDA
Natural Resources
Conservation Service

File No.
4E
Drawing No.
17
Sheet **.3** of **.5**

Site 1
SB 4E

Saturated Buffer 4 East
Job Class III

T 92 N, R 25, W
Sec. 17
WCS

Wright County, Iowa

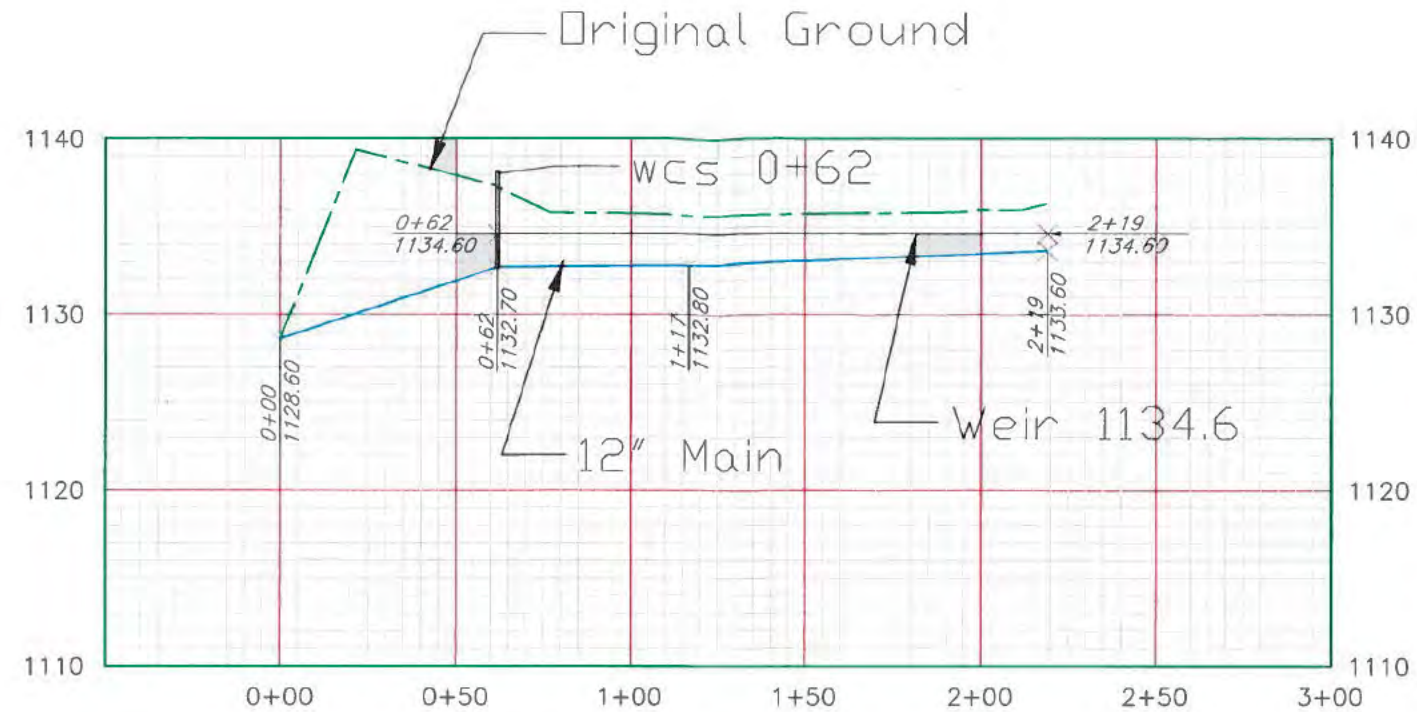
Date
6/14/22

Designed
S. McCoy

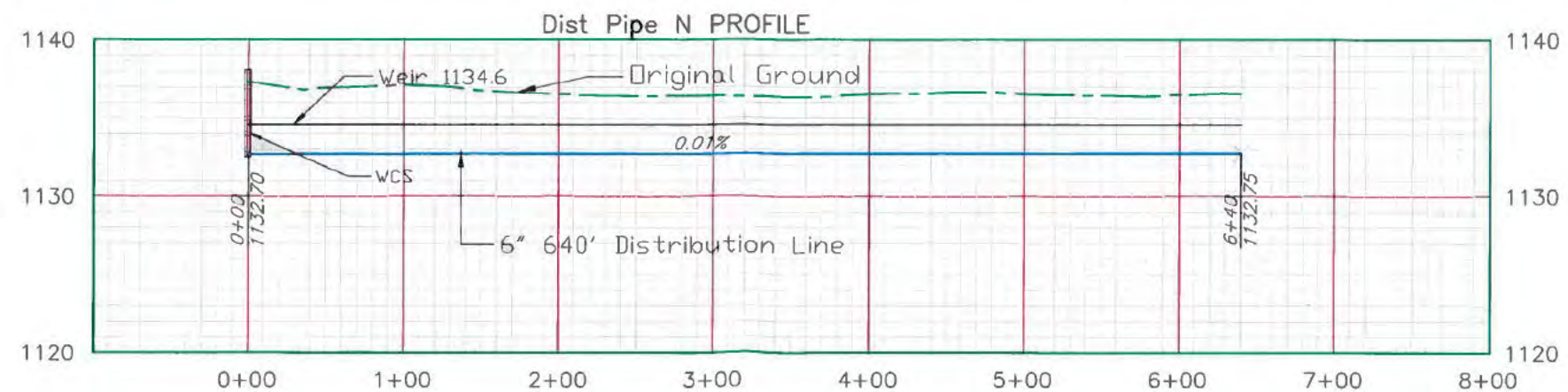
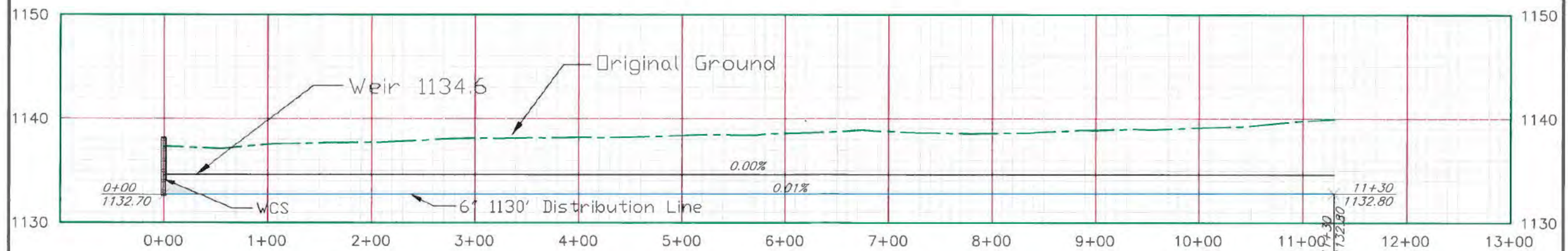
Drawn
S. McCoy

Checked
S. McCoy

Approved
S. McCoy



Alignment from Points (1) PROFILE



Dist S PROFILE

Designed	S. McCoy	Date	6/14/22
Drawn	S. McCoy		6/14/22
Checked	M. Grove		1/24
Approved			

Site 1
SB 4E

SATURATED BUFFER 4E

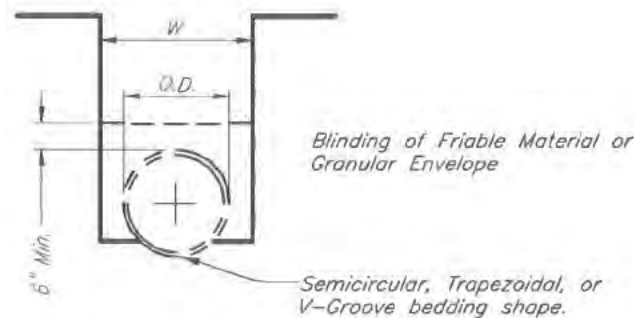
Wright County, Iowa



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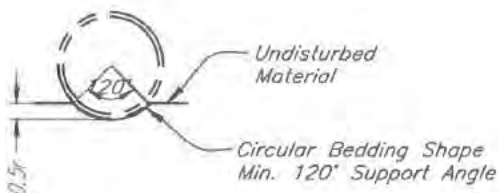
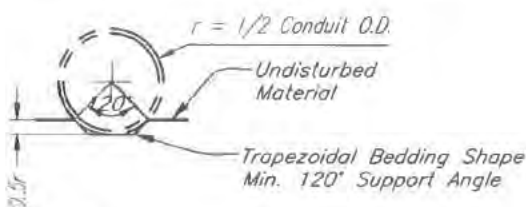
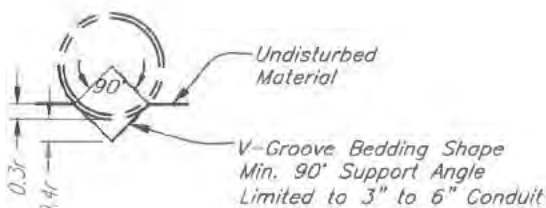
Drawing No.

Sheet 4 of 5

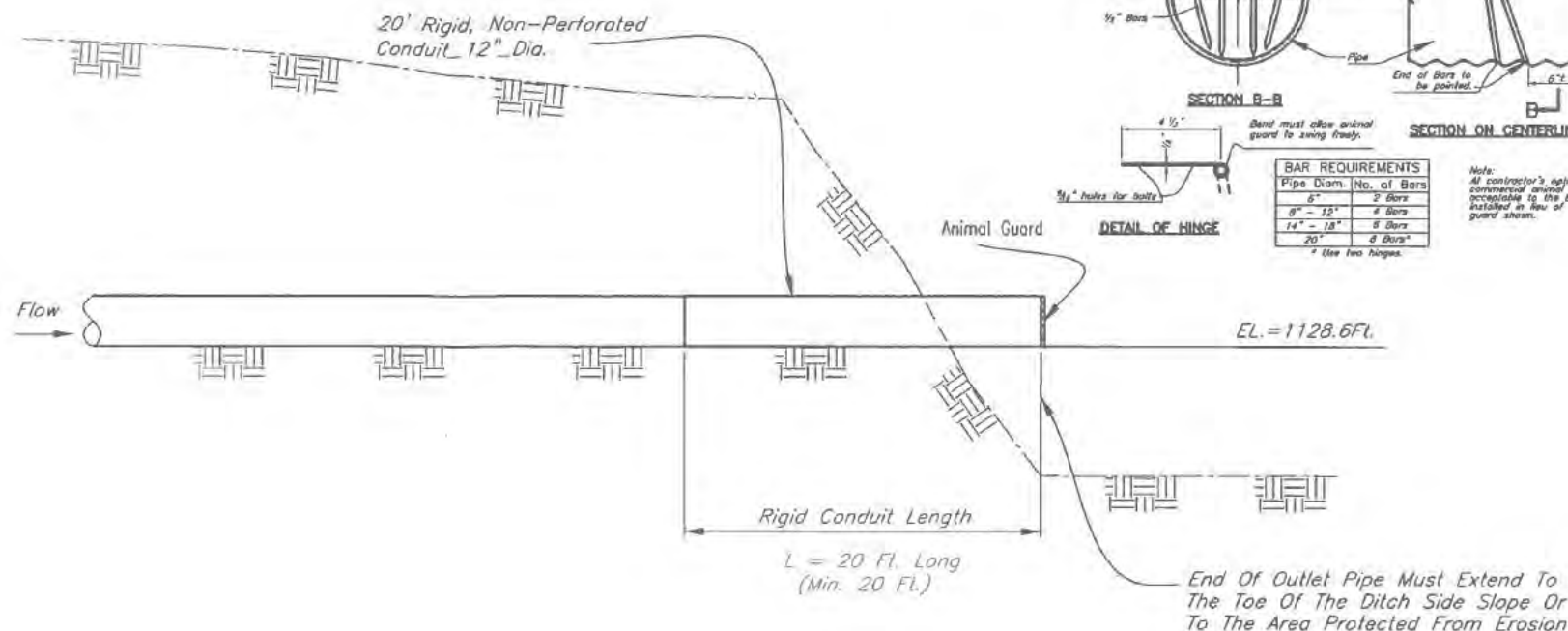


1. W = trench width at top of conduit
2. $W = O.D. + 6"$ min. for trench installation;
 $W = O.D. + 4"$ min. for plow installation.
3. Where $W > O.D. + 12"$, hand compact the blinding or use a granular envelope.

TRENCH DETAIL

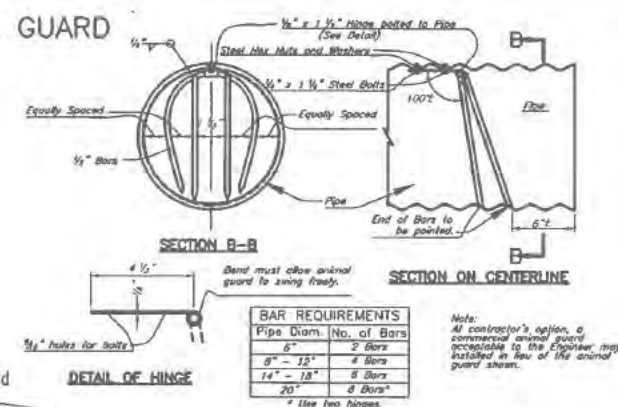


BEDDING DETAIL



TILE OUTLET DETAIL

DETAILS OF ANIMAL GUARD FORK TYPE



BAR REQUIREMENTS	
Pipe Diam.	No. of Bars
6"	2 Bars
8" - 12"	4 Bars
14" - 18"	6 Bars
20"	8 Bars*

* Use two hinges.

Note: At contractor's option, a commercial animal guard accessible to this Engineer may be installed in lieu of the animal guard shown.

NOTES:

1. Connection with outlet pipe shall be made watertight.
2. Maximum fill over conduit installed in a trench condition ($w < O.D. + 24"$) shall be 11 feet or as specified by the manufacturer.
3. The fill height over the underground outlet conduit or pipe shall not exceed the values shown in Table 2 or 3 of IA NRCS Conservation Standard 620, Underground Outlet.
4. Outlet pipe shall be a continuous section of non-perforated conduit at least 20 feet long.
5. All changes must be approved by person approving the original plans prior to change.

Date: 2/21/23
Designed: S. McCoy
Drawn: S. McCoy
Checked: M. Grace
Approved: 11214

Site 1
SB 4E

Saturated Buffer 4E

Class III

T 92 N, R 25, W

OUTLET PIPE

Wright County, Iowa

United States
Department of
Agriculture
USDA
Natural Resources
Conservation Service

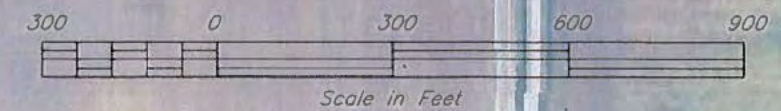
File No. 4 E
Drawing No.
Sheet 5 of 5

██████████ 5E Bioreactor Class II
Lake ██████████ Wright County, Iowa

Site 1 Bio 5E

60' x 12' Bioreactor

8" Main



Designed	S. McCoy	Date	2/24
Drawn	S. McCoy	Date	2/24
Checked	M. Grove	Date	3/24
UNITED STATES OF AMERICA			

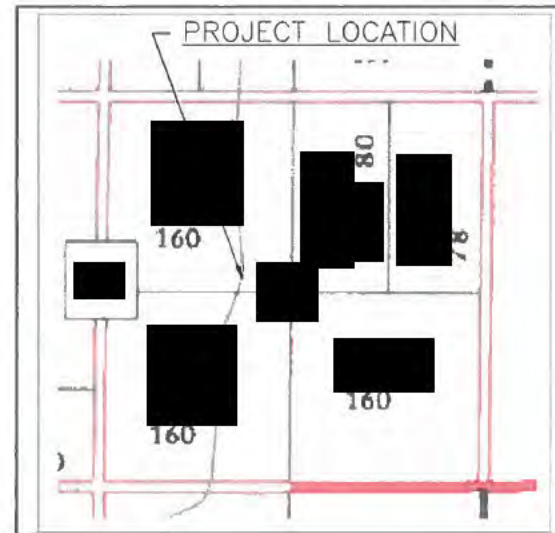
Site 1
Bio 5E

██████████
DENITRIFYING BIOREACTOR
PLAN VIEW



File No.
5E_2_22_2
Drawing No.
2/23/24 10:40 AM
Sheet 1 of 6.

Wright COUNTY, IOWA LAKE



BENCHMARK	
Elevation	Description
	To be Set at Pre Con Meeting
TABLE OF CONTENTS	
Sheet 1	Plan View
Sheet 2	COVER SHEET
Sheet 3	TYPE 2 PG 1
Sheet 4	TYPE 2 PG 2
Sheet 5	TYPE 2 PG 3
Sheet 6	PROFILES
NRCS CONTACT FOR QUESTIONS: SEAN MCCOY	
NRCS CONTACT PHONE: 515-322-0619	
LANDOWNER CONTACT:	
LANDOWNER CONTACT PHONE:	

I have reviewed and agree with the content of the plans and specifications prepared by the NRCS.

Landowner: _____ Date: _____

I certify that this practice has been constructed in accordance with the plans and specifications.

Contractor: _____ Date: _____

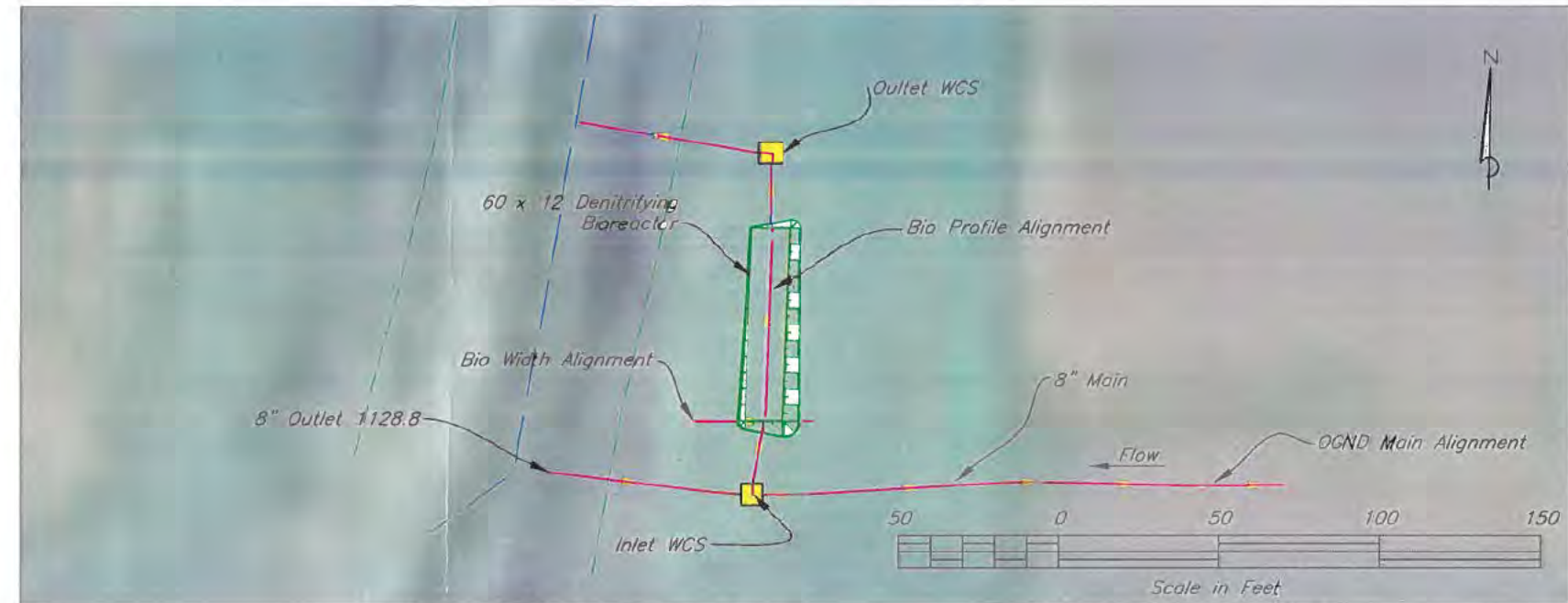
NRCS Rep.: _____ Date: _____

If a cultural resource is identified during construction, stop immediately and notify the local Natural Resources Conservation Service office.

Contractor is required to follow Iowa One Call law. IowaOneCall.com or Call 811 Ticket # _____

5E Bioreactor

SITE MAP



QUANTITIES*	
Upstream Water Control Structure (Inlet WCS) 2 - Compartment H ₂ = 7ft. d = 8 in	1
Downstream Water Control Structure (Outlet WCS) 2 - Compartment H ₂ = 8 ft. d = 6in	1
8" Non-perforated Pipe (ft)	80
6" Non-perforated Pipe (ft)	100
6" Diam. Rigid, Non-Perforated Conduit w/Animal Guard (LF)	20
6" Perforated CPT (ft)	24
Tee 8" x 6"	1
Tee 6" x 6"	2
Elbows 6"	
6" End Caps	4
Wood Chips (cu. yd.)	165
4 Mil Plastic (sq. yd.)	166
Geotextile (sq. yd.)	80
Excavation (cu. yd.)	173

Stakeout

Point Table				
Pt. Name	Northing	Easting	Elevation	Description
bio5e	15530608.68	1434448.81	1134.94	WCS
corner	15530631.35	1434446.37	1135.82	SW
corner1	15530631.35	1434458.37	1135.16	SE
ne	15530691.15	1434460.49	1135.76	NE
nw	15530691.15	1434448.49	1136.54	NW
outlet	15530723.77	1434395.21	1126.15	Main
wcs	15530714.55	1434454.53	1136.43	Outlet

Designed S McCoy
Drawn S McCoy
Checked M. Grave
Date 2/24
2/24
3/24

Site 1
Bio 5E

DENITRIFYING BIOREACTOR

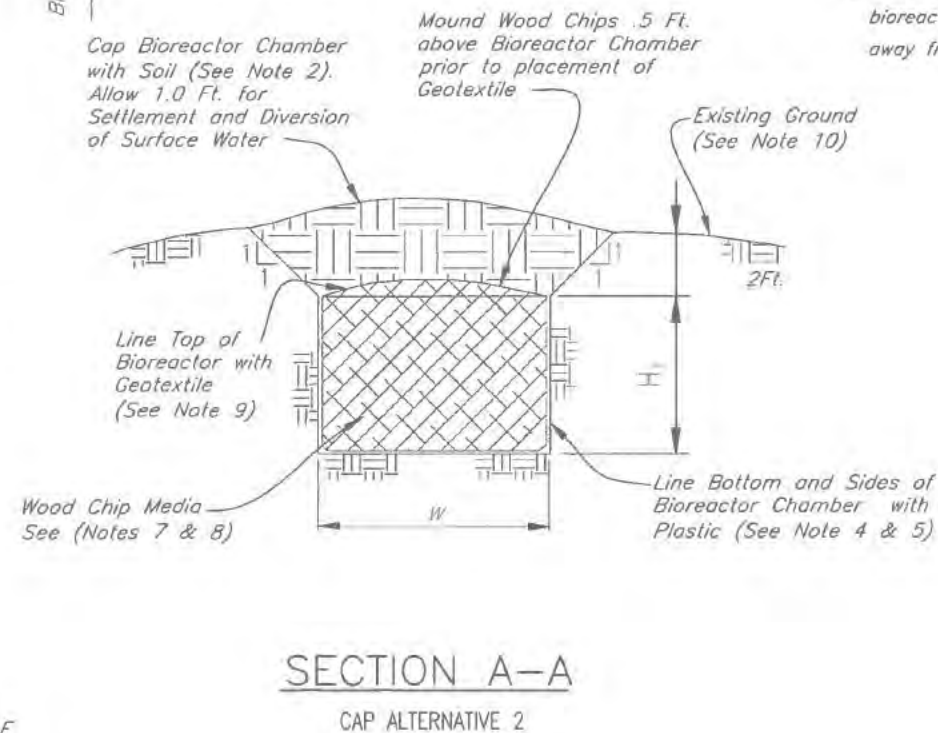
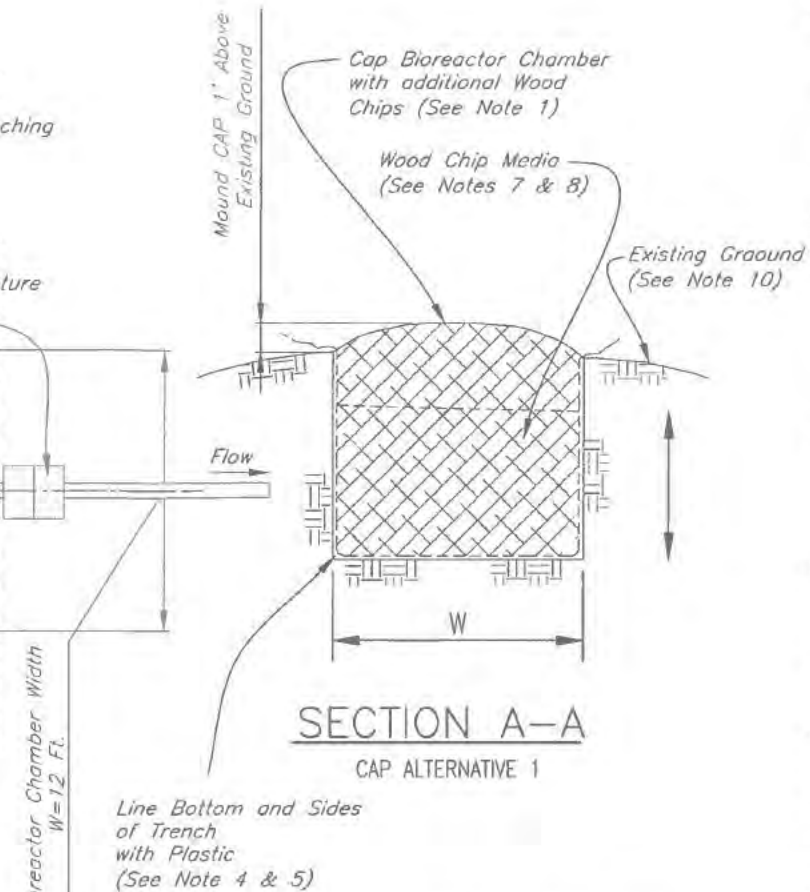
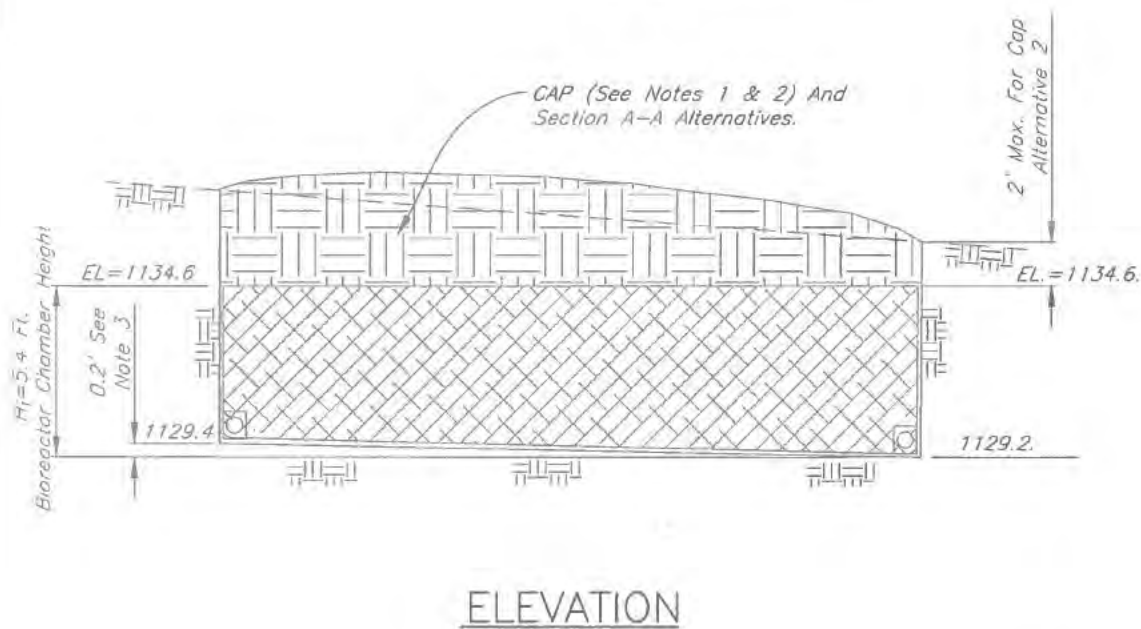
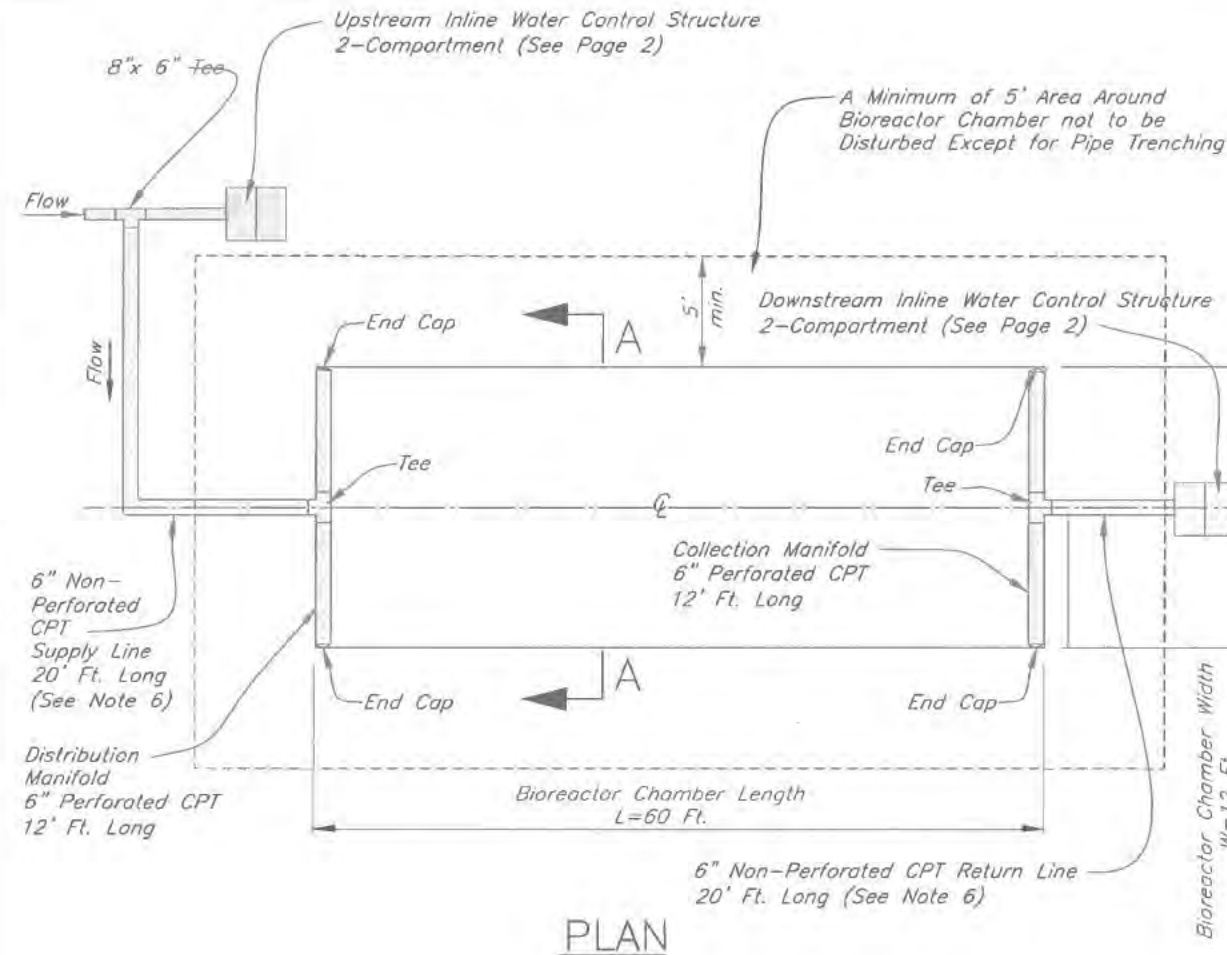
Wright County Iowa

T 0 0 N D 95 E/W

United States
Department of
Agriculture
USDA
Natural Resources
Conservation Service

File No.
5E_2_22_24

Drawing No.
2/23/24 10:45 AM
Sheet 2 of 6.



NOTES:

1. Utilize CAP ALTERNATIVE 1 for the bioreactor chamber unless traffic over the top is anticipated.
2. For CAP ALTERNATIVE 2, fill the area above the bioreactor chamber with compacted soil. Use topsoil for at least the top 6" Vegetate according to Conservation Practice Standard 342, Critical Area Planting.
3. Set bottom of bioreactor chamber to drain towards exit end.
4. Line bottom and sides of bioreactor chamber with plastic, minimum 4 mil thickness. Overlap any splices at least 6 inches. Wrap plastic carefully around tiles that enter/exit the chamber; no need to seal around tiles.
5. If bioreactor is located in glacial till soil and has Unified Soil Classification System designation of CL or CH and no sand is encountered during construction chamber sides and bottom do not need to be lined.
6. Route supply line to centerline of entrance end and return line from centerline of exit end of bioreactor chamber.
7. Wood chip media must meet requirements in Iowa Construction Specification IA-605, Denitrifying Bioreactor.
8. Obtain approval of engineer on the wood chips / media prior to installation.
9. Geotextile must be non-woven, class II, and meet the requirements of Iowa Construction Specification IA-95, Geotextile. Overlap splices at least 6 inches.
10. Grade site for positive drainage away from the bioreactor chamber. Spread spoil in designated location away from bioreactor.

Site 1
Bio 5E

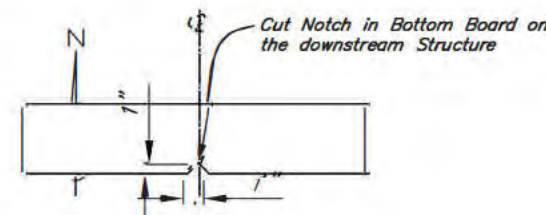
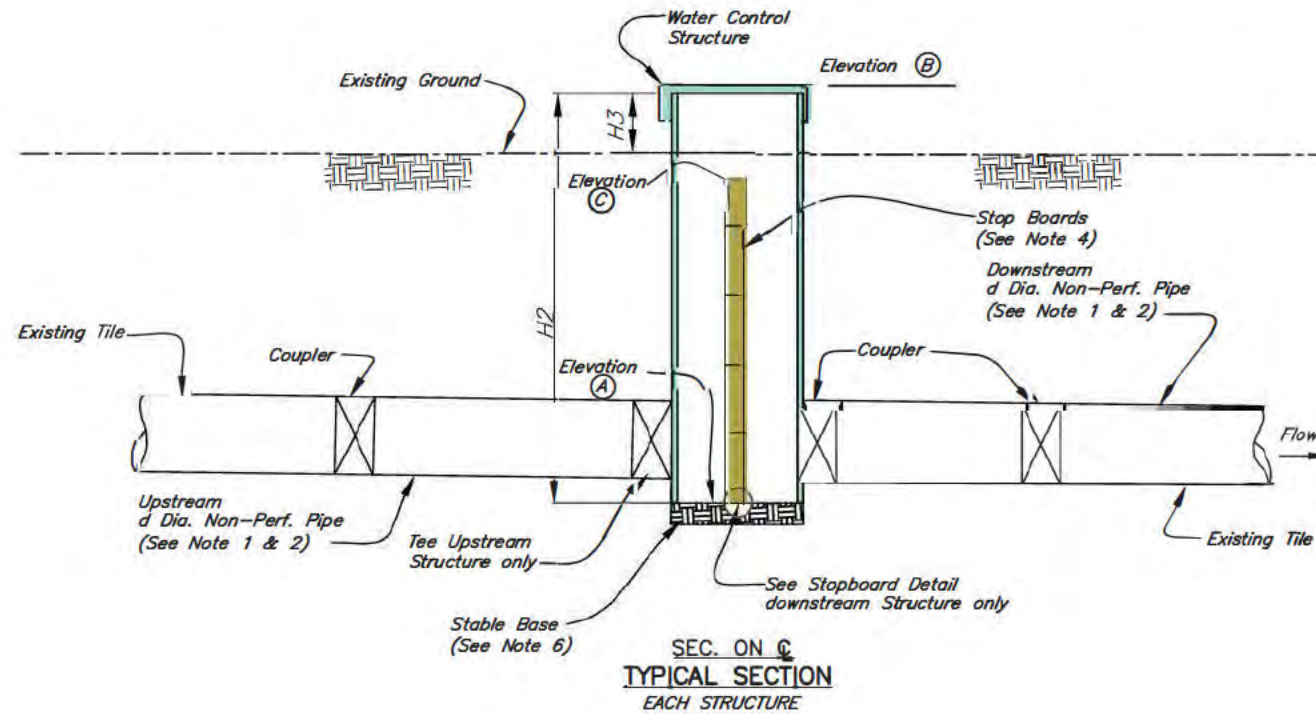
DENITRIFYING BIOREACTOR
TYPE 2 PG 1



File No.
5E_2_22_2

Drawing No.
2/23/24 10:40 AM
Sheet 3 of 6

QUANTITIES*	
Upstream Water Control Structure (Inlet WCS) 2 - Compartment H ₂ = 7ft. d = 8 in	1
Downstream Water Control Structure (Outlet WCS) 2 - Compartment H ₂ = 8 ft. d = 6in	1
8" Non-perforated Pipe (ft)	80
6" Non-perforated Pipe (ft)	100
6" Diam. Rigid, Non-Perforated Conduit w/Animal Guard (LF)	20
6" Perforated CPT (ft)	24
Tee 6" x 6" x 8"	1
Tee 6" x 6" x 6"	2
Tile Investigation (hr)	1
6" End Caps (Ea)	4
Wood Chips (cu. yd.)	165
4 Mil Plastic (sq. yd.)	166
Geotextile (sq. yd.)	80
Excavation (cu. yd.)	173
Seeding (ac)	.1
Earthfill (cu yd)	120
Fiberglas Marking Flags (ea)	6



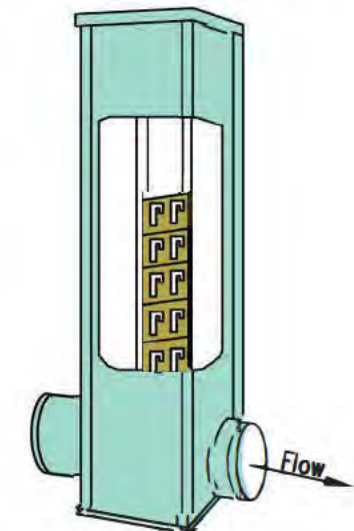
STOP-BOARD DETAIL
(Downstream Structure Only)
NOT TO SCALE

	Inlet WCS	Outlet WCS
WCS Box Bottom El. ①	1129.2	1129.0
WCS Box Top El. ②	1136.2	1137.0
WCS Ht Above EG, H ₃	.7	.9
Designed Weir El. ③	1133.5	1132.0
US Non-Perforated Pipe Length, (ft)	60	20
DS Non-Perforated Pipe Length, (ft)	20	60

* Quantities Do Not Include Tile/Pipe Couplers or Extra Material For Geotextile/Plastic Overlap

NOTES:

1. Install a minimum of 20 feet of non-perforated pipe adjacent to the water control structure, both upstream and downstream.
2. Pipe must be PVC or PE. Pipe, pipe sizes, fittings and other appurtenances shall conform to the "Materials" section of Iowa NRCS Construction Specification (CS) IA-620, Underground Outlet.
3. Bioreactor installation shall be in conformance with CS IA-605, Denitrifying Bioreactor.
4. Water Control Structure (WCS) materials shall be in conformance with CS IA-45, Plastic (PVC, PE) Pipe.
5. Place structure and pipe coupler on a minimum 4 inch stable base. A stable base may be compacted earth, compacted fill gravel, or a concrete pad. Extend the stable base no less than 1 foot around structure.
6. Stop board removal tool shall be provided.
7. Structure lid shall be provided with locking mechanism.
8. Normal stop board operation shall be verified following backfill.
9. Stop boards must provide water tight seals under a minimum of 4 foot pressure head (except notched board).
10. Mark location of structure using post or manufactured marker flag for safety in the field.
11. Refer to Operation and Maintenance (O&M) Plan for adjusting WCS weir settings.
12. Seeding and Mulching shall be performed in accordance with attached IA-CPA-4, Seeding Plan and Construction Specification IA-6, Seeding and Mulching for Protective Cover.



IN-LINE CONTROL STRUCTURE.

Date 2/24
Designed S McCoy
Drawn S McCoy
Checked
Approved

Site 1
Bio 5E

DENITRIFYING BIOREACTOR
TYPE 2 PG 2

Wright County, Iowa

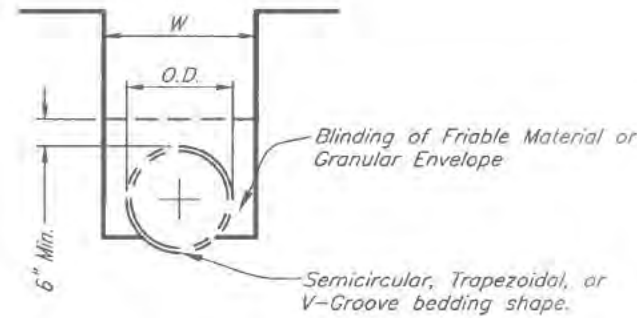
T 92 N, R 25 E/W

USDA
United States
Department of
Agriculture
Natural Resources
Conservation Service

File No.
E_1_22_26.dwg

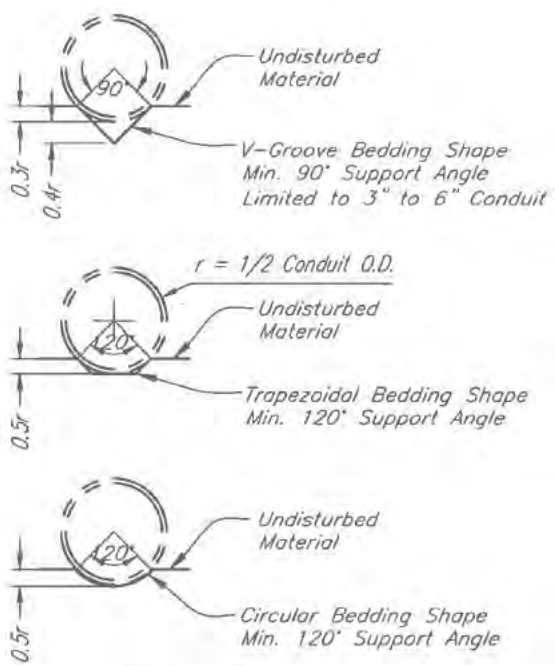
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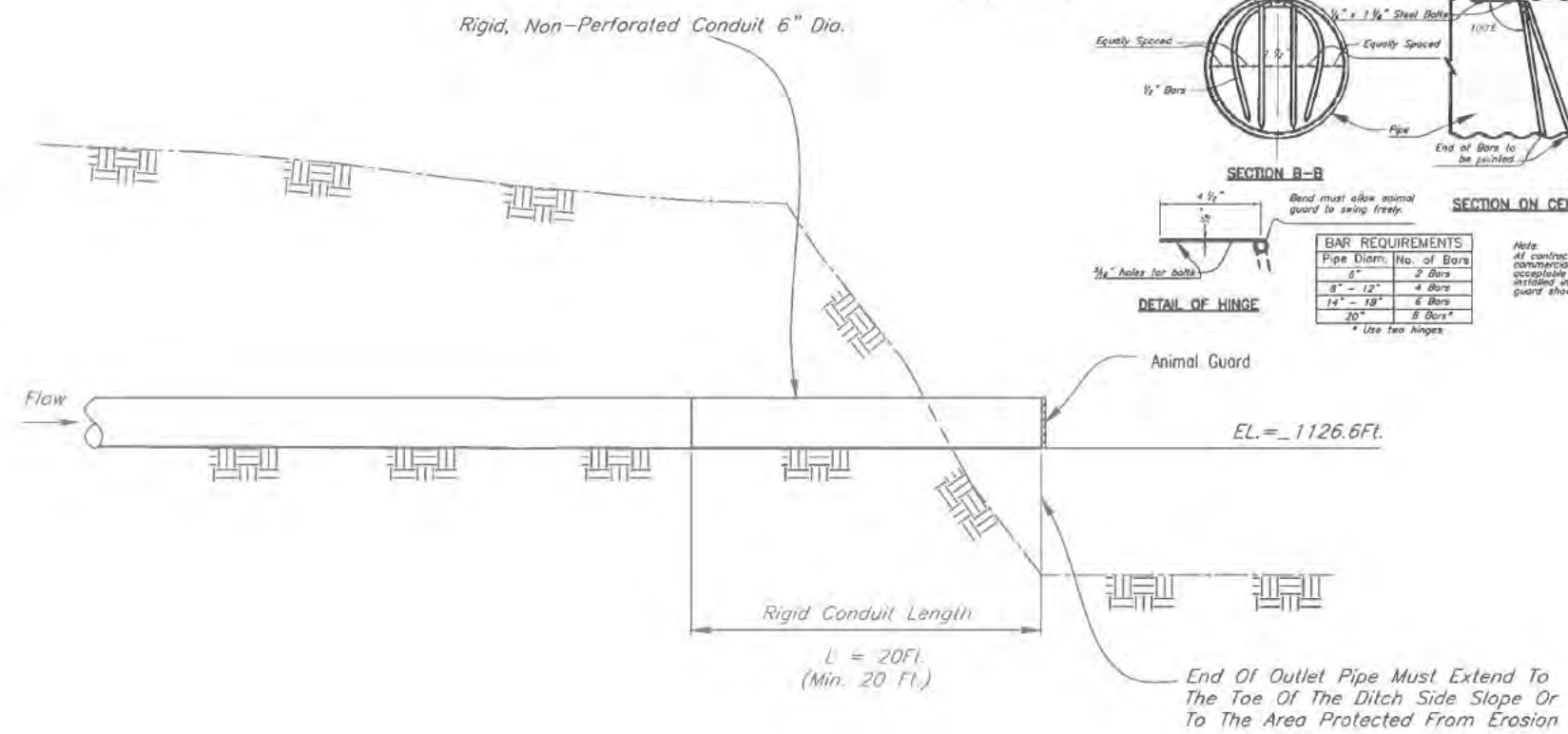


1. W = trench width at top of conduit
2. $W = O.D. + 6"$ min. for trench installation;
 $W = O.D. + 4"$ min. for plow installation.
3. Where $W > O.D. + 12"$, hand compact the blinding or use a granular envelope.

TRENCH DETAIL



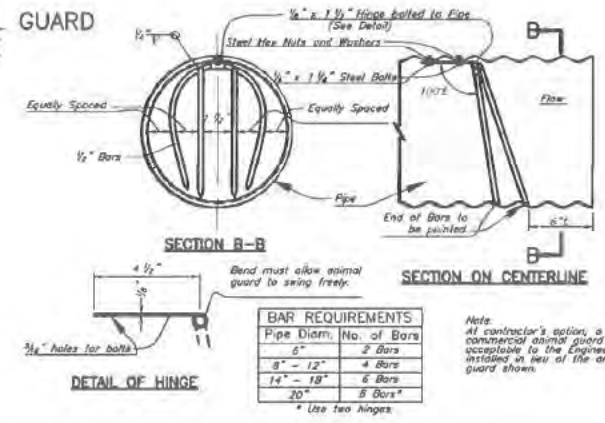
BEDDING DETAIL



TILE OUTLET DETAIL

- NOTES:**
1. Connection with outlet pipe shall be made watertight.
 2. Maximum fill over conduit installed in a trench condition ($w < O.D. + 24"$) shall be 11 feet or as specified by the manufacturer.
 3. The fill height over the underground outlet conduit or pipe shall not exceed the values shown in Table 2 or 3 of IA NRCS Conservation Standard 620, Underground Outlet.
 4. Outlet pipe shall be a continuous section of non-perforated conduit at least 20 feet long.
 5. All changes must be approved by person approving the original plans prior to change.

**DETAILS OF ANIMAL GUARD
FORK TYPE**



BAR REQUIREMENTS	
Pipe Diam.	No. of Bars
6"	2 Bars
8" - 12"	4 Bars
14" - 18"	6 Bars
20"	8 Bars*

Note:
At contractor's option, a commercial animal guard acceptable to the Engineer may be installed in lieu of the animal guard shown.

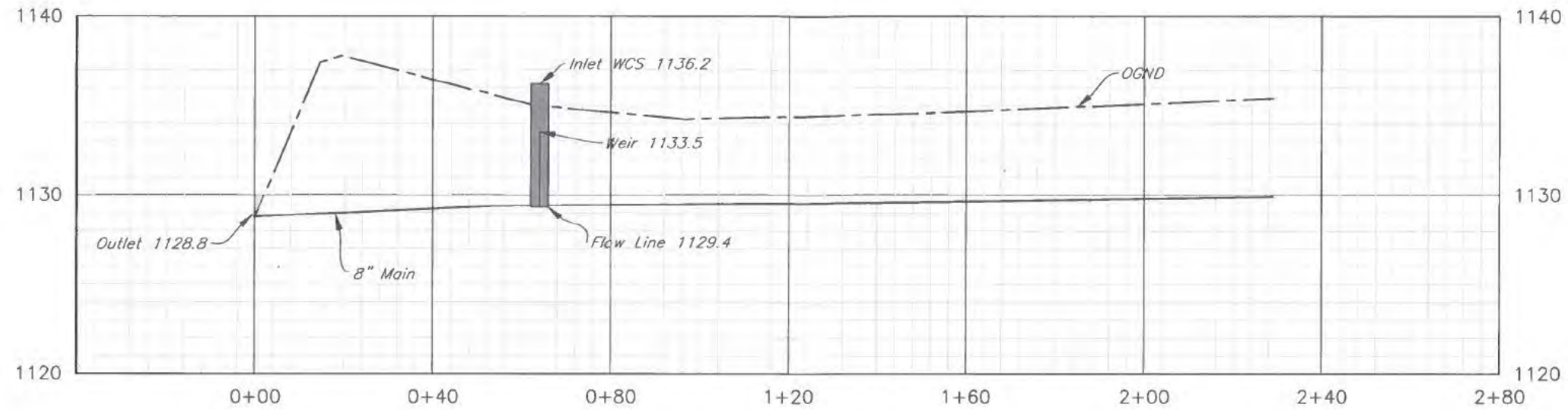
Date	2/24
Designed	S. McCoy
Drawn	S. McCoy
Checked	M. Grove
	3/24

**Site 1
Bio 5E**

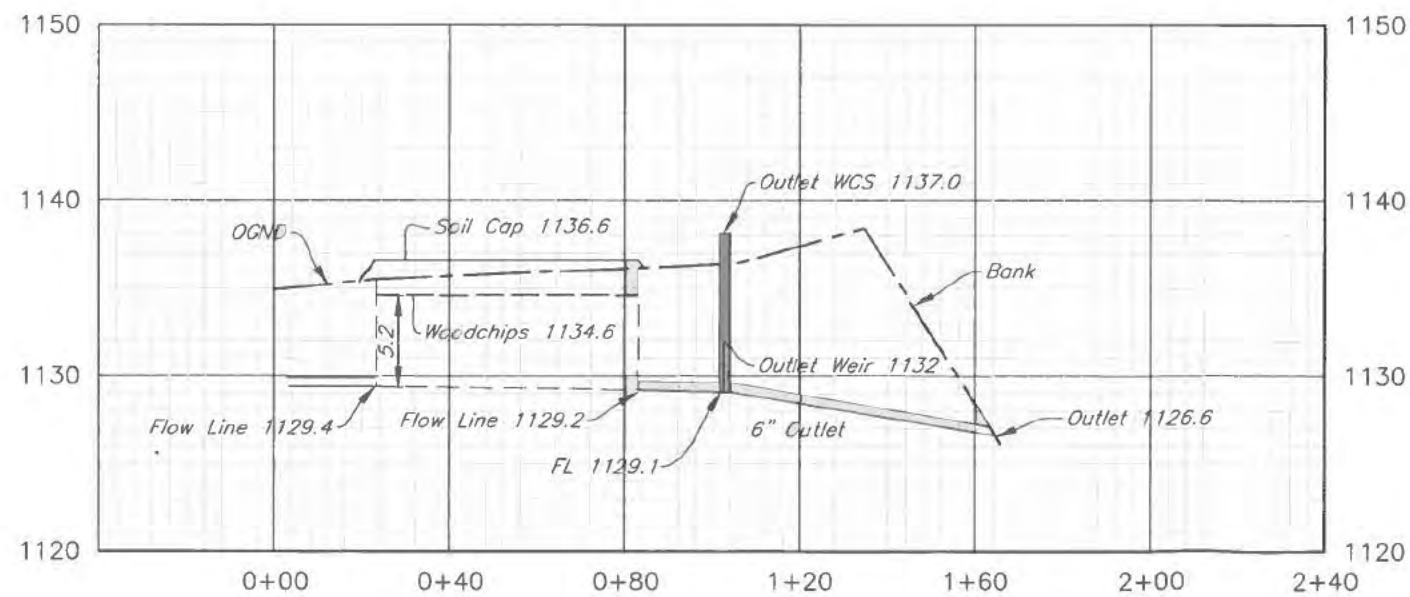
DENITRIFYING BIOREACTOR
TYPE 2 PG 3



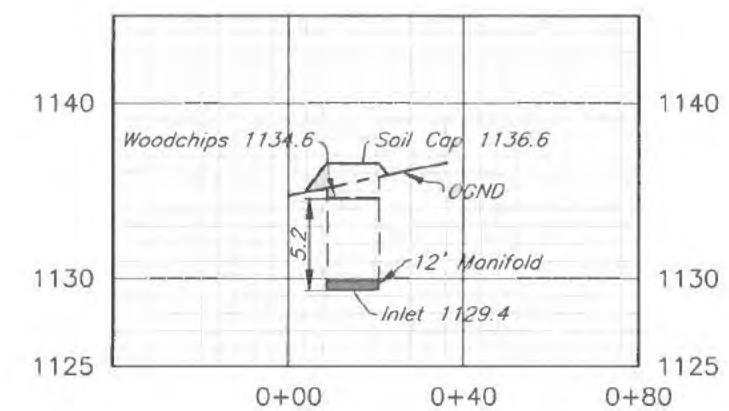
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Drawing No.	
Date	2/23/24 10:40 A
Sheet	5 of 6



OGND Main PROFILE



Bio Profile PROFILE



Bio Width Profile PROFILE

Date	2/24
Designed	S. McCoy
Drawn	S. McCoy
Checked	M. Grove
	3/24

Site 1
Bio 5E

DENITRIFYING BIOREACTOR
PROFILES



File No.
5E_2_22_2

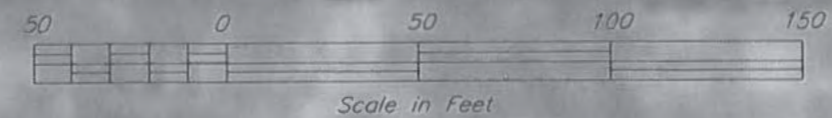
Drawing No.
2/23/24 10:40 A
Sheet 6 of 6.

Wall Lake Section
Wright County, Iowa

15' x 60' Denitrifying Bioreactor
Engineering Job Class II

Site 2
Bioreactor 1

Denitrifying Bioreactor
15' x 60'



 United States Department of Agriculture Natural Resources Conservation Service	File No. E2_3-14final.d	T 90 N, R 24 W Sec 605 PLAN VIEW BIOREACTOR 605 Wright County, Iowa	Site 2 Bio 1	Designed Sean McCoy Drawn SMM Checked M. Grove Approved [Signature] 4/19/24	Date 3-14
	Drawing No.				
	4/1/24 2:45 PM				
	Sheet 1 of 5				

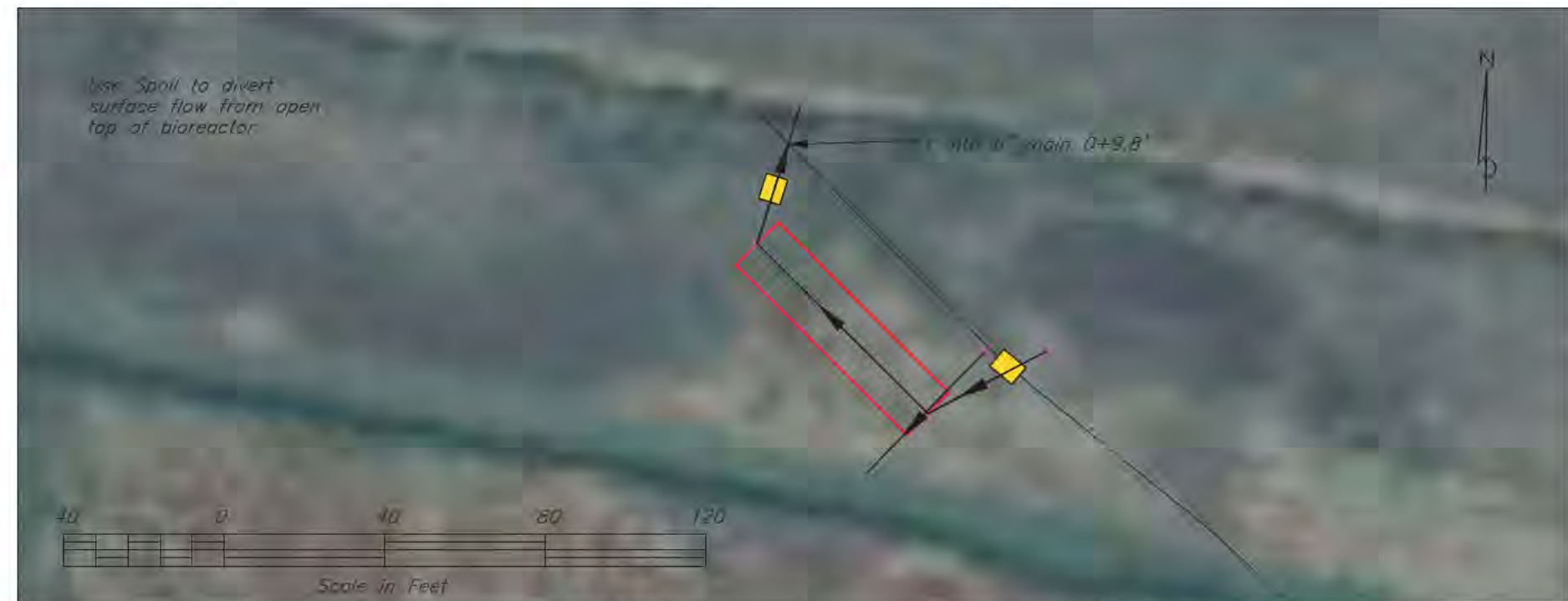
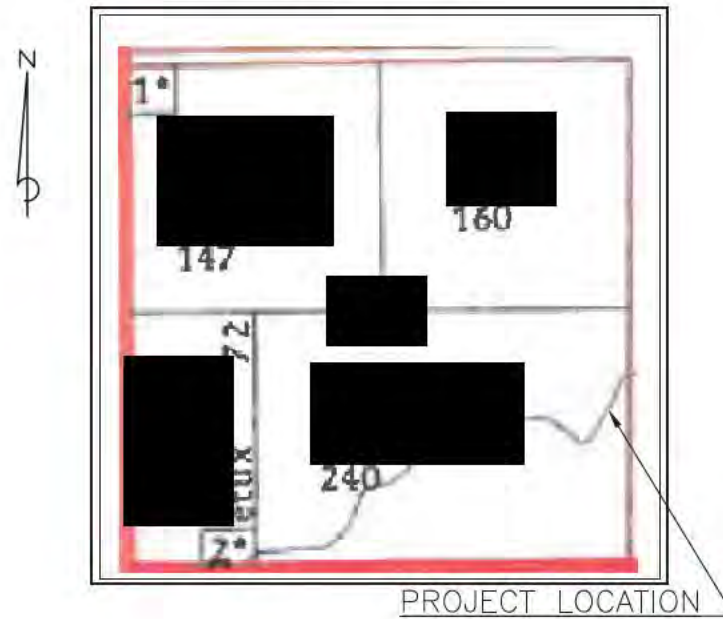


TABLE OF CONTENTS	
Sheet 1	Plan View
Sheet 2	COVER SHEET
Sheet 3	TYPE 2 PG 1
Sheet 4	TYPE 2 PG 2
Sheet 5	TYPE 2 PG 3
Sheet 6	PROFILES

NRCS/IDALS CONTACT FOR QUESTIONS:	SEAN MCCOY
NRCS/IDALS CONTACT PHONE:	515-322-0619
LANDOWNER CONTACT:	
LANDOWNER CONTACT PHONE:	

BENCHMARK	
Elevation	Description
	To be set at precon mtg.

I have reviewed and agree with the content of the plans and specifications prepared by the NRCS.

Landowner: _____ Date: _____

I certify that this practice has been constructed in accordance with the plans and specifications.

Contractor: _____ Date: _____

NRCS Rep.: _____ Date: _____

If a cultural resource is identified during construction, stop immediately and notify the local Natural Resources Conservation Service office.

Contractor is required to follow Iowa One Call law. IowaOneCall.com or Call 811 Ticket # _____

QUANTITIES*	
Upstream Water Control Structure (Inlet WCS) 2 - Compartment H ₂ = 4 ft. d = 6 in	1
Downstream Water Control Structure (Outlet WCS) 2 - Compartment H ₂ = 4 ft. d = 6 in	1
6" Non-perforated Pipe (ft)	100'
6" Perforated Pipe (ft)	30'
Tee 6" x 6" x 6"	3
Y 6" x 6"	1
6" End Caps	4
Wood Chips (cu. yd.)	122
4 Mil Plastic (sq. yd.)	156
Geotextile (sq. yd.)	100
Excavation (cu. yd.)	103
6" CMP w/Animal Guard (ft)	20'
Earthfill (cu yd)	150
Tile Investigation (hr)	1
Seeding (ac)	.2
Fiberglass Marker Flags (ea)	6

Point Table				
Pt. Name	Northing	Easting	Elevation	Description
z14	15465867.15	1446967.70	1166.87	WCSout
z15	15465823.18	1447026.34	1167.18	WCSin
z16	15465848.26	1446958.40	1167.36	nw
z17	15465858.90	1446968.97	1167.04	ne
z18	15465816.61	1447011.54	1167.53	se
z19	15465805.97	1447000.97	1167.99	sw

Date: 3/14/24

Designed: Sean McCoy

Drawn: SMM

Checked: _____

Approved: _____

Site 2
Bio 1

BIOREACTOR 605

Wright County, Iowa

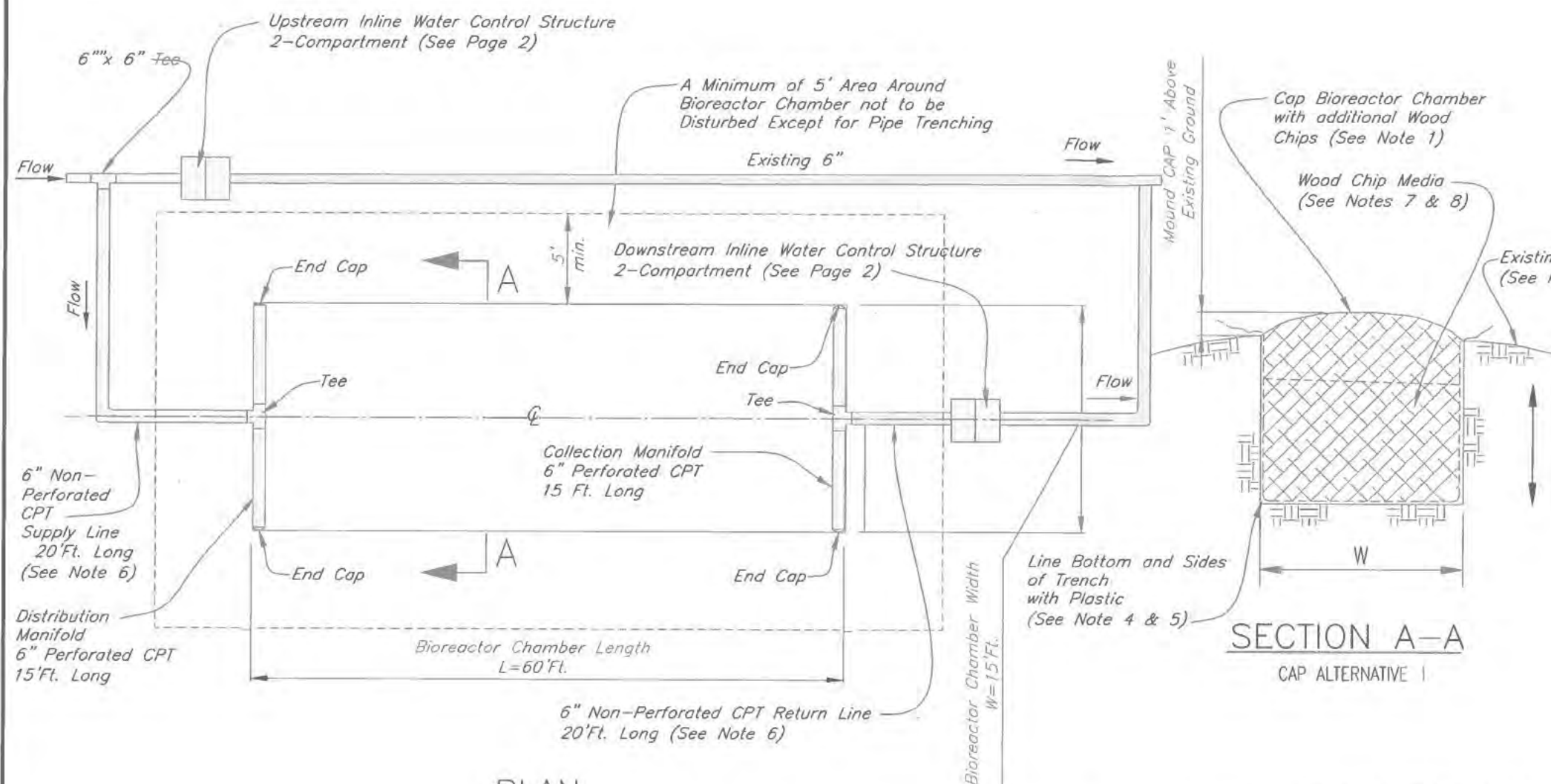
T 90 N, R 24 W



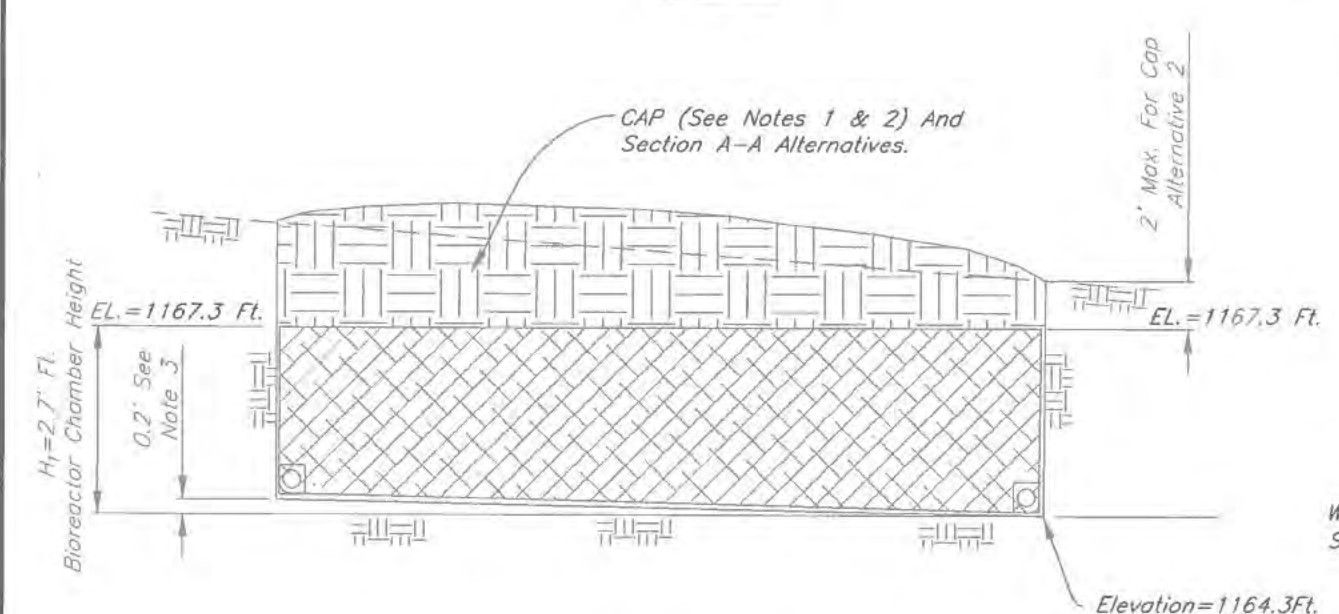
File No. 2-1-22-26final.dwg

Drawing No. _____

1/22/26 12:27 PM
Sheet 2 of 5

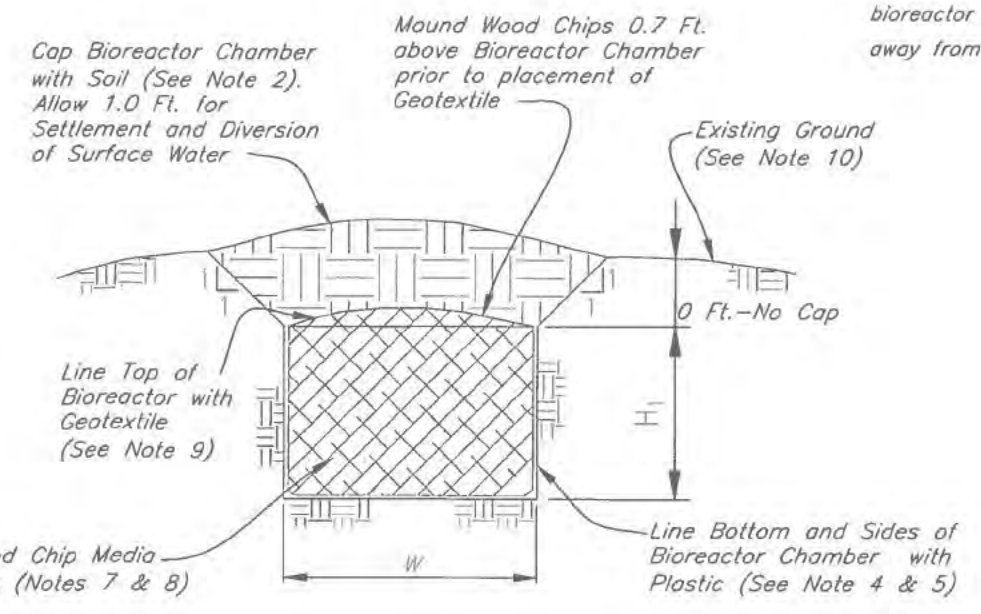


PLAN



ELEVATION

NOT TO SCALE



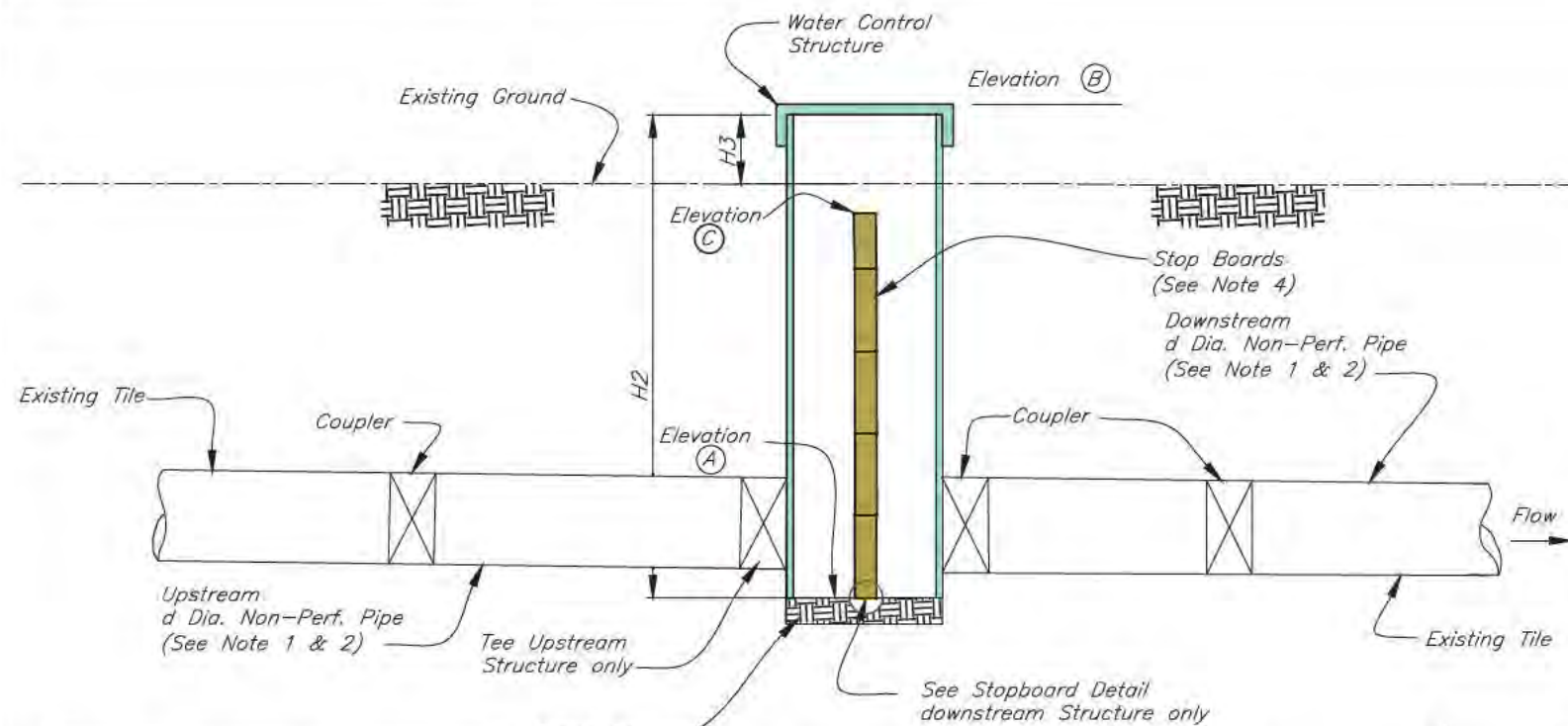
SECTION A-A

CAP ALTERNATIVE 2

NOTES:

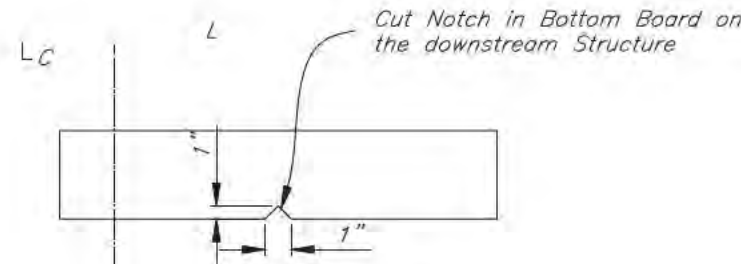
1. Utilize CAP ALTERNATIVE 1 for the bioreactor chamber unless traffic over the top is anticipated.
2. For CAP ALTERNATIVE 2, fill the area above the bioreactor chamber with compacted soil. Use topsoil for at least the top 6" Vegetate according to Conservation Practice Standard 342, Critical Area Planting.
3. Set bottom of bioreactor chamber to drain towards exit end.
4. Line bottom and sides of bioreactor chamber with plastic, minimum 4 mil thickness. Overlap any splices at least 6 inches. Wrap plastic carefully around tiles that enter/exit the chamber; no need to seal around tiles.
5. If bioreactor is located in glacial till soil and has Unified Soil Classification System designation of CL or CH and no sand is encountered during construction chamber sides and bottom do not need to be lined.
6. Route supply line to centerline of entrance end and return line from centerline of exit end of bioreactor chamber.
7. Wood chip media must meet requirements in Iowa Construction Specification IA-605, Denitrifying Bioreactor.
8. Obtain approval of engineer on the wood chips / media prior to installation.
9. Geotextile must be non-woven, class II, and meet the requirements of Iowa Construction Specification IA-95, Geotextile. Overlap splices at least 6 inches.
10. Grade site for positive drainage away from the bioreactor chamber. Spread spoil in designated location away from bioreactor.

 United States Department of Agriculture Natural Resources Conservation Service	File No. 6E2_3-14final.d	Drawing No. 4/1/24 2:45 PM Sheet 3 of 5
	T 90 N, R 24 W Sec	
	BIOREACTOR 605 TYPE 2 PG 1	
	Site 2 Bio 1 Wright County, Iowa	
Designed Sean McCoy	Date 3/14/24	Drawn SMM
Checked M. Grove	Approved 4/24	



Stable Base
(See Note 6)

SEC. ON C
TYPICAL SECTION
EACH STRUCTURE



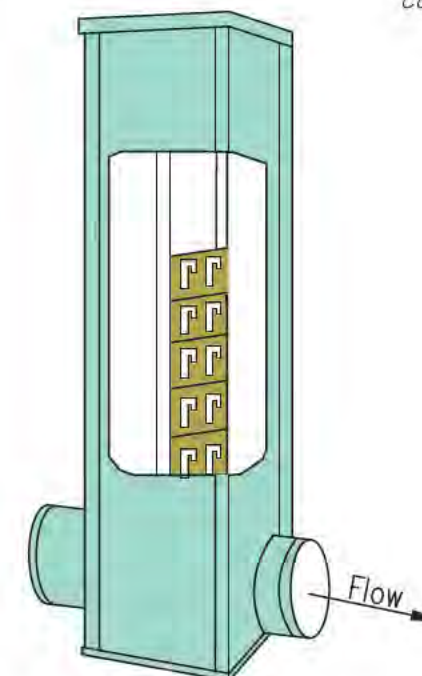
STOP-BOARD DETAIL
(Downstream Structure Only)

NOT TO SCALE

QUANTITIES*	
Upstream Water Control Structure (Inlet WCS) 2 - Compartment	1
H ₂ = 4 ft.	
d = 6 in	
Downstream Water Control Structure (Outlet WCS) 2 - Compartment	1
H ₂ = 4 ft.	
d = 6 in	
6" Non-perforated Pipe (ft)	100'
6" Perforated Pipe (ft)	30'
Tee 6" x 6" x 6"	3
Y 6" x 6"	1
6" End Caps	4
Wood Chips (cu. yd.)	122
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6" CMP w/Animal Guard (ft)	20'
Earthfill (cu yd)	150
Tile Investigation (hr)	1
Seeding (ac)	.2
Fiberglass Marker Flags (ea)	6

	Inlet WCS	Outlet WCS
WCS Box Bottom El. A	1164.3	1164.1
WCS Box Top El. B	1168.3	1168.1
WCS Ht Above EG, H ₃	1.1	1.1
Designed Weir El. C	1166.6	1165.7
US Non-Perforated Pipe Length, (ft)	20	20
DS Non-Perforated Pipe Length, (ft)	20	20

* Quantities Do Not Include Tile/Pipe Couplers or Extra Material For Geotextile/Plastic Overlap



IN-LINE CONTROL
STRUCTURE

NOTES:

1. Install a minimum of 20 feet of non-perforated pipe adjacent to the water control structure, both upstream and downstream.
2. Pipe must be PVC or PE. Pipe, pipe sizes, fittings and other appurtenances shall conform to the "Materials" section of Iowa NRCS Construction Specification (CS) IA-620, Underground Outlet.
3. Bioreactor installation shall be in conformance with CS IA-605, Denitrifying Bioreactor.
4. Water Control Structure (WCS) materials shall be in conformance with CS IA-45, Plastic (PVC, PE) Pipe.
5. Place structure and pipe coupler on a minimum 4 inch stable base. A stable base may be compacted earth, compacted fill gravel, or a concrete pad. Extend the stable base no less than 1 foot around structure.
6. Stop board removal tool shall be provided.
7. Structure lid shall be provided with locking mechanism.
8. Normal stop board operation shall be verified following backfill.
9. Stop boards must provide water tight seals under a minimum of 4 foot pressure head (except notched board).
10. Mark location of structure using post or manufactured marker flag for safety in the field.
11. Refer to Operation and Maintenance (O&M) Plan for adjusting WCS weir settings.
12. Seeding and Mulching shall be performed in accordance with attached IA-CPA-4, Seeding Plan and Construction Specification IA-6, Seeding and Mulching for Protective Cover.

Date 3-14
Designed S McCoy
Drawn SMM
Checked
Approved

Site 2
Bio 1

BIOREACTOR 605
TYPE 2 PG 2

Sec T 90 N, R 24 W

United States
Department of
Agriculture
USDA
Natural Resources
Conservation Service

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Drawing No.

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Sheet 4 of 5