

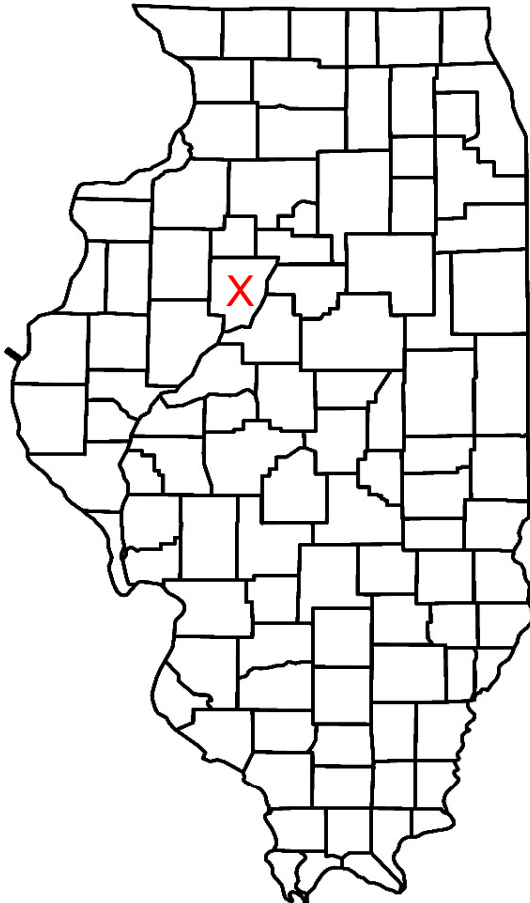
CONSTRUCTION PLANS

Producer _____ Shirley Johnson _____

Project _____ Denitrifying Bioreactor & WASCOB _____

Legal Description _____ Sect.-29, T-8N, R-7E _____

_____ Peoria _____ County, Illinois _____



STATE OF ILLINOIS

Index of Sheets

- 1. Cover Sheet
- 2. Plat Map
- 3. Preconst. Conf.
- 4. Julie Form
- 5-6. Plan Map & View
- 7. Tile Map
- 8-9. Structure Profiles
- 10-11. Bioreactor Details
- 12-16. Basin Details
- 17. Seeding Specs
- 18-25. Construction Specs
- 26-30. O&M

Contractor is responsible for
contacting Illinois JULIE
811 or 1-800-892-0123
www.illinois1call.com

Engineering Job Class III

Designed A Ramirez Date 8/26/2020
Drawn M.Quinones 3/15/17
Checked L. Younker 9/3/2020
Approved Austin Ramirez 9-24-20

USDA United States
Department of
Agriculture
**Natural Resources
Conservation Service**

COVER SHEET

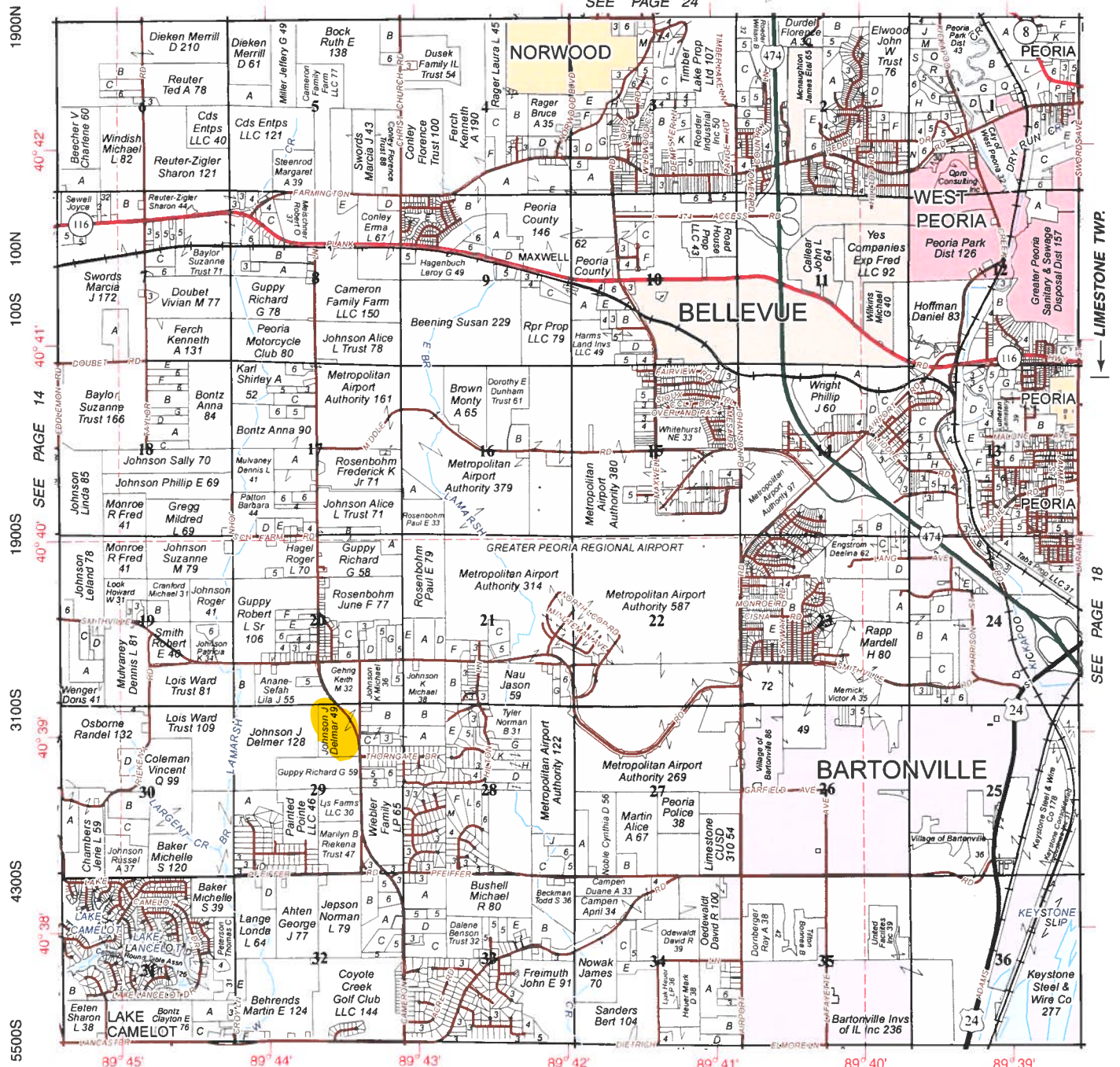
IL-ENG-6A
Drawing No.
Page 1 of 1
Sheet 1 of 30

LIMESTONE SOUTHWEST PART PEORIA CITY

Refer to page 51 for keyed parcels

T.8N.-R.7E.

SEE PAGE 24



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SEE PAGE 10

Peoria County, IL

10300W

9100W

7900W

6700W

5500W

4300W

3100W

Part 512 – CONSTRUCTION

SUBPART B – PRECONSTRUCTION ACTIVITIES



Verification of Preconstruction Conference

I verify that I met with a representative of the NRCS on _____ (date) and that the requirements for construction of the following practices were discussed:

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____

I further verify that I have been informed that any variation from the plans and specifications discussed today must be requested and approved by the NRCS prior to any actual construction.

Landowner/Operator or Representative

Date

Contractor

Date

NRCS Representative

Date

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.



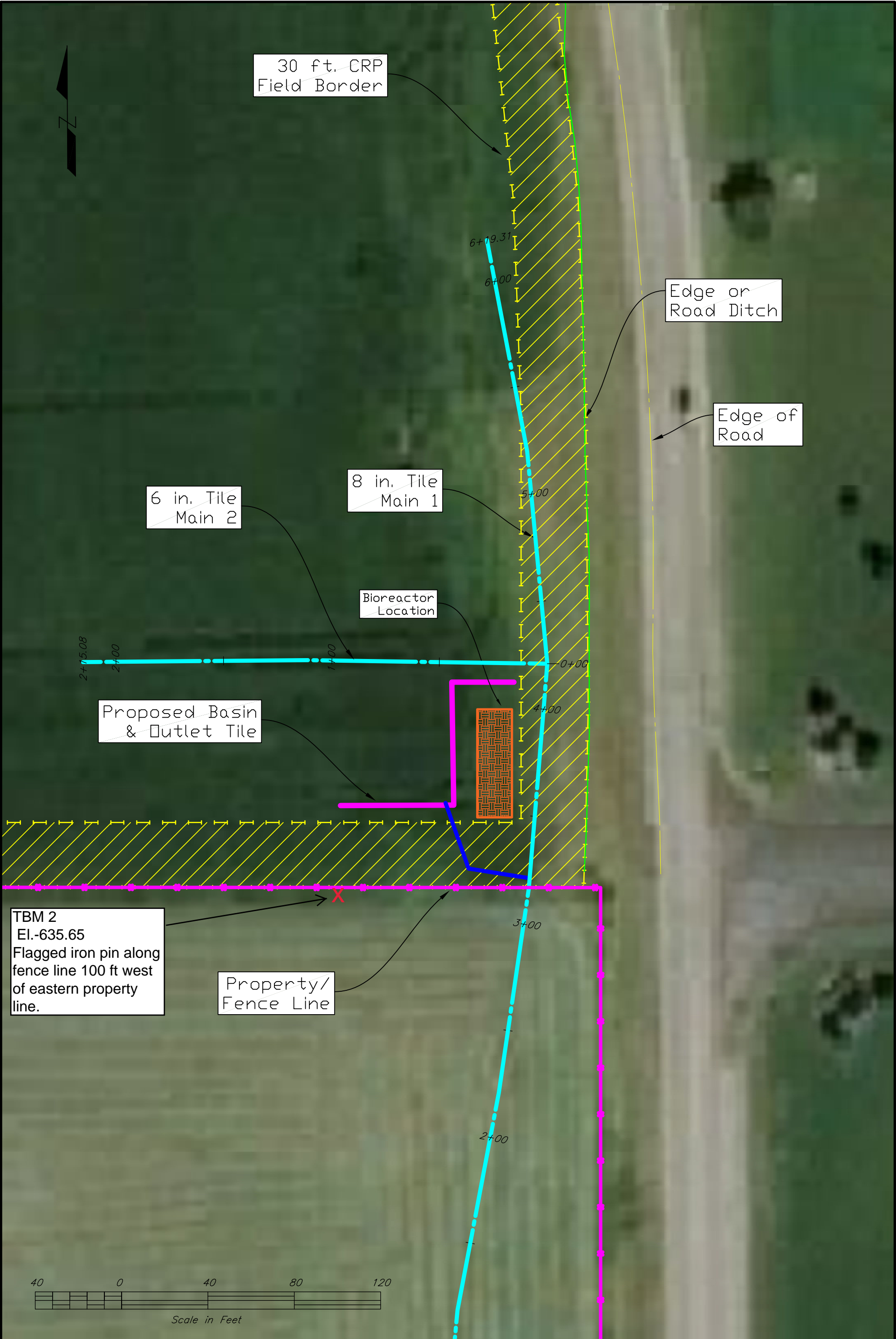
LOCATE REQUEST FORM

811 ♦ 1-800-892-0123 ♦ E-Request ♦ Remote Ticket Entry (RTE)

1-1-2012

1	COMPANY PHONE NUMBER WITH AREA CODE	COMPANY NAME		
2	CALLER NAME	EMAIL ADDRESS		
3	COMPANY ADDRESS			
4	CITY, STATE, ZIPCODE	FAX NUMBER WITH AREA CODE		
5	ONSITE CONTACT NAME	PHONE NUMBER WITH AREA CODE	EXTENSION <i>(If applies)</i>	
6	COUNTY (This is mandatory) PEORIA	<i>Check one and list location name</i>	<input type="checkbox"/> VILLAGE/CITY <i>(Urban)</i>	<input type="checkbox"/> UNINCORPORATED TOWNSHIP <i>(Rural)</i>
7	SUBDIVISION NAME	EXCAVATION SITE ADDRESS OR LOT NUMBER		
8	NEAREST CROSS STREET/CROSS ROAD, REGARDLESS OF SIZE <i>(indicate street, road, lane, etc.)</i>		IS THIS WITHIN A 1/4 MILE OF THE JOB SITE? <i>Check one:</i> <input type="checkbox"/> YES <input type="checkbox"/> NO	
9	<i>Acceptable formats: NAD83, WGS84, Decimal Degrees, Degrees Decimal Minutes and Degrees Minutes Decimal Seconds</i>		LATITUDE	LONGITUDE
10	<i>Members and their subcontractors are encouraged to provide the section - quarter/section information.</i>	TIER 8N	RANGE 7E	SECTION 29 QUARTER/SECTION
11	ADDITIONAL ADDRESS OR DIRECTIONAL INFORMATION TO JOB SITE <i>(i.e., directions, landmarks, distance from nearest town, etc.)</i>			
12	TYPE OF WORK <i>(Examples: trench for sewer, cable/telephone drops, fence/deck installation, plant trees/shrubs, foundation, ditch work, etc.)</i>			
13	ARE YOU DIRECTIONAL BORING OR HORIZONTAL DIRECTIONAL DRILLING? <i>Check one:</i> <input type="checkbox"/> YES <input type="checkbox"/> NO		WILL YOU BE DIGGING DEEPER THAN 7 FEET? <i>Check one:</i> <input type="checkbox"/> YES <input type="checkbox"/> NO	
14	EXTENT OF WORK <i>(Examples: locate north side of building, along rear lot line, front of property to curb, lot line to lot line, etc.)</i>			
15	DONE FOR (Customers name/company name) Shirley Johnson		IS THE SITE PRE-MARKED IN WHITE? <i>Check one:</i> <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNSURE	
16	REMARKS (Notes to member utilities about excavation site)			
17	WORK DATE AND TIME OF EXCAVATION	DIG-BY DATE <i>(provided by JULIE, Inc.)</i>		
18	EXPIRATION DATE OF TICKET <i>(provided by JULIE, Inc.)</i>	DIG NUMBER <i>(provided by JULIE, Inc.)</i>		
19	DO YOU WANT TO WAIVE THE MEMBER UTILITY "ALL CLEAR" CALL BACK? <i>Check one:</i> <input type="checkbox"/> YES <input type="checkbox"/> NO			
20	JULIE MEMBER COMPANIES SENT THIS MESSAGE <i>(Provided by JULIE, Inc.)</i>			

Keep your dig number as proof of your contact to JULIE and as a reference number. For your protection, JULIE recommends that you search the area for the area for the facilities of others who are not JULIE members and to notify them separately. In addition, you should communicate with the owner of the dig site to determine if there are any privately installed lines which are not marked by member utilities. For more information about the JULIE process, Remote Ticket Entry, or to access E-Request, please visit www.illinois1call.com.



TBM 2
 El.-635.65
 Flagged iron pin along
 fence line 100 ft west
 of eastern property
 line.

Property/
 Fence Line

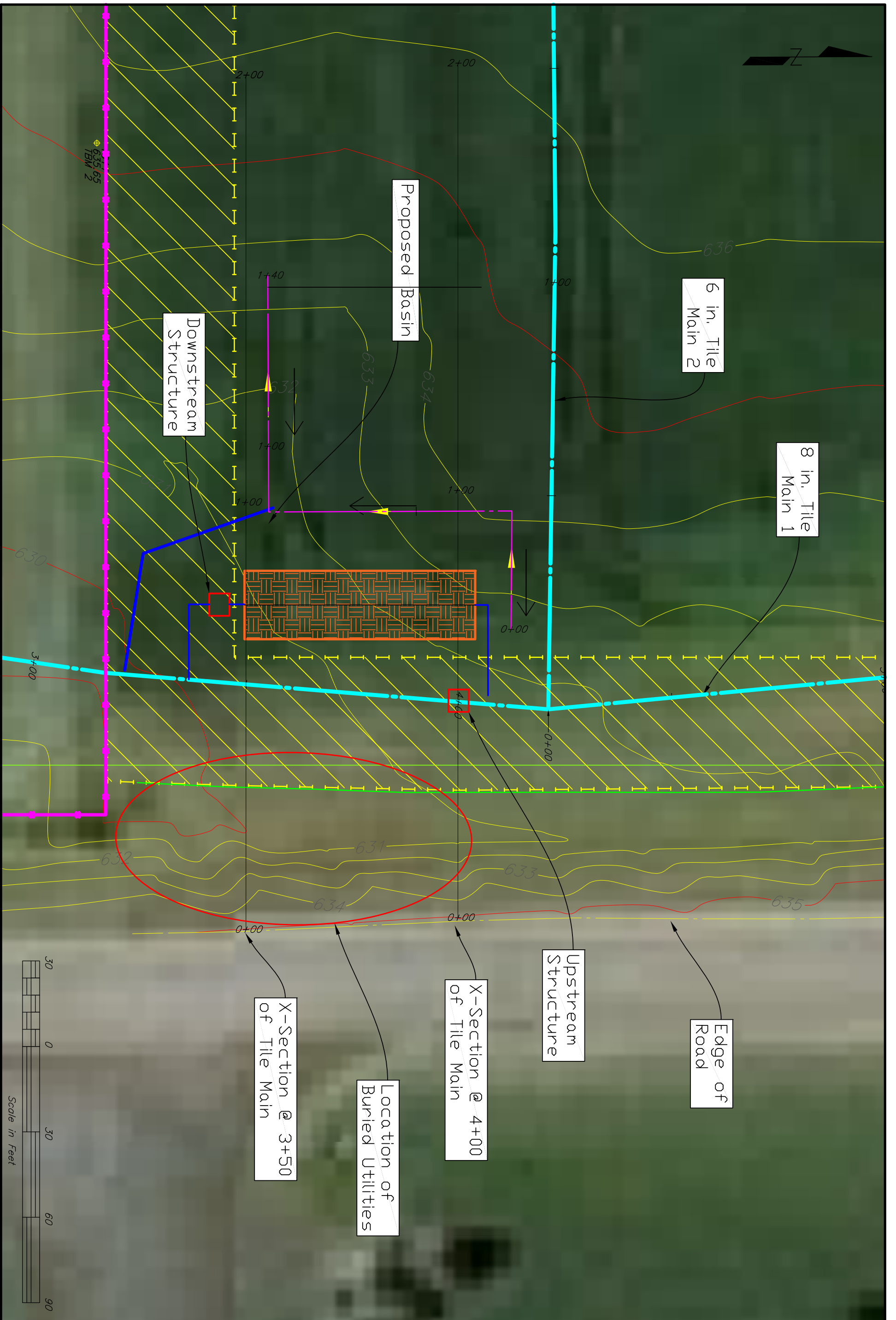


8/14/20 10:14 AM
 Sheet ## of ##

USDA United States
 Department of
 Agriculture
 Natural Resources
 Conservation Service

Plan Map
 Johnson Bioreactor
 Sec-29, T-8N, R-7E Peoria County, Illinois

Designed Austin Ramirez Date _____
 Drawn Austin Ramirez _____
 Checked L. Younker 9/3/2020
 Approved: Austin Ramirez 9-24-20

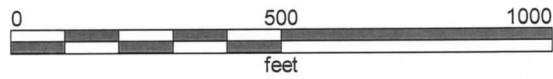
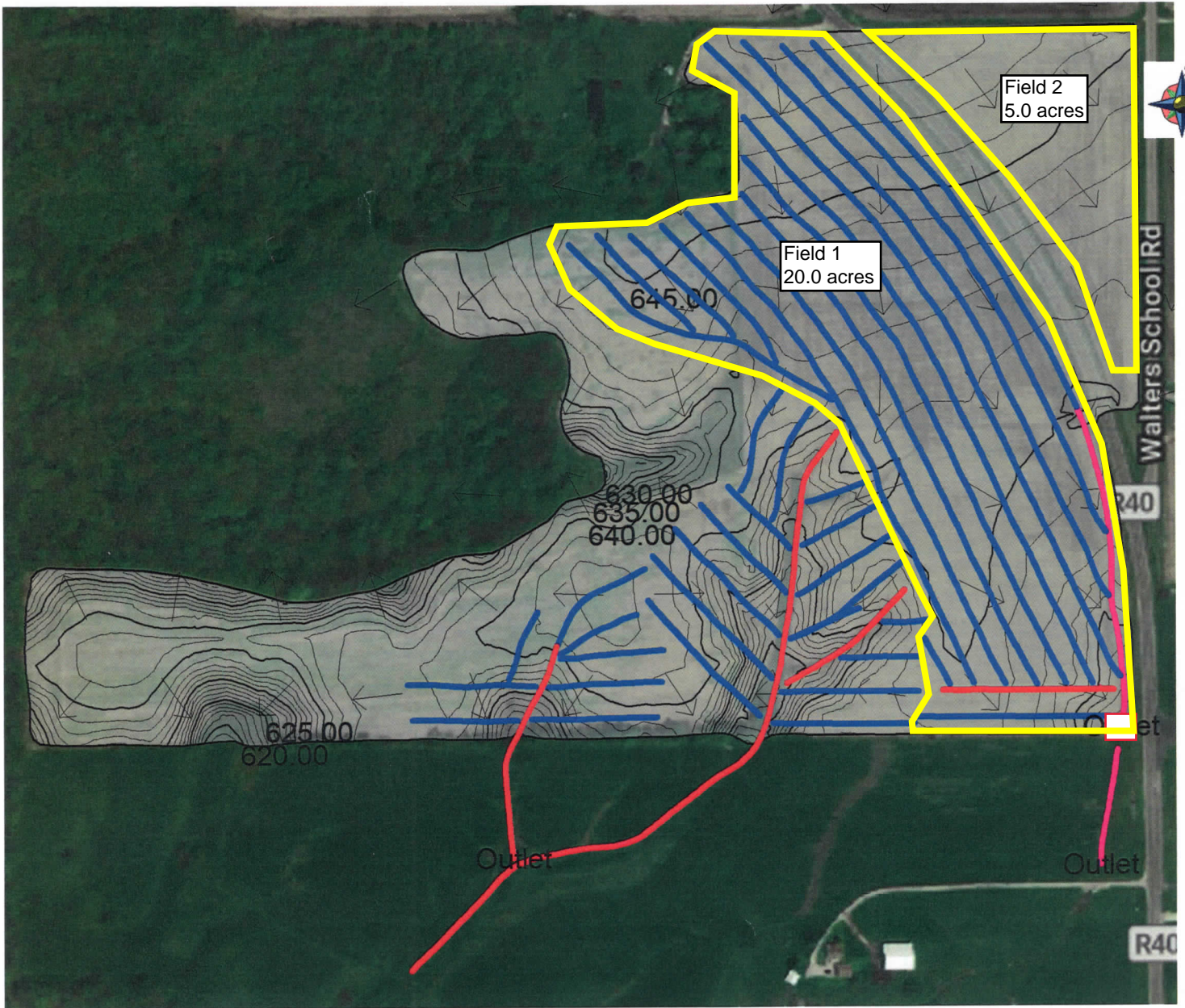


8/25/20 4:22 PM
 Drawing No. Johnson Bioreactor.dwg
 File No. #/##/## of ##



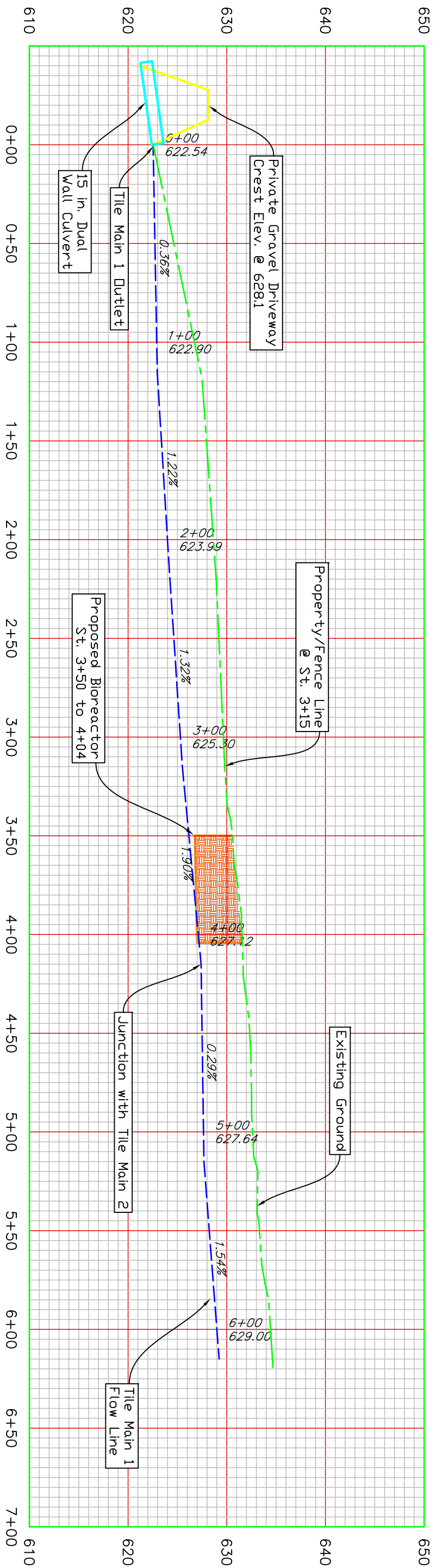
Plan Map
 Johnson Bioreactor
 Sec-29, T-8N, R-7E Peoria County, Illinois

Date _____
 Designed Austin Ramirez
 Drawn Austin Ramirez
 Checked L. Younker 9/3/2020
 Approved Austin Ramirez 9-24-20

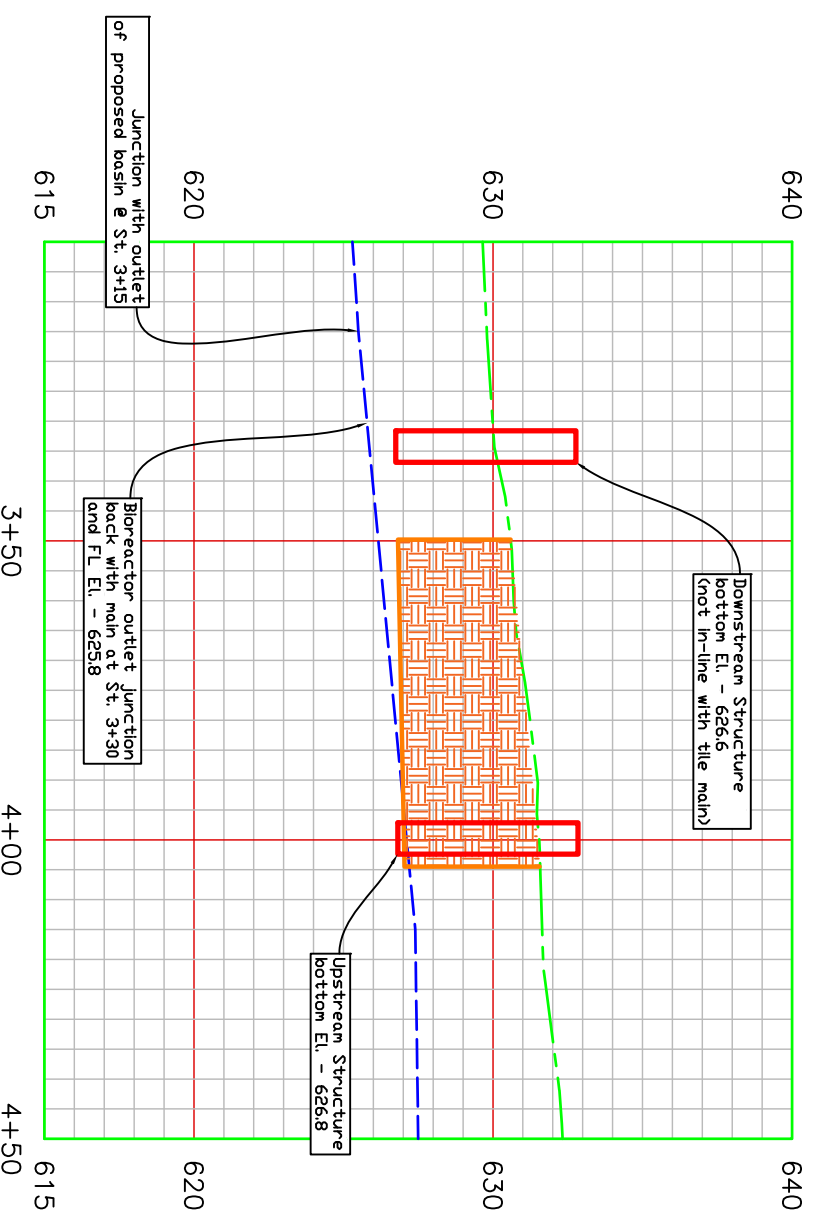


Client: SHIRLEY JOHNSON
Farm: CAMERON LN
Field: ALL
Name: Drainage - Completed

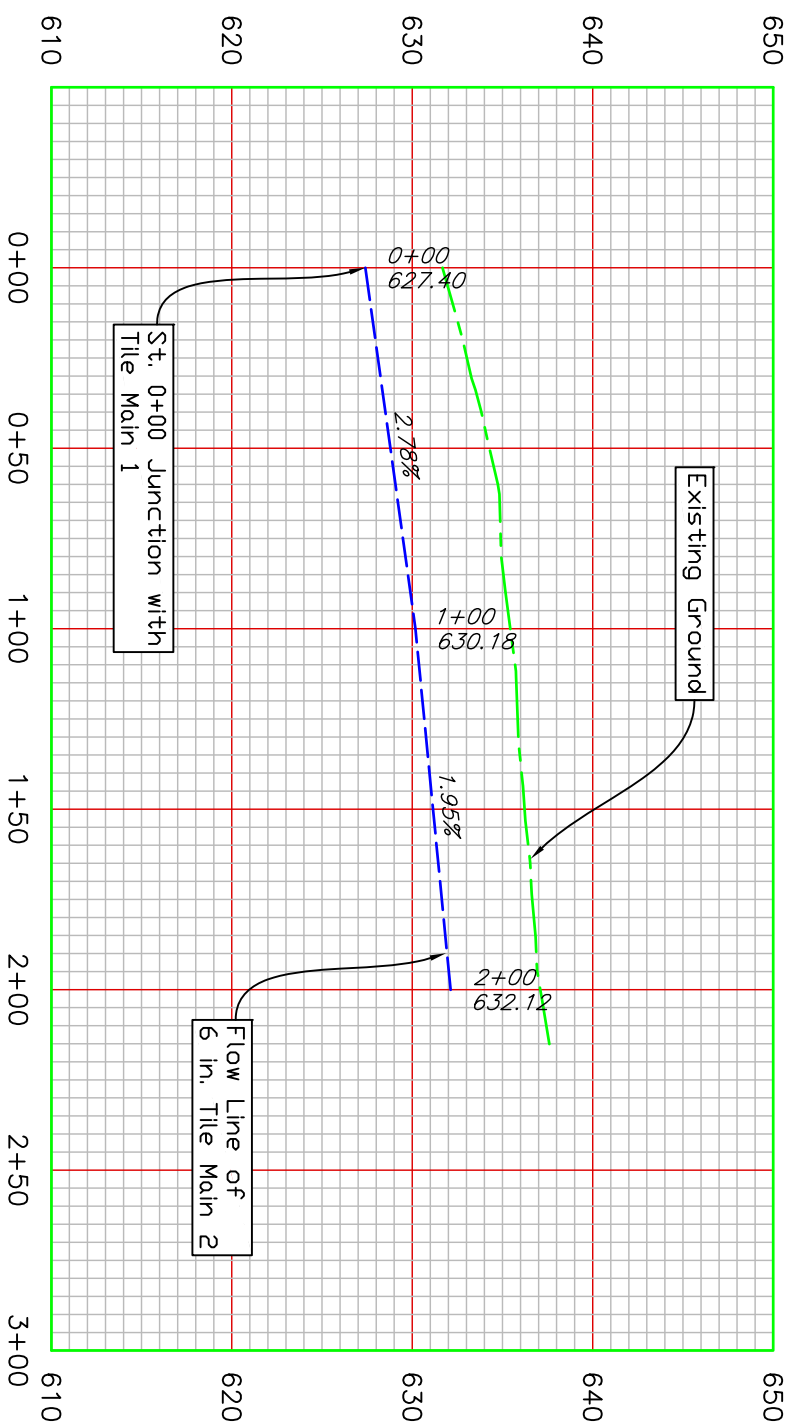
0 in	0.00 ft
4 in swp	20914.24 ft
6 in swp	2966.27 ft
8 in swp	1008.91 ft



Tile Main 1 PROFILE



Tile Main 1 PROFILE



Tile Main 2 PROFILE

Tile Main Profiles Shirley Johnson Bioreactor

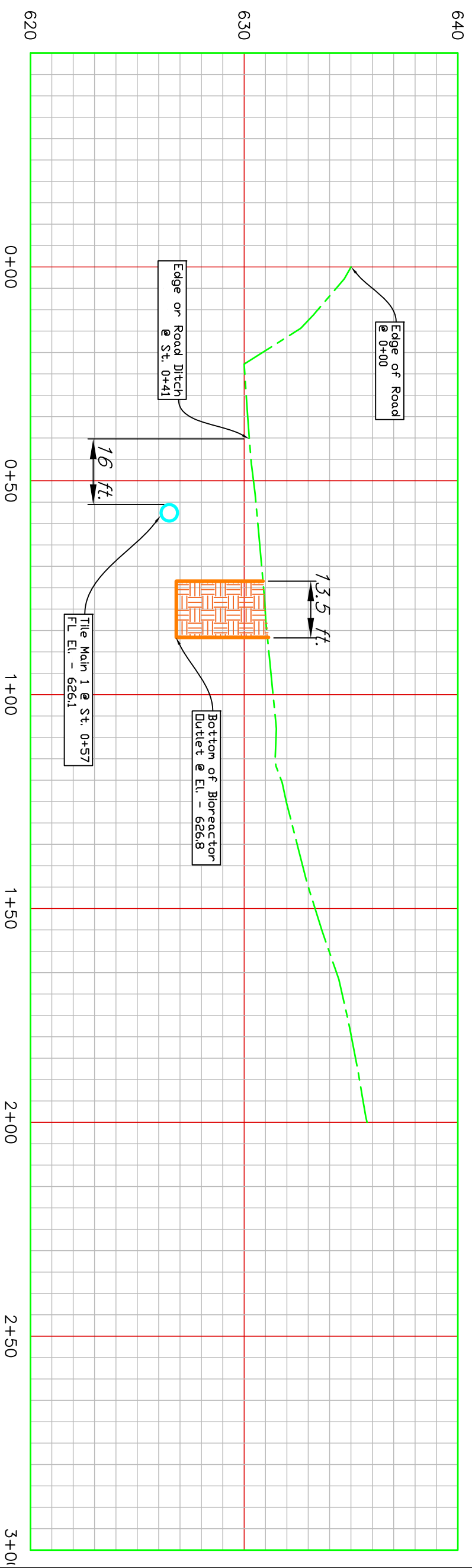


Sec.-29, T-8N, R-7E

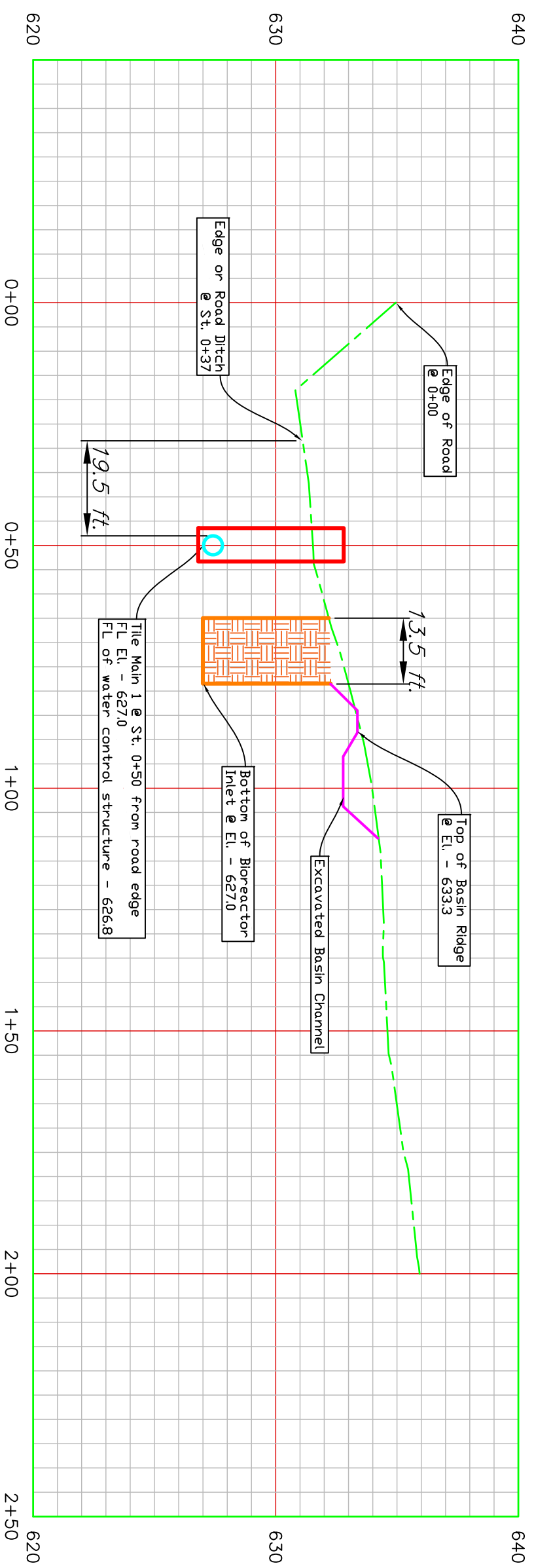
Peoria County, Illinois

Designed Austin Ramirez _____ Date _____
 Drawn Austin Ramirez _____
 Checked L. Younker 9/3/2020
 Approved: Austin Ramirez 9-24-20

File No. _____
 Drawing No. _____
 9/2/20 8:55 AM
 Sheet ## of ##



X-Section @ 3+50 PROFILE



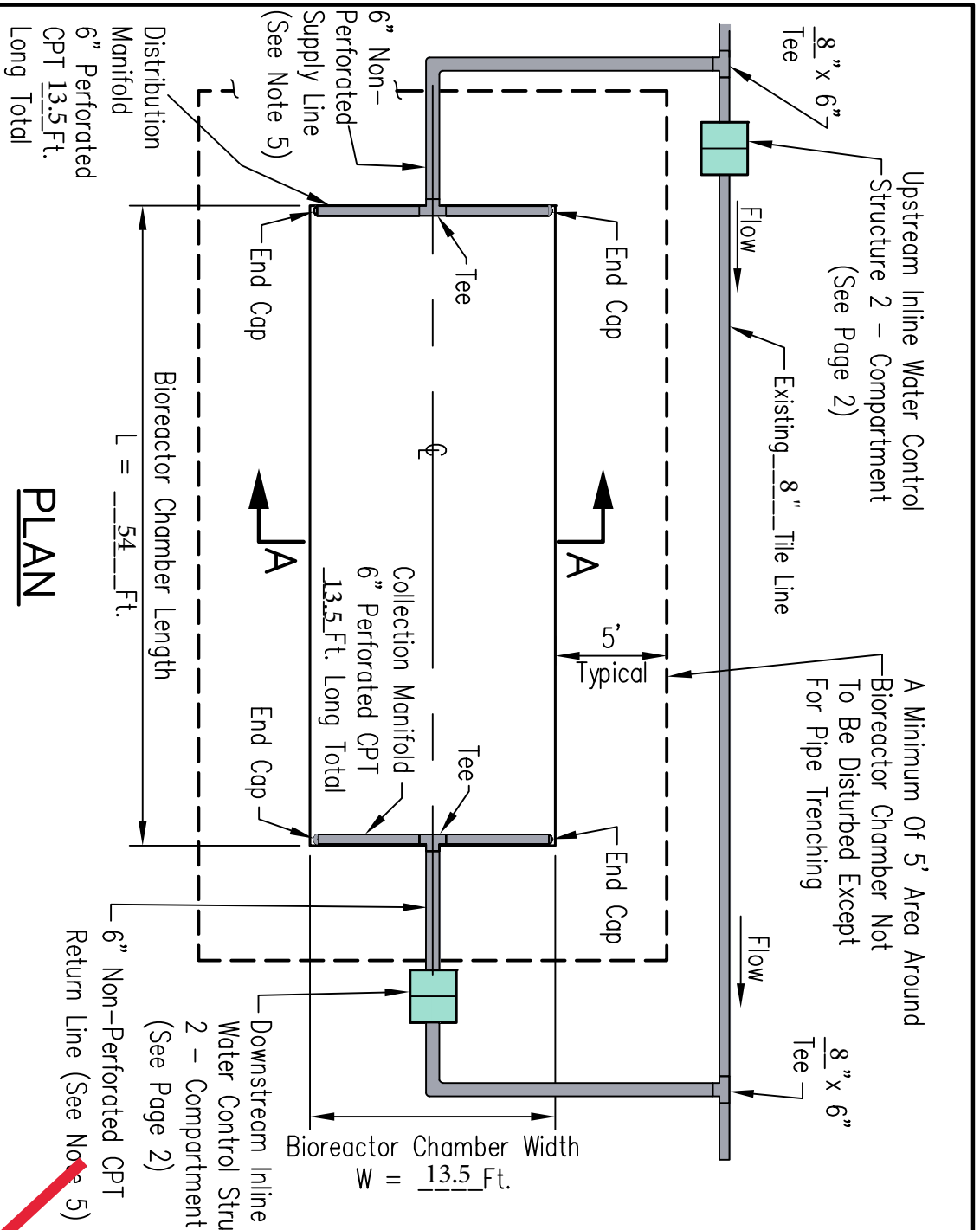
X-Section @ 4+00 PROFILE

Bioreactor X-Sections Shirley Johnson



Designed Austin Ramirez _____ Date _____
 Drawn Austin Ramirez _____
 Checked L. Younker 9/3/2020
 Approved: Austin Ramirez 9-24-20

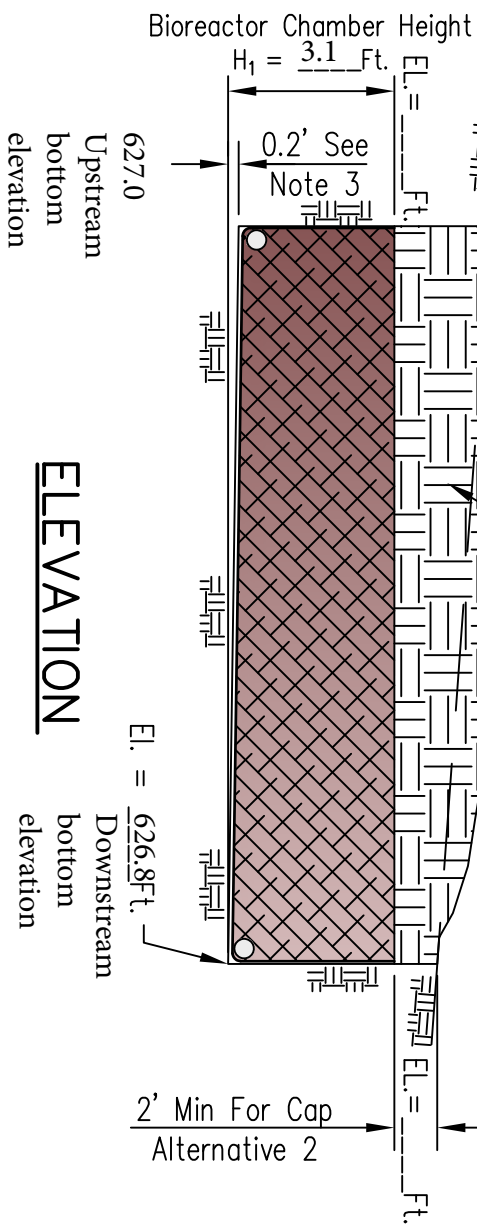
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 Drawing No. _____
 9/2/20 8:55 AM
 Sheet _____ of _____



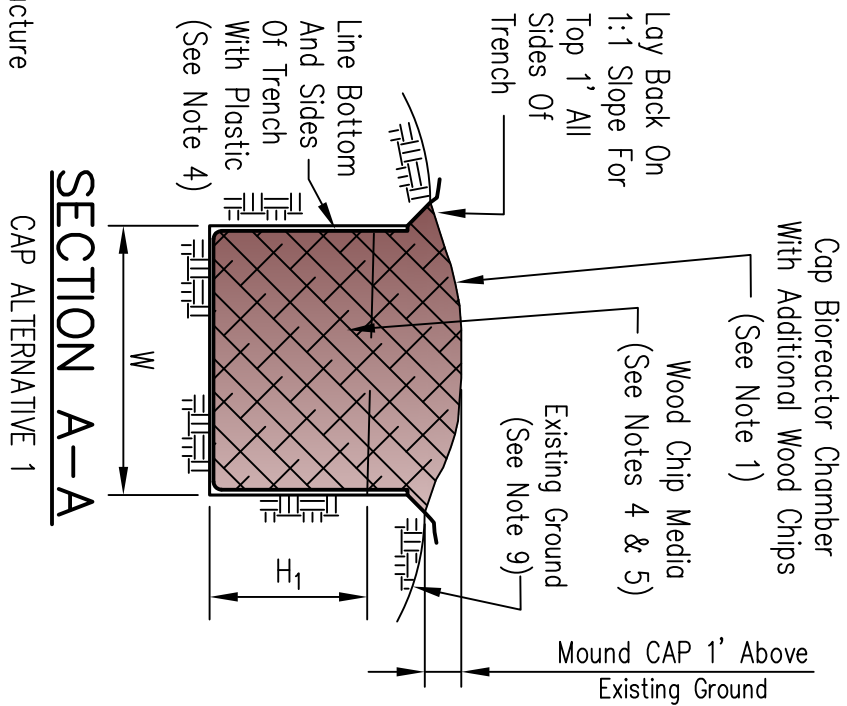
PLAN

Cap bioreactor with additional woodchips 6 inches above existing ground.

CAP See (Notes 1 & 2) And Section A-A Alternatives

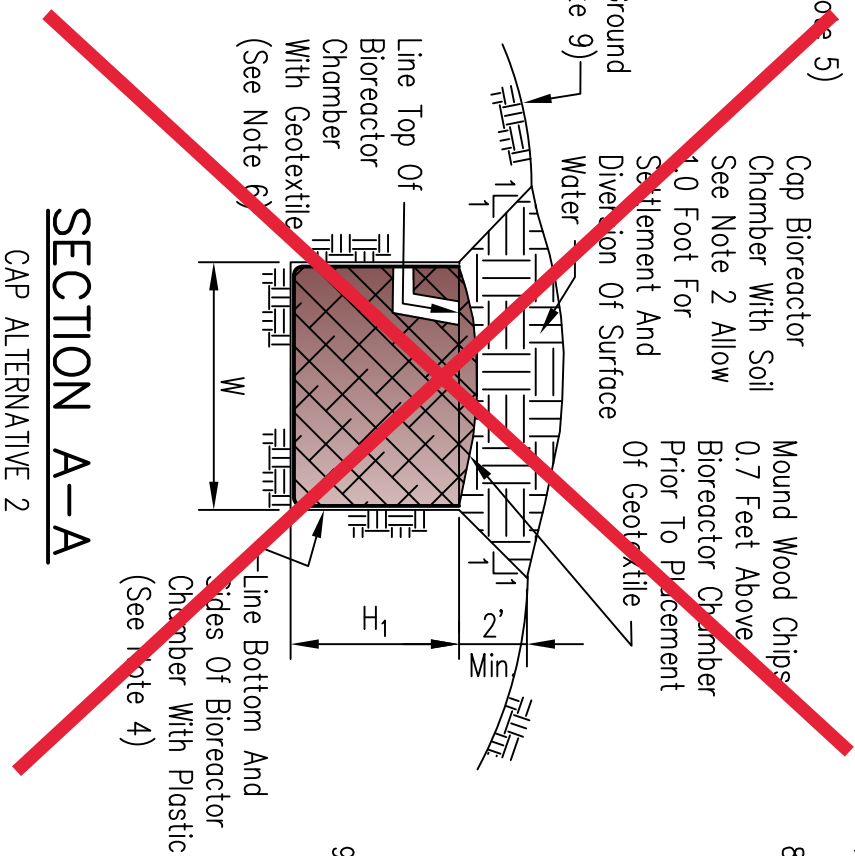


ELEVATION



SECTION A-A

CAP ALTERNATIVE 1



SECTION A-A

CAP ALTERNATIVE 2

- NOTES:**
- Utilize CAP ALTERNATIVE 1 for the bioreactor chamber unless traffic over the top is anticipated.
 - ~~For CAP ALTERNATIVE 2, fill the area above the bioreactor chamber with soil, tamped for compaction. Use topsoil at least the top 6" Vegeta according to Conservation Practice Standard 342 unless the area is to be cropped.~~
 - Set bottom of bioreactor chamber to drain towards exit end.
 - 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.
 - Route supply line to centerline of entrance end and return line from centerline of exit end of bioreactor chamber.
 - Wood chip media must be reasonably free from dirt, sawdust, leaf litter, other fine textured media and other contaminants. Do not use cedar or redwood chips because of their tannin content. Do not use treated or painted wood chips. Oak may be used if mixed with other allowable wood species and does not constitute more than 50% of the mix.
 - Obtain approval of engineer on the wood chips prior to installation.
 - Geotextile (non-woven, needle punched) Minimum criteria:
 Grab tensile strength (lb) ASTM D 4632 _____ 202
 Elongation at failure (%) ASTM D 4632 _____ ≥ 50
 Trapezoidal tear strength (lb) ASTM D 4533 _____ 79
 Puncture strength (lb) ASTM D 6241 _____ 433
 Ultraviolet light (% retained strength) ASTM D 4355 _____ min 50
 Apparent opening size (AOS) ASTM D 4751 _____ max 0.22 mm (US sieve size 70)
 Permittivity sec⁻¹ ASTM D 4491 _____ min 0.70
 Overlap splices at least 6 inches.
 - Grade site for positive drainage away from the bioreactor chamber. Spread spoil in designated location away from bioreactor.

DENITRIFYING BIOREACTOR TYPE 2 - DOUBLE STRUCTURE

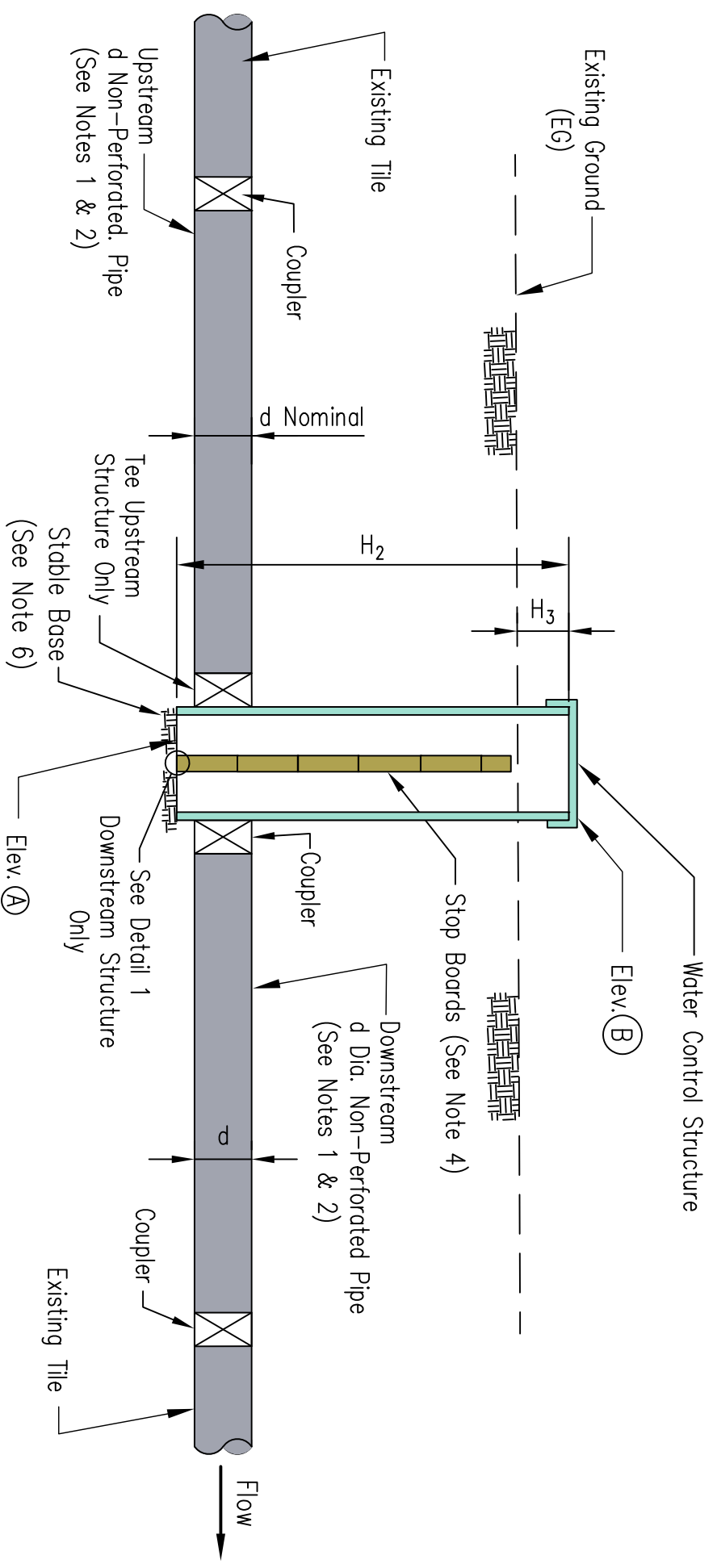
Date
 Designed Austin Ramirez 8/25/20
 Drawn M. QUINONES 7/1/20
 Checked L. Younker 9/3/2020
 Approved Austin Ramirez 9-24-20

USDA United States Department of Agriculture
 Natural Resources Conservation Service

File No. IL ENG-132
Drawing Set
 Page 1 of 2
 Sheet of

Landowner
Location

Bench Mark El. 635.65
 Description Flagged Iron Pin along southern fence line.



QUANTITIES*

Upstream Water Control Structure	1
2 - Compartment H ₂ = 6 ft. d = 8 in	1
Downstream Water Control Structure	1
2 - Compartment H ₂ = 6 ft. d = 8 in	1
8" Non-perforated Pipe (ft)	40 ft
6" Non-perforated Pipe (ft)	70 ft
6" Perforated CPT (ft)	27 ft
Tee 8" x 6"	2
Tee 6" x 6"	2
Elbows 6"	2
Wood Chips (cu. yd.)	141
4 Mil Plastic (sq. yd.)	200
Geotextile (sq. yd.)	
Excavation (cu. yd.)	125

TYPICAL SECTION

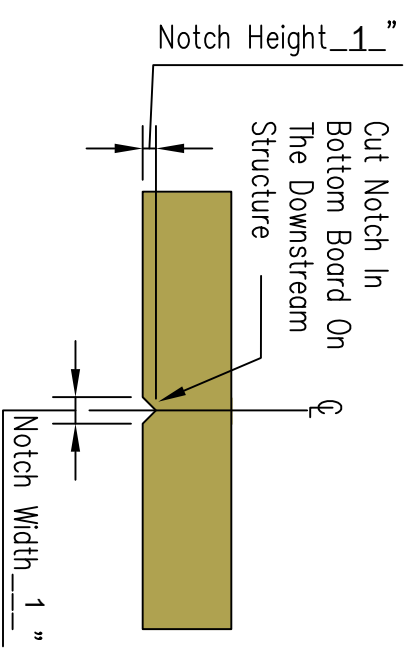
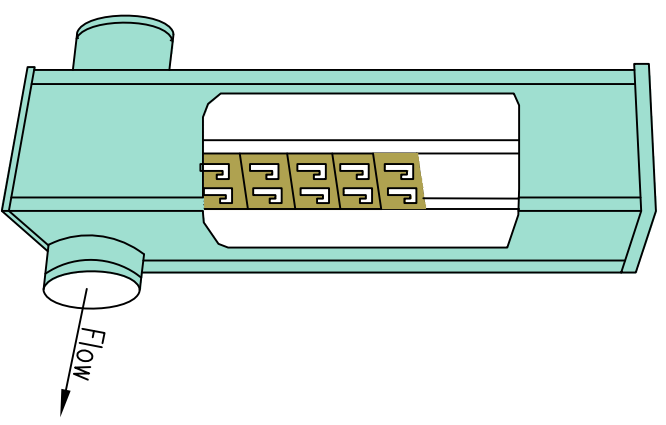
EACH STRUCTURE

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

WCS Box Bottom El. (A)	Inlet WCS	Outlet WCS
WCS Box Top El. (B)	626.8	626.6
WCS Ht Above EG, H ₃	632.8	632.6
WCS Ht Above EG, H ₃	1.5 ft.	2.0 ft
US Non-Perforated Pipe Length, (ft)	20 ft	20 ft
DS Non-Perforated Pipe Length, (ft)	20 ft	20 ft

NOTES:

1. Install a minimum of 20 feet of non-perforated pipe adjacent to the water control structure, both upstream and downstream. Pipe must be PVC, dual wall CPT or CMP.
2. PVC pipe must conform to ASTM Standard D2241 or D1785, with material 1120 or 1220. Dual wall CPT must conform to ASTM Standard F2306 or F2648. CMP must conform to ASTM Standard A760 or B745.
3. Couplings between the water control section and the non-perforated tile must be water tight.
4. Stop boards must provide water tight seals under a minimum of 1 foot. pressure head (except notched board).
5. Mark location of structure using post or manufactured marker flag for safety in the field.
6. Place structure and pipe coupler on a stable base. A stable base may be compacted earth, compacted fill sand, or a concrete pad. Extend the stable base no less than 1 foot around structure.
7. Excavated material placed around structure and pipes must be hand compacted in 4" lifts.



DETAIL 1

DOWNSTREAM STRUCTURE ONLY

Landowner _____ Location _____

Designed	<i>Austin Ramirez</i>	8/25/20
Drawn	M. QUINONES	7/1/20
Checked	L. Younker	9/3/2020
Approved	<i>Austin Ramirez</i>	9-24-20

**DENITRIFYING BIOREACTOR
TYPE 2 - DOUBLE STRUCTURE**



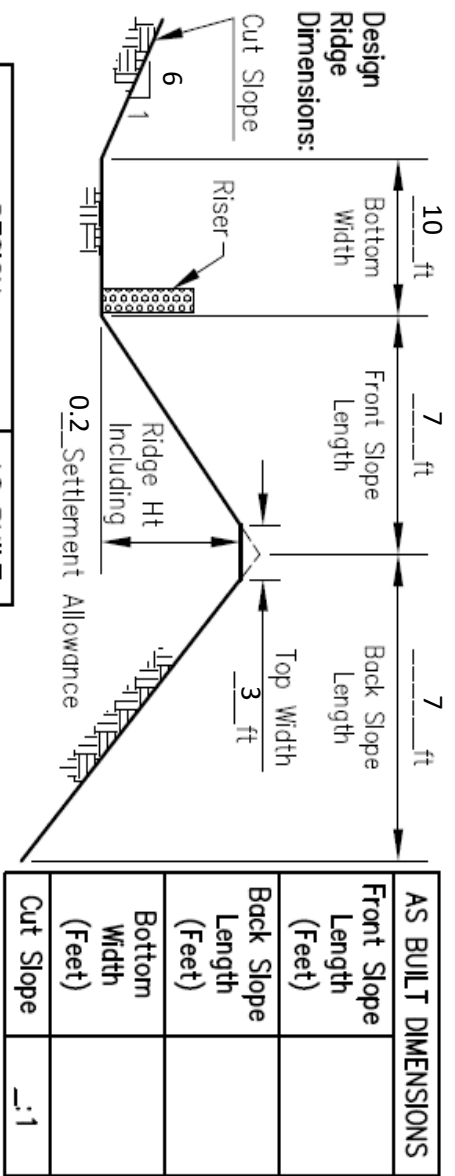
Station	Channel Cut (Fill)	Channel Grade %	DESIGN *		Remarks	CONSTRUCTION CHECK			
			Channel Elevation	Ridge Elevation		Channel	Ridge	Channel	Ridge
						Rod	El.	Rod	El.
0+00	0.0	2.00%	632.5	633.3					
0+25	1.0	2.00%	633.0	633.3					
0+50	0.7	5.20%	632.5	633.3					
0+75	0.8	4.00%	631.2	633.3					
0+85	0.6	1.33%	630.8	633.3	Riser Location				
1+00	0.7	1.33%	631.0	633.3					
1+25	0.6	3.60%	631.9	633.3					
1+40	0.0	9.33%	633.3	633.3					

*Includes Settlement Allowance: 0.2

TBM Rod Reading: _____ ft
 Height Of Instrument: _____ ft

Landowner: Shirley Johnson Location: PEORIA County, Illinois

Contractor: _____ Basin ID: WASCOB 1A
 Date: _____ Ridge Type: Narrow Base
 JULIE Number: _____ Seeding: See IL-ENG-39

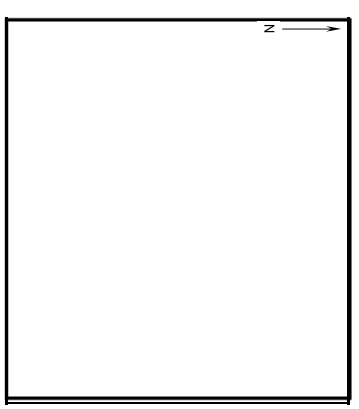


DESIGN	AS BUILT
Riser Size (Inches)	6
Riser Type	1
Orifice Dia. (Inches)	2.5
Orifice Depth (Feet)	0.5
Tile Size To Next Basin (Inches)	6
Total Ridge Length For This Basin (Feet)	140
Ridge Spacing From Basin Above (Feet)	0

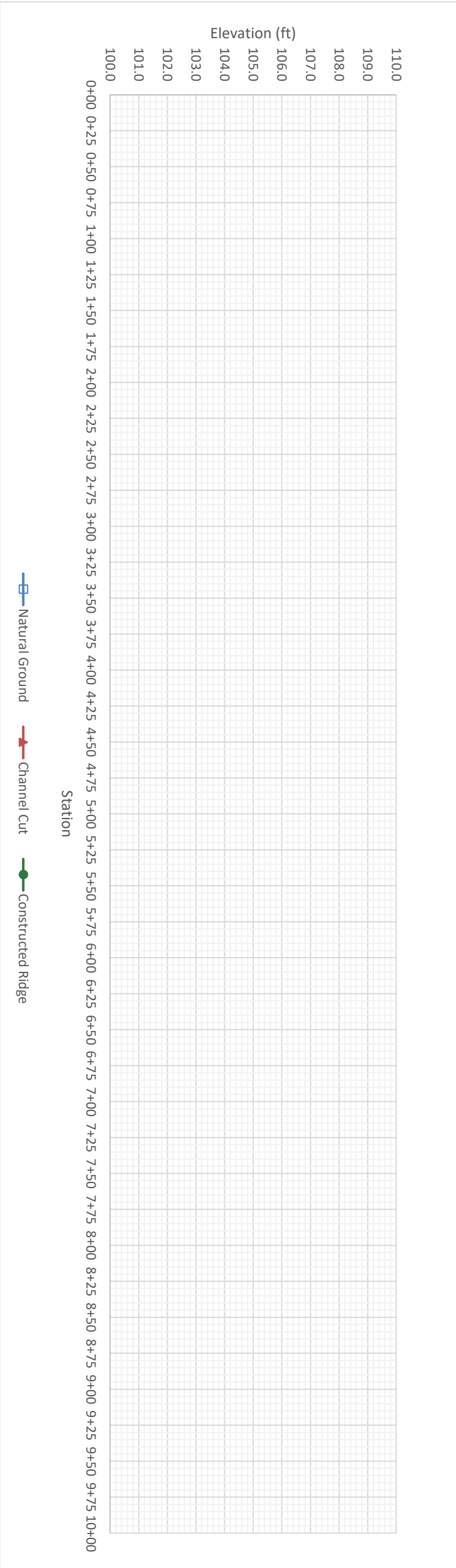
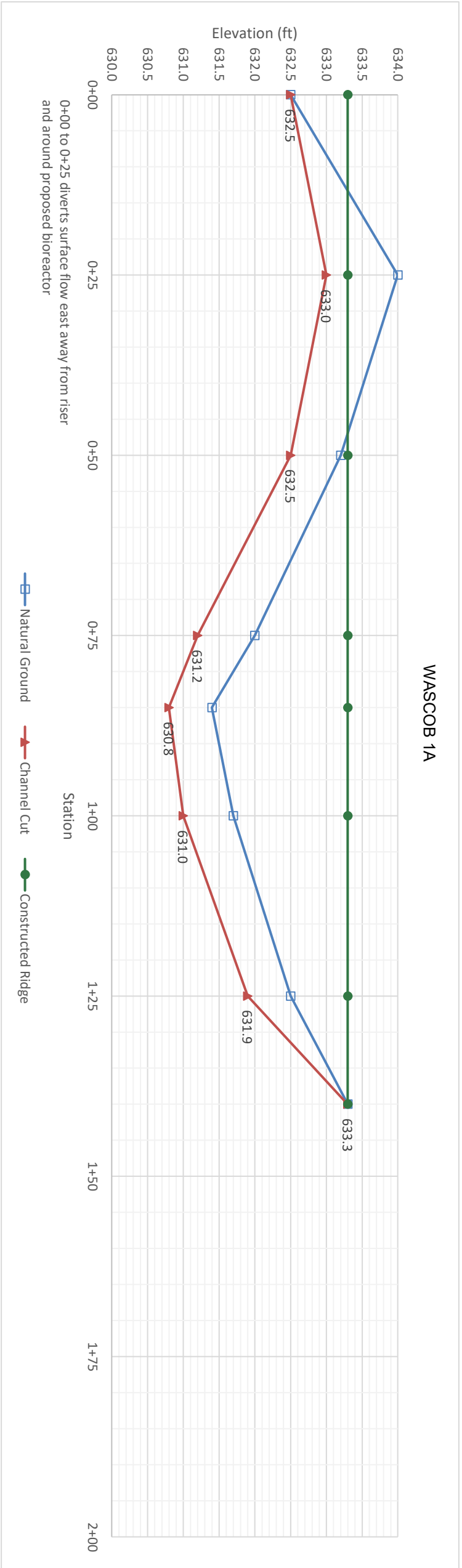
Seeded	Yes	No	N/A
Mulched	Yes	No	N/A
Animal Guard	Yes	No	N/A

Basin Meets NRCS Standards And Specs.
 Yes No
 Installer: _____ Date: _____
 NRCS Acceptance: _____ Date: _____

TBM Description: _____
 TBM Elevation: _____



PROJECT LOCATION



Landowner: Shirley Johnson
 Location: S29 T8N R7E, PEORIA County, Illinois

Legend:
 □ Natural Ground
 ▲ Channel Cut
 ● Constructed Ridge

File No: IL ENG-000
 Drawing Set
 Page 1 of 1
 Sheet 1 of 1



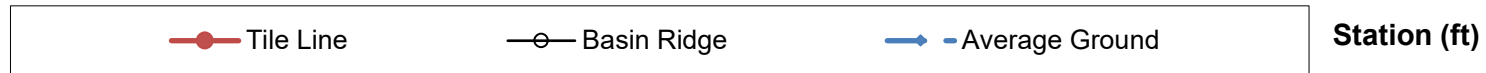
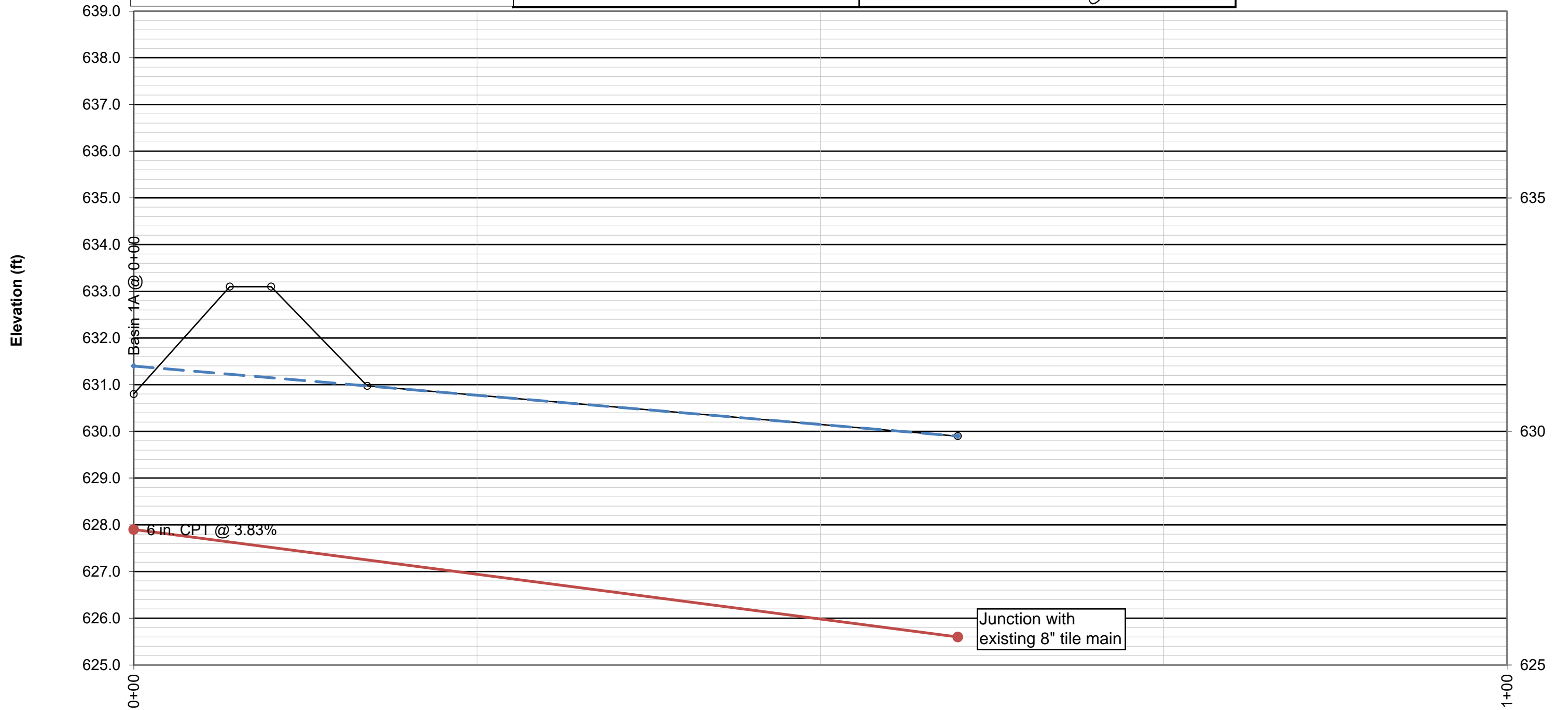
BASIN PROFILES

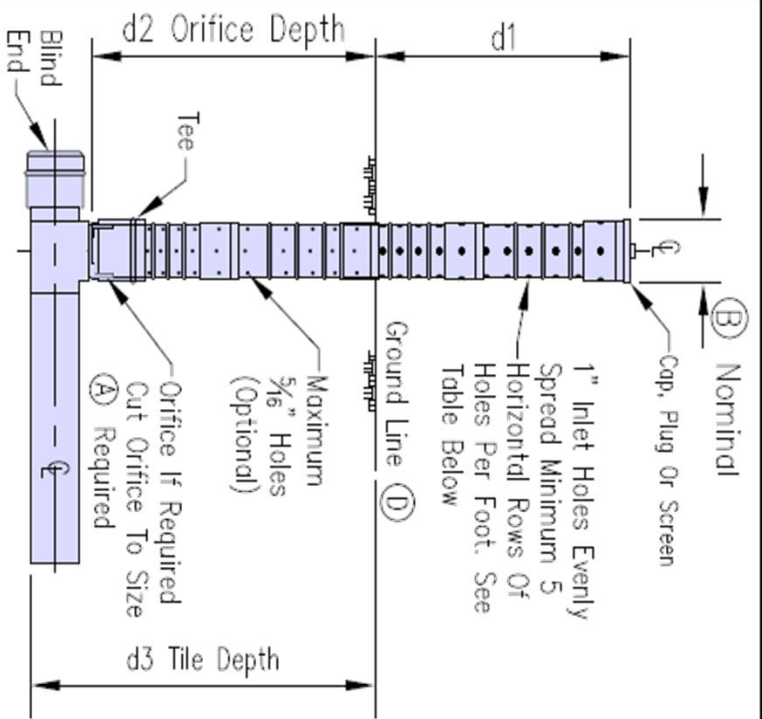
	Name	Date
Designed	A. Ramirez	08/14/20
Drawn	M. QUINONES	1/1/17
Checked	L. Younker	9/2020
Approved	Austin Ramirez	9-24-20



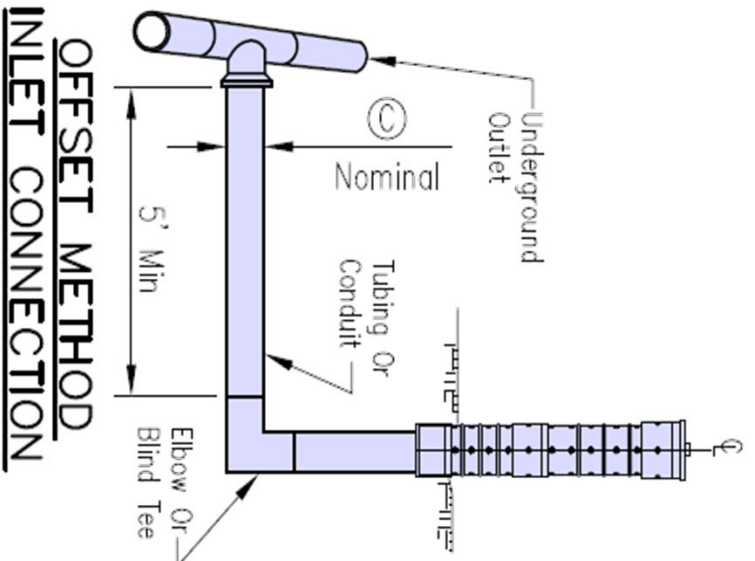
Tile Line A
Landuser Shirley Johnson
PEORIA County, Illinois
Location Bartonville, IL
Sec. 29 T 8N R 7E

Designed A. Ramirez Date 8/14/2020
Checked L. Younker Date 9/2020
Approved Austin Ramirez Date 9-24-20

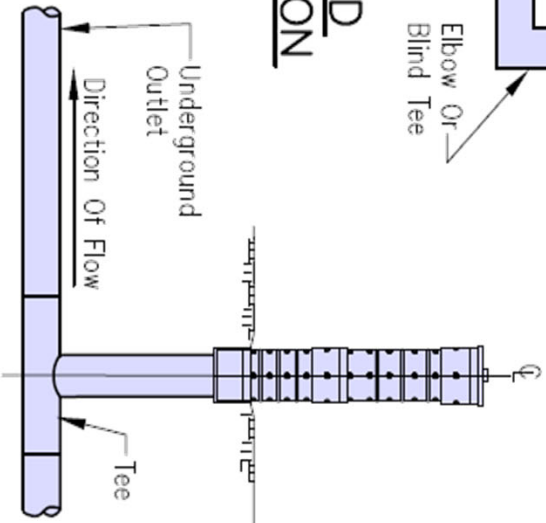




INLET FOR UNDERGROUND OUTLET
(Offset Or Top Inlet Shown)



OFFSET METHOD INLET CONNECTION

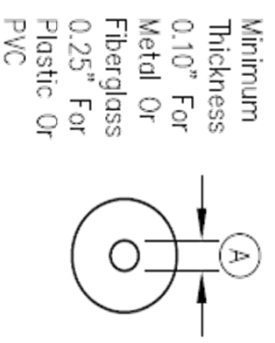


DIRECT METHOD INLET CONNECTION

DESIGN DIMENSIONS							
Inlet Number	Orifice Dia. (A)	Inlet Dia. (B)	Offset Dia. (C)	d1(Ft)	d2(Ft)	d3(Ft)	Ground El. (D)
1A	2.50 in.	6 in.		3.0	0.5	3.5	630.8

Inlet Diameter Inches	Min. No. Of 1" Dia. Holes Per Ft. Of Inlet See Note 2
5	25
6	30
8	40
10	50
12	60

DETAIL B
Orifice Plate



- NOTES:**
- Inlet must be fabricated from one of the following materials:
 - High Density Polyethylene (HDPE) plastic pipe meeting ASTM F405 or F667
 - Polyvinyl Chloride (PVC) plastic pipe meeting one of the following:
 - ASTM F949 (minimum 46 psi)
 - ASTM D1785, minimum Schedule 40
 - ASTM D2241, SDR 41 or thicker wall
 - ASTM D3034, SDR 41 or thicker wall
 - Smooth steel pipe, 1/4" minimum wall thickness
 - Corrugated Metal Pipe, minimum 16 gage (steel or aluminum)
 - The inlet portion above ground must have 1" holes placed evenly spaced around the circumference of the pipe as shown in the table on this page.
 - The inlet portion below ground may be perforated with holes 5/16" diameter or less.
 - Inlet holes must be smooth and burr-free. Holes must not remove more than 50% of material in any horizontal or vertical row of holes.
 - Holes larger than 5/16" diameter that are more than 6" below ground must be encased in geotextile or 6" thick gravel to prevent soil movement into the inlet.
 - The tee or elbow diameter must be equal to or larger than the diameter of the conduit downstream from the inlet.
 - Install a reducer immediately above the tee or elbow if the inlet diameter is not equal to the diameter of the tee or elbow.
 - If required, an orifice plate may be installed above the tee to restrict flow. Orifice plates must be firmly supported and removable for maintenance. Orifice plates must be made from an inlet material listed in Note #1 above. The opening must be burr free. See design dimension table for size details.

TILE LINE A COMPLETE AND RETURN

Landowner Shirley
 Location Bartonville, IL
 PEORIA County, Illinois

Contractor _____
 Date _____
 JULIE Number _____

TO NRCS

TILE LINE (STATION)	DISTANCE	DESIGN			Constr. Check		NOTES
		TILE GRADE %	DIAMETER (IN)	TYPE OF MATERIAL	TILE GRADE %	DIAMETER (IN)	
0+00	60 ft.	3.83	6	CPT-NPf			Tile will junction with existing 8 in. tile main.

Outlet pipe Construction Check:

Outlet Type

- Existing 8" Tile line 725.5 flow line EL
 Open ditch Other _____

As-Built Tile Material:

Manufacturer _____
 Product Line _____ ASTM Number _____

Outlet Pipe:

length N/A ft diameter _____ inch
 material _____ ASTM _____
 min cover _____ ft exposed pipe _____ ft
 flow line El _____

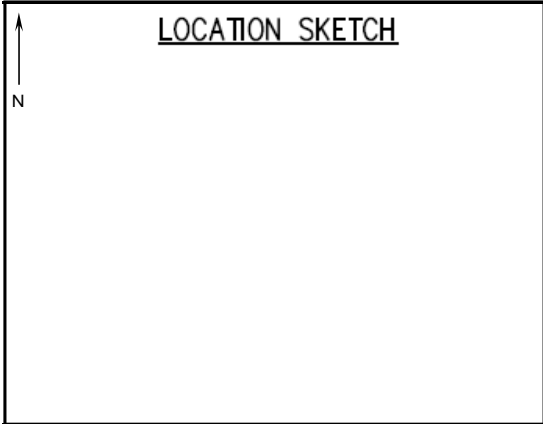
Animal Guard Yes No

Tile Line meets NRCS Standards and Specs.

Yes No

Installer _____ Date _____

NRCS Acceptance _____ Date _____



SECTION 29 T 8N R 7E

Designed A. Ramirez ^{Date} 08/14/20
 Drawn M. Quinones 7/1/20
 Checked LHY 9/2020
 Approved Austin Ramirez 9-24-20



TILE DRAIN PLAN

File Name IL-ENG-40
 Drawing No. _____
 Page 1 of 1
 Sheet of _____

NOTES:

1. Use this specification sheet for vegetative establishment on engineering projects. Refer to construction plans for detailed location of vegetation.
2. Establish vegetation on all non-crop areas disturbed by construction, in addition to the specified earthworks.
3. Prepare a firm seedbed. After the practice has been constructed to the design requirements, spread lime and fertilizer uniformly. Incorporate it into the soil to a depth of 3 to 4 inches with suitable equipment.
4. Seed grasses. Place seed 1/4 to 1/2 inch deep in a firm, even seedbed with a corrugated, roller type seeder. A grain drill or broadcast seeder may be used if followed by a corrugated roller or harrow to cover seed. A companion crop may be seeded at the same time and covered in the same manner.
5. Use a temporary vegetative cover when construction is completed in early summer, to stabilize the practice until a permanent grass mixture can be seeded. Remove the stabilizing crop prior to seeding permanent grass.
6. If mulch is required, apply uniformly and anchor. Hay or straw may be anchored by mechanical tacking, commercial tackifier or paper netting. Anchor commercial mulch products as specified by the manufacturer.
7. Seed Rates are based on pure live seed (PLS) per acre.

$$PLS = (\% \text{ germination} + \% \text{ dormant seed}) \times \frac{\% \text{ purity}}{100}$$

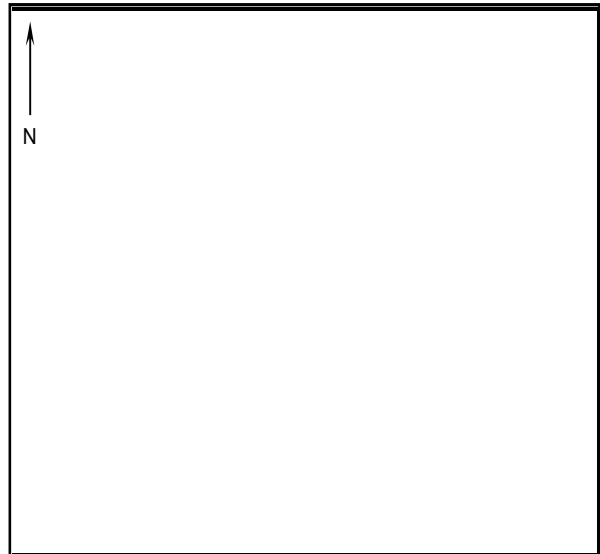
NOTES: Seed berm of basin structure and disturbed area after construction of basin and bioreactor

SEEDING SPECIFICATION


Material	Kind	PLS Lbs/Ac	Total lbs.
Seed	Smooth Bromegrass	24	8
	Alfalfa	8	3
Companion Crop			
Nitrogen (N)		120	36
Phosphorous (P ₂ O ₃)		120	36
Potassium (K ₂ O)		120	36
Lime	pH 6.5	as needed	
Temp. Seeding	Oats	32	10
Mulch	Straw or hay	1.3 Tons/Ac	0.4 Tons

Seeding Period Late winter to 5/15, 8/1 to 9/10

Seeding For 0.3 Acres



PROJECT LOCATION

Landowner	Shirley Johnson	Location	S29 T8N R7E, PEORIA County, Illinois
Designed	A. Ramirez	Date	08/14/20
Drawn	M. Quinones	Date	1/2/18
Checked	LHY	Date	9/2020
Approved	Austin Ramirez	Date	9-24-20
 United States Department of Agriculture Natural Resources Conservation Service		VEGETATIVE ESTABLISHMENT SPECIFICATIONS	
		Drawing No.	
		Page	1 of 1
		Sheet	of

Practice Specification Denitrifying Bioreactor (Code 605)

Scope

The work consists of constructing a denitrifying bioreactor as required by the construction plans.

Utilities

The landowner and/or contractor is responsible for locating all buried utilities in the project area, including drainage tile and other structural measures. The landowner will obtain all necessary permissions from regulatory agencies, or document that no permits are required.

General

Carry out construction operations in a manner and sequence that erosion and air and water pollution are minimized and held within legal limits.

The completed job must present a workmanlike appearance and conform to the line, grades, and elevations shown on the drawings or as staked in the field.

Carry out all operations in a safe and skillful manner. Observe safety and health regulations and use appropriate safety measures. Contractor must be assured that all state laws concerning buried utilities have been met.

Save documentation of materials used (geotextile tags, seed tags, photographs of pipe labeling, etc) and provide to NRCS.

Remove all trees, stumps, roots, brush, weeds, and other objectionable materials from work area as designated on the plans.

Excavation

Excess spoil material must be placed, spread, leveled, shaped, or hauled away as shown on the construction plans or as staked in the field. Finish the completed job to a degree so the surface can be traveled with farm-type equipment unless otherwise specified in the construction plans.

All excavations must conform to the lines, grades, elevations, bottom width, and side slopes shown on the construction plans or as staked in the field.

Media Chamber

Line the chamber with plastic after excavation and before adding the media. If a soil cap is to be constructed, use geotextile to separate the media from the soil. Geotextile must be non-woven, needle punched, meeting the minimum criteria shown in the plan. Plastic must have a minimum thickness of 4 mil.

Carbon source media must be reasonably free of dirt, fines, and other contaminants. If wood chips are the media, the wood must not be treated or painted. Wood made from high tannin content species such as cedar or redwood is to be avoided. Oak chips may be used if mixed with other allowable wood species and do not constitute more than 50% of the mix. Avoid the use of sawdust, bark, leaf litter or other fine textured media in the wood chips. NRCS will reject any proposed wood chips with more than trace amounts of the prohibited materials. The contractor is advised to check with NRCS in advance for acceptance of the media to be used in the bioreactor.

Spread the media evenly around the chamber. There must be no air pockets, bridging, or uneven surface of the media. Media must be placed in a manner that avoids damage to the distribution and collection pipes in the chamber.

Mound the top surface of the media chamber with the material specified in the plans to allow for settlement of the media and to shed water.

Water Control Structure and Pipe

The materials and manufacture of the water control structure, pipe, anti-seep collars, coupling bands, coatings, and other appurtenances must be as shown on the construction plans and conform to the NRCS material specifications in the approved design. The following reference specifications pertain to conduit materials currently acceptable for use with this practice:

REFERENCE SPECIFICATIONS FOR CONDUIT MATERIALS	
Description	ASTM
Plastic	
Corrugated Polyethylene (PE) Pipe and Fittings	F405, F667
Poly Vinyl Chloride (PVC) Pipe and Fittings	F949, D1785, D2241
Styrene-Rubber (SR) Plastic Drain Pipe and Fittings	D2852
Dual Wall Polyethylene Pipe	
Corrugated Polyethylene (PE) Pipe and Fittings	F2306, F2648, F405, F667
Elastomeric Seals and Joints (Gaskets)	F447, D3212
Clay	
Clay Drain Tile and Pipe	C4, C700, C301
Concrete	
Concrete Drain Tile and Pipe	C412, C118, C14, C76, C444
Test Methods for Concrete Pipe	C497
Portland Cement	C150
Metal	
Corrugated Aluminum Pipe	B745
Corrugated Steel Pipe	A760

Place the water control structure and pipe couplers on a stable base. The stable base may be compacted earth, compacted fill sand, or concrete pad. Extend the stable base no less than 1 foot around the structure.

Install structure with all stop boards in tracks. Place impervious backfill material around the structure and appurtenances by hand and in layers not more than 6 inches thick before compaction. Thoroughly compact each layer, by means of hand tamping, to the same density as the surrounding materials. Achieve proper compaction without the use of mechanical compaction. Increase height of fill at approximately the same rate on all sides of the structure.

Lay the pipe to the line, grade and elevations shown on the drawings and firmly and uniformly bed the pipe throughout its entire length. Use hand tamping methods around pipes that are within 20 feet of the water control structure. Beyond that distance, the pipe may be laid with a tile plow or trencher designed for proper bedding of the pipe, and the disturbed soil allowed to naturally subside back into place.

Outlet

Where the construction plans call for a free outlet, use a continuous section of non-perforated conduit at the outlet, unless a headwall is used. All outlets must have an animal guard, installed to allow passage of debris.

The continuous section of non-perforated conduit must be long enough to satisfy all requirements of Conservation Practice Standard 606 – Subsurface Drain:

- At least two-thirds of the pipe must be buried in the ditch bank.
- The cantilever section must extend to the toe of the ditch side slope or to the side slope protected from erosion.
- The continuous section must be at least 10 feet long.

Acceptable materials for use at the outlet include the following:

- Corrugated metal pipe, galvanized or aluminum, 16-gauge, minimum thickness,
- Smooth steel pipe with 3/16 of an inch minimum thickness,
- Smooth plastic pipe, polyvinyl chloride (PVC), with a SDR of 35 or less or schedule 40 or heavier, and
- Dual wall corrugated polyethylene pipe.

All plastic and polyethylene pipe outlets will include an ultra-violet stabilizer. Conduit ends must be protected from sun damage during installation.

Vegetation

Establish a protective cover of vegetation on all non-crop areas disturbed by construction as specified in the design plans. Vegetation should be established as soon after construction as possible.

NATURAL RESOURCES CONSERVATION SERVICE
ILLINOIS CONSTRUCTION SPECIFICATION
WATER AND SEDIMENT CONTROL BASIN

Scope

The work consists of constructing the basin channel and ridge, and excavating, filling and shaping as required by the construction plans.

Utilities

The landowner and/or contractor is responsible for locating all buried utilities in the project area, including drainage tile and other structural measures.

Location

The location of the water and sediment control basin must be as shown on the construction plans or as staked in the field.

General

Carry out construction operations in a manner and sequence that erosion and air and water pollution are minimized and held within legal limits.

The completed job must present a workmanlike appearance and conform to the line, grades, and elevations shown on the drawings or as staked in the field.

Carry out all operations in a safe and skillful manner. Observe safety and health regulations and use appropriate safety measures. Contractor must be assured that all state laws concerning buried utilities have been met.

Save documentation of materials used (rock delivery tickets, geotextile tags, etc) and provide to NRCS.

Remove all trees, stumps, roots, brush, weeds, and other objectionable materials from designated work area.

Site Preparation

Fill all dead furrows, ditches, and gullies prior to or as a part of construction. Remove old terraces, fencerows, brush, and tall standing vegetation from the area occupied by the basin ridge and the area from which the earthen construction material will be taken.

For fill heights of 6 feet and greater, thoroughly scarify the foundation area of the ridge to a minimum depth of 4 inches before placement of the fill material (and before moisture is added, if necessary), so that the first layer of fill material can be bonded to the foundation.

Material

Earth fill material must be free from frozen particles, roots, sod, brush, and other objectionable materials that might endanger the performance of the basin. The fill material must have no rock particles larger than 3 inches in diameter.

The moisture content of the earth fill material must be sufficient to permit satisfactory compaction. The moisture content can generally be considered as satisfactory if the fill material can be molded into a round ball between the hands without readily separating or squeezing out free water.

For broadbase ridges, required fill material must come from the channel unless otherwise specified. For grassed back and narrow base ridges, borrow fill material from the downhill side of the ridge, except for cuts that are required to construct the channel to the specified grade and cross section.

Placement of Earthfill

Construct all ridges to the planned alignment, grade, and cross section shown on the plans, with the specified overfill for settlement and the channel graded to drain reasonably well. Fill and smooth any ditch or depression at the bottom of the back slope so that drainage will be away from the basin ridge. All fill cross sections must conform to that specified for all stations. Compact the basin ridge by routing hauling and spreading equipment over the fill in such a manner that the entire surface of the completed ridge will be traversed by not less than one tread/track of equipment. Finish the basin channels, side slopes, ridges, cut areas, and fill areas to a smoothness so the surface

can be readily traveled upon by farm-type equipment.

When topsoil salvaging is specified, bring areas to receive topsoil to within 4 inches of final grade, or as specified on the construction plans. Evenly place topsoil and spread over specified area to bring it to final grade.

Outlets

Install underground tile outlets at locations shown on the drawings or as staked in the field. Make provisions to prevent piping if underground conduits are located under basin ridges. Methods that can be used include

mechanical compaction, water packing, trench sidewall sloping, and installation and backfill of conduit trenches early enough to allow adequate settlement are. Refer to Construction Specification (620), Underground Outlet, for detailed installation requirements.

Vegetation

Establish a protective cover of vegetation shall be established on steep back slope and narrow-based basin ridges when specified in the construction plans. Refer to the construction plans for detailed seeding requirements.

**NATURAL RESOURCES CONSERVATION SERVICE
ILLINOIS CONSTRUCTION SPECIFICATION**

UNDERGROUND OUTLET

Scope

The work consists of furnishing and installing conduits, inlets and appurtenances for the underground outlet system as shown on the drawings and specified herein.

Utilities

The landowner and/or contractor is responsible for locating all buried utilities in the project area, including drainage tile and other structural measures.

Inspection and Handling of Materials

Carefully inspect conduit and inlet materials before installation. Where applicable, check clay and concrete tile for damage from freezing and thawing prior to installation. Protect bituminized fiber and plastic pipe and tubing from hazards causing deformation or warping. Materials with physical imperfections must not be installed. All material must be satisfactory for its intended use and meet applicable specifications and requirements.

Materials

Materials for underground outlets must meet the requirements as shown in the plans and specifications. Field inspect for any deficiencies, such as thin spots or cracking, prior to installation.

Where perforated conduit is required, the water inlet area must be at least 1 in.²/ft of conduit length. Round perforations must not exceed 3/16-in. in diameter except where filters, envelopes, or other protection is provided or for organic soils, where a maximum hole diameter of ½ in. may be used. Slotted perforations must not exceed 1/8 in. in width.

The following reference specifications pertain to products currently acceptable for use as underground outlets:

REFERENCE SPECIFICATIONS FOR UNDERGROUND OUTLET MATERIALS	
Description	ASTM
<i>Plastic</i>	
Corrugated Polyethylene (PE) Pipe and Fittings	F405 F667
Poly Vinyl Chloride (PVC) Pipe and Fittings	F949 D1785 D2241
Styrene-Rubber (SR) Plastic Drain Pipe and Fittings	D2852
<i>Dual Wall Polyethylene Pipe</i>	
Corrugated Polyethylene (PE) Pipe and Fittings	F2306 F2648 F405 F667
Elastomeric Seals and Joints (Gaskets)	F477 D3212
<i>Clay</i>	
Clay Drain Tile and Pipe	C4 C700 C301
<i>Concrete</i>	
Concrete Drain Tile and Pipe	C412 C118 C14 C76 C444
Test Methods for Concrete Pipe	C497
Portland Cement	C150
<i>Metal</i>	
Corrugated Aluminum Pipe	B745
Corrugated Steel Pipe	A760

Placement

Lay all underground outlets to designed line and grade and cover with approved blinding, envelope, or filter material to a depth of not less than 3 inches over the top of the drain. No reversals in grade of the conduit are permitted. Material used for blinding must contain no rocks greater than 1½ inches in diameter. The cover over all buried conduit lines must be at least 2 feet deep, or as specified in the construction plans.

Install all conduits in accordance with the appropriate ASTM specification.

Rigid conduits, such as clay or concrete tile, will not need the 90° V groove (see Figure 1), but all other placement and bedding requirements are applicable. Joints between clay or concrete drain tiles must have the closest possible fit.

Backfill

Place earth backfill material in the trench in such a manner that displacement of the conduit will not occur and so that the filter and bedding material, after backfilling, will meet the requirements of the drawings and specifications. Backfill within 2 feet of conduit must have no rock particles larger than 2 inches in diameter.

Backfill Under Ridge Area

When conduits are installed two or more seasons prior to construction of a planned ridge associated with practices such as terrace, basin or diversion, perform backfilling operations at an angle to the trench so that loose backfill material flows down the advancing frontslope. In all other cases the conduit under the planned ridge area must receive special backfilling as shown in Figure 1.

Backfill must have adequate moisture for compaction. The moisture content can generally be considered as satisfactory if the fill material can be molded into a round ball between the hands without readily separating or squeezing out free water. Backfill within 6 inches of conduit must be hand-compacted. Place subsequent layers of backfill in 6 inch lifts and mechanically compact.

Water packing may be used as an alternative to mechanical compaction. If the conduit is non-perforated, fill with water during the water packing procedure. The initial backfill, before wetting, must be of sufficient depth to ensure complete coverage of the pipe after consolidation has taken place. Water packing is accomplished by adding water in such quantity as to thoroughly saturate the initial backfill without inundation. Allow the wetted fill to dry until firm before final backfill is begun.

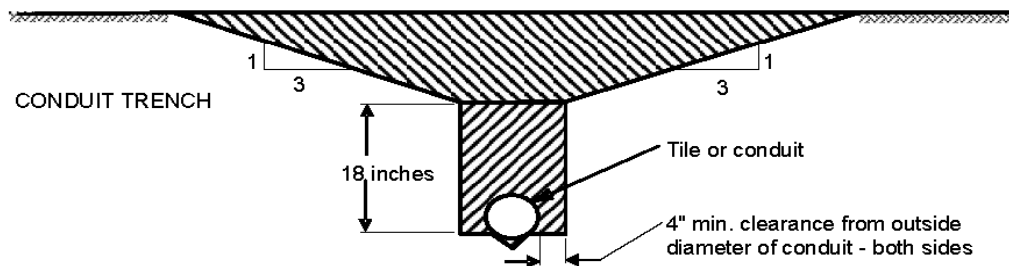


Figure 1

Inlets for Underground Outlets

Install inlets for underground outlets in accordance with the construction plans.

Outlet

Use a continuous section of non-perforated, rigid conduit at the outlet, unless the outlet connects to a headwall. All outlets must have an animal guard, hinged to allow passage of debris. Install the outlet section in accordance with the construction plans, ensuring that the end of the outlet pipe is positioned correctly over the toe of the embankment.

The continuous section of non-perforated, rigid conduit must be long enough to satisfy the following requirements:

- Bury at least two-thirds of the outlet pipe in the ditch bank.
- The cantilever section must extend to the toe of the ditch side slope or to the side slope protected from erosion.
- The continuous section must be at least as long as specified in the construction plans. Minimum length is

10 feet for 8" diameter pipe and smaller, 12 feet for pipe diameter 10" to 12", 16 feet for pipe diameter 15" to 18", and 20 feet for pipe larger than 18".

Acceptable materials for use at the outlet include the following:

- Corrugated metal pipe, galvanized or aluminum, 16-gauge, minimum thickness,
- Smooth steel pipe with 3/16 of an inch minimum thickness,
- Smooth plastic pipe, polyvinyl chloride (PVC), with a SDR of 35 or less or schedule 40 or heavier, and
- Dual wall corrugated polyethylene pipe.

All plastic and polyethylene pipe outlets must include an ultra-violet stabilizer. Protect conduit ends from sun damage during installation.

NATURAL RESOURCES CONSERVATION SERVICE
ILLINOIS OPERATION AND MAINTENANCE
WATER AND SEDIMENT CONTROL BASIN

Follow the operation and maintenance plan below to keep your water and sediment control basin system functioning as intended:

- Inspect after significant storm events and at least annually to identify repair and maintenance needs. Promptly repair or replace damaged components.
- Avoid damage to riser inlets by farm equipment. Mark risers so they are visible to prevent damage by equipment.
- Water and sediment control basin (WASCOB) ridges, especially those with steep backslopes, are potentially hazardous. All farming and maintenance operations should be executed with caution to reduce the chance of damage to machinery and injury to the operator.
- Remove accumulated sediment in the channel periodically and place on the ridge. Repair any erosion that occurs in channel. Make sure that the inlet is located at the lowest spot in the basin.
- Check frequently for burrowing animals. When found, remove the burrowing animals, replace embankment materials and reseed.
- Remove debris and trash accumulated around riser inlets that might impair water flow. Redistribute any sediment buildup so that the inlet remains the lowest elevation in the storage area.
- The riser inlet in your WASCOB system may be designed to include orifice plates. The purpose of these orifice plates is to prevent overload of the underground outlet system. Make sure that these orifice plates remain in place as designed, and keep them clear of any trash or rodent activity.
- Repair any settlement or piping along drain tubing promptly.
- Remove trash from the outlet and maintain animal guard.
- Regularly mow and fertilize desired vegetation. Time the first mowing for after nesting birds have hatched (about August 15). Remove excess top growth. Remove risers when burning warm season grasses.
- Control tree and bush growth by hand cutting, mowing, or chemicals. Avoid damaging grass with herbicide sprays.
- Maintain proper width, depth and shape of vegetated emergency spillways. Fill and seed any rills that occur.

Additional Details:

NATURAL RESOURCES CONSERVATION SERVICE

ILLINOIS OPERATION AND MAINTENANCE

UNDERGROUND OUTLET

Follow the operation and maintenance plan below to keep your underground outlet functioning as intended:

- Inspect site after significant storm events and at least annually to identify repair and maintenance needs.
- Keep inlets, orifice plates, trash guards, relief wells, collection boxes and structures clean and free of materials that can reduce the flow.
- Ensure orifice plates are installed and working properly.
- Repair leaks and broken or crushed pipe to ensure proper functioning.
- Repair any settlement or erosion that occurs around the pipe with soil and reseed as needed. If this problem persists, evaluate the pipe for leakage and erosion of the fill material into or along the pipe.
- Maintain design depth of cover on all pipelines and structures.
- Limit traffic over pipeline to designated sections that were designed for traffic loads.
- Check outlet pipe and animal guard to ensure proper functioning.
- Maintain erosion protection at outlets; repair any eroded areas at the outlet.
- Promptly repair or replace damaged or inoperable components.
- Protect the components from damage by farm equipment and livestock. Avoid damage to riser inlets and relief wells by farm equipment. Mark risers so they are visible to prevent damage by equipment.
- Follow OSHA trench safety requirements during repairs of the underground outlet.

Additional Details:

**Operation & Maintenance Plan
Denitrifying Bioreactor (Code 605)**

Landowner/Operator: Shirley Johnson

Date: 8/25/20

NRCS Service Center: Edwards

Conservation District: Peoria

Practice Location: Sect.-29, T-8N, R-7E

Tract/Field ID:

(Lat/Long or UTM Coord, or Sec/TS/R)

Expected Lifespan

The minimum expected lifespan of this practice is at least 10 years.

Follow the operation and maintenance plan below to keep your denitrifying bioreactor functioning as intended and to accomplish the water quality objectives:

- For bioreactors that are designed to be kept at the same setting year round, the settings are:

Upstream (diversion) structure: 40 inches below the top of the structure (32 inches above structure bottom.) This can be accomplished with 1 x 12 in. + 3 x 5 in. + 1 x 12 in V-Notch boards.

Downstream (capacity) structure: 54 inches below the top of the structure (18 inches above structure bottom.) This can be accomplished with 1 x 12 in & 1 x 12 in V-Notch boards.

For bioreactors that are designed for seasonal operation, manage water control levels according to the following plan. Use the recordkeeping table on the last page of this O&M plan to keep track of the operation.

Mode	Begin Date	Stoplog setting	
		Upstream(diversion) structure	Downstream(capacity) structure
Fallow	<i>(After fall harvest activities)</i>	<u> </u> inches below the top of the structure	<u> </u> inches below the top of the structure
Open	<i>(or 2 weeks before spring planting)</i>	Fully open	Fully open
Crop	<i>(or 2 weeks after the end of spring planting activities)</i>	<u> </u> inches below the top of the structure	<u> </u> inches below the top of the structure*
Open	<i>(Two weeks before fall harvest)</i>	Fully open	Fully open

* During extremely wet periods in the growing season, lower the stoplogs to the Open mode to prevent the water table from rising into the crop root zone.

- When water is released from a water control structure, high velocity flow has the potential of damaging the tile line. To prevent damage, lower the water level in the structure gradually. This is most easily achieved by pulling all the boards up no more than 2 inches, resulting in a 2 inch gap at the bottom of the structure.
- Inspect after significant storm events and at least twice a year to identify repair and maintenance needs. Monitor surrounding areas for signs of vegetation stress due to prolonged wetness. Contact NRCS if an adjustment in board settings may be necessary.
- Check the valves for proper functioning. Lock structures when not in use to prevent tampering and/or vandalism. Promptly repair or replace damaged or inoperable components.
- Remove debris that may accumulate on, around or immediately upstream or downstream from the installed structure.
- Remove debris from any surface inlets to the drainage system, to prevent excessive clogging of the bioreactor flow path. Keep any surface inlets that are connected to the supply tile in good

repair to minimize trash entry into the system.

- Repair any settlement or erosion that occurs along buried pipes. If this problem persists, evaluate the pipe for leakage and erosion of the fill material into or along the pipe.
- Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.
- Protect the bioreactor from damage by farm equipment and livestock.
- For a bioreactor designed with an open top, monitor the level of the wood chips and add more chips if they settle below the level of the ground surface.
- For a bioreactor designed with a soil cap over the wood chip chamber, monitor to make sure that the soil over the wood chips does not settle below the level of the natural ground in the area. Make sure that the ground on top of the wood chips does not become ponded with water. Contact NRCS for assistance if settlement becomes a problem. More wood chips may need to be added, or additional soil.

Bioreactor Recordkeeping Table

Producer:	Location:
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Detail of 12 in. V-Notch Stop Log Board

