Gage, Hannah

From: Barrett Knutson <bknutson@mce.us.com>
Sent: Tuesday, December 19, 2017 10:38 AM
To: McWilliams, Katherine
Subject: Cave Springs Waste Management Plan
Attachments: Waste Management Plan (with out Appendix).pdf

Katherine,

I am still waiting to get the plan certified from a Professional Engineer. I wanted to get the report to you ASAP as I wait for certification. The file size, with all appendices is 30MB, it is my understanding that the ADEQ cannot receive anything above 10MB do you have a different preferred method for file transferring? Possibly Dropbox or Google Dox.

In the meantime I have attached the narrative (Please see attached PDF). I know that you all already have certain items that I have included in the appendix, such as the engineering drawings, deed, and ADH approval. Please let me know whether it is necessary to send in some of these items that the ADEQ already has on file, as this could drastically reduce the file size and make submission easier.

Feel free to call me with any questions or concerns. If you are not able to reach me at the office, feel free to try me on my cell phone.

Respectfully,

Barret R. Knutson, E.I.
Project Designer

McCLELLAND CONSULTING ENGINEERS, INC.
1810 N. College Ave. | Fayetteville, AR 72703
P.O. Box 1229 | Fayetteville, AR 72702
479.443.2377 office | 479.443.9241 fax
501.545.7115 cell
bknutson@mce.us.com

CITY OF CAVE SPRINGS
WASTEWATER TREATMENT PLANT

CAVE SPRINGS, ARKANSAS

WASTE MANAGEMENT PLAN

FOR

SUBSURFACE DISPOSAL OF MUNICIPAL WASTEWATER

DECEMBER 2017

MCE PROJECT #FY 152122

PREPARED BY:

MCCLELLAND CONSULTING ENGINEERS, INC.
1810 N. COLLEGE AVE.
PO BOX 1229
FAYETTEVILLE, AR 72702
(479) 443-2377

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Appendix A	Design Drawings
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Appendix C	Drip Irrigation Loading Rates
Appendix D	USGS Topographic Quad Maps
Appendix E	Soils Analysis
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CITY OF CAVE SPRINGS WASTEWATER TREATMENT PLANT
WASTE MANAGEMENT PLAN FOR THE
SUBSURFACE DISPOSAL OF MUNICIPAL WASTEWATER

1. This waste management plan is prepared on behalf of the City of Cave Springs by McClelland Consulting Engineers, Inc. of Fayetteville, Arkansas. The design and implementation of this plan shall be in accordance with all applicable State and Federal regulations and Department of Environmental Quality guidelines and policies and describes the collection, treatment, and disposal of wastewater collected from local subdivisions. Final effluent generated from the treatment plant is disposed of via subsurface drip irrigation underneath The Creek Golf Course in Cave Springs, Arkansas.

2. This plan has been developed in accordance with the guidelines provided by the ADEQ. Design information, operational recommendations, calculations and other items presented herein are based on plans, verbal representations by the system operators and information provided by others and are therefore subject to the interpretations of the waste management plan engineer. Engineering documents created by others which may be used as the basis for calculations remain the sole responsibility and liability of the original design professional and in no way shall the waste management plan engineer accept any liability or responsibility for their use or interpretation.

3a. Waste Generating Process – The city of Cave Springs owns and operates a wastewater treatment plant. The wastewater treatment system consists of two separate package treatment plants which dispose of effluent via subsurface drip irrigation. Treatment Plant #1 (TP1) was designed to treat a maximum daily load of 97,000 GPD, while Treatment Plant #2 (TP2) has a much higher capacity of 320,000 GPD. TP1 is currently undergoing system repairs and is being kept on standby for future treatment needs of the city. Therefore, only TP2 is available for Cave Springs's wastewater treatment needs but has ample flow capacity for the near future. At the time when system repairs to TP1 have been completed, the City plans on making a permit modification to add the additional treatment plant into the permit as well as the Waste Management Plan.

The purpose of the treatment facility is to take in septic tank waste through utilization of a Septic Tank Effluent Pumping (STEP) system. The STEP system collects septic tank effluent from individual lots located around the City of Cave Springs. Five separate lift stations pump the septic tank effluent to the treatment plant through a sanitary sewer force main. Currently there are 1774 lots platted for eventual connection to the treatment system, however, to date, only 733 of these lots have been built out or issued a construction permit. *Table 1* shows information available on current and future lots proposed to be hooked up to the system.

Table 1
Current and Future Connections to the Plant

Reserved Capacity							
Subdivision	**Total Platted Lots**	**Lots Built Out to Date***	**Remaining Lots**	**Equivalent Capacity (gal/day)****	**Current Flows (gal/day)**	**Final Plat Approved (Date)**	**Special Improvement District**
Fairway Valley PH 1	27	26	1	5,616	5,408	7/7/2011	Yes
Fairway Valley PH 2	33	13	20	6,864	2,704	3/3/2016	Yes
Fairway Valley PH 3	25	0	25	5,200	-	PP 6/13/17	Yes
Fairway Townhomes	8	0	8	1,664	-	6/13/2017	Yes
Osage Vistas	10	0	10	2,080	-	7/14/2017	
Brown Road Condos	12	0	12	2,496	-		
Extra Capacity - Hash	37	0	37	7,696	-		
Duffer's Ridge	8	1	7	1,664	208	3/8/2015	No
Sand Springs	118	83	35	24,544	17,264	11/6/2014	Yes
Mountain View	40	36	4	8,320	7,488	10/16/2007	Yes
Hickory Hills	65	29	36	13,520	6,032	8/7/2015	Yes
Otter Creek	205	61	144	42,640	12,688	9/22/2006	Yes
Brentwood	220	159	61	45,760	33,072	6/21/2007	Yes
Hamton Estates	60	56	4	12,480	11,648		No
Hyde Park	292	211	81	60,736	43,888	9/28/2006	Yes
Marbella - Phase 1	72	37	35	14,976	7,696	7/2/2014	Yes
Marbella - Phase 2	66	0	66	13,728	-		Yes
Marbella - Phase 3	70	0	70	14,560	-		Yes
Mandalea	141	0	141	29,328	-		
Buffington - Shores	220	0	220	45,760	-	6/6/2017	
Downtown Cave Springs	45	21	24	9,360	4,368	1/9/2009	Yes
Total	**1774**	**733**	**1041**	**368,992**	**152,464**		

* Includes homes that have been issued building permits.
** Equivalent capacity is based on 208 gallons per unit per day. (1 LEU=208 gpd)

Upon arrival at treatment plant 2, flow is first sent through a biological treatment unit comprised of two 19,000 gallon parallel Lotus aerobic moving bed biofilm reactors (MBBR). Rotary blowers are used to supply air to the biological units for oxygenation, which allows for the removal of BOD. Downstream of the MBBRs are two 26-foot diameter secondary clarifiers, effluent coming from the MBBRs is sent through a splitter box and the streams are routed to two Lakeside secondary clarifiers. The clarifiers allow for flow equalization and separation of liquid and sludge during retention. A chemical feed station is available for the addition of chemicals during the treatment process to add alkalinity for pH control and/or coagulant for use as a solids settling aid. The final liquid

effluent is sent to separate dosing tanks where it will eventually be pumped through an underground leach field piping system and released via subsurface disposal. The resultant sludge, removed from the bottom of the clarifiers, is sent to the concrete sludge holding tank.

Effluent generated from TP2 is used to dose leach fields 3 through 5 (see *Engineering Drawings*) with each drip field containing many smaller sub-segments referred to as zones. Each leach field has a dedicated storage tank(s) which holds effluent prior to subsurface discharge through the leach lines. Effluent is pumped from the holding tanks at regular time intervals, dosing rates are based on the area of each zone and regulatory requirements contained within the No-Discharge Permit.

Dripfield 3 contains zones 5 through 12 and connects to pump dosing tank 3 with a volume of 25,000 gallons. Dripfield 4 contains zones 13 through 24 and connects to pump dosing tanks 4A and 4B, both with volumes of 20,000 gallons. Dripfield 5 contains zones 25 through 32 and connects pump dosing tank 5 with a volume of 20,000 gallons. In total TP2 has 3 separate leach fields supplying effluent to a total of 27 zones, with alternate fields available for use to allow for downtime of operational zones. Further analysis of the dosing rates can be seen in the *Design Calculation* portion of this report.

3b. Engineering Drawings – Drawings showing dimensions and sizes of piping, septic tanks, and leach fields can be seen in *Appendix A.*

3c. Design Calculations – Design calculations performed by the designing engineering consulting firm can be seen in the attached *Appendix B*. Since the time of the initial plant design, McClelland Consulting Engineers, Inc. (MCE) has been hired by the city of Cave Springs to work as the consulting engineers for the wastewater treatment plant. In summer of 2016 MCE faculty went to the leach fields to measure actual drip irrigation discharge rates in zones 3 through 5. A spreadsheet containing calculations obtained from the measured discharges in each zone can be seen in *Appendix C*.

3d. Copies of 8-1/2 × 12” USGS Topographic Maps (see *Appendix D*) and county maps showing:

- The location of the treatment facilities and leach field areas
- The nearest affected stream
- The distance and direction to the nearest State Highway
- Buildings near the site not labeled on the map
- A legal description of the waste-generating facility

- Location of the facility by longitude and latitude
- Name of the USGS quad map (Bentonville South and Springdale)

3e. Nearest Stream – The nearest stream is Osage Creek thence to the Illinois River, located at a distance of approximately 600 feet from the treatment facility. Osage Creek and the Illinois River are currently listed on the 2008 List of Impaired Waterbodies (303d list) for Total Phosphorus.

3f. Cover Crop – There are several different cover crops located on top of the leach fields, with the main crop consisting of Bermuda grass, with a nitrogen uptake rate of 300 lbs/acre. Bermuda is used for the fairways and rough on the golf course however in out-of-bounds regions, located further from the fairways, Fescue and Rye grasses can also be found but are less prevalent. PAN calculations are regularly submitted as part of the City's MMR submittals.

4. Soils Analysis – The soils analysis conducted prior to construction of the facilities can be is attached in *Appendix E*.

5. Depth-to-Groundwater – The depth to groundwater is periodically checked at a location of average elevation through a monitoring well. In order to stay in compliance with their permit the city must have a minimum of 5-feet of soil depth between discharge and the groundwater. The actual depth-to-groundwater was measured at 65".

6. Proof of Ownership – A copy of the Warranty Deed is attached as *Appendix F*.

7. Department of Health Notification – *Appendix G* provides a copy of the original letter notifying the Arkansas Department of Health (ADH) Division of Engineering that a permit was submitted to the ADEQ.

8. Disclosure Statement – A Disclosure Statement is not applicable to this facility.

Gage, Hannah

From: Barrett Knutson <bknutson@mce.us.com>
Sent: Tuesday, December 19, 2017 2:06 PM
To: McWilliams, Katherine
Subject: RE: Cave Springs Waste Management Plan
Attachments: Engineering Drawing Part 1.pdf

Katherine,

The following string of emails will contain the appendices to the WMP.

See attached for Appendix A part 1.

Barret R. Knutson, E.I.
Project Designer
McCLELLAND CONSULTING ENGINEERS, INC.
1810 N. College Ave. | Fayetteville, AR 72703
P.O. Box 1229 | Fayetteville, AR 72702
479.443.2377 office | 479.443.9241 fax
501.545.7115 cell
bknutson@mce.us.com

From: McWilliams, Katherine [mailto:MCWILLIAMSK@adeq.state.ar.us]
Sent: Tuesday, December 19, 2017 10:59 AM
To: Barrett Knutson
Subject: RE: Cave Springs Waste Management Plan

Barrett,

The easiest way, if possible, is to split the document and email it in parts. I think we might be able to get it from Dropbox as well, but I am not sure.

Thanks,
Katherine McWilliams
Engineer
Office of Water Quality

From: Barrett Knutson [mailto:bknutson@mce.us.com]
Sent: Tuesday, December 19, 2017 10:38 AM
To: McWilliams, Katherine
Subject: Cave Springs Waste Management Plan

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Barret R. Knutson, E.I.
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501.545.7115 cell
bknutson@mce.us.com

APPENDIX A

Engineering Drawings

CONSTRUCTION DRAWINGS

CAVE SPRINGS WASTEWATER TRANSFER AND TREATMENT SYSTEM - PHASE 1

CAVE SPRINGS, ARKANSAS

GENERAL NOTES:

A. TOPOGRAPHIC BOUNDARY SURVEY, INCLUDING PROPERTY LINES, LEGAL DESCRIPTION, EXISTING UTILITIES, SITE TOPOGRAPHY WITH SPOT ELEVATIONS, OUTSTANDING PHYSICAL FEATURES AND EXISTING STRUCTURE LOCATIONS WAS PROVIDED BY THE FOLLOWING COMPANY, AS A CONTRACTOR TO THE SELLER/OWNER:

GEOMATIC CONSULTANTS, INC.
134 N. MAIN STREET
CAVE SPRINGS, AR 72718
(479)248-1466

CEI ENGINEERING AND ITS ASSOCIATES WILL NOT BE HELD RESPONSIBLE FOR THE ACCURACY OF THE SURVEY OR FOR DESIGN ERRORS OR OMISSIONS RESULTING FROM SURVEY INACCURACIES.

B. ALL PHASES OF SITE WORK FOR THIS PROJECT SHALL MEET OR EXCEED THE OWNER / DEVELOPER SITE WORK SPECIFICATIONS.

C. CONTRACTOR SHALL BE RESPONSIBLE FOR RAZING AND REMOVAL OF THE EXISTING STRUCTURES, RELATED UTILITIES, PAVING, UNDERGROUND STORAGE TANKS AND ANY OTHER EXISTING IMPROVEMENTS AS NOTED. SEE SITE WORK SPECIFICATIONS.

D. CONTRACTOR IS TO REMOVE AND DISPOSE OF ALL DEBRIS, RUBBISH AND OTHER MATERIALS RESULTING FROM PREVIOUS AND CURRENT DEMOLITION OPERATIONS. DISPOSAL WILL BE IN ACCORDANCE WITH ALL LOCAL, STATE AND/OR FEDERAL REGULATIONS GOVERNING SUCH OPERATIONS.

E. THE GENERAL CONTRACTOR WILL BE HELD SOLELY RESPONSIBLE FOR AND SHALL TAKE ALL PRECAUTIONS NECESSARY TO AVOID PROPERTY DAMAGE TO ADJACENT PROPERTIES DURING THE CONSTRUCTION PHASES OF THIS PROJECT.

F. WARRANTY/DISCLAIMER:
THE DESIGNS REPRESENTED IN THESE PLANS ARE IN ACCORDANCE WITH ESTABLISHED PRACTICES OF CIVIL ENGINEERING FOR THE DESIGN FUNCTIONS AND USES INTENDED BY THE OWNER AT THIS TIME. HOWEVER, NEITHER THE ENGINEER NOR ITS PERSONNEL CAN OR DO WARRANT THESE DESIGNS OR PLANS AS CONSTRUCTED EXCEPT IN THE SPECIFIC CASES WHERE THE ENGINEER INSPECTS AND CONTROLS THE PHYSICAL CONSTRUCTION ON A CONTEMPORARY BASIS AT THE SITE.

G. SAFETY NOTICE TO CONTRACTOR:
IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT WILL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. ANY CONSTRUCTION OBSERVATION BY THE ENGINEER OF THE CONTRACTOR'S PERFORMANCE IS NOT INTENDED TO INCLUDE REVIEW OF THE ADEQUACY OF THE CONTRACTOR'S SAFETY MEASURES, IN, ON OR NEAR THE CONSTRUCTION SITE.

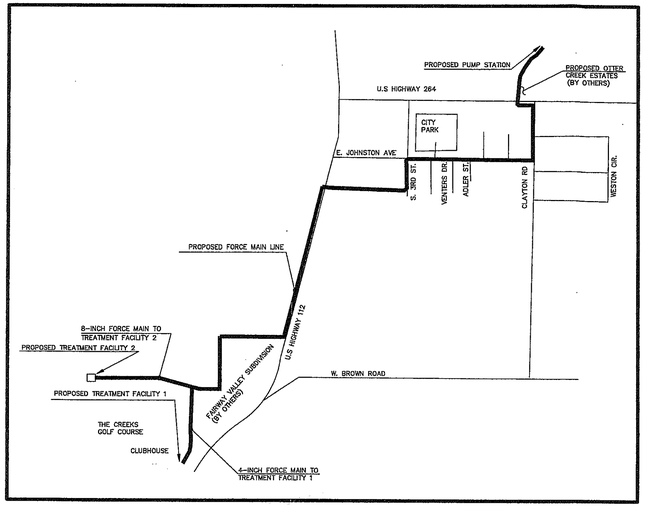
H. ALL CONSTRUCTION IN STATE HIGHWAY DEPARTMENT RIGHT-OF-WAY SHALL BE COORDINATED WITH THE HIGHWAY DEPARTMENT RESIDENT MAINTENANCE ENGINEER.

I. WETLANDS NOTE:
ANY DEVELOPMENT, EXCAVATION, CONSTRUCTION, OR FILLING IN A U.S. CORPS OF ENGINEERS DESIGNATED WETLAND IS SUBJECT TO LOCAL, STATE AND FEDERAL APPROVALS. THE CONTRACTOR SHALL COMPLY WITH ALL PERMIT REQUIREMENTS AND/OR RESTRICTIONS AND ANY VIOLATION WILL BE SUBJECT TO FEDERAL PENALTY. THE CONTRACTOR SHALL HOLD THE OWNER/DEVELOPER, THE ENGINEER AND THE LOCAL GOVERNING AGENCIES HARMLESS AGAINST SUCH VIOLATION.

J. RESIDENT ENGINEERING SERVICES:
WHEN REQUESTED BY THE OWNER, RESIDENT ENGINEERING SERVICES SHALL BE PROVIDED BY THE ENGINEERS (ON A TIME AND FREQUENCY BASIS) ACCEPTABLE TO THE CITY ENGINEER FOR IMPROVEMENTS TO PUBLIC WATER MAINS, PUBLIC SEWER, AND CITY STREETS. AT THE COMPLETION OF CONSTRUCTION, THE ENGINEER SHALL CERTIFY THE CONSTRUCTION TO BE IN COMPLIANCE WITH THE PLANS AND SPECIFICATIONS. THIS WORK WILL BE AT THE OWNER/DEVELOPER'S DIRECT EXPENSE AND SHALL BE COORDINATED WITH CEI ENGINEERING ASSOCIATES, INC. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE RESIDENT ENGINEER OF ANY PRECONSTRUCTION / CONSTRUCTION CONFERENCES AND ANY PUBLIC CONSTRUCTION 24 HOURS PRIOR TO SAID ACTION.

FLOOD CERTIFICATION:

A PORTION OF THIS SITE AS SHOWN IS IN THE "ZONE A" DESIGNATED FLOOD AREA (100-YEAR FREQUENCY FLOOD ZONE) AS DESIGNATED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY, FLOOD INSURANCE RATE MAP, COMMUNITY PANEL NUMBER 05007C 0145 E, FOR BENTON COUNTY, EFFECTIVE DATE SEPTEMBER 18, 1991.



Vicinity Map

NOT TO SCALE

APPROVED	DATE
CITY OF CAVE SPRINGS WASTEWATER DISTRICT	
CITY OF CAVE SPRINGS	
CARROLL ELECTRIC COOPERATIVE CORP.	
ARKANSAS WESTERN GAS	
COX COMMUNICATIONS	
SOUTHWESTERN BELL	
ARKANSAS DEPARTMENT OF HEALTH	
ARKANSAS HIGHWAY AND TRANSPORTATION DEPARTMENT	
ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY	
ARKANSAS GAME AND FISH COMMISION	

CEI® ENGINEERING ASSOCIATES, INC

ENGINEERS • PLANNERS • SURVEYORS

3317 S.W. I Street
Bentonville, AR 72712

(479) 273-9472
FAX (479) 273-0844

PLAN INDEX:

1. COVER SHEET
2. OVERALL LAYOUT 1
3. OVERALL LAYOUT 2
4. GRADING PLAN: PUMP STATION
5. CAVE SPRINGS INTERCEPTOR #1 PLAN AND PROFILE #1
6. CAVE SPRINGS INTERCEPTOR #1 PLAN AND PROFILE #2
7. CAVE SPRINGS INTERCEPTOR #1 PLAN AND PROFILE #3
8. CAVE SPRINGS INTERCEPTOR #1 PLAN AND PROFILE #4
9. CAVE SPRINGS INTERCEPTOR #1 PLAN AND PROFILE #5
10. CAVE SPRINGS INTERCEPTOR #1 PLAN AND PROFILE #6
11. CAVE SPRINGS INTERCEPTOR #1 PLAN AND PROFILE #7
12. CAVE SPRINGS INTERCEPTOR #1 PLAN AND PROFILE #8
13. CAVE SPRINGS INTERCEPTOR #1 PLAN AND PROFILE #9
14. CAVE SPRINGS INTERCEPTOR #1 PLAN AND PROFILE #10
15. CAVE SPRINGS INTERCEPTOR #1 PLAN AND PROFILE #11
16. TREATMENT PLANT #2 INTERCEPTOR #1 PLAN AND PROFILE #1
17. TREATMENT PLANT #2 INTERCEPTOR #1 PLAN AND PROFILE #2
18. DRIP FIELD OVERALL LAYOUT
19. DRIP FIELD LAYOUT 1
20. DRIP FIELD LAYOUT 2
21. DRIP FIELD LAYOUT 3
22. DRIP FIELD LAYOUT 4
23. DRIP FIELD LAYOUT 5
24. DRIP FIELD LAYOUT 6
25. DRIP FIELD LAYOUT 7
26. DRIP FIELD LAYOUT 8
27. DRIP FIELD LAYOUT 9
28. DRIP FIELD LAYOUT 10
29. DRIP FIELD LAYOUT 11
30. DRIP FIELD LAYOUT 12
31. DRIP FIELD LAYOUT 13
32. DRIP FIELD LAYOUT 14
33. DRIP FIELD LAYOUT 15
34. SITE PLAN TREATMENT PLANT 2
35. GRADING PLAN TREATMENT PLANT 2
36. DETAIL SHEET 1
37. DETAIL SHEET 2
38. DETAIL SHEET 3
39. DETAIL SHEET 4
40. DETAIL SHEET 5
41. DETAIL SHEET 6
42. DETAIL SHEET 7
43. PUMP STATION DETAIL

ASSOCIATED PLANS:

1. PLANS FOR WATER AND SEWER IMPROVEMENTS TO SERVE FAIRWAY VALLEY SUBDIVISION (ESI, INC.)

RESOURCE LIST:

CITY OF CAVE SPRINGS WATER DEPT.
WATER/STREET SUPERINTENDENT
479-248-1040 EXT. 17
MR. RICK SAYRE

CARROLL ELECTRICAL COOPERATIVE CORP.
U.S. HWY. 71B
BENTONVILLE, AR 72712
(479) 273-2421
MR. MIKE PHILLIPS

AMERICAN ELECTRIC POWER CORP.
101 W. TOWNSHIP
FAYETTEVILLE, AR 72701
(479) 973-2333
MR. RONALD R. BERTRAM

ARKANSAS DEPT. OF HEALTH AND HUMAN SERVICES
4815 W. MARKHAM ST.
LITTLE ROCK, AR 72205-3867
(501) 661-2623
MR. ROY DAVIS, P.E

ARKANSAS DEPT. OF ENVIRONMENTAL QUALITY
#1 STATE POLICE PLAZA DRIVE
LITTLE ROCK, AR 72209
(501) 682-0045
MS. CARA HILL, P.E

ARKANSAS HWY. & TRANS. DEPT.
P.O. BOX 610
HIGHWAY 65 SOUTH
HARRISON AR 72601
(870) 743-2100
MR. BOBBY KEETON

ARKANSAS WESTERN GAS COMPANY
P.O. BOX 13288
FAYETTEVILLE, AR 72703-1002
(479) 435-1753
MR. DERRY BIRDSONG

COX COMMUNICATIONS
4901 S. 48th STREET
SPRINGDALE, AR 72762
(479) 717-3738
MR. RYAN BUTLER

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12638
FERDINAND FOURIE
11-7-06

ENGINEER
CEI ENGINEERING ASSOCIATES, INC.
3317 SW "I" ST.
BENTONVILLE, AR 72712
(479) 273-9472
(479) 273-0844 (FAX)
FERDINAND FOURIE, P.E

DEVELOPER
CAVE SPRINGS MUNICIPAL PROPERTY OWNERS IMPROVEMENT DISTRICT #1/ THE CREEKS SPECIAL SEWER DISTRICT
(479)601-5687
MR. BRETT HASH

JOB NO.: 20733
DWG NAME: 20733COVER
DATE: 09-15-06 08:42 AM
SHEET NO: 1 OF 43
REVISE

© 2006 CEI ENGINEERING ASSOCIATES, INC.

N

0 400' 600' 800'
SCALE IN FEET

PROPOSED LIFT STATION
SEE SHEET 4 FOR SITE DETAILS
SEE SHEET 43 FOR LIFT STATION DETAILS

COMMON AREA 7
COMMON AREA 2
COMMON AREA 1
LOT 2
LOT 3
LOT 4
LOT 5
LOT 6
SHEET 16
SHEET 14
SHEET 13
US HIGHWAY 264
ARKANSAS STATE HWY. 264
10" FORCE MAIN
SHEET 11
SHEET 12
SHEET 10
10196
10195
10194
10193
10192
10191
10190
10187
10199
PROPOSED SAND SPRINGS SUBDIVISION
KERTON HILLS SUBDIVISION
LOT 29
LOT 30
LOT 31
LOT 32
LOT 33
LOT 34
LOT 35
LOT 36
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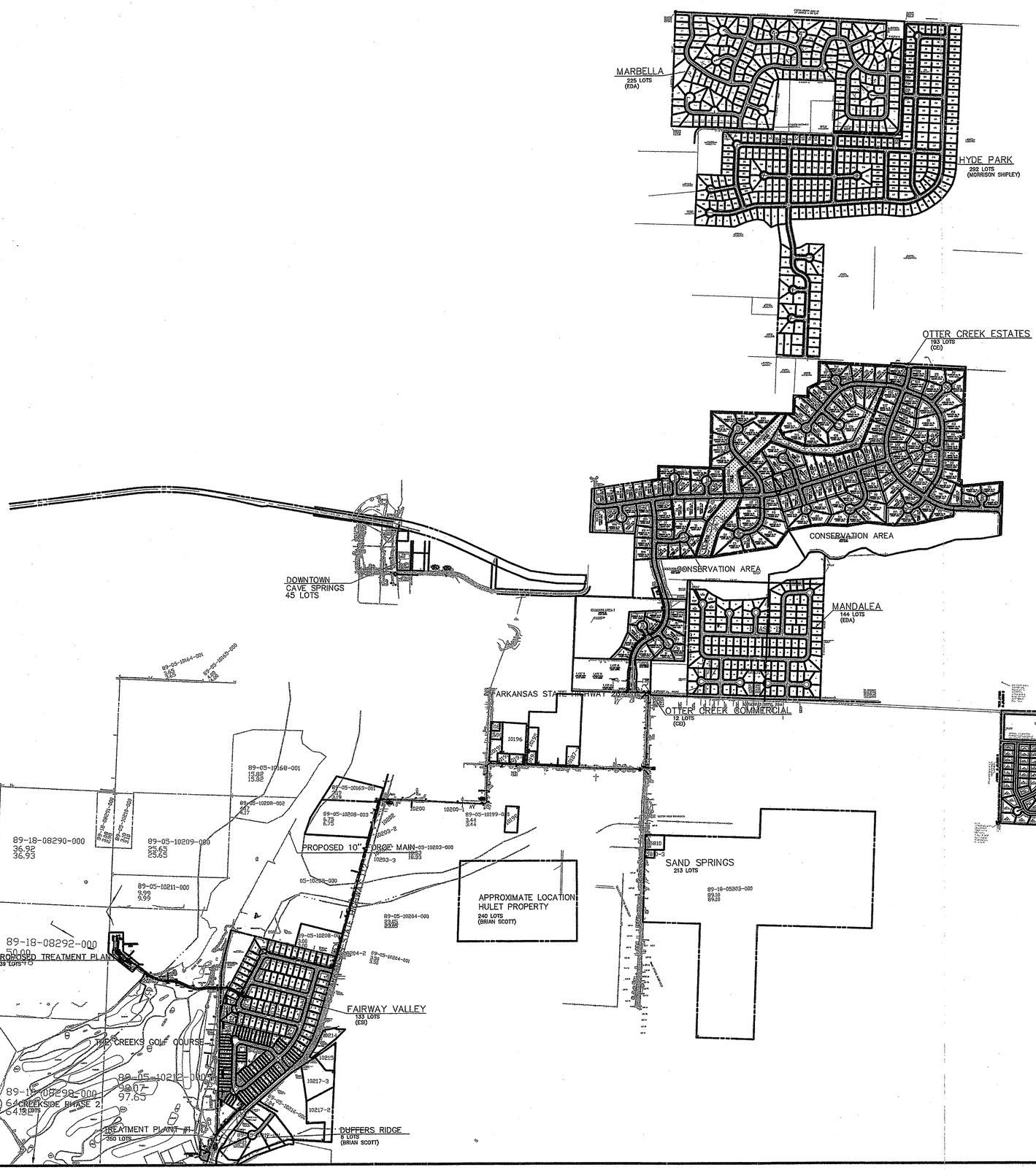
LOT 48
LOT



0 600' 900' 1200'
SCALE IN FEET

WASTEWATER DISTRICT SUMMARY

DEVELOPMENT	EQ. #LOTS	AVG. DAILY WASTEWATER (G/DAY)	ENGINEER
MARBELLA	225	58,500	EDA
HYDE PARK	292	75,920	MORRISON SHIPLEY
OTTER CREEK ESTATES	193	50,180	CEI
MANDALEA	144	37.440	EDA
OTTER CREEK COMMERCIAL	12	3,120	CEI
BRENTWOOD	220	57,200	RANDY RICHEY
DOWNTOWN CAVE SPRINGS	45	11,700	--
FAIRWAY VALLEY	133	34,580	ESI
HULET PLACE	240	62,400	--
DUFFERS RIDGE	8	2,080	(COMPLETE)
CREEKSIDE PHASE 2	15	3,900	(COMPLETE)
TOTAL	*1527*	*397,020*	

SUMMARY OF WASTEWATER COMPONENT CAPACITIES

COMPONENT	NO. LOTS	AVERAGE DAILY FLOW (G/DAY)
TREATMENT PLANT NO. 1	350	91,000
FORCE MAIN LINE	2600	676,000
EXPANDED DRIPFIELD	250	66,000
TREATMENT PLANT #2	1231	320,000
TREATMENT PLANT #2 FIELD	1231	320,000
TOTAL SYSTEM CAPACITY	1584	412,000

350
1231
1581

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No.7944
DAVID A. TODD
David A. Todd
14 Sept 2006

INITIAL DESIGN	10-10-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE I

CAVE SPRINGS *ARKANSAS*

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS · PLANNERS · SURVEYORS

3317 S.W. I Street
Bentonville, AR 72712
(479) 273-9472
FAX (479) 273-0844

JOB NO.: 20733
DWG NAME: 20733OVERALL2

OVERALL LAYOUT 2

DATE: 08-21-06 11:01 AM REV 5
SHEET NO.: 3 OF 43

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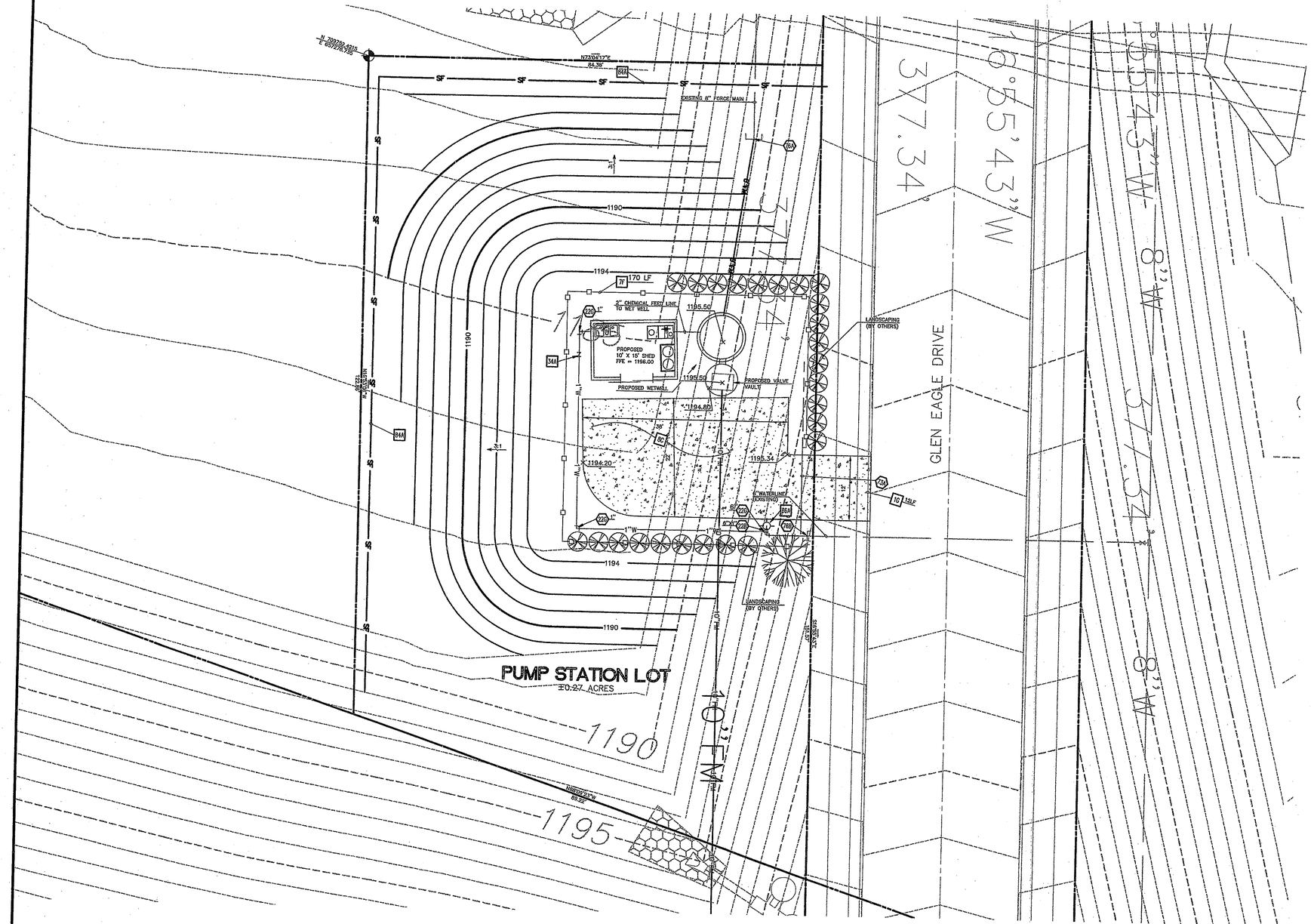

0 10' 15' 20'

SCALE IN FEET

LEGEND

EXISTING

e	EAST OR ELECTRIC
n	NORTH
oh	OVERHEAD
s	SOUTH OR SEWER
t	TELEPHONE
ug	UNDERGROUND
w	WEST OR WATER
	BOUNDARY LINE
	RIGHT OF WAY LINE
	STORM DRAIN
X"G	GAS
OHE	OVERHEAD ELECTRIC
OHE&T	OVERHEAD ELECTRIC AND TELEPHONE
OHT	OVERHEAD TELEPHONE
OHTV	OVERHEAD TV
X"S	SEWER
UGE	UNDERGROUND ELECTRIC
UGE&T	UNDERGROUND ELECTRIC AND TELEPHONE
UGT	UNDERGROUND TELEPHONE
UGTV	UNDERGROUND TV
X"W	WATER
.5-10-11 50.5	TREE INFO .5 = DIAMETER OF TRUNK IN FEET 10 = HEIGHT OF TREE IN FEET 11 = CANOPY DIAMETER IN FEET 50.5 = ELEVATION AT BASE OF TREE

PROPOSED

	BOUNDARY LINE
	RIGHT OF WAY LINE
	GRADE BREAK
XXX	CONTOUR ELEVATIONS
	STORM DRAIN
	LIMITS OF PAVING
x XX.XX	SPOT ELEVATIONS: TC = TOP OF CURB G = GUTTER

GENERAL GRADING NOTES

A. PRIOR TO INSTALLATION OF WATERLINE OR SANITARY SEWER, THE CONTRACTOR SHALL EXCAVATE, VERIFY, AND CALCULATE ALL CROSSINGS AND INFORM THE OWNER AND THE ENGINEER OF ANY CONFLICTS PRIOR TO CONSTRUCTION. THE ENGINEER WILL BE HELD HARMLESS IN THE EVENT THE ENGINEER IS NOT NOTIFIED OF DESIGN CONFLICTS.

B. ALL SLOPES AND AREAS DISTURBED BY CONSTRUCTION SHALL BE GRADED SMOOTH AND 4" OF TOPSOIL APPLIED. IF ADEQUATE TOPSOIL IS NOT AVAILABLE ON SITE, THE CONTRACTOR SHALL PROVIDE TOPSOIL, APPROVED BY THE OWNER, AS NEEDED. THE AREA SHALL THEN BE SEEDED, FERTILIZED, MULCHED, WATERED AND MAINTAINED UNTIL HARDY GRASS GROWTH IS ESTABLISHED IN ALL AREAS. ANY AREAS DISTURBED FOR ANY REASON PRIOR TO FINAL ACCEPTANCE OF THE PROJECT SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

C. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES.

GRADING DETAILS

	1G	MOUNTABLE CURB
7F	7F	SECURITY CHAIN LINK FENCE AND GATE
8C	8C	REGULAR DUTY CONCRETE PAVING
SF	84A	TEMPORARY SILT FENCE
	34A	REDUCED PRESSURE ZONE ASSEMBLY
	36A	FIRE HYDRANT ASSEMBLY – SEE DETAIL FOR BRAND & TYPE

GRADING NOTES

22D	22D	M.J. TEE WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
22E	22E	M.J. REDUCER (SEE SIZES THIS SHEET)
22G	22G	90° M.J. BEND WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
	22Y	INTERIOR BACKFLOW PREVENTER
	73A	SLIDING GATE
	76A	CONNECT 8" INLET FORCE MAIN TO EXISTING FORCE MAIN USING REQUIRED JOINTS, AND FITTINGS
	76B	REMOVE CAP AND CONNECT TO EXISTING 6" WATER LINE.

CALL BEFORE YOU DIG
1-800-482-8998
ARKANSAS ONE CALL SYSTEM

NOTE:
CONTRACTOR SHALL COORDINATE WITH OTTER CREEK ESTATES CONTRACTOR DURING CONSTRUCTION

NOTE:
EXISTING GROUND ELEVATIONS, UTILITIES AND ROADS AS SHOWN ON THESE PLANS ARE PARTLY BASED ON DESIGN DRAWINGS FOR THE OTTER CREEK ESTATES SUBDIVISION, PREPARED BY CEI ENGINEERING. ACTUAL ELEVATIONS/LOCATIONS MAY DIFFER AFTER CONSTRUCTION OF OTTER CREEK ESTATES. THE CONTRACTOR SHALL INFORM CEI EGINEERING OF ANY INCONSISTENCIES, DISCREPANCIES OR CONFLICTS THAT MAY ARISE.

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No.7944
David A. Tosh
14 Sept 2006

INITIAL DESIGN	10-10-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1
CAVE SPRINGS ARKANSAS

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS · PLANNERS · SURVEYORS

3317 S.W. I Street, Bentonville, AR 72712 (479) 273-9472 FAX (479) 273-0844

JOB NO.: 20733
DWG NAME: 20733PUMPSTA1.DWG

GRADING PLAN
PUMP STATION

DATE 08-21-06 10:33 AM REV. 5

SHEET NO. 4 OF 43

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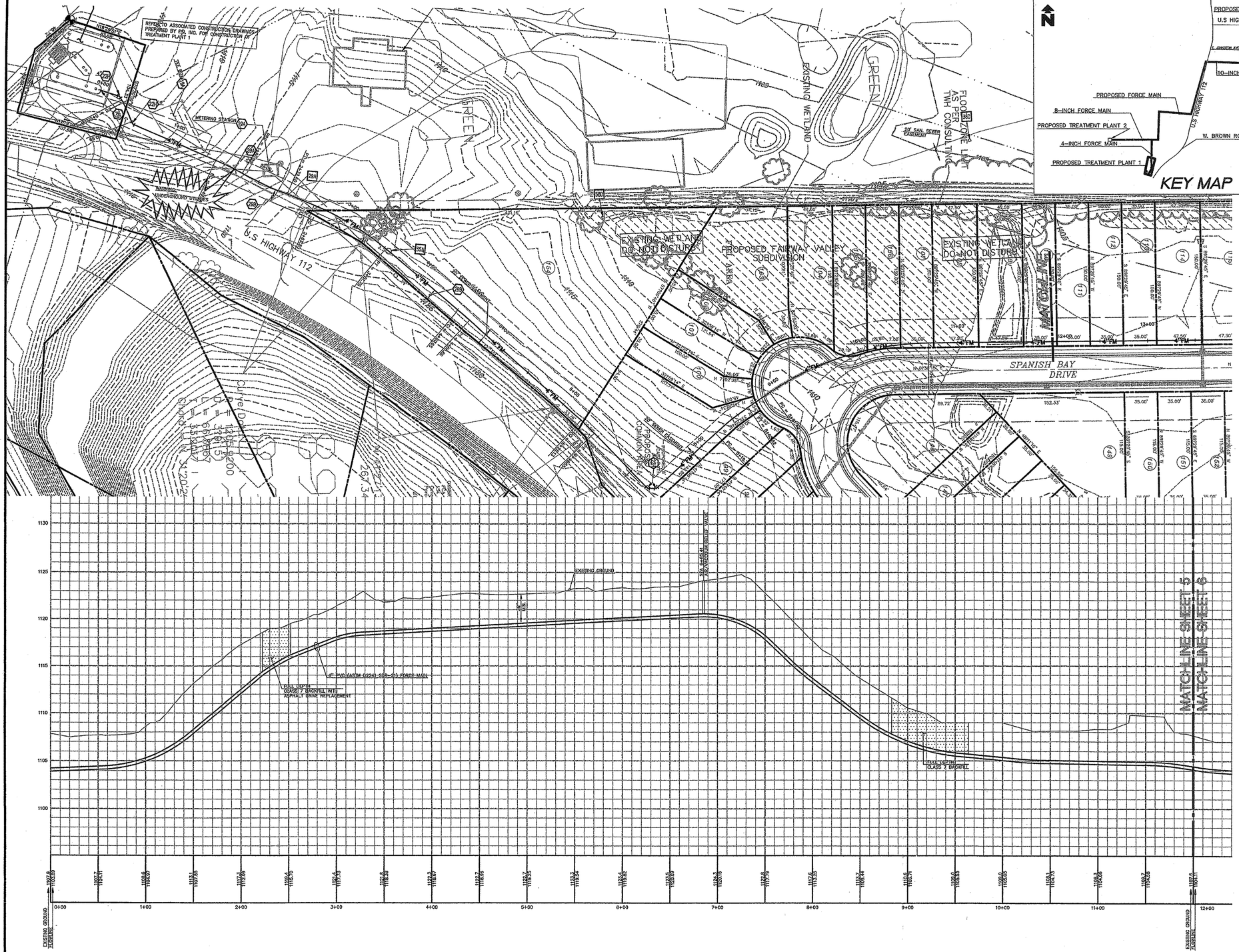

0 50' 75' 100'
SCALE IN FEET

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OHE
- OVERHEAD ELECTRIC
- OVERHEAD ELECTRIC AND TELEPHONE
- OHT
- OVERHEAD TELEPHONE
- OHTV
- OVERHEAD TV
- SEWER
- UGE
- UNDERGROUND ELECTRIC
- UGE&T
- UNDERGROUND ELECTRIC AND TELEPHONE
- UGT
- UNDERGROUND TELEPHONE
- UGTV
- UNDERGROUND TV
- WATER
- .5-10-11 50.5 TREE INFO: .5 = DIAMETER OF TRUNK IN FEET; 10 = HEIGHT OF TREE IN FEET; 11 = CANOPY DIAMETER IN FEET; 50.5 = ELEVATION AT BASE OF TREE
- EDGE OF ROADWAY

PROPOSED

- PROPERTY LINE
- RIGHT OF WAY LINE
- EASEMENT
- X"S SANITARY SEWER SERVICE
- X"W WATER SERVICE

GENERAL UTILITY NOTES

A. ALL WASTEWATER LINES 4" AND SMALLER SHALL BE PVC (ASTM D2241 SDR-21) WITH 36" MIN. COVER. ALL WASTEWATER LINES LARGER THAN 4" SHALL BE PVC (ASTM D2241 SDR-21) WITH 48" MIN. COVER.

B. ALL SANITARY SEWER LINES AT CREEK AND ROAD CROSSING SHALL BE PVC (ASTM D2241 DR-14) WITH 60" MIN. COVER.

A. ALL WATER LINES SHALL BE PVC (AWWA C-900) WITH 48" MIN. COVER.

C. CONTRACTOR SHALL COORDINATE ANY DISRUPTIONS TO EXISTING UTILITY SERVICES WITH ADJACENT PROPERTY OWNERS.

D. CONSTRUCTION SHALL NOT START ON ANY PUBLIC UTILITY SYSTEM UNTIL WRITTEN APPROVAL HAS BEEN RECEIVED BY THE ENGINEER FROM THE APPROPRIATE GOVERNING AUTHORITY AND CONTRACTOR HAS BEEN NOTIFIED BY THE ENGINEER.

E. PRIOR TO THE CONSTRUCTION OF OR CONNECTION TO ANY STORM DRAIN, SANITARY SEWER, WATER MAIN OR ANY OF THE DRY UTILITIES, THE CONTRACTOR SHALL EXCAVATE, VERIFY AND CALCULATE ALL POINTS OF CONNECTION AND ALL UTILITY CROSSINGS AND INFORM CEI ENGINEERING AND THE OWNER/DEVELOPER OF ANY CONFLICT OR REQUIRED DEVIATIONS FROM THE PLAN. NOTIFICATION SHALL BE MADE A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION. CEI ENGINEERING AND ITS CLIENTS SHALL BE HELD HARMLESS IN THE EVENT THAT THE CONTRACTOR FAILS TO MAKE SUCH NOTIFICATION.

F. UNLESS OTHERWISE SHOWN, CALLED OUT OR SPECIFIED HEREON OR WITHIN SPECIFICATIONS:

ALL SANITARY SEWER PIPE BEDDING SHALL BE INSTALLED PER DETAIL 42A.

ALL SANITARY FORCE MAIN FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE PIPE BEDDING SHALL BE INSTALLED PER DETAIL 42A.

UTILITY NOTES

- 19A EXISTING TO REMAIN
- 22C M.J. ECCENTRIC PLUG VALVE WITH ADJUSTABLE VALVE BOX (SEE SIZES THIS SHEET)
- 22D M.J. TEE WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
- 22E M.J. ECCENTRIC REDUCER, FLAT SIDE ON TOP (SEE SIZES THIS SHEET)
- 22F M.J. CAP/PLUG WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
- 22H 45° M.J. BEND WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
- 51D PROTECT EXISTING STRUCTURES AND/OR PIPES DURING DEMOLITION AND CONSTRUCTION PHASES.
- 76A ASPHALT PAVEMENT STRIP WITH FULL DEPTH CLASS 7 BACKFILL.
- 76B CONNECT TO TREATMENT PLANT TANK (REFER TO CONSTRUCTION DRAWINGS PREPARED BY ESI, INC.)
- 76C FLOW CONTROL VALVE
- 76G SOLENOID VALVE

UTILITY DETAILS

- 29A ASPHALT DRIVE CUT/REPAIR
- 29C GRAVEL DRIVE CUT/REPAIR
- 30B JACK & BORE
- 35A A/R/VACUUM RELIEF VALVE (SANITARY SEWER)
- 76A SANITARY SEWER FORCE MAIN CLEAN-OUT WITH CHECK VALVE
- 76B LIFT STATION
- 76C CONCRETE CHANNEL WITH DISSIPATORS
- 36D TRACER WIRE INSTALLATION

STA 0+00 TO STA 12+00

HORIZONTAL : 1" = 50'
VERTICAL : 1" = 5'

CALL BEFORE YOU DIG 1-800-482-8998 ARKANSAS ONE CALL SYSTEM

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No.7944 DAVID A. TODD
David A. Todd
14 Sept 2006

INITIAL DESIGN	4-26-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

CAVE SPRINGS ARKANSAS

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS • PLANNERS • SURVEYORS

3317 S.W. I Street (479) 273-9472
Bentonville, AR 72712 FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733PROJ05

CAVE SPRINGS INTERCEPTOR #1
PLAN AND PROFILE #1

DATE 09-13-06 1:38 PM REV.6

SHEET NO. 5 OF 43

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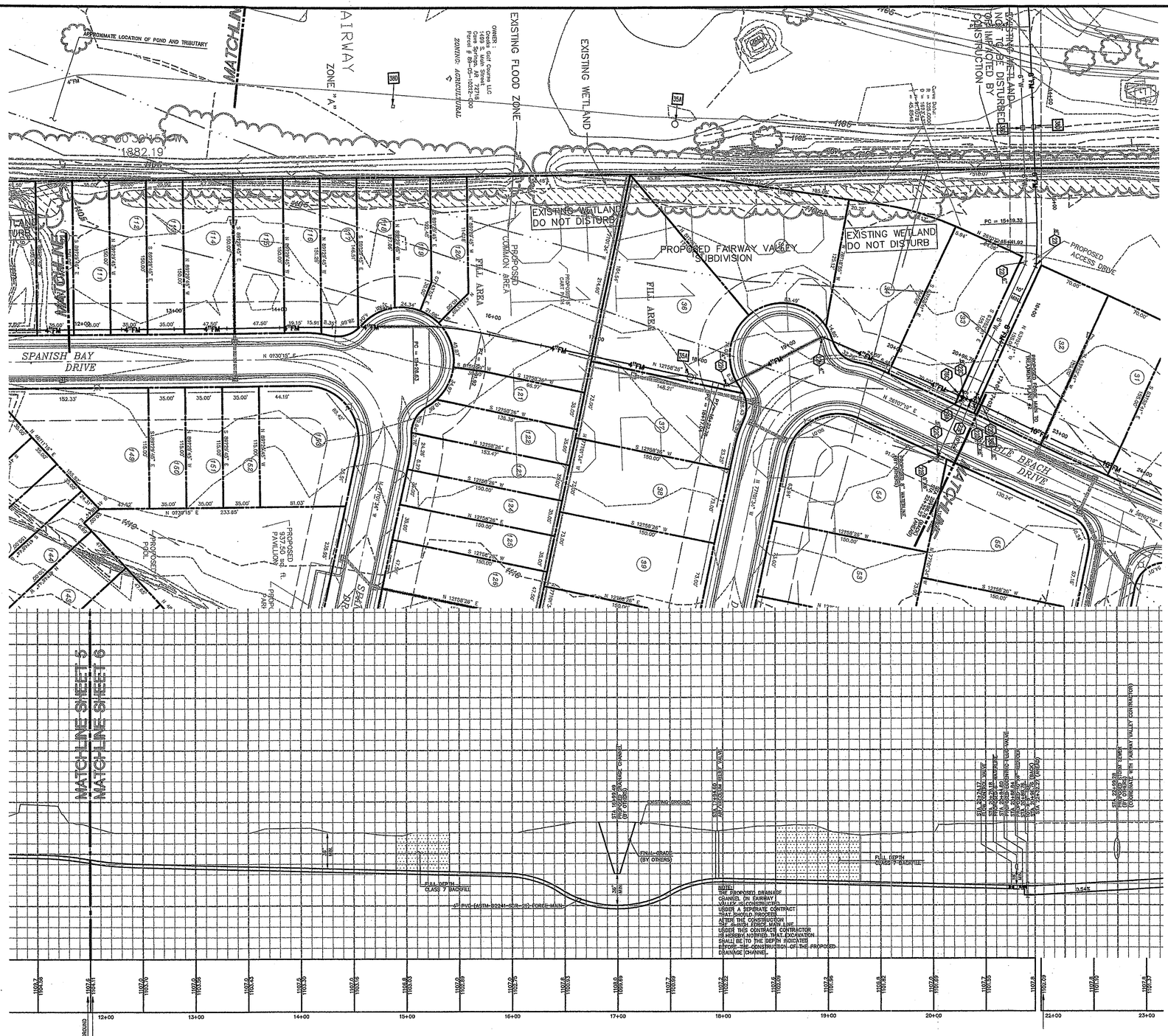
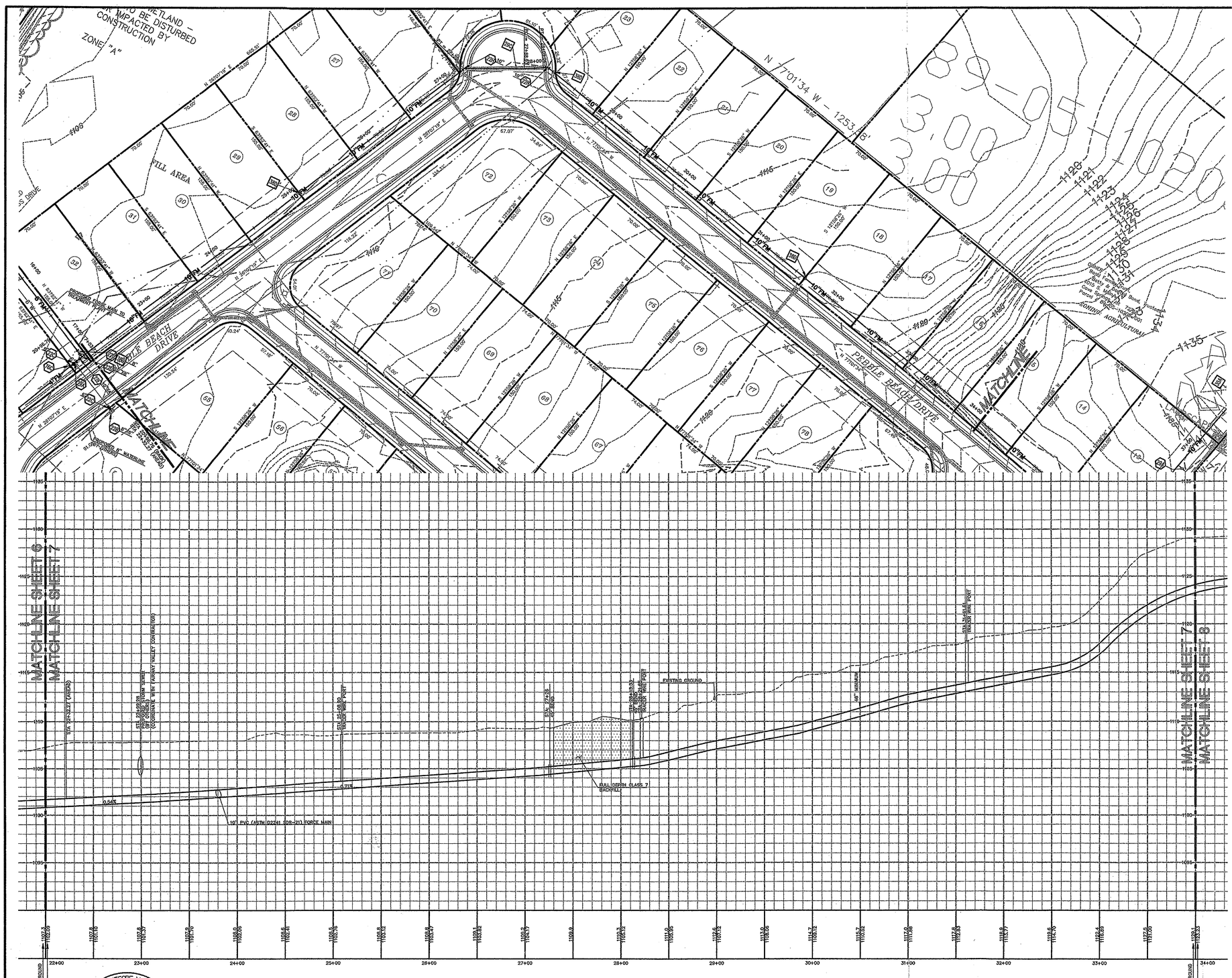
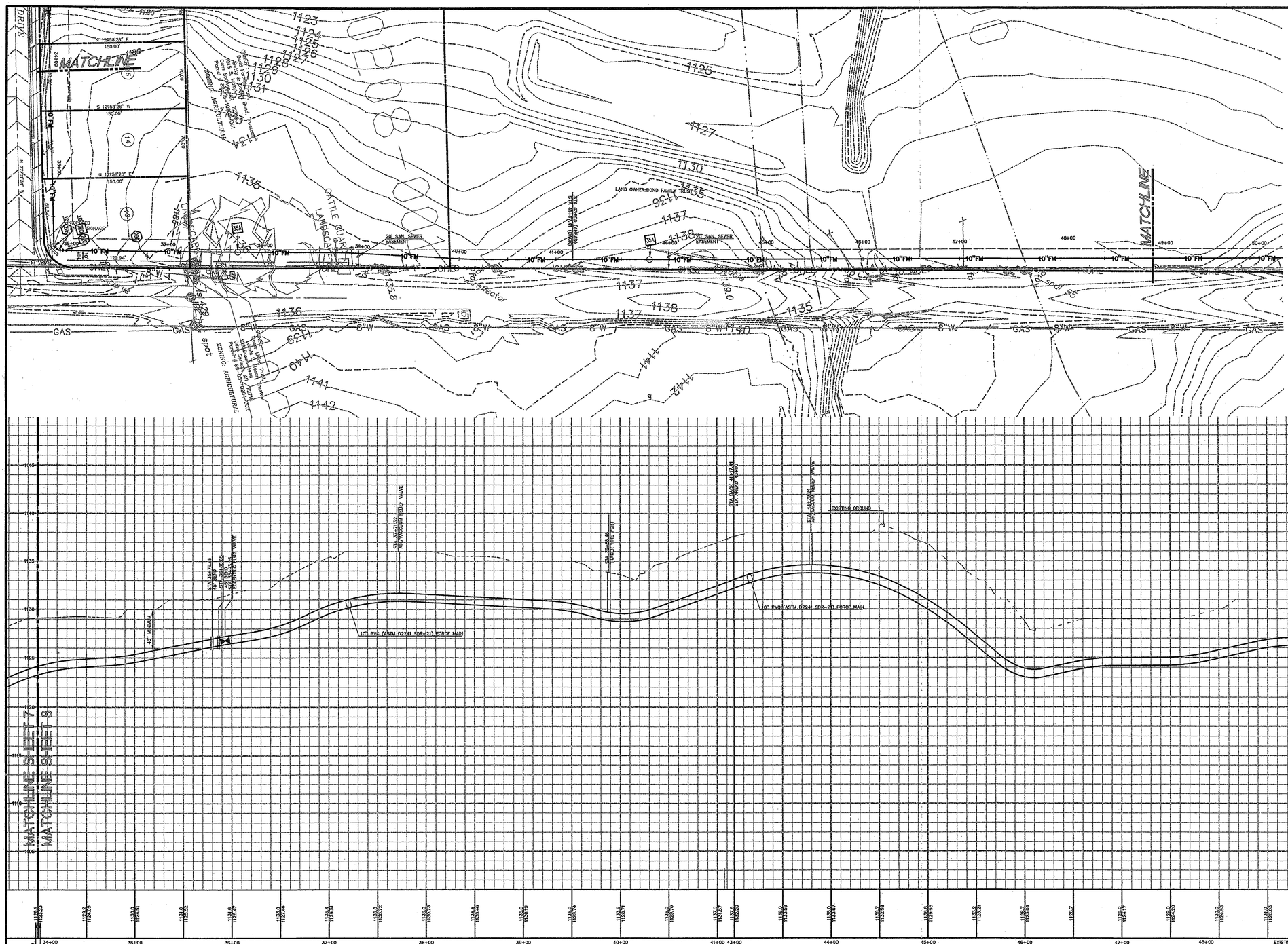
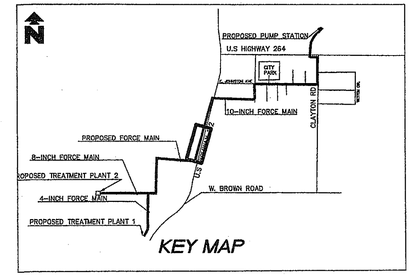

APPROXIMATE LOCATION OF POND AND TRIBUTARY
MATCHLINE
AIRWAY
ZONE "A"
EXISTING FLOOD ZONE
EXISTING WETLAND
OWNER : Oneida Golf Courses LLC
Oneida Golf Courses
Cave Springs, AR 72718
Parcel # 89-05-10212-000
ZONING: AGRICULTURAL
EXISTING WETLAND TO BE DISTURBED OR IMPACTED BY CONSTRUCTION
S 00°30'15" W
1882.19
EXISTING WETLAND DO NOT DISTURB
PROPOSED FAIRWAY VALLEY SUBDIVISION
EXISTING WETLAND DO NOT DISTURB
PROPOSED ACCESS DRIVE
PROPOSED COMMON AREA
FILL AREA
SPANISH BAY DRIVE
PROPOSED 937.50 sq. ft. PAVILION
PROPOSED POOL
PROPOSED CART PATH
PROPOSED 8" WATERLINE
PROPOSED FORCE MAIN TO TREATMENT PLANT #2
PROPOSED 3" GAS LINE
PROPOSED 8" SEWER LINE
PROPOSED 10" SEWER LINE
PROPOSED 12" WATERLINE
PROPOSED 6" WATERLINE
PROPOSED 4" WATERLINE
PROPOSED 2" WATERLINE
PROPOSED 1" WATERLINE
PROPOSED 3" WATERLINE
PROPOSED 4" GAS LINE
PROPOSED 6" GAS LINE
PROPOSED 8" GAS LINE
PROPOSED 10" GAS LINE
PROPOSED 12" GAS LINE
PROPOSED 2" GAS LINE
PROPOSED 1" GAS LINE
PROPOSED 3" GAS L


WETLAND - TO BE DISTURBED IMPACTED BY CONSTRUCTION
ZONE "A"
N 77°01'34" W - 1253.16'
PEBBLE BEACH DRIVE
MATCHLINE
MATCHLINE SHEET 6
MATCHLINE SHEET 7
MATCHLINE SHEET 8
EXISTING 8" WATERLINE
EXISTING 6" WATERLINE
EXISTING 4" WATERLINE
EXISTING 10" FORCE MAIN
EXISTING 6" FORCE MAIN
EXISTING 4" FORCE MAIN
EXISTING 8" SEWER MAIN TO WESTERN SEWER MAIN PS
EXISTING GROUND
STA 24+32.22 (MEDIO)
STA 23+08.00 (BEGIN 10" FORCE MAIN)
STA 22+00.00 (BEGIN 8" GRAVITY SEWER)
STA 27+26 45° BEND
STA 28+33.33 (END 10" FORCE MAIN)
TRACER WIRE PORT
48" MINIMUM
0.44%
0.71%
FULL DEPTH CLASS 7 BACKFILL
10" PVC (ASTM D2241 SDR-21) FORCE MAIN
CONTOUR AGRICULTURAL
GRAVEL DRIVE
Gravel Entrance
Gravel Entrance
Gravel Entrance



0 50' 75' 100'
SCALE IN FEET



LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS — GAS
- OHE — OVERHEAD ELECTRIC
- OHE&T — OVERHEAD ELECTRIC AND TELEPHONE
- OHT — OVERHEAD TELEPHONE
- OHTV — OVERHEAD TV
- SEWER
- UGE — UNDERGROUND ELECTRIC
- UGE&T — UNDERGROUND ELECTRIC AND TELEPHONE
- UGT — UNDERGROUND TELEPHONE
- UGTV — UNDERGROUND TV
- W — WATER
- .5–10–11 50.5 — TREE INFO: .5 = DIAMETER OF TRUNK IN FEET; 10 = HEIGHT OF TREE IN FEET; 11 = CANOPY DIAMETER IN FEET; 50.5 = ELEVATION AT BASE OF TREE
- EDGE OF ROADWAY

PROPOSED

- PROPERTY LINE
- RIGHT OF WAY LINE
- EASEMENT
- X"S — SANITARY SEWER SERVICE
- X"W — WATER SERVICE

GENERAL UTILITY NOTES

A. ALL WASTEWATER LINES 4" AND SMALLER SHALL BE PVC (ASTM D2241 SDR-21) WITH 30" MIN. COVER. ALL WASTEWATER LINES LARGER THAN 4" SHALL BE PVC (ASTM D2241 SDR-21) WITH 48" MIN. COVER.

B. ALL SANITARY SEWER LINES AT CREEK AND ROAD CROSSING SHALL BE PVC (ASTM D2241 DR-14) WITH 60" MIN. COVER.

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- 76B CONNECT TO TREATMENT PLANT TANK (REFER TO CONSTRUCTION DRAWINGS PREPARED BY ESI, INC.)
- 76C FLOW CONTROL VALVE
- 76G SOLENOID VALVE

UTILITY DETAILS

- 29A ASPHALT DRIVE CUT/REPAIR
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- 30B JACK & BORE
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- 76B LIFT STATION
- 76C CONCRETE CHANNEL WITH DISSIPATORS
- 38D TRACER WIRE INSTALLATION

NOTE:
CONTRACTOR SHALL COORDINATE WITH OTTER CREEK CONTRACTOR DURING CONSTRUCTION

CALL BEFORE YOU DIG 1-800-482-8998 ARKANSAS ONE CALL SYSTEM

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No.7944
DAVID A. WOOD
14 Sept. 2006

INITIAL DESIGN	4-26-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1
CAVE SPRINGS ARKANSAS

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS • PLANNERS • SURVEYORS
3317 S.W. I Street
Bentonville, AR 72712
(479) 273-9472
FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733PRO.DGN

CAVE SPRINGS INTERCEPTOR #1
PLAN AND PROFILE #4

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SHEET NO. 8 OF 43

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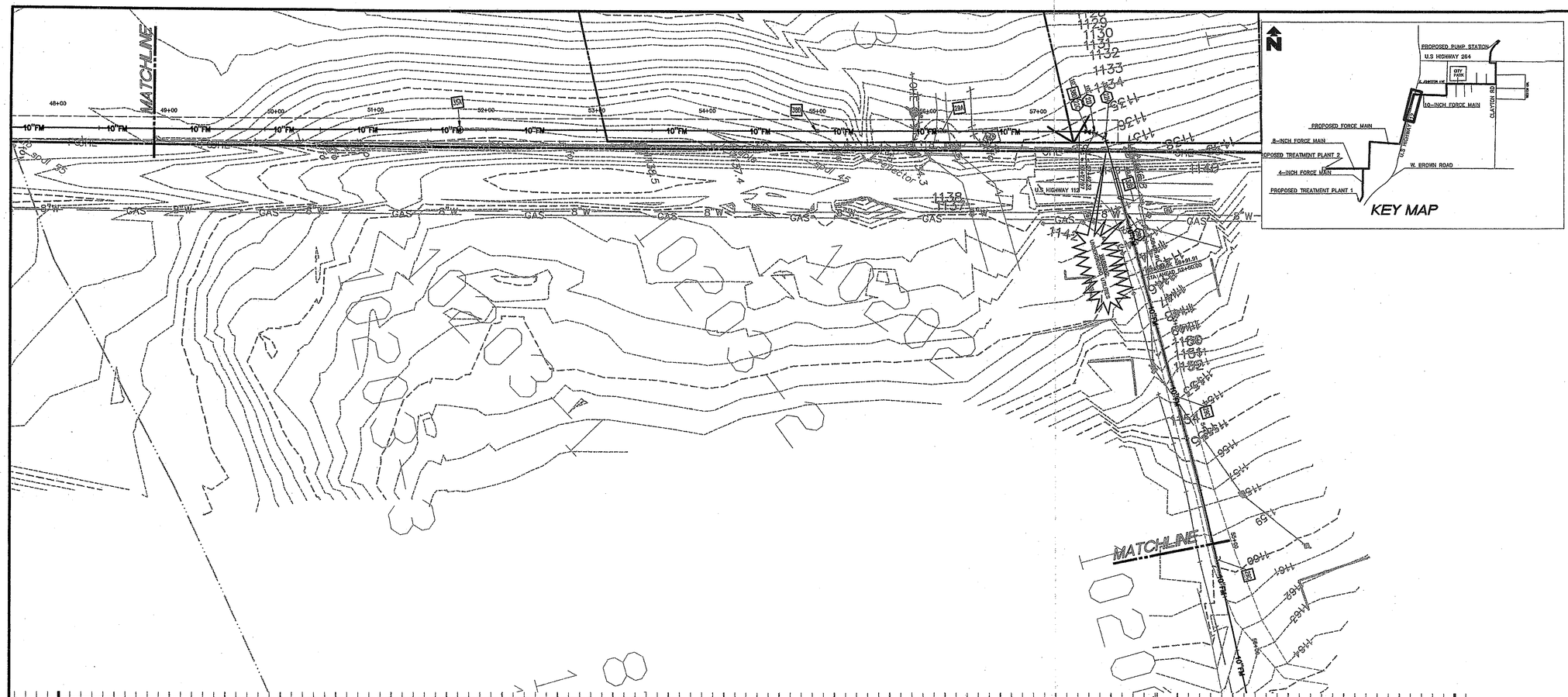

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- X"G GAS
- OHE OVERHEAD ELECTRIC
- OHE&T OVERHEAD ELECTRIC AND TELEPHONE
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- OHTV OVERHEAD TV
- X"S SEWER
- UGE UNDERGROUND ELECTRIC
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- .5-10-11 50.5 TREE INFO
  .5 = DIAMETER OF TRUNK IN FEET
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- RIGHT OF WAY LINE
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- 76C FLOW CONTROL VALVE
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UTILITY DETAILS

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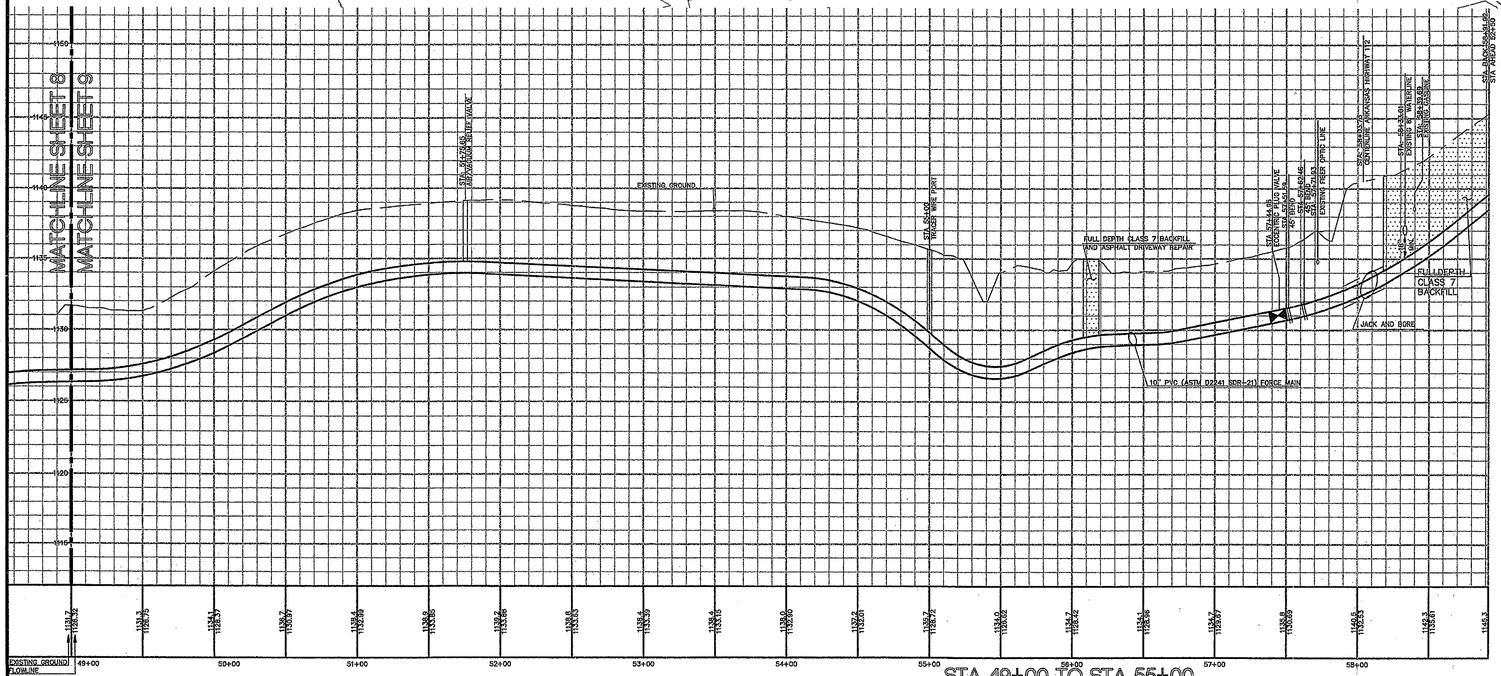
- 78A SANITARY SEWER FORCE MAIN CLEAN-OUT WITH CHECK VALVE
- 76B LIFT STATION
- 76C CONCRETE CHANNEL WITH DISSIPATORS
- 38D TRACER WIRE INSTALLATION


MATCHLINE SHEET 8
MATCHLINE SHEET 9
EXISTING GROUND
STA 48+00 TO STA 55+00
HORIZONTAL : 1" = 50'
VERTICAL : 1" = 5'
STA 48+00 TO STA 55+00
STA 49+00 TO STA 55+00
STA 54+00 TO STA 58+00
STA 55+00 TO STA 58+00
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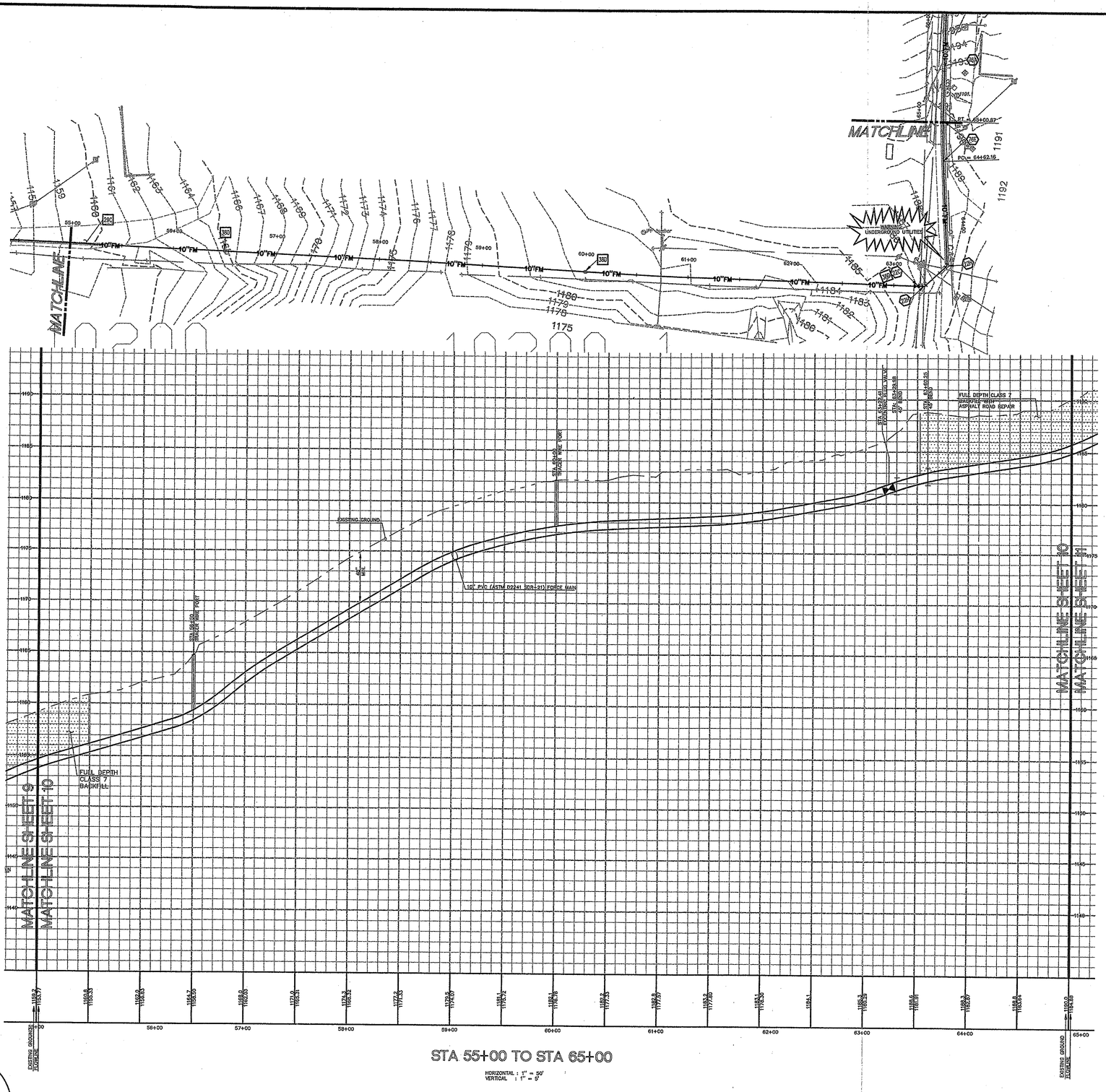
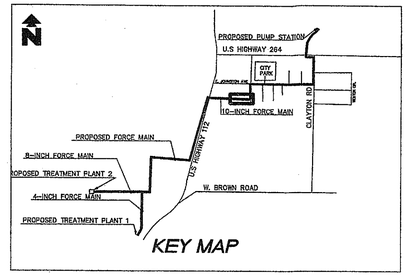
STA 55





0 50' 75' 100'
SCALE IN FEET

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OHE — OVERHEAD ELECTRIC
- OHE&T — OVERHEAD ELECTRIC AND TELEPHONE
- OHT — OVERHEAD TELEPHONE
- OHTV — OVERHEAD TV
- SEWER
- UGE — UNDERGROUND ELECTRIC
- UGE&T — UNDERGROUND ELECTRIC AND TELEPHONE
- UGT — UNDERGROUND TELEPHONE
- UGTV — UNDERGROUND TV
- WATER
- .5-10-11 50.5 — TREE INFO .5 = DIAMETER OF TRUNK IN FEET; 10 = HEIGHT OF TREE IN FEET; 11 = CANOPY DIAMETER IN FEET; 50.5 = ELEVATION AT BASE OF TREE
- EDGE OF ROADWAY

PROPOSED

- PROPERTY LINE
- RIGHT OF WAY LINE
- EASEMENT
- X"S — SANITARY SEWER SERVICE
- X"W — WATER SERVICE

GENERAL UTILITY NOTES

A. ALL WASTEWATER LINES 4" AND SMALLER SHALL BE PVC (ASTM D2241 SDR-21) WITH 36" MIN. COVER. ALL WASTERATER LINES LARGER THAN 4" SHALL BE PVC (ASTM D2241 SDR-21) WITH 48" MIN. COVER.

B. ALL SANITARY SEWER LINES AT CREEK AND ROAD CROSSING SHALL BE PVC (ASTM D2241 DR-14) WITH 60" MIN. COVER.

A. ALL WATER LINES SHALL BE PVC (AWWA C-900) WITH 48" MIN. COVER.

C. CONTRACTOR SHALL COORDINATE ANY DISRUPTIONS TO EXISTING UTILITY SERVICES WITH ADJACENT PROPERTY OWNERS.

D. CONSTRUCTION SHALL NOT START ON ANY PUBLIC UTILITY SYSTEM UNTIL WRITTEN APPROVAL HAS BEEN RECEIVED BY THE ENGINEER FROM THE APPROPRIATE GOVERNING AUTHORITY AND CONTRACTOR HAS BEEN NOTIFIED BY THE ENGINEER.

E. PRIOR TO THE CONSTRUCTION OF OR CONNECTION TO ANY STORM DRAIN, SANITARY SEWER, WATER MAIN OR ANY OF THE DRY UTILITIES, THE CONTRACTOR SHALL EXCAVATE, VERIFY AND CALCULATE ALL POINTS OF CONNECTION AND ALL UTILITY CROSSINGS AND INFORM CEI ENGINEERING AND THE OWNER/DEVELOPER OF ANY CONFLICT OR REQUIRED DEVIATIONS FROM THE PLAN. NOTIFICATION SHALL BE MADE A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION. CEI ENGINEERING AND ITS CLIENTS SHALL BE HELD HARMLESS IN THE EVENT THAT THE CONTRACTOR FAILS TO MAKE SUCH NOTIFICATION.

F. UNLESS OTHERWISE SHOWN, CALLED OUT OR SPECIFIED HEREON OR WITHIN SPECIFICATIONS:

ALL SANITARY SEWER PIPE BEDDING SHALL BE INSTALLED PER DETAIL 42A.

ALL SANITARY FORCE MAIN FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE PIPE BEDDING SHALL BE INSTALLED PER DETAIL 42A.

UTILITY NOTES

	19A	EXISTING TO REMAIN
⋈	22C	M.J. ECCENTRIC PLUG VALVE WITH ADJUSTABLE VALVE BOX (SEE SIZES THIS SHEET)
⊥	22D	M.J. TEE WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
▸	22E	M.J. ECCENTRIC REDUCER, FLAT SIDE ON TOP (SEE SIZES THIS SHEET)
⊣	22F	M.J. CAP/PLUG WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
⊾	22H	45° M.J. ELBO WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
	51D	PROTECT EXISTING STRUCTURES AND/OR PIPES DURING DEMOLITION AND CONSTRUCTION PHASES.
	76A	ASPHALT PAVEMENT STRIP WITH FULL DEPTH CLASS 7 BACKFILL.
	76B	CONNECT TO TREATMENT PLANT TANK (REFER TO CONSTRUCTION DRAWINGS PREPARED BY ESI, INC.)
	76C	FLOW CONTROL VALVE
	76G	SOLENOID VALVE

UTILITY DETAILS

29A	ASPHALT DRIVE CUT/REPAIR
29C	GRAVEL DRIVE CUT/REPAIR
30B	JACK & BORE
35A	AIR/VACUUM RELIEF VALVE (SANITARY SEWER)
76A	SANITARY SEWER FORCE MAIN CLEAN-OUT WITH CHECK VALVE
76B	LIFT STATION
76C	CONCRETE CHANNEL WITH DISSIPATORS
38D	TRACER WIRE INSTALLATION

CALL BEFORE YOU DIG 1-800-482-8998 ARKANSAS ONE CALL SYSTEM

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No.7944 DAVID A. TODD
David A. Todd
14 Sept 2006

INITIAL DESIGN	4-26-05 DATE	DAT EOR	FF PM	FF DES	FF DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1
CAVE SPRINGS ARKANSAS

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS • PLANNERS • SURVEYORS

3317 S.W. I Street, Bentonville, AR 72712 — (479) 273-9472, FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733PRO25

CAVE SPRINGS INTERCEPTOR #1
PLAN AND PROFILE #6

DATE 09-13-06 1:38 PM REV6

SHEET NO. 10 OF 43

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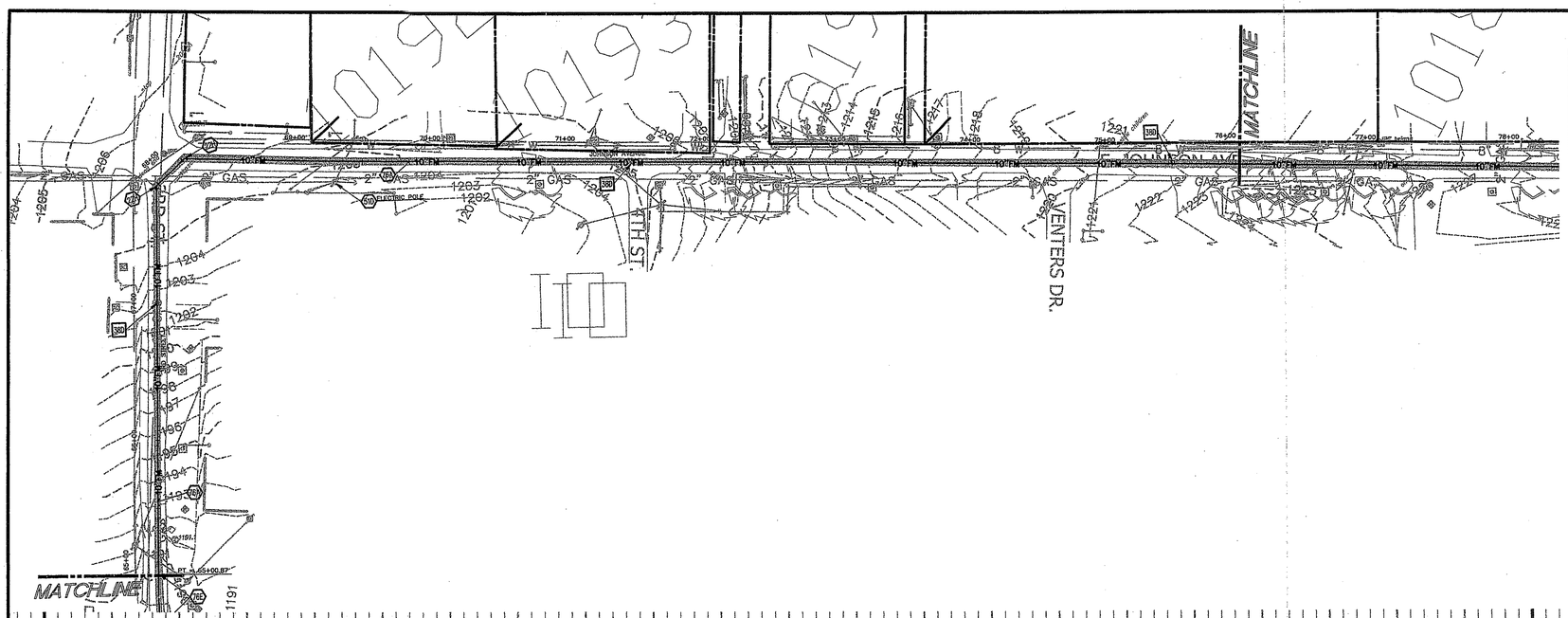
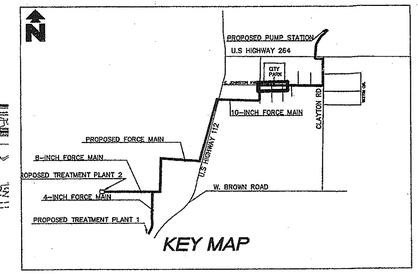


STA 65+00 TO STA 76+00

HORIZONTAL : 1" = 50'
VERTICAL : 1" = 5'



0 50' 75' 100'
SCALE IN FEET

N

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
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- EDGE OF ROADWAY

PROPOSED

- PROPERTY LINE
- RIGHT OF WAY LINE
- EASEMENT
- SANITARY SEWER SERVICE
- WATER SERVICE

GENERAL UTILITY NOTES

A. ALL WASTEWATER LINES 4" AND SMALLER SHALL BE PVC (ASTM D2241 SDR-21) WITH 30" MIN. COVER. ALL WASTEWATER LINES LARGER THAN 4" SHALL BE PVC (ASTM D2241 SDR-21) WITH 48" MIN. COVER.

B. ALL SANITARY SEWER LINES AT CREEK AND ROAD CROSSING SHALL BE PVC (ASTM D2241 DR-14) WITH 60" MIN. COVER.

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ALL SANITARY FORCE MAIN FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE PIPE BEDDING SHALL BE INSTALLED PER DETAIL 42A.

UTILITY NOTES

⋈	19A	EXISTING TO REMAIN
	22C	M.J. ECCENTRIC PLUG VALVE WITH ADJUSTABLE VALVE BOX (SEE SIZES THIS SHEET)
	22D	M.J. TEE WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
	22E	M.J. ECCENTRIC REDUCER, FLAT SIDE ON TOP (SEE SIZES THIS SHEET)
	22F	M.J. CAP/PLUG WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
	22H	45° M.J. BEND WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
	51D	PROTECT EXISTING STRUCTURES AND/OR PIPES DURING DEMOLITION AND CONSTRUCTION PHASES.
	76A	ASPHALT PAVEMENT STRIP WITH FULL DEPTH CLASS 7 BACKFILL.
	76B	CONNECT TO TREATMENT PLANT TANK (REFER TO CONSTRUCTION DRAWINGS PREPARED BY ESI, INC.)
	76C	FLOW CONTROL VALVE
	76G	SOLENOID VALVE

UTILITY DETAILS

29A	ASPHALT DRIVE CUT/REPAIR
29C	GRAVEL DRIVE CUT/REPAIR
30B	JACK & BORE
35A	AIR/VACUUM RELIEF VALVE (SANITARY SEWER)
76A	SANITARY SEWER FORCE MAIN CLEAN-OUT WITH CHECK VALVE
76B	LIFT STATION
76C	CONCRETE CHANNEL WITH DISSIPATORS
36D	TRACER WIRE INSTALLATION

CALL BEFORE YOU DIG 1-800-482-8998 ARKANSAS ONE CALL SYSTEM

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No.7944
DAVID A. TODD
14 Sept 2006

INITIAL DESIGN	4-26-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

CAVE SPRINGS ARKANSAS

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS · PLANNERS · SURVEYORS

3317 S.W. I Street, Bentonville, AR 72712
(479) 273-9472, FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733PRO.DGN

CAVE SPRINGS INTERCEPTOR #1
PLAN AND PROFILE #7

DATE 09-13-06 1:38 PM REV.6

SHEET NO. 11 OF 43

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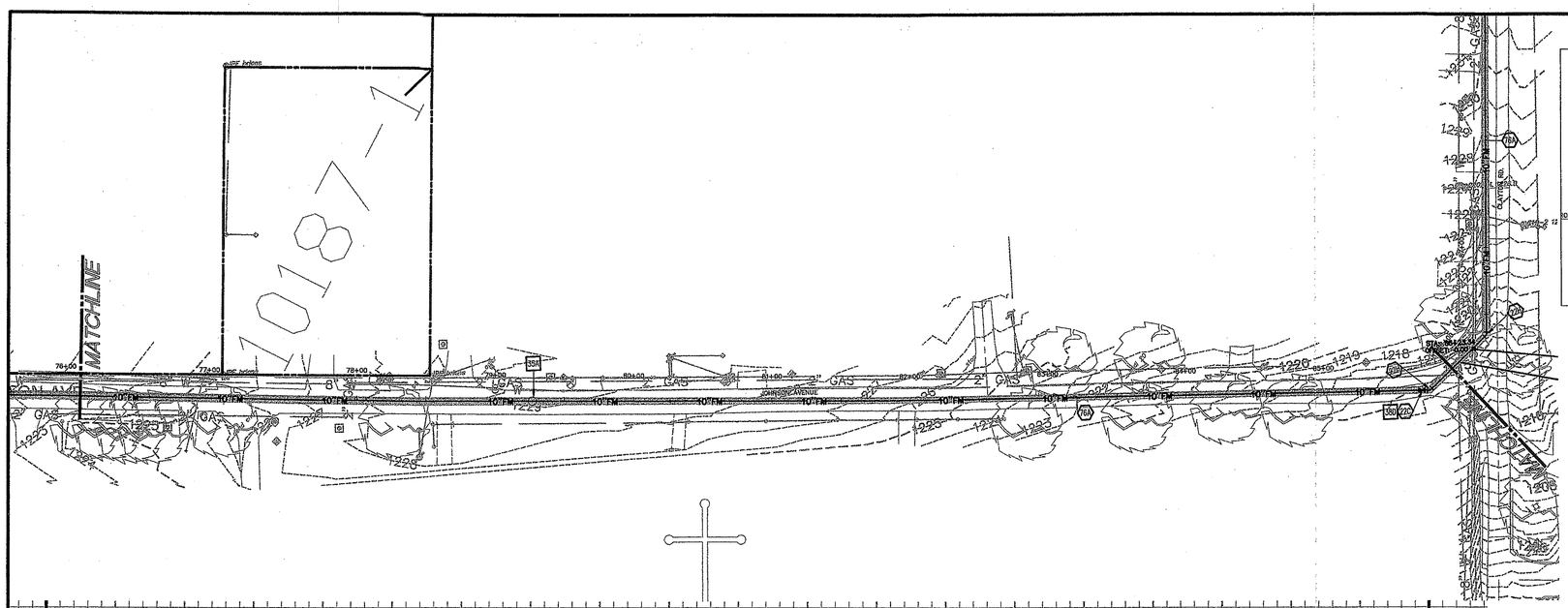

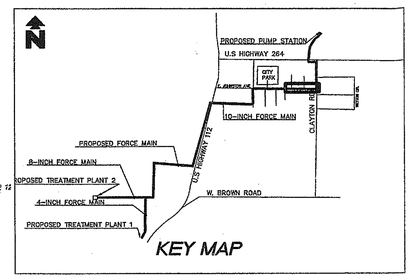

0 50' 75' 100'

SCALE IN FEET

N

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OHE — OVERHEAD ELECTRIC
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- OHT — OVERHEAD TELEPHONE
- OHTV — OVERHEAD TV
- S — SEWER
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- W — WATER
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- EDGE OF ROADWAY

PROPOSED

- PROPERTY LINE
- RIGHT OF WAY LINE
- EASEMENT
- X"S — SANITARY SEWER SERVICE
- X"W — WATER SERVICE

GENERAL UTILITY NOTES

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ALL SANITARY SEWER PIPE BEDDING SHALL BE INSTALLED PER DETAIL 42A.

ALL SANITARY FORCE MAIN FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE PIPE BEDDING SHALL BE INSTALLED PER DETAIL 42A.

UTILITY NOTES

	19A	EXISTING TO REMAIN
⋈	22C	M.J. ECCENTRIC PLUG VALVE WITH ADJUSTABLE VALVE BOX (SEE SIZES THIS SHEET)
⊢	22D	M.J. TEE WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
▸	22E	M.J. ECCENTRIC REDUCER, FLAT SIDE ON TOP (SEE SIZES THIS SHEET)
⊣	22F	M.J. CAP/PLUG WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
∠	22H	45° M.J. BEND WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
	51D	PROTECT EXISTING STRUCTURES AND/OR PIPES DURING DEMOLITION AND CONSTRUCTION PHASES.
	76A	ASPHALT PAVEMENT STRIP WITH FULL DEPTH CLASS 7 BACKFILL
	76B	CONNECT TO TREATMENT PLANT TANK (REFER TO CONSTRUCTION DRAWINGS PREPARED BY ESI, INC.)
	76C	FLOW CONTROL VALVE
	76G	SOLENOID VALVE

UTILITY DETAILS

29A	ASPHALT DRIVE CUT/REPAIR
29C	GRAVEL DRIVE CUT/REPAIR
30B	JACK & BORE
35A	AIR/VACUUM RELIEF VALVE (SANITARY SEWER)
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76B	LIFT STATION
76C	CONCRETE CHANNEL WITH DISSIPATORS
38D	TRACER WIRE INSTALLATION

CALL BEFORE YOU DIG 1-800-482-8998 ARKANSAS ONE CALL SYSTEM

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER No.7944 DAVID A. FOUTS 14 Sept 2006

INITIAL DESIGN	4-26-05	DAT	FF	FF	FF
	DATE	FOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

CAVE SPRINGS ARKANSAS

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS • PLANNERS • SURVEYORS
3317 S.W. I Street (479) 273-9472
Bentonville, AR 72712 FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733PROJ25

CAVE SPRINGS INTERCEPTOR #1
PLAN AND PROFILE #8

DATE 09-13-06 1:38 PM REV.6

SHEET NO. 12 OF 43

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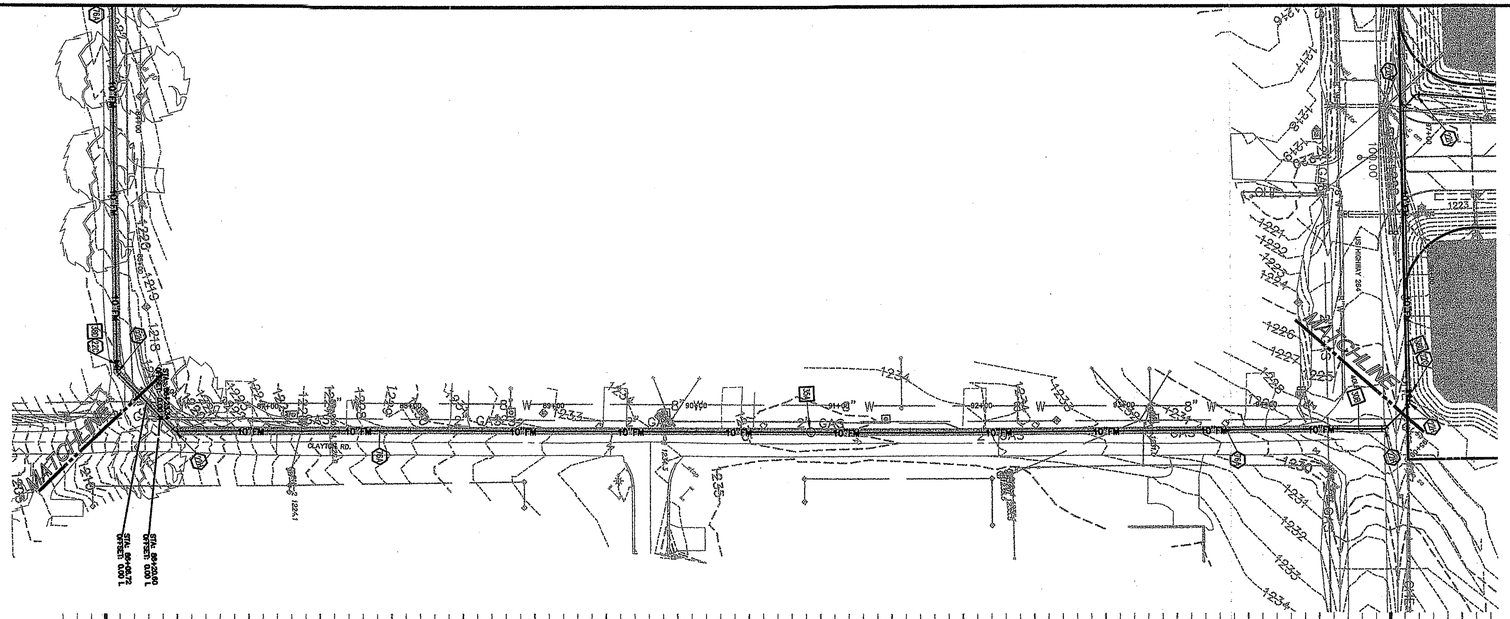

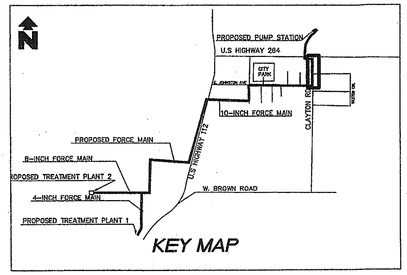

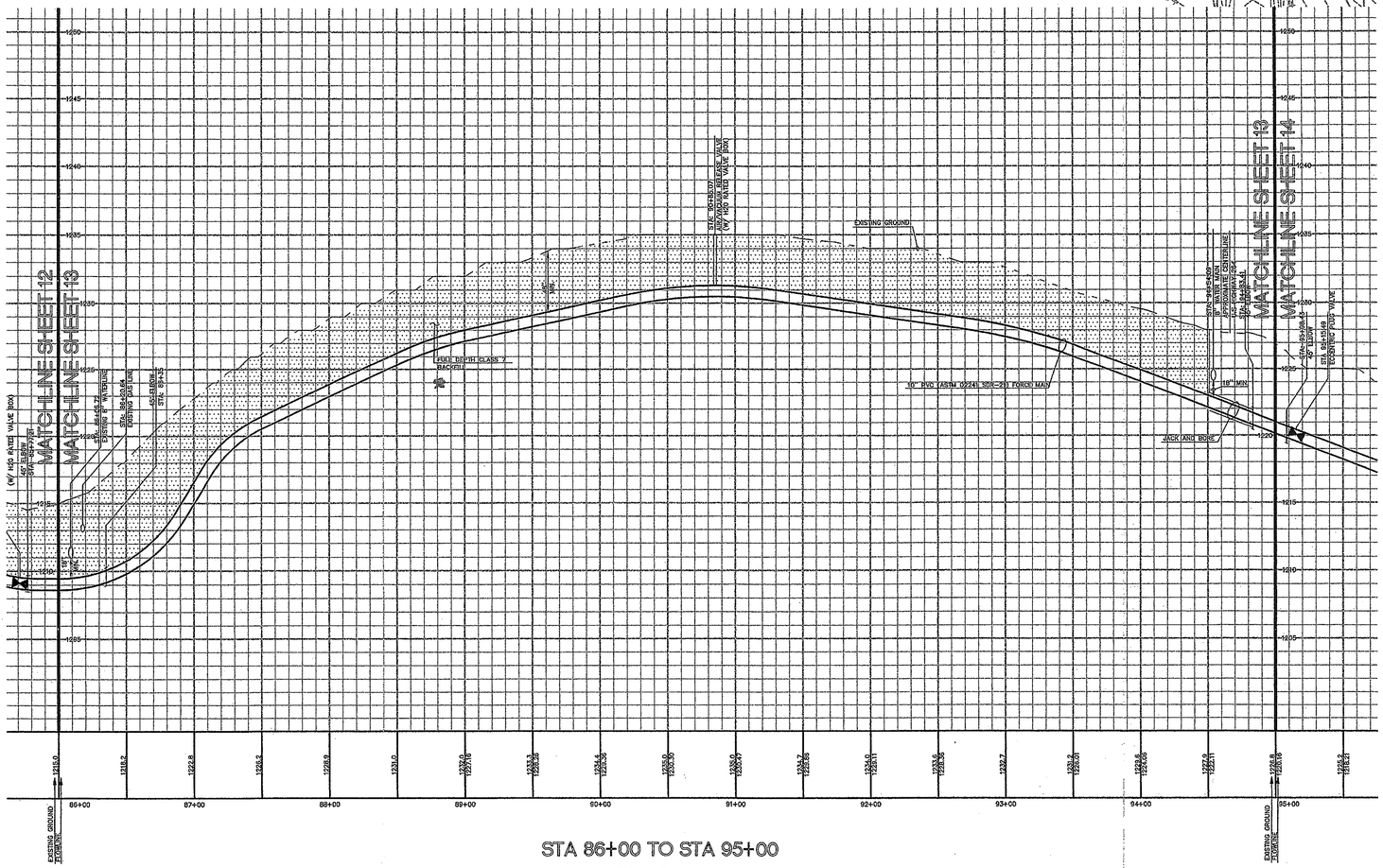
MATCH LINE SHEET 12
MATCH LINE SHEET 13
MATCH LINE SHEET 14
EXISTING GROUND
PIPE DEPTH CLASS 7 BACKFILL
10" PVC (ASTM D2241 SDR-21) FORCE MAIN
JACK AND BORE
STA. 86+00.72 OFFSET: 0.00' L
STA. 89+00.00 OFFSET: 0.00' L
STA. 94+50.09 8" WATER MAIN
STA. 95+08.42 45° ELBOW
STA. 95+19.49 WEDGING PER "WUC"
STA. 86+00.72 EXISTING 8" W/LEDGE
STA. 86+20.84 EXISTING 20X12 TEE
STA. 86+35 45° ELBOW
STA. 87+00 PVC
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STA. 89+45.72 EXISTING 8" W/LEDGE
STA. 89+65.84 EXISTING 20X12 TEE
STA. 89+80 45° ELBOW
STA. 90+00 PVC
(W/ MJ RATED VALVE BOX)
STA. 94+50.09 8" WATER MAIN
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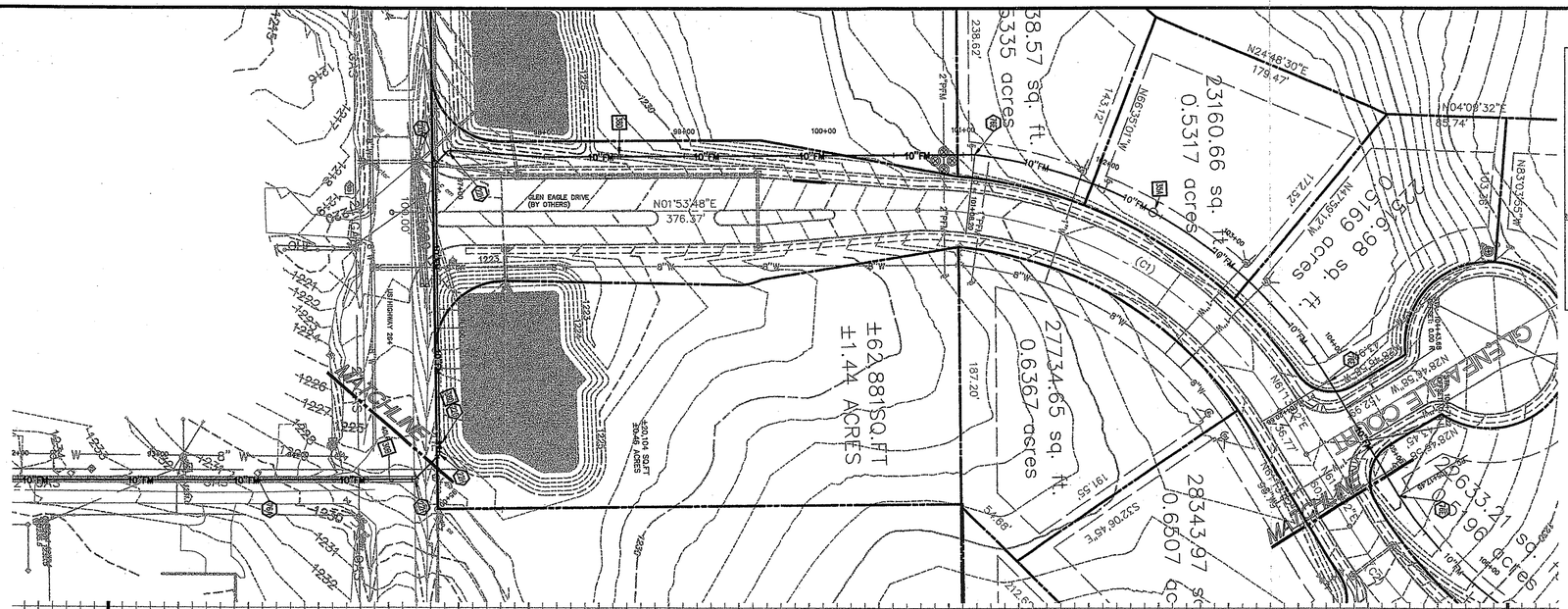
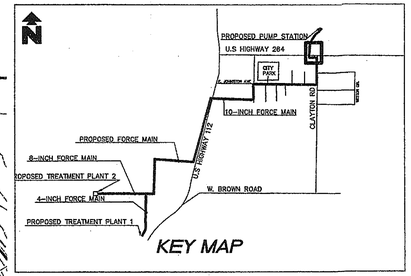
STA. 95+34.49 8" WATER MAIN
STA. 95+34.49 8" GATE VALVE
STA. 95+34.49 FIRE HYDRANT ASSEMBLY
STA. 95+34.49 8" GATE VALVE
STA. 95+34.49 8" WATER MAIN



STA 95+00 TO STA 105+00

HORIZONTAL : 1" = 50'
VERTICAL : 1" = 5'



KEY MAP

0 50' 75' 100'
SCALE IN FEET

LEGEND

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76B	LIFT STATION
76C	CONCRETE CHANNEL WITH DISSIPATORS
39A	TRACER WIRE INSTALLATION

NOTE:
CONTRACTOR SHALL COORDINATE WITH OTTER CREEK CONTRACTOR DURING CONSTRUCTION.

CALL BEFORE YOU DIG
1-800-482-8998
ARKANSAS ONE CALL SYSTEM

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No.7944
DAVID A. TODD
14 Sept 2006

INITIAL DESIGN	4-26-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

CAVE SPRINGS ARKANSAS

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS • PLANNERS • SURVEYORS

3317 S.W. I Street, Bentonville, AR 72712
(479) 273-9472 FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733PRO25

CAVE SPRINGS INTERCEPTOR #1
PLAN AND PROFILE #10

DATE 09-13-06 1:38 PM REV.6

SHEET NO. 14 OF 43

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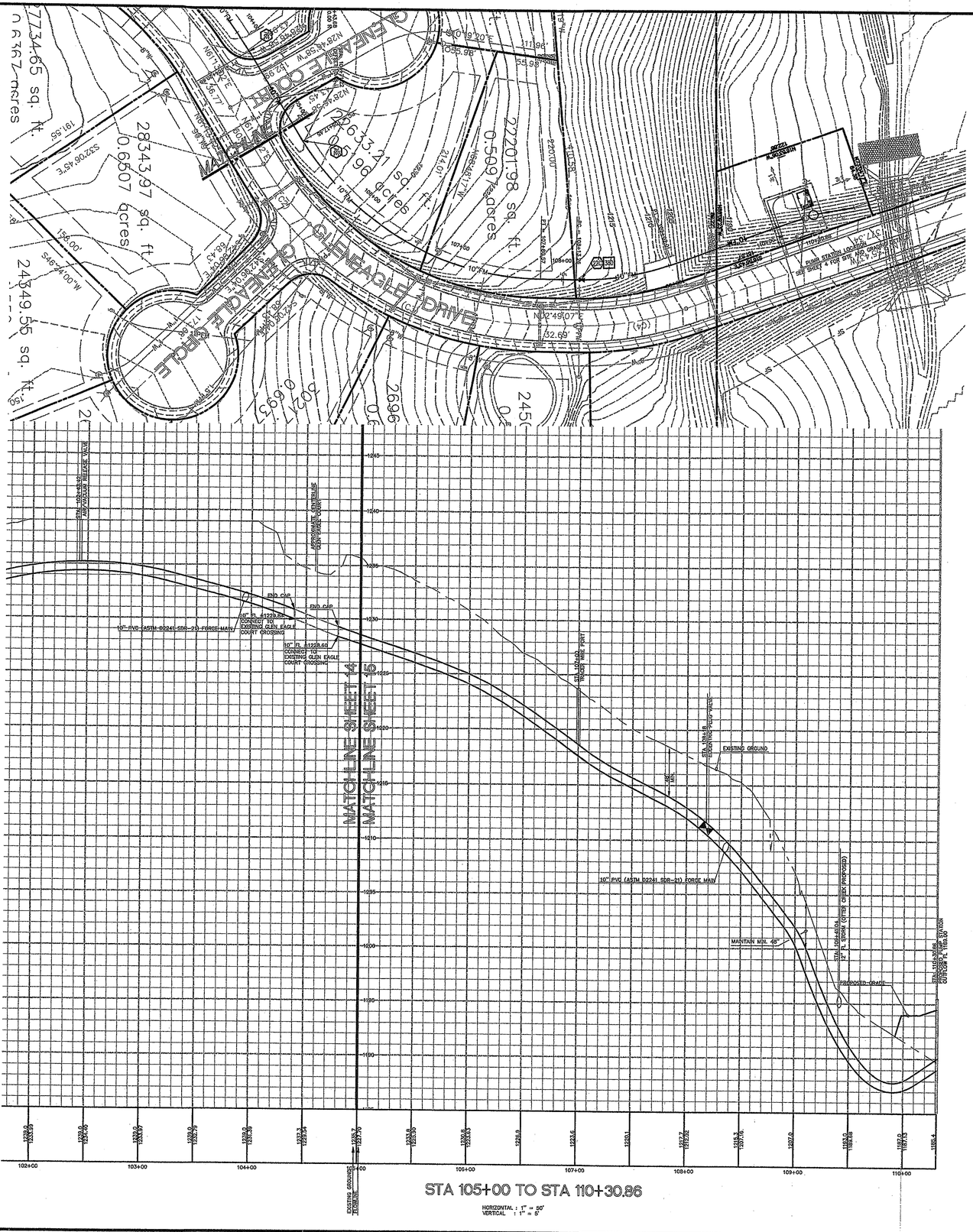

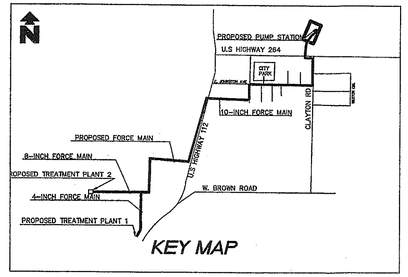

0 50' 75' 100'
SCALE IN FEET

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OHE — OVERHEAD ELECTRIC
- OHE&T — OVERHEAD ELECTRIC AND TELEPHONE
- OHT — OVERHEAD TELEPHONE
- OHTV — OVERHEAD TV
- X"S — SEWER
- UGE — UNDERGROUND ELECTRIC
- UGE&T — UNDERGROUND ELECTRIC AND TELEPHONE
- UGT — UNDERGROUND TELEPHONE
- UGTV — UNDERGROUND TV
- X"W — WATER
- .5-10-11 50.5 — TREE INFO (.5 = DIAMETER OF TRUNK IN FEET; 10 = HEIGHT OF TREE IN FEET; 11 = CANOPY DIAMETER IN FEET; 50.5 = ELEVATION AT BASE OF TREE)
- EDGE OF ROADWAY

PROPOSED

- PROPERTY LINE
- RIGHT OF WAY LINE
- EASEMENT
- X"S — SANITARY SEWER SERVICE
- X"W — WATER SERVICE

GENERAL UTILITY NOTES

A. ALL WASTEWATER LINES 4" AND SMALLER SHALL BE PVC (ASTM D2241 SDR-21) WITH 36" MIN. COVER. ALL WASTEWATER LINES LARGER THAN 4" SHALL BE PVC (ASTM D2241 SDR-21) WITH 48" MIN. COVER.

B. ALL SANITARY SEWER LINES AT CREEK AND ROAD CROSSING SHALL BE PVC (ASTM D2241 DR-14) WITH 60" MIN. COVER.

A. ALL WATER LINES SHALL BE PVC (AWWA C-900) WITH 48" MIN. COVER.

C. CONTRACTOR SHALL COORDINATE ANY DISRUPTIONS TO EXISTING UTILITY SERVICES WITH ADJACENT PROPERTY OWNERS.

D. CONSTRUCTION SHALL NOT START ON ANY PUBLIC UTILITY SYSTEM UNTIL WRITTEN APPROVAL HAS BEEN RECEIVED BY THE ENGINEER FROM THE APPROPRIATE GOVERNING AUTHORITY AND CONTRACTOR HAS BEEN NOTIFIED BY THE ENGINEER.

E. PRIOR TO THE CONSTRUCTION OF OR CONNECTION TO ANY STORM DRAIN, SANITARY SEWER, WATER MAIN OR ANY OF THE DRY UTILITIES, THE CONTRACTOR SHALL EXCAVATE, VERIFY, AND CALCULATE ALL POINTS OF CONNECTION AND ALL UTILITY CROSSINGS AND INFORM CEI ENGINEERING AND THE OWNER/DEVELOPER OF ANY CONFLICT OR REQUIRED DEVIATIONS FROM THE PLANS. NOTIFICATION SHALL BE MADE A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION. CEI ENGINEERING AND ITS CLIENTS SHALL BE HELD HARMLESS IN THE EVENT THAT THE CONTRACTOR FAILS TO MAKE SUCH NOTIFICATION.

F. UNLESS OTHERWISE SHOWN, CALLED OUT OR SPECIFIED HEREON OR WITHIN SPECIFICATIONS:

ALL SANITARY SEWER PIPE BEDDING SHALL BE INSTALLED PER DETAIL 42A.

ALL SANITARY FORCE MAIN FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE PIPE BEDDING SHALL BE INSTALLED PER DETAIL 42A.

UTILITY NOTES

	19A	EXISTING TO REMAIN
⋈	22C	M.J. ECCENTRIC PLUG VALVE WITH ADJUSTABLE VALVE BOX (SEE SIZES THIS SHEET)
⊥	22D	M.J. TEE WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
▸	22E	M.J. ECCENTRIC REDUCER, FLAT SIDE ON TOP (SEE SIZES THIS SHEET)
⊣	22F	M.J. CAP/PLUG WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
∢	22H	45° M.J. BEND WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
	51D	PROTECT EXISTING STRUCTURES AND/OR PIPES DURING DEMOLITION AND CONSTRUCTION PHASES.
	76A	ASPHALT PAVEMENT STRIP WITH FULL DEPTH CLASS 7 BACKFILL.
	76B	CONNECT TO TREATMENT PLANT TANK (REFER TO CONSTRUCTION DRAWINGS PREPARED BY ESI, INC.)
	76C	FLOW CONTROL VALVE
	76G	SOLENOID VALVE

UTILITY DETAILS

29A	ASPHALT DRIVE CUT/REPAIR
29C	GRAVEL DRIVE CUT/REPAIR
30B	JACK & BORE
35A	AIR/VACUUM RELIEF VALVE (SANITARY SEWER)
76A	SANITARY SEWER FORCE MAIN CLEAN-OUT WITH CHECK VALVE
76B	LIFT STATION
76C	CONCRETE CHANNEL WITH DISSIPATORS
38D	TRACER WIRE INSTALLATION

NOTE:
CONTRACTOR SHALL COORDINATE WITH OTTER CREEK CONTRACTOR DURING CONSTRUCTION.

CALL BEFORE YOU DIG 1-800-482-8998 ARKANSAS ONE CALL SYSTEM

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No.7944
DAVID A. TODD
David A. Todd
14 Sept 2006

INITIAL DESIGN	4-26-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1
CAVE SPRINGS ARKANSAS

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS • PLANNERS • SURVEYORS

3317 S.W. I Street, Bentonville, AR 72712 (479) 273-9472 FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733PRO.25

CAVE SPRINGS INTERCEPTOR #1
PLAN AND PROFILE #11

DATE 09-13-06 1:38 PM REV.6

SHEET NO. 15 OF 43

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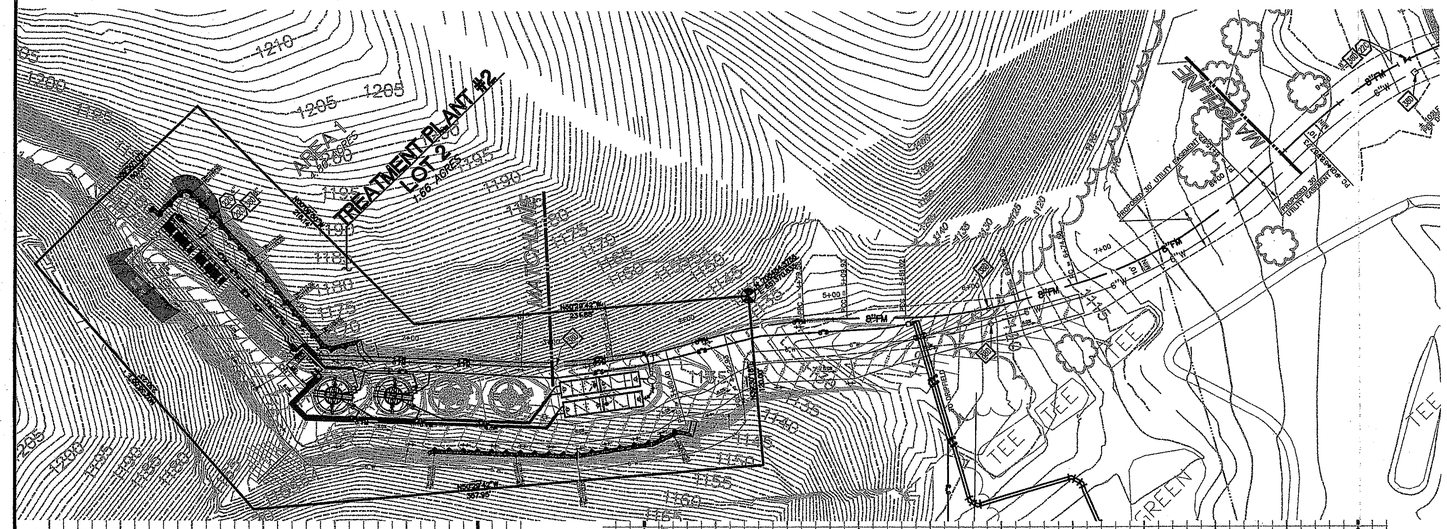
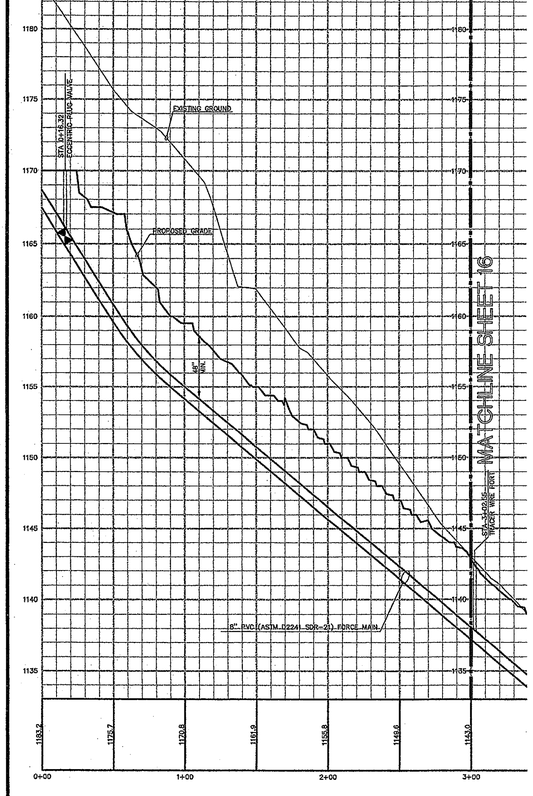
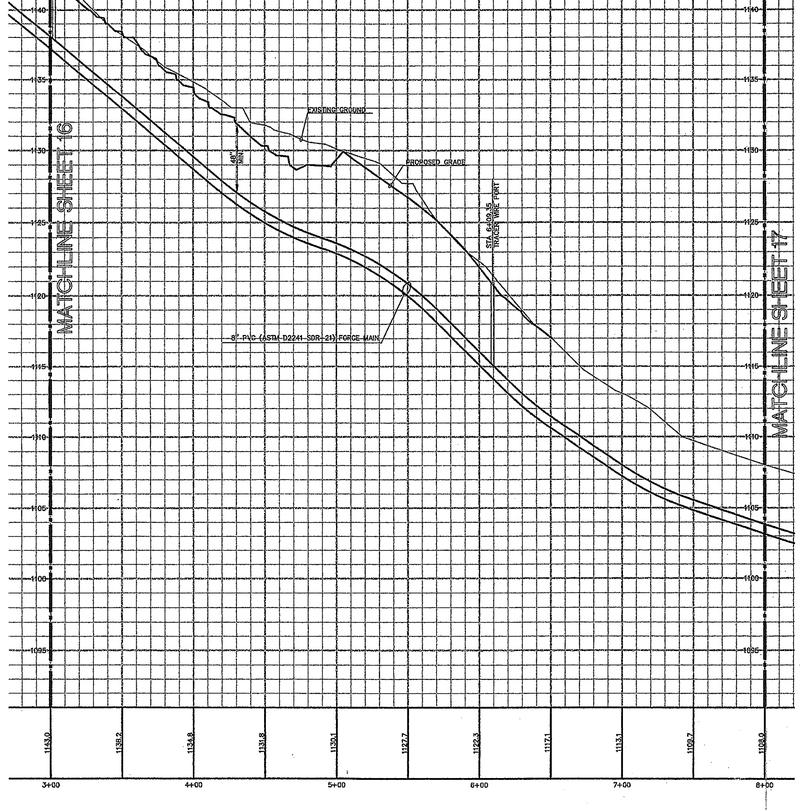




TREATMENT PLANT #2 INTERCEPTOR LINE STA 0+00 TO STA 3+00

HORIZONTAL : 1" = 50'
VERTICAL : 1" = 5'



TREATMENT PLANT #2 INTERCEPTOR LINE STA 3+00 TO STA 8+00

HORIZONTAL : 1" = 50'
VERTICAL : 1" = 5'

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OHE
- OHE&T
- OHT
- OHTV
- SEWER
- UGE
- UGE&T
- UGT
- UGTV
- WATER
- .5–10–11 50.5 TREE INFO .5 = DIAMETER OF TRUNK IN FEET 10 = HEIGHT OF TREE IN FEET 11 = CANOPY DIAMETER IN FEET 50.5 = ELEVATION AT BASE OF TREE
- EDGE OF ROADWAY

PROPOSED

- PROPERTY LINE
- RIGHT OF WAY LINE
- EASEMENT
- SANITARY SEWER SERVICE
- WATER SERVICE

GENERAL UTILITY NOTES

A. ALL WASTEWATER LINES 4" AND SMALLER SHALL BE PVC (ASTM D2241 SDR-21) WITH 30" MIN. COVER. ALL WASTEWATER LINES LARGER THAN 4" SHALL BE PVC (ASTM D2241 SDR-21) WITH 48" MIN. COVER.

B. ALL SANITARY SEWER LINES AT CREEK AND ROAD CROSSING SHALL BE PVC (ASTM D2241 DR-14) WITH 60" MIN. COVER.

A. ALL WATER LINES SHALL BE PVC (AWWA C-900) WITH 48" MIN. COVER.

C. CONTRACTOR SHALL COORDINATE ANY DISRUPTIONS TO EXISTING UTILITY SERVICES WITH ADJACENT PROPERTY OWNERS.

D. CONSTRUCTION SHALL NOT START ON ANY PUBLIC UTILITY SYSTEM UNTIL WRITTEN APPROVAL HAS BEEN RECEIVED BY THE ENGINEER FROM THE APPROPRIATE GOVERNING AUTHORITY AND CONTRACTOR HAS BEEN NOTIFIED BY THE ENGINEER.

E. PRIOR TO THE CONSTRUCTION OF OR CONNECTION TO ANY STORM DRAIN, SANITARY SEWER, WATER MAIN OR ANY OF THE DRY UTILITIES, THE CONTRACTOR SHALL EXCAVATE, VERIFY AND CALCULATE ALL POINTS OF CONNECTION AND ALL UTILITY CROSSINGS AND INFORM CEI ENGINEERING AND THE OWNER/DEVELOPER OF ANY CONFLICT OR REQUIRED DEVIATIONS FROM THE PLANS. NOTIFICATION SHALL BE MADE A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION. CEI ENGINEERING AND ITS CLIENTS SHALL BE HELD HARMLESS IN THE EVENT THAT THE CONTRACTOR FAILS TO MAKE SUCH NOTIFICATION.

F. UNLESS OTHERWISE SHOWN, CALLED OUT OR SPECIFIED HEREON OR WITHIN SPECIFICATIONS:

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ALL SANITARY FORCE MAIN FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE PIPE BEDDING SHALL BE INSTALLED PER DETAIL 42A.

UTILITY NOTES

	19A	EXISTING TO REMAIN
⋈	22C	M.J. ECCENTRIC PLUG VALVE WITH ADJUSTABLE VALVE BOX (SEE SIZES THIS SHEET)
⊢	22D	M.J. TEE WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
▸	22E	M.J. ECCENTRIC REDUCER, FLAT SIDE ON TOP (SEE SIZES THIS SHEET)
⊣	22F	M.J. CAP/PLUG WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
⊾	22H	45° M.J. BEND WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
	59A	~~MAINTAIN EXISTING STRUCTURE/REPAIR~~ PIPES DURING DEMOLITION AND CONSTRUCTION PHASES.
DEMOLITION	76A	ASPHALT PAVEMENT STRIP WITH FULL DEPTH CLASS 7 BACKFILL.
	76B	CONNECT TO TREATMENT PLANT TANK (REFER TO CONSTRUCTION DRAWINGS PREPARED BY ESI, INC.)
	76C	FLOW CONTROL VALVE
	76G	SOLENOID VALVE

UTILITY DETAILS

- 29A ASPHALT DRIVE CUT/REPAIR
- 28C GRAVEL DRIVE CUT/REPAIR
- 30B JACK & BORE
- 35A AIR/VACUUM RELIEF VALVE (SANITARY SEWER)
- 76A SANITARY SEWER FORCE MAIN CLEAN-OUT WITH CHECK VALVE
- 76B LIFT STATION
- 76C CONCRETE CHANNEL WITH DISSIPATORS
- 38D TRACER WIRE INSTALLATION

CALL BEFORE YOU DIG 1-800-482-8998 ARKANSAS ONE CALL SYSTEM

INITIAL DESIGN	4-26-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS • PLANNERS • SURVEYORS
3317 S.W. I Street, Bentonville, AR 72712
(479) 273-9472 FAX (479) 273-0844
JOB NO.: 20733.0
DWG NAME: 20733PRO1

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No.7944
DANIEL A. TODD
14 Sept 2006

8-INCH INTERCEPTOR (TP2) PLAN AND PROFILE 1

DATE 09-14-06 09:23 AM REV.6

SHEET NO. 16 OF 43

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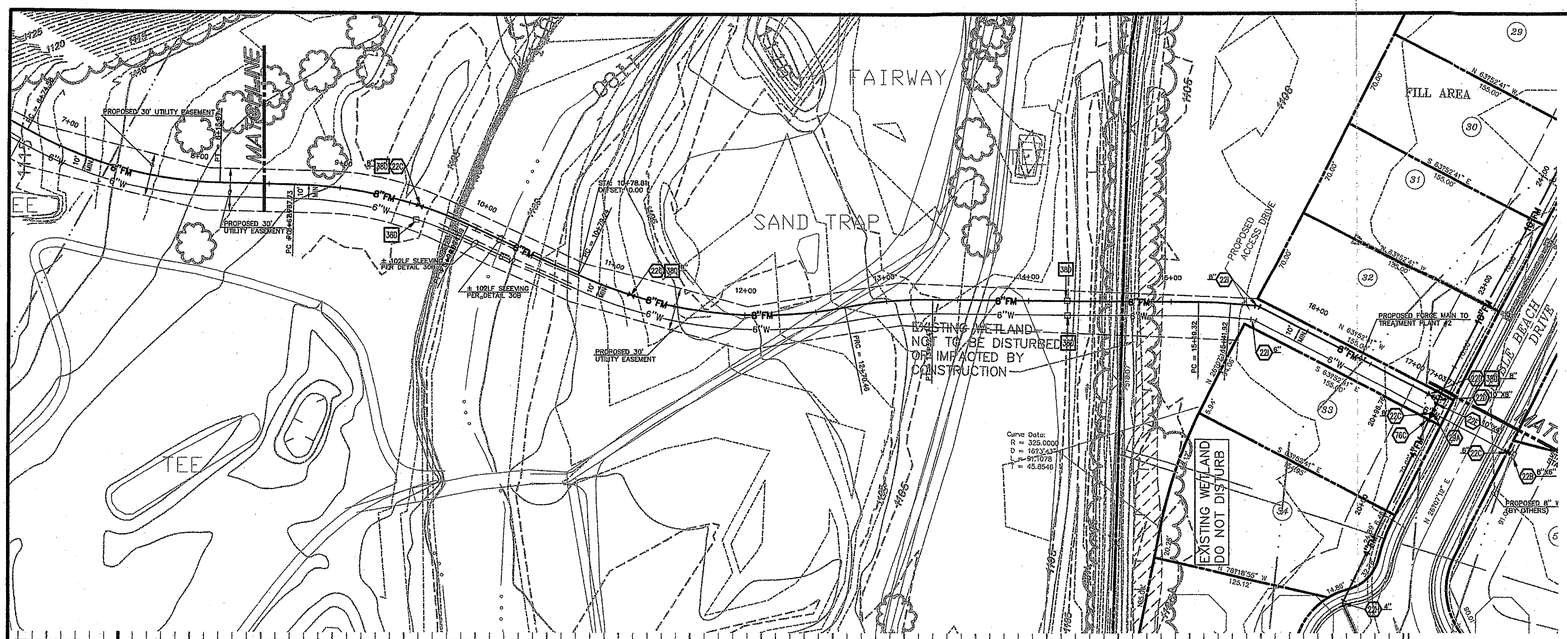

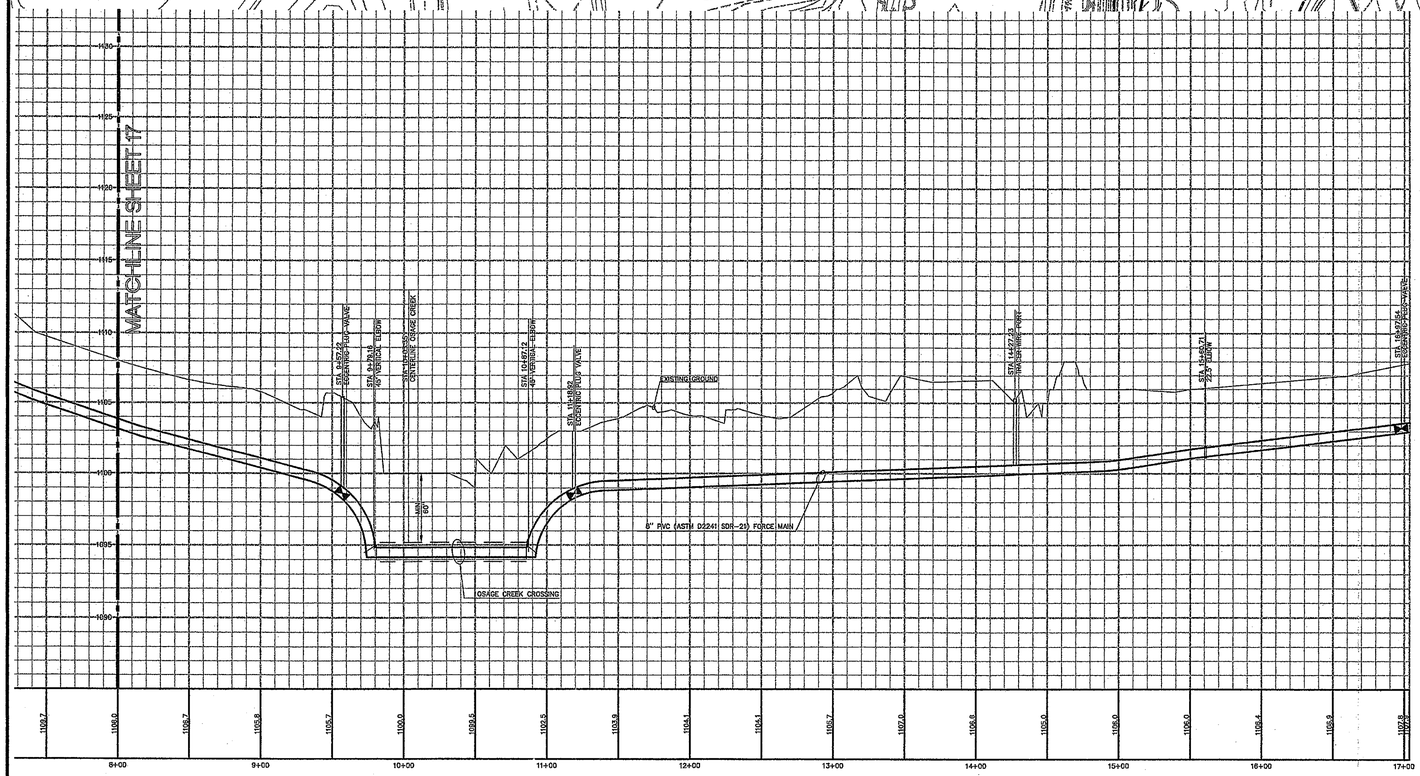

TREATMENT PLANT #2 INTERCEPTOR LINE
STA 8+00 TO STA 14+35.41

HORIZONTAL : 1" = 50'
VERTICAL : 1" = 5'

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- X"G — GAS
- OHE — OVERHEAD ELECTRIC
- OHE&T — OVERHEAD ELECTRIC AND TELEPHONE
- OHT — OVERHEAD TELEPHONE
- OHTV — OVERHEAD TV
- X"S — SEWER
- UGE — UNDERGROUND ELECTRIC
- UGE&T — UNDERGROUND ELECTRIC AND TELEPHONE
- UGT — UNDERGROUND TELEPHONE
- UGTV — UNDERGROUND TV
- X"W — WATER
- .5-10-11 50.5 — TREE INFO: .5 = DIAMETER OF TRUNK IN FEET; 10 = HEIGHT OF TREE IN FEET; 11 = CANOPY DIAMETER IN FEET; 50.5 = ELEVATION AT BASE OF TREE
- EDGE OF ROADWAY

PROPOSED

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- RIGHT OF WAY LINE
- EASEMENT
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ALL SANITARY FORCE MAIN FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKING PER DETAIL 31C.

ALL WATER LINE PIPE BEDDING SHALL BE INSTALLED PER DETAIL 42A.

UTILITY NOTES

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⊤	22D	M.J. TEE WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
▸	22E	M.J. ECCENTRIC REDUCER, FLAT SIDE ON TOP (SEE SIZES THIS SHEET)
⊣	22F	M.J. CAP/PLUG WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
⌐	22H	45° M.J. BEND WITH THRUST BLOCKING (SEE SIZES THIS SHEET)
	51D	PROTECT EXISTING STRUCTURES AND/OR PIPES DURING DEMOLITION AND CONSTRUCTION PHASES.
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	76B	CONNECT TO TREATMENT PLANT TANK (REFER TO CONSTRUCTION DRAWINGS PREPARED BY ESI, INC.)
	76C	FLOW CONTROL VALVE
	76G	SOLENOID VALVE

UTILITY DETAILS

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29C	GRAVEL DRIVE CUT/REPAIR
30B	JACK & BORE
35A	AIR/VACUUM RELIEF VALVE (SANITARY SEWER)
76A	SANITARY SEWER FORCE MAIN CLEAN-OUT WITH CHECK VALVE
76B	LIFT STATION
76C	CONCRETE CHANNEL WITH DISSIPATORS
38D	TRACER WIRE INSTALLATION

CALL BEFORE YOU DIG 1-800-482-8998 ARKANSAS ONE CALL SYSTEM

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No.7944
David A. Tosh
14 Sept. 2006

INITIAL DESIGN	4-26-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS · PLANNERS · SURVEYORS

3317 S.W. I Street
Bentonville, AR 72712
(479) 273-9472
FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733PROJ25

8-INCH INTERCEPTOR (TP2) PLAN AND PROFILE 2

DATE 09-13-06 1:38 PM REV.6

SHEET NO. 17 OF 43

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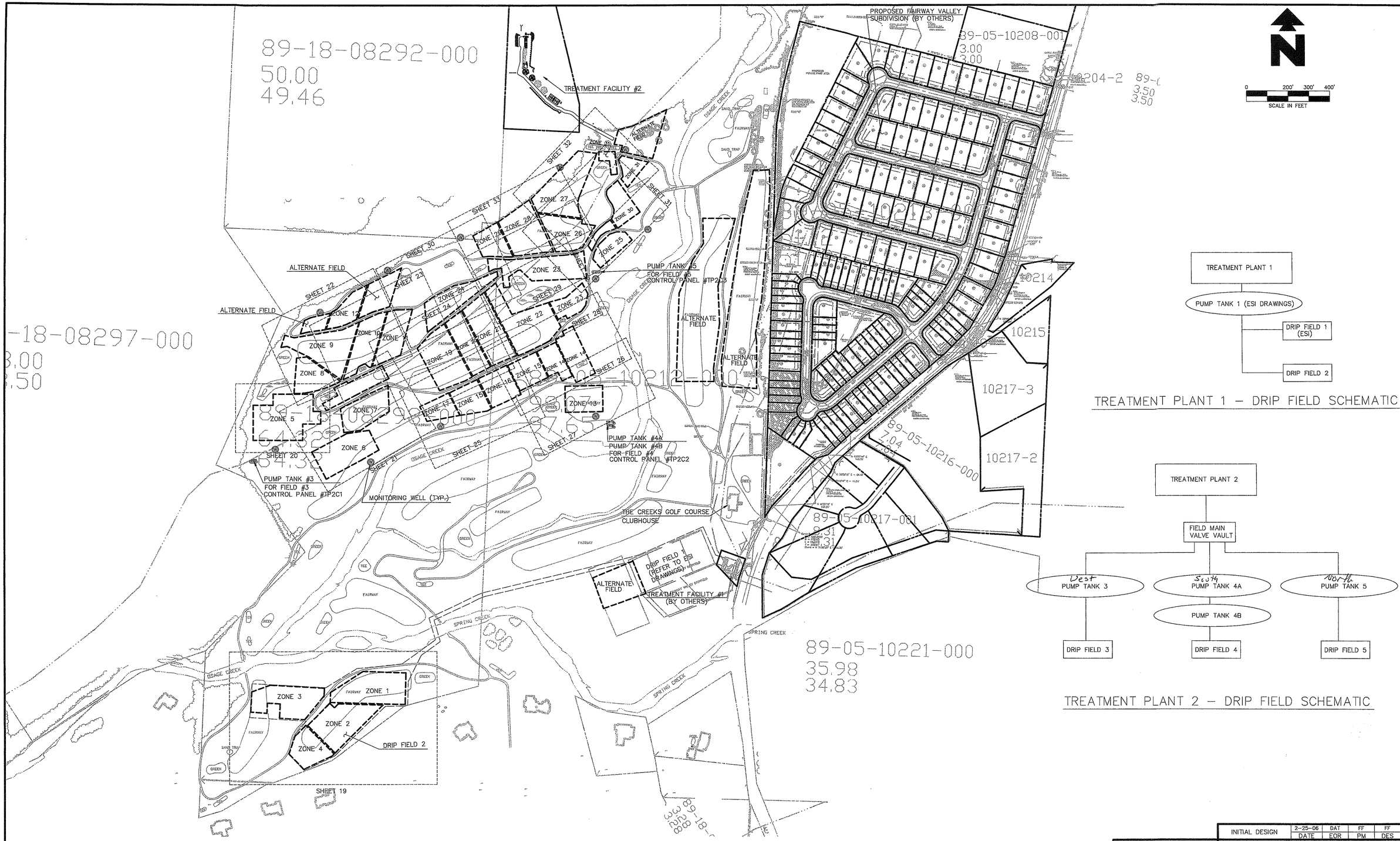

TREATMENT PLANT 1 – DRIP FIELD SCHEMATIC

TREATMENT PLANT 2 – DRIP FIELD SCHEMATIC

INITIAL DESIGN	2-25-06	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1
U.S HIGHWAY 12

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS • PLANNERS • SURVEYORS

3317 S.W. 1 Street
Bentonville, AR 72712
(479) 273-9472
FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733OVERALLEACH

DRIP FIELD OVERALL LAYOUT

DATE 08-21-06 10:56 AM REV5

SHEET NO. 18 OF 43

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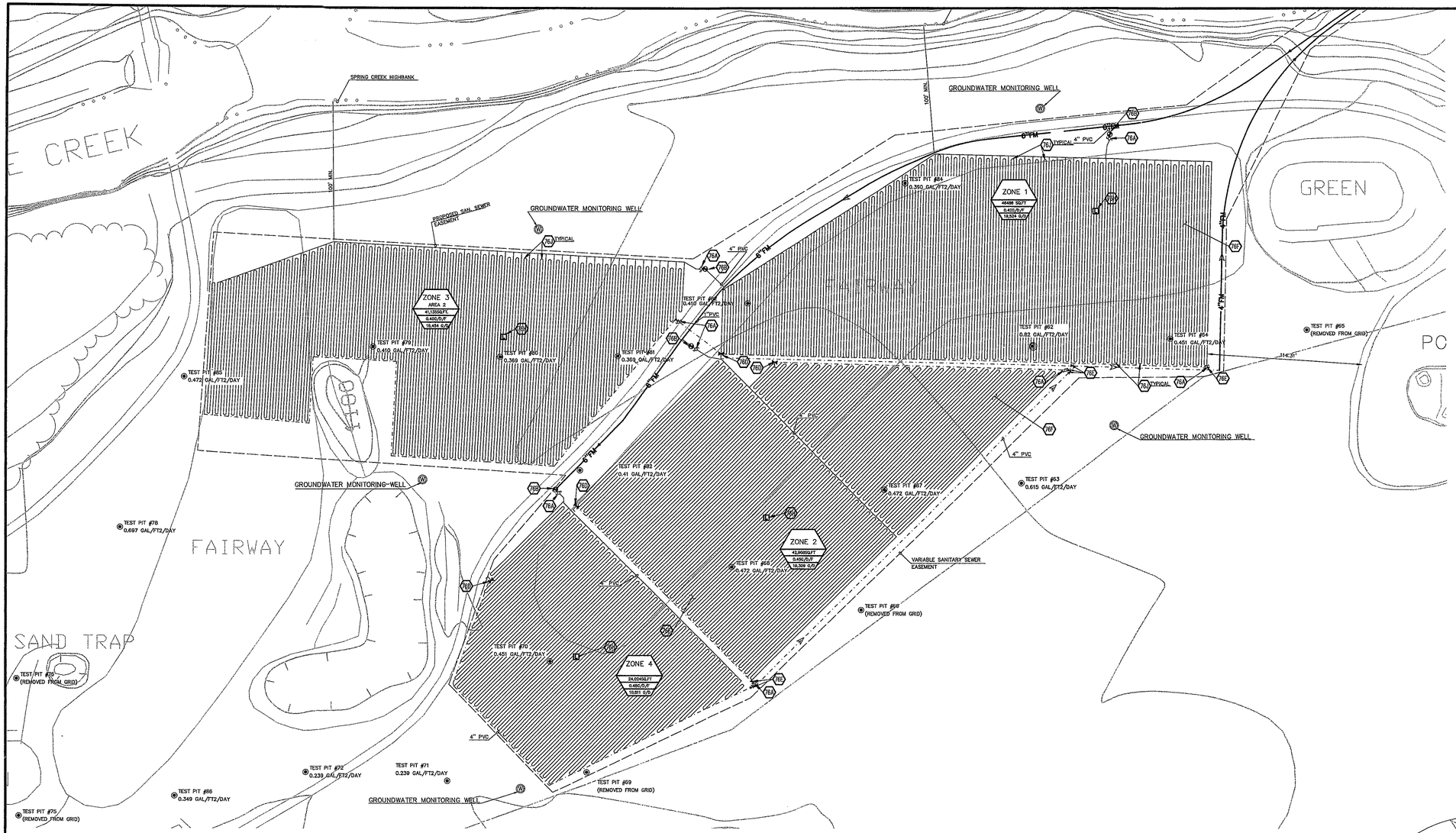

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OHE — OVERHEAD ELECTRIC
- OHE&T — OVERHEAD ELECTRIC AND TELEPHONE
- OHT — OVERHEAD TELEPHONE
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- SEWER
- UGE — UNDERGROUND ELECTRIC
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- UGT — UNDERGROUND TELEPHONE
- UGTV — UNDERGROUND TV
- WATER
- .5-10-11 50.5 — TREE INFO: .5 = DIAMETER OF TRUNK IN FEET; 10 = HEIGHT OF TREE IN FEET; 11 = CANOPY DIAMETER IN FEET; 50.5 = ELEVATION AT BASE OF TREE

PROPOSED

- BOUNDARY LINE
- RIGHT OF WAY LINE
- EASEMENT
- PVC SUPPLY MANIFOLD
- PVC RETURN MANIFOLDS
- DIRECTION OF FLOW

GENERAL UTILITY NOTES

A. ALL DRIPLINE SHALL BE 1/2" GEOFLOW WASTEFLOW PC (MODEL NO. WFPC16-2-24) WITH DRIP EMITTERS SPACED EVERY 2'.

B. DRIPLINE AND MANIFOLDS SHALL BE INSTALLED 10"-12" BELOW SOIL SURFACE

C. ALL CONNECTIONS WITH DRIPLINE SHALL BE MADE WITH LOCKSLIP ADAPTERS. USE OF ADHESIVES ON DRIPLINE IS NOT ALLOWED.

D. DO NOT USE TOOLS ON LOCKSLIP ADAPTERS. HAND TIGHTEN ONLY.

E. TRENCH WIDTH FOR DRIPLINE BURIAL SHALL NOT EXCEED 4".

F. ALL SECTIONS OF SUPPLY AND RETURN MANIFOLDS NOT TIED DIRECTLY TO THE DRIPLINES SHALL BE INSTALLED AT A MINIMUM OF 24" BELOW GRADE.

G. VACUUM BREAKER/AIR RELEASE VALVES SHALL BE INSTALLED AT ALL HIGH POINTS IN SUPPLY AND RETURN MANIFOLD LINES.

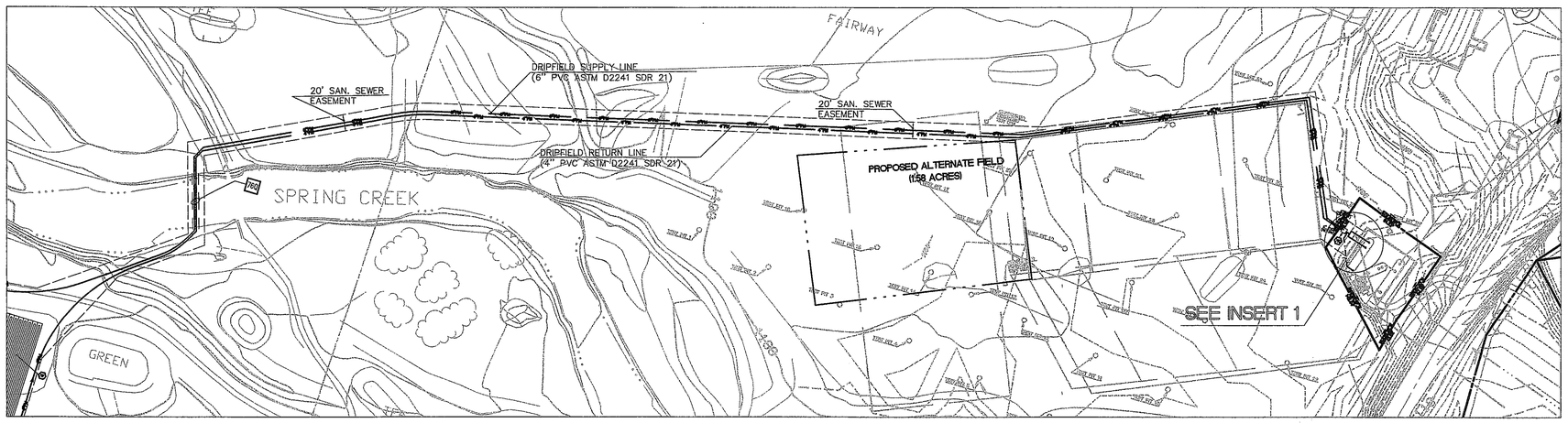
H. TERRAIN IN DRIP FIELD IS NEARLY FLAT. LAY DRIP TUBING AS CLOSE TO PARALLEL WITH CONTOURS AS POSSIBLE.

I. ALL MANIFOLDS SHALL BE 4-INCH PVC, UNLESS OTHERWISE INDICATED.

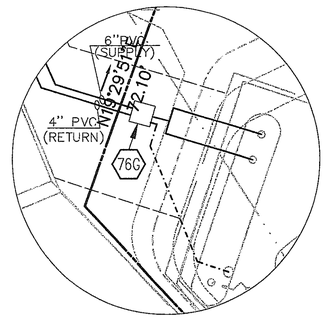
UTILITY NOTES

76A	PRESSURE INDICATING DEVICE
76B	ZONE VALVE (ZOELLER)
76D	AIR/VACUUM RELEASE VALVE
76E	CHECK VALVE
76F	GEOFLOW DRIP LINE (SPACED 2' O.C)
76G	ULTRA HEADWORKS BOX W/ GEOVAC FILTER
76H	FIELD LYSIMETER
76I	SOLENOID VALVE FOR FLUSHING
76J	FIELD LINE LOOP
76K	PUMP TANK (SEE SPECIFICATIONS)

FAIRWAY VALLEY – FAIRWAYS #13 AND #14		
DRIP FIELD SOIL LOADING RATES		
NO.	DESCRIPTION	LOADING RATE (GAL/FT2/DAY)
62	BRIEF SWT @40"	0.820
63	BRIEF SWT @30"	0.615
64	BRIEF SWT @22"	0.451
65	DELETED	--
66	DELETED	--
67	BRIEF SWT @23"	0.472
68	BRIEF SWT @23"	0.472
69	DELETED	--
70	BRIEF SWT @ 22"	0.451
71	BSWT @ 22"; MSWT @ 35"	0.239
72	BSWT @ 20"; MSWT @ 35"	0.239
73	BSWT @ 20"; MSWT @ 29"	0.198
74	BRIEF SWT @21"	0.431
75	DELETED	--
76	DELETED	--
77	BSWT @ 19"; MSWT @ 33"	0.226
78	BRIEF SWT 34"	0.697
79	BRIEF SWT 20"	0.410
80	BRIEF SWT 18"	0.369
81	BRIEF SWT 18"	0.369
82	BRIEF SWT 20"	0.410
83	BRIEF SWT 19"	0.390
84	BRIEF SWT 19"	0.390
85	BRIEF SWT 23"	0.472
86	BRIEF SWT 17"	0.349



PROPOSED LINE FROM TREATMENT PLANT #1 TO EXPANDED DRIPFIELD (FAIRWAY 13)



INSERT 1
SCALE : 1" = 20'

INITIAL DESIGN	1-15-06	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM-PHASE 1

CAVE SPRINGS ARKANSAS

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER FERDINAND FOURIE No. 12538 11-7-06

CEI® ENGINEERING ASSOCIATES, INC

ENGINEERS • PLANNERS • SURVEYORS

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JOB NO.: 20733.0

DWG NAME: 20733LEAG1_REV2

DRIP FIELD LAYOUT 1

DATE 11-06-06 10:07 PM REV5

SHEET NO. 19 OF 43

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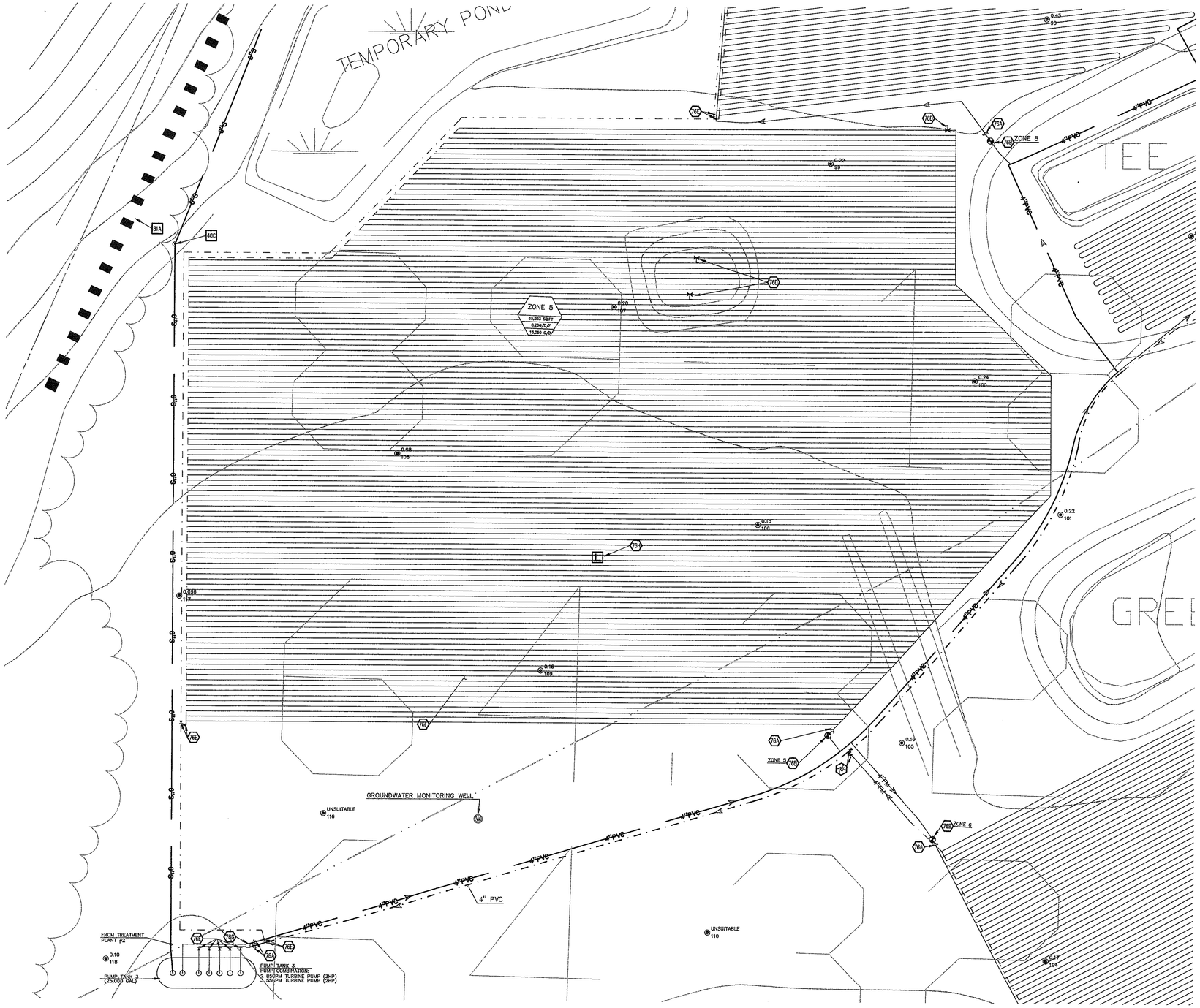

EFFLUENT DISPOSAL FIELD #3
ZONE 5

NOTE:
OVERALL EFFLUENT DISPOSAL FIELD LAYOUT IS ON SHEET 18

TOTAL GRIPFIELD REQUIRED (TREATMENT PLANT #2)	917,038 SQ.FT
TOTAL ALTERNATE FIELD PROVIDED (TREATMENT PLANT #2)	273,377 SQ.FT
ALTERNATE FIELD RATIO (TREATMENT PLANT #2)	30%

N

0 20' 30' 40'
SCALE IN FEET

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OHE — OVERHEAD ELECTRIC
- OHE,T — OVERHEAD ELECTRIC AND TELEPHONE
- OHT — OVERHEAD TELEPHONE
- OHTV — OVERHEAD TV
- SEWER
- UGE — UNDERGROUND ELECTRIC
- UGE,T — UNDERGROUND ELECTRIC AND TELEPHONE
- UGT — UNDERGROUND TELEPHONE
- UGTV — UNDERGROUND TV
- WATER
- .5-10-11 50.5 — TREE INFO
  .5 = DIAMETER OF TRUNK IN FEET
  10 = HEIGHT OF TREE IN FEET
  11 = CANOPY DIAMETER IN FEET
  50.5 = ELEVATION AT BASE OF TREE

PROPOSED

- BOUNDARY LINE
- RIGHT OF WAY LINE
- EASEMENT
- PVC SUPPLY MANIFOLD
- PVC RETURN MANIFOLDS
- DIRECTION OF FLOW
- PERC TEST LOCATION

GENERAL UTILITY NOTES

A. ALL DRIPLINE SHALL BE 1/2" GEOFLOW WASTEFLOW PC (MODEL NO. WFPC16-2-24) WITH DRIP EMITTERS SPACED EVERY 2'.

B. DRIPLINE AND MANIFOLDS SHALL BE INSTALLED 10"-12" BELOW SOIL SURFACE

C. ALL CONNECTIONS WITH DRIPLINE SHALL BE MADE WITH LOCKSLIP ADAPTERS. USE OF ADHESIVES ON DRIPLINE IS NOT ALLOWED.

D. DO NOT USE TOOLS ON LOCKSLIP ADAPTERS. HAND TIGHTEN ONLY.

E. TRENCH WIDTH FOR DRIPLINE BURIAL SHALL NOT EXCEED 4".

F. ALL SECTIONS OF SUPPLY AND RETURN MANIFOLDS NOT TIED DIRECTLY TO THE DRIPLINES SHALL BE INSTALLED AT A MINIMUM OF 24" BELOW GRADE.

G. VACUUMBREAKER/AIR RELEASE VALVES SHALL BE INSTALLED AT ALL HIGH POINTS IN SUPPLY AND RETURN MANIFOLD LINES.

H. TERRAIN IN DRIP FIELD IS NEARLY FLAT. LAY DRIP TUBING AS CLOSE TO PARALLEL WITH CONTOURS AS POSSIBLE.

I. ALL MANIFOLDS SHALL BE 4-INCH PVC, UNLESS OTHERWISE INDICATED.

UTILITY DETAILS

- 81A TEMPORARY DIVERSION DIKE

UTILITY NOTES

- 76A PRESSURE INDICATING DEVICE
- 76B ZONE VALVE (ZOELLER)
- 76D AIR/VACUUM RELEASE VALVE
- 76E CHECK VALVE
- 76F GEOFLOW DRIP LINE (SPACED 2' O.C)
- 76G ULTRA HEADWORKS BOX W/ GEOVAC FILTER
- 76H FIELD LYSIMETER
- 76I SOLENOID VALVE FOR FLUSHING
- 76J FIELD LINE LOOP
- 76K PUMP TANK (SEE SPECIFICATIONS)

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

INITIAL DESIGN	2-9-06	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER SYSTEM - PHASE 1
CAVE SPRINGS ARKANSAS

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DRIP FIELD LAYOUT 2

DATE 11-06-06 10:24 PM REV5

SHEET NO. 20 OF 43

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Gage, Hannah

From: Barrett Knutson <bknutson@mce.us.com>
Sent: Tuesday, December 19, 2017 2:07 PM
To: McWilliams, Katherine
Subject: RE: Cave Springs Waste Management Plan
Attachments: Engineering Drawings Part 2.pdf

Appendix A Part 2

From: McWilliams, Katherine [mailto:MCWILLIAMSK@adeq.state.ar.us]
Sent: Tuesday, December 19, 2017 10:59 AM
To: Barrett Knutson
Subject: RE: Cave Springs Waste Management Plan

Barrett,

The easiest way, if possible, is to split the document and email it in parts. I think we might be able to get it from Dropbox as well, but I am not sure.

Thanks,
Katherine McWilliams
Engineer
Office of Water Quality

From: Barrett Knutson [mailto:bknutson@mce.us.com]
Sent: Tuesday, December 19, 2017 10:38 AM
To: McWilliams, Katherine
Subject: Cave Springs Waste Management Plan

Katherine,

I am still waiting to get the plan certified from a Professional Engineer. I wanted to get the report to you ASAP as I wait for certification. The file size, with all appendices is 30MB, it is my understanding that the ADEQ cannot receive anything above 10MB do you have a different preferred method for file transferring? Possibly Dropbox or Google Dox.

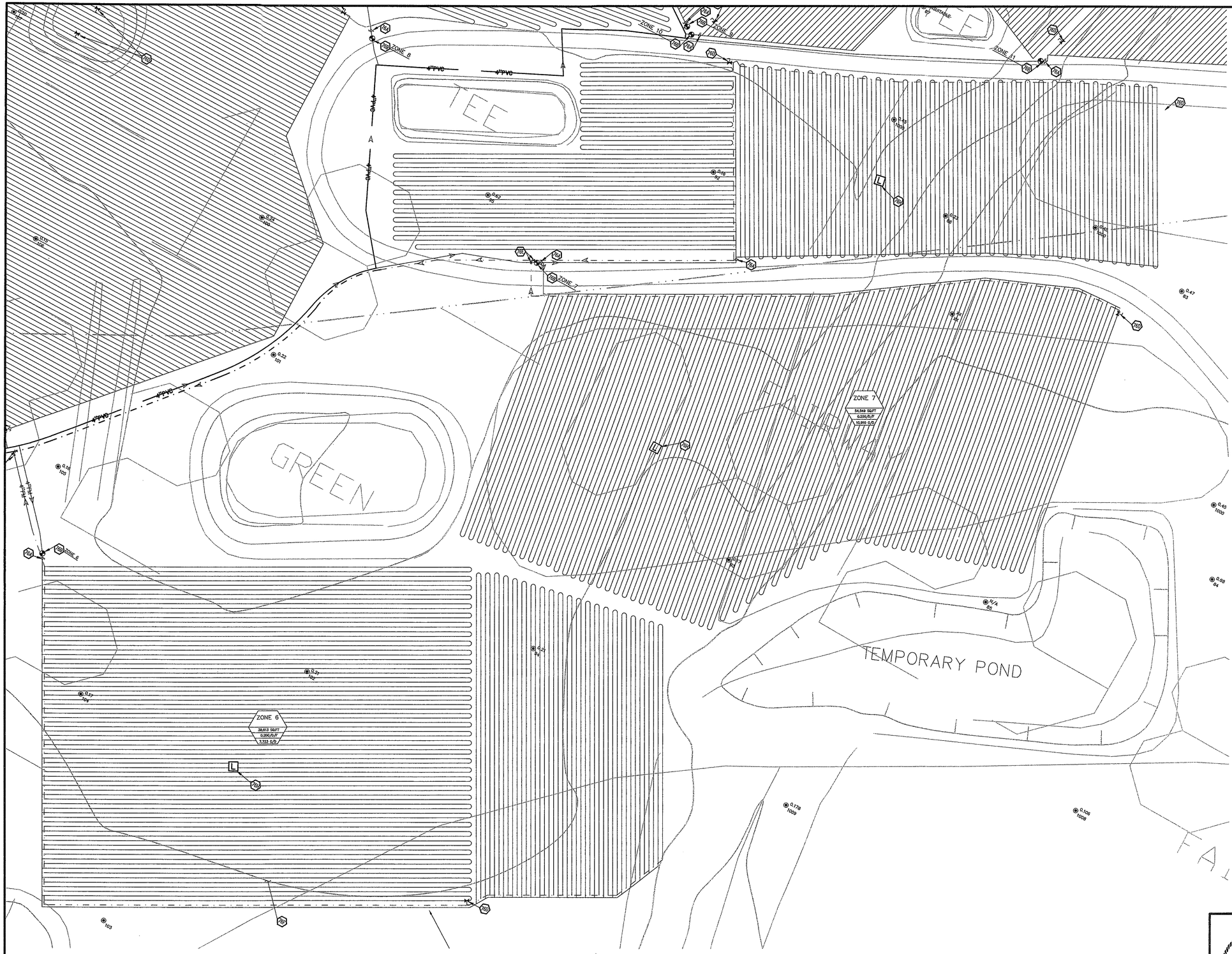
In the meantime I have attached the narrative (Please see attached PDF). I know that you all already have certain items that I have included in the appendix, such as the engineering drawings, deed, and ADH approval. Please let me know whether it is necessary to send in some of these items that the ADEQ already has on file, as this could drastically reduce the file size and make submission easier.

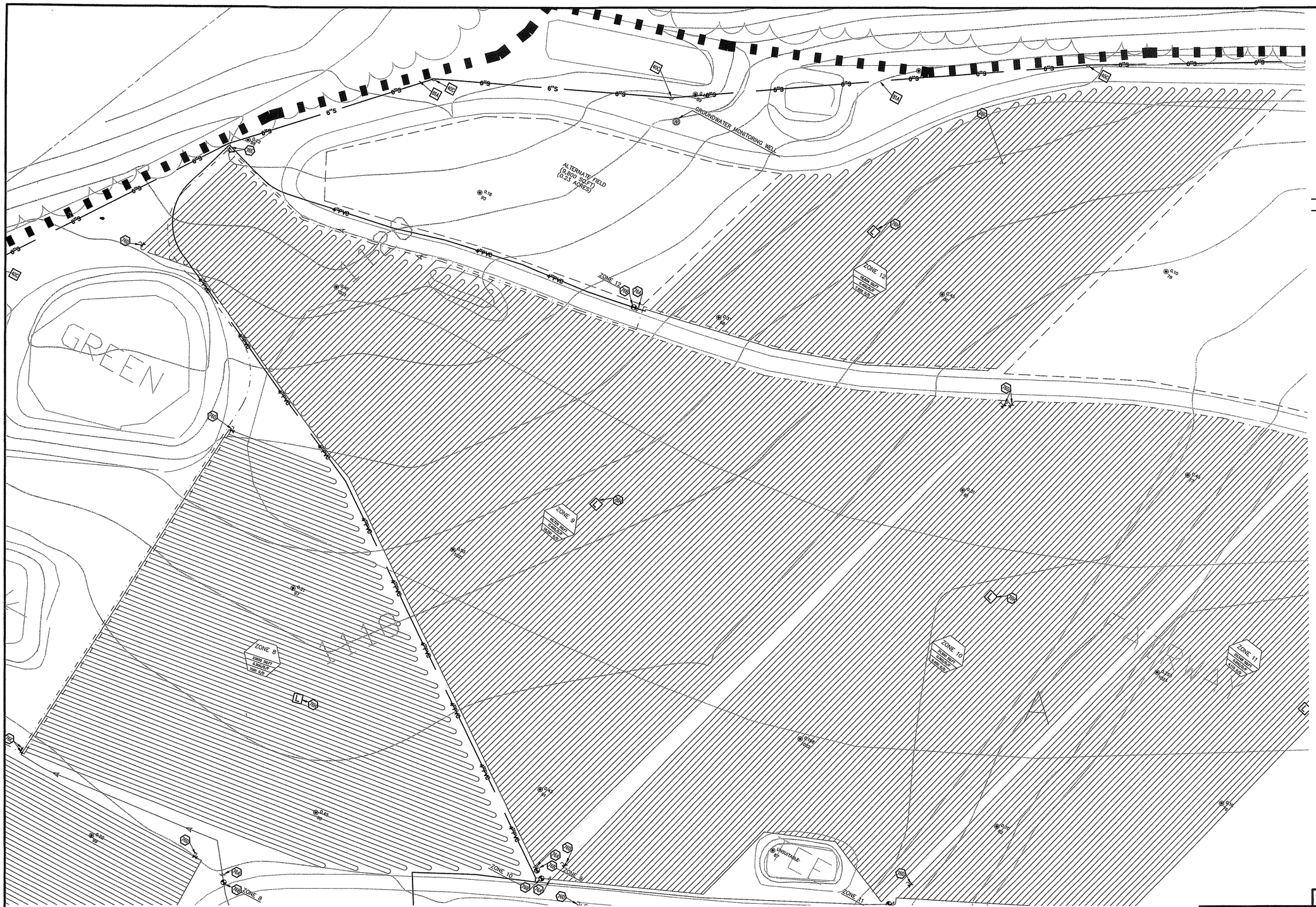
Feel free to call me with any questions or concerns. If you are not able to reach me at the office, feel free to try me on my cell phone.

Respectfully,

Barret R. Knutson, E.I.
Project Designer

McCLELLAND CONSULTING ENGINEERS, INC.
1810 N. College Ave. | Fayetteville, AR 72703
P.O. Box 1229 | Fayetteville, AR 72702
479.443.2377 office | 479.443.9241 fax
501.545.7115 cell
bknutson@mce.us.com


TEE
GREEN
TEMPORARY POND
ZONE 6
38,613 SQ.FT
0.200/D/F
7,723 G/D
ZONE 7
54,549 SQ.FT
0.200/D/F
10,910 G/D
ZONE 8
ZONE 9
ZONE 10
ZONE 11
4"PVC
4"PVC
4"PVC



0 20' 30' 40'
SCALE IN FEET

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OHE — OVERHEAD ELECTRIC
- OHE/T — OVERHEAD ELECTRIC AND TELEPHONE
- OHT — OVERHEAD TELEPHONE
- OHTV — OVERHEAD TV
- SEWER
- UGE — UNDERGROUND ELECTRIC
- UGE/T — UNDERGROUND ELECTRIC AND TELEPHONE
- UGT — UNDERGROUND TELEPHONE
- UGTV — UNDERGROUND TV
- WATER
- .5-10-11 50.5 — TREE INFO: .5 = DIAMETER OF TRUNK IN FEET; 10 = HEIGHT OF TREE IN FEET; 11 = CANOPY DIAMETER IN FEET; 50.5 = ELEVATION AT BASE OF TREE

PROPOSED

- BOUNDARY LINE
- RIGHT OF WAY LINE
- EASEMENT
- PVC SUPPLY MANIFOLD
- PVC RETURN MANIFOLDS
- DIRECTION OF FLOW
- PZXX / XX — PIEZO TEST LOCATION

GENERAL UTILITY NOTES

A. ALL DRIPLINE SHALL BE 1/2" GEOFLOW WASTEFLOW PC (MODEL NO. WFPC16-2-24) WITH DRIP EMITTERS SPACED EVERY 2'.

B. DRIPLINE AND MANIFOLDS SHALL BE INSTALLED 10"-12" BELOW SOIL SURFACE

C. ALL CONNECTIONS WITH DRIPLINE SHALL BE MADE WITH LOCKSLIP ADAPTERS. USE OF ADHESIVES ON DRIPLINE IS NOT ALLOWED.

D. DO NOT USE TOOLS ON LOCKSLIP ADAPTERS. HAND TIGHTEN ONLY.

E. TRENCH WIDTH FOR DRIPLINE BURIAL SHALL NOT EXCEED 4".

F. ALL SECTIONS OF SUPPLY AND RETURN MANIFOLDS NOT TIED DIRECTLY TO THE DRIPLINES SHALL BE INSTALLED AT A MINIMUM OF 24" BELOW GRADE.

G. VACUUMBREAKER/AIR RELEASE VALVES SHALL BE INSTALLED AT ALL HIGH POINTS IN SUPPLY AND RETURN MANIFOLD LINES.

H. TERRAIN IN DRIP FIELD IS NEARLY FLAT. LAY DRIP TUBING AS CLOSE TO PARALLEL WITH CONTOURS AS POSSIBLE.

I. ALL MANIFOLDS SHALL BE 4-INCH PVC, UNLESS OTHERWISE INDICATED.

UTILITY DETAILS

- 81A TEMPORARY DIVERSION DIKE

UTILITY NOTES

- 76A PRESSURE INDICATING DEVICE
- 76B ZONE VALVE (ZOELLER)
- 76D AIR/VACUUM RELEASE VALVE
- 76E CHECK VALVE
- 76F GEOFLOW DRIP LINE (SPACED 2' O.C)
- 76G ULTRA HEADWORKS BOX W/ GEOVAC FILTER
- 76H FIELD LYSIMETER
- 76I SOLENOID VALVE FOR FLUSHING
- 76J FIELD LINE LOOP
- 76K PUMP TANK (SEE SPECIFICATIONS)

EFFLUENT DISPOSAL FIELD #3
ZONE 8, ZONE 9, ZONE 10, ZONE 12

NOTE:
OVERALL EFFLUENT DISPOSAL FIELD LAYOUT IS ON SHEET 18

TOTAL DRIPFIELD REQUIRED (TREATMENT PLANT #2)	917,038 SQ.FT
TOTAL ALTERNATE FIELD PROVIDED (TREATMENT PLANT #2)	273,377 SQ.FT
ALTERNATE FIELD RATIO (TREATMENT PLANT #2)	30%

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

INITIAL DESIGN	2-9-06	DAT	FF	FF	FF
	DATE	FOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER SYSTEM - PHASE 1
CAVE SPRINGS ARKANSAS

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DRIP FIELD LAYOUT 4

DATE 11-06-06 10:24 PM REV5

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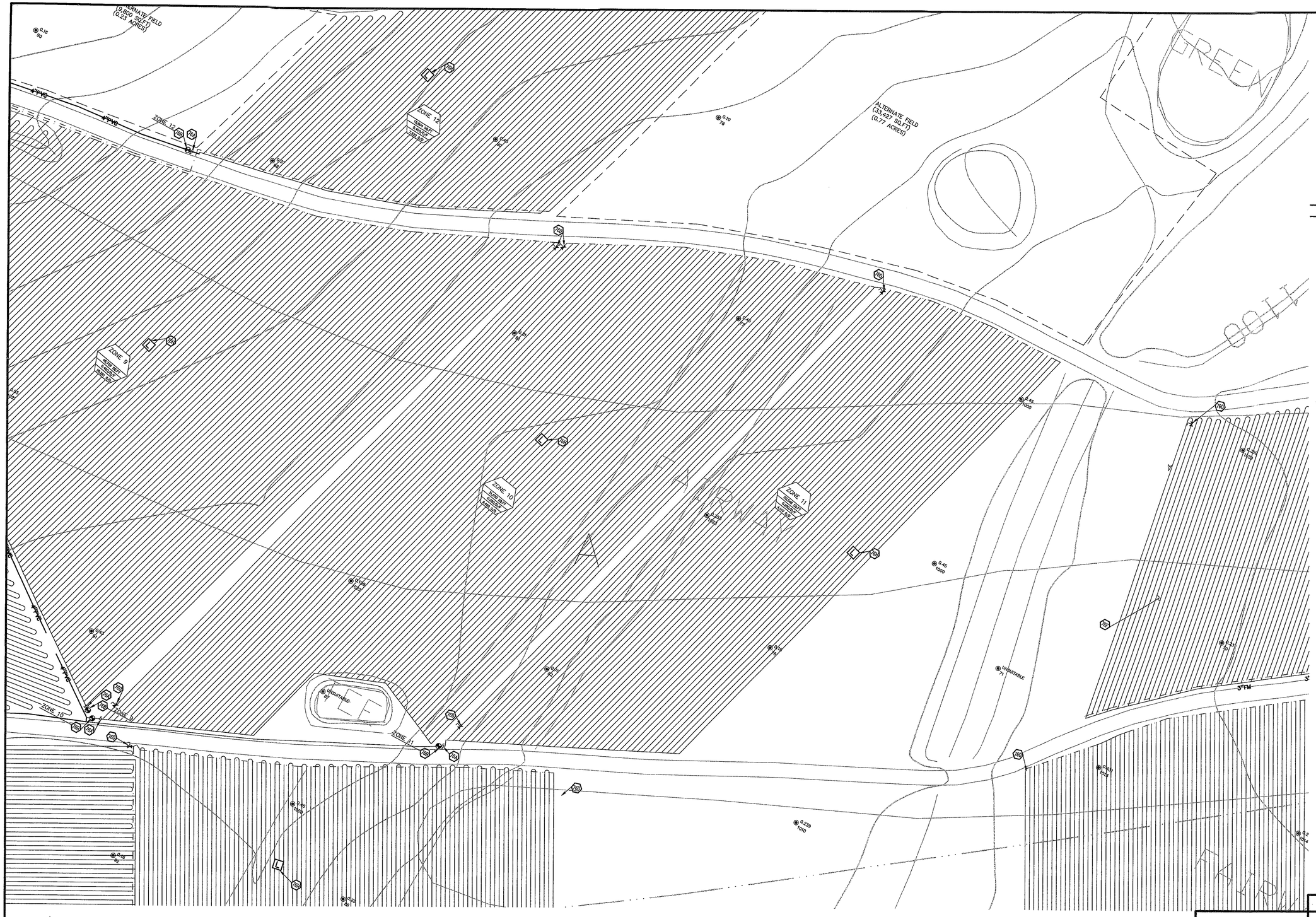

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OHE — OVERHEAD ELECTRIC
- OHETT — OVERHEAD ELECTRIC AND TELEPHONE
- OHT — OVERHEAD TELEPHONE
- OHTV — OVERHEAD TV
- SEWER
- UGE — UNDERGROUND ELECTRIC
- UGETT — UNDERGROUND ELECTRIC AND TELEPHONE
- UGT — UNDERGROUND TELEPHONE
- UGTV — UNDERGROUND TV
- WATER

.5-10-11 50.5 TREE INFO
.5 = DIAMETER OF TRUNK IN FEET
10 = HEIGHT OF TREE IN FEET
11 = CANOPY DIAMETER IN FEET
50.5 = ELEVATION AT BASE OF TREE

PROPOSED

- BOUNDARY LINE
- RIGHT OF WAY LINE
- EASEMENT
- PVC SUPPLY MANIFOLD
- PVC RETURN MANIFOLDS
- DIRECTION OF FLOW
- XXX / XX — PERC TEST LOCATION

A. GENERAL UTILITY NOTES

B. ALL DRIPLINE SHALL BE 1/2" GEOFLOW WASTEFLOW PC (MODEL NO. WFPC16-2-24)
C. WITH DRIP EMITTERS SPACED EVERY 2'.

DRIPLINE AND MANIFOLDS SHALL BE INSTALLED 10"-12" BELOW SOIL SURFACE

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E. USE OF ADHESIVES ON DRIPLINE IS NOT ALLOWED.

F. DO NOT USE TOOLS ON LOCKSLIP ADAPTERS. HAND TIGHTEN ONLY.

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UTILITY NOTES

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- 76F GEOFLOW DRIP LINE (SPACED 2' O.C)
- 76G ULTRA HEADWORKS BOX W/ GEOVAC FILTER
- 76H FIELD LYSIMETER
- 76I SOLENOID VALVE FOR FLUSHING
- 76J FIELD LINE LOOP
- 76K PUMP TANK (SEE SPECIFICATIONS)

NOTE:
OVERALL EFFLUENT DISPOSAL FIELD LAYOUT IS ON SHEET 18

EFFLUENT DISPOSAL FIELD #3
ZONE 10, ZONE 11

TOTAL DRIPFIELD REQUIRED (TREATMENT PLANT #2)	917,039 SQ.FT
TOTAL ALTERNATE FIELD PROVIDED (TREATMENT PLANT #2)	273,377 SQ.FT
ALTERNATE FIELD RATIO (TREATMENT PLANT #2)	30%

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

INITIAL DESIGN	2-9-06	DAT	FF	PF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER SYSTEM - PHASE 1
CAVE SPRINGS ARKANSAS

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DRIP FIELD LAYOUT 5

DATE: 11-06-06 10:24 PM REVS
SHEET NO.: 23 OF 43

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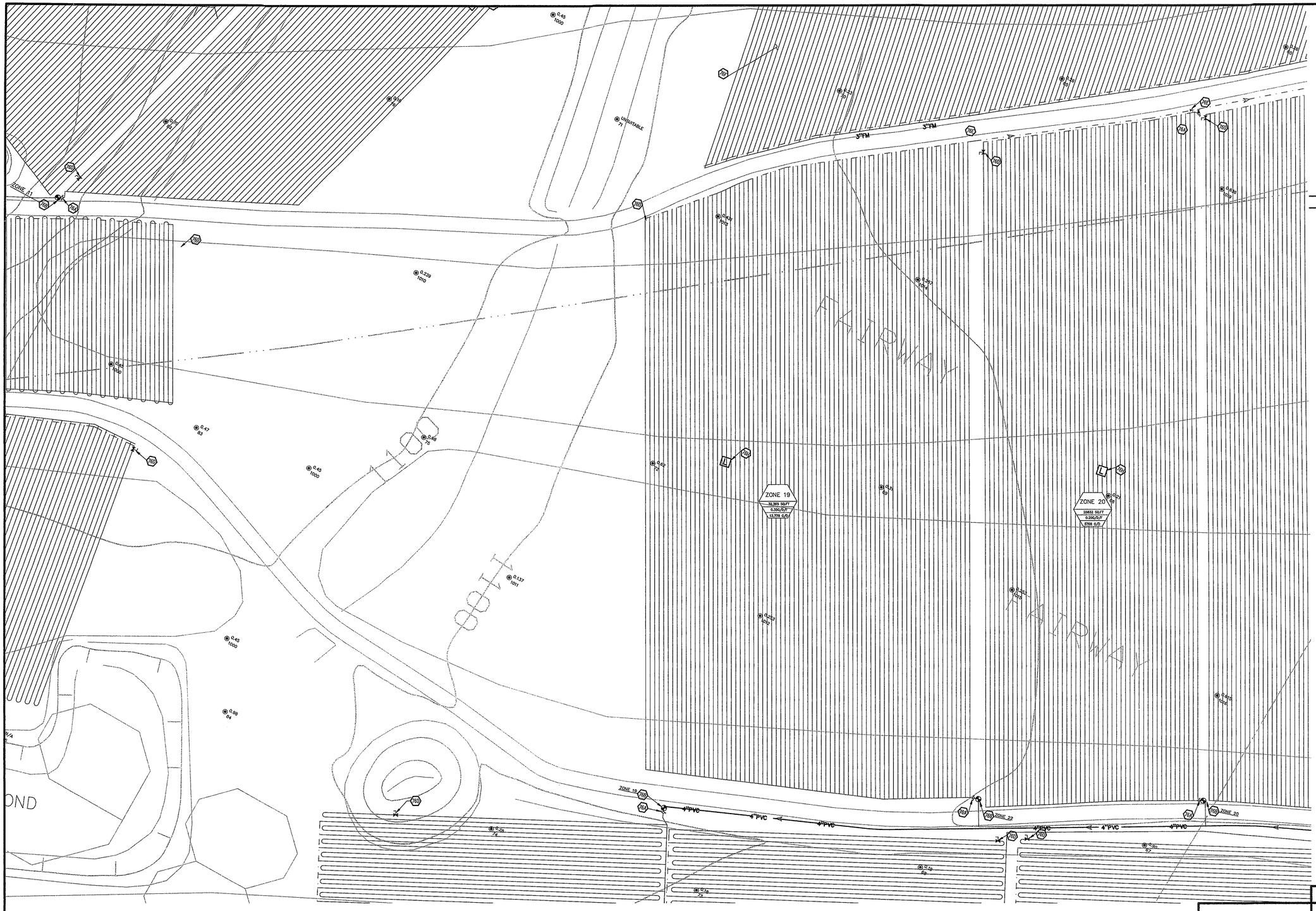

EFFLUENT DISPOSAL FIELD #4
ZONE 18, ZONE 19, ZONE 20

NOTE:
OVERALL EFFLUENT DISPOSAL FIELD LAYOUT IS ON SHEET 18

TOTAL DRIPFIELD REQUIRED (TREATMENT PLANT #2)	917,038 SQ.FT
TOTAL ALTERNATE FIELD PROVIDED (TREATMENT PLANT #2)	273,377 SQ.FT
ALTERNATE FIELD RATIO (TREATMENT PLANT #2)	30%

0 20' 30' 40'
SCALE IN FEET

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- X"G — GAS
- OHE — OVERHEAD ELECTRIC
- OHE&T — OVERHEAD ELECTRIC AND TELEPHONE
- OHT — OVERHEAD TELEPHONE
- OHTV — OVERHEAD TV
- X"S — SEWER
- UGE — UNDERGROUND ELECTRIC
- UGE&T — UNDERGROUND ELECTRIC AND TELEPHONE
- UGT — UNDERGROUND TELEPHONE
- UGTV — UNDERGROUND TV
- X"W — WATER
- .5-10-11 50.5 — TREE INFO
  .5 = DIAMETER OF TRUNK IN FEET
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  11 = CANOPY DIAMETER IN FEET
  50.5 = ELEVATION AT BASE OF TREE

PROPOSED

- BOUNDARY LINE
- RIGHT OF WAY LINE
- EASEMENT
- PVC SUPPLY MANIFOLD
- PVC RETURN MANIFOLDS
- X.XX — DIRECTION OF FLOW
- XX — PERC TEST LOCATION

GENERAL UTILITY NOTES

A. ALL DRIPLINE SHALL BE 1/2" GEOFLOW WASTEFLOW PC (MODEL NO. WFPC16-2-24) WITH DRIP EMITTERS SPACED EVERY 2'.

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C. ALL CONNECTIONS WITH DRIPLINE SHALL BE MADE WITH LOCKSLIP ADAPTERS. USE OF ADHESIVES ON DRIPLINE IS NOT ALLOWED.

D. DO NOT USE TOOLS ON LOCKSLIP ADAPTERS. HAND TIGHTEN ONLY.

E. TRENCH WIDTH FOR DRIPLINE BURIAL SHALL NOT EXCEED 4".

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G. VACUUMBREAKER/AIR RELEASE VALVES SHALL BE INSTALLED AT ALL HIGH POINTS IN SUPPLY AND RETURN MANIFOLD LINES.

H. TERRAIN IN DRIP FIELD IS NEARLY FLAT. LAY DRIP TUBING AS CLOSE TO PARALLEL WITH CONTOURS AS POSSIBLE.

I. ALL MANIFOLDS SHALL BE 4-INCH PVC, UNLESS OTHERWISE INDICATED.

UTILITY DETAILS

- 81A — TEMPORARY DIVERSION DIKE

UTILITY NOTES

- 76A — PRESSURE INDICATING DEVICE
- 76B — ZONE VALVE (ZOELLER)
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- 76I — SOLENOID VALVE FOR FLUSHING
- 76J — FIELD LINE LOOP
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STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

INITIAL DESIGN	2-9-06	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER SYSTEM - PHASE 1
CAVE SPRINGS ARKANSAS

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DRIP FIELD LAYOUT 6

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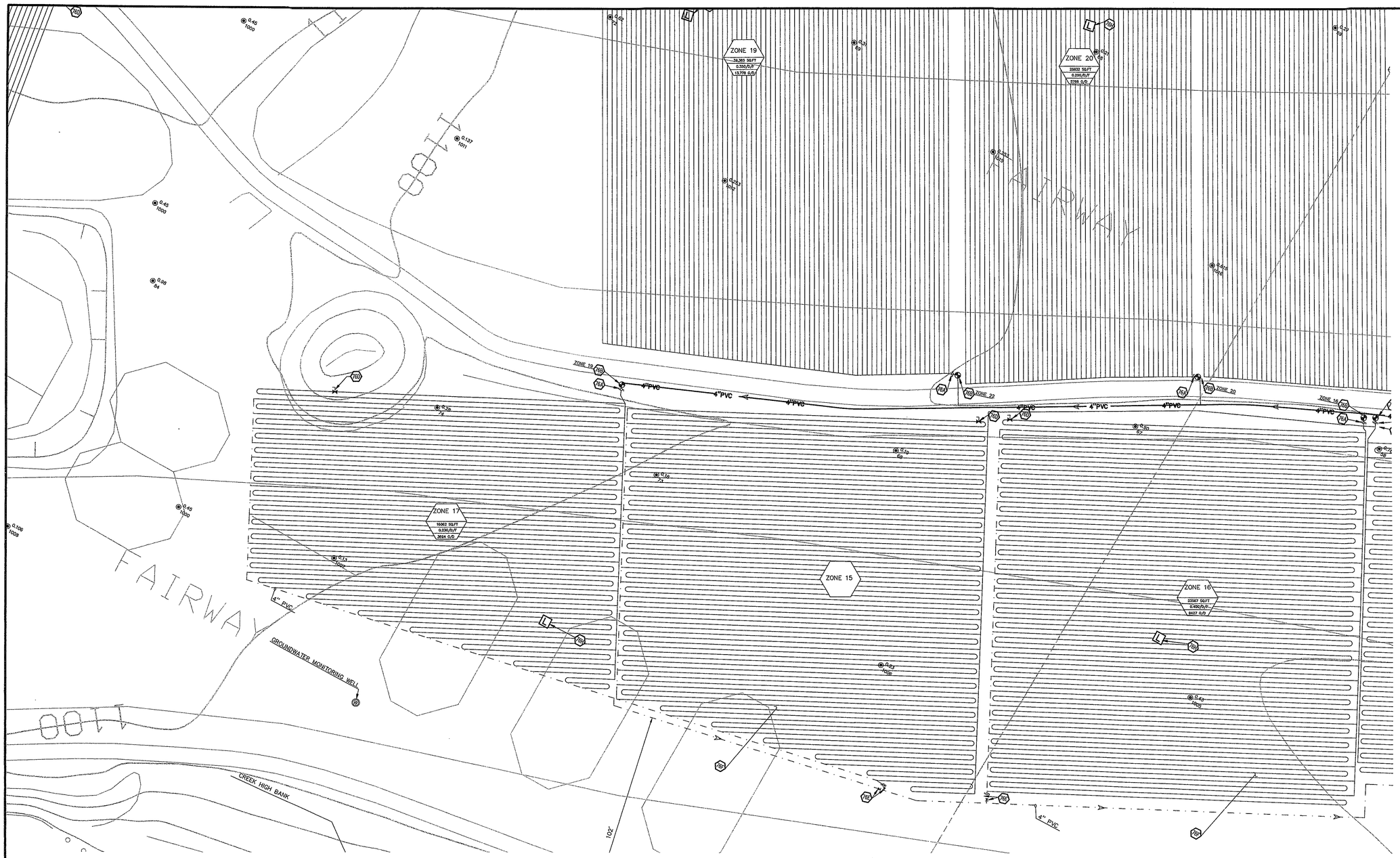

0 20' 30' 40'

SCALE IN FEET

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OVERHEAD ELECTRIC
- OVERHEAD ELECTRIC AND TELEPHONE
- OVERHEAD TELEPHONE
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PROPOSED

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- RIGHT OF WAY LINE
- EASEMENT
- PVC SUPPLY MANIFOLD
- PVC RETURN MANIFOLDS
- DIRECTION OF FLOW
- XXX / XX PERC TEST LOCATION

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UTILITY DETAILS

■	81A	TEMPORARY DIVERSION DIKE

UTILITY NOTES

◊	76A	PRESSURE INDICATING DEVICE
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⋈	76E	CHECK VALVE
	76F	GEOFLOW DRIP LINE (SPACED 2' O.C)
□	76G	ULTRA HEADWORKS BOX W/ GEOVAC FILTER
L	76H	FIELD LYSIMETER
⊖	76I	SOLENOID VALVE FOR FLUSHING
	76J	FIELD LINE LOOP
	76K	PUMP TANK (SEE SPECIFICATIONS)

EFFLUENT DISPOSAL FIELD #4
ZONE 15B, ZONE 16, ZONE 17

NOTE:
OVERALL EFFLUENT DISPOSAL FIELD LAYOUT IS ON SHEET 18

TOTAL DRIPFIELD REQUIRED (TREATMENT PLANT #2)	917,036 SQ.FT
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No. 12538
FERDINAND FOURIE
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INITIAL DESIGN	2-9-06	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER SYSTEM - PHASE 1
CAVE SPRINGS ARKANSAS

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DRIP FIELD LAYOUT 7

DATE 11-06-06 10:24 PM REV5

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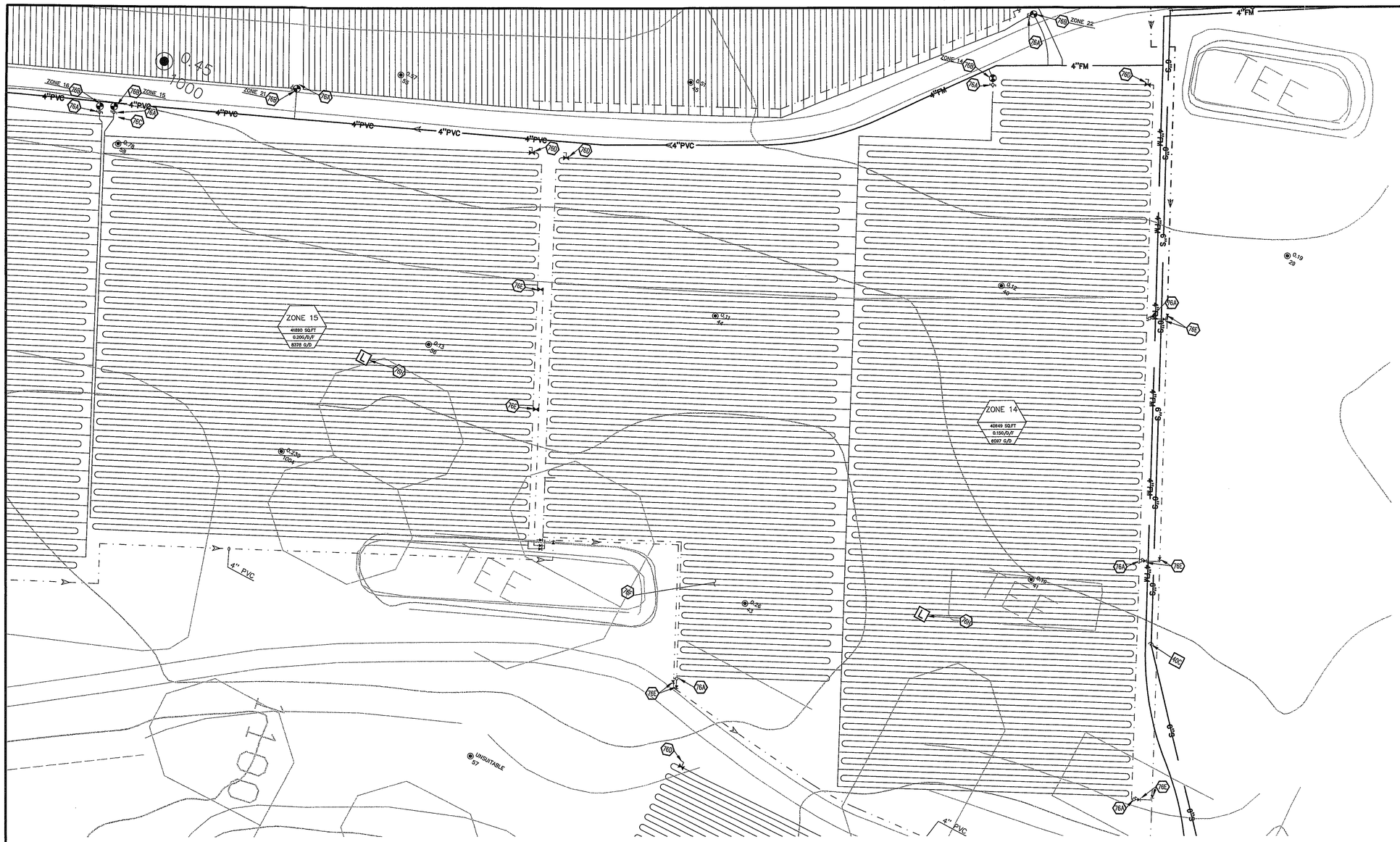
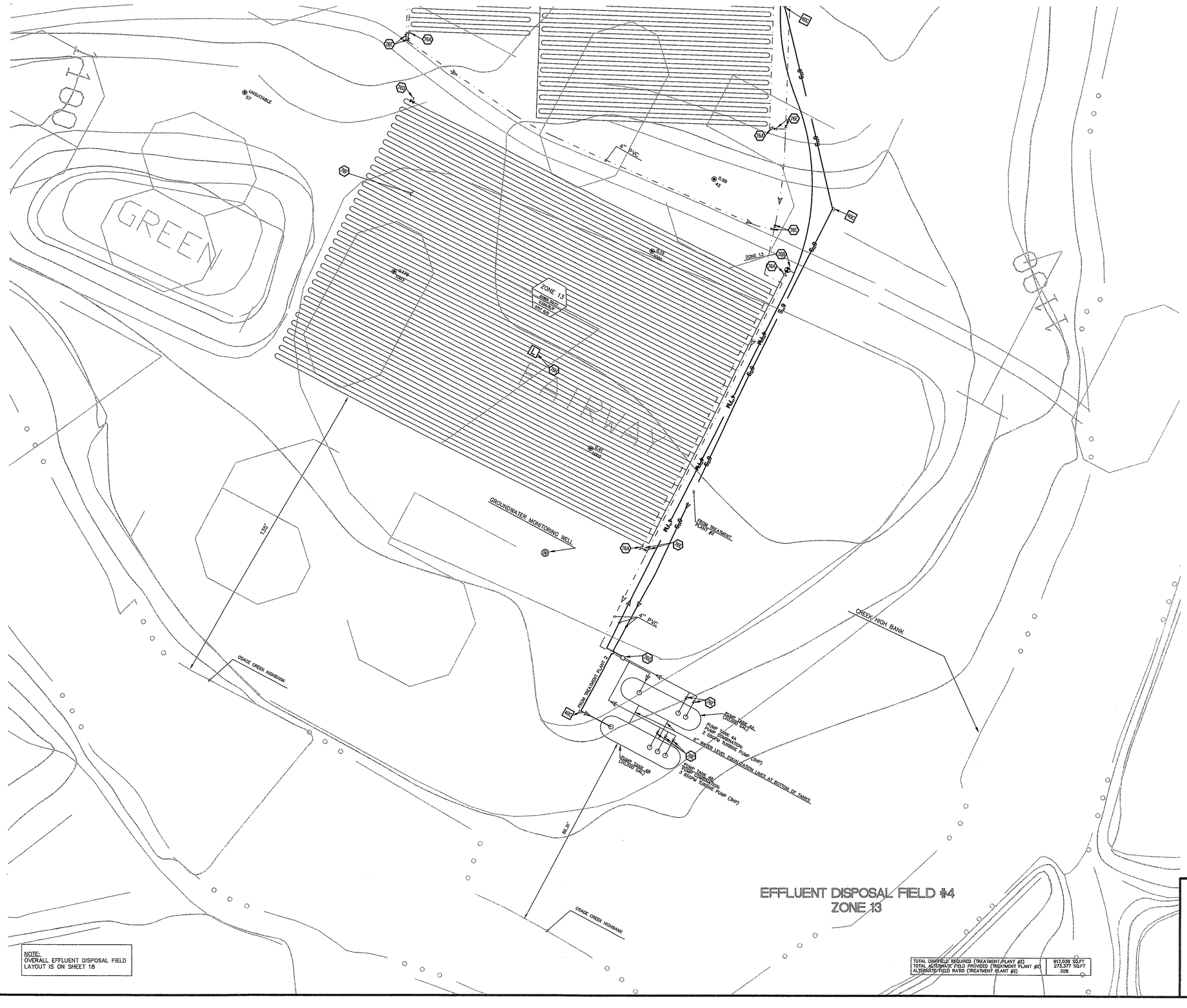
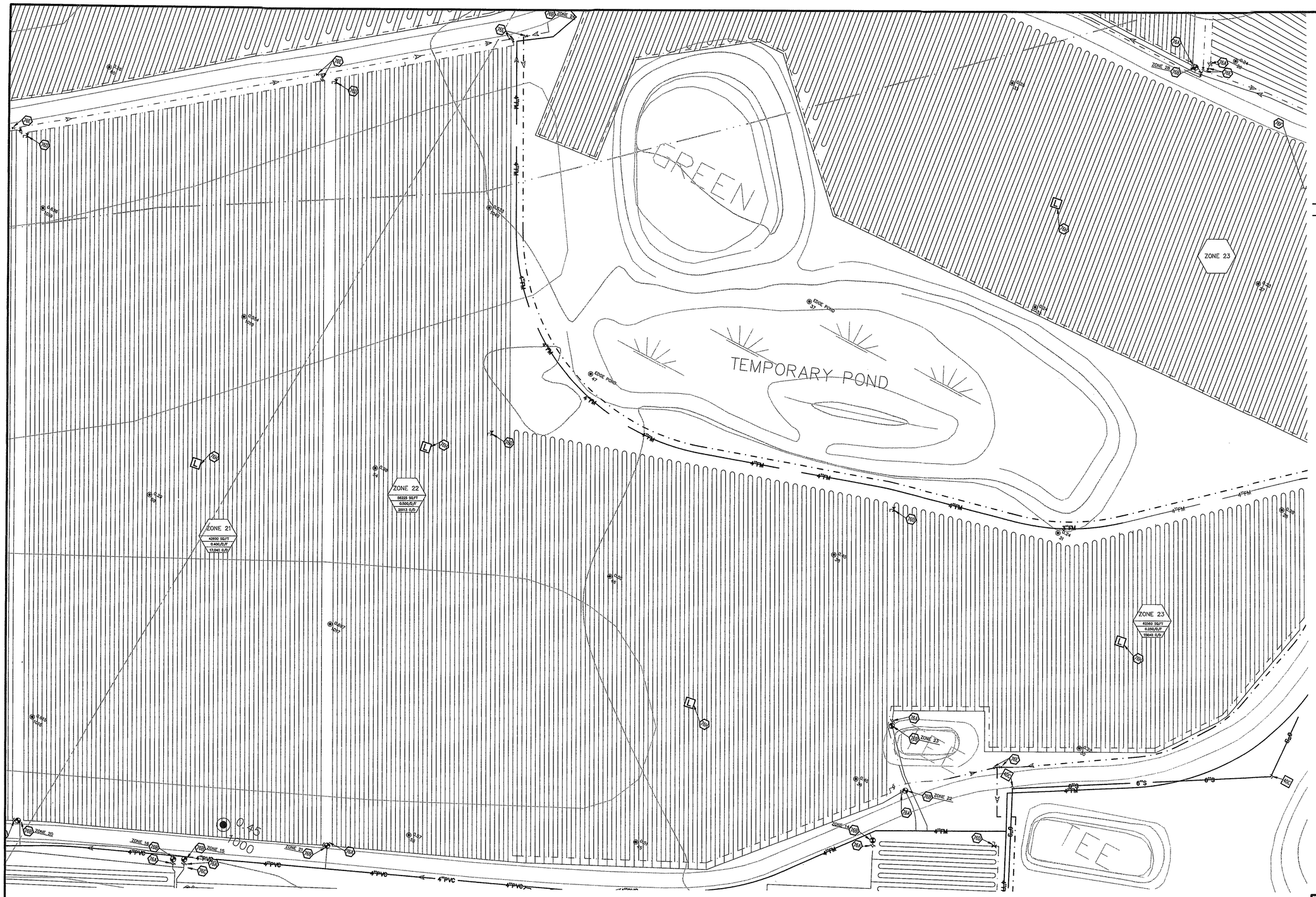
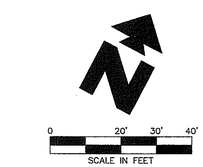

ZONE 15
41880 SQ.FT
0.200/D/F
8376 G/D
ZONE 14
40649 SQ.FT
0.150/D/F
6097 G/D
ZONE 15
ZONE 16
ZONE 21
ZONE 14
ZONE 22
4"PVC
4"FM
4" PVC
UNSUITABLE
57
TEE
0.45
1000
0.57
15
0.79
39
0.71
46
0.19
29
0.13
36
0.25
100+
0.26
9
0.15
97
5.0 W.L.
5.9 W.L.
5.9 W.L.
5.0 W.L.
5.0 W.L.
5.0


GREEN
ZONE 13
2060 SQ.FT.
0.80GPD/SQ.FT.
1651 GPD
ZONE 13
2060 SQ.FT.
0.80GPD/SQ.FT.
1651 GPD
ZONE 13
2060 SQ.FT.
0.80GPD/SQ.FT.
1651 GPD
UNSUITABLE
37
0.99
42
0.72
100%
0.72
100%
0.21
100%
4" PVC
4" PVC
4" PVC
4" PVC
5.0
5.0
5.0





LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OHE — OVERHEAD ELECTRIC
- OHE/T — OVERHEAD ELECTRIC AND TELEPHONE
- OHT — OVERHEAD TELEPHONE
- OHTV — OVERHEAD TV
- SS — SEWER
- UGE — UNDERGROUND ELECTRIC
- UGE/T — UNDERGROUND ELECTRIC AND TELEPHONE
- UGT — UNDERGROUND TELEPHONE
- UGTV — UNDERGROUND TV
- W — WATER
- .5-10--11 50.5 — TREE INFO
  .5 = DIAMETER OF TRUNK IN FEET
  10 = HEIGHT OF TREE IN FEET
  11 = CANOPY DIAMETER IN FEET
  50.5 = ELEVATION AT BASE OF TREE

PROPOSED

- BOUNDARY LINE
- RIGHT OF WAY LINE
- EASEMENT
- PVC SUPPLY MANIFOLD
- PVC RETURN MANIFOLDS
- DIRECTION OF FLOW
- XXX / XX — PERC TEST LOCATION

GENERAL UTILITY NOTES

A. ALL DRIPLINE SHALL BE 1/2" GEOFLOW WASTEFLOW PC (MODEL NO. WFPC16-2-24) WITH DRIP EMITTERS SPACED EVERY 2'.

B. DRIPLINE AND MANIFOLDS SHALL BE INSTALLED 10"-12" BELOW SOIL SURFACE

C. ALL CONNECTIONS WITH DRIPLINE SHALL BE MADE WITH LOCKSLIP ADAPTERS. USE OF ADHESIVES ON DRIPLINE IS NOT ALLOWED.

D. DO NOT USE TOOLS ON LOCKSLIP ADAPTERS. HAND TIGHTEN ONLY.

E. TRENCH WIDTH FOR DRIPLINE BURIAL SHALL NOT EXCEED 4".

F. ALL SECTIONS OF SUPPLY AND RETURN MANIFOLDS NOT TIED DIRECTLY TO THE DRIPLINES SHALL BE INSTALLED AT A MINIMUM OF 24" BELOW GRADE.

G. VACUUMBREAKER/AIR RELEASE VALVES SHALL BE INSTALLED AT ALL HIGH POINTS IN SUPPLY AND RETURN MANIFOLD LINES.

H. TERRAIN IN DRIP FIELD IS NEARLY FLAT. LAY DRIP TUBING AS CLOSE TO PARALLEL WITH CONTOURS AS POSSIBLE.

I. ALL MANIFOLDS SHALL BE 4-INCH PVC, UNLESS OTHERWISE INDICATED.

UTILITY DETAILS

- 81A — TEMPORARY DIVERSION DIKE

UTILITY NOTES

- 76A — PRESSURE INDICATING DEVICE
- 76B — ZONE VALVE (ZOELLER)
- 76D — AIR/VACUUM RELEASE VALVE
- 76E — CHECK VALVE
- 76F — GEOFLOW DRIP LINE (SPACED 2' O.C)
- 76G — ULTRA HEADWORKS BOX W/ GEOVAC FILTER
- 76H — FIELD LYSIMETER
- 76I — SOLENOID VALVE FOR FLUSHING
- 76J — FIELD LINE LOOP
- 76K — PUMP TANK (SEE SPECIFICATIONS)

NOTE:
OVERALL EFFLUENT DISPOSAL FIELD LAYOUT IS ON SHEET 18

EFFLUENT DISPOSAL FIELD #4
ZONE 21, ZONE 22, ZONE 23A

TOTAL DRIPFIELD REQUIRED (TREATMENT PLANT #2)	912,036 SQ.FT
TOTAL ALTERNATE FIELD PROVIDED (TREATMENT PLANT #2)	273,377 SQ.FT
ALTERNATE FIELD RATIO (TREATMENT PLANT #2)	30%

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12539
FERDINAND FOURIE
11-7-06

	DAT	FF	FF	FF
INITIAL DESIGN	2-9-06			
DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER SYSTEM - PHASE 1
CAVE SPRINGS ARKANSAS

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS • PLANNERS • SURVEYORS
3317 S.W. I Street
Bentonville, AR 72712
(479) 273-9472
FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733LEACH_REV2

DRIP FIELD LAYOUT 10

DATE 11-06-06 10:24 PM REV5

SHEET NO. 28 OF 43

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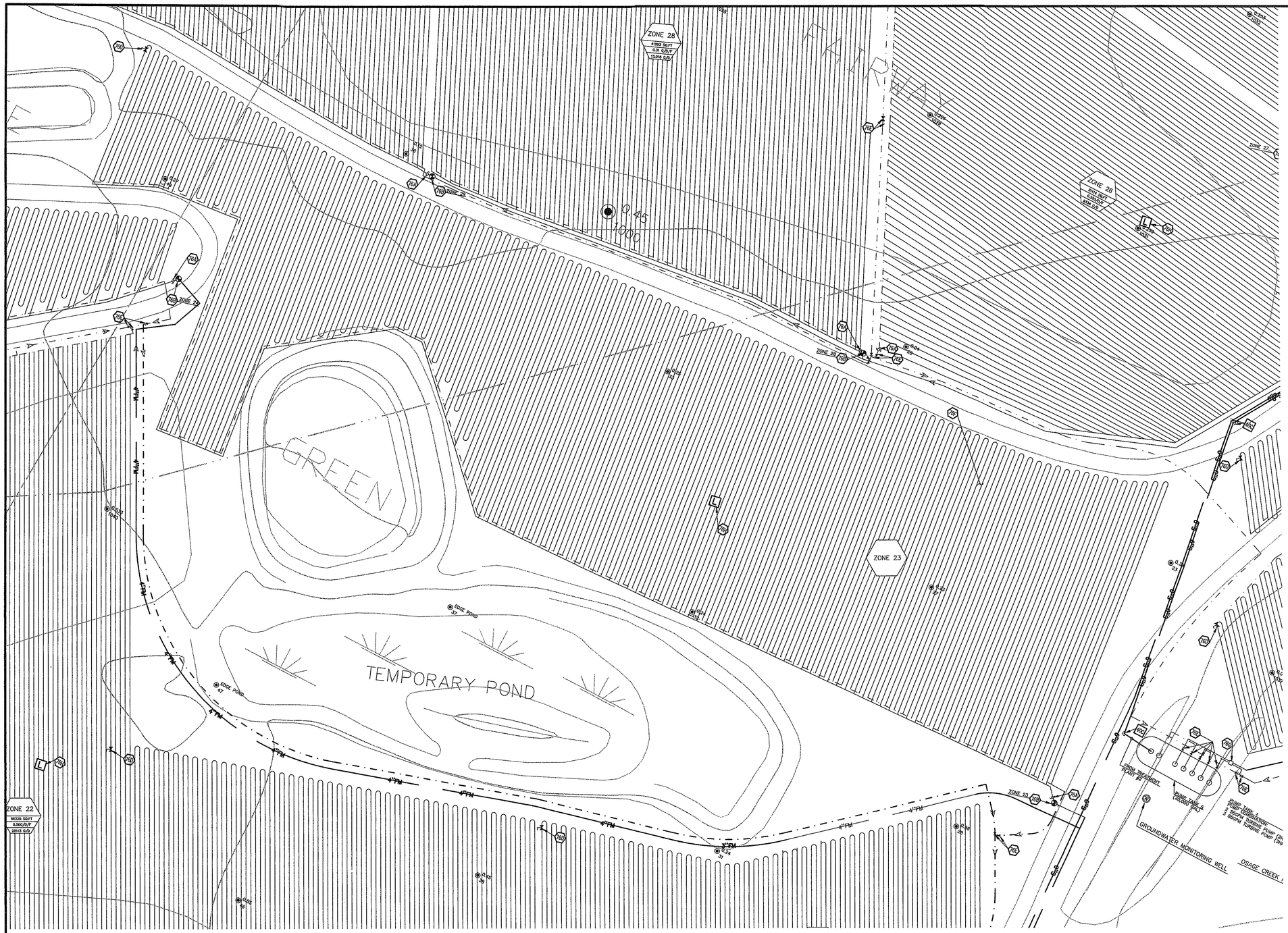

0 20' 30' 40'
SCALE IN FEET

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OHE
- OHE&T
- OHT
- OHTV
- SEWER
- UGE
- UGE&T
- UGT
- UGTV
- WATER
- 5-10-11 50.5 TREE INFO
  5 = DIAMETER OF TRUNK IN FEET
  10 = HEIGHT OF TREE IN FEET
  11 = CANOPY DIAMETER IN FEET
  50.5 = ELEVATION AT BASE OF TREE

PROPOSED

- BOUNDARY LINE
- RIGHT OF WAY LINE
- EASEMENT
- PVC SUPPLY MANIFOLD
- PVC RETURN MANIFOLDS
- DIRECTION OF FLOW
- X.XX / XX PERC TEST LOCATION

GENERAL UTILITY NOTES

A. ALL DRIPLINE SHALL BE 1/2" GEOFLOW WASTEFLOW PC (MODEL NO. WSPC16-2-24) WITH DRIP EMITTERS SPACED EVERY 2'.

B. DRIPLINE AND MANIFOLDS SHALL BE INSTALLED 10"-12" BELOW SOIL SURFACE

C. ALL CONNECTIONS WITH DRIPLINE SHALL BE MADE WITH LOCKSLIP ADAPTERS. USE OF ADHESIVES ON DRIPLINE IS NOT ALLOWED.

D. DO NOT USE TOOLS ON LOCKSLIP ADAPTERS. HAND TIGHTEN ONLY.

E. TRENCH WIDTH FOR DRIPLINE BURIAL SHALL NOT EXCEED 4".

F. ALL SECTIONS OF SUPPLY AND RETURN MANIFOLDS NOT TIED DIRECTLY TO THE DRIPLINES SHALL BE INSTALLED AT A MINIMUM OF 24" BELOW GRADE.

G. VACUUMBREAKER/AIR RELEASE VALVES SHALL BE INSTALLED AT ALL HIGH POINTS IN SUPPLY AND RETURN MANIFOLD LINES.

H. TERRAIN IN DRIP FIELD IS NEARLY FLAT. LAY DRIP TUBING AS CLOSE TO PARALLEL WITH CONTOURS AS POSSIBLE.

I. ALL MANIFOLDS SHALL BE 4-INCH PVC, UNLESS OTHERWISE INDICATED.

UTILITY DETAILS

- 81A TEMPORARY DIVERSION DIKE

UTILITY NOTES

- 76A PRESSURE INDICATING DEVICE
- 76B ZONE VALVE (ZOELLER)
- 76D AIR/VACUUM RELEASE VALVE
- 76E CHECK VALVE
- 76F GEOFLOW DRIP LINE (SPACED 2' O.C)
- 76G ULTRA HEADWORKS BOX W/ GEOVAC FILTER
- 76H FIELD LYSIMETER
- 76I SOLENOID VALVE FOR FLUSHING
- 76J FIELD LINE LOOP
- 76K PUMP TANK (SEE SPECIFICATIONS)

NOTE:
OVERALL EFFLUENT DISPOSAL FIELD LAYOUT IS ON SHEET 18

EFFLUENT DISPOSAL FIELD #4
ZONE 23B

TOTAL DRIPFIELD REQUIRED (TREATMENT PLANT #2)	917,038 SQ.FT
TOTAL ALTERNATE FIELD PROVIDED (TREATMENT PLANT #2)	273,377 SQ.FT
ALTERNATE FIELD RATIO (TREATMENT PLANT #2)	30%

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

INITIAL DESIGN	2-9-06	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER SYSTEM - PHASE 1
CAVE SPRINGS ARKANSAS

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS · PLANNERS · SURVEYORS

3317 S.W. I Street (479) 273-9472
Bentonville, AR 72712 FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733LEACH_REV2

DRIP FIELD LAYOUT 11

DATE 11-06-06 10:24 PM REV5

SHEET NO. 29 OF 43

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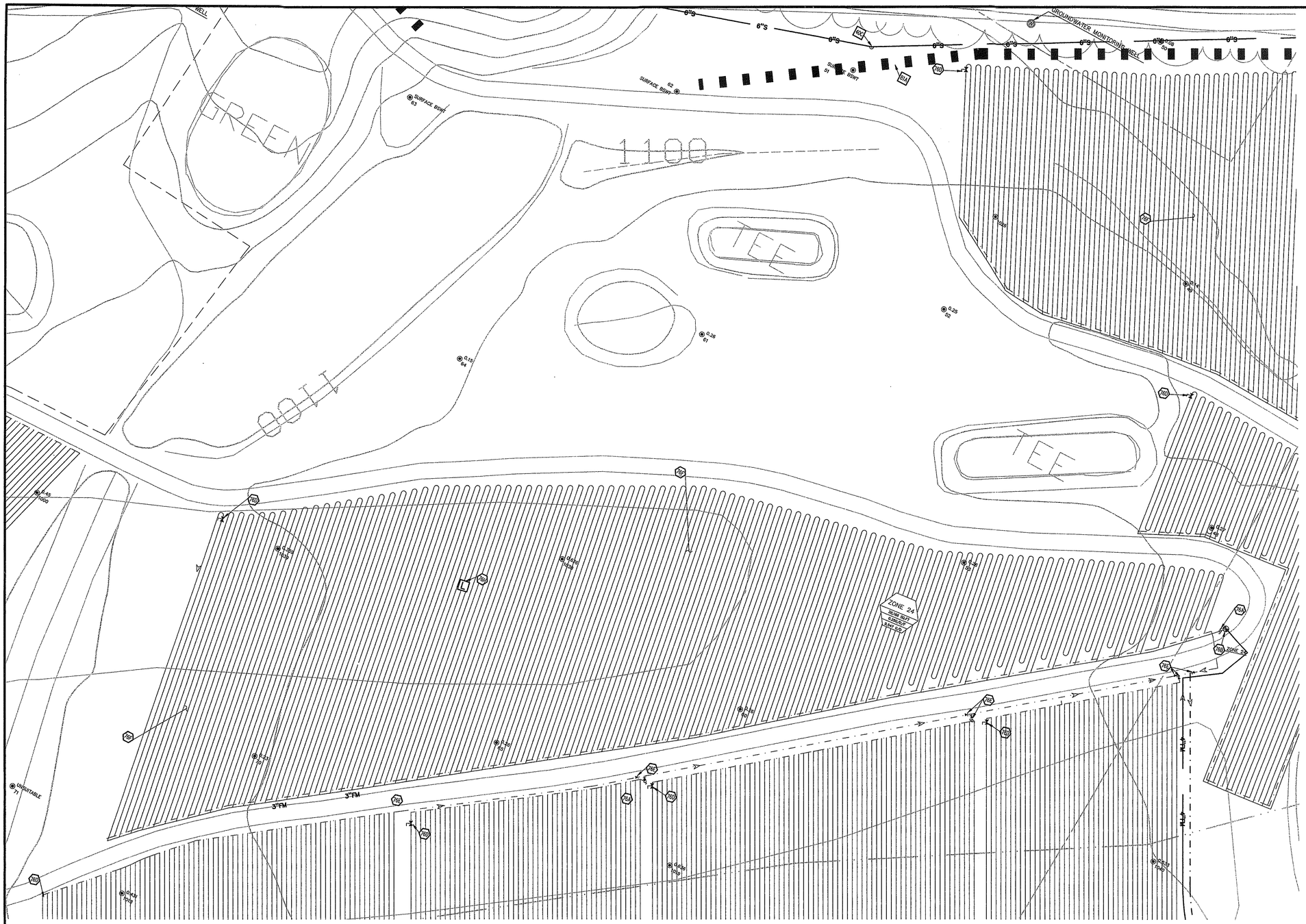
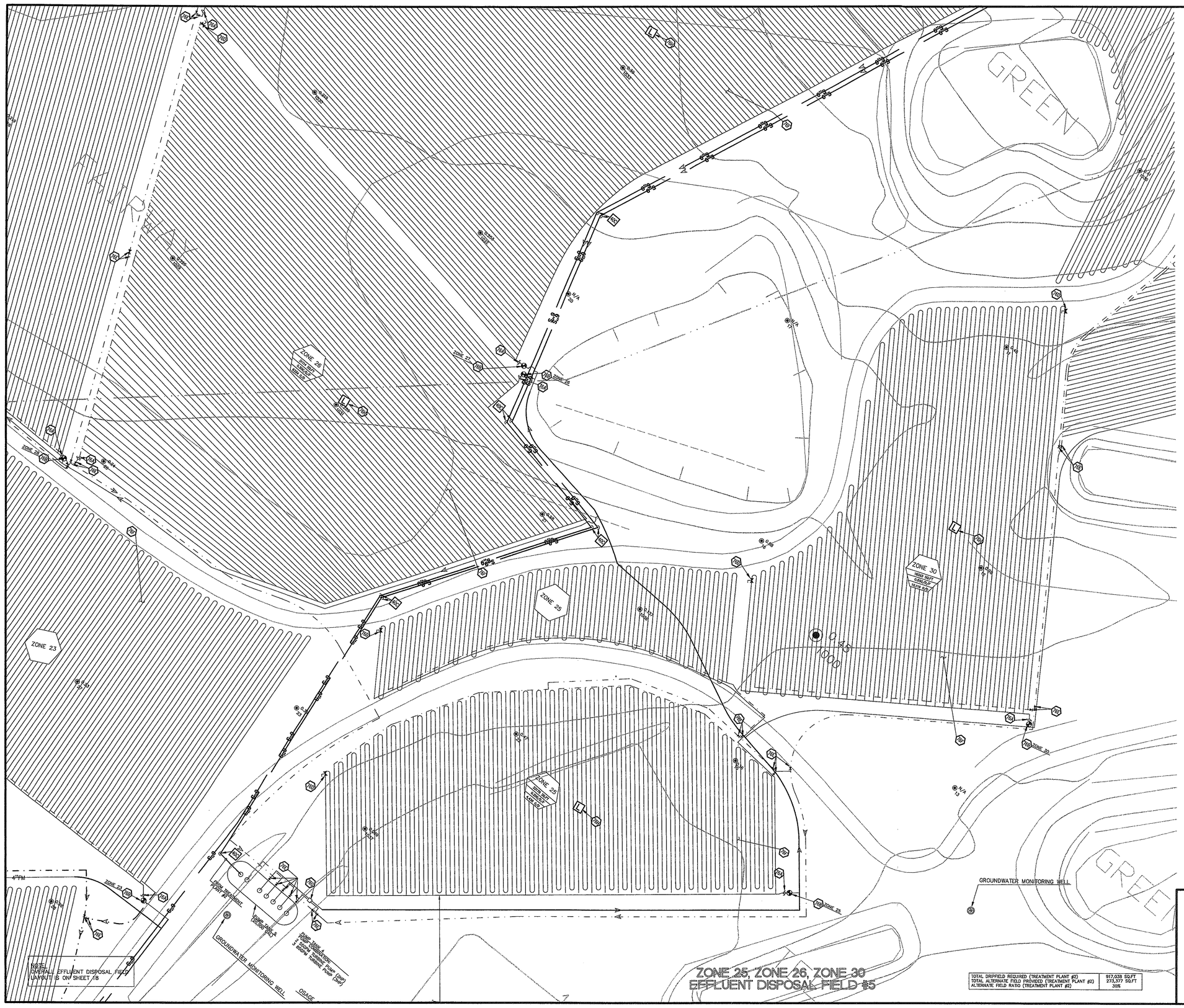

WELL
GREEN
1100
TEE
6"S
6"S
6"S


GREEN
GREEN
ZONE 25
ZONE 23
ZONE 30
ZONE 26
ZONE 25
ZONE 22
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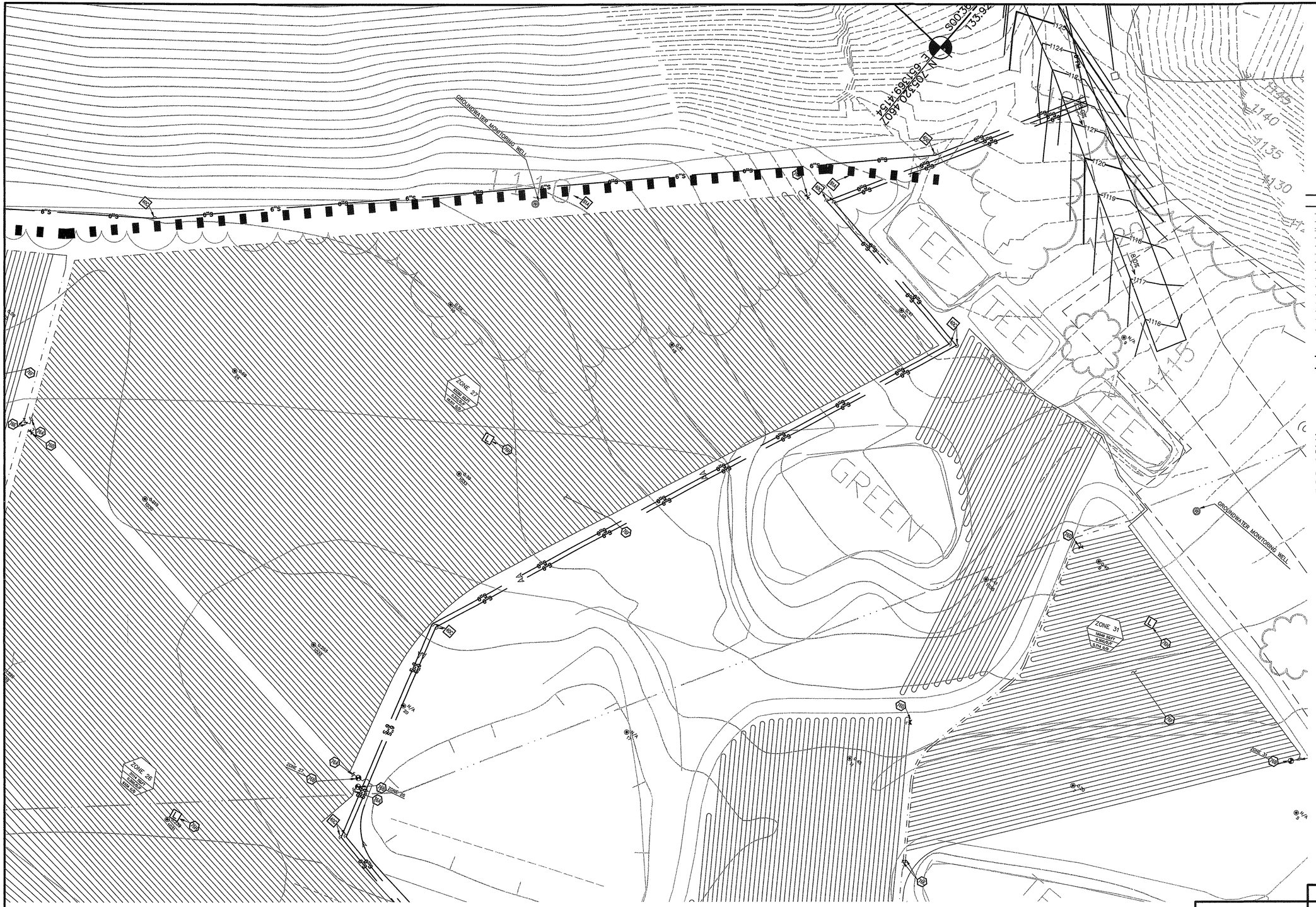

0 20' 30' 40'

SCALE IN FEET

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OHE — OVERHEAD ELECTRIC
- OHE/T — OVERHEAD ELECTRIC AND TELEPHONE
- OHT — OVERHEAD TELEPHONE
- OHTV — OVERHEAD TV
- SEWER
- UGE — UNDERGROUND ELECTRIC
- UGE/T — UNDERGROUND ELECTRIC AND TELEPHONE
- UGT — UNDERGROUND TELEPHONE
- UGTV — UNDERGROUND TV
- WATER

.5-10-11 50.5 — TREE INFO
.5 = DIAMETER OF TRUNK IN FEET
10 = HEIGHT OF TREE IN FEET
11 = CANOPY DIAMETER IN FEET
50.5 = ELEVATION AT BASE OF TREE

PROPOSED

- BOUNDARY LINE
- RIGHT OF WAY LINE
- EASEMENT
- PVC SUPPLY MANIFOLD
- PVC RETURN MANIFOLDS
- X.XX — DIRECTION OF FLOW
- XX — PERC TEST LOCATION

A. GENERAL UTILITY NOTES

B. ALL DRIPLINE SHALL BE 1/2" GEOFLOW WASTEFLOW PC (MODEL NO. WFPC16-2-24) C. WITH DRIP EMITTERS SPACED EVERY 2'.

DRIPLINE AND MANIFOLDS SHALL BE INSTALLED 10"-12" BELOW SOIL SURFACE

D. ALL CONNECTIONS WITH DRIPLINE SHALL BE MADE WITH LOCKSLIP ADAPTERS.
E. USE OF ADHESIVES ON DRIPLINE IS NOT ALLOWED.

F. DO NOT USE TOOLS ON LOCKSLIP ADAPTERS. HAND TIGHTEN ONLY.

TRENCH WIDTH FOR DRIPLINE BURIAL SHALL NOT EXCEED 4".

G. ALL SECTIONS OF SUPPLY AND RETURN MANIFOLDS NOT TIED DIRECTLY TO THE DRIPLINES SHALL BE INSTALLED AT A MINIMUM OF 24" BELOW GRADE.

H. VACUUMBREAKER/AIR RELEASE VALVES SHALL BE INSTALLED AT ALL HIGH POINTS IN SUPPLY AND RETURN MANIFOLD LINES.

I. TERRAIN IN DRIP FIELD IS NEARLY FLAT. LAY DRIP TUBING AS CLOSE TO PARALLEL WITH CONTOURS AS POSSIBLE.

J. ALL MANIFOLDS SHALL BE 4-INCH PVC, UNLESS OTHERWISE INDICATED.

UTILITY DETAILS

- 81A TEMPORARY DIVERSION DIKE

UTILITY NOTES

- 76A PRESSURE INDICATING DEVICE
- 76B ZONE VALVE (ZOELLER)
- 76D AIR/VACUUM RELEASE VALVE
- 76E CHECK VALVE
- 76F GEOFLOW DRIP LINE (SPACED 2' O.C)
- 76G ULTRA HEADWORKS BOX W/ GEOVAC FILTER
- 76H FIELD LYSIMETER
- 76I SOLENOID VALVE FOR FLUSHING
- 76J FIELD LINE LOOP
- 76K PUMP TANK (SEE SPECIFICATIONS)

ZONE 27, ZONE 31
EFFLUENT DISPOSAL FIELD #5

NOTE:
OVERALL EFFLUENT DISPOSAL FIELD LAYOUT IS ON SHEET 18

TOTAL DRIPFIELD REQUIRED (TREATMENT PLANT #2)	917,038 SQ.FT
TOTAL ALTERNATE FIELD PROVIDED (TREATMENT PLANT #2)	273,377 SQ.FT
ALTERNATE FIELD RATIO (TREATMENT PLANT #2)	30%

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

	DATE	DAT	FF	FF	FF
INITIAL DESIGN	2-9-06	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER SYSTEM - PHASE 1
CAVE SPRINGS ARKANSAS

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ENGINEERS • PLANNERS • SURVEYORS
3317 S.W. I Street (479) 273-9472
Bentonville, AR 72712 FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733.LEACH_REV5

DRIP FIELD LAYOUT 14

DATE 11-08-06 10:24 PM REV5

SHEET NO. 32 OF 43

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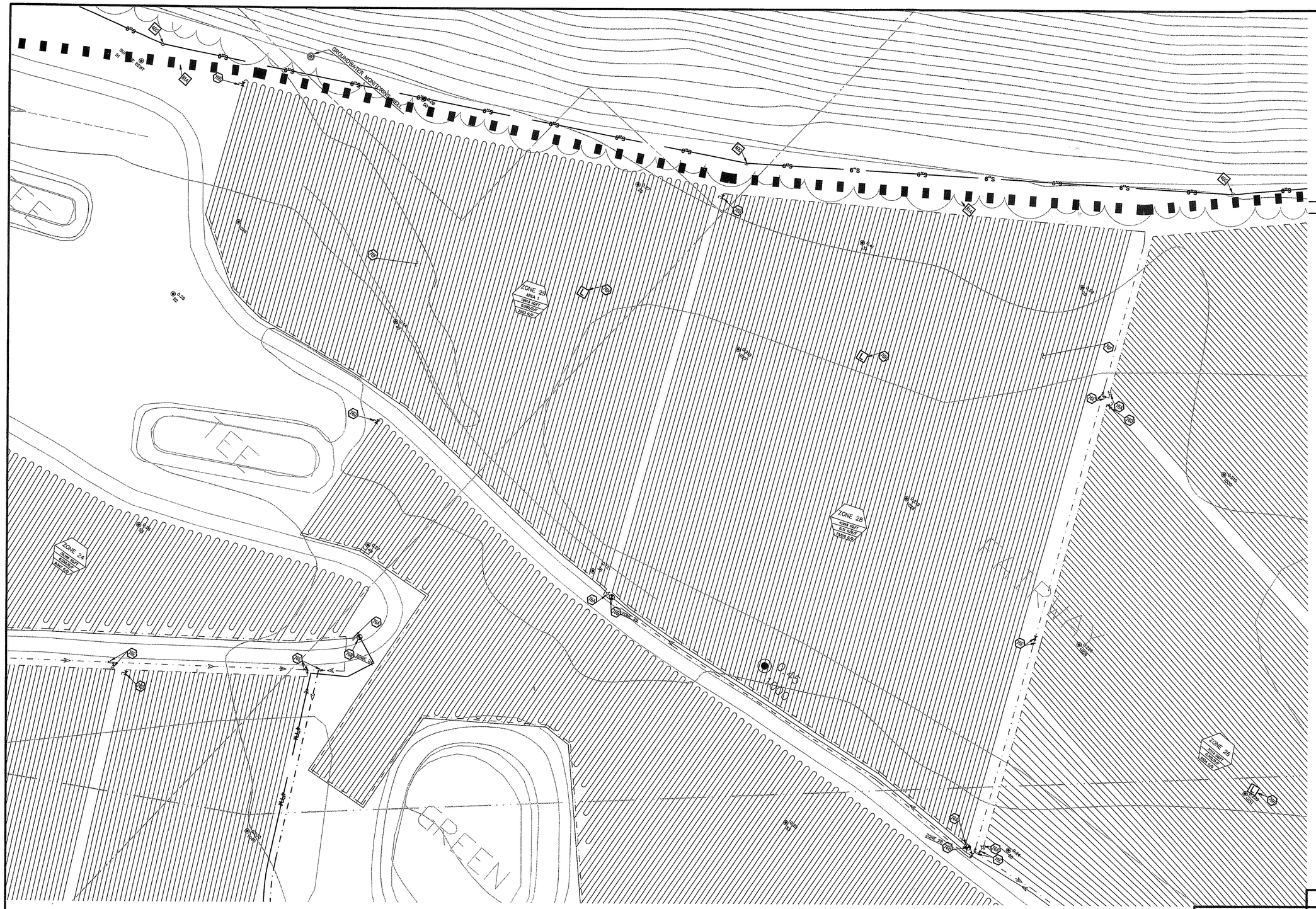

ZONE 28, ZONE 29
EFFLUENT DISPOSAL FIELD #5

NOTE:
OVERALL EFFLUENT DISPOSAL FIELD LAYOUT IS ON SHEET 18

TOTAL DRIPFIELD REQUIRED (TREATMENT PLANT #2)	917,038 SQ.FT
TOTAL ALTERNATE FIELD PROVIDED (TREATMENT PLANT #2)	273,377 SQ.FT
ALTERNATE FIELD RATIO (TREATMENT PLANT #2)	30%

0 20' 30' 40'
SCALE IN FEET

LEGEND

EXISTING

- BOUNDARY LINE
- RIGHT OF WAY LINE
- STORM DRAIN
- GAS
- OHE — OVERHEAD ELECTRIC
- OHE&T — OVERHEAD ELECTRIC AND TELEPHONE
- OHT — OVERHEAD TELEPHONE
- OHTV — OVERHEAD TV
- SEWER
- UGE — UNDERGROUND ELECTRIC
- UGE&T — UNDERGROUND ELECTRIC AND TELEPHONE
- UGT — UNDERGROUND TELEPHONE
- UGTV — UNDERGROUND TV
- WATER
- .5-10-11 50.5 — TREE INFO: .5 = DIAMETER OF TRUNK IN FEET; 10 = HEIGHT OF TREE IN FEET; 11 = CANOPY DIAMETER IN FEET; 50.5 = ELEVATION AT BASE OF TREE

PROPOSED

- BOUNDARY LINE
- RIGHT OF WAY LINE
- EASEMENT
- PVC SUPPLY MANIFOLD
- PVC RETURN MANIFOLDS
- DIRECTION OF FLOW
- XXX / XX — PERC TEST LOCATION

GENERAL UTILITY NOTES

A. ALL DRIPLINE SHALL BE 1/2" GEOFLOW WASTEFLOW PC (MODEL NO. WFPC16-2-24) WITH DRIP EMITTERS SPACED EVERY 2'.

B. DRIPLINE AND MANIFOLDS SHALL BE INSTALLED 10"-12" BELOW SOIL SURFACE

C. ALL CONNECTIONS WITH DRIPLINE SHALL BE MADE WITH LOCKSLIP ADAPTERS. USE OF ADHESIVES ON DRIPLINE IS NOT ALLOWED.

D. DO NOT USE TOOLS ON LOCKSLIP ADAPTERS. HAND TIGHTEN ONLY.

E. TRENCH WIDTH FOR DRIPLINE BURIAL SHALL NOT EXCEED 4".

F. ALL SECTIONS OF SUPPLY AND RETURN MANIFOLDS NOT TIED DIRECTLY TO THE DRIPLINES SHALL BE INSTALLED AT A MINIMUM OF 24" BELOW GRADE.

G. VACUUMBREAKER/AIR RELEASE VALVES SHALL BE INSTALLED AT ALL HIGH POINTS IN SUPPLY AND RETURN MANIFOLD LINES.

H. TERRAIN IN DRIP FIELD IS NEARLY FLAT. LAY DRIP TUBING AS CLOSE TO PARALLEL WITH CONTOURS AS POSSIBLE.

I. ALL MANIFOLDS SHALL BE 4-INCH PVC, UNLESS OTHERWISE INDICATED.

UTILITY DETAILS

- 81A TEMPORARY DIVERSION DIKE

UTILITY NOTES

- 76A PRESSURE INDICATING DEVICE
- 76B ZONE VALVE (ZOELLER)
- 76D AIR/VACUUM RELEASE VALVE
- 76E CHECK VALVE
- 76F GEOFLOW DRIP LINE (SPACED 2' O.C)
- 76G ULTRA HEADWORKS BOX W/ GEOVAC FILTER
- 76H FIELD LYSIMETER
- 76I SOLENOID VALVE FOR FLUSHING
- 76J FIELD LINE LOOP
- 76K PUMP TANK (SEE SPECIFICATIONS)

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

INITIAL DESIGN	2-9-06	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER SYSTEM - PHASE 1
CAVE SPRINGS ARKANSAS

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS • PLANNERS • SURVEYORS

3317 S.W. I Street (479) 273-9472
Bentonville, AR 72712 FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733LEAG_REV2

DRIP FIELD LAYOUT 15

DATE 11-06-06 10:24 PM REV5

SHEET NO. 33 OF 43

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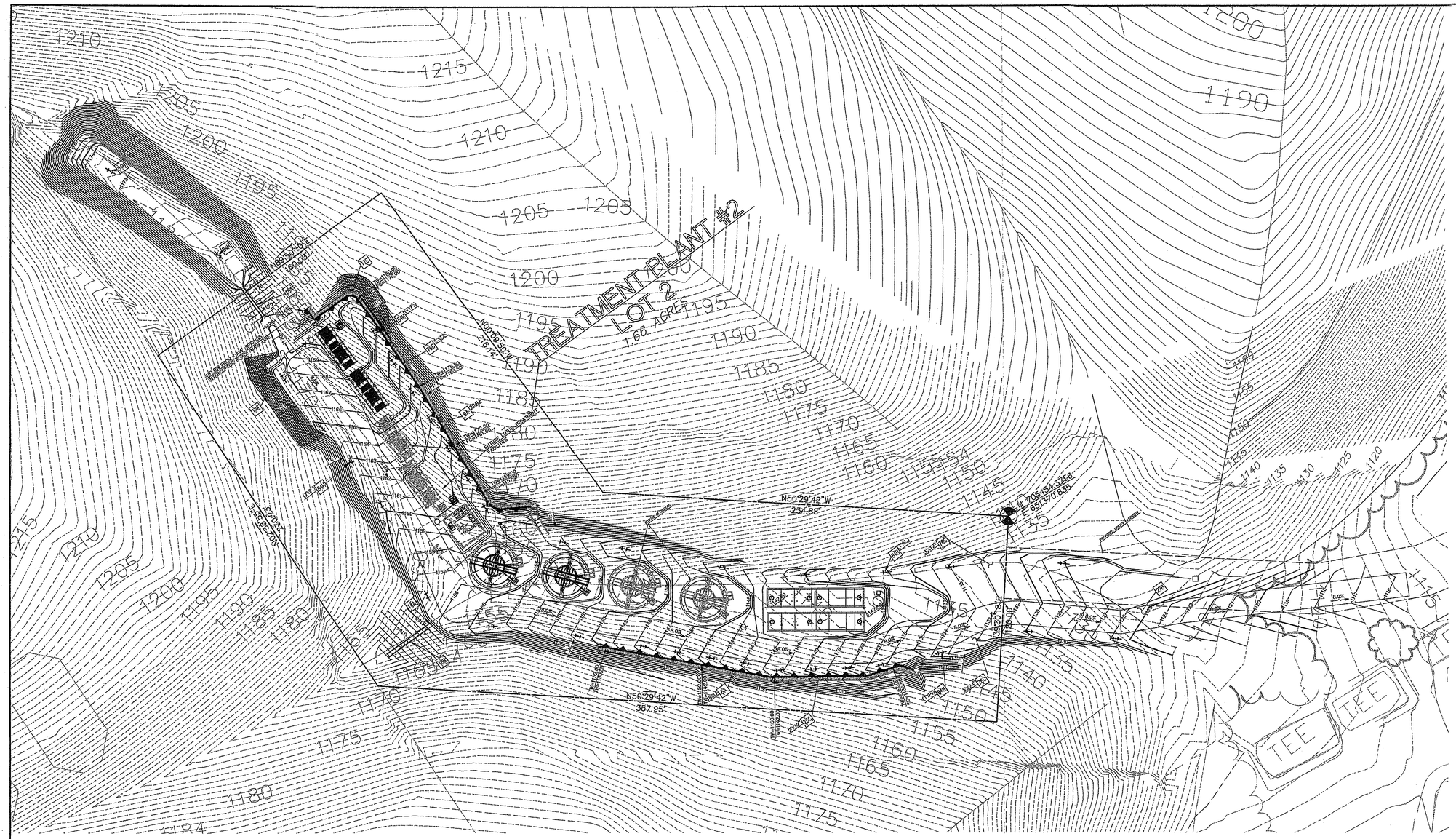

0 30' 45' 60'

SCALE IN FEET

LEGEND

EXISTING

e	EAST OR ELECTRIC
n	NORTH
oh	OVERHEAD
s	SOUTH OR SEWER
t	TELEPHONE
ug	UNDERGROUND
w	WEST OR WATER
———	BOUNDARY LINE
———	RIGHT OF WAY LINE
———	STORM DRAIN
——G——	GAS
—OHE—	OVERHEAD ELECTRIC
—OHE&T—	OVERHEAD ELECTRIC AND TELEPHONE
—OHT—	OVERHEAD TELEPHONE
—OHTV—	OVERHEAD TV
——S——	SEWER
—UGE—	UNDERGROUND ELECTRIC
—UGE&T—	UNDERGROUND ELECTRIC AND TELEPHONE
—UGT—	UNDERGROUND TELEPHONE
—UGTV—	UNDERGROUND TV
——W——	WATER
.5-10-11 50.5	TREE INFO .5 = DIAMETER OF TRUNK IN FEET 10 = HEIGHT OF TREE IN FEET 11 = CANOPY DIAMETER IN FEET 50.5 = ELEVATION AT BASE OF TREE
◉	SOIL BORING LOCATION

PROPOSED

———	BOUNDARY LINE
———	RIGHT OF WAY LINE
———	GRADE BREAK
—XXX—	CONTOUR ELEVATIONS
———	STORM DRAIN
▨	LIMITS OF PAVING
×XX.XX	SPOT ELEVATIONS: TC = TOP OF CURB G = GUTTER

GENERAL GRADING NOTES

A. PRIOR TO INSTALLATION OF WATERLINE OR SANITARY SEWER, THE CONTRACTOR SHALL EXCAVATE, VERIFY, AND CALCULATE ALL CROSSINGS AND INFORM THE OWNER AND THE ENGINEER OF ANY CONFLICTS PRIOR TO CONSTRUCTION. THE ENGINEER WILL BE HELD HARMLESS IN THE EVENT THE ENGINEER IS NOT NOTIFIED OF DESIGN CONFLICTS.

B. ALL SLOPES AND AREAS DISTURBED BY CONSTRUCTION SHALL BE GRADED SMOOTH AND 4" OF TOPSOIL APPLIED. IF ADEQUATE TOPSOIL IS NOT AVAILABLE ON SITE, THE CONTRACTOR SHALL PROVIDE TOPSOIL, APPROVED BY THE OWNER, AS NEEDED. THE AREA SHALL THEN BE SEEDED, FERTILIZED, MULCHED, WATERED AND MAINTAINED UNTIL HARDY GRASS GROWTH IS ESTABLISHED IN ALL AREAS (SEE LANDSCAPE PLAN FOR SEED MIX AND PROPER APPLICATION RATE). ANY AREAS DISTURBED FOR ANY REASON PRIOR TO FINAL ACCEPTANCE OF THE PROJECT SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

C. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES.

GRADING DETAILS

6A	SEGMENTAL RETAINING WALL (BY GENERAL CONTRACTOR)
14A	CONCRETE SWALE
17D	RIP-RAP (GROUTED IN PLACE)
17P	MORTARED RIP-RAP
27B	TRENCH DRAIN
76C	CONCRETE CHANNEL
84H	ROCK DITCH CHECK

INITIAL DESIGN	7-17-06	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 7944
DAVID A. TODD
David A. Todd
14 Sept 2006

CAVE SPRINGS WASTEWATER TRANSFER AND TREATMENT SYSTEM

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS • PLANNERS • SURVEYORS
3317 S.W. I Street
Bentonville, AR 72712
(479) 273-9472
FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733TREATMENTSITE

GRADING PLAN
TREATMENT PLANT 2

DATE 08-24-06 3:55 PM REV4

SHEET NO. 35 OF 43

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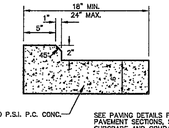
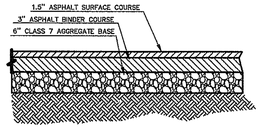


TYPE "G" CURB (MOUNTABLE) 1G

N.T.S.



REGULAR DUTY ASPHALT PAVING 8D

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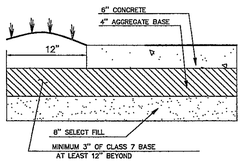
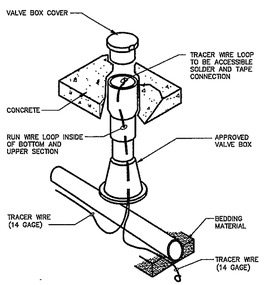


REGULAR DUTY CONCRETE PAVING 8C

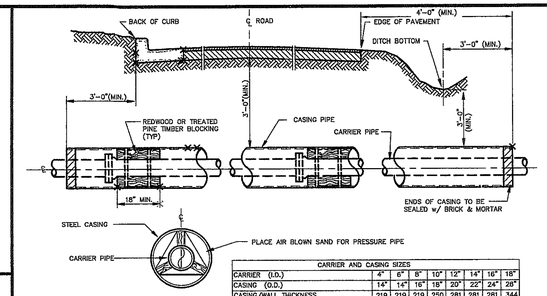
N.T.S.



TRACER WIRE INSTALLATION FOR NON-FERROUS PIPE 36D

N.T.S.

(AWAY FROM VALVE)



CARRIER AND CASING SIZES								
CARRIER (I.D.)	6"	8"	10"	12"	14"	16"	18"
CASING (O.D.)	14"	14"	16"	18"	20"	22"	24"	28"
CASING/WALL THICKNESS	.219	.219	.219	.250	.281	.281	.281	.344
MAX LENGTH PVC PIPE W/OUT BLOCKING	4.7'	6.3'	7.4'	8.5'	9.6'	–	–	–
MAX LENGTH DI PIPE W/OUT BLOCKING	–	–	–	–	–	15'	15'	15'

NOTES:

(1) JACK & BORE PER LOCAL CODES AND SPECIFICATIONS.

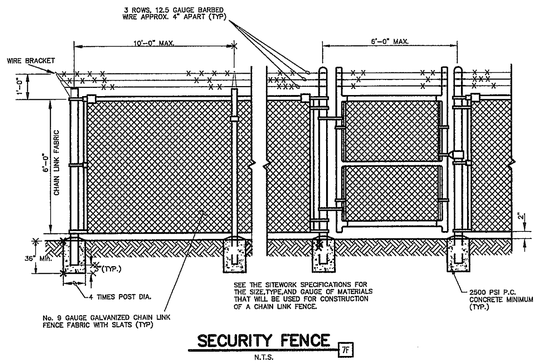
(2) CASING FOR BORING OR JACKING CONSTRUCTION SHALL BE STEEL PIPE CONFORMING TO ASTM A 139 WITH A MINIMUM DIAMETER AS SHOWN ON CHART ABOVE.

(3) TIMBER BLOCKING TO BE FASTENED TO BARREL OF CARRIER PIPE, ABUTTING EACH BELL WITH STAINLESS STEEL BANDING AS SHOWN. NOTCH TIMBER SO BANDING CLEARS CASING. USE INTERMEDIATE BANDING AS REQUIRED.

(4) ALL VOIDS BETWEEN STEEL CASING AND SURROUNDING EARTH SHALL BE FILLED WITH GROUT FORCED IN UNDER PRESSURE. THE GROUT SHALL CONSIST OF TWO PARTS OF SAND TO ONE PART OF PORTLAND CEMENT, MIXED WITH SUFFICIENT WATER TO MAINTAIN A FREELY POURING CONSISTENCY.

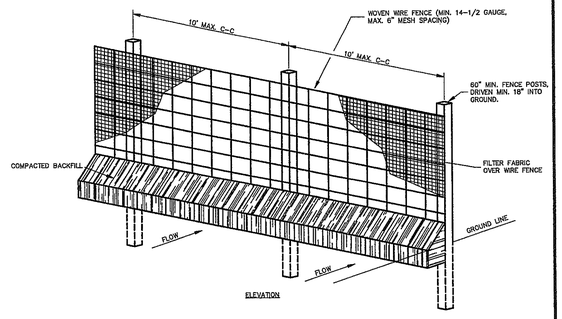
JACK & BORE 30B

N.T.S.

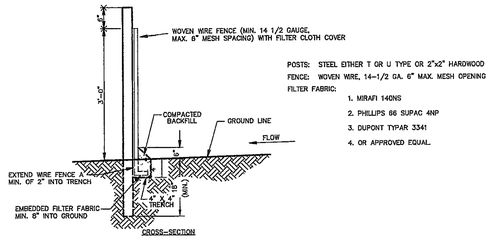


SECURITY FENCE 7F

N.T.S.



ELEVATION



CROSS-SECTION

POSTS: STEEL EITHER T OR U TYPE OR 2"x2" HARDWOOD

FENCE: WOVEN WIRE, 14-1/2 GA. 6" MAX. MESH OPENING

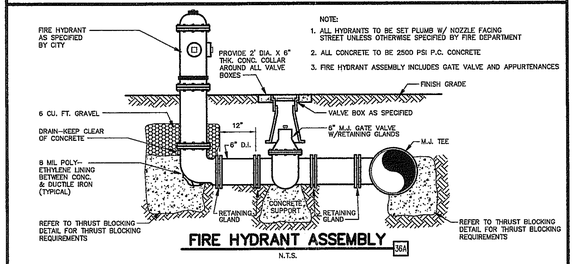
FILTER FABRIC:

1. MIRAFI 140NS
2. PHILLIPS 66 SUPAC 4NP
3. DUPONT TYPAR 3341
4. OR APPROVED EQUAL.

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY 6" AND FOLDED.
4. MAINTENANCE SHALL BE PERFORMED AS NOTED IN THE EROSION CONTROL PLAN. COLLECTED MATERIAL SHALL BE REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

TEMPORARY SEDIMENTATION/SILT FENCE 8A1A

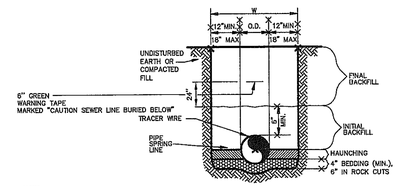
N.T.S.



NOTE:
1. ALL HYDRANTS TO BE SET PLUMB W/ NOZZLE FACING STREET UNLESS OTHERWISE SPECIFIED BY FIRE DEPARTMENT
2. ALL CONCRETE TO BE 2500 PSI P.C. CONCRETE
3. FIRE HYDRANT ASSEMBLY INCLUDES GATE VALVE AND APPURTENANCES

FIRE HYDRANT ASSEMBLY 36A

N.T.S.



NOTE:
ALL MATERIALS SHALL BE CLASSIFIED IN ACCORDANCE WITH ASTM D 2321.

FORCE MAIN 42A

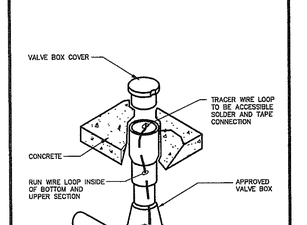
N.T.S.

GENERAL NOTES

1. BEDDING SHALL BE CLASS 67 STONE.
2. HAUNCHING SHALL BE WORKED AROUND THE PIPE BY HAND TO ELIMINATE VOIDS AND SHALL BE CLASS 67 COMPACTED TO 85% PROCTOR.
3. INITIAL BACKFILL SHALL BE CLASS 67 WORKED BY HAND COMPACTED TO 85% STANDARD PROCTOR
4. FINAL BACKFILL SHALL BE CLASS I, II, OR III COMPACTED AS NOTED IN NOTES 3.
5. FINAL BACKFILL NOT UNDER PAVED AREAS CAN BE CLASS IV-A COMPACTED TO 95% STANDARD PROCTOR.
6. CLASS 67 STONE SHALL BE IN ACCORDANCE WITH ASTM D 448. ALL OTHER MATERIALS ARE CLASSIFIED IN ACCORDANCE WITH ASTM D2321.
7. ALL MATERIALS SHALL BE INSTALLED IN MAXIMUM 8" LOOSE LIFTS. CLASS III AND IV-A MATERIALS SHALL BE COMPACTED NEAR OPTIMUM MOISTURE CONTENT.
8. FILL SALVAGED FROM EXCAVATION SHALL BE FREE OF DEBRIS, ORGANICS AND ROCKS LARGER THAN 3".
9. ALL TRENCH EXCAVATIONS SHALL BE SLOPED, SHORED, SHEETED, BRACED, OR OTHERWISE SUPPORTED IN COMPLIANCE WITH OSHA REGULATIONS AND LOCAL ORDINANCES. (SEE SPECIFICATIONS)

TRENCH AND BEDDING

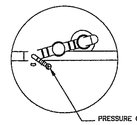
N.T.S.

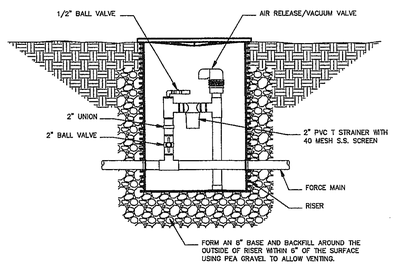


TRACER WIRE INSTALLATION FOR NON-FERROUS PIPE 36D

N.T.S.

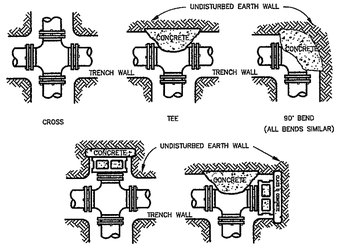
(AT VALVE)



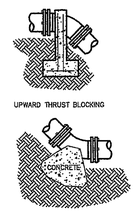


AIR VACUUM RELIEF VALVE (AS PRROVIDED BY ZOELLER PUMP CO.) 35A

N.T.S.



HORIZONTAL FITTINGS



45° BENDS
(ALL BENDS SIMILAR)

VERTICAL FITTINGS

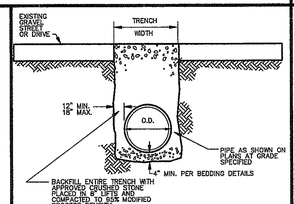
HORIZONTAL THRUST BLOCKING TABLE						
SIZE	REQUIRED SQ. FT. OF UNDISTURBED EARTHWALL FOR REACTION BACKING					
	TYPE OF FITTINGS					
	TEE	90°	45°	22½°	11¼°
2"	1	1	1	1	1
3"	1	1	1	1	1
4"	1	1	1	1	1
6"	1.5	2	1	1	1
8"	2.5	3.5	1.8	1	1
10"	4	5.5	2.8	1.5	1
12"	6	8	4	2	1.5
14"	8	11	5.5	3	2
16"	10	14.2	7	4	3
18"	21	21	12	6	4
20"	25	26	14	7	5
24"	36	38	20	10	7
30"	59	59	32	16	9
36"	85	85	46	23	12

MINIMUM CONCRETE VOLUMES FOR UPWARD THRUST BLOCKING												
PIPE SIZE Inches	11.25 DEGREE BEND			22.5 DEGREE BEND			45 DEGREE BEND			90 DEGREE BEND		
	ANCHOR STRAPS NO.	SIZE	Concrete VOLUME cu.yd.	ANCHOR STRAPS NO.	SIZE	Concrete VOLUME cu.yd.	ANCHOR STRAPS NO.	SIZE	Concrete VOLUME cu.yd.	ANCHOR STRAPS NO.	SIZE	Concrete VOLUME cu.yd.
2.0	1	#6	0.04	1	#6	0.08	1	#6	0.16	1	#6	0.30
3.0	1	#6	0.09	1	#6	0.18	1	#6	0.36	1	#6	0.67
4.0	1	#6	0.16	1	#6	0.33	1	#6	0.64	1	#6	1.19
6.0	1	#6	0.37	1	#6	0.74	1	#6	1.44	1	#6	2.67
8.0	1	#6	0.66	1	#6	1.31	2	#6	2.57	2	#6	4.74
10.0	1	#6	1.03	1	#6	2.04	2	#6	4.01	2	#6	7.40
12.0	1	#6	1.48	1	#6	2.94	2	#6	5.77	2	#6	10.62
14.0	1	#6	2.01	2	#6	4.01	2	#6	7.86	2	#6	14.52
16.0	1	#6	2.63	2	#6	5.23	2	#6	10.26	3	#6	18.95
NOTE: 18" AND LARGER REQUIRES SPECIFIC DESIGN												

NOTES:
1. DO NOT COVER BELLS OR FLANGES WITH CONCRETE
2. WRAP ALL FITTINGS WITH VISQUEEN.
3. BACK ALL TEES ACCORDING TO SIZE OF BRANCH.
4. BACKING FUTURE LINE EXTENSIONS SHALL BE SUCH THAT LATER REMOVAL IS POSSIBLE.
5. ALL BENDS WHERE FITTINGS ARE USED, BOTH HORIZONTAL OR VERTICAL SHALL BE BACKED.
6. REACTION BACKING TABLE IS BASED ON 100 P.S.I. AND SOIL BEARING PRESSURE OF 2,500 lb./sq.ft. ADDITIONAL BACKING MAY BE REQUIRED IN SOME AREAS AS DIRECTED BY ENGINEERS.
7. ALL CONCRETE SHALL BE 2500 P.S.I.

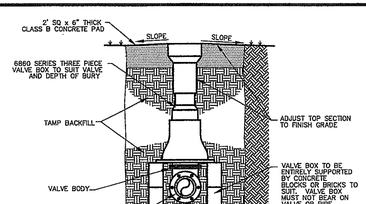
THRUST BLOCKING 31C

N.T.S.



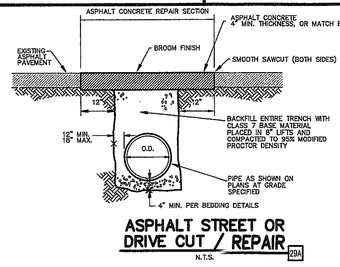
GRAVEL STREET OR DRIVE CUT / REPAIR 29C

N.T.S.



GATE VALVE 45A

N.T.S.



ASPHALT STREET OR DRIVE CUT / REPAIR 29A

N.T.S.

INITIAL DESIGN	10-16-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS • PLANNERS • SURVEYORS
3317 S.W. I Street, Bentonville, AR 72712
(479) 273-9472 FAX (479) 273-0844

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

JOB NO.: 20733.0
DWG NAME: 20733DET

DETAIL SHEET 1

DATE: 09-14-06 08:59 AM REV.6

SHEET NO.: 36 OF 43

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SEGMENTAL RETAINING WALL GENERAL NOTES

A. THE GENERAL CONTRACTOR SHALL PROVIDE THE SEGMENTAL RETAINING WALL SYSTEM DESIGN AND SUPPORTING SIGNED AND SEALED STRUCTURAL CALCULATIONS TO THE OWNER PRIOR TO THE START OF WORK. THE DESIGN SUBMITTED SHALL BE BASED ON SOIL PARAMETERS, FOUNDATION CONDITIONS, AND LOADING AS OUTLINED IN THE GEOTECHNICAL REPORT. GENERAL CONTRACTOR'S ENGINEER/MANUFACTURE SHALL PROVIDE WALL DESIGN AND ANALYSES UTILIZING SRW COMPUTER SOFTWARE.

B. NOTARIZED CERTIFICATE FROM GENERAL CONTRACTOR SHALL BE PROVIDED TO THE OWNER PRIOR TO START OF WORK STATING THAT THE SRW SYSTEM COMPLIES WITH THE CRITERIA REFERENCED IN THIS SECTION.

C. SUBMITTAL PACKAGES TO OWNER SHALL INCLUDE THE FOLLOWING:

1. PRODUCT LITERATURE INDICATING SPECIFICALLY WHICH SEGMENTAL RETAINING WALL UNITS ARE PROPOSED FOR USE ON PROJECT, INCLUDING COLOR, FACE STYLE AND TEXTURE.
2. PRODUCT SPECIFICATIONS INDICATING COMPRESSIVE STRENGTH, UNIT WEIGHT, MIX AND PERCENT ABSORPTION FOR THE UNITS PROPOSED.
3. RETAINING WALL DRAWINGS SHOWING COMPLETE WALL PROFILES, REINFORCEMENT ELEVATIONS, REINFORCEMENT LENGTHS, REINFORCEMENT TYPES, TOP OF WALL, BOTTOM OF WALL, PROPOSED GRADES AT TOP OF WALL, PROPOSED GRADES AT BOTTOM OF WALL, AND STATIONS SHOWING BEGINNING AND END OF WALL AS WELL AS BEGINNING AND END OF TURNS AND RADII. DRAWINGS SHALL INCLUDE DETAIL DRAWINGS FOR FACING CONNECTIONS, WALL PENETRATIONS, GUARD RAILS, HAND RAILS, LEVELING PAD, DRAINAGE SWALES, TYPICAL SECTIONS AND CONSTRUCTION DETAILS.
4. RETAINING WALL DRAWINGS SHALL SHOW DESIGN PARAMETERS FOR RETAINING WALL, REQUIRED BEARING CAPACITY OF FOUNDATION SOILS ALONG WITH PROVIDED FACTOR SAFETY AGAINST BEARING CAPACITY FAILURES WALL SUBGRADE AND CONSTRUCTION DETAILS.
5. RETAINING WALL DRAWINGS SHALL BE ACCOMPANIED BY A COMPLETE SET OF CONSTRUCTION SPECIFICATIONS.
6. RETAINING WALL DRAWINGS AND SPECIFICATIONS SHALL BE ACCOMPANIED BY ENGINEER'S/MANUFACTURE'S DESIGN CALCULATIONS AND/OR COMPUTER OUTPUT ADDRESSING REQUIRED DESIGN PARAMETERS ACCORDING TO NATIONAL CONCRETE MASONRY ASSOCIATION RECOMMENDATIONS.

D. SOIL DESIGN PARAMETERS SHALL BE AS PROVIDED IN THE MANUFACTURES CONSTRUCTION DOCUMENTS. WALL DESIGN ENGINEER/MANUFACTURE OF RECORD SHALL BE RESPONSIBLE FOR SELECTING AND SPECIFYING REINFORCED FILL MATERIAL. GENERAL CONTRACTOR IS RESPONSIBLE FOR ENSURING AND DOCUMENTING THE REINFORCED FILL MEETS THE SPECIFIED PARAMETERS FOR BOTH STRENGTH AND COMPACTION.

E. DESIGNS FOR SRWS USING EXTENSIBLE (GEOSYNTHETIC) REINFORCEMENT SHALL BE PREPARED ACCORDING TO DESIGN METHODOLOGY PRESENTED IN NATIONAL CONCRETE MASONRY ASSOCIATION "DESIGN MANUAL FOR SEGMENTAL RETAINING WALLS" AND CONFORM TO THE MINIMUM SAFETY FACTORS AS SPECIFIED. OWNER RESERVES ALL RIGHTS IN DETERMINING COMPLIANCE FOR PLAN APPROVAL AND MAY REJECT ANY SUBMITTALS.

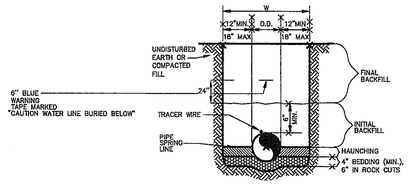
F. RETAINING WALL UNITS, REINFORCING, AND ACCESSORIES SHALL BE SUPPLIED AS INDICATED. UNITS PRODUCED UNDER LICENSE FROM APPROVED PROPRIETARY SYSTEM SHALL BE MANUFACTURED IN FACILITY MEETING REQUIREMENTS OF LICENSING SYSTEM WITH ADEQUATE CAPACITY TO SUPPLY PRODUCT TO SITE IN TIMELY MANNER. MATERIALS SHALL BE STORED AS REQUIRED TO PREVENT DAMAGE AND STAINING.

G. ACCEPTABLE RETAINAGE SYSTEMS INCLUDE THE FOLLOWING PRODUCTS OR APPROVED EQUAL:

1. REINFORCED EARTH® RETAINING WALL UNITS AS MANUFACTURED BY LICENSED DISTRIBUTOR FOR THE REINFORCED EARTH COMPANY, BEDFORD, TEXAS.
2. KEYSTONE® RETAINING WALL UNITS AS MANUFACTURED BY LICENSED DISTRIBUTOR FOR KEYSTONE RETAINING WALL SYSTEMS, INC., MINNEAPOLIS, MINNESOTA.
3. VERSA-LOK® RETAINING WALL UNITS AS MANUFACTURED BY LICENSED DISTRIBUTOR FOR VERSA-LOK RETAINING WALL SYSTEMS, NORTH ST. PAUL, MINNESOTA.
4. MESA RETAINING WALL UNITS AS MANUFACTURED BY LICENSED DISTRIBUTOR FOR MESA RETAINING WALL SYSTEMS, CARMEL, NEW YORK.
5. ROCKWOOD RETAINING WALL UNITS AS MANUFACTURED BY LICENSED DISTRIBUTOR FOR ROCKWOOD RETAINING WALLS, INC. ROCHESTER, MINNESOTA.
6. ANCHOR WALLS UNITS AS MANUFACTURED BY LICENSED DISTRIBUTOR FOR ANCHOR WALL SYSTEMS, MINNETONKA, MINNESOTA.

H. GENERAL CONTRACTOR ASSUMES ALL RESPONSIBILITY FOR THE DESIGN AND CONSTRUCTION OF ALL SEGMENTAL RETAINING WALLS AS SHOWN IN THE CONSTRUCTION DOCUMENTS. CEI ENGINEERING ASSOCIATES, INC. ASSUMES NO LIABILITY OR RESPONSIBILITY FOR DESIGN OR CONSTRUCTION OF ANY SEGMENTAL RETAINING WALL SYSTEM RELATED TO THESE SITE IMPROVEMENTS.

SEGMENTAL RETAINING WALL 6A
N.T.S.

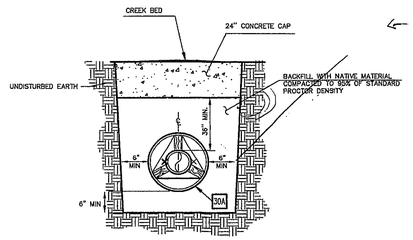


WATER LINE 42B
N.T.S.

GENERAL NOTES

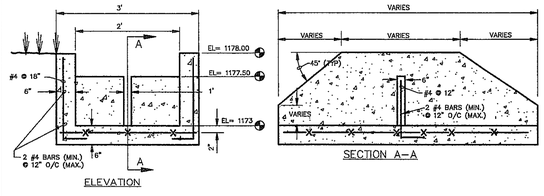
1. BEDDING SHALL BE CLASS I-A WORKED BY HAND. IF GROUNDWATER IS ANTICIPATED, THEN BEDDING SHALL BE CLASS I-B COMPACTED TO 85% STANDARD PROCTOR. (SEE SPECIFICATIONS FOR GRADATION)
2. HAUNCHING SHALL BE WORKED AROUND THE PIPE BY HAND TO ELIMINATE VOIDS AND SHALL BE CLASS I-A OR CLASS I-B OR CLASS II COMPACTED TO 85% PROCTOR.
3. INITIAL BACKFILL SHALL BE CLASS I-A WORKED BY HAND, OR CLASS I-B OR CLASS II COMPACTED TO 85% STANDARD PROCTOR.
4. INITIAL BACKFILL NOT UNDER PAVED AREAS CAN BE CLASS II COMPACTED TO 90% STANDARD PROCTOR.
5. FINAL BACKFILL SHALL BE CLASS I, II, OR III COMPACTED AS NOTED IN NOTES 3. AND 4
6. FINAL BACKFILL NOT UNDER PAVED AREAS CAN BE CLASS IV-A COMPACTED TO 95% STANDARD PROCTOR.
7. ALL MATERIALS ARE CLASSIFIED IN ACCORDANCE WITH ASTM D 2321, LATEST EDITION.
8. ALL MATERIALS SHALL BE INSTALLED IN MAXIMUM 8" LOOSE LIFTS IN ACCORDANCE WITH ASTM D 698. CLASS III AND IV-A MATERIALS SHALL BE COMPACTED NEAR OPTIMUM MOISTURE CONTENT.
9. FILL SALVAGED FROM EXCAVATION SHALL BE FREE OF DEBRIS, ORGANICS AND ROCKS LARGER THAN 3".
10. ALL TRENCH EXCAVATIONS SHALL BE SLOPED, SHORED, SHEETED, BRACED, OR OTHERWISE SUPPORTED IN COMPLIANCE WITH OSHA REGULATIONS AND LOCAL ORDINANCES. (SEE SPECIFICATIONS)

WATER LINE TRENCHING AND BEDDING
N.T.S.



OPEN TRENCH CREEK CROSSING 76A
N.T.S.

NOTE:
CASING SHALL BE LAID IN OPEN TRENCH, NOT JACKED AND BORED. FORCE MAIN SHALL THEN BE INSTALLED IN CASING PER DETAIL 30A.



GENERAL NOTES

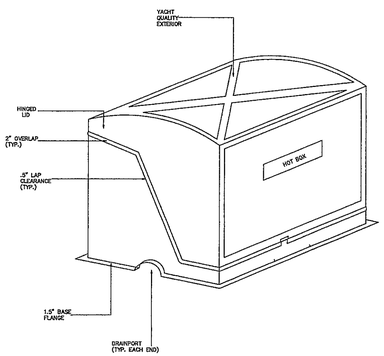
SUBGRADE

1. COMPACT TO 95% MAXIMUM DRY DENSITY AS DETERMINED BY A.S.T.M. D-698-78 (STANDARD PROCTOR) AT ± 2% OF PROCTOR OPTIMUM MOISTURE VALUE.

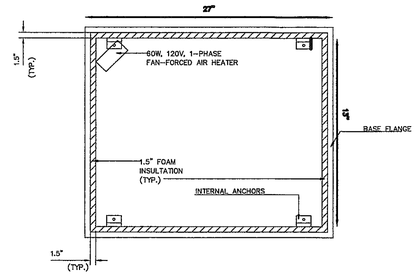
CONCRETE

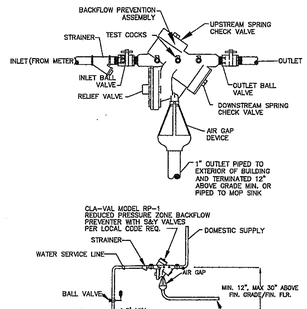
1. COMPRESSIVE STRENGTH: 3,500 P.S.I. MINIMUM AT 28 DAYS. WITH 5%-8% AIR ENTRAINMENT.
2. REINFORCEMENT: WELDED WIRE FABRIC - 6"X6" - W 2.1 X W 2.1,
3. WEAKENED - PLANE CONTROL JOINTS TO BE 15' O.C. AND FILLED/SEALED. SEE SPECIFICATIONS FOR APPROVED FILLER / SEALER.
4. CHAMFER ALL EXPOSED EDGES.

CONCRETE WEIR 18A
N.T.S.

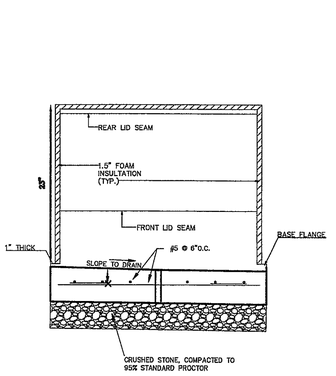


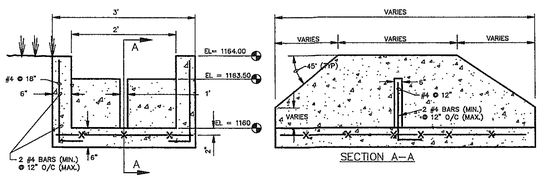
NOTE:
1. INSIDE DIMENSIONS 27"L X 13"W X 23"H.
2. REQUIRED SLAB SIZE: 36"L X 22"W X 6" MINIMUM THICKNESS
3. ANCHORING IS INTERNAL. ANCHOR KIT IS INCLUDED
4. HEAT: 60W, 120V, SINGLE-PHASE HEATER
5. 1.5" INSULATION: POLYISOCYANURATE, SPRAY APPLIED AND BONDED
6. UNIT IS A HB1 (LOK BOX)





REDUCED PRESSURE ZONE ASSEMBLY 54A
N.T.S.





GENERAL NOTES

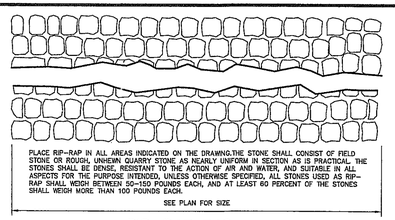
SUBGRADE

1. COMPACT TO 95% MAXIMUM DRY DENSITY AS DETERMINED BY A.S.T.M. D-698-78 (STANDARD PROCTOR) AT ± 2% OF PROCTOR OPTIMUM MOISTURE VALUE.

CONCRETE

1. COMPRESSIVE STRENGTH: 3,500 P.S.I. MINIMUM AT 28 DAYS. WITH 5%-8% AIR ENTRAINMENT.
2. REINFORCEMENT: WELDED WIRE FABRIC - 6"X6" - W 2.1 X W 2.1,
3. WEAKENED - PLANE CONTROL JOINTS TO BE 15' O.C. AND FILLED/SEALED. SEE SPECIFICATIONS FOR APPROVED FILLER / SEALER.
4. CHAMFER ALL EXPOSED EDGES.

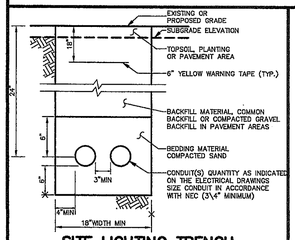
CONCRETE WEIR 18B
N.T.S.



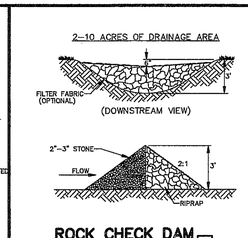
PLACE RIP-RAP IN ALL AREAS INDICATED ON THE DRAWING.THE STONE SHALL CONSIST OF FIELD STONE OR ROUGH, UNHEWN QUARRY STONE AS NEARLY UNIFORM IN SECTION AS IS PRACTICAL. THE STONES SHALL BE DENSE, RESISTANT TO THE ACTION OF AIR AND WATER, AND SUITABLE IN ALL ASPECTS FOR THE PURPOSE INTENDED. UNLESS OTHERWISE SPECIFIED, ALL STONES USED AS RIP-RAP SHALL WEIGH BETWEEN 50-150 POUNDS EACH, AND AT LEAST 60 PERCENT OF THE STONES SHALL WEIGH MORE THAN 100 POUNDS EACH.

SEE PLAN FOR SIZE

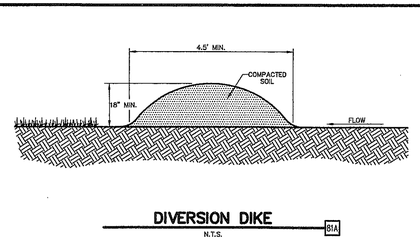
RIP-RAP PAD FOR SLOPE PROTECTION 17E
N.T.S.



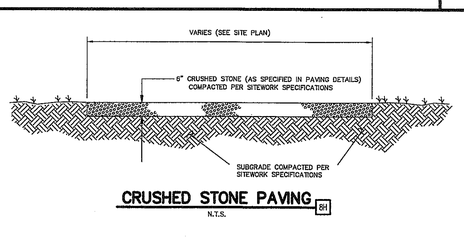
SITE LIGHTING TRENCH 17D
N.T.S.



ROCK CHECK DAM 82H
N.T.S.



DIVERSION DIKE 81A
N.T.S.



CRUSHED STONE PAVING 8H
N.T.S.

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

1631.61

INITIAL DESIGN	10-16-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

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ENGINEERS • PLANNERS • SURVEYORS

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JOB NO.: 20733.0
DWG NAME: 20733DET

DETAIL SHEET 2

DATE: 09-14-06 08:59 AM REV.6

SHEET NO. 37 OF 43

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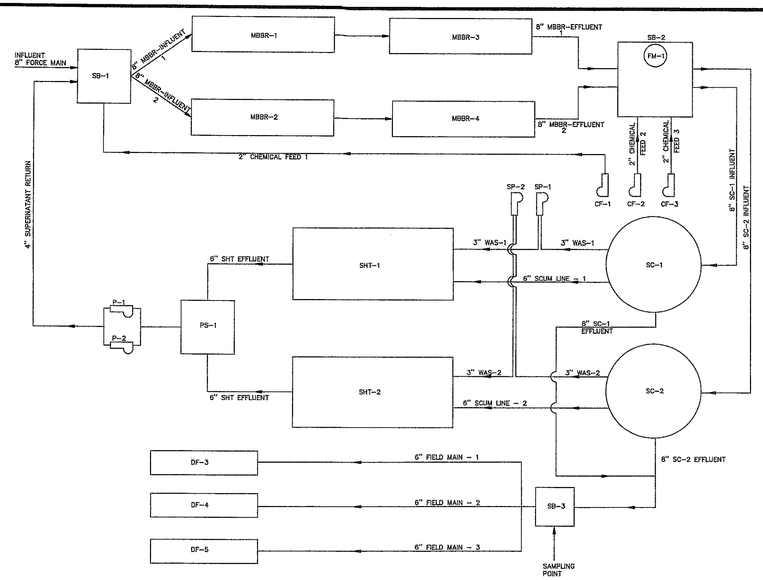
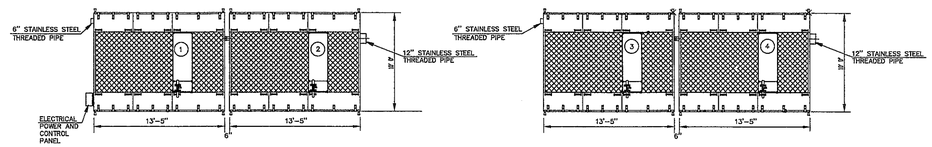
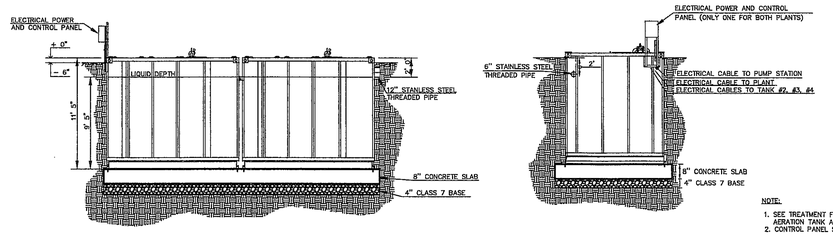


TREATMENT PLANT #2 - EQUIPMENT LIST

SB-1 : SPLITTER BOX 1
MBBR-1 : MOVING BED BIOLOGICAL REACTOR 1: LOTUS-OH 27'X10'X11.5'
MBBR-2 : MOVING BED BIOLOGICAL REACTOR 2: LOTUS-OH 27'X10'X11.5'
MBBR-3 : MOVING BED BIOLOGICAL REACTOR 3: LOTUS-OH 27'X10'X11.5'
MBBR-4 : MOVING BED BIOLOGICAL REACTOR 4: LOTUS-OH 27'X10'X11.5'
SB-2 : SPLITTER BOX 2
CF-1 : CHEMICAL FEED PUMP 1
CF-2 : CHEMICAL FEED PUMP 2
CF-3 : CHEMICAL FEED PUMP 3
SP-1 : SLUDGE PUMP 1
SP-2 : SLUDGE PUMP 2
SC-1 : LAKESIDE 26'X12' SWD DIAMETER SECONDARY CLARIFIER 1
SC-2 : LAKESIDE 26'X12' SWD DIAMETER SECONDARY CLARIFIER 2
SHT-1 : 30,000 GAL. SLUDGE HOLDING TANK 1
SHT-2 : 30,000 GAL. SLUDGE HOLDING TANK 2
SB-3 : SPLITTER BOX 3
PS-1 : SUPERNATANT SLUDGE PUMPING STATION 1
P-1 : SLUDGE TANK DECANT PUMP 1
P-2 : SLUDGE TANK DECANT PUMP 2
DF-3 : DRIP DISPOSAL FIELD 3
DF-4 : DRIP DISPOSAL FIELD 4
DF-5 : DRIP DISPOSAL FIELD 5
FM-1 : INFLUENT DOPPLER ULTRA SONIC FLOW METER 1

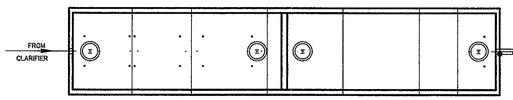
TREATMENT PLANT #2
FLOW SCHEMATIC
N.T.S.



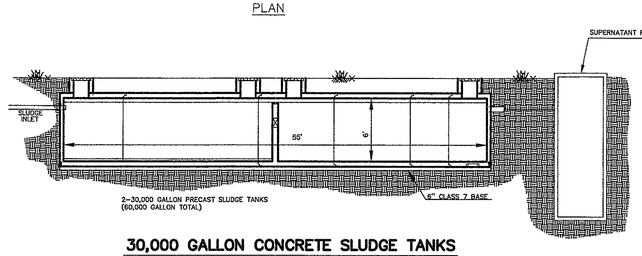


NOTE:
1. SEE TREATMENT FACILITY #2 GRADING AND LAYOUT PLAN FOR LOTUS AERATION TANK ALIGNMENT.
2. CONTROL PANEL SHOULD BE MOUNTED AS SHOWN.

CONTAINERIZED "LOTUS" AEROBIC REACTOR TANK
N.T.S.



PLAN



30,000 GALLON CONCRETE SLUDGE TANKS
N.T.S.

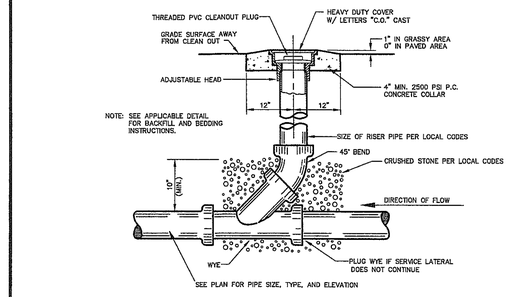
SUBGRADE NOTES

1. COMPACT TO 95% MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D 698 (STANDARD PROCTOR) AT ± 2% OF PROCTOR OPTIMUM MOISTURE CONTENT.

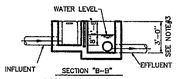
CONCRETE NOTES

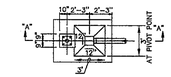
1. COMPRESSIVE STRENGTH: 3,500 P.S.I. MINIMUM AT 28 DAYS.
2. FLOAT OR SMOOTH FINISH.
3. REINFORCEMENT: WELDED WIRE FABRIC - 6"X6" - W 2.1 X W 2.1, 2" FROM BOTTOM.
4. WEAKENED-PLANE CONTROL JOINTS 15' O.C. AND FILLED/SEALED. SEE SPECIFICATIONS FOR APPROVED FILLER/SEALERS.

CONCRETE SWALE
N.T.S. 14A

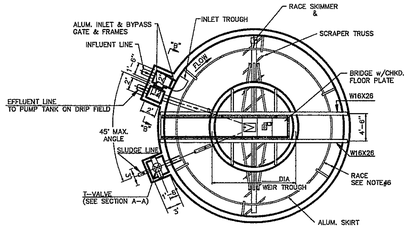


SANITARY SEWER CLEAN-OUT
N.T.S. 40C

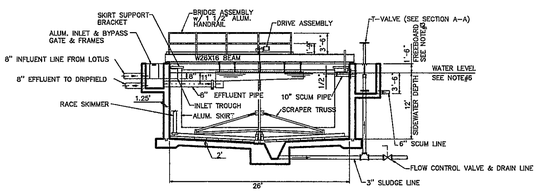




PLAN OF CENTER PIER



PLAN



SECTIONAL ELEVATION
ROTATED TO SHOW SECTION
SEE PLAN FOR LOCATION

NOTES:
1) ALL EQUIPMENT SHOWN SHALL BE PROVIDED BY LAKESIDE EQUIPMENT CORPORATION UNLESS OTHERWISE SPECIFIED.
2) ALL CONCRETE & GROUT SUPPLIED BY OTHERS.
3) ALL BOX DEPTHS BASED ON 1'-6" FREEBOARD ANY VARIATION IN FREEBOARD AFFECTS DIMENSIONS ACCORDINGLY.
4) CLOCKWISE FLOW IS SHOWN DIRECTION OF FLOW IS OPTIONAL. BOXES WOULD BE MIRROR IMAGE OF BOXES IN PLAN VIEW.
5) RACE DESIGN AND QUANTITY OF SUPPORTS BY LAKESIDE.
6) WATER LEVEL SHOWN IS BOTTOM OF V-NOTCH IN WEIR TROUGH.

26' DIAMETER CLARIFIER DETAIL
LAKESIDE SPIROFLOW
N.T.S.

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

INITIAL DESIGN	10-16-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

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Bentonville, AR 72712 FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733DET

DETAIL SHEET 3

DATE 09-14-06 08:59 AM REV.6
SHEET NO. 38 OF 43

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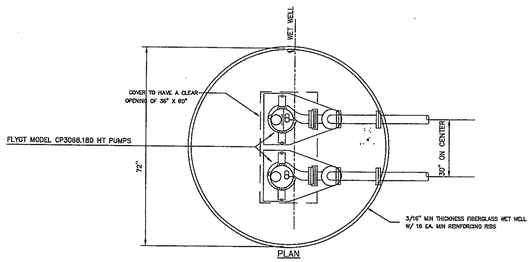
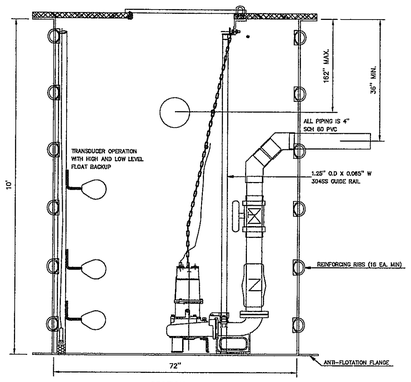


PUMP STATION DETAIL

SCALE: N.T.S.



PUMP STATION DETAIL

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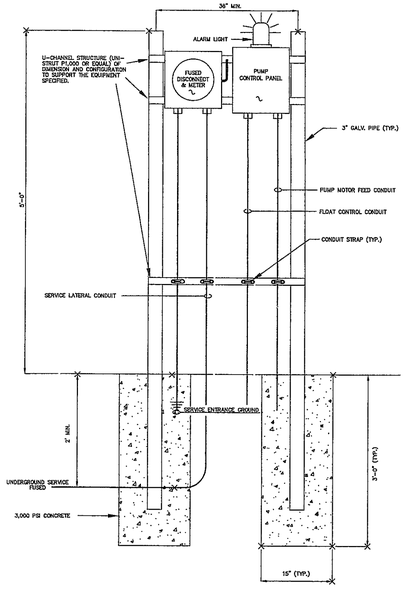

UNDERGROUND SERVICE METER INSTALLATION THREE PHASE – 4 WIRE 480 VOLTS

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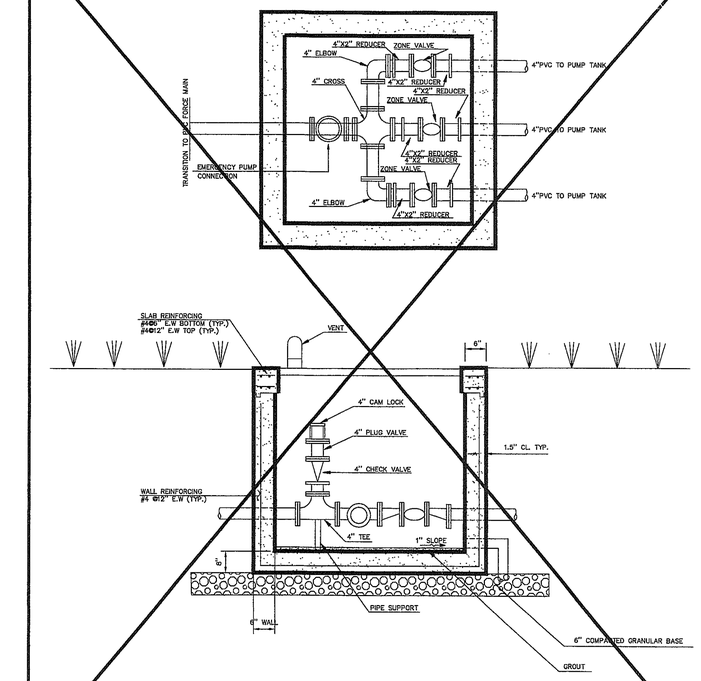


VALVE VAULT FOR FIELD MAINS

70A

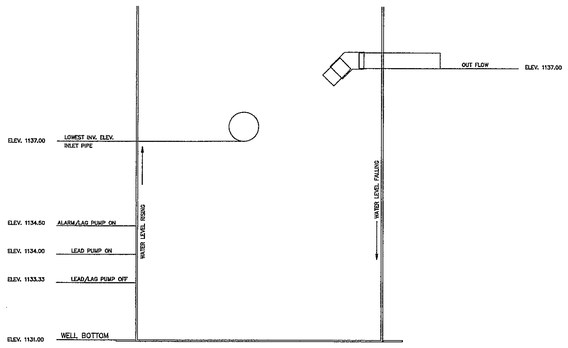
N.T.S.

ELECTRICAL NOTES:

1. INSTALL METER SOCKET IN ENCLOSURE IN ACCORDANCE WITH ELECTRIC COMPANY REQUIREMENTS AND THE NATIONAL ELECTRIC CODE.
2. INSTALL SERVICE LATERAL CONDUIT SERVICE ENTRANCE GROUND, SERVICE ENTRANCE CONDUCTORS AND FUSED DISCONNECT IN ACCORDANCE WITH ELECTRIC COMPANY REQUIREMENTS AND THE NATIONAL ELECTRIC CODE.
3. MAKE CONNECTIONS IN THE CONTROL PANEL IN ACCORDANCE WITH INSTRUCTIONS PROVIDED BY EQUIPMENT MANUFACTURER.
4. ALL CONDUIT BURIED IN EARTH, IN OR UNDER CONCRETE SLABS OR IN CONTACT WITH EARTH SHALL BE PVC SCHEDULE 40, UL LABELED.
5. ALL CONDUIT ABOVE GRADE SHALL BE RIGID GALVANIZED STEEL, 1/2" MINIMUM SIZE.
6. POWER WIRE SHALL BE COPPER. MINIMUM SIZE SHALL BE #12 AWG. MINIMUM INSULATION RATING SHALL BE 600V 75 DEG. C.
7. CONTROL WIRE SHALL BE AS FURNISHED OR SPECIFIED BY THE CONTROLS MANUFACTURER.
8. THE CONTRACTOR SHALL SUBMIT, PRIOR TO BEGINNING OF CONSTRUCTION, MANUFACTURERS DATA FOR ALL MATERIALS AND EQUIPMENT ITEMS. THE CONTRACTOR SHALL FURNISH MANUFACTURER'S DESCRIPTIONS AND SCHEMATICS TO THE ENGINEER FOR HIS REVIEW AND APPROVAL.
9. THE CONTRACTOR SHALL VERIFY AND CONFORM TO ANY ADDITIONAL ELECTRIC COMPANY REQUIREMENTS. ANY ELECTRIC COMPANY INSTALLATION COSTS AND ARRANGING SERVICE WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.
10. THE COST OF ALL NECESSARY PERMITS, FEES AND INSPECTIONS REQUIRED BY ELECTRIC COMPANY OR ANY PUBLIC AUTHORITY HAVING JURISDICTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
11. ALL ELECTRIC MATERIALS AND WORK SHALL CONFORM TO THE LATEST EDITION OF THE NATIONAL ELECTRIC CODE FOR SERVICES IN CORROSIVE ATMOSPHERE WITH FLAMMABLE GASES AND SHALL MEET LOCAL AND ELECTRIC COMPANY CODES AND REGULATIONS.

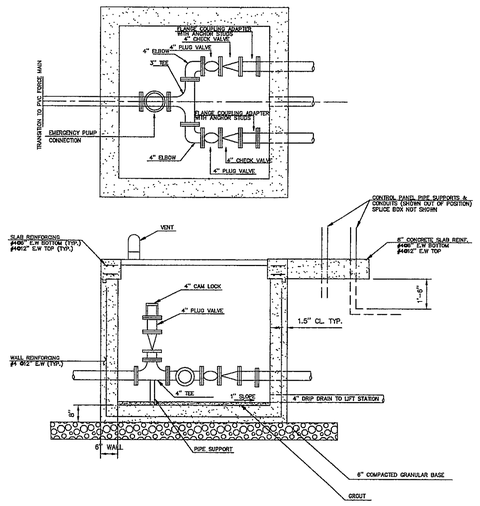
PUMP STATION NOTES:

1. SITE SHALL BE GRADED TO CHANNEL WATER AWAY FROM THE PUMP STATION.
2. BACKFILL AROUND WET-WELL SHALL BE CLASS I, II, OR III MATERIAL AS DESCRIBED BY ASTM D2487. MATERIAL SHALL BE COMPACTED TO 95% MODIFIED PROCTOR. BACKFILL TO BE PLACED IN 6" LIFTS.
3. ALL PIPE JOINTS INSIDE WET WELL TO BE FLANGED UNLESS OTHERWISE SPECIFIED. ALL BURIED PIPE JOINTS TO BE MECHANICAL JOINT.
4. VERIFY ALL OPENINGS THROUGH FLOOR AND WALLS WITH MECHANICAL, ELECTRICAL, AND PIPING REQUIREMENTS.
5. FORCE MAIN SHALL BE AIR TESTED BY THE CONTRACTOR AND WITNESSED BY VILLAGE WASTE WATER COMPANY.
6. THIS STATION SHALL BE A PRODUCT OF A MANUFACTURER'S REPRESENTATIVE AND REGIONAL VENDOR THAT HAS A MINIMUM OF FIVE YEARS EXPERIENCE IN BUILDING UNDERGROUND PUMP STATIONS.
7. NO SUBSTITUTIONS OR CHANGES ARE TO BE MADE TO THIS DESIGN WITHOUT WRITTEN CONSENT OF CEI ENGINEERING ASSOCIATES TO INCLUDE USE OF SPECIFIC BRAND AND MODEL NUMBERS SPECIFIED ON THESE PLANS AND THE WRITTEN SPECIFICATIONS. ALL CONSTRUCTION SHALL BE IN STRICT ACCORDANCE WITH THE SPECIFICATIONS FOR THE WAL-MART STORE AT JANE, MISSOURI.



SWITCH LEVEL SETTINGS

SCALE: N.T.S.



PIPING CONVERGENCE

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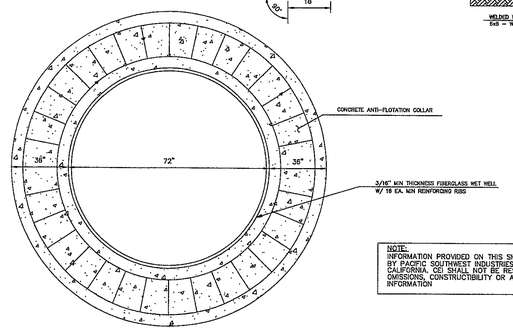
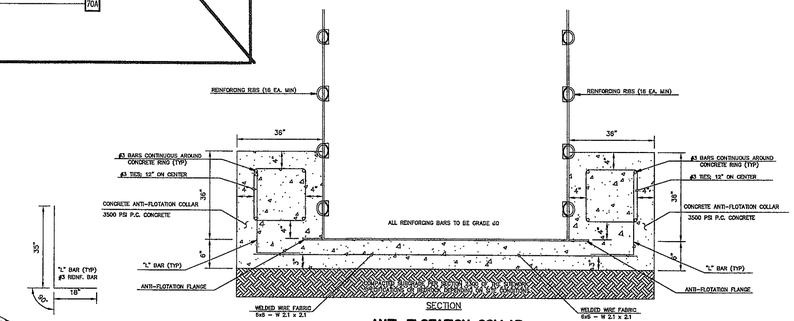


ANTI-FLOTATION COLLAR



ANTI-FLOTATION COLLAR

NOTE:
INFORMATION PROVIDED ON THIS SHEET WAS PROVIDED BY PACIFIC SOUTHWEST INDUSTRIES OF LAKE ELSINORE CALIFORNIA. CEI SHALL NOT BE RESPONSIBLE FOR OMISSIONS, CONSTRUCTIBILITY OR ACCURACY OF THIS INFORMATION

SUPERNATANT PUMP STATION 70B

N.T.S.

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

INITIAL DESIGN	9-16-04	DAT	FF	FF	FF
	DATE	FOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

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ENGINEERS • PLANNERS • SURVEYORS
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(479) 273-9472 FAX (479) 273-0844

JOB NO.: 20733
DWG NAME: 20733DT

DETAIL SHEET 4

DATE 09-14-06 08:59 AM REV.6

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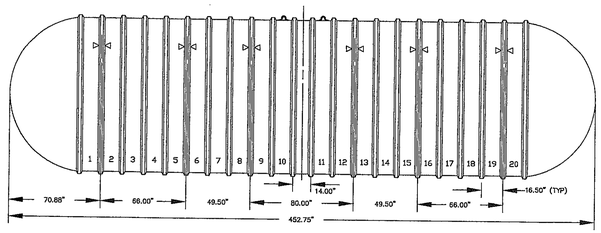
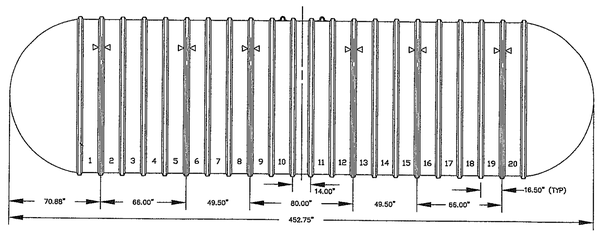


PUMP TANK 3
(25,000 GAL)
N.T.S.



PUMP TANK 4A
(20,000 GAL)
N.T.S.

NOTE:
PUMP TANK DRAWINGS WILL BE PRODUCED BY XERXES CORPORATION AFTER PUMP TANK ORDER IS PLACED BY OWNER UNDER CONTRACT 1. THESE DRAWINGS WILL BE UPDATED AFTER THIS INFORMATION BECOMES AVAILABLE.

PUMP TANK 4B
(20,000 GAL)
N.T.S.

PUMP TANK 5
(20,000 GAL)
N.T.S.

INITIAL DESIGN	10-16-05	DAT	FF	FF	FF
	DATE	FOR	PM	DES	DRW

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

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Bentonville, AR 72712
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DWG NAME: 20733DET

DETAIL SHEET 5

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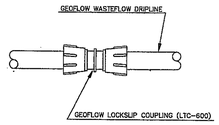
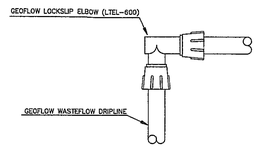


LOCKSLIP COUPLING (LTC-600)

N.T.S.



LOCKSLIP ELBOW (LTEL-600)

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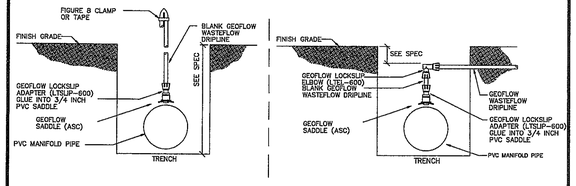
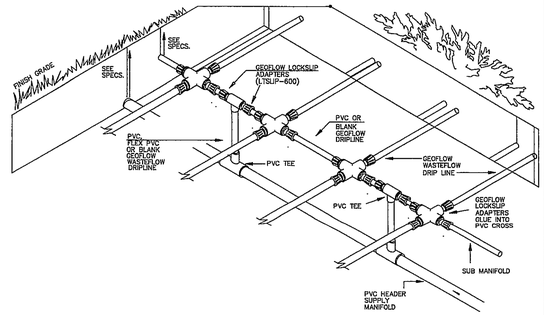


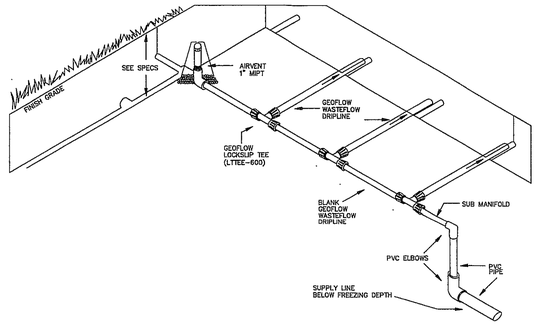
SADDLE MANIFOLD INSTALLATION

N.T.S.



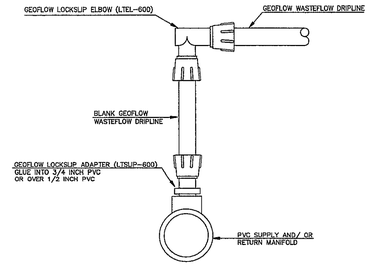
CENTER SUB-MANIFOLD

N.T.S.



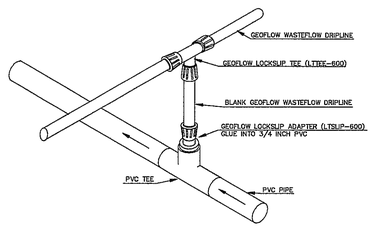
LOW END SUB-MANIFOLD BLANK GEOFLOW WASTEFLOW DRIPLINE

N.T.S.



LOCKSLIP ELBOW TO LOCKSLIP ADAPTER CONNECTION

N.T.S.



MANIFOLD CONNECTION (CENTER FEED)

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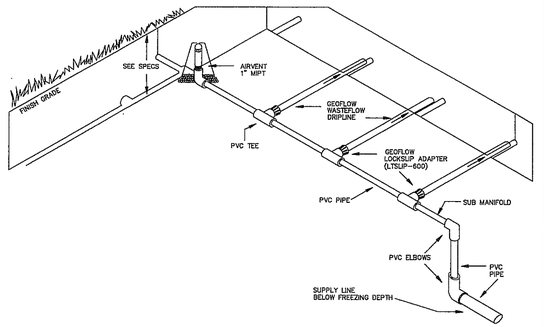
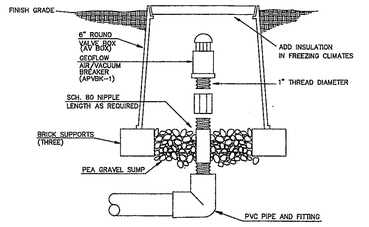


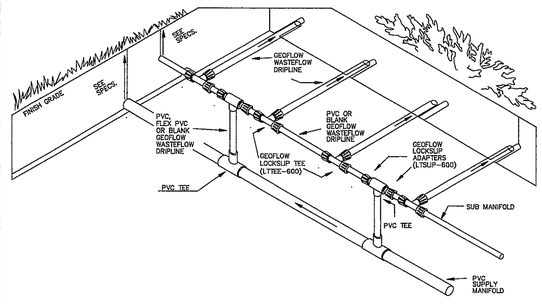
LOW END SUB-MANIFOLD PVC PIPE

N.T.S.



1" AIR/VACUUM BREAKER (PLUMBED TO PVC)

N.T.S.



END SUB-MANIFOLD

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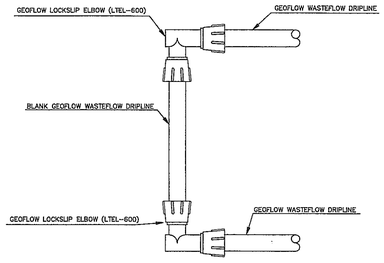
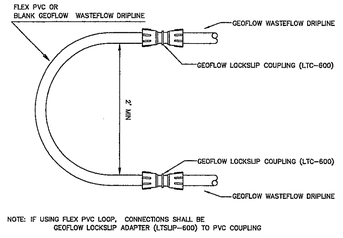


LOCKSLIP ELBOW LOOP

N.T.S.



NOTE: IF USING FLEX PVC LOOP, CONNECTIONS SHALL BE GEOFLOW LOCKSLIP ADAPTER (LTSLIP-600) TO PVC COUPLING

LOCKSLIP COUPLING LOOP

N.T.S.

INITIAL DESIGN	10-16-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

CEI® ENGINEERING ASSOCIATES, INC
ENGINEERS · PLANNERS · SURVEYORS
3317 S.W. I Street (479) 273-9472
Bentonville, AR 72712 FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733DET

DETAIL SHEET 6

DATE 09-14-06 08:59 AM REV.6

SHEET NO. 41 OF 43

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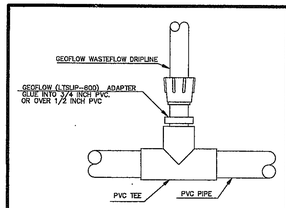
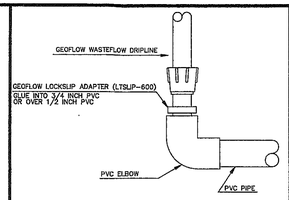


MANIFOLD CONNECTION (PVC TO ADAPTER)

N.T.S.



MANIFOLD CONNECTION (PVC TO ADAPTER)

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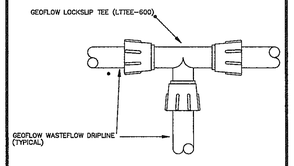
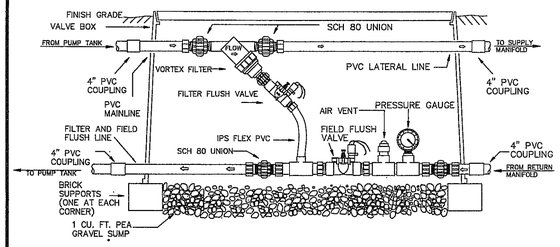


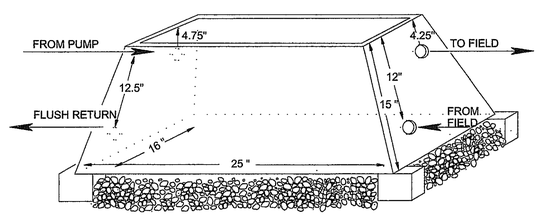
LOCKSLIP TEE(LTTEE-600)

N.T.S.



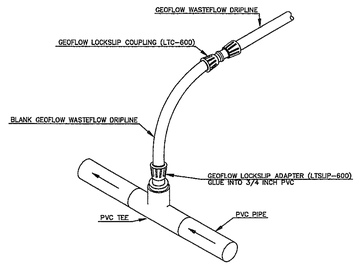
SIMPLE WASTEFLOW HEADWORKS BOX – AUTOMATIC SCHEMATIC

N.T.S.



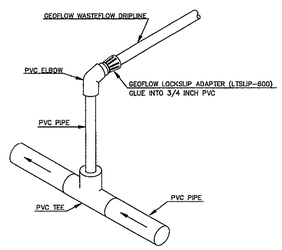
SIMPLE WASTEFLOW HEADWORKS BOX – DIMENSIONS 1" AND 3/4;; MODELS

N.T.S.



MANIFOLD CONNECTION (END FEED) BLANK GEOFLOW WASTEFLOW DRIPLINE RISER

N.T.S.



MANIFOLD CONNECTION (END FEED) PVC RISER

N.T.S.

STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 12538
FERDINAND FOURIE
11-7-06

INITIAL DESIGN	10-16-05	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

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(479) 273-9472 FAX (479) 273-0844

JOB NO.: 20733.0
DWG NAME: 20733DET

DETAIL SHEET 7

DATE: 09-14-06 08:59 AM REV.6

SHEET NO. 42 OF 43

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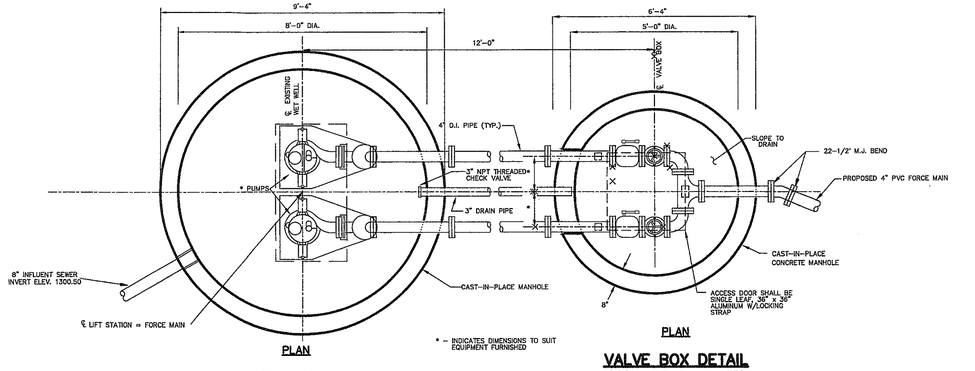
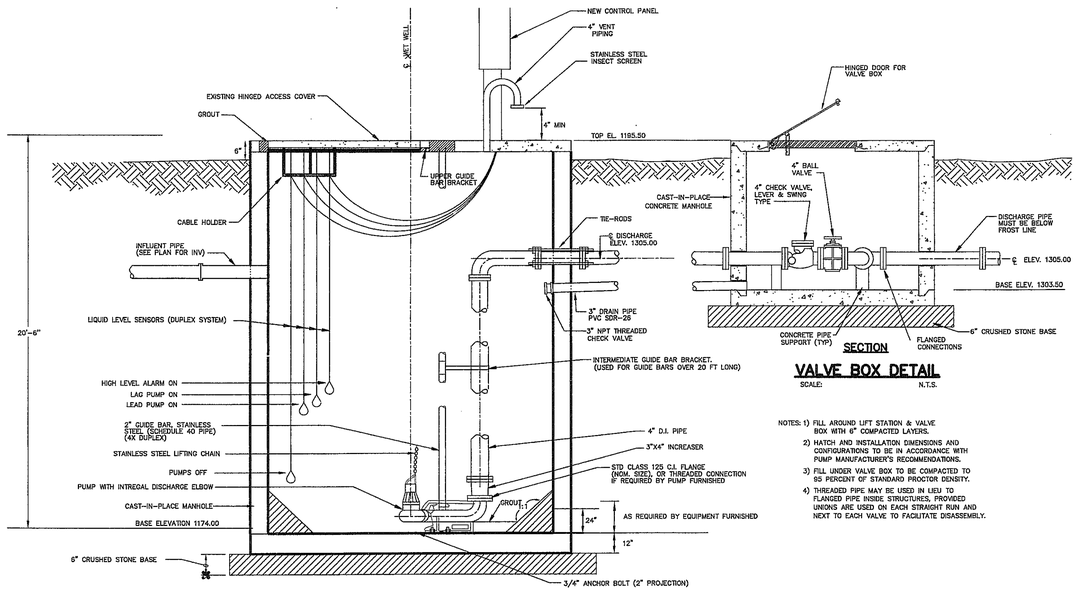


LIFT STATION DETAIL

SCALE: N.T.S.

VALVE BOX DETAIL

SCALE: N.T.S.



SECTION

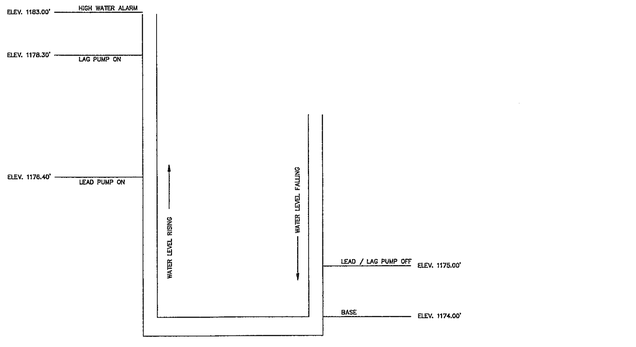
LIFT STATION DETAIL

SCALE: N.T.S.

VALVE BOX DETAIL

SCALE: N.T.S.

NOTES: 1) FILL AROUND LIFT STATION & VALVE BOX WITH 6" COMPACTED LAYERS.
2) HATCH AND INSTALLATION DIMENSIONS AND CONFIGURATIONS TO BE IN ACCORDANCE WITH PUMP MANUFACTURER'S RECOMMENDATIONS.
3) FILL UNDER VALVE BOX TO BE COMPACTED TO 95 PERCENT OF STANDARD PROCTOR DENSITY.
4) THREADED PIPE MAY BE USED IN LIEU TO FLANGED PIPE INSIDE STRUCTURES, PROVIDED UNIONS ARE USED ON EACH STRAIGHT RUN AND NEXT TO EACH VALVE TO FACILITATE DISASSEMBLY.



SWITCH LEVEL SETTINGS

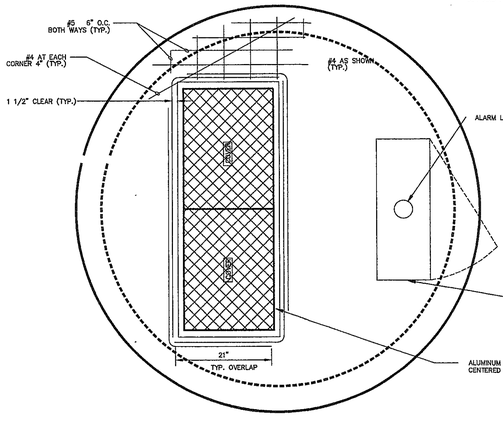
SANITARY SEWER LIFT STATION DETAIL

N.T.S.

768

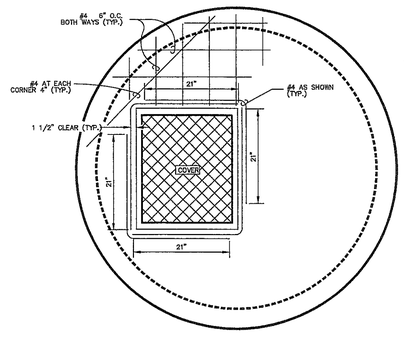
LIFT STATION NOTES:

1. SITE SHALL BE GRADED TO CHANNEL WATER AWAY FROM THE PUMP STATION.
2. BACKFILL AROUND WETWELL SHALL BE CLASS I, II, OR III MATERIAL AS DESCRIBED BY ASTM D2487. MATERIAL SHALL BE COMPACTED TO 95% STANDARD PROCTOR. BACKFILL TO BE PLACED IN 6" LIFTS.
3. ALL PIPE JOINTS INSIDE WETWELL TO BE FLANGED UNLESS OTHERWISE SPECIFIED. ALL BURIED PIPE JOINTS TO BE MECHANICAL JOINT.
4. VERIFY ALL OPENINGS THROUGH FLOOR AND WALLS WITH MECHANICAL, ELECTRICAL, AND PIPING REQUIREMENTS.
5. WETWELL SHALL BE CAST-IN-PLACE CONCRETE.
6. FORCE MAIN SHALL BE AIR TESTED BY THE CONTRACTOR AND WITNESSED BY THE CITY.
7. THIS STATION RETROFITTING SHALL BE A PRODUCT OF A MANUFACTURER'S REPRESENTATIVE AND REGIONAL VENDOR THAT HAS A MINIMUM OF FIVE YEARS EXPERIENCE IN BUILDING UNDERGROUND PUMP STATIONS.
8. NO SUBSTITUTIONS OR CHANGES ARE TO BE MADE TO THIS DESIGN WITHOUT WRITTEN CONSENT OF CEI ENGINEERING ASSOCIATES TO INCLUDE USE OF SPECIFIC BRAND AND MODEL NUMBERS SPECIFIED ON THESE PLANS AND THE WRITTEN SPECIFICATIONS FOR THE SEWAGE LIFT STATION. ALL CONSTRUCTION SHALL BE IN STRICT ACCORDANCE WITH THE WATER AND SEWER SPECIFICATIONS FOR THE BENTONVILLE, ARKANSAS.
9. LIQUID LEVEL SENSORS SHALL BE PER SPECIFICATIONS.
10. TELEMETRY UNIT TO BE PURCHASED FROM CITY OF BENTONVILLE AND INSTALLED BY CONTRACTOR.
11. THE LEVEL CONTROLS SHALL BE SET BY THE VENDOR REPRESENTATIVE AND WITNESSED BY CITY AND CEI ENGINEERING REPRESENATIVES.
12. THE EXISTING LEVEL CONTROLS, ELECTRICAL CONTROLS, PANELS, AND ALL ASSOCIATED WIRES SHALL BE REMOVED AND REPLACED
13. CONSTRUCT PROPOSED 4" FORCEMAIN PARALLEL AND WITHIN 5 FT OF EXISTING FORCEMAIN. CUT AND PLUG EXISTING FORCEMAIN.



LIFT STATION WETWELL TOP SLAB REINFORCEMENT DETAIL

SCALE: N.T.S.



VALVE BOX TOP SLAB REINFORCEMENT DETAIL

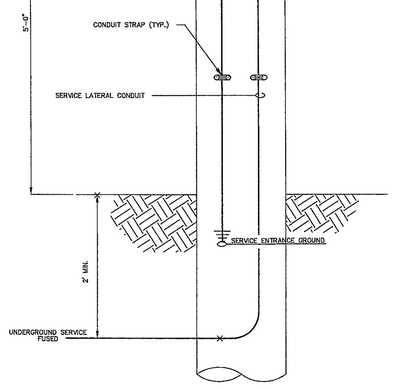
SCALE: N.T.S.

CONCRETE NOTES:

1. ALL CONCRETE UNLESS NOTED SHALL BE STONE AGGREGATE, TYPE I PORTLAND CEMENT WITH A COMPRESSIVE STRENGTH OF 3500 PSI AT 28 DAYS AND 4% TO 6% AIR ENTRAINMENT WITH A SLUMP RANGE OF 3" TO 4".
2. ALL REINFORCING NOT OTHERWISE NOTED SHALL BE HIGH STRENGTH DEFORMED BARS (ASTM A615 – GRADE 60).
3. ALL FORMS SHALL BE INSPECTED AND APPROVED FOR GRADE, ALIGNMENT, AND WORKMANSHIP BY THE ENGINEER PRIOR TO PLACING ANY CONCRETE.
4. THE STEEL REINFORCEMENT SHALL BE DEFORMED BARS FREE FROM DEFECTS, SCALES, RUST, OIL, OR COATING WHICH WILL REDUCE THE BOND OF THE CONCRETE. THE REBARS SHALL BE ACCURATELY BENT AND PLACED AS INDICATED ON THE PLANS AND SECURELY SUPPORTED AND FASTENED TO PREVENT MOVEMENT DURING THE PLACEMENT OF CONCRETE.
5. CONCRETE SHALL BE ADEQUATELY VIBRATED USING MECHANICAL VIBRATORS TO ENSURE THE PROPER DISTRIBUTION OF CONCRETE WITHIN THE FORMS. CONCRETE WHICH IS ADVERSELY HONEYCOMBED SHALL BE REMOVED AS DIRECTED BY THE ENGINEER.
6. REINFORCEMENT PROTECTION UNLESS OTHERWISE NOTED:
   (A) CONCRETE POURED AGAINST EARTH, 3–INCHES.
   (B) CONCRETE POURED IN FORMS, BUT EXPOSED TO WEATHER OR EARTH, 2–INCHES.
   (C) BARS LARGER THAN #5, 2–INCHES.
7. NO SPLICES OF REINFORCEMENT SHALL BE MADE, EXCEPT AS DETAILED OR AUTHORIZED BY ENGINEER. SPLICES SHALL BE MADE BY CONTACT LAPS A MINIMUM OF 36–BAR DIAMETERS, UNLESS NOTED OTHERWISE.
8. DETAIL BARS IN ACCORDANCE WITH CRSI DETAILING MANUAL AND ACI BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE, LATEST EDITIONS ONLY.
9. PROVIDE ALL ACCESSORIES NECESSARY TO SUPPORT REINFORCING AT POSITIONS SHOWN ON PLANS.
10. SLAB SHALL NOT HAVE JOINTS IN A HORIZONTAL PLANE. ALL CONSTRUCTION JOINTS SHALL BE AS DETAILED OR AS APPROVED BY THE ENGINEER.
11. ALL REINFORCING CHAIRS SHALL HAVE ALUMINUM LEGS, OR THE LEGS SHALL BE RUBBER TIPPED TO PREVENT RUST MARKS.
12. ALL CONCRETE IN DIRECT CONTACT WITH SEWAGE SHALL BE COATED WITH MASTER BUILDERS CEDLGUARD 663 IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS (MASTER BUILDERS: PH 1-800-227-3350) OR SIKA GUARD, MANUFACTURED BY THE SIKA COMPANY.

ELECTRICAL NOTES:

1. INSTALL METER SOCKET IN ENCLOSURE IN ACCORDANCE WITH ELECTRIC COMPANY REQUIREMENTS AND THE NATIONAL ELECTRIC CODE.
2. INSTALL SERVICE LATERAL CONDUIT SERVICE ENTRANCE GROUND, SERVICE ENTRANCE CONDUCTORS AND FUSED DISCONNECT IN ACCORDANCE WITH THE ELECTRIC UTILITY REQUIREMENTS AND THE NATIONAL ELECTRIC CODE.
3. MAKE CONNECTIONS IN THE CONTROL PANEL IN ACCORDANCE WITH INSTRUCTIONS PROVIDED BY EQUIPMENT MANUFACTURER.
4. ALL CONDUIT BURIED IN EARTH, IN OR UNDER CONCRETE SLABS OR IN CONTACT WITH EARTH SHALL BE PVC SCHEDULE 40, UL LABELED.
5. ALL CONDUIT ABOVE GRADE SHALL BE RIGID GALVANIZED STEEL, 1/2" MINIMUM SIZE.
6. POWER WIRE SHALL BE COPPER. MINIMUM SIZE SHALL BE #12 AWG. MINIMUM INSULATION RATING SHALL BE 600V 75 DEG. C.
7. CONTROL WIRE SHALL BE AS FURNISHED OR SPECIFIED BY THE CONTROLS MANUFACTURER.
8. THE CONTRACTOR SHALL SUBMIT PRIOR TO BEGINNING OF CONSTRUCTION ALL MATERIALS AND EQUIPMENT ITEMS. THE CONTRACTOR SHALL FURNISH MANUFACTURER'S DESCRIPTIONS AND SCHEMATICS TO THE ENGINEER FOR REVIEW AND APPROVAL.
9. THE CONTRACTOR SHALL VERIFY AND CONFORM TO ANY ADDITIONAL ELECTRIC UTILITY REQUIREMENTS. ANY ELECTRIC UTILITY INSTALLATION COSTS AND ARRANGING SERVICE WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.
10. THE COST OF ALL NECESSARY PERMITS, FEES AND INSPECTIONS REQUIRED BY ELECTRIC UTILITY OR ANY PUBLIC AUTHORITY HAVING JURISDICTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
11. ALL ELECTRIC MATERIALS AND WORK SHALL CONFORM TO THE LATEST EDITION OF THE NATIONAL ELECTRIC CODE AND SHALL MEET LOCAL AND ELECTRIC UTILITY CODES AND REGULATIONS.



UNDERGROUND SERVICE METER INSTALLATION ONE PHASE – 240 VOLTS

SCALE: N.T.S.

INITIAL DESIGN	9-16-04	DAT	FF	FF	FF
	DATE	EOR	PM	DES	DRW

CAVE SPRINGS WASTEWATER TRANSFER SYSTEM - PHASE 1

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(479) 273-9472 FAX (479) 273-0844

STATE OF ARKANSAS ★★★ REGISTERED PROFESSIONAL ENGINEER ★★★ No. 12538 FERDINAND FOURIE
11-7-06

JOB NO.: 20733
DWG NAME: 20733ST

PUMP STATION DETAIL

DATE 09-14-06 08:59 AM REV.6

SHEET NO. 43 OF 43

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Gage, Hannah

From: Barrett Knutson <bknutson@mce.us.com>
Sent: Tuesday, December 19, 2017 2:07 PM
To: McWilliams, Katherine
Subject: RE: Cave Springs Waste Management Plan
Attachments: CEI Design Calculations.pdf; Loading Rates.pdf

Appendix B, Appendix C

From: McWilliams, Katherine [mailto:MCWILLIAMSK@adeq.state.ar.us]
Sent: Tuesday, December 19, 2017 10:59 AM
To: Barrett Knutson
Subject: RE: Cave Springs Waste Management Plan

Barrett,

The easiest way, if possible, is to split the document and email it in parts. I think we might be able to get it from Dropbox as well, but I am not sure.

Thanks,
Katherine McWilliams
Engineer
Office of Water Quality

From: Barrett Knutson [mailto:bknutson@mce.us.com]
Sent: Tuesday, December 19, 2017 10:38 AM
To: McWilliams, Katherine
Subject: Cave Springs Waste Management Plan

Katherine,

I am still waiting to get the plan certified from a Professional Engineer. I wanted to get the report to you ASAP as I wait for certification. The file size, with all appendices is 30MB, it is my understanding that the ADEQ cannot receive anything above 10MB do you have a different preferred method for file transferring? Possibly Dropbox or Google Dox.

In the meantime I have attached the narrative (Please see attached PDF). I know that you all already have certain items that I have included in the appendix, such as the engineering drawings, deed, and ADH approval. Please let me know whether it is necessary to send in some of these items that the ADEQ already has on file, as this could drastically reduce the file size and make submission easier.

Feel free to call me with any questions or concerns. If you are not able to reach me at the office, feel free to try me on my cell phone.

Respectfully,

Barret R. Knutson, E.I.
Project Designer

McCLELLAND CONSULTING ENGINEERS, INC.
1810 N. College Ave. | Fayetteville, AR 72703
P.O. Box 1229 | Fayetteville, AR 72702
479.443.2377 office | 479.443.9241 fax
501.545.7115 cell
bknutson@mce.us.com

APPENDIX B

Design Calculations

8317 SW "I" ST
Bentonville, AR 72712
Tel. (479) 273-9472
Ferdi Fourie

DRIPFIELD SUMMARY CALCULATION

Zone Number	Area Number	Hydraulic Loading Rate (g/d/sq.ft)	Area (ft²)	Daily Allowable Disposal (g/d)	Flowrate for area (gpm)	Number of doses for area	Dosing Time for area (min)	Disposal Rate For Area (g/d/sq.ft) (check)	Number of doses for zone	Dosing Time for zone (min)	Dosing Time for zone (hours)	Dose Volume for zone	Disposal Rate for zone (g/d/sq.ft) (check)
1	1	0.42	7650	3213	16.89	15	12.68	3212	45	570.60	9.51	9637	0.42
	2	0.42	7650	3213	16.89	15	12.68	3212					
	3	0.42	7650	3213	16.89	15	12.68	3212					
2	1	0.45	6950	3128	15.35	15	13.58	3127	45	611.10	10.19	9380	0.45
	2	0.45	6950	3128	15.35	15	13.58	3127					
	3	0.45	6950	3128	15.35	15	13.58	3127					
3	1	0.40	6620	2648	14.62	15	12.08	2649	45	543.60	9.06	7947	0.40
	2	0.40	6620	2648	14.62	15	12.08	2649					
	3	0.40	6620	2648	14.62	15	12.08	2649					
4	1	0.45	6950	3128	15.35	20	10.19	3128	40	407.60	6.79	6257	0.25
	2	0.45	6950	3128	15.35	20	10.19	3128					
5	1	0.20	11262	2252	24.87	10	9.06	2253	50	453.00	7.55	11266	0.20
	2	0.20	11262	2252	24.87	10	9.06	2253					
	3	0.20	11262	2252	24.87	10	9.06	2253					
	4	0.20	11262	2252	24.87	10	9.06	2253					
	5	0.20	11262	2252	24.87	10	9.06	2253					
6	1	0.20	13728	2746	30.31	10	9.06	2746	20	181.20	3.02	5492	0.16
	2	0.20	13728	2746	30.31	10	9.06	2746					
7	1	0.20	7642	1528	16.88	10	9.06	1529	30	271.80	4.53	4588	0.20
	2	0.20	7642	1528	16.88	10	9.06	1529					
	3	0.20	7642	1528	16.88	10	9.06	1529					
8	1	0.30	7820	2346	17.27	15	9.06	2347	45	407.70	6.80	7041	0.30
	2	0.30	7820	2346	17.27	15	9.06	2347					
	3	0.30	7820	2346	17.27	15	9.06	2347					
9	1	0.50	845	423	1.87	20	11.32	423	100	1132.00	18.87	2117	0.50
	2	0.50	845	423	1.87	20	11.32	423					
	3	0.50	845	423	1.87	20	11.32	423					
	4	0.50	845	423	1.87	20	11.32	423					
	5	0.50	845	423	1.87	20	11.32	423					
10	1	0.20	5950	1190	13.14	10	9.06	1190	20	181.20	3.02	2381	0.11
	2	0.20	5950	1190	13.14	10	9.06	1190					
11	1	0.30	10547	3164	23.29	10	13.58	3163	20	271.60	4.53	6326	0.21
	2	0.30	10547	3164	23.29	10	13.58	3163					
12	1	0.40	8916	3566	19.69	15	12.08	3568	75	906.00	15.10	17839	0.40
	2	0.40	8916	3566	19.69	15	12.08	3568					
	3	0.40	8916	3566	19.69	15	12.08	3568					
	4	0.40	8916	3566	19.69	15	12.08	3568					
	5	0.40	8916	3566	19.69	15	12.08	3568					
13	1	0.16	7638	1222	16.87	10	7.25	1223	10	72.50	1.21	1223	0.16
14	1	0.45	8682	3907	19.17	20	10.19	3907	40	407.60	6.79	7814	0.31
	2	0.45	8682	3907	19.17	20	10.19	3907					
15	1	0.10	7450	745	16.45	5	9.06	745	15	135.90	2.27	2236	0.10
	2	0.10	7450	745	16.45	5	9.06	745					
	3	0.10	7450	745	16.45	5	9.06	745					
16	1	0.40	10114	4046	22.34	15	12.08	4048	45	543.60	9.06	12144	0.40
	2	0.40	10114	4046	22.34	15	12.08	4048					
	3	0.40	10114	4046	22.34	15	12.08	4048					
17	1	0.20	10828	2166	23.91	10	9.06	2166	30	271.80	4.53	6499	0.20
	2	0.20	10828	2166	23.91	10	9.06	2166					
	3	0.20	10828	2166	23.91	10	9.06	2166					
18	1	0.60	9697	5818	21.41	20	13.58	5815	60	814.80	13.58	17445	0.60
	2	0.60	9697	5818	21.41	20	13.58	5815					
	3	0.60	9697	5818	21.41	20	13.58	5815					
19	1	0.28	7807	2186	17.24	15	8.45	2185	30	253.50	4.23	4370	0.18
	2	0.28	7807	2186	17.24	15	8.45	2185					
20	1	0.25	8030	2008	17.73	10	11.32	2007	20	226.40	3.77	4014	0.16
	2	0.25	8030	2008	17.73	10	11.32	2007					
21	1	0.25	9516	2379	21.01	10	11.32	2378	40	452.80	7.55	9513	0.25
	2	0.25	9516	2379	21.01	10	11.32	2378					
	3	0.25	9516	2379	21.01	10	11.32	2378					
	4	0.25	9516	2379	21.01	10	11.32	2378					
22	1	0.40	8814	3526	19.46	20	9.06	3526	100	906.00	15.10	17631	0.40
	2	0.40	8814	3526	19.46	20	9.06	3526					
	3	0.40	8814	3526	19.46	20	9.06	3526					
	4	0.40	8814	3526	19.46	20	9.06	3526					
	5	0.40	8814	3526	19.46	20	9.06	3526					
23	1	0.20	6952	1390	15.35	10	9.06	1391	30	271.80	4.53	4172	0.20
	2	0.20	6952	1390	15.35	10	9.06	1391					
	3	0.20	6952	1390	15.35	10	9.06	1391					
24	1	0.20	9335	1867	20.61	10	9.06	1867	30	271.80	4.53	5602	0.20
	2	0.20	9335	1867	20.61	10	9.06	1867					
	3	0.20	9335	1867	20.61	10	9.06	1867					
25	1	0.40	7856	3142	17.35	15	12.08	3144	45	543.60	9.06	9431	0.40
	2	0.40	7856	3142	17.35	15	12.08	3144					
	3	0.40	7856	3142	17.35	15	12.08	3144					
26	1	0.30	10493	3148	23.17	15	9.06	3149	60	543.60	9.06	12595	0.30
	2	0.30	10493	3148	23.17	15	9.06	3149					
	3	0.30	10493	3148	23.17	15	9.06	3149					
	4	0.30	10493	3148	23.17	15	9.06	3149					
27	1	0.20	7010	1402	15.48	15	6.04	1402	45	271.80	4.53	4207	0.20
	2	0.20	7010	1402	15.48	15	6.04	1402					
	3	0.20	7010	1402	15.48	15	6.04	1402					
28	1	0.50	11144	5572	24.61	20	11.32	5572	40	452.80	7.55	11143	0.35
	2	0.50	11144	5572	24.61	20	11.32	5572					
29	1	0.50	9802	4901	21.65	20	11.32	4902	60	679.20	11.32	14705	0.50
	2	0.50	9802	4901	21.65	20	11.32	4902					
	3	0.50	9802	4901	21.65	20	11.32	4902					
30	1	0.15	5667	850	12.51	20	3.4	851	60	204.00	3.40	2552	0.15
	2	0.15	5667	850	12.51	20	3.4	851					
	3	0.15	5667	850	12.51	20	3.4	851					
31	1	0.25	8134	2034	17.96	10	11.32	2033	20	226.40	3.77	4066	0.16
	2	0.25	8134	2034	17.96	10	11.32	2033					
32	1	0.15	8616	1292	19.03	5	13.58	1292	15	203.70	3.40	3876	0.15
	2	0.15	8616	1292	19.03	5	13.58	1292					
	3	0.15	8616	1292	19.03	5	13.58	1292					

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 5

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/24/2006

Total Quantity of effluent to be disposed per day	25,000	gallons / day
Hydraulic loading rate	1	gallons / sq.ft. / day
Total Dispersal Field Area	56,310	square ft.
Number of Zones	5	zone(s)
Dispersal area per zone	11,262	square ft.
Choose spacing between WASTEFLOW lines	2	ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	5,631	each
Total number of emitters per zone	2,816	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	25 psi	psi
Feet of Head at the beginning of the dripfield	57.75	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	24.87	gallons per minute

If required, choose flush velocity	1.0	ft/sec
How many lines of WASTEFLOW?	4	lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	5.18	gpm
Total System Flow - worst case scenario	30.05	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	Two x AP4E-1F (1in.)	
Select Zone Valve (item no.)	SVLV-150	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	478	ft.

Check below to choose quantity and length of daily doses

Number of doses per day / zone:	10	doses
Pump run time per dose/zone (minutes):	9.06	minutes
Pump run time per day/zone (hours):	1.51	hours / day
Number of doses per day / all zones	50	
Pump run time per day/all zones (hours):	7.55	hours
Dose volume per zone	225	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	5,631	ft
Total Volume in dripline / zone	69.50	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 6

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day	5,500	gallons / day
Hydraulic loading rate	0.2	gallons / sq.ft. / day
Total Dispersal Field Area	27,455	square ft.
Number of Zones	2	zone(s)
Dispersal area per zone	13,728	square ft.
Choose spacing between WASTEFLOW lines	2	ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	6,864	each
Total number of emitters per zone	3,432	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	25 psi	psi
Feet of Head at the beginning of the dripfield	57.75	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	30.31	gallons per minute

If required, choose flush velocity	2.0	ft/sec
How many lines of WASTEFLOW?	1.0	lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	7.03	gpm
Total System Flow - worst case scenario	37.35	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1.5F-3 (1.5in./3hole)	
Select Zone Valve (item no.)	SVLV-150	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	478	ft.

Number of doses per day / zone:	10	doses
Pump run time per dose/zone (minutes):	9.06	minutes
Pump run time per day/zone (hours):	1.51	hours / day
Number of doses per day / all zones	20	
Pump run time per day/all zones (hours):	3.02	hours
Dose volume per zone	275	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	6,864	ft
Total Volume in dripline / zone	84.72	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 7

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	22,925	square ft.
Number of Zones		zone(s)
Dispersal area per zone	7,642	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	3,821	each
Total number of emitters per zone	1,910	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	25 psi	psi
Feet of Head at the beginning of the dripfield	57.75	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	16.88	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	9.99	gpm
Total System Flow - worst case scenario	26.87	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	478	ft.

Number of doses per day / area:	10	doses
Pump run time per dose/area (minutes):	9.06	minutes
Pump run time per day/area (hours):	1.51	hours / day
Number of doses per day for zone	30	
Pump run time per day for zone	4.53	hours
Dose volume per area	153	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	3,821	ft
Total Volume in dripline / zone	47.16	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 8

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	23,460	square ft.
Number of Zones		zone(s)
Dispersal area per zone	7,820	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	3,910	each
Total number of emitters per zone	1,955	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	17.27	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	14.43	gpm
Total System Flow - worst case scenario	31.70	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	Two x AP4E-1F (1in.)	
Select Zone Valve (item no.)	SVLV-150	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:		doses
Pump run time per dose/area (minutes):	9.06	minutes
Pump run time per day/area (hours):	2.26	hours / day
Number of doses per day for zone	45	
Pump run time per day for zone	6.79	hours
Dose volume per area	156	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	3,910	ft
Total Volume in dripline / zone	48.26	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 9

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	4,226	square ft.
Number of Zones		zone(s)
Dispersal area per zone	845	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	423	each
Total number of emitters per zone	211	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	1.87	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	3.33	gpm
Total System Flow - worst case scenario	5.20	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-.75F	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	20	doses
Pump run time per dose/area (minutes):	11.32	minutes
Pump run time per day/area (hours):	3.77	hours / day
Number of doses per day for zone	100	
Pump run time per day for zone	18.87	hours
Dose volume per area	21	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	423	ft
Total Volume in dripline / zone	5.22	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 10

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	11,900	square ft.
Number of Zones	2	zone(s)
Dispersal area per zone	5,950	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	2,975	each
Total number of emitters per zone	1,488	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	13.14	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	10.36	gpm
Total System Flow - worst case scenario	23.50	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	10	doses
Pump run time per dose/area (minutes):	9.06	minutes
Pump run time per day/area (hours):	1.51	hours / day
Number of doses per day for zone	20	
Pump run time per day for zone	3.02	hours
Dose volume per area	119	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	2,975	ft
Total Volume in dripline / zone	36.72	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 11

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	21,093	square ft.
Number of Zones	2	zone(s)
Dispersal area per zone	10,547	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	5,273	each
Total number of emitters per zone	2,637	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	23.29	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	6.66	gpm
Total System Flow - worst case scenario	29.95	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	Two x AP4E-1F (1in.)	
Select Zone Valve (item no.)	SVLV-150	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	7	doses
Pump run time per dose/area (minutes):	13.58	minutes
Pump run time per day/area (hours):	2.26	hours / day
Number of doses per day for zone	20	
Pump run time per day for zone	4.53	hours
Dose volume per area	316	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	5,273	ft
Total Volume in dripline / zone	65.09	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 12

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	44,580	square ft.
Number of Zones		zone(s)
Dispersal area per zone	8,916	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	4,458	each
Total number of emitters per zone	2,229	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	19.69	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	12.58	gpm
Total System Flow - worst case scenario	**32.27**	**gpm**
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	Two x AP4E-1F (1in.)	
Select Zone Valve (item no.)	SVLV-150	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:		doses
Pump run time per dose/area (minutes):	12.08	minutes
Pump run time per day/area (hours):	3.02	hours / day
Number of doses per day for zone	75	
Pump run time per day for zone	15.09	hours
Dose volume per area	238	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	4,458	ft
Total Volume in dripline / zone	55.02	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 13

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day	5,000	gallons / day
Hydraulic loading rate	0.65	gallons / sq.ft. / day
Total Dispersal Field Area	7,638	square ft.
Number of Zones	1	zone(s)
Dispersal area per zone	7,638	square ft.
Choose spacing between WASTEFLOW lines	2	ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	3,819	each
Total number of emitters per zone	1,909	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	16.87	gallons per minute

If required, choose flush velocity	0.5	ft/sec
How many lines of WASTEFLOW?	1	lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	6.29	gpm
Total System Flow - worst case scenario	23.16	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	not applicable	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	10	doses
Pump run time per dose/area (minutes):	7.25	minutes
Pump run time per day/area (hours):	1.21	hours / day
Number of doses per day for zone	10	
Pump run time per day for zone	1.21	hours
Dose volume per area	122	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	3,819	ft
Total Volume in dripline / zone	47.13	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 14

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	17,364	square ft.
Number of Zones		zone(s)
Dispersal area per zone	8,682	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	4,341	each
Total number of emitters per zone	2,171	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	19.17	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	13.32	gpm
Total System Flow - worst case scenario	32.49	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	Two x AP4E-1F (1in.)	
Select Zone Valve (item no.)	SVLV-150	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:		doses
Pump run time per dose/area (minutes):	10.19	minutes
Pump run time per day/area (hours):	3.40	hours / day
Number of doses per day for zone	40	
Pump run time per day for zone	6.79	hours
Dose volume per area	195	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	4,341	ft
Total Volume in dripline / zone	53.58	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 15

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day	4,200	gallons / day
Hydraulic loading rate	0.188	gallons / sq.ft. / day
Total Dispersal Field Area	22,350	square ft.
Number of Zones	3	zone(s)
Dispersal area per zone	7,450	square ft.
Choose spacing between WASTEFLOW lines	2 ft.	ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	3,725	each
Total number of emitters per zone	1,863	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	16.45	gallons per minute

If required, choose flush velocity	0	ft/sec
How many lines of WASTEFLOW?	1	lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	7.77	gpm
Total System Flow - worst case scenario	24.22	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	3	doses
Pump run time per dose/area (minutes):	9.06	minutes
Pump run time per day/area (hours):	0.75	hours / day
Number of doses per day for zone	15	
Pump run time per day for zone	2.26	hours
Dose volume per area	149	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	3,725	ft
Total Volume in dripline / zone	45.98	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 16

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	30,343	square ft.
Number of Zones	3	zone(s)
Dispersal area per zone	10,114	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft per zone (minimum required)	5,057	each
Total number of emitters per zone	2,529	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	22.34	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	7.03	gpm
Total System Flow - worst case scenario	29.37	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	Two x AP4E-1F (1in.)	
Select Zone Valve (item no.)	SVLV-150	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	2	doses
Pump run time per dose/area (minutes):	12.08	minutes
Pump run time per day/area (hours):	3.02	hours / day
Number of doses per day for zone	45	
Pump run time per day for zone	9.06	hours
Dose volume per area	270	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	5,057	ft
Total Volume in dripline / zone	62.42	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 17

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	32,485	square ft.
Number of Zones		zone(s)
Dispersal area per zone	10,828	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	5,414	each
Total number of emitters per zone	2,707	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	23.91	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	7.77	gpm
Total System Flow - worst case scenario	31.68	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	Two x AP4E-1F (1in.)	
Select Zone Valve (item no.)	SVLV-150	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:		doses
Pump run time per dose/area (minutes):	9.06	minutes
Pump run time per day/area (hours):	1.51	hours / day
Number of doses per day for zone	30	
Pump run time per day for zone	4.53	hours
Dose volume per area	217	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	5,414	ft
Total Volume in dripline / zone	66.83	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 18

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day	[illegible]	gallons / day
Hydraulic loading rate	[illegible]	gallons / sq.ft. / day
Total Dispersal Field Area	29,090	square ft.
[illegible]		
Number of Zones	[illegible]	zone(s)
Dispersal area per zone	9,697	square ft.
Choose spacing between WASTEFLOW lines	[illegible]	ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	4,848	each
Total number of emitters per zone	2,424	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	21.41	gallons per minute

If required, choose flush velocity	[illegible]	ft/sec
How many lines of WASTEFLOW?	[illegible]	lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	5.55	gpm
Total System Flow - worst case scenario	26.96	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

[illegible]		
Number of doses per day / area:	[illegible]	doses
Pump run time per dose/area (minutes):	13.58	minutes
Pump run time per day/area (hours):	4.53	hours / day
Number of doses per day for zone	60	
Pump run time per day for zone	13.58	hours
Dose volume per area	291	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	4,848	ft
Total Volume in dripline / zone	59.84	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 19

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	15,614	square ft.
Number of Zones		zone(s)
Dispersal area per zone	7,807	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	3,904	each
Total number of emitters per zone	1,952	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	17.24	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	4.44	gpm
Total System Flow - worst case scenario	21.68	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:		doses
Pump run time per dose/area (minutes):	8.45	minutes
Pump run time per day/area (hours):	2.11	hours / day
Number of doses per day for zone	30	
Pump run time per day for zone	4.23	hours
Dose volume per area	146	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	3,904	ft
Total Volume in dripline / zone	48.18	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 20

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day	3,015	gallons / day
Hydraulic loading rate	0.2	gallons / sq.ft. / day
Total Dispersal Field Area	16,060	square ft.
Number of Zones	2	zone(s)
Dispersal area per zone	8,030	square ft.
Choose spacing between WASTEFLOW lines	2	ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	4,015	each
Total number of emitters per zone	2,008	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	17.73	gallons per minute

If required, choose flush velocity	0.5	ft/sec
How many lines of WASTEFLOW?	2	lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	8.14	gpm
Total System Flow - worst case scenario	25.87	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	10	doses
Pump run time per dose/area (minutes):	11.32	minutes
Pump run time per day/area (hours):	1.89	hours / day
Number of doses per day for zone	20	
Pump run time per day for zone	3.77	hours
Dose volume per area	201	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	4,015	ft
Total Volume in dripline / zone	49.56	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 21

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day	[redacted]	gallons / day
Hydraulic loading rate	[redacted]	gallons / sq.ft. / day
Total Dispersal Field Area	38,064	square ft.
Number of Zones	[redacted]	zone(s)
Dispersal area per zone	9,516	square ft.
Choose spacing between WASTEFLOW lines	[redacted]	ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	4,758	each
Total number of emitters per zone	2,379	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	21.01	gallons per minute

If required, choose flush velocity	[redacted]	ft/sec
How many lines of WASTEFLOW?	22	lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	8.14	gpm
Total System Flow - worst case scenario	29.16	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	Two x AP4E-1F (1in.)	
Select Zone Valve (item no.)	SVLV-150	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	[redacted]	doses
Pump run time per dose/area (minutes):	11.32	minutes
Pump run time per day/area (hours):	1.89	hours / day
Number of doses per day for zone	40	
Pump run time per day for zone	7.55	hours
Dose volume per area	238	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	4,758	ft
Total Volume in dripline / zone	58.73	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 22

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	44,070	square ft.
Number of Zones		zone(s)
Dispersal area per zone	8,814	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	4,407	each
Total number of emitters per zone	2,204	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	19.46	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	10.36	gpm
Total System Flow - worst case scenario	29.83	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	Two x AP4E-1F (1in.)	
Select Zone Valve (item no.)	SVLV-150	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	2	doses
Pump run time per dose/area (minutes):	9.06	minutes
Pump run time per day/area (hours):	3.02	hours / day
Number of doses per day for zone	100	
Pump run time per day for zone	15.09	hours
Dose volume per area	176	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	4,407	ft
Total Volume in dripline / zone	54.39	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 24

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total field		
Total Quantity of effluent to be disposed per day	5,603	gallons / day
Hydraulic loading rate	0.2	gallons / sq.ft. / day
Total Dispersal Field Area	28,005	square ft.
Flow per zone		
Number of Zones	3	zone(s)
Dispersal area per zone	9,335	square ft.
Choose spacing between WASTEFLOW lines	2	ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	4,668	each
Total number of emitters per zone	2,334	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	**20.61**	**gallons per minute**

If required, choose flush velocity	0.5	ft/sec
How many lines of WASTEFLOW?	16	lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	5.92	gpm
Total System Flow - worst case scenario	**26.54**	**gpm**
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Dosing		
Number of doses per day / area:	10	doses
Pump run time per dose/area (minutes):	9.06	minutes
Pump run time per day/area (hours):	1.51	hours / day
Number of doses per day for zone	30	
Pump run time per day for zone	4.53	hours
Dose volume per area	187	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	4,668	ft
Total Volume in dripline / zone	57.61	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 25

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	23,568	square ft.
Number of Zones		zone(s)
Dispersal area per zone	7,856	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	3,928	each
Total number of emitters per zone	1,964	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	17.35	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?	10	lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	3.70	gpm
Total System Flow - worst case scenario	21.05	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	10	doses
Pump run time per dose/area (minutes):	12.08	minutes
Pump run time per day/area (hours):	3.02	hours / day
Number of doses per day for zone	45	
Pump run time per day for zone	9.06	hours
Dose volume per area	209	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	3,928	ft
Total Volume in dripline / zone	48.48	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 26

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day	10,597	gallons / day
Hydraulic loading rate	0.25	gallons / sq.ft. / day
Total Dispersal Field Area	41,973	square ft.
Number of Zones	4	zone(s)
Dispersal area per zone	10,493	square ft.
Choose spacing between WASTEFLOW lines	4 ft.	ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	5,247	each
Total number of emitters per zone	2,623	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	23.17	gallons per minute

If required, choose flush velocity	2	ft/sec
How many lines of WASTEFLOW?	2	lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	6.29	gpm
Total System Flow - worst case scenario	29.46	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	Two x AP4E-1F (1in.)	
Select Zone Valve (item no.)	SVLV-150	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	5	doses
Pump run time per dose/area (minutes):	9.06	minutes
Pump run time per day/area (hours):	2.26	hours / day
Number of doses per day for zone	60	
Pump run time per day for zone	9.06	hours
Dose volume per area	210	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	5,247	ft
Total Volume in dripline / zone	64.76	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 27

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	21,030	square ft.
Number of Zones		zone(s)
Dispersal area per zone	7,010	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft per zone (minimum required)	3,505	each
Total number of emitters per zone	1,753	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	15.48	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	3.33	gpm
Total System Flow - worst case scenario	18.81	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:		doses
Pump run time per dose/area (minutes):	6.04	minutes
Pump run time per day/area (hours):	1.51	hours / day
Number of doses per day for zone	45	
Pump run time per day for zone	4.53	hours
Dose volume per area	93	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	3,505	ft
Total Volume in dripline / zone	43.26	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 28

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day	11,144	gallons / day
Hydraulic loading rate	0.5	gallons / sq.ft. / day
Total Dispersal Field Area	22,288	square ft.
Number of Zones	2	zone(s)
Dispersal area per zone	11,144	square ft.
Choose spacing between WASTEFLOW lines	2	ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	5,572	each
Total number of emitters per zone	2,786	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	24.61	gallons per minute

If required, choose flush velocity	0.5	ft/sec
How many lines of WASTEFLOW?	2	lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	3.33	gpm
Total System Flow - worst case scenario	27.94	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	20	doses
Pump run time per dose/area (minutes):	11.32	minutes
Pump run time per day/area (hours):	3.77	hours / day
Number of doses per day for zone	40	
Pump run time per day for zone	7.55	hours
Dose volume per area	279	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	5,572	ft
Total Volume in dripline / zone	68.77	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 29

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	29,406	square ft.
Number of Zones		zone(s)
Dispersal area per zone	9,802	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	4,901	each
Total number of emitters per zone	2,451	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	21.65	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	4.81	gpm
Total System Flow - worst case scenario	26.46	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:		doses
Pump run time per dose/area (minutes):	11.32	minutes
Pump run time per day/area (hours):	3.77	hours / day
Number of doses per day for zone	60	
Pump run time per day for zone	11.32	hours
Dose volume per area	245	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	4,901	ft
Total Volume in dripline / zone	60.49	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 30

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day	4,300	gallons / day
Hydraulic loading rate	0.25	gallons / sq.ft. / day
Total Dispersal Field Area	17,000	square ft.
Number of Zones	3	zone(s)
Dispersal area per zone	5,667	square ft.
Choose spacing between WASTEFLOW lines	2 ft.	ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	2,833	each
Total number of emitters per zone	1,417	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	12.51	gallons per minute

If required, choose flush velocity	2.0	ft/sec
How many lines of WASTEFLOW?	3	lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	4.81	gpm
Total System Flow - worst case scenario	17.32	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	3	doses
Pump run time per dose/area (minutes):	3.40	minutes
Pump run time per day/area (hours):	1.13	hours / day
Number of doses per day for zone	60	
Pump run time per day for zone	3.40	hours
Dose volume per area	43	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	2,833	ft
Total Volume in dripline / zone	34.97	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 31

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day		gallons / day
Hydraulic loading rate		gallons / sq.ft. / day
Total Dispersal Field Area	16,268	square ft.
Number of Zones		zone(s)
Dispersal area per zone	8,134	square ft.
Choose spacing between WASTEFLOW lines		ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	4,067	each
Total number of emitters per zone	2,034	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	17.96	gallons per minute

If required, choose flush velocity		ft/sec
How many lines of WASTEFLOW?		lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	8.51	gpm
Total System Flow - worst case scenario	26.47	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:		doses
Pump run time per dose/area (minutes):	11.32	minutes
Pump run time per day/area (hours):	1.89	hours / day
Number of doses per day for zone	20	
Pump run time per day for zone	3.77	hours
Dose volume per area	203	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	4,067	ft
Total Volume in dripline / zone	50.20	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

Geoflow Subsurface Dripline Dispersal: Field Calculation Zone 32

Job Description:	Cave Springs Wastewater Transfer
Contact:	Ferdi Fourie
Prepared by:	Ferdi Fourie
Date:	2/8/2006

Total Quantity of effluent to be disposed per day	4,000	gallons / day
Hydraulic loading rate	0.15	gallons / sq.ft. / day
Total Dispersal Field Area	25,847	square ft.
Number of Zones	3	zone(s)
Dispersal area per zone	8,616	square ft.
Choose spacing between WASTEFLOW lines	2 ft.	ft.
Choose spacing between WASTEFLOW emitters	2 ft.	ft.
Total linear ft.per zone (minimum required)	4,308	each
Total number of emitters per zone	2,154	each
Select Wasteflow dripline	Wasteflow PC - 1/2gph	dripline
Pressure at the beginning of the dripfield	30 psi	psi
Feet of Head at the beginning of the dripfield	69.3	ft.
What is the flow rate per emitter in gph?	0.53	gallons per hour
Total flow per zone - dosing	19.03	gallons per minute

If required, choose flush velocity	2	ft/sec
How many lines of WASTEFLOW?	12	lines
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	4.81	gpm
Total System Flow - worst case scenario	23.84	gpm
Select pipe diameters for manifolds and submains	2	inch
Select Vortex Filter (item no.)	AP4E-1F/5 (1in.)	
Select Zone Valve (item no.)	SVLV-100	
Maximum length of each WASTEFLOW line. For additional technical flow, pressure and flushing data please refer to Geoflow's Design Manual and WASTEFLOW hydraulics worksheet.	535	ft.

Number of doses per day / area:	5	doses
Pump run time per dose/area (minutes):	13.58	minutes
Pump run time per day/area (hours):	1.13	hours / day
Number of doses per day for zone	15	
Pump run time per day for zone	3.40	hours
Dose volume per area	258	gallons per dose

Dripline Volume Formula		
Tubing Inside diameter	0.55	inches
Total length of WASTEFLOW dripline / zone	4,308	ft
Total Volume in dripline / zone	53.17	gallons

Flush Cycle Flow formula		
Drip tube diameter	0.55	in
Drip Tube Diameter	0.0458	ft
Drip Tube Cross Sectional Area	0.0016	ft^2
Flow required per dripline for flush velocity	0.0008	ft^3/sec

APPENDIX C

Measured Loading Rates

City of Cave Springs
Existing Drip Irrigation System
Estimated Loading Rates
FY15-2122
Date: July 12, 2016

McCLELLAND CONSULTING ENGINEERS, INC.
DESIGNED TO SERVE

Drip Irrigation Loading Rates

DRIP FIELD NO.	ZONE NO.	AREA (FT2)	AREA (Acre)	RECORD MAX DISCHARGE (GPD)	CONSERVATIVE MAX DISCHARGE (GPD)	POSSIBLE OVERLOAD (GPD)	
3	5	65,293	1.50	13,059	9,794	3,265	
	6	38,613	0.89	7,723	6,564	1,159	
	7	54,549	1.25	10,910	10,910	0	One test pit used in 42,908 sq ft.
	8	11,650	0.27	7,081	2,447	4,635	
	9	45,726	1.05	18,291	16,004	2,287	
	10	31,500	0.72	9,450	9,450	0	One test pit used in 31,500 sq ft.
	11	20,548	0.47	4,110	3,288	822	
	12	18,804	0.43	8,462	1,880	6,582	
	TOTAL	286,683	6.58	79,086	60,337	18,749	23.7%
4	13	22,868	0.52	5,717	5,717	0	No test pits in zone. Closest two are unsuitable.
	14	40,649	0.93	6,097	4,471	1,626	
	15	41,890	0.96	8,378	5,446	2,932	
	16	23,567	0.54	9,427	4,478	4,949	
	17	16,062	0.37	3,694	3,694	0	Only one suitable pit in zone, one pit unsuitable.
	18	Not Used.					
	19	39,365	0.90	13,778	12,203	1,575	
	20	28,832	0.66	5,766	5,766	0	One test pit in zone.
	21	42,600	0.98	17,040	12,354	4,686	
	22	56,225	1.29	28,113	26,988	1,125	
	23	62,560	1.44	15,640	14,389	1,251	
	24	38,186	0.88	9,547	8,783	764	
	TOTAL	412,804	9.48	123,197	104,289	18,908	15.3%
5	25	22,178	0.51	4,436	3,548	888	
	26	31,114	0.71	9,334	7,467	1,867	
	27	53,260	1.22	16,511	16,511	0	No test pits in zone.
	28	41,993	0.96	13,018	8,819	4,199	
	29	19,613	0.45	3,923	2,746	1,177	
	30	18,393	0.42	10,116	10,116	0	One test pit in zone.
	31	24,792	0.57	7,438	7,438	0	One test pit in zone.
	TOTAL	211,343	4.85	64,776	56,645	8,131	12.6%

NOTES:
Record Max Discharge rates were obtained from As-Build drawings. Conservate Max Discharge rates were calculated using the minimum test pit loading in or adjacent to the subject Zone. The loadings were obtained from 2006 Construction Drawings and ADH design submittals.

PLANT NO. 2 DRIP FIELD LOADING SUMMARY (Drip Fields 3, 4, &5)

TOTAL LOADING BASED ON TEST PIT AVERAGING, gpd	267,059
TOTAL LOADING BASED ON CONSERVATIVE TEST PIT, gpd	221,271
TOTAL PLANT NO. 2 POTENTIAL UTILIZATION	83%

Gage, Hannah

From: Barrett Knutson <bknutson@mce.us.com>
Sent: Tuesday, December 19, 2017 2:08 PM
To: McWilliams, Katherine
Subject: RE: Cave Springs Waste Management Plan
Attachments: USGS Quad.pdf

Appendix D

From: McWilliams, Katherine [mailto:MCWILLIAMSK@adeq.state.ar.us]
Sent: Tuesday, December 19, 2017 10:59 AM
To: Barrett Knutson
Subject: RE: Cave Springs Waste Management Plan

Barrett,

The easiest way, if possible, is to split the document and email it in parts. I think we might be able to get it from Dropbox as well, but I am not sure.

Thanks,
Katherine McWilliams
Engineer
Office of Water Quality

From: Barrett Knutson [mailto:bknutson@mce.us.com]
Sent: Tuesday, December 19, 2017 10:38 AM
To: McWilliams, Katherine
Subject: Cave Springs Waste Management Plan

Katherine,

I am still waiting to get the plan certified from a Professional Engineer. I wanted to get the report to you ASAP as I wait for certification. The file size, with all appendices is 30MB, it is my understanding that the ADEQ cannot receive anything above 10MB do you have a different preferred method for file transferring? Possibly Dropbox or Google Dox.

In the meantime I have attached the narrative (Please see attached PDF). I know that you all already have certain items that I have included in the appendix, such as the engineering drawings, deed, and ADH approval. Please let me know whether it is necessary to send in some of these items that the ADEQ already has on file, as this could drastically reduce the file size and make submission easier.

Feel free to call me with any questions or concerns. If you are not able to reach me at the office, feel free to try me on my cell phone.

Respectfully,

Barret R. Knutson, E.I.
Project Designer

McCLELLAND CONSULTING ENGINEERS, INC.
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501.545.7115 cell
bknutson@mce.us.com

APPENDIX D

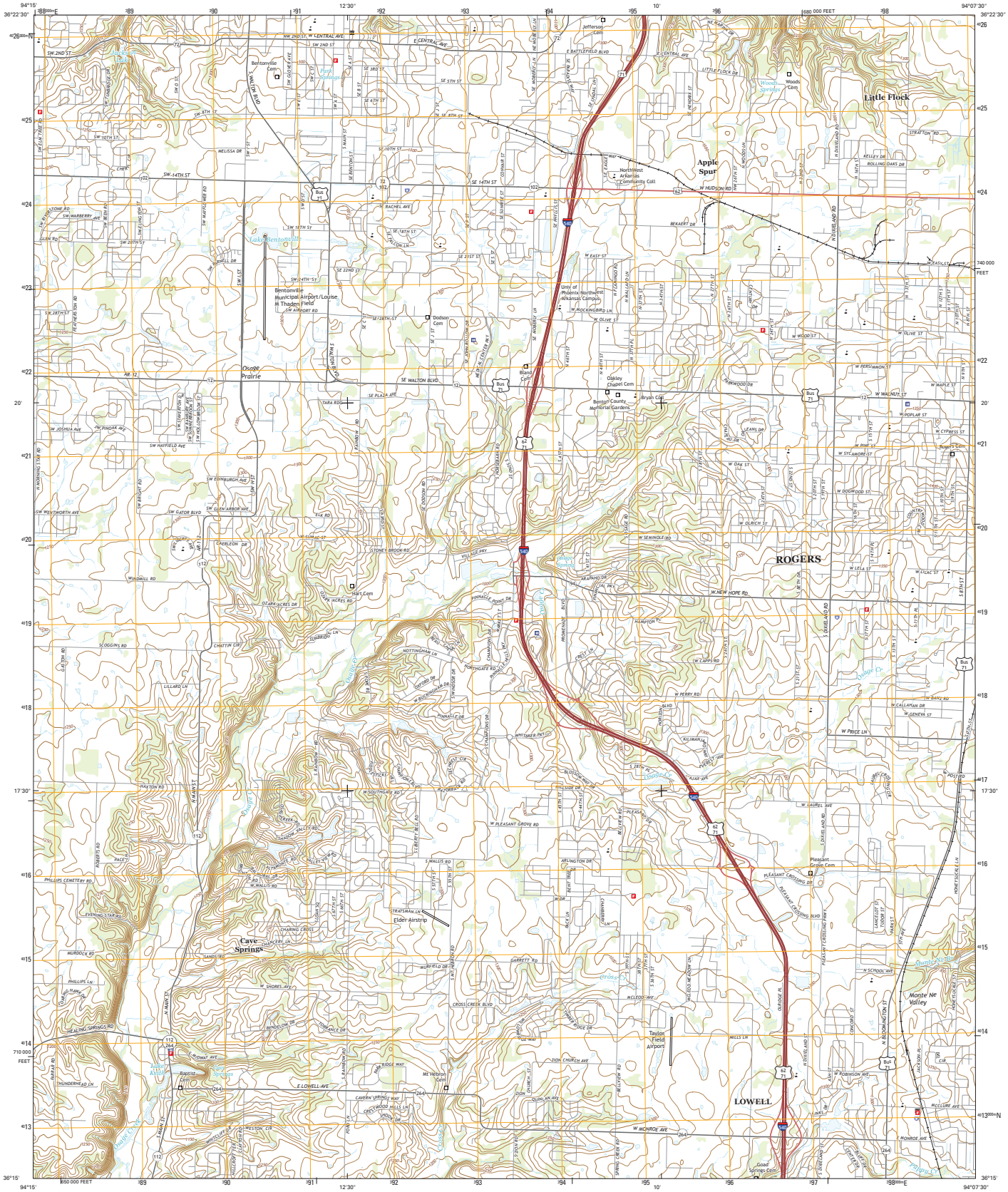
USGS Topographic Maps

USGS
science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

BENTONVILLE SOUTH QUADRANGLE
ARKANSAS-BENTON CO.
7.5-MINUTE SERIES



Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 15S
10 000-foot ticks: Arkansas Coordinate System of 1983 (north zone)

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, June 2010
Roads.....HERE, ©2013
Names.....GNIS, 2013
Hydrography.....National Hydrography Dataset, 2010
Contours.....National Elevation Dataset, 2006
Boundaries.....Multiple sources; see metadata file 1972 - 2013
Public Land Survey System.....BLM, 2011

UTM GRID AND 2014 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
UA
Grid Zone Designation
15S

SCALE 1:24 000

KILOMETERS 0 0.5 1 2
METERS 0 500 1000 2000
MILES 0 0.5 1
FEET 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

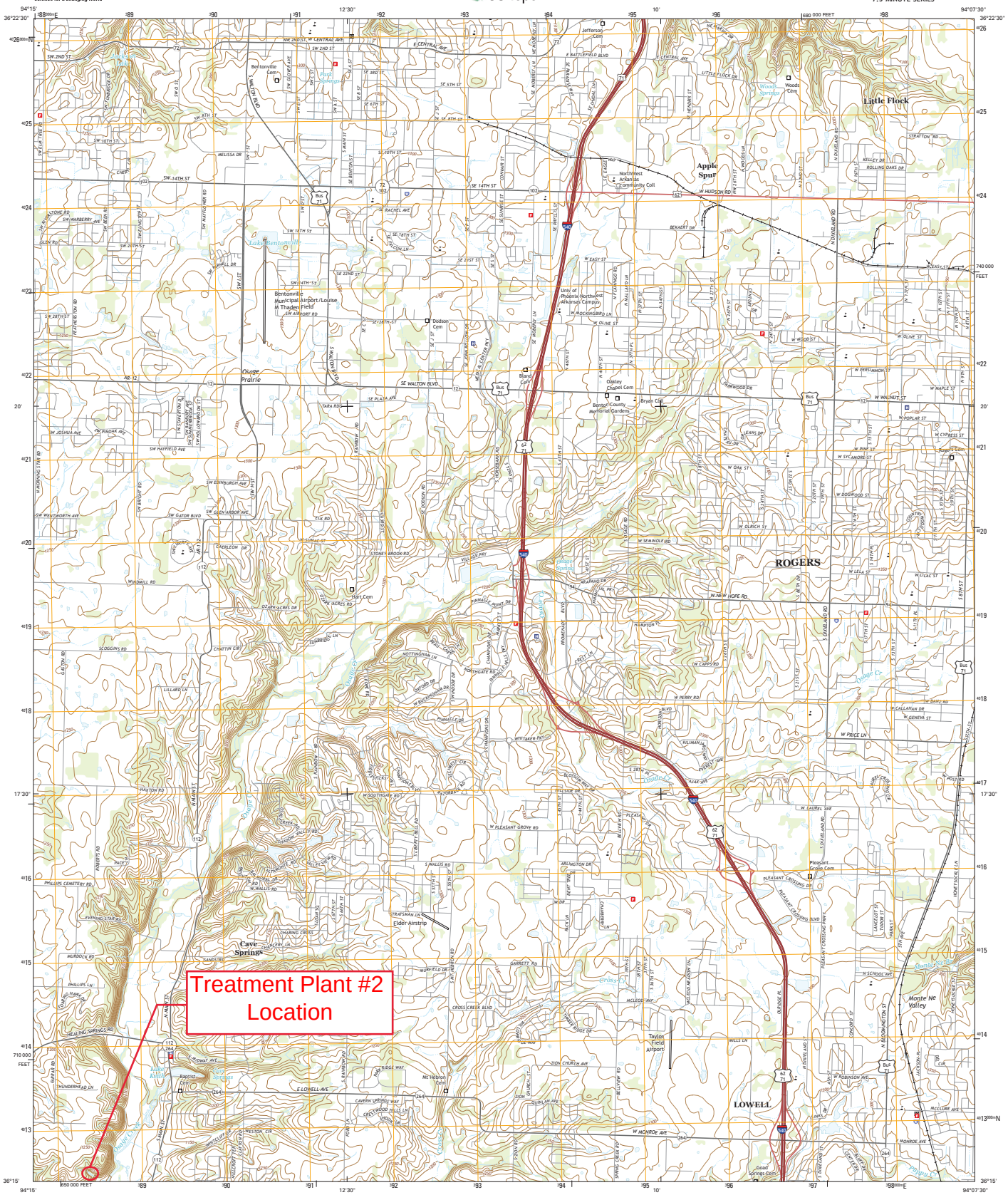
This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.16

ARKANSAS
QUADRANGLE LOCATION

ADJOINING QUADRANGLES
1 Hiwasse
2 Bentonville North
3 Pea Ridge
4 Centerton
5 Rogers
6 Robinson
7 Springdale
8 Sonora

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

BENTONVILLE SOUTH, AR
2014



U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

USGS science for a changing world

The National Map US Topo

BENTONVILLE SOUTH QUADRANGLE
ARKANSAS-BENTON CO.
7.5-MINUTE SERIES

Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 15S
10 000-foot ticks: Arkansas Coordinate System of 1983 (north zone)

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, June 2010
Roads.....HERE, ©2013
Names.....GNIS, 2013
Hydrography.....National Hydrography Dataset, 2010
Contours.....National Elevation Dataset, 2006
Boundaries.....Multiple sources; see metadata file 1972 - 2013
Public Land Survey System.....BLM, 2011

UTM GRID AND 2014 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
UA
Grid Zone Designation
15S

SCALE 1:24 000

KILOMETERS 0 0.5 1 2
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FEET 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

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ARKANSAS
QUADRANGLE LOCATION

ADJOINING QUADRANGLES
1 Hiwasse
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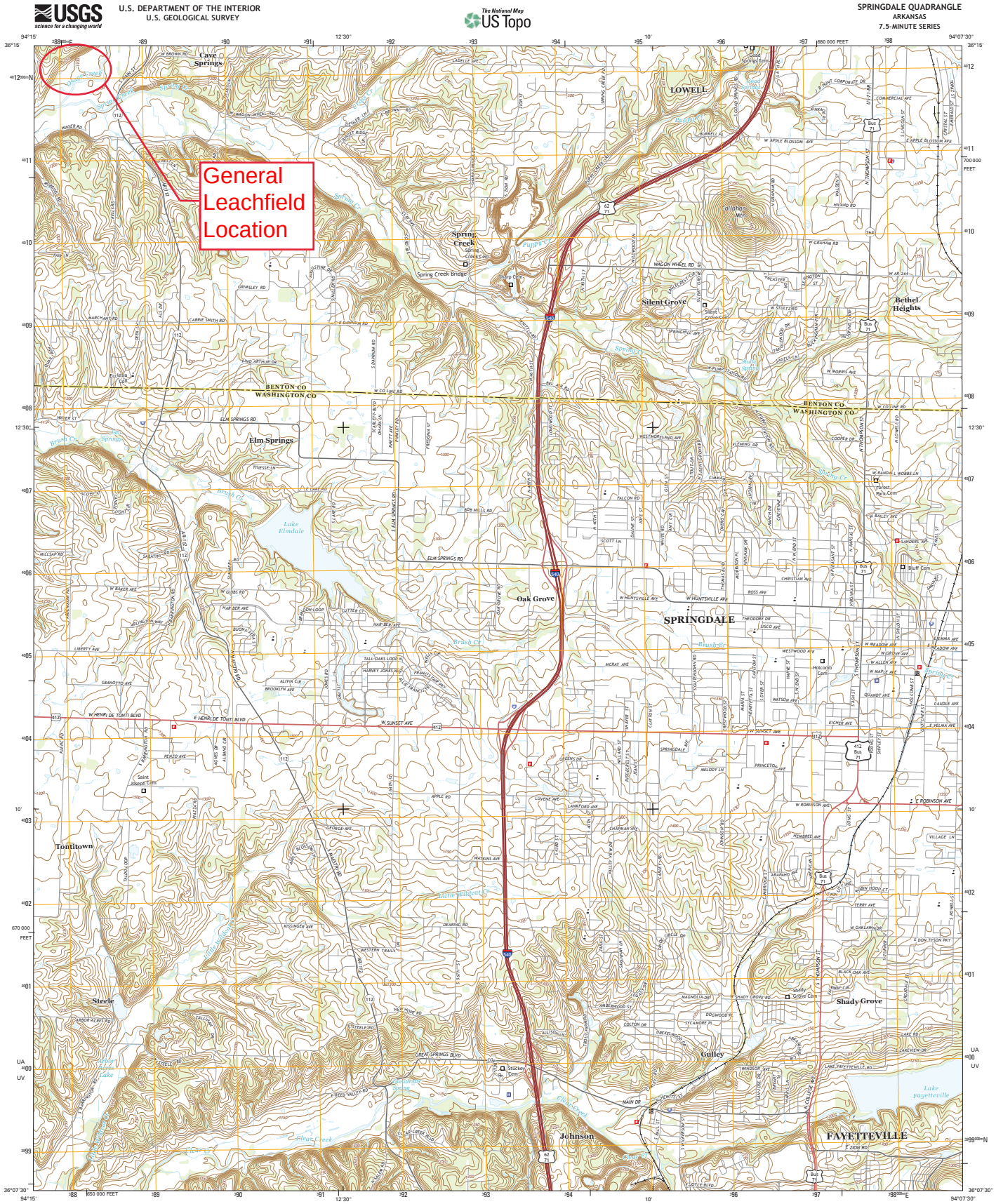
4 Centerton
5 Rogers
6 Robinson
7 Springdale
8 Sonora

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

BENTONVILLE SOUTH, AR
2014


Cave Springs
LOWELL
Spring Creek
Spring Creek Bridge
Silent Grove
Bethel Heights
BENTON CO
WASHINGTON CO
Elm Springs
Lake Elmdale
Oak Grove
SPRINGDALE
Tontitown
Steele
Gulley
Johnson
Shady Grove
FAYETTEVILLE
Lake Fayetteville
Lake Sequoyah
Lake Wilson
Lake Lucerne
Brush Creek
Spring Creek
Clear Creek
Goose Creek
Little Muddy Creek
Osage Creek
Puppy Creek
Sinking Creek
Spring Branch
Turkey Creek
Wilson Springs
Holcomb Cem
Bluff Cem
Shady Grove Cem
Saint Joseph Cem
Sequoyah Cem
Spring Creek Cem
Silent Grove Cem
Laurel Park Cem
Calhoun MEA
Cave Springs Cem
Sharp Cem
Bus 71
62
71
412
Bus 71
412
Bus 71
540
540
540
Bus 71
Bus 71
Bus 71



U.S. DEPARTMENT OF THE INTERIOR
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The National Map US Topo

SPRINGDALE QUADRANGLE
ARKANSAS
7.5-MINUTE SERIES

Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 15S
10 000-foot ticks: Arkansas Coordinate System of 1983 (north zone)

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Boundaries.....Multiple sources; see metadata file 1972 - 2013
Public Land Survey System.....BLM, 2011

UTM GRID AND 2014 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
UA
UV
Grid Zone Designation
15S

SCALE 1:24 000

KILOMETERS 0 0.5 1 2
METERS 0 500 1000 2000
MILES 0 0.5 1
FEET 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

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A metadata file associated with this product is draft version 0.6.16

ARKANSAS
QUADRANGLE LOCATION

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

ADJOINING QUADRANGLES
1 Centerton
2 Bentonville South
3 Rogers
4 Robinson
5 Sonora
6 Wheeler
7 Fayetteville
8 Elkins

SPRINGDALE, AR
2014

Gage, Hannah

From: Barrett Knutson <bknutson@mce.us.com>
Sent: Tuesday, December 19, 2017 2:09 PM
To: McWilliams, Katherine
Subject: RE: Cave Springs Waste Management Plan
Attachments: Soils Analysis.pdf; Warranty Deed.pdf; ADH Approval.pdf

Appendix E, F, G

From: McWilliams, Katherine [mailto:MCWILLIAMSK@adeq.state.ar.us]
Sent: Tuesday, December 19, 2017 10:59 AM
To: Barrett Knutson
Subject: RE: Cave Springs Waste Management Plan

Barrett,

The easiest way, if possible, is to split the document and email it in parts. I think we might be able to get it from Dropbox as well, but I am not sure.

Thanks,
Katherine McWilliams
Engineer
Office of Water Quality

From: Barrett Knutson [mailto:bknutson@mce.us.com]
Sent: Tuesday, December 19, 2017 10:38 AM
To: McWilliams, Katherine
Subject: Cave Springs Waste Management Plan

Katherine,

I am still waiting to get the plan certified from a Professional Engineer. I wanted to get the report to you ASAP as I wait for certification. The file size, with all appendices is 30MB, it is my understanding that the ADEQ cannot receive anything above 10MB do you have a different preferred method for file transferring? Possibly Dropbox or Google Dox.

In the meantime I have attached the narrative (Please see attached PDF). I know that you all already have certain items that I have included in the appendix, such as the engineering drawings, deed, and ADH approval. Please let me know whether it is necessary to send in some of these items that the ADEQ already has on file, as this could drastically reduce the file size and make submission easier.

Feel free to call me with any questions or concerns. If you are not able to reach me at the office, feel free to try me on my cell phone.

Respectfully,

Barret R. Knutson, E.I.
Project Designer

McCLELLAND CONSULTING ENGINEERS, INC.
1810 N. College Ave. | Fayetteville, AR 72703
P.O. Box 1229 | Fayetteville, AR 72702
479.443.2377 office | 479.443.9241 fax
501.545.7115 cell
bknutson@mce.us.com

APPENDIX E

Soils Analysis

TREATMENT PLANT#1 EXPANSION

FAIRWAY VALLEY RESERVE AREA DRIP DISPERSAL FIELD SIZE AND SOIL LOADING RATES

Pit 62

Brief SWT @ 40"
Loading rate 0.820 Gal/Ft2/Day
121.951 Ft2/100 Gal

Pit 63

Brief SWT @ 30"
Loading rate 0.615 Gal/Ft2/Day
162.602 Ft2/100 Gal

Pit 64

Brief SWT @ 22"
Loading rate 0.451 Gal/ft2/Day
221.729Ft2/100 Gal

Pit 65

Too close to pond and property line

Pit 66

Too close to property line

Pit 67

Brief SWT @ 23"
Loading rate 0.472 Ga/Ft2/Day
212.089 Ft2/100 Gal

Pit 68

Brief SWT @ 23"
Loading rate 0.472 Gal/Ft2/Day
212.089 Ft2/100 Gal

Pit 69

Too close to property line

Pit 70

Brief SWT @ 22"
Loading rate 0.451 Gal/Ft2/Day
221.729 Ft2/100 Gal

Pit 71

Brief SWT @ 22"
Moderate SWT @ 42" (Adjusted to 35")
Loading rate 0.239 Gal/Ft2/Day
418.118 Ft2/100 Gal

Pit 72

Brief SWT @ 20"
Moderate SWT @ 42" (Adjusted to 35")
Loading rate 0.239 Gal/Ft2/Day
418.118 Ft2/100 Gal

Pit 73

Brief SWT @ 20"
Moderate @ 34" (Adjusted to 29")
Loading rate 0.198 Gal/Ft2/Day
504.626 Ft2/100 Gal

Pit 74

Brief SWT @ 21"
Loading rate 0.431 Gal/Ft2/Day
232.288 Ft2/100 Gal

Pit 75

Edge of green. Did not dig.

Pit 76

Edge of sandtrap, disturbed area, did not dig.

Pit 77

Brief SWT @ 19"
Moderate SWT @ 40" (Adjusted to 33")
Loading rate 0.226 Gal/Ft2/Day
443.459 Ft2/100 Gal

Pit 78

Brief SWT @ 34"
Loading rate 0.697 Gal/Ft2/Day
143.472 Ft2/100 Gal

Pit 79

Brief SWT @ 20"
Loading rate 0.410 Gal/Ft2/Day
243.902 Ft2/100 Gal

Pit 80

Brief SWT @ 18"
Loading rate 0.369 Gal/Ft2/Day
271.003 Ft2/100 Gal

Pit 81

Brief SWT @ 18"
Loading rate 0.369 Gal/Ft2/Day
271.003 Ft2/100 Gal

Pit 82

Brief SWT @ 20"
Loading rate 0.410 Gal/Ft2/Day
243.902 Ft2/100 Gal

Pit 83

Brief SWT @ 19"
Loading rate 0.390 Gal/Ft2/Day
256.739 Ft2/100 Gal

Pit 84

Brief SWT @ 19"
Loading rate 0.390 Gal/Ft2/Day
256.739 Ft2/100 Gal

Pit 85

Brief SWT @ 23"
Loading rate 0.472 Gal/Ft2/Day
212.089 Ft2/100 Gal

Pit 86

Brief SWT @ 17"
Loading rate 0.349 Gal/Ft2/Day
286.944 Ft2/100 Gal

Pits completed 12-15-05 North of Club House and Shed

Pit 1

Overburden @ 8"
Brief @ 21"
Long @ 31" Unsuitable pit area

Pit 2

Brief SWT @ 30"
Moderate SWT @ 38" (Adjusted to 35")
Loading rate 0.239 Gal/Ft2/Day
418.118 Ft2/100 Gal

Pit 3

Brief SWT @ 22"
Loading rate 0.451Gal/Ft2/Day
221.729 Ft2/100 Gal

These drip disposal field sizes and loading rates are taken from the Arkansas Department of Health Guidelines for the Design and Construction of Drip Dispersal Systems.

TREATMENT PLANT #2

BAILEY ENVIRONMENTAL SERVICES, INC.
P.O. Box 6428
Springdale, AR 72766
Ph (479) 361-5044

June 13, 2005

Brian Hash, Developer
ReMax and Associates
1285 N. Shiloh
Fayetteville, AR 72703

RE: Irrigation lines on the The Creeks
Highway 112, Cave Springs, AR

To Whom It May Concern:

Soil pit analyses were made of 105 pits as marked by surveyors from CEI Engineering to determine seasonal water tables and loading rates by Reba Bailey, DR and Glen Laurent, P.S.C. on June 7th and 8th, 2005. This information is also being provided to Benny Mays, E.H.S. from the Benton County Health Department.

This information is pertinent to the area of the property where the soil pits were dug. Pit locations must be shown on the plat. 15 other proposed pits were not dug due either to proximity to ponds, irrigation lines, putting greens or stakes not found. Notes referring to this are included on the attached analysis chart.

The drip field disposal field sizes and loading rates are taken from the Arkansas Department of Health Guidelines for the Design and Construction of Drip Dispersal Systems provided to the designated representatives. Pits were reviewed by Benny Mays, Environmental Health Specialist, on June 7th, 2005. Pit locations considered unsuitable for irrigation lines and proposed pit sites not dug are noted on the plat provided by CEI Engineering.

Sincerely,

Reba Bailey, R.S.
Designated Representative #269

C: Benny Mays, E.H.S., Benton County Health Department
CEI Engineering Associates

Soils Investigation Data
Drip Dispersal Field Loading Rates
The Creeks Golf Course
Cave Springs, AR

Prepared for:
Brett Hash, Developer
CEI Engineering Associates

Prepared by:
Reba Bailey, R.S.
Designated Representative #269

June 13, 2005

Introduction

This report was prepared to provide information for health department approval of the proposed irrigation lines using treated effluent on The Creeks Golf Course.

105 soil pits were dug and soil pit analyses were made on June 7th and 8th, 2005. A health department representative reviewed the pits and concurred with our findings.

Soil pit locations are indicated on the plat provided by CEI Engineering Associates. Related loading rates are pertinent to the referenced pit locations.

Site description

The proposed drip dispersal field is located on The Creeks Golf Course located on Highway 112 in Cave Springs, AR in Benton County. Areas analyzed were staked and identified by CEI Engineering Associates.

Methods

This investigation was performed by digging four feet deep soil pits based on a 100 foot grid in the non disturbed areas over much of the golf course. All soil interpretations and profile descriptions were made by Glen Laurent, Arkansas Registered Professional Soil Classifier. Seasonal water table depths were determined by Reba Bailey, Designated Representative #269 and Glen Laurent, Arkansas Registered Professional Soil Classifier. Soil pits were reviewed by Benny Mays, Environmental Health Specialist with the Arkansas Department of Health.

Loading rates were based on the seasonal water tables and interpretations were made using the Arkansas Department of Health Guidelines for the Design and Construction of Drip Dispersal Systems

THE CREEKS GOLF COURSE
PIT B4

PROFILE DESCRIPTION

A	0 – 10"	Dark brown (10YR3/3) silt loam; weak, medium subangular blocky structure; friable; 5% gravel by volume1/2 to 3 inches in diameter; gradual, smooth boundary.
B	10– 18"	Brown (10YR4/4) silt loam; weak, medium subangular blocky structure; friable; 10% gravel by volume 1 to 3 inches in diameter; gradual, smooth boundary.
Bt1	18 – 27"	Brown (7.5YR4/4) gravelly silt loam with common, medium distinct yellowish brown (10YR5/4) iron depletions; moderate, medium subangular blocky structure; friable; common, distinct clay films on ped faces; 2% common black stains on ped faces; 20% rounded gravel by volume 1 to 3 inches in diameter; gradual, wavy boundary.
Bt2	27 – 42"	Brown (7.5YR4/4) gravelly silty clay loam with common, medium distinct brown (7.5YR5/4) iron depletions; moderate, medium subangular blocky structure; friable; many, distinct clay films on ped faces; common black stains; 15% rounded gravel by volume 1 to 3 inches in diameter; gradual, wavy boundary.
Bt3	42 – 52"	Brown (7.5YR4/4) silty clay loam with common, medium distinct yellowish brown (10YR5/4) iron depletions; moderate, medium subangular blocky structure; friable; common, distinct clay films on ped faces; common black stains on ped faces; 10% rounded gravel by volume 1 to 3 inches in diameter.

THE CREEKS GOLF COURSE
PIT B33

PROFILE DESCRIPTION

A	0 – 18"	Dark yellowish brown (10YR4/4) silt loam; weak, medium subangular blocky structure; friable; gradual, smooth boundary.
Bt1	18– 28"	Brown (7.5YR4/4) silt loam with common, medium distinct yellowish brown (10YR5/4) iron depletions; moderate, medium subangular blocky structure; friable; common, clay films; gradual, smooth boundary.
Bt2	28 – 45"	Brown (7.5YR4/4) silty clay loam with common, medium distinct light yellowish brown (10YR6/4) iron depletions; moderate, medium subangular blocky structure; friable; common, distinct clay films on ped faces; 2% common black stains on ped faces; gradual, smooth boundary.
Bt3	45 – 52"	Brown (7.5YR4/4) silty clay loam with common, medium distinct light yellowish brown (10YR6/4) and light brownish gray (10YR6/2) iron depletions; moderate, medium subangular blocky structure; friable; common, distinct clay films on ped faces; common FeMn concretions.

THE CREEKS GOLF COURSE
PIT B75

PROFILE DESCRIPTION

A	0 – 13"	Dark yellowish brown (10YR4/4) silt loam; weak, medium subangular blocky structure; friable; 10% rounded gravel by volume1to 3 inches in diameter; gradual, smooth boundary.
B1	13– 21"	Brown (10YR4/4) very gravelly silt loam; weak, medium subangular blocky structure; very friable; 60% rounded gravel by volume 1 to 3 inches in diameter; gradual, smooth boundary.
B2	21 – 48"	Dark brown (7.5YR3/4) extremely gravelly silt loam; wesak, medium subangular blocky structure; very friable; 80% rounded gravel by volume 1 to 3 inches in diameter.

SOIL PITS SIMILAR TO SOIL PROFILE DESCRIPTIONS FOR :						
B4		**B33**			**B75**	
B1		B25	B72		B6	B110
B2		B26	B73		B11	B112
B3		B27	B74		B12	B113
B7		B29	B81		B15	B120
B8		B30	B86		B16	
B10		B31	B88		B21	
B76		B32	B89		B22	
B77		B33	B90		B23	
B78		B34	B92		B28	
B79		B36	B93		B35	
B80		B38	B94		B42	
B95		B39	B96		B43	
B104		B40	B97		B50	
B107		B41	B98		B54	
B114		B44	B99		B55	
		B45	B100		B56	
		B46	B102		B57	
		B48	B105		B58	
		B49	B106		B62	
		B51	B109		B67	
		B52	B115		B69	
		B53	B116		B71	
		B59	B117		B75	
		B60	B118		B82	
		B61	B119		B83	
		B64			B84	
		B65			B91	
		B66			B101	
		B68			B103	
		B70			B108	

PIT #	BSWT	MSWT	LSWT	ADJ MSWT	ADJ LSWT	LOADING RATE G/FT2/DAY	FT2/100 GAL		
B1	19"					0.39	256.739		
B2	18"					0.369	271.003		
B3	19"					0.39	256.739		
B4	18"					0.369	271.003		
B5	NO PIT OR STAKE								
B6			28" FREE H20			0.096	1045.3	UNSUITABLE	
B7	18"	34"		29"		0.198	504.626		
B8	29"					0.492	203.252		
B9	NO PIT OR STAKE								
B10	20"						243.902		
B11	22"					0.451	221.729		
B12	>48"					0.984	101.626		
B13	NO PIT OR STAKE								
B14	NO PIT OR STAKE								
B15			47" FREE H20			0.161	622.73		
B16	43"					0.882	113.443		
B17	LOCATED IN DRY POND								
B18	NO PIT OR STAKE					USE LR from PIT 10			
B19	NO PIT OR STAKE					" " 25			
B20	LOCATED IN DRY POND								
B21	>51"					0.984	101.626		
B22	23"					0.472	212.069		
B23	19"					0.39	256.739		
B24	NO PIT OR STAKE					USE LR from PIT 25			
B25	29"					0.595	168.209		
B26	20"	42"		35"		0.239	418.118		
B27	19"	42"		34"		0.226	443.459		
B28	>48"					0.984	101.626		
B29	18"	33"		28"		0.191	522.648		
B30	16"	38"		31"		0.212	472.069		
B31	20"	43"		35"		0.239	418.118		
B32	18"	44"		35"		0.239	418.118		
B33	18"	45"		36"		0.246	406.504		

Close to creek

PIT #	BSWT	MSWT	LSWT	ADJ MSWT	ADJ LSWT	LOADING RATE G/FT2/D	FT2/100 GAL		
B34	20"					0.41	243.902		
B35	21"	48"		39"		0.267	375.235		
B36	17"	30"	45" FREE H20	26"	35"	0.12	836.237		
B37	AT EDGE OF POND-(H20 PUMPED IN)				NOT DUG				
B38	22"					0.451	221.729		
B39	22"					0.451	221.729		
B40	12"	24"	50" FREE H20	20"	35"	0.12	836.237		
B41	18"	32"		27"		0.185	542.005		
B42	55"+					0.984	101.626		
B43	22"	46"		38"		0.26	385.109		
B44	10"	20"	45" FREE H20	17"	31"	0.106	944.138		
B45	25"					0.513	195.122		
B46	27"					0.554	180.668		
B47	AT EDGE OF POND-(H20 PUMPED IN)								
B48	18"	49"		39"		0.267	375.235		
B49	18"	38"	51" FREE H20	31"	41"	0.14	713.861		
B50	4"	24"	46" FREE H20	18"	34"	0.082	1219.51		
B51	SURFACE	12"	25"						
B52	19"	45"		36"		0.246	406.504		
B53	20"	47"		38"		0.26	385.109		
B54	>54"					0.984	101.626		
B55	28"					0.574	174.216		
B56	28"	36"	45" FREE H20	33"	39"	0.133	750.469		
B57	5" FILL	25"				DO NOT USE THIS AREA, HEALTH DEPT REQUEST			
B58	38"					0.779	128.37		
B59	32"	49"		43"		0.294	340.329		
B60	19"	48"		38"		0.26	385.109		
B61	19"	48"		38"		0.26	385.109		
B62	SURFACE		27" , 34" H20						
B63	NOT DUG, NORTH OF POND								
B64	21"	41"	52"	35"	43"	0.147	680.658		
B65	21"	48"		38"		0.26	385.109		
B66	28"	33"		31"		0.212	472.069		
B67	44"					0.902	110.865		

HASH PROJECT SEASONAL WATER TABLES AND LOADING RATES THE CREEKS								
PIT #	BSWT	MSWT	LSWT	ADJ MSWT	ADJ LSWT	LOADING RATE G/FT2/D	FT2/100 GAL	
B68	20"	30"		27"		0.185	542.005	
B69	26"	54"		45"		0.308	325.203	
B70	20"	39"		33"		0.226	443.459	
B71	SURFACE					UNSUITABLE		
B72	30"					0.615	162.602	
B73	23"	28"		26"		0.178	562.852	
B74	20"	52"		41"		0.28	356.93	
B75	48"+					0.984	101.626	
B76		24"				0.164	609.756	
B77	22"					0.451	221.729	
B78	6"	20"		15"		0.103	975.61	
B79	48"+					0.984	101.626	
B80	22"					0.451	221.729	
B81	33"	51"		45'		0.308	325.203	
B82	34"					0.697	143.472	
B83	23"					0.472	212.089	
B84	48"+					0.984	101.626	
B85	NOT DUG-TOO CLOSE TO T (GREEN?)							
B86	20"	40"		33"		0.226	443.459	
B87	NOT DUG-TOO CLOSE TO IRRIGATION LINES							
B88	18"					0.369	271.003	
B89	17"	33"		28"		0.191	522.648	
B90	17"	27"		24"		0.164	609.756	
B91	21"					0.431	232.288	
B92	19"	26"		24"		0.164	609.756	
B93	18"	29"		25"		0.171	585.366	
B94	18"	37"		31"		0.212	472.069	
B95	30"					0.615	162.602	
B96	22"					0.451	221.729	
B97	20"	35"		30"		0.205	487.205	
B98	29"	33"		32"		0.219	457.317	

HASH PROJECT SEASONAL WATER TABLES AND LOADING RATES THE CREEKS							
PIT #	BSWT	MSWT	LSWT	ADJ MSWT	ADJ LSWT	LOADING RATE G/FT2/D	FT2/100 GAL
B99	29"	34"		32"		0.219	457.317
B100	29"	38"		35"		0.239	418.118
B101	23"	36"		32"		0.219	457.317
B102	23"	34"		30"		0.205	487.205
B103	33"					0.677	147.82
B104	20"	28"		25"		0.171	585.366
B105	17"	27"		24"		0.164	609.756
B106	17"	24"		22"		0.15	665.188
B107	20"	33"		29"		0.198	504.628
B108	48"					0.984	101.626
B109	22"	25"		24"		0.164	609.756
B110	SURFACE	UNSUITABLE AREA					
B111	TOO CLOSE TO POND-HEALTH DEPT ASKED NOT TO USE AREA						
B112	7"	15"		12"		0.082	1219.51
B113	35"					0.718	139.373
B114	20"	26"		24"		0.164	609.756
B115	SURFACE	16"	UNSUITABLE				
B116	SURFACE						
B117	10"	16"		14"		0.096	1045.3
B118	6"	19"		15"		0.103	975.61
B119	23"	33"		30"		0.205	487.805
B120	34"					0.697	143.472
BSWT=BRIEF SEASONAL WATER TABLE							
MSWT=MODERATE "							
LSWT=LONG "							
ADJ=ADJUSTED							

AVG 0.375

APPENDIX F

Warranty Deed

2005 335
Recorded in the Above
Deed Book & Page
01-04-2005 10:15:48 AM
Brenda DeShields-Circuit Clerk
Benton County, AR

Book/Pg: 2005/335
Term/Cashier: CIRCL501 / BStubbs
Tran: 2548.75076.211689
Recorded: 01-04-2005 10:16:09
DFE Deed 11.00
DFE Recording Fee 0.00
Total Fees: $ 11.00

WARRANTY DEED
(Married Persons)

**Re-recorded to correct legal description

KNOW ALL MEN BY THESE PRESENTS:

That we, **Arnold D. Harp and Mary Harp, husband and wife**, hereinafter called Grantors for and in consideration of the sum of Ten Dollars and no/100...($10.00) and other good and valuable consideration paid by **Northwest Land Development, LLC, an Nevada limited liability company**, Grantee, the receipt of which is hereby acknowledged, do hereby grant, bargain, sell and convey unto the said Grantee, and unto Grantee's heirs and assigns forever, the following described property situate in the County of Benton, State of Arkansas, to-wit:

SEE ATTACHED EXHIBIT "A"

TO HAVE AND TO HOLD The same unto the Grantee and unto Grantee's heirs and assigns forever, with all appurtenances thereunto belonging. And we hereby covenant with Grantee that we will forever warrant and defend the title to the property against all lawful claims whatever except easements, special assessments, and restrictions.

And we the Grantors, for and in consideration of the said sum of money, do hereby release and relinquish unto said Grantee, and to Grantee's heirs and assigns forever, all our rights of dower, curtesy and homestead, in and to the above described real property.

WITNESS our hands and seals this 21st day of December, 2004.

ARKANSAS DOCUMENTARY $1100 35448
ARKANSAS DOCUMENTARY $1100 35447
ARKANSAS DOCUMENTARY $1100 35446
ARKANSAS DOCUMENTARY $1100 35444
ARKANSAS DOCUMENTARY $1100 35443
ARKANSAS DOCUMENTARY $1100 35442
ARKANSAS DOCUMENTARY $110 495223
ARKANSAS DOCUMENTARY $110 495222
ARKANSAS DOCUMENTARY $1100 35445

Arnold D. Harp

Mary Harp

TITLE ASSOCIATES LLC
1088 EAST HILLSAP RD
FAYETTEVILLE, AR 72703

2005 6063
Recorded in the Above
Deed Book & Page
02-08-2005 02:30:23 PM

1197

2005 336
Recorded in the Above
Deed Book & Page
01-04-2005 10:15:48 AM
Brenda DeShields-Circuit Clerk
Benton County, AR

ACKNOWLEDGMENT

State of Arkansas)
) SS
County of Washington)

BE IT REMEMBERED, that on this day came before, the undersigned, a Notary Public within and for the County and State aforesaid, duly commissioned and acting **Arnold D. Harp and Mary Harp, husband and wife** to me well known as the Grantors in the foregoing Deed, and stated that they had executed the same for the consideration and purposes therein mentioned and set forth.

WITNESS my hand and official seal this 21st day of December, 2004.

Notary Public

My commission expires:

Prepared by: Title Associates, LLC
1088 East Milsap Road
Fayetteville, Arkansas 72703

OFFICIAL SEAL
KATHERINE MYERS
NOTARY PUBLIC - ARKANSAS
WASHINOTON COUNTY
COMMISSION EXP. 11/01/2013

I certify under penalty of false swearing that at least the legally correct amount of documentary stamps have been placed on this instrument.

Title Associates, LLC, Agent
Grantee or Grantee's Agent

4265 N. Shiloh Ste 205
Address to send next tax statement
Fayetteville, AR 72703

1197 KM

2005 6064
Recorded in the Above
Deed Book & Page
02-08-2005 02:30:23 PM

2005 336.001
Recorded in the Above
Deed Book & Page
01-04-2005 10:15:48 AM
Brenda DeShields-Circuit Clerk
Benton County, AR

EXHIBIT "A"

TRACT A:

A part of the S½ of the NW¼ and a part of the N½ of the SW¼ all in Section 12, T-18-N, R-31-W, Benton County, Arkansas, being more particularly described as follows: Commencing at the Center of Section 12; thence N 88°33'13" W, 228.18 feet to a point on the Westerly Right-of-Way of Arkansas State Highway 112, said point being the point of beginning; thence Northeasterly along said Right-of-Way the following: N 19°04'05" E, 8.37 feet; N 14°40'29" E, 839.78 feet; thence leaving said Right-of-Way; thence N 77°01'34" W, 1,253.58 feet to a point at a fence in the centerline of an abandoned Railroad Right-of-Way; thence along said centerline and fence line S 13°22'49" W, 326.65 feet; thence along said centerline and fence line, S 08°59'36" W, 173.14 feet; thence along said centerline and fence line, S 00°30'15" W, 1,882.19 feet returning to the Westerly Right-of-Way of Arkansas State Highway 112; thence along said Right-of-Way along a curve to the right having a radius of 1,205.92 feet and length of 66.39 feet with a chord bearing N 31°20'29" E, having a chord length of 66.38 feet; thence along said Right-of-Way the following: N 41°27'13" E, 267.34 feet; N 45°42'14" E, 44.34 feet; N 72°29'16" E, 54.10 feet; N 45°37'44" E, 148.70 feet; N 48°11'16" E, 603.00 feet; N 44°27'16" E, 160.32 feet; N 29°09'28" E, 234.24 feet; thence N 19°04'05" E, 147.99 feet to the point of beginning, containing 45.04 acres, more or less, and subject to Easements, Rights-of-Way, and/or Restrictions of record if any.

TRACT B:

The SW¼ of the NW¼ of Section 24, T-18-N, R-31-W, Benton County, Arkansas, EXCEPT a part of said SW¼ of the NW¼, described as beginning at the NE Corner of said 40 acre tract; thence S 01°04' W, 328.33 feet; thence West 471.58 feet; thence N 18°55' W, 347.02 feet; thence East 590.14 feet to the place of beginning. ALSO LESS AND EXCEPT beginning at the SW Corner of said SW¼ of the NW¼; thence East 208.00 feet; thence North 208.00 feet; thence West 208.00 feet; thence South 208.00 feet to the place of beginning. ALSO EXCEPT beginning South 01°04' W, 328.33 feet from the NE Corner of said SW¼ of the NW¼; thence South 00°36' W, 989.90 feet; thence S 87°55' W, 147.43 feet; thence N 09°36' W, 467.77 feet; thence N 19°37' W, 96.03 feet; thence N 27°58' W, 335.24 feet; thence N 17°29' W, 154.63 feet; thence East 471.53 feet to the place of beginning.

2005 6065
Recorded in the Above
Deed Book & Page
02-08-2005 02:30:23 PM

Benton County, AR
I certify this instrument was filed on
01-04-2005 10:15:48 AM
and recorded in Deed Book
2005 at pages 336 - 336
Brenda DeShields-Circuit Clerk

File No.: 1197

2005 6066
Recorded in the Above
Deed Book & Page
02-08-2005 02:30:23 PM
Brenda DeShields-Circuit Clerk
Benton County, AR

EXHIBIT A

TRACT A:

A part of the S½ of the NW¼ and a part of the N½ of the SW¼ all in Section 12, T-18-N, R-31-W, Benton County, Arkansas, being more particularly described as follows: Commencing at the Center of Section 12; thence N 88°33'13" W, 228.18 feet to a point on the Westerly Right-of-Way of Arkansas State Highway 112, said point being the point of beginning; thence Northeasterly along said Right-of-Way the following: N 19°04'05" E, 8.37 feet; N 14°40'29" E, 839.78 feet; thence leaving said Right-of-Way; thence N 77°01'34" W, 1,253.58 feet to a point at a fence in the centerline of an abandoned Railroad Right-of-Way; thence along said centerline and fence line S 13°22'49" W, 326.65 feet; thence along said centerline and fence line, S 08°59'36" W, 173.14 feet; thence along said centerline and fence line, S 00°30'15" W, 1,882.19 feet returning to the Westerly Right-of-Way of Arkansas State Highway 112; thence along said Right-of-Way along a curve to the right having a radius of 1,205.92 feet and length of 66.39 feet with a chord bearing N 31°20'29" E, having a chord length of 66.38 feet; thence along said Right-of-Way the following: N 41°27'13" E, 267.34 feet; N 45°42'14" E, 44.34 feet; N 72°29'16" E, 54.10 feet; N 45°37'44" E, 148.70 feet; N 48°11'16" E, 603.00 feet; N 44°27'16" E, 160.32 feet; N 29°09'28" E, 234.24 feet; thence N 19°04'05" E, 147.99 feet to the point of beginning, containing 45.04 acres, more or less, and subject to Easements, Rights-of-Way, and/or Restrictions of record if any.

TRACT B:

Lots 1 through 31 (inclusive), Woodruff Subdivision, to the City of Cave Springs, Arkansas, as shown on plat of record in plat book 20 at page 81, plat records of Benton County, Arkansas.

Less & Except: A part of Lot 30, Woodruff Subdivision, to the City of Cave Springs, Arkansas, as shown on plat of record in plat 20 at page 81, plat records of Benton County, Arkansas, being more particularly described as follows: Beginning N 89°35'21" E, 144.90 feet from the SW Corner of said Lot 30; thence N 00°01'14" W, 130.00 feet; thence N 89°35'21" E, 125.00 feet; thence S 00°01'14" E, 130.00 feet; thence S 89°35'21" W, 125.00 feet to the point of beginning. Subject to any easements of record or fact. To be known as Tract 30-B, Woodruff Subdivision, Cave Springs, Arkansas.

Benton County, AR
I certify this instrument was filed on
02-08-2005 02:30:23 PM
and recorded in Deed Book
2005 at Pages 6062 - 6066
Brenda DeShields-Circuit Clerk

APPENDIX G

ADH Notification

Arkansas Department of Health and Human Services

Division of Health

Paul K. Halverson, DrPH, Director

Engineering Section – Environmental Health Branch – Center for Local Public Health

Postal Address	P. O. Box 1437, Slot H-37	Little Rock, AR 72203-1437	1-501-661-2623	TDD: 1-800-234-4399
Physical Address for UPS or Fedex	4815 West Markham St., Slot H-37	Little Rock, AR 72205		Fax: 1-501-661-2032

January 24, 2006

Brian J. Moore, PE
Engineering Services, Inc.
P.O. Box 282
Springdale, Arkansas 72765-0282

RE: Water Line Extensions and S.T.E.P System
Fairway Valley Subdivision
Cave Springs, Benton County
ADHHS# 51682-3

Dear Mr. Moore:

The revised plans and specifications for the captioned project, revised 01/17/2006, prepared by Engineering Services, Inc. and submitted to the Division of Engineering on 01/18/2006 have been reviewed and are hereby approved with the following conditions.

1. The Division of Engineering relied upon the statements and representations made in the engineer's report, plans, and specifications. In case any statement or representation in the aforementioned documents is found to be incorrect, this Approval may be revoked.

2. There shall be no deviation from the plans and specifications unless revised plans and specifications have been first submitted for review and written consent given.

3. The review and approval of the plans and specifications were for functional and sanitary features and in no way constitute an analysis of structural design.

4. If construction on this project is not started within one year of the date affixed hereto, this Letter of Approval is void.

5. Engineering Services, Inc. shall provide construction inspection services.

6. Specifications for Cave Springs will be utilized if there are any conflicts between those submitted with these plans and subsequently submitted specifications approved for Cave Springs.

7. Septic Tanks will be tested after installation and before backfilling by completely filling the tank two inches into the riser. After two hours inspect the tank. There should be no drop in water level. Any drop in water level will be cause for rejection.

One set of plans and specifications will be retained for our files. One set of plans and specifications are included.

When submitting correspondence pertaining to this project, please include our reference number ADHHS# 51682-3.

Sincerely,

Robert Hart, P.E.
Chief Engineer
Engineering Section

RH:CSC:RAD:rd:

Enclosure

cc: Benton County Sanitarian
Ody Bien, Area 1 Plumbing Inspector
Cave Springs Water