

**WATER PERMIT NO. 1861-1**

Name of Applicant: Duane E Robbins LLC

Address: 4041 Canyon Dr, Rapid City SD 57702

Phone: 605 399-1761

Amount of Water Claimed: 0.19 cfs (85 gpm)

Total Acres: NA

Source of Water Supply: groundwater (one well)

Water to be used for: suburban housing development

County: Meade

Type of Waste Disposal System:

Location: 1 mile north of Ellsworth Airforce Base

PRIORITY Date Received: 4-20-06

Application/License Fee: \$275

Corrected Application Received:

Period of Annual Use: January 1 – December 31

Remarks:

Diversion Point: SW ¼ SW ¼ Sec 25-T3N-R8E

Land to be Irrigated: NA

Depth of Well: 2560 feet deep

Well Driller: : Cimarron Drilling Inc.

Remarks:

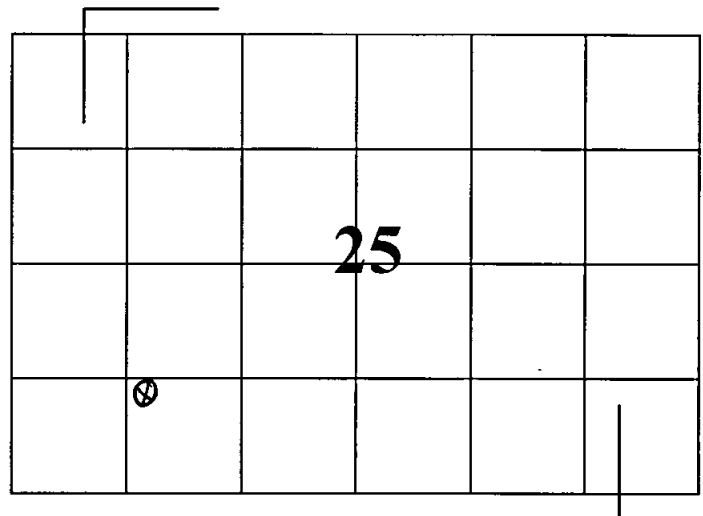
Type of Map: topo

Prepared by: Gregroy M Wierenga, PE

Reviewed and the Number Assigned on: 4-21-06

By: Karen Schlaak

Notice of Hearing - date to intervene: \_\_\_\_\_



FORM 2: Application for uses other than irrigation  
(type or print)

Mail to:  
Water Rights Program  
Joe Foss Building  
523 E. Capitol  
Pierre, SD 57501-3181  
(605) 773-3352

(office use only)  
No. 1861-1 Hydrologic Unit 10120111  
Basin Upper Cheyenne  
Newspaper Meade Co Times-Tribune  
Sturgis

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WATER RIGHTS  
PROGRAM

Application For Permit To Appropriate Water Within The State Of South Dakota

Check use(s) of water:

☐ Municipal ☒ Suburban Housing ☐ Recreational ☐ Institutional  
☐ Rural Water System ☐ Commercial ☐ Fish & Wildlife ☐ Geothermal Heat  
☐ Domestic (over 18 gpm) ☐ Industrial ☐ Other

Type of Application: ☐ New ☒ Vested Right (Use predates Mar 2, 1955) ☐ Future Use Reservation  
(check one) ☐ Place to Beneficial Use Water Reserved by Future Use Permit No. \_\_\_\_\_  
☐ Amendment/Correction to Permit No. \_\_\_\_\_

Description of amendment/correction: (i.e. change diversion point(s), add diversion point(s), change use, etc.) \_\_\_\_\_

- Name of Applicant Duane E Robbins LLC Phone 605-399-1761  
(check one) ☒ Owner ☐ Tenant/lessee  
Mailing Address 4041 Canyon Dr Rapid City State SD 57702  
(Street, RR, or Box and City) (Zip Code)
- Amount of water claimed 0.19 \*CFS or 137 \*\*GPM → 85 \*\*\*AF  
(\*Cubic Feet per Second) (\*\*Gallons per Minute) (\*\*\*Acre Feet - storage capacity of dam/dugout or annual use if applicable)
- Source of water supply 2560' deep well
- Location of point of diversion (example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W)  
SE 1/4 Sec 25 T3N R8E (SW1/4 SW1/4)  
County Meade
- County or counties where water will be used Meade County
- Annual period during which water is to be used year around Jan 1 - Dec 31
- Give a description of the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

STATE OF SOUTH DAKOTA)

County of Tennington SS

Attachments: Attach Form 2A if diversion is from a well or dugout, or if storage of water is proposed. Attach map and any other technical information. (see instructions)

I, Duane E Robbins, the applicant, certify that I have read this application, have examined the attached map and that the matters stated are true and that I intend, and am able to complete the necessary construction.

Applicant's signature Duane E Robbins

Subscribed and sworn to before me this 11 day of April 20 06

Jay Christensen  
Notary Public signature

**SOUTH DAKOTA  
WATER PERMIT NO. 1861-1**

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Date of first receipt of application April 20, 2006.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 1861-1 to Duane E Robbins LLC, 4041 Canyon Dr, Rapid City SD 57702 authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 1861-1 appropriate 0.19 cubic feet of water per second from one well completed into the Inyan Kara Aquifer (2560 feet deep) located in the SW 1/4 SW 1/4 Section 25-T3N-R8E.
2. The water appropriated shall be used for the purpose of suburban housing development use at Horseshoe Acres Estates and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: January 1 – December 31.
4. The date of approval of Permit No. 1861-1 is September 5, 2006.
5. The date from which applicant may claim right is April 20, 2006.
6. One-fifth of the construction is to be completed on or before March 5, 2009.
7. All construction is to be completed on or before September 5, 2011.
8. Water is to be put to beneficial use on or before September 5, 2015.
9. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

**QUALIFICATION**

The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.

**WATER MANAGEMENT BOARD**

By: Garland Erbele  
Garland Erbele, Chief Engineer  
Water Rights Program  
Department of Environment and Natural Resources

NOV 03 2003

date



# RECEIPT

## WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date April 21, 20 06

RECEIVED OF Duane Robbins Construction, 23581 Old Folsom Rd, Rapid City SD 57701

The following amount in fees for services rendered as provided for by law:

|                                                                                                                        |       |        |
|------------------------------------------------------------------------------------------------------------------------|-------|--------|
| Fee for Application for Permit No. <u>1861-1</u> to Appropriate Water, to construct and to put water to beneficial use | 225   | 00     |
| Fee for Application for Permit No. _____ to Appropriate Water for Future use                                           |       |        |
| Fee to retain Future Use Permit No. _____ after period of seven years.                                                 |       |        |
| Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>1861-1</u>            | 50    | 00     |
| Fee for Filing Transfer Form _____                                                                                     |       |        |
| Fee for _____                                                                                                          |       |        |
| Fee for Issuing New Well Driller's License No. _____ for C.Y. _____                                                    |       |        |
| Fee for Renewal of Well Driller's License No. _____ for C.Y. _____                                                     |       |        |
| Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____                                                 |       |        |
| Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____                                              |       |        |
| (Any Other Work Provided by Law)                                                                                       | TOTAL | 275.00 |

No.

0242

By

Darland Erbe

Chief Engineer

gm

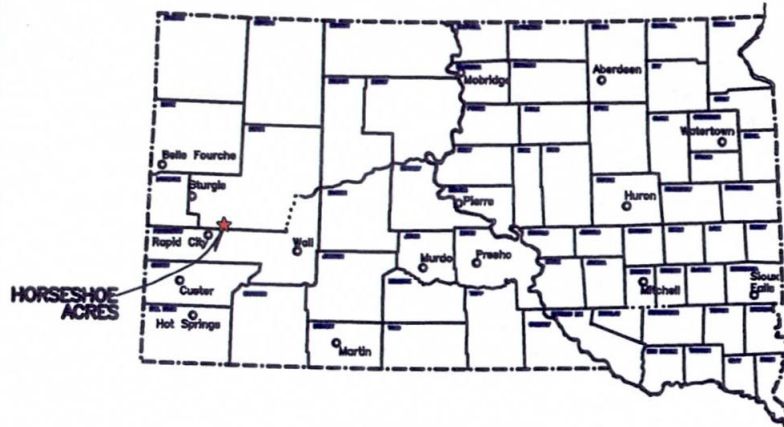
# **PUBLIC WATER SUPPLY SYSTEM FOR HORSESHOE ACRES ESTATES MEADE COUNTY, SOUTH DAKOTA**

**OWNER: DUANE ROBBINS**  
**APRIL 17, 2006**

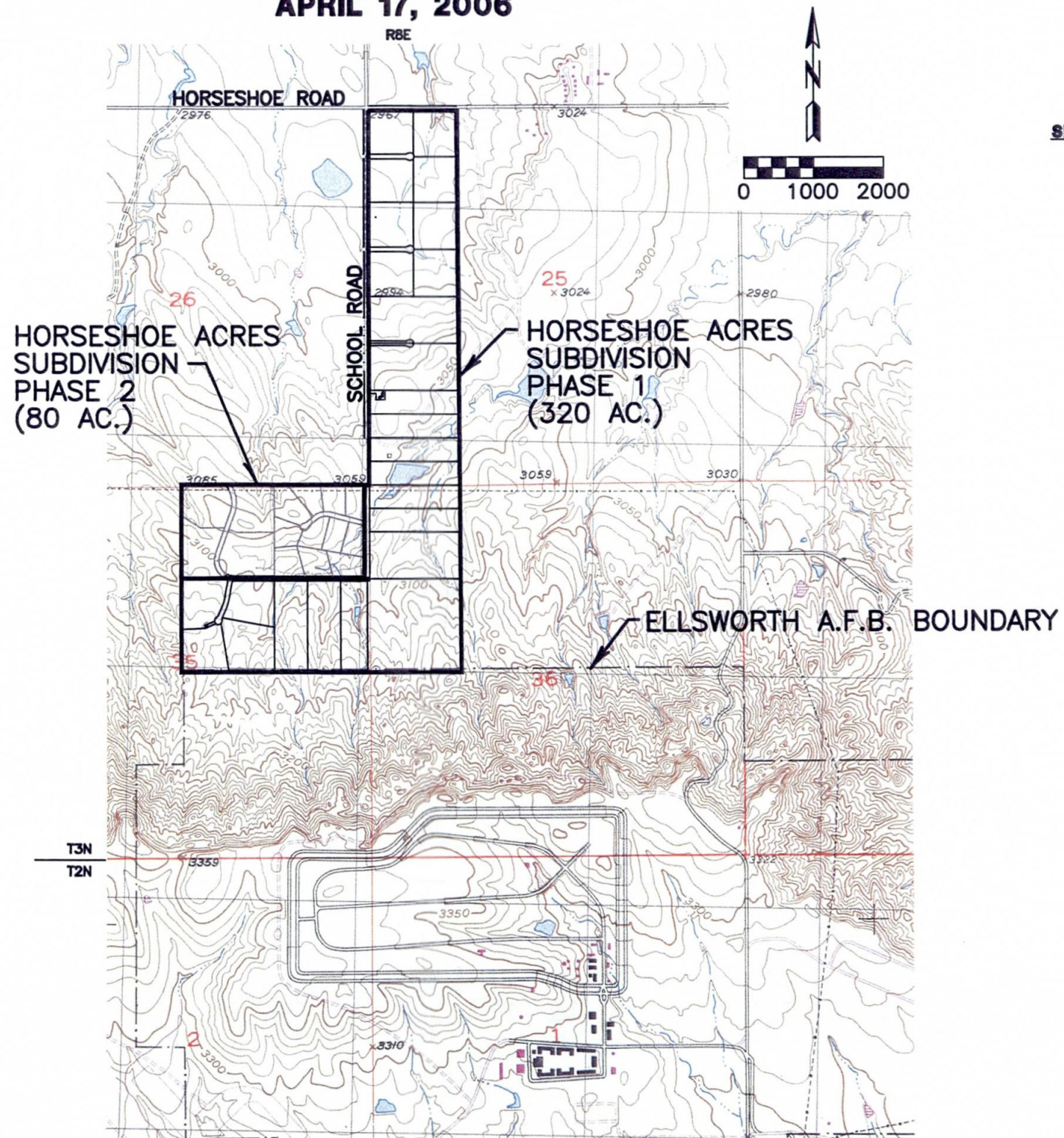
06-116  
RECEIVED

APR 20 2006

WATER RIGHTS  
PROGRAM



### PROJECT LOCATION



| <b><u>INDEX OF DRAWINGS</u></b> |                           |
|---------------------------------|---------------------------|
| <b><u>SHEET NO.</u></b>         | <b><u>DESCRIPTION</u></b> |

1 \_\_\_\_\_ TITLE SHEET  
2 \_\_\_\_\_ GENERAL NOTES AND SURVEY CONTROL  
3 \_\_\_\_\_ WATER SYSTEM LAYOUT  
4 \_\_\_\_\_ WELL HOUSE SITE PLAN  
5 \_\_\_\_\_ WELL HOUSE  
6 \_\_\_\_\_ WELL HOUSE MECHANICAL  
7 \_\_\_\_\_ RESERVOIR SITE PLAN  
8 \_\_\_\_\_ RESERVOIR GRADING PLAN  
9 \_\_\_\_\_ RESERVOIR PLAN AND ELEVATION  
10 \_\_\_\_\_ DISTRIBUTION SYSTEM DETAILS  
11 - 19 \_\_\_\_\_ DISTRIBUTION SYSTEM PLAN & PROFILES



1830 West Fulton Street  
Rapid City, SD 57702  
Phone: (605) 341-7800  
Fax: (605) 341-7864  
cetec@rushmore.com

## GENERAL NOTES

### 1. Specifications

Specifications for the project shall be "Detailed Specifications, for the Water Supply and Distribution System, Horseshoe Acres Subdivision", CETEC Engineering Services, Inc., April 5, 2006. This document is published separately from the plans.

### 2. Utilities

The information on these drawings concerning the type, size, and location of utilities has been based upon the information available. The Contractor shall be responsible for the determination of the exact location of all utilities prior to beginning construction. The Contractor shall be responsible for protecting all existing utilities in place. The Contractor shall coordinate all relocations with the utility companies.

Electrical, telephone, television and gas utilities may be adjusted and/or relocated by the respective utility companies.

The Contractor shall utilize the South Dakota One Call notification process to provide advance notice of at least 48 hours, excluding weekends and holidays, to inform all South Dakota underground facility operators of intended excavation. All utility companies shall be contacted by the Contractor before work is commenced.

South Dakota One Call 1-800-781-7474

Telephone: Qwest  
P.O. Box 100  
Rapid City, SD 57709  
1-800-781-7474

Electric: West River Electric Association, Inc.  
P.O. Box 412  
Wall, SD 57790-0412  
605-271-2135

Cable TV: Midcontinent Communications  
1301 Omaha Street  
Rapid City, SD 57701  
605-343-3402

Water: Duane Robbins, Developer  
23581 Old Folsom Road  
Rapid City, SD 57703  
605-399-1761

### 3. Construction Sequencing and Traffic Control

The Contractor is responsible for traffic controls in School Rd. and other work areas. Traffic controls shall include barricades, channelizing devices, warning signs, lane delineators and all other necessary devices. All devices shall conform with the Manual on Uniform Traffic Control Devices (MUTCD), and to the approved Traffic Control Plan as prepared and submitted by the Contractor.

The Contractor shall prepare a Traffic Control Plan in advance of the work and submit for approval as part of project submittals. The Engineer will request Meade County review and will coordinate review comments and approvals with the County.

In general, plans do not show traffic control requirements. The Contractor-prepared plan shall conform with the following general guidelines and conditions.

- Two-way traffic shall be maintained on School Rd. throughout the construction period.
- Total closure of work areas within the Horseshoe Acres Subdivision is permitted.

### 4. Construction Staking

CETEC Engineering will provide construction staking for all work associated with this project at the expense of the Owner. Staking will include, but not necessarily be limited to: Structure offset and grade, easement limits, and pipe offset and grade.

### 5. Dewatering Permit

Dewatering activities, if needed, shall be conducted in compliance with the "General Permit to Discharge Under the Surface Water Discharge System for Temporary Dewatering Activities in South Dakota," SDDENR Permit No. SDG 070000. The Contractor is required to furnish the "Request for Authorization" to DENR required under the permit and to obtain DENR an authorization and furnish a copy to the Owner at the preconstruction conference.

The Contractor is responsible for performing self-monitoring activities, including sampling, testing and reporting as may be determined to be required under the authorization to discharge.

Payment for obtaining the necessary authorization to discharge, and for all compliance activities and obligations by the Contractor shall be taken to be included under the bid item "Incidental Work."

### 6. Trenching and Backfill

The Contractor's attention is called to site constraints imposed by the nature and location of the work. Deep excavations may require that the Contractor take special precautions to protect property and to ensure the safety of the public and his workers. The Contractor shall make necessary provisions to protect other utilities, sidewalks, power poles, etc. from movement during excavation, backfill and compaction.

The Contractor shall confine his activities to the public right-of-way and designated areas of easements and/or work limits shown on the plans. The Contractor shall not operate or place equipment, materials, or stockpiles on private property without the property owner's written consent.

The Contractor shall be responsible for maintaining a safe excavation complying with applicable state and federal safety regulations.

In some areas, special foundations may be required to provide adequate support for the pipe. Such foundation will consist of sub-excavation to a depth as required by the Engineer and placement of Type 2 foundation material.

All PVC pipe installed under this contract shall be bedded with 3" of Type 1 granular bedding material and shall have Type 1 granular bedding material placed to the 3" above the top of the pipe.

### 7. Topsoil Stripping, Stockpiling and Placement

Existing topsoil along the length of the project shall be stripped and stockpiled in advance of the trenching work. The depth of stripping shall be a minimum of 3", but the depth shall be adjusted to obtain the best quality material available. All topsoil encountered on the project shall be salvaged to its full depth in all disturbed areas. Topsoil shall be spread uniformly across the disturbed areas at a thickness of 3" to 4".

The Contractor shall confine trenching and grading operations to minimize the width of disturbance created. The Contractor may utilize a motor grader or other similar equipment to strip topsoil along the pipe alignment. The topsoil stripping width shall be a maximum of 20 feet unless the Engineer approves an increase due to site conditions. The topsoil shall be stripped and stockpiled to prevent mixing with excavation materials.

Topsoil stripping, salvage and placement requirements are limited to Dyess Avenue right-of-way and tank and well house work areas. It is not required for work within easement areas in Rolling Dice Subdivision.

### 8. Seeding, Fertilizing and Mulching

Disturbed project areas within the School Road right-of-way shall be seeded per project specifications.

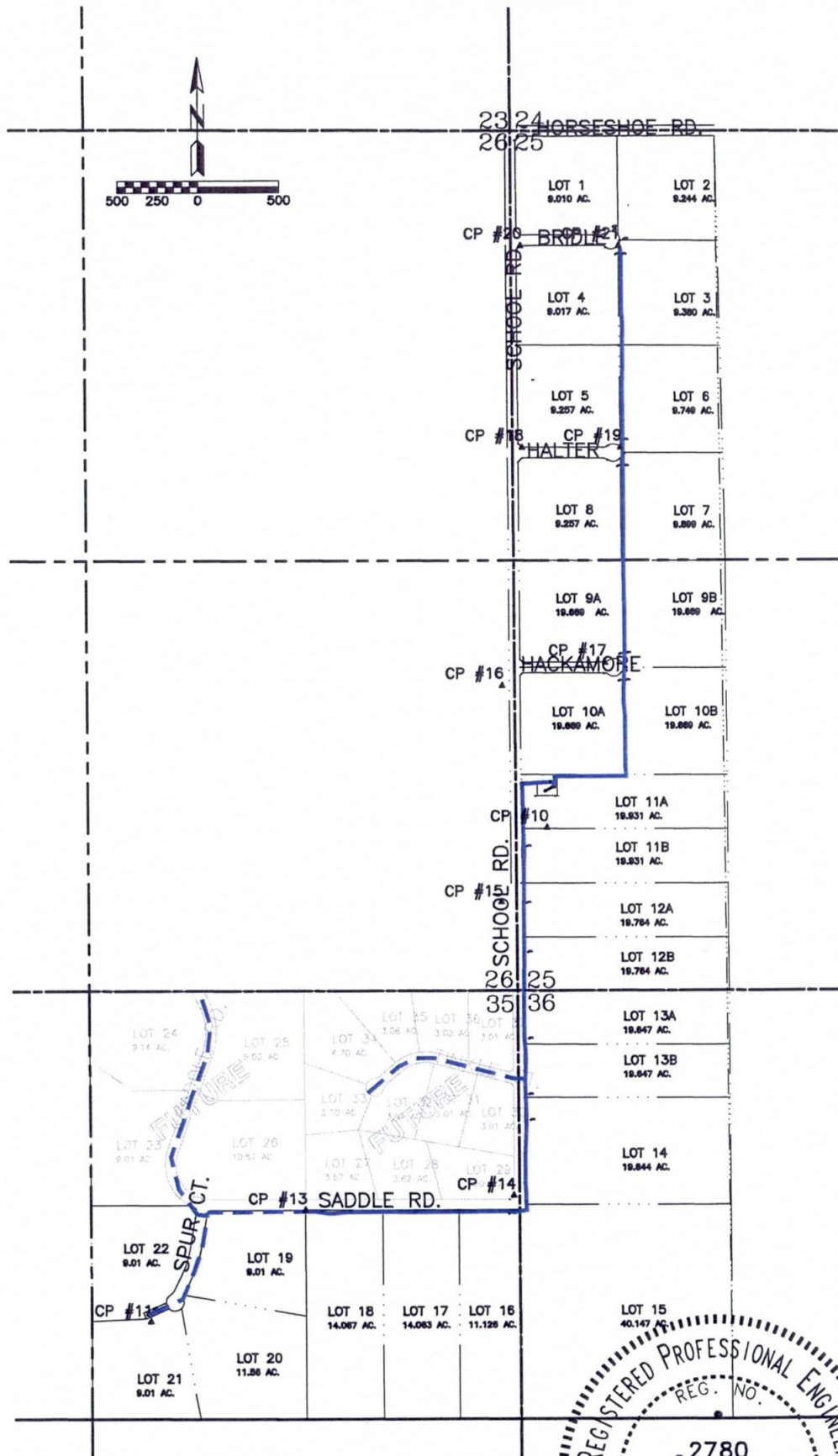
Seeding is not required within Horseshoe Acres Subdivision.

### 9. Previously Constructed Water Main

Portions of the water main system shown on these drawings have been previously constructed and are in service. Existing pipe locations shown are approximate. The Contractor shall verify the exact locations and extent of existing mains with the owner. Exploratory digging shall be performed by the Contractor as needed to locate existing pipe elements for work interfaces shown on these plans.

CONTROL POINT DATA

| #              | NORTHING | EASTING  | ELEVATION | DESCRIPTION |
|----------------|----------|----------|-----------|-------------|
| 10             | 20000    | 20000    | 3065.25   | IR/SCOTT    |
| 11             | 16951.15 | 17531.63 | 3136.71   | IR/SCOTT    |
| 13             | 17635.80 | 18485.99 | 3090.31   | IR/SCOTT    |
| 14             | 17723.52 | 19776.15 | 3091.07   | IR/SCOTT    |
| 15             | 19540.67 | 19711.58 | 3054.85   | IR/SCOTT    |
| 16             | 20880.98 | 19726.76 | 3025.05   | IR/SCOTT    |
| 17             | 21020.04 | 20369.64 | 3019.88   | IR/SCOTT    |
| 18             | 22354.67 | 19861.63 | 2977.33   | IR/SCOTT    |
| 19             | 22352.35 | 20476.27 | 2976.50   | IR/SCOTT    |
| 20             | 23604.71 | 19860.26 | 2966.46   | IR/SCOTT    |
| 21             | 23601.28 | 20474.83 | 2963.63   | IR/SCOTT    |
| DATUM: NGVD 29 |          |          |           |             |



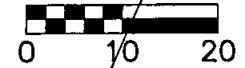


March 07, 2008 4:31:58 PM  
Drawing: WELL HOUSE SITE PLAN (C:\Users\GREGORY\Documents\10 HORSESHOE ADRES\)

SCHOOL RD.

LOT 10A

LOT 11A



15' WIDE  
UTILITY  
EASEMENT  
(TYP.)

40+00

18" CMP

3045

3045

15' WIDE  
UTILITY  
EASEMENT  
(TYP.)

S 89°37'31" E  
100.00'

S 89°37'31" E  
225.00'

GRAVEL ACCESS ROAD

3050

1002 3050.40  
IRON ROD WELL LOT

N 00°04'15" E  
85.00'

52'

WELL LOT  
0.45 ACRES

WELL

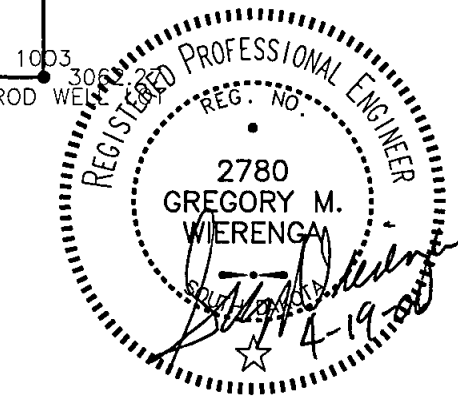
1001 3053.17  
IRON ROD WELL LOT

S 89°37'31" E  
125.00'

WELL HOUSE DRAIN

WELL HOUSE

1003 3053.17  
IRON ROD WELL LOT



SHEET:

4 OF 19

PROJECT:  
PUBLIC WATER SUPPLY SYSTEM  
HORSESHOE ACRES ESTATES  
MEADE COUNTY, SOUTH DAKOTA

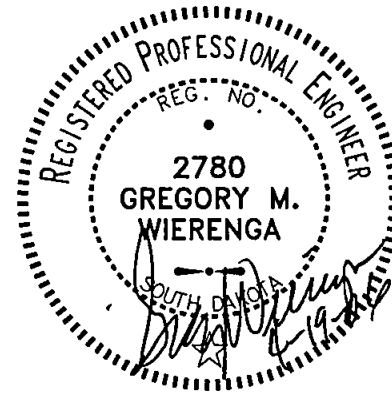
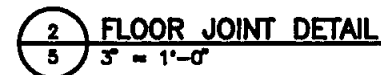
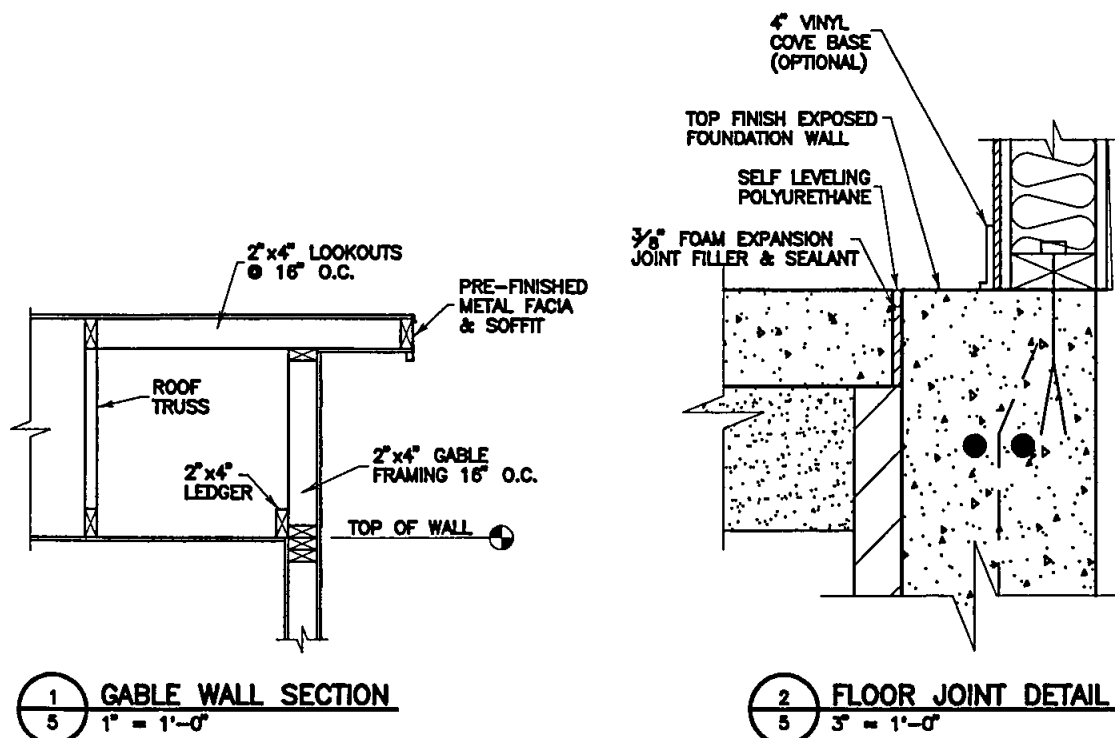
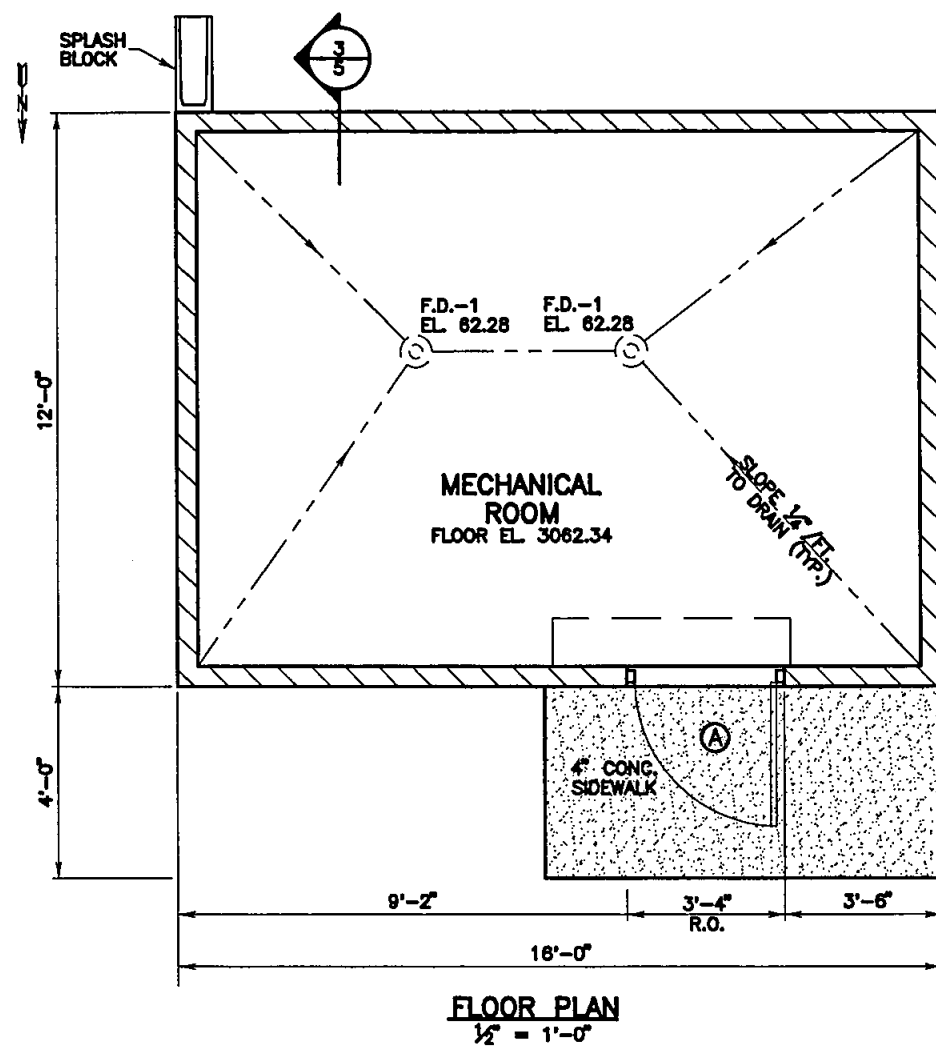
SHEET DESCRIPTION:

WELL HOUSE  
SITE PLAN

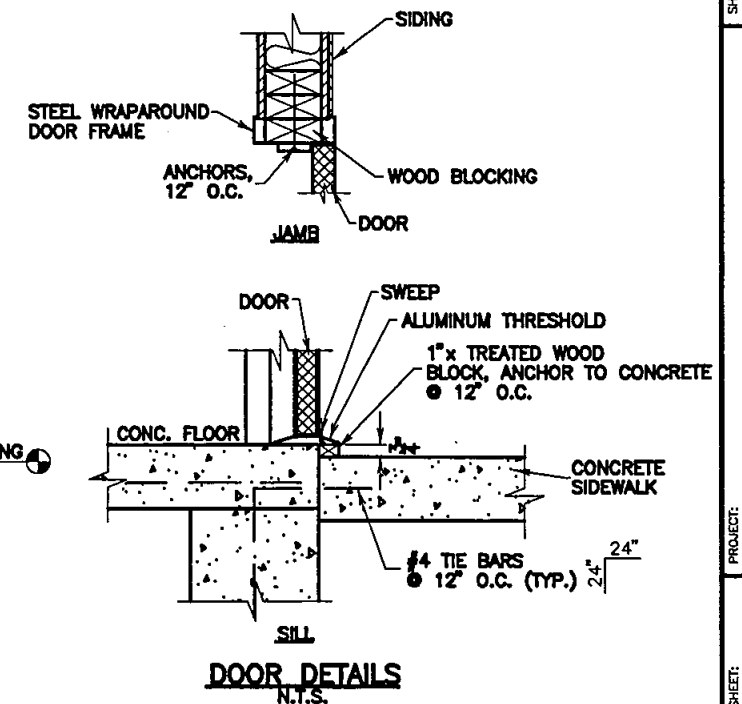
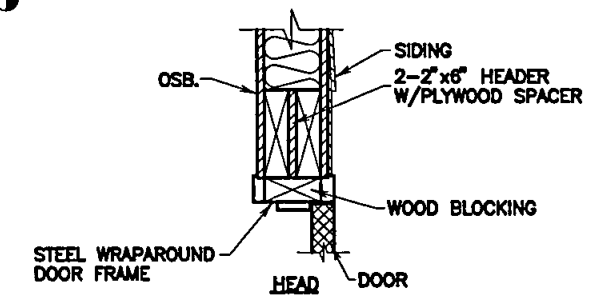
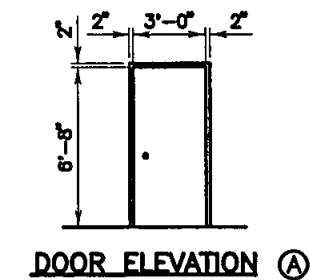
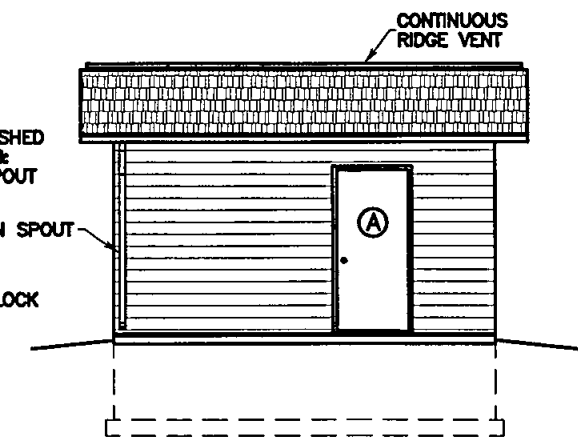
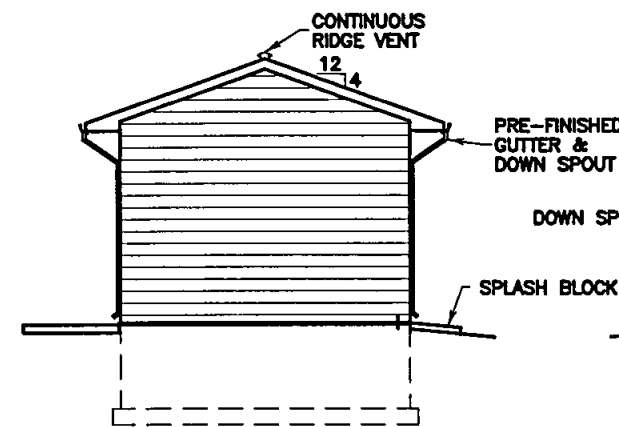
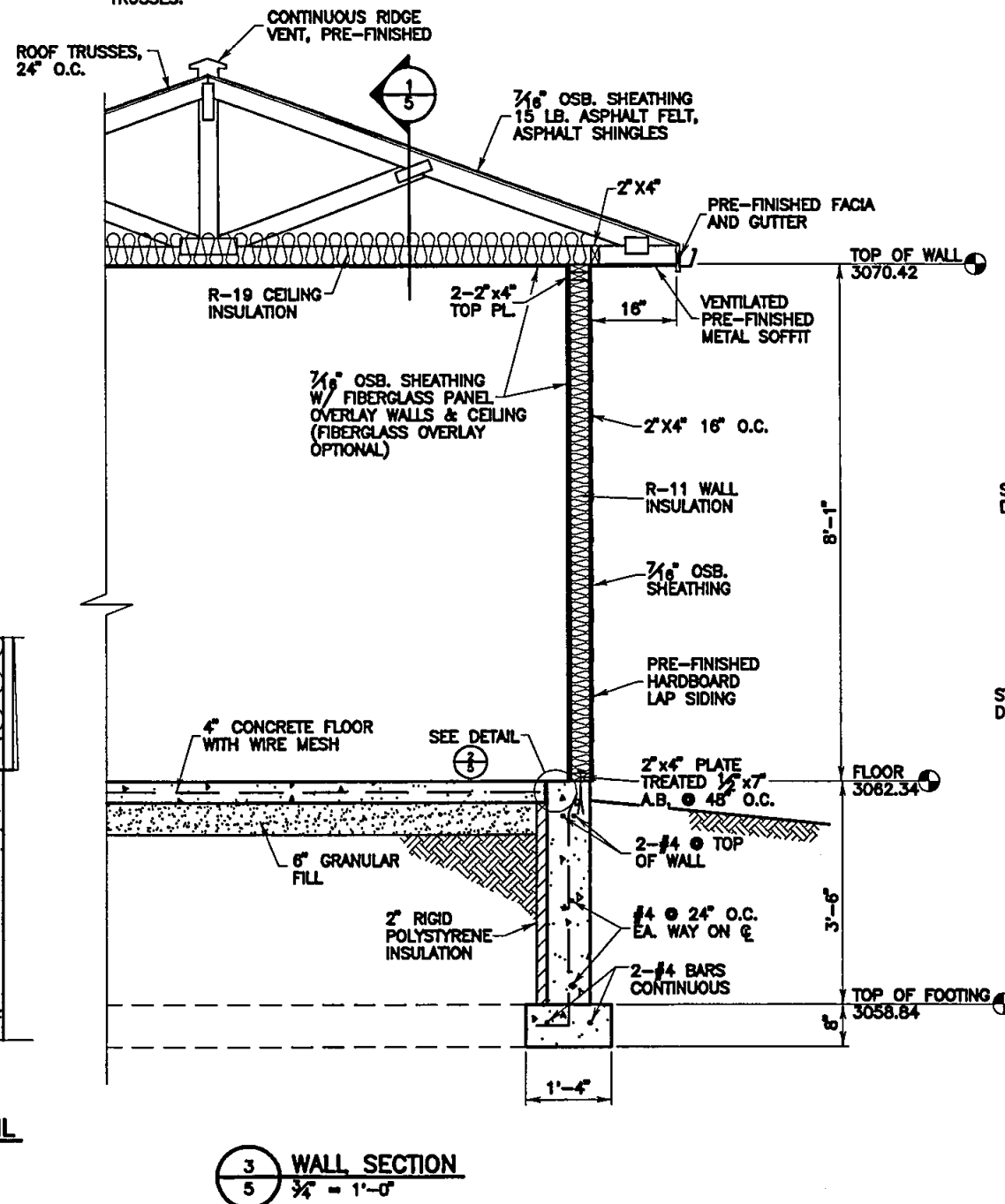
DESIGNED: GW  
DETAILED: JM  
CHECKED: GW  
APPROVED: [Signature]  
DATE: 04/17/08

**CETEC**  
Engineering Services Inc.

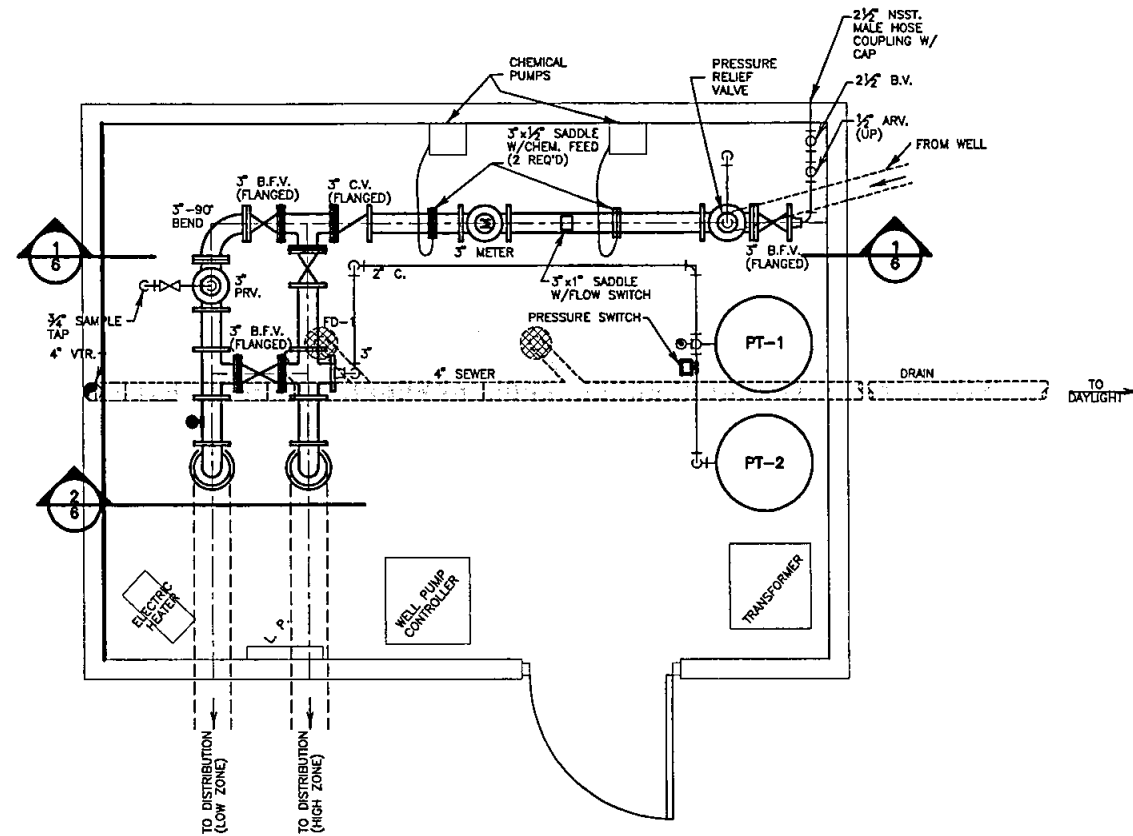
1830 West Fulton Street  
Rapid City, SD 57702  
Phone: (605) 341-7800  
Fax: (605) 341-7864  
cetecc@rustmore.com



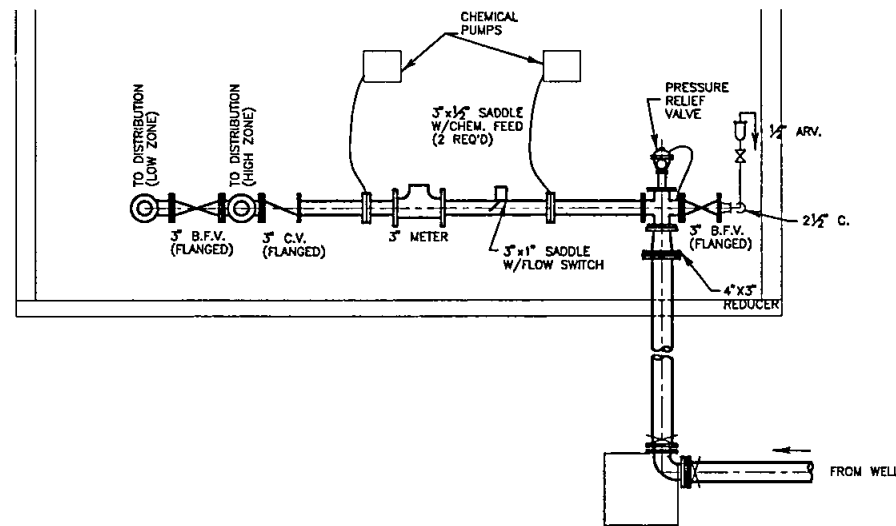
**NOTE:**  
CONTRACTOR MAY SUBSTITUTE  
2"x6" JOIST & RAFTER FRAMING  
FOR MANUFACTURED ROOF  
TRUSSES.



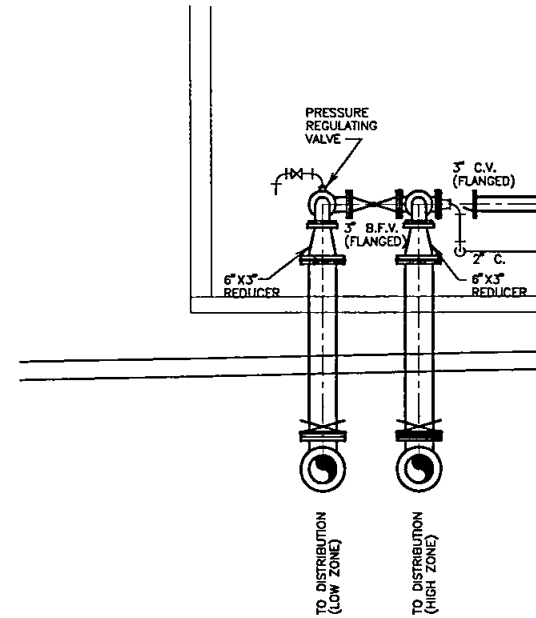
DATE: 04/17/06  
DRAWN: JRM  
CHECKED: JRM  
APPROVED: JRM  
DESIGNED: JRM



PLAN  
SCALE: 1/4" = 1'-0"



1 SECTION  
SCALE: 1/4" = 1'-0"



2 SECTION  
SCALE: 1/4" = 1'-0"

WELL HOUSE PIPING SYSTEM NOTES:

1. INTERIOR PIPING IS DETAILED USING 3" DUCTILE IRON PIPE, CLASS 51 WITH FLANGED DUCTILE IRON FITTINGS PER ANSI/AWWA C110/A21.6 STANDARD, CLASS 125 FLANGES. SCREW ON FLANGE OR UNI-FLANGE ADAPTORS ARE ACCEPTABLE FOR PIPE CONNECTIONS TO FITTINGS AND VALVES. FITTINGS BELOW GROUND SHALL BE RESTRAINED MECHANICAL JOINT WITH POLYETHYLENE ENCASEMENT. FERROUS PIPE AND FITTINGS EXPOSED IN THE STRUCTURE SHALL BE SHOP PRIMED FOR FIELD PAINTING. BITUMINOUS COATED PIPE AND FITTINGS ARE NOT ACCEPTABLE.
2. SMALL DIAMETER PIPING (2" DIA. AND UNDER) SHALL BE COPPER TYPE L. PROVIDE UNIONS AT LOCATIONS SHOWN OR AS NEEDED FOR DISASSEMBLY OF ALL VERT. & HORIZ. PIPE RUNS.
3. CONTRACTOR MAY SUBSTITUTE SCH. 80 PVC PIPE FOR ALL INTERIOR AND BELOW GRADE PIPING SYSTEMS. CONNECTIONS AND FITTINGS SHALL BE FLANGED PVC. SOLVENT WELD FITTINGS ARE ACCEPTABLE FOR 1 1/2" AND SMALLER PIPING. INSTALL UNIONS IN ALL PIPE RUNS OF SW PIPING TO FACILITATE FOR PIPE SIZE 2" AND LARGER DISASSEMBLING.



SHEET:

6 OF 19

PROJECT:

PUBLIC WATER SUPPLY SYSTEM  
HORSESHOE ACRES ESTATES  
MEADE COUNTY, SOUTH DAKOTA

SHEET DESCRIPTION:

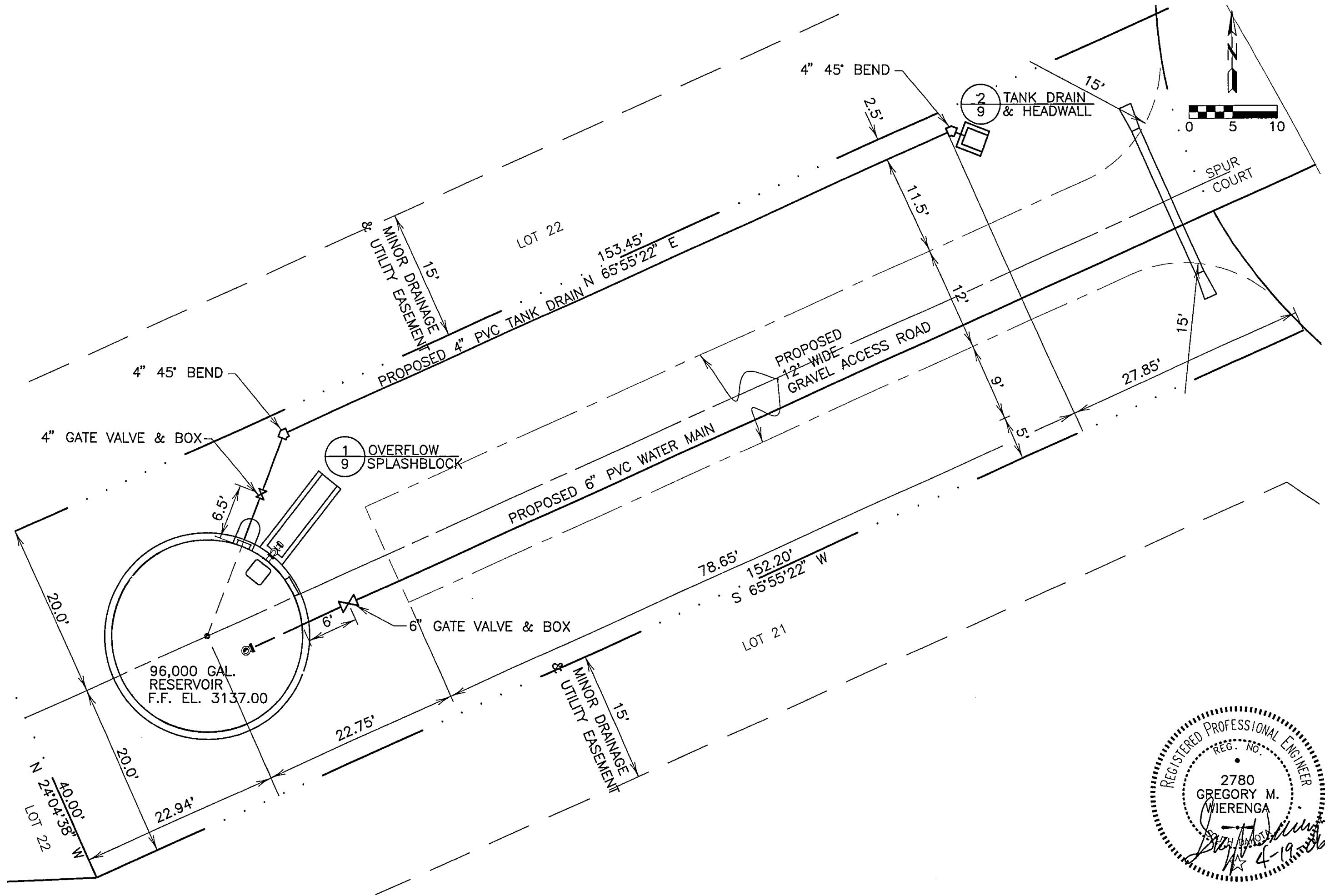
WELL HOUSE MECHANICAL

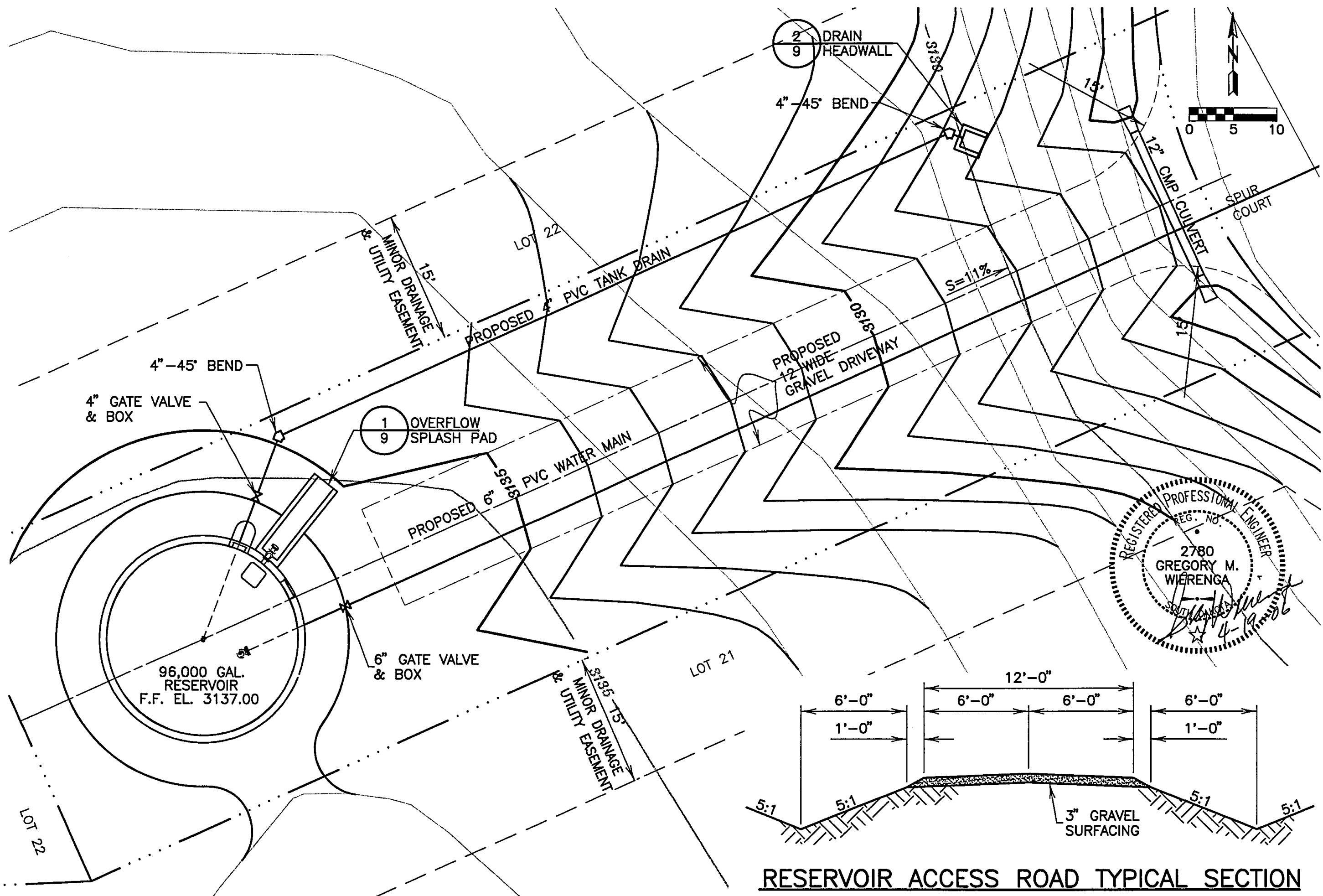
DESIGNED: JRM  
CHECKED: JRM  
APPROVED: JRM  
DATE: 04/17/06

Engineering Services Inc

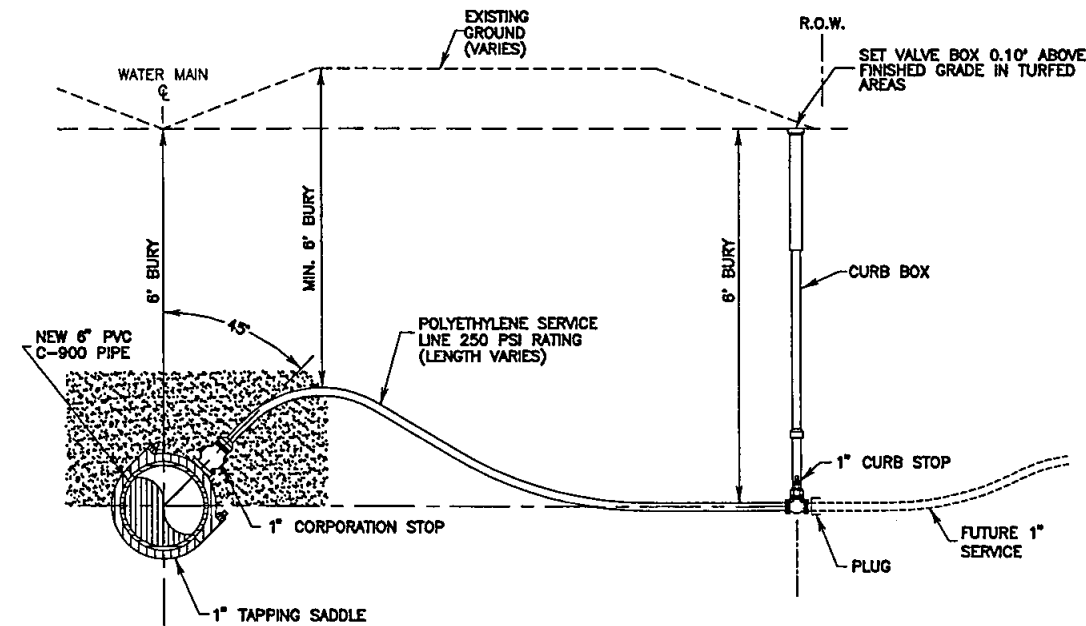
1830 West Fulton Street  
Rapid City, SD 57702  
Phone: (605) 341-7800  
Fax: (605) 341-7864  
calec@rushmore.com

March 07, 2008 4:54:08 P.m.  
Drawing: RESERVOIR SITE LAYOUT.DWG (C:\GEOGRAPHIC\CELEC\US10 HORSESHOE ACRES\)

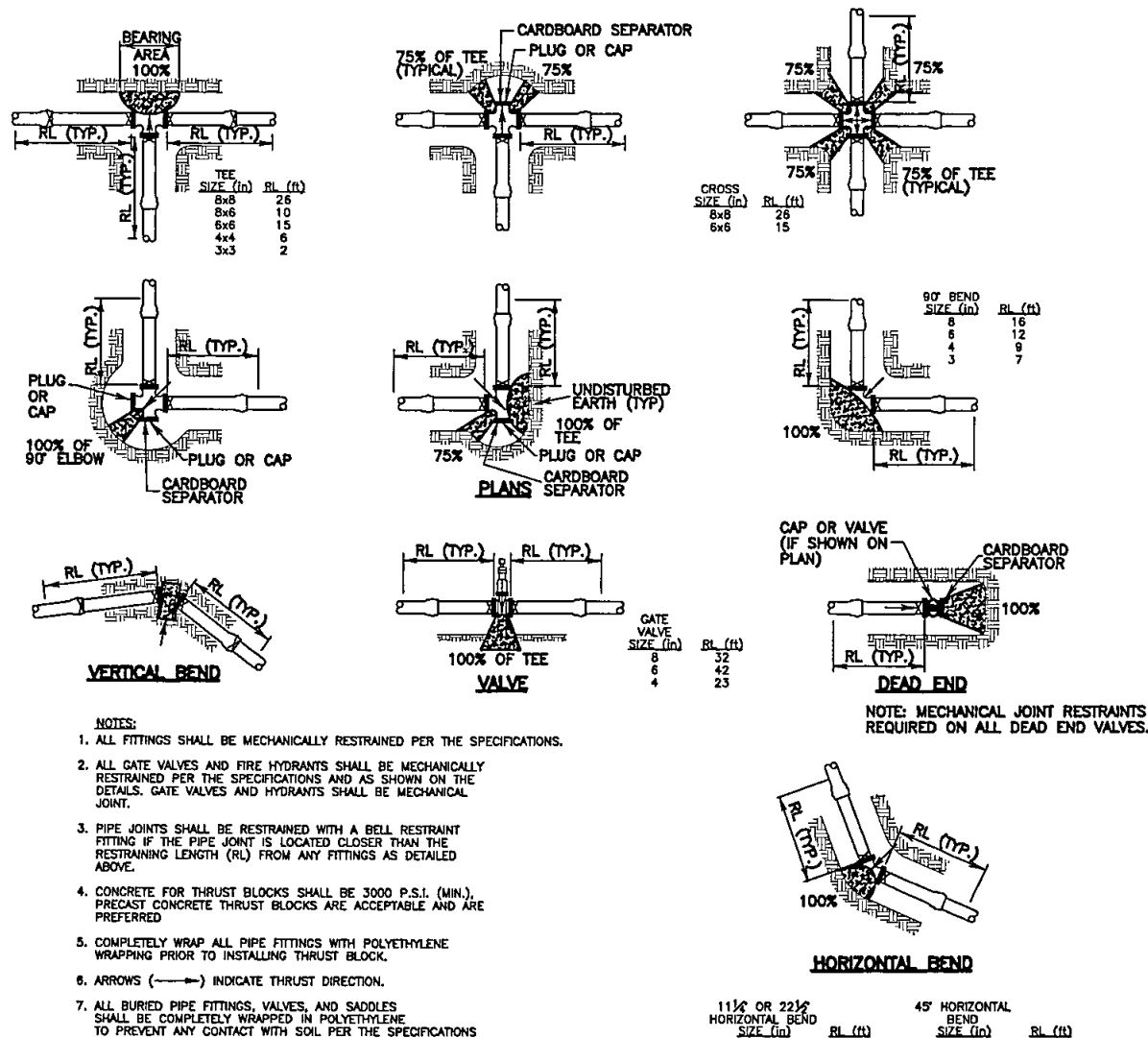




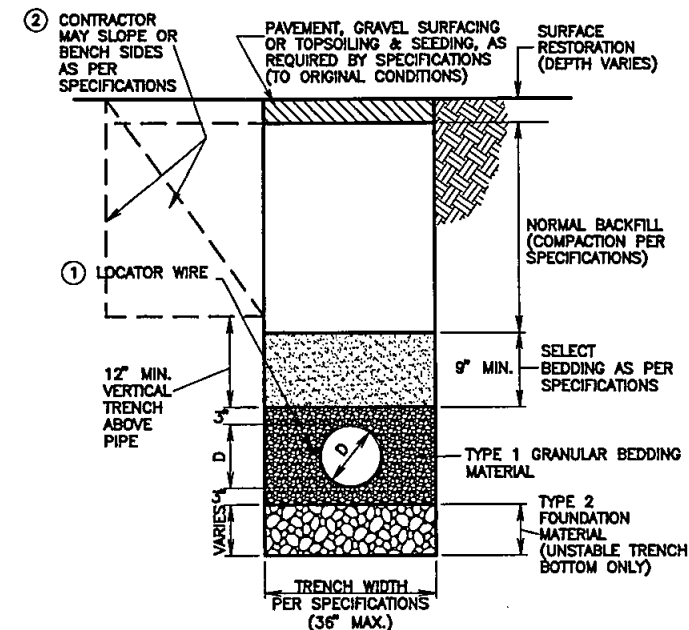




**TYPICAL HDPE WATER SERVICE CONNECTION**  
N.T.S.

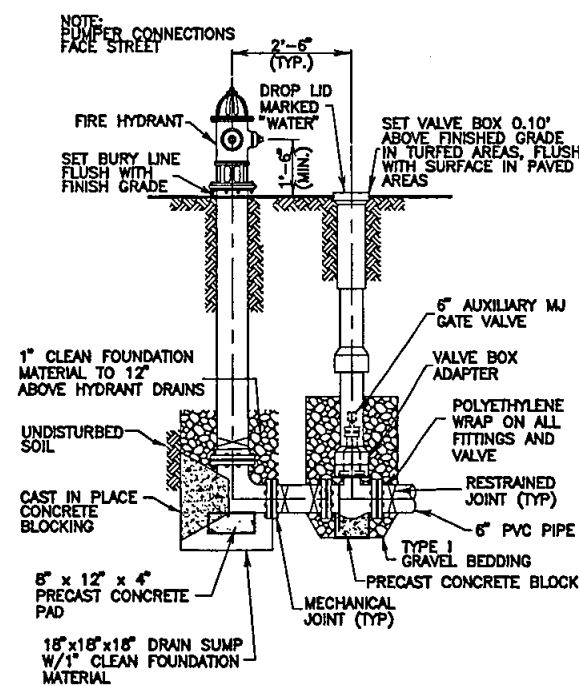


**JOINT RESTRAINTS FOR PVC PIPE**

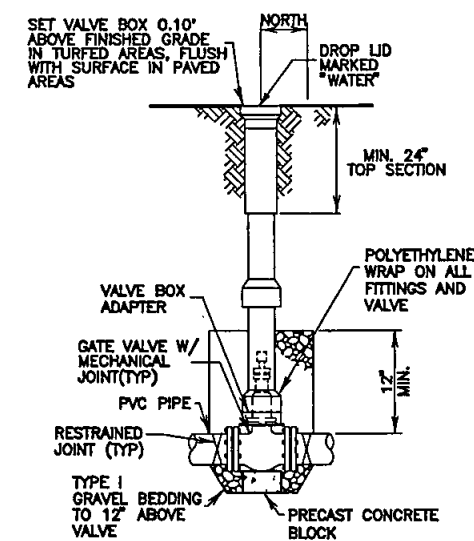


**TRENCH DETAIL FOR PVC WATER MAIN**  
N.T.S.

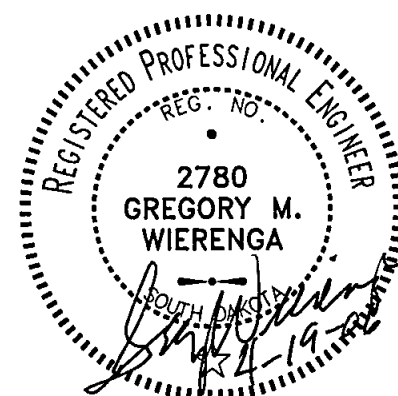
1. CONNECT LOCATOR WIRE TO TRACER WIRE ACCESS BOX AT LOCATIONS DESIGNATED ON THE PLANS. CONNECT TO EXISTING LOCATOR WIRE AT EXISTING CONNECTIONS.
2. THE CONTRACTOR SHALL UTILIZE A TRENCH BOX OR OTHER OSHA APPROVED SHORING METHODS TO MINIMIZE SURFACE RESTORATION REQUIREMENTS.
3. THE ENGINEER MAY DIRECT DIFFERENT BEDDING DEPTHS BASED ON FIELD CONDITIONS.



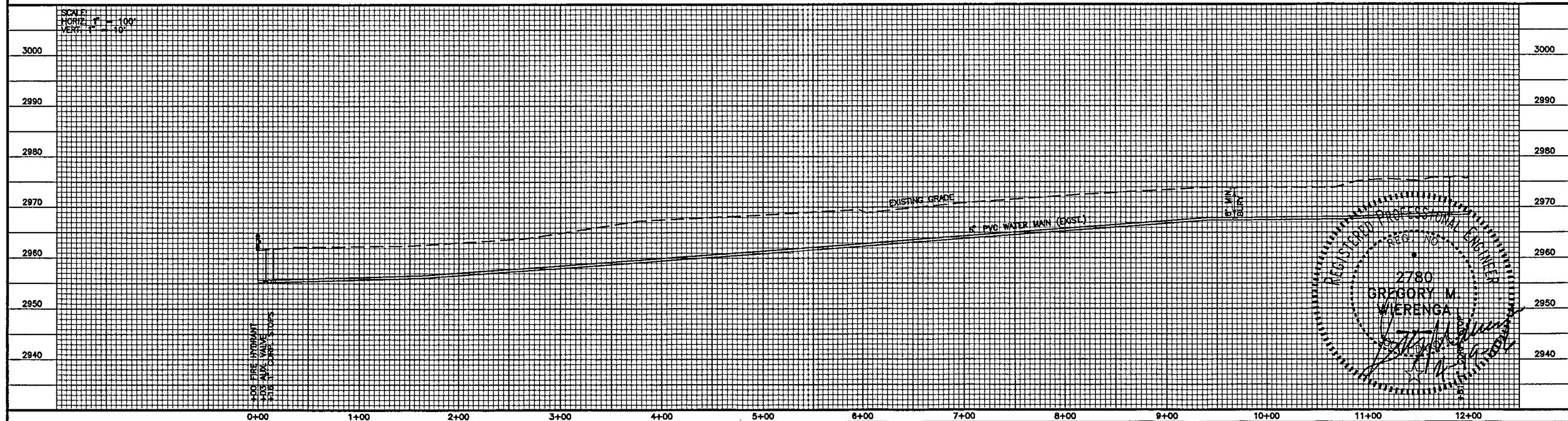
**HYDRANT SETTING DETAIL**  
N.T.S.



**GATE VALVE SETTING DETAIL**  
N.T.S.



March 08, 2006 9:52:34 a.m.  
Drawing: ALLDWG (JDM) (\\CE008\C\CETEC\05110 HORSESHOE ACRES\)



BRIDLE

BEGIN PROJECT 0+00

0+00  
STD. FIRE HYDRANT W/AUX. GATE VALVE (EXIST.)  
BEGIN 6" PVC WATER MAIN

0+16  
4 EA. 6" X 1" SERVICE SADDLE & CORP. STOP (EXIST.)  
1" COPPER WATER SERVICE (EXIST.)  
4 EA. CURB STOP & BOX (EXIST.)

11+81, 8'L  
6" X 1" SERVICE SADDLE & CORP. STOP (EXIST.)  
1" COPPER WATER SERVICE (EXIST.)  
CURB STOP & BOX (EXIST.)

~~6" PVC WATER MAIN (EXIST.)~~

MATCH LINE 12+00

# HALTER

**PUBLIC WATER SUPPLY SYSTEM  
HORSESHOE ACRES ESTATES  
MEADE COUNTY, SOUTH DAKOTA**

**SHEET:**  
**11 OF 19**

**WATER MAIN  
PLAN & PROFILE  
0+00 TO 12+00**

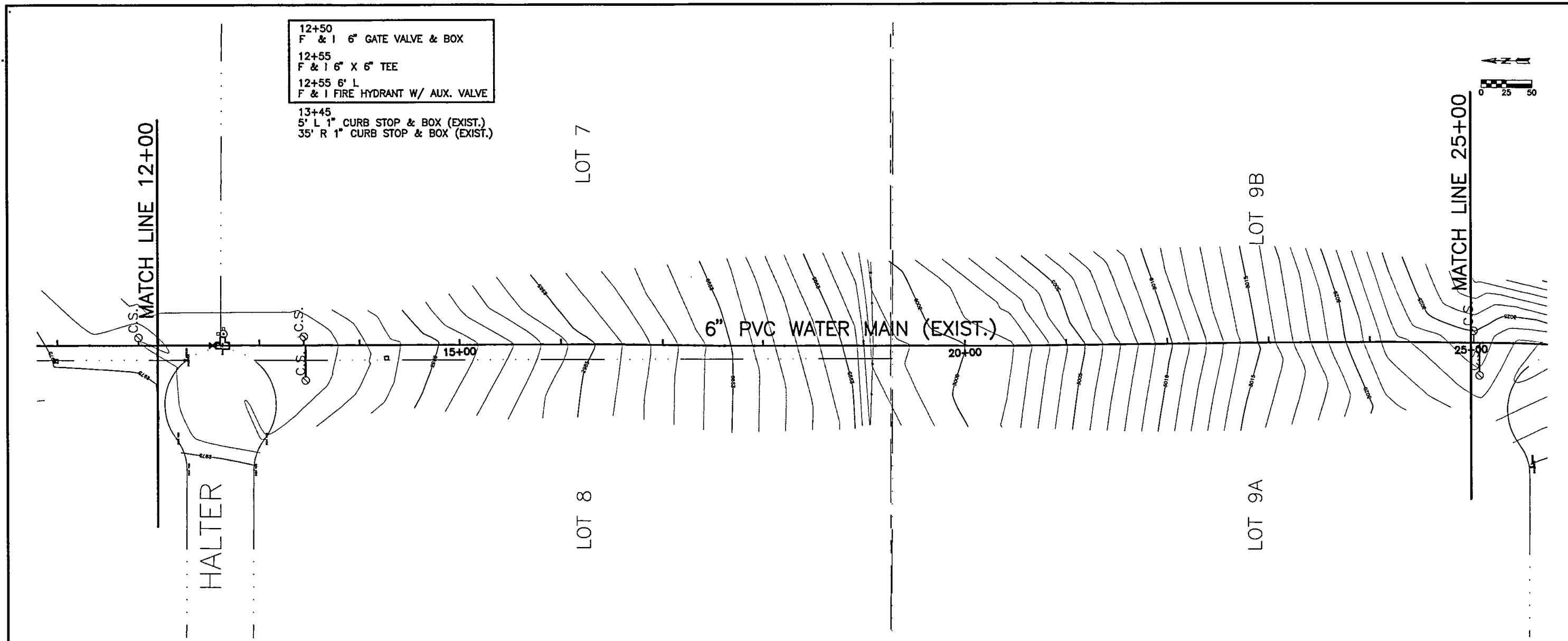
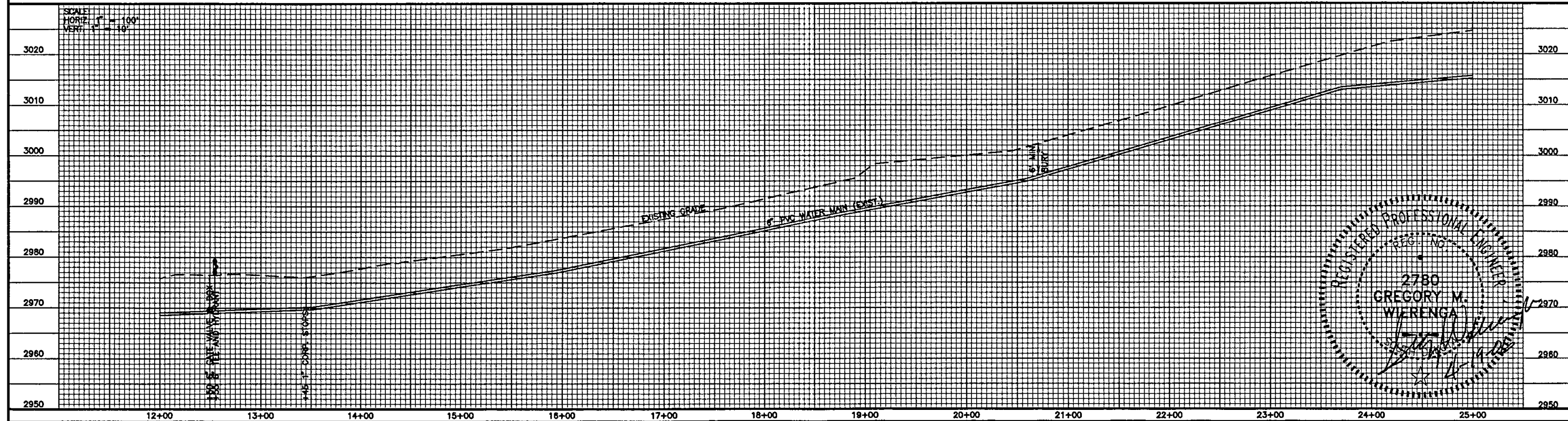
**SHEET DESCRIPTION:**

DESIGNED \_\_\_\_\_ GW  
 DETAILED \_\_\_\_\_ JM  
 CHECKED \_\_\_\_\_ GW  
 APPROVED \_\_\_\_\_  
 DATE 04/17/06

**CETEC**  
Engineering Services Inc

**1830 West Fulton Street**  
**Rapid City, SD 57702**  
**Phone: (605) 341-7800**  
**Fax: (605) 341-7864**  
**[www.cetecengineering.com](http://www.cetecengineering.com)**

March 08, 2008 9:52:34 a.m.  
Drawing: ALLWING (JDM) (\\DE008\G\CETEC\05110 HORSESHOE ACRES\)



|          |                                                                                     |                                                |          |          |
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| SHEET:   | PROJECT:                                                                            | SHEET DESCRIPTION:                             | DESIGNED | CW       |
| 12 OF 19 | PUBLIC WATER SUPPLY SYSTEM<br>HORSESHOE ACRES ESTATES<br>MEADE COUNTY, SOUTH DAKOTA | WATER MAIN<br>PLAN & PROFILE<br>12+00 TO 25+00 | DETAILED | JM       |
|          |                                                                                     |                                                | CHECKED  | CW       |
|          |                                                                                     |                                                | APPROVED |          |
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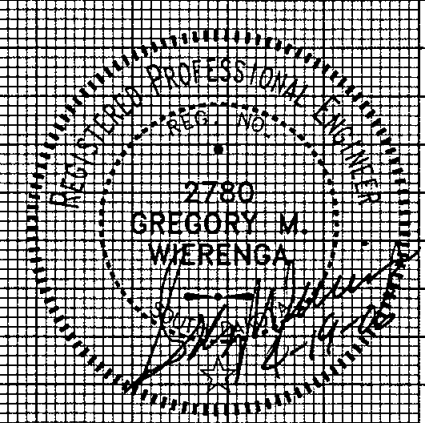
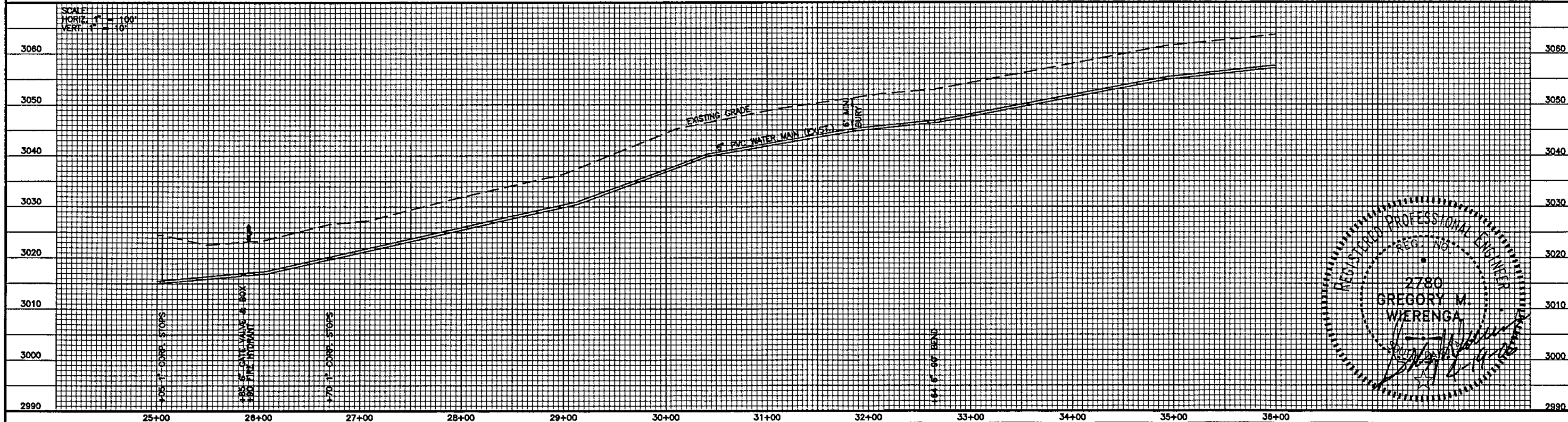
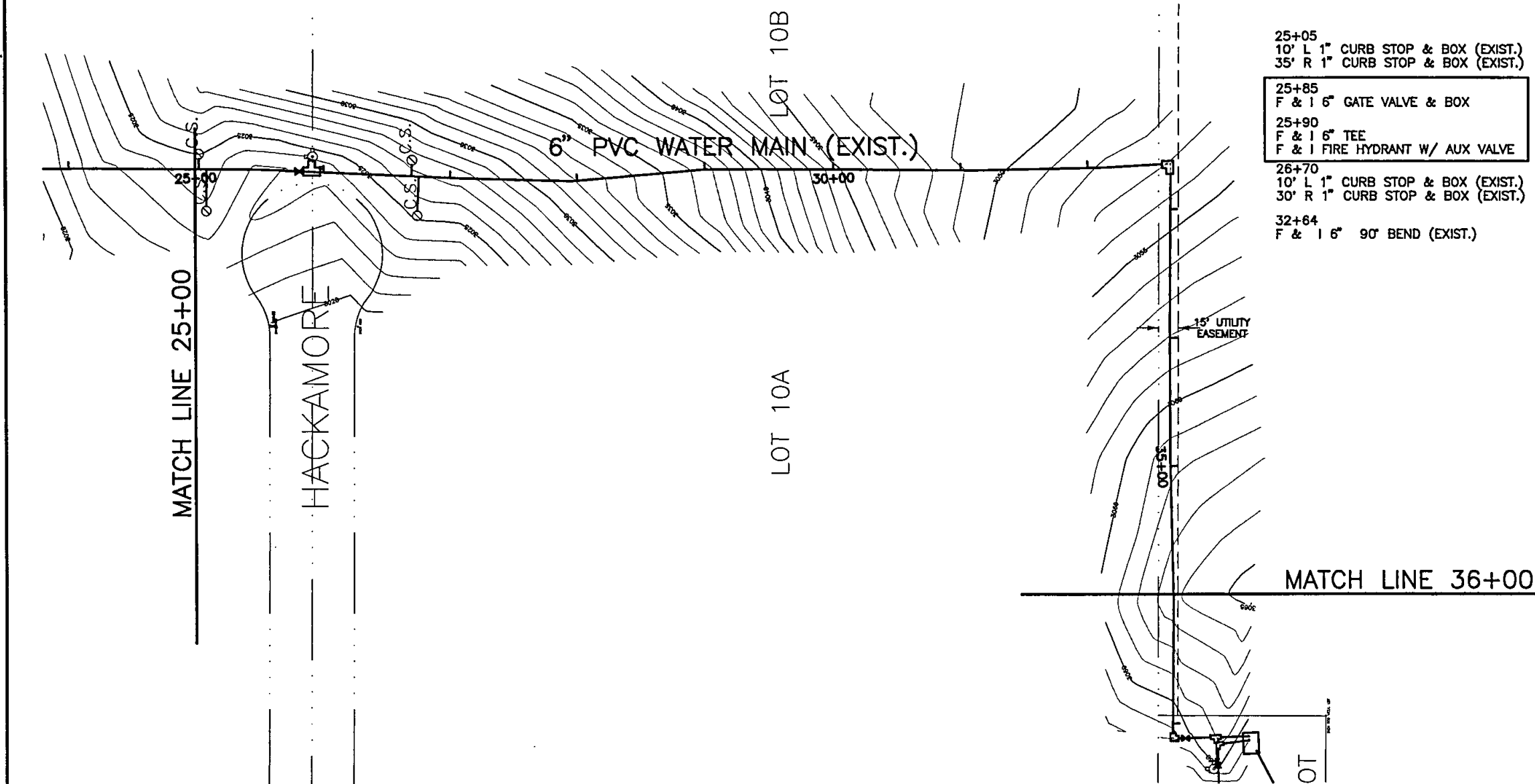
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**CETEC**

Engineering Services Inc

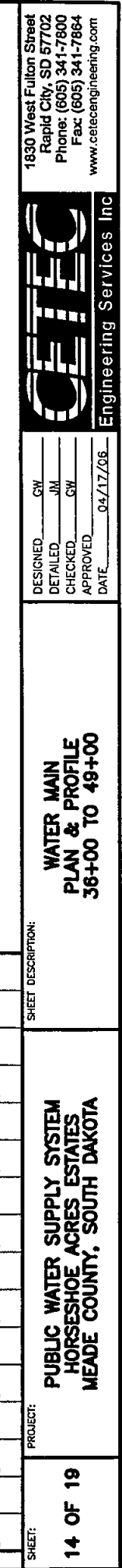
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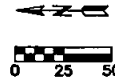
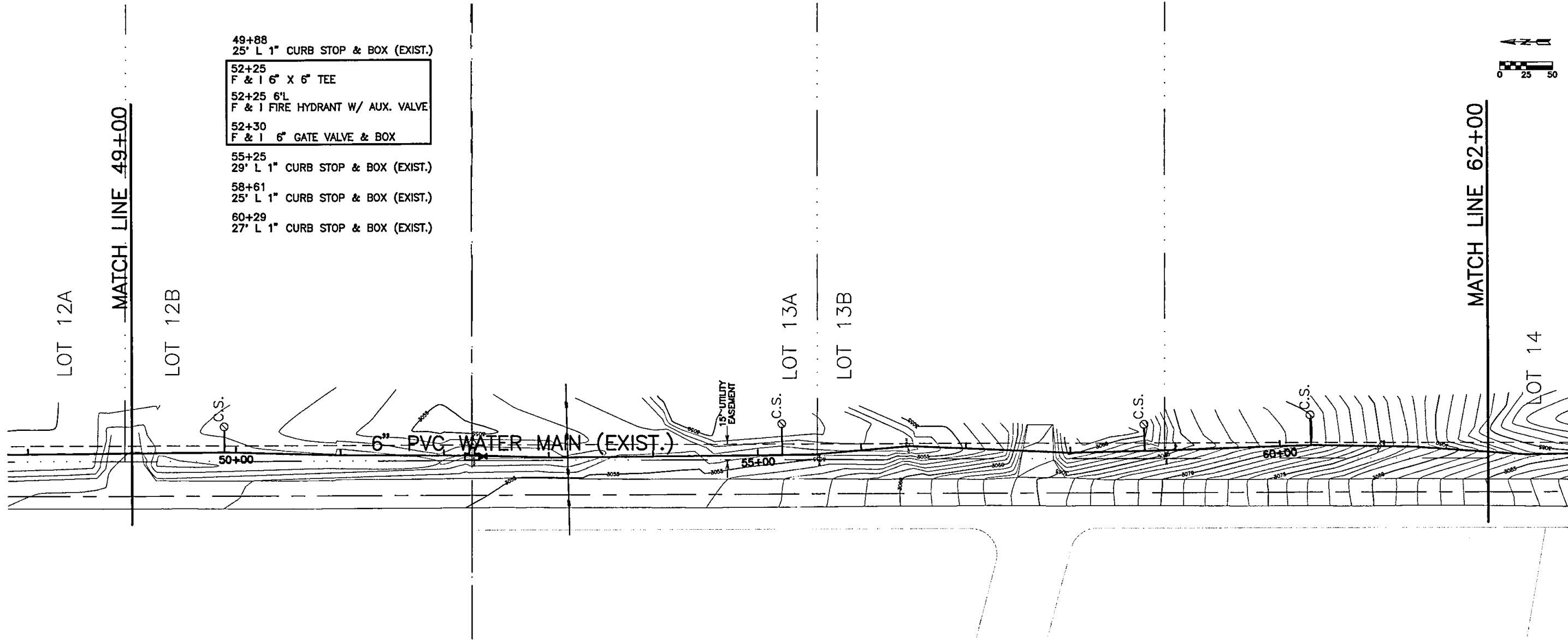
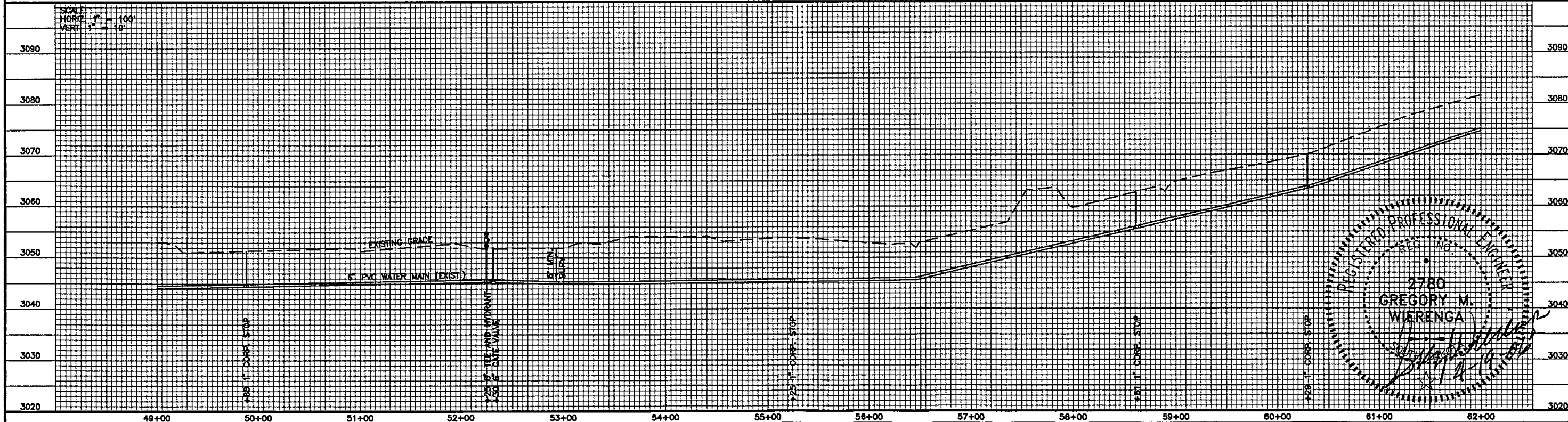
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|                 |                                                                                              |                                                                   | CHECKED: JM  |                |
|                 |                                                                                              |                                                                   | APPROVED: GW |                |

1830 West Fulton Street  
Rapid City, SD 57702  
Phone: (605) 341-7800  
Fax: (605) 341-7864  
www.ceteceengineering.com

**CETECE**  
Engineering Services Inc



March 06, 2008 9:52:34 a.m.  
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SHEET:

15 OF 19

PROJECT:  
PUBLIC WATER SUPPLY SYSTEM  
HORSESHOE ACRES ESTATES  
MEADE COUNTY, SOUTH DAKOTA

SHEET DESCRIPTION:

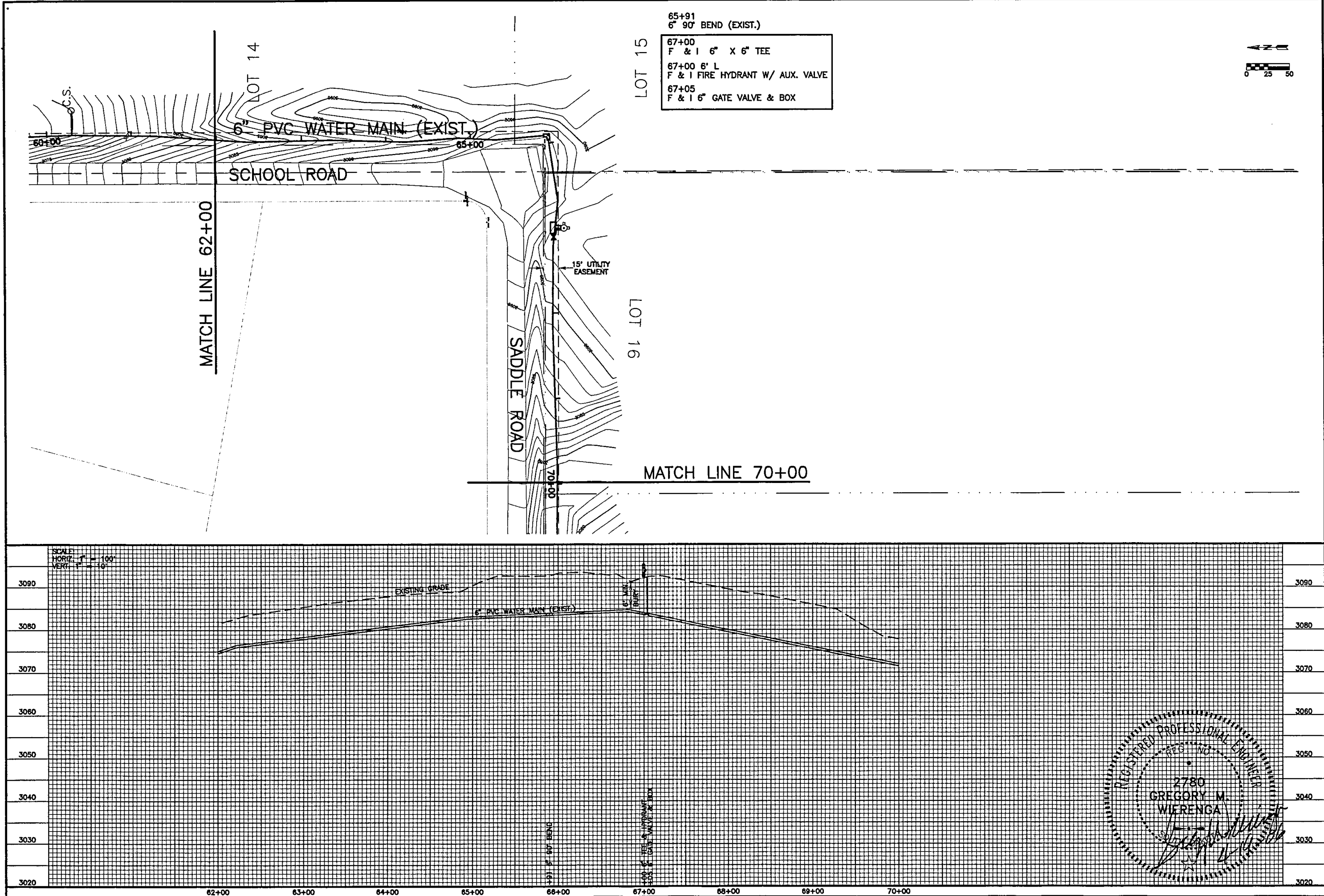
WATER MAIN  
PLAN & PROFILE  
49+00 TO 62+00

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| DESIGNED | GW       |
| DETAILED | JM       |
| CHECKED  | GW       |
| APPROVED |          |
| DATE     | 04/17/06 |

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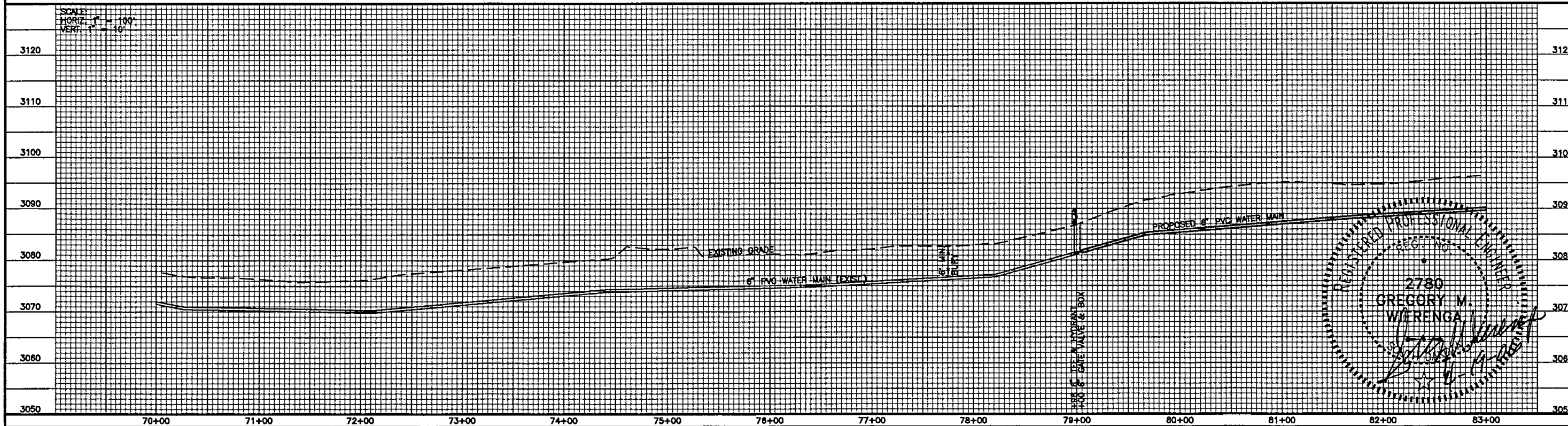
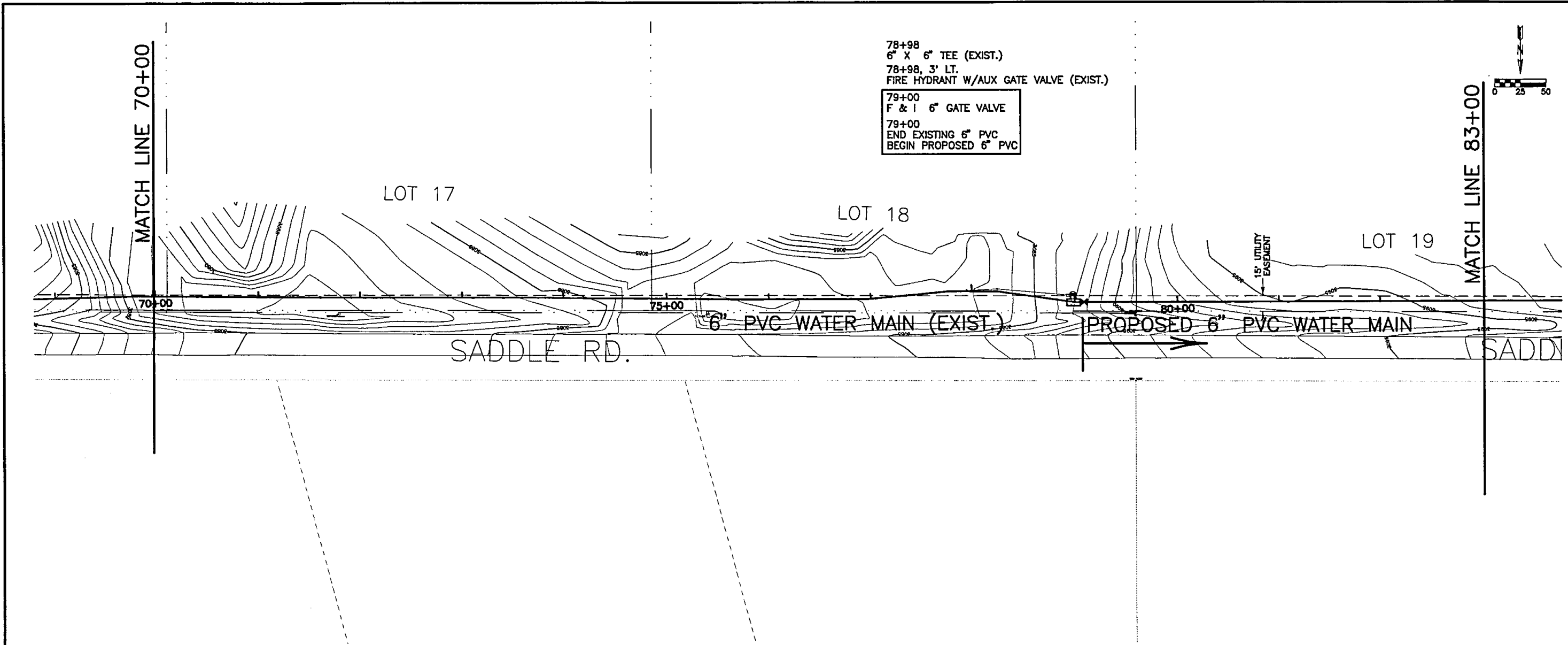
1830 West Fulton Street  
Rapid City, SD 57702  
Phone: (605) 341-7800  
Fax: (605) 341-7864  
www.cetecengineering.com

North Arrow  
Scale: 1" = 100'  
Drawing: 11/10/06  
Project: 11/10/06  
Client: HORSESHOE ACRES



|                                                                                                                                                                |                                                                                              |                                                                   |              |                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------|--------------|----------------|
| SHEET: 16 OF 19                                                                                                                                                | PROJECT: PUBLIC WATER SUPPLY SYSTEM<br>HORSESHOE ACRES ESTATES<br>MEADE COUNTY, SOUTH DAKOTA | SHEET DESCRIPTION: WATER MAIN<br>PLAN & PROFILE<br>62+00 TO 70+00 | DESIGNED: GW | DATE: 04/17/06 |
|                                                                                                                                                                |                                                                                              |                                                                   | CHECKED: JM  |                |
| CETEC Engineering Services Inc.<br>1830 West Fulton Street<br>Rapid City, SD 57702<br>Phone: (605) 341-7800<br>Fax: (605) 341-7864<br>www.cetecengineering.com |                                                                                              |                                                                   |              |                |

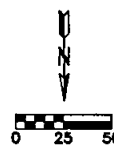
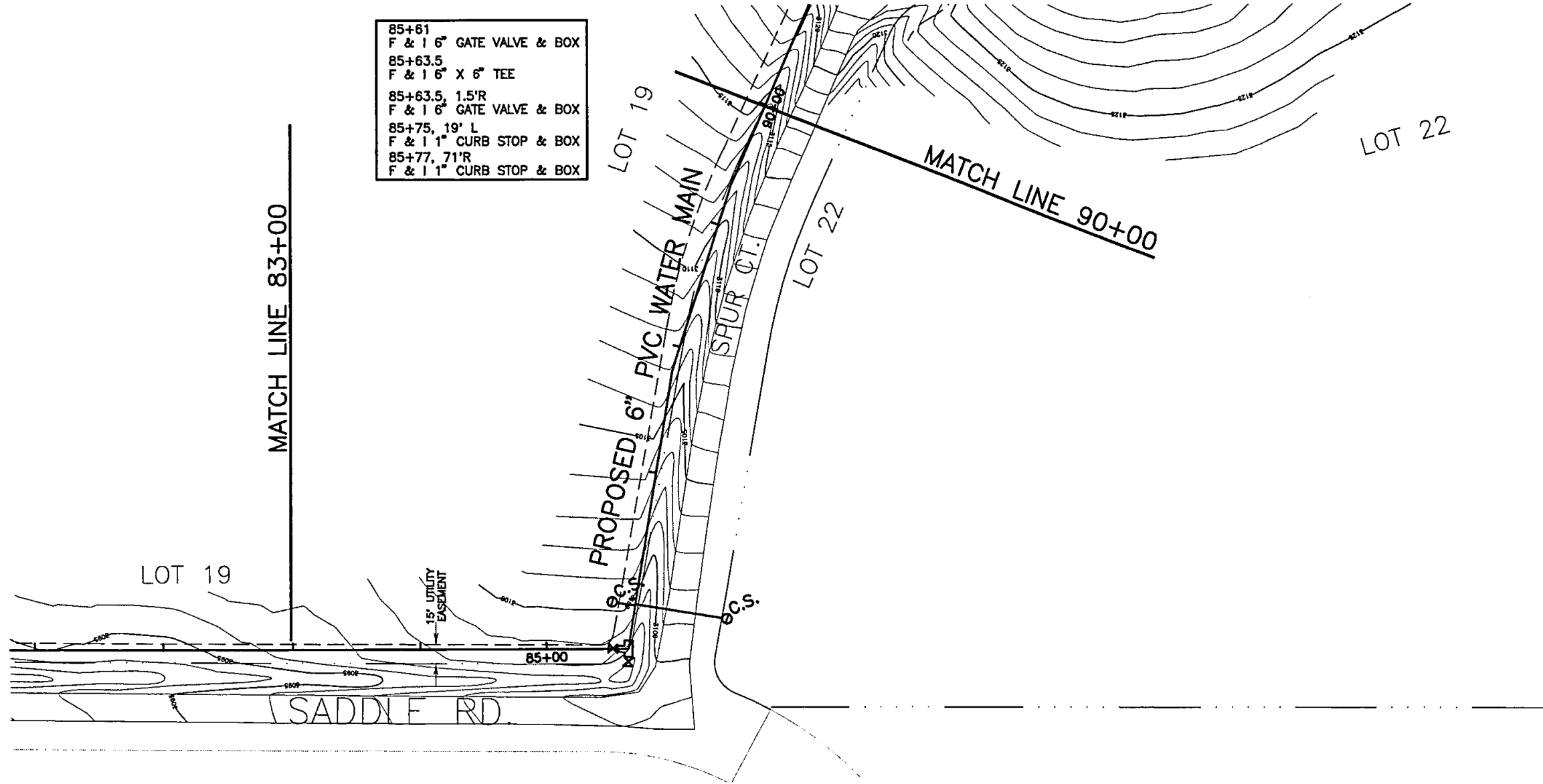
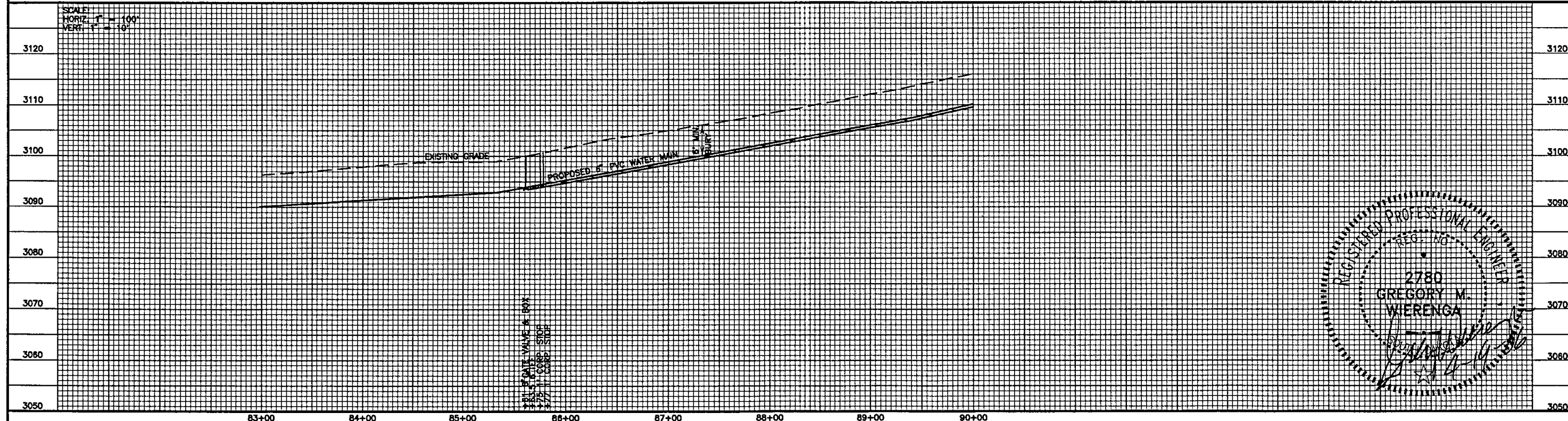
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| SHEET:<br><b>17 OF 19</b> | PROJECT:<br><b>PUBLIC WATER SUPPLY SYSTEM<br/>HORSESHOE ACRES ESTATES<br/>MEADE COUNTY, SOUTH DAKOTA</b> | SHEET DESCRIPTION:<br><b>WATER MAIN<br/>PLAN &amp; PROFILE<br/>70+00 TO 83+00</b> | DESIGNED: _____ | GW |
|                           |                                                                                                          |                                                                                   | Detailed: _____ | JM |
|                           |                                                                                                          |                                                                                   | CHECKED: _____  | GW |
|                           |                                                                                                          |                                                                                   | APPROVED: _____ |    |
|                           |                                                                                                          |                                                                                   | DATE: 04/17/06  |    |

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Rapid City, SD 57702  
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Fax: (605) 341-7864  
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March 04, 2009 4:55:34 PM  
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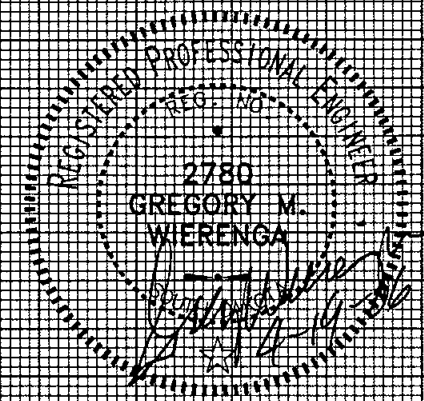
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| DETAILED | JM       |
| CHECKED  | GW       |
| APPROVED | GW       |
| DATE     | 04/17/06 |

WATER MAIN  
PLAN & PROFILE  
83+00 TO 90+00

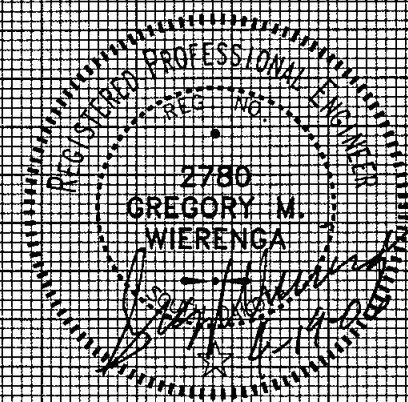
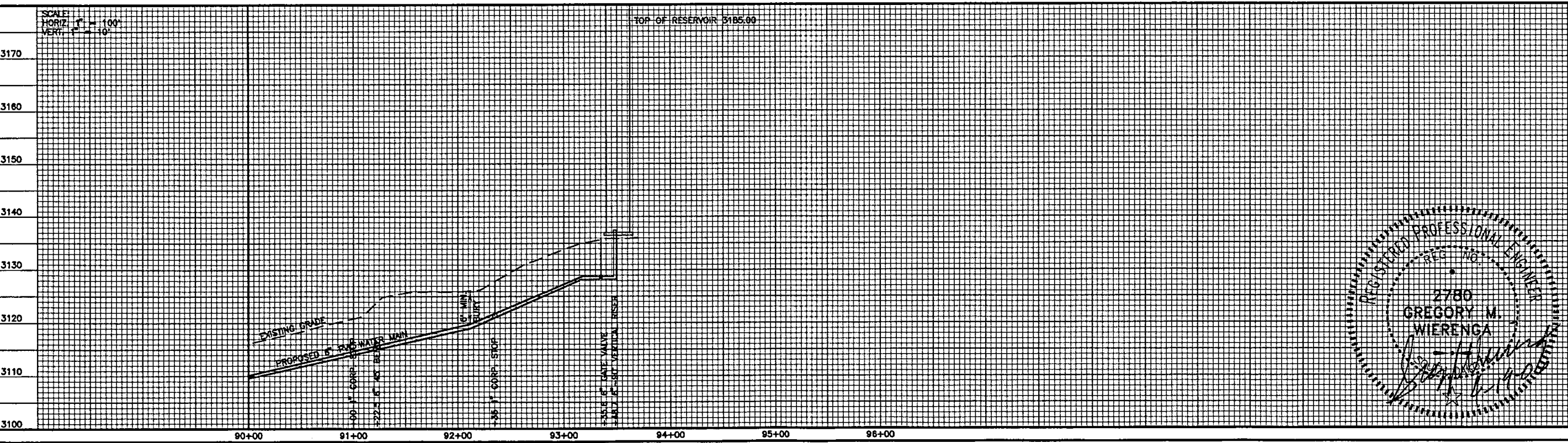
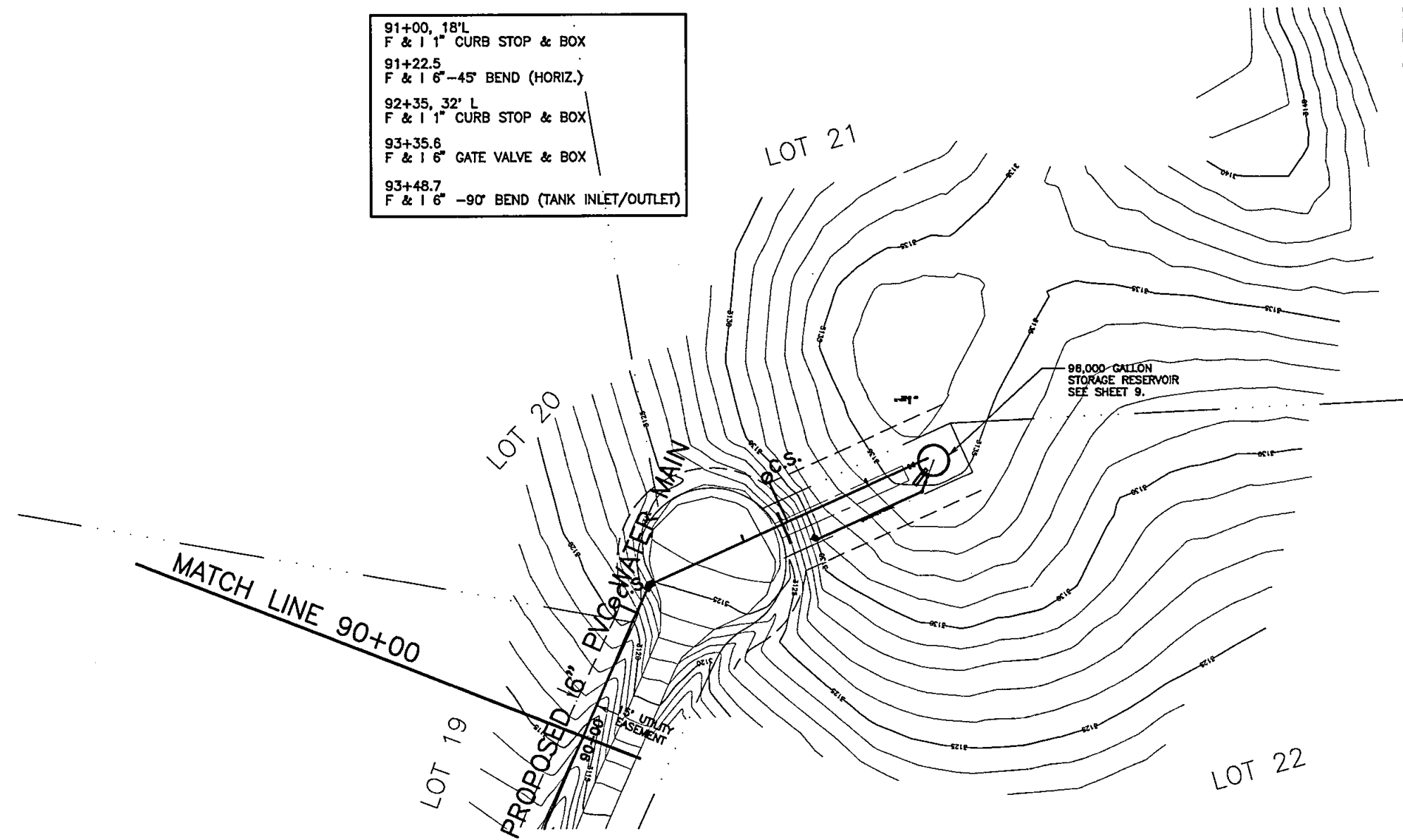
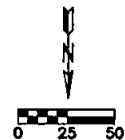
PUBLIC WATER SUPPLY SYSTEM  
HORSESHOE ACRES ESTATES  
MEADE COUNTY, SOUTH DAKOTA

18 OF 19

1830 West Fulton Street  
Rapid City, SD 57702  
Phone: (605) 341-7800  
Fax: (605) 341-7864  
www.cetecengineering.com



91+00, 18' L  
F & 1" CURB STOP & BOX  
91+22.5  
F & 1" 6"-45° BEND (HORIZ.)  
92+35, 32' L  
F & 1" CURB STOP & BOX  
93+35.6  
F & 1" 6" GATE VALVE & BOX  
93+48.7  
F & 1" 6" -90° BEND (TANK INLET/OUTLET)



March 08, 2008 8:52:34 a.m.  
Drawing: ALLIANCE (DWG) (\\C000001\c000001\HORSESHOE ACRES\)

1830 West Fulton Street  
Rapid City, SD 57702  
Phone: (605) 341-7800  
Fax: (605) 341-7884  
www.cetecengineering.com

**CETEC**  
Engineering Services, Inc.

DESIGNED: GW  
DETAILED: JM  
CHECKED: GW  
APPROVED: \_\_\_\_\_  
DATE: 04/17/06

WATER MAIN  
PLAN & PROFILE  
90+00 TO END

PROJECT:  
PUBLIC WATER SUPPLY SYSTEM  
HORSESHOE ACRES ESTATES  
MEADE COUNTY, SOUTH DAKOTA

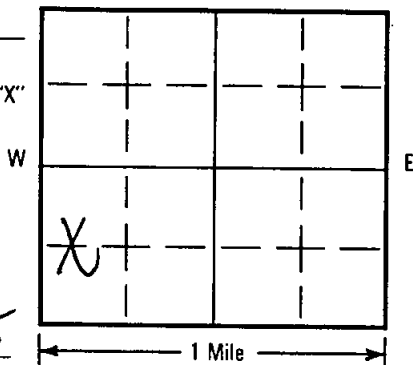
SHEET:  
19 OF 19

## SOUTH DAKOTA WATER WELL COMPLETION REPORT

07-92

Location 1/4 SW 1/4 Sec 25 Twp 3-N Rg 8-E  
County Meade

Please mark well location with an "X"



Well Completion Date

10-04-05

## LOCATION:

Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.)? N/A ft. from N/A (identify source).

## PROPOSED USE:

☒ Domestic/Stock ☒ Municipal ☐ Business ☐ Test Holes  
☐ Irrigation ☐ Industrial ☐ Institutional ☐ Monitoring well

## METHOD OF DRILLING:

Rotary Air - Water

## CASING DATA:

☒ Steel ☐ Plastic ☐ Other

If other describe \_\_\_\_\_

| PIPEWEIGHT      | DIAMETER        | FROM           | TO             | HOLE DIAMETER   |
|-----------------|-----------------|----------------|----------------|-----------------|
| <u>23 LB/FT</u> | <u>7 IN</u>     | <u>0 FT</u>    | <u>2180 FT</u> | <u>8 3/4 IN</u> |
| <u>14 LB/FT</u> | <u>4 1/2 IN</u> | <u>2150 FT</u> | <u>2560 FT</u> | <u>6 1/4 IN</u> |
| _____ LB/FT     | _____ IN        | _____ FT       | _____ FT       | _____ IN        |

## GROUTING DATA

| Grout Type      | No. of Sacks | Grout Weight      | From      | To          |
|-----------------|--------------|-------------------|-----------|-------------|
| <u>Portland</u> | <u>265</u>   | <u>94 lb./gal</u> | <u>0</u>  | <u>2180</u> |
| <u>Type III</u> |              | <u>lb./gal</u>    | <u>ft</u> | <u>ft</u>   |

Describe grouting procedure Pressure grout thru casing, displace w water by mud pumpSCREEN: ☒ Perforated pipe ☐ Manufactured

Diameter 4 1/2 IN Length 150' FEET  
 Material Steel  
 Slot Size 1/16 Set From 2300 Feet to 2340 Feet  
 Other information \_\_\_\_\_

WAS A PACKER OR SEAL USED? ☒ YES ☐ NO

If so, what material? Neoprene  
 Describe packer(s) and location? 4 1/2 x 6 1/2 @ 2160

## DISINFECTION: Was well disinfected upon completion?

☒ YES, How: Chlorine  
☐ NO, Why Not? Pellets

Laboratory sent to for water quality analysis

owner to complete

Well Owner: Duane Robbins  
 Business Name: Horseshoe Acres Sub.  
 Address: 4041 Canyon Drive  
Rapid City S.D. 57702

## WELL LOG:

| FORMATION                            | DEPTH        |              |
|--------------------------------------|--------------|--------------|
|                                      | FROM         | TO           |
| <u>Brown Clay</u>                    | <u>0'</u>    | <u>60'</u>   |
| <u>Blue shale &amp; Stone</u>        | <u>60'</u>   | <u>1600'</u> |
| <u>Sand, Stone &amp; shale</u>       | <u>1600'</u> | <u>1800'</u> |
| <u>Blue shale &amp; S. Stone</u>     | <u>1800'</u> | <u>2000'</u> |
| <u>Hard Blue shale &amp; ss</u>      | <u>2000'</u> | <u>2110'</u> |
| <u>Orange-red clay</u>               | <u>2110'</u> | <u>2120'</u> |
| <u>Multicolored clay</u>             | <u>2120'</u> | <u>2200'</u> |
| <u>BRN SS &amp; Sand &amp; shale</u> | <u>2200'</u> | <u>2380'</u> |
| <u>Grey sand &amp; grey shale</u>    | <u>2380'</u> | <u>2560'</u> |

STATIC WATER LEVEL 400 Feet

If flowing: closed in pressure \_\_\_\_\_ PSI

GPM flow \_\_\_\_\_ through \_\_\_\_\_ inch pipe

Controlled by ☐ Valve ☐ Reducers ☐ Other \_\_\_\_\_

Reduced Flowrate \_\_\_\_\_ GPM

Can well be completely shut in? \_\_\_\_\_

## WELL TEST DATA:

☐ Pumped Describe: Air developed  
☐ Bailed  
☒ Other \_\_\_\_\_

Pumping Level Below Land Surface

700 ft. After 2 Hrs. Blow 50+ GPM  
880 ft. After 2 Hrs. Blow 100+ GPM

If pump installed, pump rate 85 GPM @ 800' GPM

REMARKS Cased & logged to 2180'. Log showed not quite deep enough, drilled & cased to 2560'

This well was drilled under license # 568

And this report is true and accurate.

Drilling firm CIMARRON Drilling Inc.Signature of License Representative: Michael J. Dauter

Signature of Well Owner or Equitable Property Holder: \_\_\_\_\_

RECEIVED

JAN 17 2006

WATER RIGHTS PROGRAM

Date: \_\_\_\_\_

1-17-06



1861-1  
**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

June 15, 2005

Mike Deutsch  
Cimarron Drilling  
9017 S. Ridge Trail  
Sturgis, SD 57785

Dear Mr. Deutsch:

As requested, pursuant to South Dakota Well Construction Standard 74:02:04:21, Cimarron Drilling is authorized to construct a test hole for the Duane Robbins prior to approval of a water permit. The test well will be located in the SW¼ Sec. 25, T3N-R8E. The test well must be constructed in accordance with the SD Well Construction Standards. Any test holes that are abandoned must be plugged pursuant to the SD Well Construction Standards.

A SD Water Permit must be obtained before water from this well can be used. Approval of this test well does not assure issuance of a water permit. Following review of a Water Permit Application; and assessing the availability of water, the potential impacts to existing users, the beneficial use, and the public interest of a permit, the Chief Engineer will make a recommendation to the Water Management Board regarding the application. The recommendation to approve, deny, or defer the application will be publicly noticed and an opportunity afforded for the public to intervene. A public hearing may be required to consider the water permit.

Very truly yours,

JAMES A. GOODMAN, P.E.  
Natural Resources Engineer  
for GARLAND ERBELE, Chief Engineer  
Water Rights Program  
(605) 773-3352

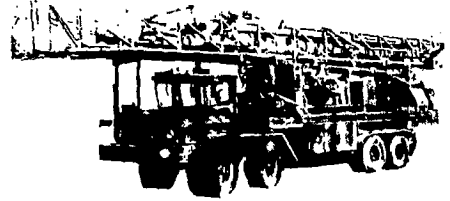
cc: Duane Robbins  
4041 Canyon Dr.  
Rapid City, SD 57702

**CIMARRON DRILLING**WATER WELLS - TEST HOLES - CATHODIC - PUMPS  
PUMP SERVICE - SHALLOW PRODUCTION

9017 S. RIDGE TRAIL

STURGIS, SD 57785

605-347-3071



Gentlemen:

I AM requesting permission  
to drill a Test well until  
a permit can be obtained.

The well will be approximately  
2200' deep into the INYAN KARA  
F.M. It will be a 8 3/4" hole, cased  
with 7" casing.

It will be located on well  
lot in lot 11 of Horseshoe Acres Sub.  
located in the SW 1/4 of the SW 1/4 of  
S-25 - T-3N R 8E of the BHM  
Meade Cty S.D.

The well will be drilled for Duane  
Robbins for a Resident Subdivision.

Duane Robbins  
4041 Canyon Dr.  
R.C. S.D. 57702

Respectfully  
Submitted  
Michael J. Duntch  
CIMARRON Drilling I

# **CONSTRUCTION SPECIFICATIONS**

for

**Water Supply and Distribution System**

**Horseshoe Acres**

**Meade County, South Dakota**

## **OWNER**

**Duane Robbins  
4041 Canyon Drive  
Rapid City, SD 57702**

## **ENGINEER**



**1830 West Fulton Street  
P.O. Box 9014  
Rapid City, SD 57709-9014**



**April 5, 2006**

## **PROJECT DIRECTORY**

### **Water Supply and Distribution System Horseshoe Acres Meade County, SD**

**OWNER:**

Duane Robbins  
4041 Canyon Drive  
Rapid City, SD 57702  
Telephone: 605-399-1761

**ENGINEER:**

CETEC Engineering Services, Inc.  
1830 West Fulton Street  
P.O. Box 9014  
Rapid City, SD 57709-9014  
Contact: Greg Wierenga, P.E.  
Telephone: 605-341-7800

**GEOTECHNICAL ENGINEER:**

American Technical Services, Inc.  
7557 Black Hawk Road  
P.O. Box 558  
Black Hawk, SD 57718-0558  
Contact: Dave Bressler  
Telephone: 605-787-9303

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## SECTION 01010

### SUMMARY OF WORK

#### PART 1 - GENERAL

##### 1.1 Scope of Work Under This Contract

The project work consists of constructing water supply and distribution system facilities for the Horseshoe Acres. Principal items of work are as follows:

- 9,350 l.f. of 6" PVC water main and appurtenances (Phase 1 only).
- 79,000-gallon factory-coated bolted steel water storage tank.
- Well house, controls and appurtenances.

##### 1.2 Contractor's Use of Premises

The Contractor shall limit his use of the project site to those areas within the construction easement limits as shown on the Plans.

##### 1.3 Owner's Access to Site

The Contractor shall cooperate with the Owner in all construction operations to minimize conflict. The contractor shall at all times allow for access by the Engineer and Owner's personnel and equipment.

##### 1.4 Protection of Property

- A. The Contractor shall protect, shore, brace, support and maintain all underground pipes, conduits, drains and other underground construction uncovered or otherwise affected by construction operations.
- B. The Contractor shall restore to their original condition roadways, utilities, fences, landscaping and other surface features affected by construction operations.

##### 1.5 Permits and Fees

- A. The Contractor is responsible to obtain and pay for applicable permits and fees in connection with this work.

##### 1.6 Protection of Work Areas

- A. The Contractor shall provide temporary fencing for all work areas where excavation could pose a potential hazard to the public.
- B. The Contractor shall provide protective covers over excavations where fencing is impractical or does not provide adequate security in high use areas.

##### 1.7 Work By Others

- A. The water supply well has previously been constructed and is in service using a temporary pressure tank system. The existing well location and control system are shown on the plans. The Contractor will interface electrical and piping systems with the existing system as shown on the plans.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 01340

### SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

#### PART 1 - GENERAL

##### 1.1 General

- A. The Contractor shall submit shop drawings, product data and samples for all equipment and materials as set forth in the specifications.
- B. The Contractor is required to submit to the Engineer a detailed schedule of necessary shop drawings and product data.

##### 1.2 Submittal Requirements

- A. Shop Drawings:
  - 1. Shop drawings shall be submitted in sufficient detail to show the type, size, arrangement and function of all components.
  - 2. Details shall refer to Plan Sheet number, specification section, schedule or other reference to the Contract Documents.
- B. Product Data:
  - 1. Product data shall clearly show the pertinent product, model number, size, performance characteristics, connections, anchorages and other data necessary to evaluate compliance with project requirements.
  - 2. Delete extraneous information not applicable to the work and supplement with additional information where standard literature or drawings do not provide information specifically applicable to the work.
- C. Samples: Submit samples in sufficient size or quantity to fully illustrate characteristics, color, texture, pattern and details of the product.

##### 1.3 Procedures

- A. Contractor Responsibility:
  - 1. The Contractor shall review all shop drawings and samples prior to submission and shall verify the complete conformance of the submittal with project requirements.
  - 2. Field measurements shall be verified before submittals and any variation from project requirements shall be identified and brought to the attention of the Engineer in writing.
- B. Submittal Requirements:
  - 1. Submit shop drawings, product data and samples in strict accordance with the approved schedule.
  - 2. Submit three (3) copies for use and distribution by the Engineer and such additional number of copies needed for his own use or for the use of his subcontractors, or suppliers.
  - 3. Coordinate with the Engineer for quantities or volumes of samples required.
  - 4. Each submittal shall contain the following minimum information:
    - a. Date of submission.
    - b. Project title and number.
    - c. Contractor's name.
    - d. Supplier or manufacturer's names and addresses.
    - e. Identification of product with reference to specification number and/or plan sheet.
    - f. Field measurements and dimensions.
    - g. Reference to applicable standards (ASTM, etc.).
    - h. Clear identification of deviations from standard items or deviations from specifications.
    - i. A Contractor's stamp certifying as to his review and verification of all criteria and field measurements. Stamp must be signed and dated.

C. Engineer's Review:

1. The Engineer will review submittals and mark as "reviewed," "rejected," "revise and resubmit" or "make corrections."
2. Three (3) copies will be retained for the Engineer's use, with all other copies returned to the Contractor.
3. If resubmission is required, the Contractor shall make the necessary corrections and make an entirely new submittal with the same number of copies as required for an initial submittal.
4. Resubmitted data must clearly show changes other than those requested by the Engineer.
5. The Engineer will review submittals with reasonable promptness and in accordance with the submittal schedule.
6. The Engineer will return without review any material not submitted directly from the Contractor, such as submittals from subcontractors or suppliers.

D. Engineer's Responsibility:

1. The Engineer will assume no responsibility for the correctness, dimensional accuracy or completeness of submittals.
2. The Engineer's review will in no way relieve the Contractor of his responsibility to furnish materials and products in compliance with the Contract Documents.
3. Unless deviations from Contract Documents are clearly identified in the submittal, the Engineer's review does not constitute an acceptance by the Engineer.

1.4 Substitutions

- A. The contract is based on the standards of quality established in the Contract Documents.
- B. Substitutions will be permitted only with the approval of the Engineer.
- C. Submit complete product data for proposed substitutions not later than ten (10) days in advance of the bid opening date.
- D. Products or equipment which are specified by reference to standard specifications (ASTM, etc.), and products specified by reference to a specific manufacturer's name and catalogue number do not require further approval, except as provided by the normal submittal process after contract award.
- E. "Or Equal" Provisions:
  1. Where the phrase "or equal" or "Engineer approved equal" is used in the specifications, do not assume that a substitute material or product will be approved as equal unless the item has been specifically approved by the Engineer.
  2. The Engineer is solely responsible for evaluating and approving substitutions, and his decision shall be final.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 01360

### CONSTRUCTION STAKING AND LAYOUT

#### 1.1 General

- A. The Contractor will be responsible for the accurate construction of all work to the lines, grades and elevations shown on the drawings. The Engineer will furnish basic survey controls, such as benchmarks and reference control points.

#### 1.2 Survey and Staking to be Provided by Contractor

- A. The Contractor is responsible for detailed construction staking and layout for all facilities, including structures and pipelines.
- B. Survey and staking needs beyond that described in 1.2 above, will be the responsibility of the Contractor.

#### 1.3 Changes or Discrepancies on Survey Layout

- A. The Engineer shall be promptly notified of any discrepancies discovered during layout work. The Contractor shall not make changes or relocations without written approval of the Engineer.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 01400

### TESTS AND INSPECTIONS

#### PART 1 - GENERAL

##### 1.1 SCOPE OF TESTS

All materials, equipment, installation, and workmanship included in this contract, if so required by the Engineer, shall be tested and inspected to prove compliance with the contract requirements.

- A. No tests specified herein shall be applied until the item to be tested has been inspected and approval given for the application of such test.
- B. Tests and inspections shall include:
  - 1. The delivery acceptance of tests and inspections.
  - 2. The installed tests and inspections of items as installed.
  - 3. Performance guarantee tests.  
Tests and inspections, unless otherwise verified, shall be in accordance with the recognized standards of the industry.
- C. The Contractor shall pay for tests and inspections which may be so specified herein. The Owner shall pay the cost of testing and inspection not normally conducted by manufacturers or material suppliers or not specified herein.
- D. Contractor shall conduct field tests on his work as required to comply with applicable codes to determine acceptability of workmanship, and as specified including, but not limited to, the following:
  - 1. Hydrostatic of piping, equipment and water retaining structures.
  - 2. Calibration tests.
  - 3. Other tests as defined in the specifications.

##### 1.2 Evidence Of Test

- A. The form of evidence of satisfactory fulfillment of delivery acceptance test and of installed test and inspection requirements shall be, at the discretion of the Engineer, either by tests and inspections carried out in his presence or by certificates or reports of tests and inspections carried out by approved persons or organizations.

##### 1.3 Delivery Acceptance Tests

- A. The delivery acceptance tests and inspections shall be at the Contractor's expense for any materials or equipment specified herein and shall include the following:
  - 1. Test of items during the process of manufacture and/or on completion of manufacture, comprising material test, hydraulic pressure tests, electric tests, performance and operating tests, and inspections in accordance with the relevant standards of the industry and, more particularly, as detailed in individual clauses of these specifications or as may be required by the Engineer to satisfy himself that the items tested and inspected comply with the requirements of this contract.
  - 2. Inspection of all items delivered at the site in order that the Engineer may be satisfied that such items are of the specified quality and are in good order and condition at the time of delivery.

##### 1.4 Testing and Laboratory Services

- A. Independent Testing Laboratory: Where test or inspections by an independent testing laboratory are required by this specification, the Contractor shall employ and arrange for, at his expense, the services of an approved independent testing laboratory satisfactory to the Engineer to perform the testing utilizing recognized standard procedures and criteria.

- B. Reports and Certificates: The Contractor shall submit reports and certificates of all inspections and test to engineer in duplicate. The reports and certificates become the property of the Owner.
- C. Sample Materials: The Contractor shall furnish all sample materials required for these tests and shall deliver same without charge to the testing laboratory or other designated agency when and where directed by them.
- D. Additional Tests: Any additional tests required beyond these required under this specification may be ordered by the Engineer to settle disagreements with the Contractor regarding quality of work done. If the work is defective, the Contractor shall pay all costs of the extra tests and shall correct the work. If the work is satisfactory, the Owner will pay for extra tests.

#### 1.5 Leakage Testing

##### A. General

1. Except as otherwise provided herein, the Contractor shall furnish all equipment, labor and materials required for testing water storage structures and pipelines as specified. Water for testing will be furnished by the Owner; however, the Contractor shall make all necessary provisions for conveying the water from the-designated source to the points of use.
2. All hydraulic structures and pipelines shall be tested. Refer to detailed specifications for test procedures and requirements.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 01501

### UTILITY COMPANY NOTIFICATIONS

#### PART 1 - GENERAL

##### 1.1 Locations

- A. The information on the drawings concerning the type, size and location of utilities has been based upon the information available. The Contractor shall be responsible for the determination of the exact location of all utilities prior to beginning construction. The Contractor shall be responsible for protecting all existing utilities in place. The Contractor shall coordinate all relocations with the utility companies.

##### 1.2 Adjustments

- A. Electrical, telephone, television, fiber optic and gas utilities may be adjusted and/or relocated by the respective utility companies. The Contractor may adjust water and sanitary sewer utilities after approval of the Engineer.

##### 1.3 One Call Notification

- A. The Contractor shall utilize the South Dakota One Call notification process to provide advance notice of at least 48 hours, excluding weekends and holidays, to inform all South Dakota underground facility operators of intended excavation. The Contractor shall contact all utility companies before work is commenced.

Utilities:

South Dakota One Call      1-800-781-7474

Telephone:      QWEST  
P.O. Box 100  
Rapid City, SD 57709  
1-800-781-7474

Electric:      West River Electric Association, Inc.  
3250 E. Hwy. 44  
P.O. Box 3486  
Rapid City, SD 57709-3486  
605-393-1500

Water:      Duane Robbins  
4041 Canyon Drive  
Rapid City, SD 57702  
605-399-1761

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 01730

### OPERATION AND MAINTENANCE DATA AND PRODUCTS

#### PART 1 - SPARE PARTS AND MAINTENANCE MATERIALS

##### 1.1 General

- A. The Contractor shall provide spare parts, maintenance materials, special tools and other similar items as specified in the individual specification section. Provide also any unspecified items which are furnished by the manufacturer or supplier.
- B. Maintenance items shall be properly stored in weathertight facilities until delivered to the Owner.

##### 1.2 Delivery to Owner

- A. At or prior to the time of inspection for substantial completion, deliver all required items to the Owner and place in storage locations designated by the Owner.
- B. Prepare an inventory invoice of all items delivered and verify with the Engineer. Identify any damage or deficiency in delivered items, and any missing items.
- C. The Owner, Engineer, and Contractor shall sign the invoice certifying that all listed items were delivered in good condition unless noted otherwise.
- D. The contractor shall promptly obtain and deliver all items to replace damaged, defective or missing items noted on the original invoice. Prepare and submit invoices for replacement items and obtain Owner's and Engineer's signature.
- E. Final payment will not be made until the above-described procedures have been satisfied.

#### PART 2 - OPERATION AND MAINTENANCE MANUALS

##### 2.1 General

The Contractor shall compile product data, maintenance information and related materials necessary for the Owner's proper use and operation of products furnished under the Contract. The Contractor shall further fully instruct Owner's personnel in product maintenance and equipment operation.

##### 2.2 Quality Of Submittals

All operation and maintenance data shall be prepared by professionally trained personnel, completely familiar with the product. Written and graphic instructions shall be thorough, legible and complete in all respects.

##### 2.3 Format

- A. All operations and maintenance submittals shall be in 8 1/2" x 11" size or 11" x 17" folded to 8 1/2" x 11". Larger drawings shall be reduced in scale or may be folded and inserted in 8 1/2" x 11" envelopes if reduction is impractical. Provide indexed tabs for each component or section.
- B. Each volume of operating and maintenance data for the various categories of products or equipment shall have an identifying cover sheet on heavy paper with typed or commercially printed titles, including "Operating and Maintenance Instructions," project title, subject matter covered, manufacturer's identification, other applicable identification.

## 2.4 General Contents of Manuals

Each volume of manuals shall have the following minimum information:

- A. Table of Contents:
  - 1. Contractors name, address, phone.
  - 2. Product or system tabulation and index.
  - 3. Listing with each product or system of subcontractor or installer, maintenance contractor or service representative, area of responsibility and local supply source for parts and replacements. Include all names, addresses, phone numbers.
  - 4. Product identification reference to plans and specification numbers.
- B. Product Data: Include only material which is relevant to the project and clearly identify all data applicable to the installation.
- C. Drawings: Drawings shall be used to supplement written data as necessary and shall show only relevant features. Coordinate drawings with project record drawings to assure correct illustration of completed installation.
- D. Written Text: Written instructions and data shall be organized in a consistent format with logical and clearly written instructions for each procedure.
- E. Copies of Warranties, Bonds and Service Contract: An instruction sheet shall accompany each item with proper instructions regarding claims procedures in the event of failure, plus any special instructions which might affect the validity of warranties or bonds.

## 2.5 Contents of Manuals For Equipment and Systems

The Contractor shall provide an operation and maintenance manual for each item listed hereinafter under the schedule of manuals. Manual content shall include the following:

- A. Description of unit and component part including function, operations characteristics and limiting conditions.
- B. Performance curves, engineering data and factory-performed tests.
- C. Complete nomenclature and parts identification system for replaceable parts.
- D. Operating procedures, including start-up, break-in and normal operation. Include regulation and control, stopping, shut-down and emergency requirements. Include summer/winter and other special conditions as applicable.
- E. Maintenance procedures including routine operations, trouble-shooting, repair and adjustment.
- F. Servicing and lubrication schedule including specific lubricants required or recommended.
- G. Control and sequence of operation instructions.
- H. Tabulation of anticipated wear life of components and stock of spare parts provided and recommended.
- I. As-built control diagrams by controls manufacturer/installer.
- J. As-built color-coded piping diagrams with valve locations, functions and tag number identification system.
- K. Miscellaneous data not listed above, but required by the various sections of specifications, or necessary for proper operation of equipment.

## 2.6 Contents of Manuals For Electrical and Control Items or Systems

Provide a manual for each listed hereinafter under the schedule of manuals. Manual content shall include the following:

- A. Description of system and component parts, including function, operating characteristics and limiting conditions.
- B. Performance curves, engineering data and tests.
- C. Complete nomenclature and parts identification system for replaceable parts.
- D. Circuit directories of panel board for electrical service, controls, phone system.
- E. As-built color-coded wiring diagrams.
- F. Operating procedures including normal and routine operation, sequencing and special operations.

- G. Maintenance procedures including routine maintenance, trouble-shooting and adjustments.
- H. Tabulation of spare parts provided and recommended spare parts inventory.
- I. Miscellaneous data not listed above, but required by the various sections of specifications, or necessary for proper operation.

## 2.7 Procedures For Submittal

### A. Equipment and Systems:

1. Submit two (2) preliminary copies of manual prior to the date of shipment of the equipment or system.
2. Engineer will review and return one (1) copy with review comments and deficiencies noted.
3. No partial payments will be made for equipment or systems delivered or installed until preliminary manuals are approved.
4. Submit three (3) final copies of manuals within thirty (30) days after placing equipment into service and performing manufacturer's field services.
5. Submit one (1) copy of any supplemental data or revisions to preliminary manual for insertion in previously approved preliminary manuals to conform with final manuals.
6. Engineer will review final submittals and notify Contractor of discrepancies. All final manuals will be retained by Engineer for subsequent transfer to Owner.
7. No portion of work will be considered substantially complete until review of final manuals.
8. Any changes to manual found necessary after submittal of final manuals shall be submitted in four (4) copies with instructions for insertion.

## 2.8 Instruction Of Owner's Personnel

- A. Prior to final inspection or acceptance, the Contractor shall arrange for instruction of Owner's operating personnel in the operation, adjustment and maintenance of all product, equipment and systems.
- B. Manuals must be complete and accepted in preliminary form before conducting instructions to Owner's personnel.

## 2.9 Schedule Of Manuals

Submit manuals for the following items in connection with this project:

### A. Equipment and Systems:

| <u>Specification Section</u> | <u>Description Of Equipment</u> |
|------------------------------|---------------------------------|
| 02550                        | Water Mains and Appurtenances   |
| 11345                        | Chemical Feed Equipment         |
| 15100                        | Process Piping and Valves       |
| Division 16                  | Electrical and Control Systems  |

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 02221

### UTILITY EXCAVATION AND BACKFILL

#### PART 1 - GENERAL

##### 1.1 Scope of Work

###### A. General:

1. This work consists of excavation, backfill and compaction of trenches for installation of underground utilities. This includes, but is not limited to, dewatering, rock and/or muck excavation and disposal, bedding, and shoring and bracing.

###### B. Related Work:

1. Section 02229 – Select Granular Backfill

###### C. License and Permit Requirements:

1. The Contractor for this work must hold a valid State of South Dakota license as a plumbing contractor or Water and Sewer Installer Contractor.
2. Qualified personnel with appropriate journeyman licenses shall be present at the jobsite.
3. Storm Water Construction Permit.
  - a. When more than one acre of land is disturbed by construction, the Contractor shall submit a Notice of Intent to DENR for coverage under the General Permit for Storm Water Discharge Associated With Construction Activities (DENR, Stacy Reed, 1-800-737-8696).
  - b. The Contractor is responsible for compliance with permit terms and for preparation and implementation of a Storm Water Pollution Prevention Plan as required under the permit.

###### D. Submittals/Test Samples:

1. Section 02229 - Select Granular Backfill: The Contractor shall provide a submittal to the Engineer for the materials proposed for use under Section 02229 unless waived by the Engineer.

#### PART 2 - MATERIALS

##### 2.1 Select granular backfill

- A. Select granular backfill and bedding shall be in accordance with Section 02229.

#### PART 3 - CONSTRUCTION REQUIREMENTS

##### 3.1 Protection of Existing Facilities:

###### A. Public and Private Utilities:

1. The Contractor shall contact SD One Call for the locations of public and private utilities prior to any excavation. Underground utilities shown on the plans are not necessarily exact and, therefore, must be located by the individual utility company prior to excavation activities.

###### B. Clearing and Grubbing:

1. Prior to stripping topsoil, remove trees, stumps, roots, rocks, trash, fencing and other objectionable material in the work area.
2. No trees or shrubs shall be removed without permission from Owner.
3. Sod and/or crop residue may remain in place to be stripped along with the topsoil.
4. Limit clearing operations to the areas indicated on the drawings and do not disturb vegetation outside of the work area.

###### C. Stripping and Salvaging Topsoil

1. Remove topsoil from all areas within the areas shown on the drawings which will be disturbed by trenching or other construction. Limit topsoil removal to trenching areas within the right-of-way or easement area.

2. Remove topsoil to its entire depth, or to a depth which will provide the quantity required for topsoiling as part of finish grading operations.
  3. Stockpile topsoil in convenient locations for subsequent spreading and placing.
  4. When trenching is through grassed or cultivated areas, strip all topsoil over the trench line to its entire depth, or 4", whichever is greater. Stockpile this topsoil separately from other excavated material and replace at the surface after pipe installation and backfilling.
- D. Trenching:
1. Methods:
    - a. Under ordinary conditions and where the depth of excavation and soil conditions will allow, excavation shall be by open cut from the surface. Tunneling or boring may be required under sidewalks, curb and gutter, or other surface structures. However, no additional compensation will be allowed for such tunneling or boring.
    - b. Where surface conditions allow, the Contractor will be permitted to slope or bench the trench sidewalls from a point one foot above the top of the pipe barrel. Below this point the trench walls shall be vertical. Contractor shall shore as necessary. This requirement does not relieve the Contractor of the responsibility of meeting all applicable OSHA requirements.
    - c. Excavated material suitable for backfill shall be deposited sufficiently distant along the sides of the trench so as to limit the potential for cave-in and shall be so deposited that the public shall be inconvenienced as little as possible.
    - d. All excavated material not required for backfill shall be removed from the project by and at the expense of the Contractor as directed by the Engineer.
    - e. All rock, including excavated bedrock and large loose rock such as boulders or fieldstone, much or other unsuitable material, which cannot be used as backfill, as determined by the Engineer, shall be segregated from the rest of the excavated material and removed from the project by and at the expense of the Contractor. Established drainage in the street, alley, or drainage ditch, must be maintained by the Contractor during his construction operations to limit further damage and un-necessary removal costs.
    - f. Damage to the property of others, such as engineering fabric, edge or sub drains, private or public utilities, fences, trees, shrubs, laws, sidewalks, etc. shall be repaired or replaced the Contractor's expense, unless removal of such is shown on the plans or written permission was first obtained from the Engineer.
    - g. The Contractor is responsible for all damage and repair of existing pavement or existing features. No payment will be made for costs associated with any repair of the existing asphalt or concrete except as defined under the bid items for water main and water service road crossings.
  2. Protection of the Excavation:
    - a. The Contractor shall be solely responsible for providing a safe trenching operation and shall, as a minimum, comply with all OSHA regulations, regardless of limits of trench width imposed by project plans work limits, site constraints, or the direction of the Engineer.
    - b. The Contractor shall employ qualified, properly trained personnel to design, place, and maintain shoring during progress of work until the trench is backfilled.
    - c. Failure to properly shore and/or brace excavations shall be at the risk of the Contractor, and any damage to pipes, curb and gutter, street pavement, grassed areas, storm sewer and appurtenances, gas mains, and/or other public or private property occurring through settlements, heaving, water or earth pressures, slides, caving, or other causes due to failure of shoring, improper shoring, or lack of shoring, or due to negligence on the part of the Contractor, shall be repaired by the Contractor at his own expense and to the satisfaction of the Engineer.
    - d. When utilized, the shoring shall be arranged so as not to place any stress on portions of the completed work until the general construction thereof has progressed far enough to provide adequate strength. Unless left in place by written order of the Engineer, shoring shall be removed as work progresses.
  3. Dewatering:
    - a. The Contractor shall be responsible for evaluating soil and groundwater conditions and for furnishing and maintaining necessary and suitable dewatering devices and equipment.

- b. The Contractor shall provide for positive drainage away from the excavation or otherwise take steps to protect the excavation and backfill from becoming excessively wet prior to placing the finished surface.
  - c. Should the Engineer determine that any portion of the backfill or trench has become excessively wet during excavation and/or backfill operations, the Contractor shall, at his own expense, remove the material to the satisfaction of the Engineer and furnish an approved backfill and/or bedding material meeting specifications.
  - d. The Contractor shall provide and maintain at all times ample means and devices with which to remove promptly and to properly dispose of all water entering the excavation.
  - e. The Contractor shall dispose of water in a suitable manner without damage to adjacent property or without creating a health hazard or nuisance condition. Water may not be discharged to private property or to irrigation ditches without prior approval from the affected property owner or ditch company. No water shall be drained into work built or under construction without prior consent of the Engineer.
  - f. Dewatering shall be accomplished by placing well points, sumps, or any other acceptable method, which will insure a dewatered trench. Any proposed dewatering method shall be subject to the approval of the Engineer. The Contractor will be permitted to allow groundwater to drain through completed sewers provided that satisfactory means are employed to keep solids out of the pipe and the water does not enter the existing sanitary sewer system. The Contractor will be required to thoroughly clean all debris and sediment from the newly installed sewer as directed by the Engineer.
  - g. The Contractor shall provide for positive drainage of water away from the excavation and take the necessary action to protect the excavation and backfill from becoming excessively wet prior to placing the finished surface. Should the Engineer determine that any portion of the backfill or trench has become excessively wet due to actions or inactions of the Contractor after the initial excavation, the Contractor shall remove the soil and/or pipe or appurtenance(s) to the satisfaction of the Engineer and furnish an approved backfill material meeting specifications and reinstall the pipe and/or appurtenance(s) as specified herein, all at no expense to the Owner.
  - h. If water from temporary dewatering will be discharged to waters of the state during construction, the contractor must first get coverage under the DENR General Permit for Temporary Dewatering. For more information on obtaining a permit, contact Al Spangler (or current DENR representative) at (605)773-3351.
4. Trench Dimensions:
- a. Minimum Trench Width: The minimum clear trench width measured at the top of the pipe barrel shall not be less than the outside pipe diameter, plus sixteen (16) inches, or such width as approved by the Engineer.
  - b. Maximum Trench Width: For all pipe, the maximum clear trench width measured at a point twelve (12) inches above the top of the pipe barrel shall not be greater than the trench width shown in the following table:

| MAXIMUM TRENCH WIDTH TABLE |                        |
|----------------------------|------------------------|
| Pipe Diameter (Inches)     | Maximum Width (Inches) |
| <6                         | 24                     |
| 6 - 16                     | 36                     |
| 18 - 21                    | 42                     |
| 24 & Greater               | Pipe OD + 2'           |

- (1) The Contractor shall adhere to the maximum trench widths as is reasonably possible. However, if the maximum trench width is exceeded the contractor, at his own expense, shall backfill the over-excavated area with Type 1 Bedding material. The Type 1 Bedding material used for backfill of the over-excavated area will not be considered as a pay item.
- (2) The Contractor will not be allowed to excavate excessive trench width in lieu of adequate dewatering or shoring or as a method to increase excavation production.
- c. Maximum Trench Length: Not more than 300 linear feet of trench shall be open at any one time unless otherwise specified or permitted by the Engineer.

5. Foundations: Foundations shall be considered as that material which is neither bedding nor backfill, but is used under the pipe or conduit for support in the bottom of the trench.
  - a. Normal Trench Bottom: The bottom of the normal trench where the undisturbed soil is of a supportive nature for the pipe or conduit laid, as determined by the Engineer, shall be accurate for line and grade to provide uniform bearing and support for each section of pipe or conduit. Bell holes and depressions for joints shall be dug after the trench bottom is graded, and shall be no greater in length, depth, and width than required for making the joint. The undisturbed trench bottom shall be at least 3" below the pipe invert, to allow for the placement of Type 1 Bedding material.
  - b. Rock Trench Bottom: When solid rock, large loose rock, such as field stone, very coarse gravel, or any other material of a similar nature that is stable but will not allow a proper foundation for the pipe or conduit, is encountered at the trench bottom, it shall be excavated to a sufficient depth to allow refilling under the body and joints of pipe or conduit. The undisturbed trench bottom shall be at least 3" below the pipe invert, to allow for the placement of Type 1 Bedding material.
  - c. Unstable Trench Bottom: When the trench bottom is earth that will not support the pipe or conduit, the earth shall be considered an unstable foundation and shall be excavated below grade as directed by the Engineer. A solid foundation shall be built with rock that is sound, hard and clean or with Controlled Low Strength Material.
    - (1) The amount of foundation material required will vary depending upon the soil encountered. Foundation material shall be Type 2 Foundation Material.
    - (2) Foundation material consisting of Type 2 Foundation Material shall be compacted and placed in separate lifts from the trench bottom up to 3" below the pipe invert. Foundation material lifts shall not exceed 8" and each lift shall be compacted separately.
6. Rock Excavation:
  - a. Rock excavation will not be defined or used on this project. All trenching shall be unclassified excavation.
  - b. The Contractor is responsible for all excavation regardless of material type. No payment will be made for rock excavation, removal, blasting or soil replacement. The Contractor shall furnish all equipment necessary to remove any rock formation, but no direct payment will be made for the work.
  - c. The Contractor shall dispose of unsuitable excavated material and shall furnish an approved backfill material to fill the void left by rock excavation. He shall also provide the results of a modified proctor (AASHTO T-180) test for the furnished backfill.
7. Blasting and the Use of Explosives:
  - a. All materials removed by blasting which cannot be shoveled as earth shall be deemed unsuitable and shall be handled and disposed of separately from other suitable backfill materials as directed by the Engineer. The Contractor shall provide a disposal site for unsuitable backfill materials. The disposal site shall be approved by the Engineer.
  - b. No payment will be made for rock excavation, blasting or removal or backfill.
  - c. Where blasting is necessary, the Contractor shall comply with the laws, ordinances, and applicable safety code requirements relative to the handling, storage and use of explosives and the protection of life and property. Suitable covering or shielding shall be provided to confine all materials lifted by blasting, within the limits of the trench of excavation, and prevent injury to property or life. The Contractor shall be responsible for all damages caused by his blasting operations. The Contractor will demonstrate that he is in compliance with applicable laws, rules, and regulations, and that he has the required expertise in advance of any blasting work. The Contractor shall notify all governmental agencies, property owners and utility owners that may be affected by the blast 48 hours in advance.
8. Unsuitable Backfill Material Excavation:
  - a. Unsuitable Backfill Material excavation shall consist of the removal and disposal of unsuitable material, which in the opinion of the Engineer is not suitable as backfill material. The Contractor shall provide an approved disposal site for unsuitable material. The Contractor shall provide and use any necessary shoring devices necessary to maintain trench walls.
  - b. The shortage of backfill material created by the removal of the unsuitable material shall be replaced by the Contractor with an approved imported backfill material meeting specifications.

No payment for imported backfill will be made on this project. The Contractor shall provide the results of a modified proctor analysis (AASHTO T-180) for all furnished imported backfill material, except Controlled Low Strength Material.

E. Pipe Bedding:

1. Bedding material from 3" below the pipe to springline of the pipe crown shall be backfilled using Select Bedding Material. Select Bedding Material may include loam, clay, sand, and gravel, but shall be free of cinder, ashes, refuse, organic matter, rock or material determined unsuitable by the Engineer. No material larger than three inches (3") in size shall be permitted. Frozen material may not be used.
  - a. Select Bedding Material maybe native excavated material or material brought from offsite. Select Bedding Material shall be hand-tamped in the trench for its full width on each side of the pipe, simultaneously. Mechanical tampers may be used if pipe damage will not occur.
2. Controlled Low Strength Material maybe used in lieu of Type 1 Bedding or Select Bedding Material as approved by the Engineer or as required on the drawings or specifications. Controlled Low Strength Material shall be installed in accordance with Specification 03601.

F. Backfilling and Compaction:

1. Backfill shall start one foot (1') above the pipe or conduit crown and continue to the surface of the trench. The Contractor shall take precautions to backfill trenches in a manner that installed pipe or conduit will not be disturbed.
2. All backfill material shall be free from cinders, ashes, refuse, vegetable or organic material, boulders, rocks, or stones, or other material which the Engineer determines to be unsuitable. Stones larger than 3" diameter shall not e placed in the backfill within two feet of the top of the pipe.
3. When the type of backfill material is not specified, the Contractor may backfill with the excavated material provided that the Engineer determines that it is suitable. Where excavated material is deemed unsuitable, or where there is a shortage of backfill material, the Contractor shall furnish an approved Imported Backfill unless otherwise specified. Controlled Low Strength Material will be considered acceptable as backfill material when installed in accordance with Specification 03601or as directed by the Engineer.
4. Should the Contractor cause the trench to be excavated to a greater depth or width than that designated of the drawings, herein, or as directed by the Engineer, the Contractor shall refill to grade, at his own expense, with an approved material, notwithstanding that it may be necessary to bring such material from other localities or to purchase suitable material with which to form a solid bed for the pipe.
5. Frozen material will not be permitted as trench backfill.
6. Prior to backfilling, the Contractor shall not sell, remove, or permit to be removed, any suitable backfill material from the project.

G. Embankment:

1. Where embankment is necessary to support pipe or to cover or protect it in any way, it shall be placed to the dimensions shown on the plans or as directed by the Engineer. The surface of the ground receiving the embankment shall be cleared of all unsuitable material and scarified, or loosened with a disc or multi-toothed hydraulic ripper, moisture adjusted and re-compacted as directed by the Engineer. Embankment shall then be formed of an approved material and compacted to the densities specified herein unless otherwise specified. Embankment shall be placed prior to laying pipe. Unless otherwise approved, pipe laid in embankment shall be trenched in.

H. Compaction: Refer to Section 02230.

I. Frost:

1. When frost in the ground becomes deep enough to inhibit excavation, the Contractor may request a stop work order. However, it shall be the Contractor's responsibility to prove to the Engineer that the cost of excavation due to the frost is excessive and a stop work order is justified. The request for the stop work order shall be made in writing. Regardless of when the request is made, contract time will not stop until the stop work order is issued, i.e. the order will not be retroactive. Stop work orders shall be made in accordance with the specifications unless otherwise modified herein.

2. As a prerequisite to issuance of the stop work order, the Contractor shall backfill and compact all open excavations and clean up the project to the satisfaction of the Engineer.
  3. The Engineer may issue a Notice to Proceed when conditions improve to the point where frost does not inhibit excavation and a resumption of work is possible. The resumption of work and Notice to Proceed shall be made in accordance with the specifications unless otherwise modified herein.
- J. Cleanup:
1. Trenches located in public right-of-way shall be backfilled, compacted, and restored to original condition as soon as practicable. In cases where the permanent surfacing will not be placed within 24 hours of backfill the Engineer may require temporary surfacing. Temporary surfacing shall be considered as incidental to the bid item for the pipe or conduit for which it pertains unless a bid item is specifically provided for Temporary Surfacing.
- K. Bedding Boxes and other similar devices:
1. The contractor shall use a bedding box or other similar device for the storage of Type 1 Bedding Material and Select Granular Backfill Materials. The bedding box shall follow the progression of work and shall be used to store the materials prior to their placement in the trench. The use of such devices will minimize contamination and waste of the material. The Engineer may make a deduction in the quantity, for payment purposes, of Type 1 Bedding Material and/or Select Granular Backfill Material if the material is being contaminated or wasted.
- L. Underground Obstructions:
1. The location of underground public or private utilities may be shown on the plans, as reported by the various utility companies and the Owner, but this does not relieve the Contractor of the responsibility of determining the accuracy or completeness of said locations. The Contractor shall determine the location of all underground ducts, conduits, pipes, cables or structures which will be affected by the work, and shall take steps necessary to support and protect said structures by any means suitable to the owners of the structure involved and the Engineer. When necessary, the Contractor shall conduct operations as to permit access to the work site and provide time for utility work to be accomplished during the progress of the work.
  2. Portions of existing utilities, which are found to interfere with the line and/or grade of the proposed utility will be relocated, altered or reconstructed by the utility companies, or the Engineer may order changes in the work to avoid interference. When the plans or specifications provide for the Contractor to alter, relocate, or reconstruct an existing utility, all costs for such work shall be included in the bid for the items of work necessitating such work unless a separate bid item is provided. Temporary or permanent relocation or alteration of existing utilities requested by the Contractor for the Contractor's convenience shall be the Contractor's responsibility, and the Contractor shall make all arrangements and bear all costs. In those instances where existing utility relocation or reconstruction is impractical, the Engineer may order a deviation from line and grade.
  3. The Contractor shall be responsible for notifying the various utility companies if the Contractor's work will expose, affect or endanger any existing utility. All cost of investigation and any necessary protection, support, removal or relocation of said structures shall be included in the contract bid price for installing pipe or manholes. The Contractor shall not begin construction until all utility companies have been contacted and their respective underground utilities have been located and marked. All costs for exploratory investigation/excavation necessary for determining the location and depth of utilities shall be included in the contract bid price for installing the proposed utility.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 02222

### STRUCTURE EXCAVATION AND BACKFILLING

#### PART 1 - GENERAL

##### 1.1 Description

- A. Scope: Excavate, backfill, compact and grade for structures to the elevations and to the extent shown on the Drawings.

##### 1.2 Related Work Specified Elsewhere

- A. Utility Excavation and Backfill: Section 02221

##### 1.3 Measurement and Payment Conditions

- A. No measurements will be made in connection with structure excavation.  
B. Payment for structure excavation and backfill will be taken to be included in the lump sum amount bid for the structure to which it relates.

#### PART 2 - PRODUCTS

##### 2.1 Soil Materials

- A. Fill and Backfill Materials:
1. Soil materials shall be existing on-site material obtained from excavation work and shall be free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2" in their greatest dimension.
  2. Fill material is subject to the approval of the Engineer, and is that material removed from excavations.
  3. Do not permit rocks having a dimension greater than 2" in the upper 12" of fill or embankment.
- B. Topsoil: On site material salvaged from stripping operations in connection with excavation work.
- C. Aggregate Bedding: Aggregate bedding shall be a manufactured or classified crushed stone or gravel obtained from an off-site source. Aggregate bedding shall conform to the following gradation requirements:

| <u>Sieve Size</u> | <u>% Passing</u> |
|-------------------|------------------|
| 1"                | 100              |
| ¾"                | 90-100           |
| 3/8"              | 20-55            |
| No. 200           | 0-10             |

Where the term granular fill, granular bedding, gravel fill or gravel bedding is used on the plans or elsewhere in the specifications, it shall be taken to have the same meaning as aggregate bedding, and these specifications shall apply.

#### PART 3 - EXECUTION

##### 3.1 Finish Elevations and Lines

- A. Comply with provisions of the detailed drawings.

### 3.2 Procedures

#### A. Utilities:

1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise made known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this Contract, immediately notify the Engineer and secure his instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.

#### B. Protection of Persons and Property:

1. Barricade open holes and depressions occurring as part of the Work.
2. Protect structures, utilities, and other facilities from damage caused by settlement, lateral movement, and other hazards created by operations under this Section.

#### C. Dewatering:

1. Remove all water, including rainwater, encountered during trench and substructure work to an approved location by pumps, drains and other approved methods.
2. Keep excavations and site construction area free from water. All construction shall occur under dry conditions.

### 3.3 Excavating

- A. Perform excavating of every type of material encountered within the limits of the Work to the lines, grades and elevations indicated and specified herein.
- B. Stripping Topsoil: Strip all topsoil from within the limits of the excavation, salvage and stockpile for finish grading operations.
- C. Surplus Materials: Dispose of unsatisfactory excavated material, and surplus satisfactory excavated material.
- D. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.
- E. Unauthorized excavation:
  1. Unauthorized excavation consists of removal of materials beyond indicated sub-grade elevations or dimensions without specific instruction from the Engineer.
  2. Under footings, foundations, or retaining walls:
    - a. Fill unauthorized excavations by extending the indicated bottom elevation for the footing or base to the excavation bottom, without altering the required top elevation.
    - b. When acceptable to the Engineer, lean concrete fill may be used to bring the bottom elevation to proper position.
  3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the Engineer.
- F. Excavation for structures:
  1. Conform to elevations and dimensions shown within a tolerance of 0.10 ft., and extending a sufficient distance from footings and foundations to permit placing and removing concrete formwork, installation of services, and other construction required, and for inspection.
  2. In excavation for footings and foundations, take care not to disturb bottom of excavation:
    - a. Excavate by hand tools to final grade just before concrete is placed.
    - b. Trim bottoms to required lines and grades to leave solid base to receive concrete.
    - c. Maintain natural moisture; do not allow natural soils to dry more than 2% below natural moisture content.
- G. Cold weather protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35° F.

### 3.4 Filling and Backfilling

- A. General:
  - 1. Backfill structure excavation areas with on-site excavation material or borrow if suitable backfill materials cannot be obtained from excavation work.
- B. Backfill excavations as promptly as progress of the Work permits, but not until completion of the following:
  - 1. Acceptance of construction below finish grade.
  - 2. Inspecting, testing, approving and recording locations of underground utilities.
  - 3. Removing concrete formwork.
  - 4. Removing shoring and bracing, and backfilling of voids with satisfactory materials.
- C. Placing and compacting:
  - 1. Place backfill and fill materials in layers not more than 8" in loose depth.
  - 2. Before compacting, moisten or aerate each layer as necessary to provide near optimum moisture content.
  - 3. Compact each layer to required percentage of maximum density for area.
  - 4. Do not place backfill or fill material on surfaces that are muddy, frozen or containing frost or ice.
  - 5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
  - 6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structure to approximately the same elevations in each lift.

### 3.5 Grading

- A. Grading outside building lines:
  - 1. Grade areas adjacent to structures to achieve drainage away from the structures, and to prevent ponding.
  - 2. Finish the surfaces to be free from irregular surface changes.
  - 3. Underfill backfill to allow for finish grade to be achieved with salvaged topsoil during finish grading work.
  - 4. Place salvaged topsoil material at the surface for all areas for which pavement, or another type of surfacing is not required.

### 3.6 Compacting

- A. Control soil compaction during construction to provide the minimum percentage of density specified for each area.
- B. Moisture Control:
  - 1. Where sub-grade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface of sub-grade or layer of soil material and prevent free water appearing on surface during or subsequent to compacting operations.
  - 2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.

### 3.7 Maintenance

- A. Protection of newly graded areas:
  - 1. Protect newly graded areas from traffic and erosion, and keep from trash and weeds.
  - 2. Repair and re-establish grades in settled, eroded and rutted areas to the specified tolerances.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 02229

### SELECT GRANULAR BACKFILL

#### PART 1 - GENERAL

##### 1.1 Description

- A. General: This work shall consist of furnishing select granular backfill.
- B. Related Work
  - 1. Section 02221 – Utility Excavation and Backfill

#### PART 2 - MATERIALS

##### 2.1 General:

- A. This material shall be free from dirt, vegetable matter, cinder, ashes, refuse, organic matter, or other unsuitable foreign substance. Frozen material may not be used.
- B. Utility Trench Backfill:
  - 1. Type 1, Type 2 or Type 3 material shall be a crushed limestone rock or natural stone having a minimum of two (2) fractured faces and meet the following gradation requirements by dry weight.
    - a. Type 1, Bedding Material:

| Sieve Size | % Passing |
|------------|-----------|
| 1"         | 100       |
| ¾"         | 90 - 100  |
| 3/8"       | 20 - 55   |
| No. 4      | 0 - 10    |
| No. 8      | 0 - 8     |

- b. Type 2, Foundation Material:

| Sieve Size | % Passing |
|------------|-----------|
| 3"         | 100       |
| 1"         | 0         |

(Material shall be a clean rock.)

- c. Type 3, Foundation Material:

| Sieve Size | % Passing |
|------------|-----------|
| 3"         | 100       |
| ¾"         | 70 - 95   |
| No. 4      | 20 - 55   |
| No. 200    | 0 - 8     |

(Material retained on the No. 4 sieve shall have a minimum of two (2) fractured faces.)

- C. Roadway Backfill and Utility Trench Special Foundation Material:
  - 1. Roadway foundation backfill and utility trench special foundation backfill for stabilization of sub-grade shall be a crushed rock with a minimum of two (2) fractured faces and shall meet the following gradations:

a. Sugar Rock:

| Sieve Size | % Passing |
|------------|-----------|
| 8"         | 100       |
| 6"         | 95 - 100  |
| 3"         | 0 - 10    |
| 2"         | 0 - 5     |
| No. 200    | 0 - 3     |

b. Shot Rock:

| Sieve Size | % Passing |
|------------|-----------|
| 24"        | 100       |
| 2"         | 0 - 10    |
| No. 200    | 0 - 5     |

D. L. A. Abrasion: Abrasion loss shall not exceed forty percent (40%).

E. Sampling and Testing:

|                            |             |
|----------------------------|-------------|
| Sampling .....             | SD 201      |
| Gradation .....            | SD 202      |
| Fractured Faces .....      | SD 211      |
| Los Angeles Abrasion ..... | AASHTO T 96 |

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 02230

### SOIL COMPACTION CONTROL

#### PART 1 - GENERAL

##### 1.1 Description

- A. Included in this section are the requirements for all compacted fill, embankments and backfill required for this project.

##### 1.2 Related Work Specified Elsewhere

- A. Utility Excavation and Backfill: Section 02221.

#### PART 2 - PRODUCTS

##### 2.1 Materials

- A. Use materials as required to accomplish the results indicated and as specified in each section of the work.

#### PART 3 - EXECUTION

##### 3.1 On-Site Soils

- A. The following soil compaction requirements shall be achieved when placing satisfactory cohesive and/or cohesionless embankment materials in 4" to 8" layers and compacting by appropriate means to the designated percentage of maximum dry density as determined by modified Proctor Test ASTM D-698.

| <u>COMPACTION TYPE</u> | <u>% OF MAXIMUM DRY DENSITY</u><br>(Standard Proctor) |
|------------------------|-------------------------------------------------------|
| Trench Backfill        | 95                                                    |
| Footings and Slabs     | 95                                                    |

- B. Water content in cohesive backfill soils shall be adjusted to a value not more than 3% below, nor more than 3% above optimum unless otherwise indicated.
- C. Water inundation of cohesive soils will not be permitted.

##### 3.2 Granular / Engineered Fill Material

- A. The following compaction requirements shall be achieved when placing imported select granular fill material, as shown on the drawings and compacting by appropriate means to the designated percentage of standard method for standard Proctor Test ASTM D-698.

| <u>COMPACTION TYPE</u> |     |
|------------------------|-----|
| All Locations          | 95% |

- B. Moisture condition to  $\pm 3\%$  of optimum moisture content.
- C. Place in lifts of 4" or less.

### 3.3 Correction of Compaction Work

- A. In the event backfill compaction requirements are not met, the Contractor shall remove fill material, adjust moisture content if required, replace and re-compact until the required density is achieved.

### 3.4 Field Quality Control

- A. Where embankment or backfill is required to be compacted by a specified density, tests for compliance may be made by an Owner-designated representative, at the expense of the Owner, using the appropriate test procedures.
- B. Field density tests will be performed in accordance with test procedures established in "Standard Test Methods of Density of Soil in Place by the Sand Cone Method", ASTM D-1556, or "Standard Test Methods of Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)," ASTM D-2922. The field tests may also be performed using the modified Proctor method.
- C. The Contractor shall cooperate with testing by the Owner by allotting sufficient time for testing each layer. Any layer that does not meet density requirements shall be reworked and re-compacted until it meets the specified density.
- D. Retesting of non-complying embankment or backfill will be the Contractor's expense.
- E. Backfill moisture and density shall be determined at least every 400 feet horizontally and every three (3) feet vertically in trenches and at road/driveway crossings. However, the Engineer may take moisture and density tests at any location and depth he desires. The Contractor shall, at his own expense, excavate the backfill at those locations and to those depths required by the Engineer to conduct moisture/density tests.
- F. When specified moisture contents are not met, the Contractor has the options of drying wet soil, furnishing approved materials meeting specifications, or adding water as necessary, to soils that are too dry to meet specifications. If water is added to dry soil, it must be thoroughly mixed with the soil to provide a uniform moisture content prior to backfilling.
- G. Backfill material not meeting specified densities shall receive additional compaction or shall be removed and replaced at the Contractor's expense as necessary to meet specified densities. Wet soils that otherwise meet the requirements for backfill do not necessarily constitute unsuitable material. It is the contractor's responsibility to either dry the material or furnish other approved material at his expense, unless otherwise specified herein. When the Contractor furnishes backfill material, he shall also furnish the results of the AASHTO T-180 test for the furnished material.
- H. The Contractor shall not place the finished surface (asphalt, curb and gutter, grass, etc.) until the specified densities are met at each test location and the Engineer gives his approval for placement.
- I. Trench flooding with water as a method of compaction is prohibited.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 02550

### WATER MAINS AND APPURTENANCES

#### PART 1 - GENERAL

##### 1.1 Description

- A. Scope: Water mains and appurtenances.

##### 1.2 Additional Requirements Specified Elsewhere

- A. Summary of Work: Section 01010.
- B. Shop Drawings, Product Data and Samples: Section 01340.

##### 1.3 Related Work Specified Elsewhere

- A. Trenching and Backfilling for Pipelines: Section 02221.
- B. Erosion Control and Seeding: Section 02900.

##### 1.4 Quality Control

- A. Regulatory Agencies: Pipe for potable water service shall bear the National Sanitation Foundation Seal.
- B. Source Quality Control: Pipe shall be clearly marked with pipe size, class, type, test pressure and manufacturer's name.
- C. Reference Standards:
  - 1. AWWA C-900 Pressure Pipe.
  - 2. Unibell Plastic Pipe Association "Recommended Standards for Installation of PVC Pressure Pipe".
  - 3. "Handbook of Ductile Iron Pipe", Ductile Iron Pipe Research Association.

##### 1.5 Submittals

- A. Shop Drawings and Product Data:
  - 1. Submit dimensional data for all pipe and fittings.
  - 2. Submit descriptive literature and specifications for all products proposed for use on this project, including valves, fittings, hydrants and accessory items.

##### 1.6 Product Delivery, Storage and Handling

- A. Pipe and accessories shall be unloaded and stored at the jobsite in a manner that will not damage pipe or fittings.
- B. Contractor is responsible for safe storage of all materials until they have been incorporated into the completed project.

##### 1.7 Measurement and Payment Conditions

- A. Lump Sum Contract.
  - 1. No direct measurement of quantities will be made except those necessary to verify compliance with plans and specifications.
  - 2. Payment will be taken to be included in the lump sum contract amount for the work element to which it relates.
- B. Unit Price Contract.
  - 1. Pipe.
    - a. Water main will be measured by the linear foot, parallel with the ground, including measurement through valves and fittings.

- b. Payment will be at the contract unit price per linear foot.
- 2. Pipe Fittings and Valves.
  - a. Water main fittings and valves will be measured per each of the respective size and type.
  - b. Payment will be at the contract unit price per each.
- 3. Fire Hydrants.
  - a. Fire hydrants will be measured per each assembly, including pipe lead and auxiliary valve.
  - b. Payment will be at the contract unit price per each, such payment including compensation for the auxiliary valve and 6" pipe lead up to and including 20 l.f. of length.

## PART 2 - PRODUCTS

### 2.1 Pipe Materials

- A. Distribution System Pipe (PVC):
  - 1. PVC, AWWA C-900, 150 psi, SDR 18.
  - 2. Joints: Push-on integral bell and rubber ring gaskets, ASTM D-3139 and F-477.
  - 3. Exterior Coating: None.
  - 4. Interior Lining: None.
  - 5. Gaskets: Vulcanized rubber.
  - 6. Manufacturer: CertainTeed "Fluid-Tite" or equal.
- B. Distribution System Pipe (Ductile Iron):
  - 1. Ductile Iron, ANSI/AWWA C151/A 21.51, pressure class 350, thickness class 50.
  - 2. Joints: mechanical joints.
  - 3. Exterior coating: bituminous (buried applications).
  - 4. Interior coating: cement mortar per ANSI/AWWA C104/A21.4.
  - 5. Gaskets: vulcanized rubber, ANSI/AWWA C-111/A21.11.
  - 6. Bolts for mechanical joints: Cor-Blue, or equal.
- C. Ductile Iron Fittings:
  - 1. Ductile iron, compact type, ANSI/AWWA C-153/A21.53, or standard, ANSI/AWWA C-110/A21.10, Pressure Class 350.
  - 2. Joints: mechanical joints, ANSI/AWWA C-III/A21.11.
  - 3. Exterior Coating: Epoxy per AWWA C-116, 6 mil.
  - 4. Interior Lining: Epoxy per AWWA C-116, 6 mil.
  - 5. Gaskets: Vulcanized rubber, non-tipped, ANSI/AWWA C-III/A21.11.
  - 6. Bolts for mechanical joints shall be NSS "Cor-Ten" corrosion resistant type.
- D. Sleeve Couplings:
  - 1. Comply with ANSI/AWWA C219.
  - 2. Ductile iron or stainless steel construction.
  - 3. Ductile iron shall be epoxy coated.
  - 4. Bolts and nuts shall be stainless steel or approved alternative corrosion resistant alloy.

### 2.2 Pipe Accessories

- A. Gate Valves:
  - 1. Iron body resilient seated solid wedge, non-rising stem per AWWA C-509, Mueller, American flow Control, Waterous, or Engineer approved equal.
  - 2. Mechanical joint ends per ANSI/AWWA C-III/A21.11.
  - 3. Wrench nuts per AWWA C-500.
  - 4. Valves shall be internally and externally epoxy coated per AWWA C-550.
  - 5. Gate valves used as tapping valves or auxiliary gate valves mounted directly to hydrant shoes shall meet the requirements of this specification, but shall have one mechanical joint end and one flanged end (ANSI B.16.1).
- B. Valve Boxes:
  - 1. Cast iron, screw-type extension sleeve, 5 1/4" dia. with 3/16" casting thickness, adjustable to the heights indicated on the drawings using extension pieces. The top piece shall be at least 24" in length.

2. The cast iron cover of the valve box shall be a drop lid.
  3. Cover shall be marked "water".
  4. Valve boxes shall be Tyler or equivalent.
- C. Fire Hydrants:
1. Comply with AWWA C-502, Mueller A-423 or Waterous WB-67 Pacer.
  2. Bury Depth: 6'-6" minimum, or as called for on plans.
  3. Valve opening: 5 1/4".
  4. Nozzles: Two-2 1/2" nozzles and one 4 1/2" nozzle, NST threads.
- D. Curb Stop Valves
1. General: Curb stops shall be of bronze construction conforming to AWWA C800. Curb stops shall have Minneapolis pattern for threaded connection to curb boxes and shall turn only 90 degrees.
  2. Curb stops for 3/4 and 1 inch copper pipe shall be Mueller Mark II Oriseal, or equal, with compression type connections.
- E. Corporation Stops
1. Corporation Stops - Service Lines:
  2. Corporation stops for 1, 1 1/2 and 2 inch, copper service lines shall have male iron pipe thread by compression-type connections. Curb stops for service lines shall be Mueller, Ford Ballcorp Corporation Stops or equivalent.
- F. Service Saddles.
1. General: Saddles shall be sized for the appropriate pipe and tap size to be installed. Saddles shall be manufactured specifically for the type of pipe being tapped (PVC).  
  
Saddles for 6 inch and larger pipe. Service saddles for 6 inch and larger PVC pipe shall provide full-circumferential support of the pipe. Service saddles shall be one of two general types: stainless steel or bronze.
    - a. Stainless steel saddles shall be of type 304 stainless steel construction. Saddles shall be minimum 5 inches wide for 4 inch and larger pipe. Outlet taps shall be stainless steel with FIPT connections sized as required. Saddles shall have Buna-N rubber gaskets. Nuts and bolts shall be type 304 stainless steel with bolts an integral part of the saddle such that only one nut per bolt is required. A minimum of two bolts is required for saddles with taps 1 1/2 or 2 inches in size. Saddles shall be Ford Style FS303, Power Seal Model 3412, Smith-Blair Models 371 and 372, or equivalent.
    - b. Bronze saddles shall be of bronze construction meeting the requirements of ASTM B62. Saddles shall be 2 inches wide minimum and shall be of 2-piece construction with a buckle hinge assembly on one side and 2-bolt connection assembly on the opposite side. Outlet taps shall be bronze with FIPT connections sized as required. Saddles shall have SBR rubber gaskets. Nuts and bolts shall be silicon bronze. Bronze saddles shall be Power Seal Style 3401/3403 as appropriate for the specific pipe, or equivalent.
- G. Joint Restraining Devices:
1. D.I. pipe to D.I. fitting with mechanical joint fittings: EBBA Megalug Series 1100, 1100 SD, or equal.
  2. PVC pipe to D.I. fittings with mechanical joint fittings: EBBA 2000 PV, or equal.
  3. PVC pipe to PVC pipe, push on fittings: EBBA 2500, or equal.

### 2.3 Miscellaneous Accessories

- A. Pipe Lubricant: Per pipe manufacturer's recommendations.
- B. Locator Wire:
  1. Solid copper AWG #12.
  2. Polyethylene insulation, blue color, .045" thickness.
  3. Splices shall be waterproof, 3M epoxy, or equal.
  4. Tracer wire access box: 2 1/2" diameter, C.I. lockable, Valvco Terminal Box, or equal.
- C. PVC Encasing Pipe: Where PVC Pipe is used to encase the water main due to inadequate vertical clearance at a sewer main crossing, the PVC pipe shall be PVC sewer pipe per ASTM D 3034.
- D. Tie Rods: Steel, ASTM 307, galvanized, minimum 5/8" diameter.

- E. Polyethylene encasement: ANSI A21.5, seamless tube, black ASTM D1248, Type 1, Class C, Grade G-1, 8 mil thickness. Tape for joints in polyethylene shall be 3M "Scotchwrap 50" or equal.
- F. Concrete for Thrust Blocks: Cement Content - 564 lbs. per cubic yard; Maximum coarse aggregate of one inch. Maximum slump of 6 inches admixtures for air-entraining; Minimum compressive strength of 3,000 psi at 28 days.
- G. Pipeline Insulation:
  - 1. Polystyrene sheet per AASHTO M230-70.
  - 2. 1.6 pcf density, 25-psf compressive strength.
  - 3. Thickness per plans, 2" minimum.

## PART 3 - EXECUTION

### 3.1 Alignment and Grade

- A. Lay water main to lines and grades established and indicated on the plans. If grade is not indicated, provide cover depth shown, but not less than 6'-0" unless directed otherwise by the Engineer.
- B. If unforeseen obstructions are encountered during the progress of the work and interfere with the proposed vertical or horizontal alignment of the pipeline, the Engineer will alter the plans and order a deviation in line, and/or grade, or may arrange for the removal or relocation of the obstruction. If pipe grades are established on the plans, the Contractor shall not deviate from plan line or grade without Engineer's approval.

### 3.2 Installation

- A. Cutting Pipe:
  - 1. Cut pipe neatly without damage to pipe.
  - 2. Cut smooth, straight, and at right angles to the pipe axis using saw or abrasive wheel.
  - 3. Dress and bevel end of cut pipe to remove roughness and sharp corners.
- B. Cleaning:
  - 1. Thoroughly clean pipe and fittings of foreign matter before installation.
  - 2. Keep pipe and fittings clean until piping system placed into service.
  - 3. Clean joint contact surfaces immediately prior to jointing.
  - 4. Trenching:
    - a. Comply with the requirements of specification 02221.
- C. Jointing and Laying Pipe:
  - 1. Lay pipe with bell ends facing in the direction of laying.
  - 2. Comply with pipe manufacturer's recommended laying and joining instructions, and with Unibell Standards, unless specifically required otherwise by these specifications.
  - 3. Mechanical Joints:
    - a. Do not over tighten joints; if an effective seal is not obtained, disassemble joint, clean thoroughly, and reassemble.
    - b. Where tie rods are used for restraining joints, align holes carefully to permit installation of harness bolts.
  - 4. Push on Joints:
    - a. Clean and lubricate joint surfaces immediately before completing the joint.
    - b. Bevel the spigot ends of field cut piping.
  - 5. Mechanical Sleeve Type Couplings.
    - a. Cut pipe ends clean square and smooth.
    - b. Leave a space not less than 1/4" or more than 1" between pipe ends.
- D. Anchorage.
  - 1. Provide a complete system of reaction blocking and/or mechanical restraint to prevent pipe movement caused by internal pressure. Mechanical restraint is required when specifically called for a detailed on the plans; otherwise, restraint or blocking is at Contractor's discretion.
  - 2. Provide thrust blocking and/or restraining system at a tees, crosses, bends deflecting 11 1/4° or more, plugs, caps and similar locations whether specifically indicated on the drawings or not.

3. Concrete thrust blocking shall:
  - a. Provide the bearing area as shown on the plans, or as directed by the Engineer.
  - b. Blocking shall extend from the fitting to solid undisturbed earth, and shall be installed such that the joints are not covered by concrete.
  - c. Where mechanical joint fittings are being blocked, provide polyethylene encasement completely over the fitting to protect the bolts from concrete.
  - d. If adequate support against undisturbed earth cannot be obtained, provide harness or tie bolt assemblies.
  - e. The minimum thickness of concrete between the fitting and the soil bearing area shall be 6".
4. Where prior approval of the Engineer is obtained, the Contractor may substitute acceptable joint restraining devices for concrete thrust blocking.
5. Coat all steel rods, clamps, bolts or other metal accessories used in tapping saddles, anchorages, harnesses or other devices which are subject to earth contact with 2 coats of coal tar epoxy. Apply coal tar epoxy to clean dry surfaces. Apply in two distinct operations with adequate cure time between coats.
6. In lieu of coal tar coating of metal accessories, provide polyethylene tube protection over entire area to be protected with ends taped firmly closed using circumferential turns of tape. The polyethylene encasement shall extend at least 2 feet beyond the area to be protected.
- E. Placing Hydrants and Auxiliary Valves.
  1. Hydrants and auxiliary gate valves and boxes shall be placed in a vertical position at the locations indicated on the plans.
  2. Excavate an area not less than 18" square and 18" deep below the base of each hydrant and fill this excavation with 3/4" to 1" clean rock or gravel before placing the hydrant.
  3. After the hydrant is placed, construct a concrete thrust block between the back of the hydrant and the firm undisturbed earth at the back of the hydrant excavation.
  4. Place an additional quantity of clean rock or gravel at the base of the hydrant to completely cover the base of the hydrant to a depth of at least 6" above the barrel drain ports.
  5. Place the hydrant auxiliary gate valve in the position indicated on the plans. Where the valve is to be located immediately adjacent to the hydrant, provide a flanged hydrant inlet with a flanged by mechanical joint valve, with the flanged connection made between the valve and hydrant before the hydrant is set in the excavation.
  6. Set the hydrant with the bury line at the finished ground surface. Contractor shall refer to plans for finish grade elevations which vary from existing ground elevations.
- F. Placing Valves and Valve Boxes.
  1. Valves shall be placed on a precast concrete block, with a thickness of at least 6" and a surface area of at least 8" x 18", and centered at the valve center.
  2. Valves and boxes shall be placed in a vertical position, with the top of the valve box flush with the pavement in paved areas, and approximately 1" above finish grade in turfed areas.
  3. Where the plans indicate that the future grade at the valve location will be higher or lower than the surface elevation at the time of valve installation, the Contractor shall provide the correct combination of extension pieces such that the elevation of the valve box can be adjusted to the future finish grade without replacing the valve box.
- G. Locator Wire:
  1. Lay locator wire along with the pipe near the top of the pipe embedment zone, taking care not to damage the wire during backfilling.
  2. Bring the wire unspliced to the surface at each fire hydrant.
  3. Terminate wire at access box lids with 3' of slack, and wire slack folded neatly into the box.

### 3.3 Water Main and Sewer Main/Storm Sewer Separation

- A. Vertical Separation at Crossings:
  1. Water mains may cross above sanitary and storm sewers with a minimum vertical distance of eighteen (18) inches between the invert of the water main and the top of the sewer. In these cases where the water main is above the sewer and there is at least 18 in. of separation, then at the crossings one full 20 ft. length of water pipe shall be centered on the crossing.

2. A water main may cross above a sewer main with a vertical separation of less than eighteen (18) inches or below the sewer main if either the water or sewer main is encased in PVC, ductile iron, or six (6) inches of concrete for at least ten (10) feet each side of the crossing. If PVC or ductile iron is utilized as encasement material, the ends shall be sealed with six (6) inches of concrete.
  3. Water mains crossing under vitrified clay sewer pipes or concrete sewer pipes shall be encased in six (6) inches of concrete extending ten (10) feet either side of the crossing. The 10 feet either side shall be measured from the outside wall of the sewer to the end of the encasement and is not measured from the centerline of the sewer main.
- B. Water Main and Sewer Main/Storm Sewer Horizontal Separation:
1. Water mains shall be constructed with 10 feet of horizontal separation from any existing sanitary or storm sewer or proposed sanitary or storm sewer. The 10 feet horizontal separation shall be the clear distance (water pipe sidewall to sewer pipe sidewall) and not the centerline distance between the utilities.
  2. The following installation requires Engineer's approval and is appropriate for installations where the 10 feet separation physically is not possible.
    - a. A water main may be constructed closer than 10 feet to a Sanitary or Storm sewer if it is laid in a separate trench or it is laid in the same trench and the water main is located on the opposite side on a bench of undisturbed earth. In both cases, the elevation of the crown of the sewer has to be at least 18 inches below the invert of the water main. The sewer main shall be constructed of water main pipe (pressure class pipe) meeting the requirements of this specification and pressure tested for water tightness in accordance with AWWA standards for leakage testing.
    - b. As an alternative to constructing the sewer with water main pipe (pressure class pipe) and pressure testing the sewer, it would also be acceptable to either encase the water or sewer main with 6 inches of concrete or to encase either the water or sewer within a PVC or cast iron casing.

### 3.4 Pressure Testing

- A. Every section of PVC water main between successive valves or other closures shall be tested in accordance with AWWA C-605. Ductile iron water main shall be tested in accordance with AWWA C-600.
- B. Each section shall be tested by applying a hydrostatic pressure of 150 psi as measured by a gauge at the lowest hydrant.
- C. Lines shall be filled slowly (velocity less than 1 fps) and all air completely expelled from pipes prior to pressure testing.
- D. Allowable leakage shall be not more than in the following table.

| Allowable Leakage in Gallons<br>Per Hour Per 1,000 Feet of Pipe<br>(GPH) |                 |                  |                  |                  |                  |                  |
|--------------------------------------------------------------------------|-----------------|------------------|------------------|------------------|------------------|------------------|
| Average Test Pressure (PSI)                                              |                 |                  |                  |                  |                  |                  |
| Pipe<br>Dia.<br>(in.)                                                    | 50 psi<br>(gph) | 100 psi<br>(gph) | 150 psi<br>(gph) | 200 psi<br>(gph) | 250 psi<br>(gph) | 300 psi<br>(gph) |
| 4                                                                        | 0.19            | 0.27             | 0.33             | 0.38             | 0.43             | 0.47             |
| 6                                                                        | 0.29            | 0.41             | 0.50             | 0.57             | 0.64             | 0.70             |
| 8                                                                        | 0.38            | 0.54             | 0.66             | 0.76             | 0.85             | 0.94             |
| 10                                                                       | 0.48            | 0.68             | 0.83             | 0.96             | 1.07             | 1.17             |
| 12                                                                       | 0.57            | 0.81             | 0.99             | 1.15             | 1.28             | 1.40             |
| 14                                                                       | 0.67            | 0.95             | 1.16             | 1.34             | 1.50             | 1.64             |
| 16                                                                       | 0.76            | 1.08             | 1.32             | 1.53             | 1.71             | 1.87             |
| 18                                                                       | 0.86            | 1.22             | 1.49             | 1.72             | 1.92             | 2.11             |
| 20                                                                       | 0.96            | 1.35             | 1.66             | 1.91             | 2.14             | 2.34             |
| 24                                                                       | 1.15            | 1.62             | 1.99             | 2.29             | 2.56             | 2.81             |
| 30                                                                       | 1.43            | 2.03             | 2.48             | 2.87             | 3.21             | 3.51             |
| 36                                                                       | 1.72            | 2.43             | 2.98             | 3.44             | 3.85             | 4.21             |

- E. The above-described tests shall be made under the observation of the Engineer. The Contractor shall correct and/or replace any faulty material or workmanship at his expense to the satisfaction of the Engineer. Tests shall be repeated after any replacements have been made.
- F. All necessary pumps, appliances, gauges and labor for the test shall be furnished by the Contractor at his own expense.
- G. Replace all defective fittings pipe or other accessories with new material. The use of repair clamps or sleeves to repair defective materials will not be permitted.

### 3.5 Disinfection of Water Main.

#### A. General:

- 1. Disinfection shall comply with the requirements of AWWA Standard C651, C605, and C600. All new water mains and appurtenances shall be disinfected before they are placed in service. All water mains taken out of service for inspecting, repairing, or other activity that might lead to contamination shall be disinfected before they are returned to service.

#### B. Preventative Methods:

- 1. The tablet method specified below may be used only if the pipes and appurtenances are kept clean and dry during construction. Therefore, the Contractor shall take precautions to protect the interiors of pipes, fittings, and valves against contamination. Pipe delivered for construction shall be strung so as to minimize the entrance of foreign material.
- 2. If dirt enters the pipe, it shall be removed and the interior of the pipe surface swabbed with a 1%-5% hypochlorite disinfecting solution. If, in the opinion of the Engineer, the dirt remaining in the pipe will not be removed by flushing, the Contractor shall clean the interior of the pipe by mechanical means, such as a hydraulically propelled foam pig. Following mechanical cleaning, the Contractor shall flush the line, achieving minimum flushing velocities of at least 30 ft/s and shall then disinfect the pipe using either the continuous-feed or the slug method. Flushing a completed main will not be allowed as a method of cleaning sediment allowed to enter the pipe during construction.
- 3. All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. If water accumulates in the trench, the plugs shall remain in place until the trench is dry. If, for any reason, the water main is flooded during construction, it shall be cleared of the floodwater by draining and flushing with potable water until the main is clean. The section exposed to floodwater shall then be filled with a chlorinated potable water that, at the end of a 24-hour holding period, will have a free chlorine residual of not less than 25 mg/l. The chlorinated water shall then be flushed from the main and after construction is completed, the main shall be disinfected using the continuous-feed or slug method.

#### C. Disinfectant:

- 1. Unless specified otherwise in the Detailed Specifications or on the Drawings, or required by other provisions of this specification, disinfection shall be accomplished by the tablet method. The Contractor shall obtain the Engineer's approval prior to using a method other than the tablet method.
- 2. This method requires that the pipes and appurtenances be kept clean and dry. This method may not be used if the pipes and appurtenances are not kept clean and dry and in the event this happens, the Engineer must be contacted.
- 3. Tablets shall be 5-gram calcium hypochlorite tablets conforming to AWWA Standard B300 and shall contain between 65 and 70 per cent available chlorine. Tablets shall be fresh and shall be stored in a cool, dry, and dark environment to prevent loss of strength, which occurs upon exposure to the atmosphere.
- 4. Do not use calcium hypochlorite intended for swimming pool disinfection, as this material has been sequestered and is extremely difficult to eliminate from the pipe after the desired contact time has been achieved.

#### D. Dosage:

- 1. Unless otherwise specified, the Contractor shall place hypochlorite tablets in each section of water pipe installed, including the hydrant branch, according to the table below.

**NUMBER OF 5-GRAM CALCIUM HYPOCHLORITE  
TABLETS REQUIRED  
(50 mg/l Dose)**

| Length of<br>Pipe Section<br>(Ft.) | Diameter of Pipe<br>(In.) |   |   |    |    |    |    |
|------------------------------------|---------------------------|---|---|----|----|----|----|
|                                    | 4                         | 6 | 8 | 10 | 12 | 14 | 16 |
| 13 or less                         | 1                         | 2 | 2 | 3  | 5  | 6  | 8  |
| 13 - 18                            | 1                         | 2 | 3 | 5  | 6  | 8  | 11 |
| 18 - 20                            | 1                         | 2 | 3 | 5  | 7  | 9  | 12 |
| 20 - 30                            | 2                         | 3 | 5 | 7  | 10 | 14 | 18 |
| 30 - 40                            | 2                         | 4 | 6 | 9  | 14 | 18 | 24 |

For Pipes 18 inches and larger refer to drawings or detailed specifications for disinfection requirements.

**E. Placing Tablets:**

1. Tablets shall be adhered to the inside top section of each pipe length using a food-grade adhesive, such as Permatex Form-A-Gasket No. 2 or Permatex Clear RTV Silicon Adhesive Sealant as manufactured by Loctite Corporation. There shall be no adhesive on the tablet except on the broad side attached to the surface of the pipe. If the tablets are attached before the pipe section is placed in the trench, their position shall be marked on the pipe section to indicate the pipe has been installed with the tablets at the top.

**F. Filling and Contact:**

1. The water main shall be filled slowly so that the water velocity is no greater than one foot per second. Precautions shall be taken to assure that air pockets are eliminated. The water shall be allowed to stand in the pipe for at least 24 hours. Valves shall be positioned so that the strong chlorine solution in the treated main will not flow into water mains in active service. The chlorinated water shall remain in the pipe for at least 24 hours. The Contractor shall notify the Engineer at the end of the 24-hour retention period prior to flushing to allow the Engineer to check the chlorine residual in the pipe. If the chlorine residual is less than 25 mg/l, the Contractor shall, at his expense, disinfect the water main again by the continuous-feed method or the slug method, as approved by the Engineer.

**G. Flushing:**

1. Within 48 hours of the end of the 24-hour retention period, the Contractor shall flush the heavily-chlorinated water from the main until the chlorine concentration in the water leaving the main is no higher than that prevailing in the system or is less than 1 ppm as determined by the Engineer. In addition to the above requirements, a minimum flushing velocity of 3 feet per second and flushing duration of one minute per 100 feet of pipe being flushed shall be achieved per the following table.
2. Flushing shall be done in accordance with AWWA C651. Flushing shall be accomplished through use of hydrants or temporary fittings installed for the purpose; flushing through corporations and/or water service lines is prohibited. The Contractor shall obtain the Engineer's approval prior to installing special fittings for flushing.
3. Flushing shall be conducted in such a way as to prevent contamination of existing water mains and/or water service lines and to minimize traffic and pedestrian hazards and nuisance conditions. When possible, flushing shall be to the nearest storm sewer or drainage way. Flushing to the sanitary sewer is prohibited.
4. The Contractor will be responsible for any damage to fish and/or aquatic life caused by the chlorine residual. If Chlorine reaches or is detected in a stream, river, or other waterway the Contractor will be in violation for that discharge. For more information, contact SD DENR Surface Water Quality Program at (605) 773-3351. Refer to section below, "Disposal of Chlorinated Water" for additional information regarding neutralizing chlorine residual.
5. A velocity in the main of at least 3.0 fps shall be attained during flushing. The flushing shall proceed until the chlorine concentration in the water leaving the main is no higher than that prevailing in the system or is less than 1 ppm as determined by the Engineer. In no case shall the flushing duration be less than that indicated in the following table.

## REQUIRED FLOW AND MINIMUM FLOW DURATION TO FLUSH PIPELINES

| Pipe Diameter<br>(In.) | Flow required to<br>produce 3.0 fps<br>Velocity in Main*<br>gpm | Fire Hydrants                 |                         | Minimum<br>Flushing Duration<br>(minutes per<br>100 feet of pipe) |
|------------------------|-----------------------------------------------------------------|-------------------------------|-------------------------|-------------------------------------------------------------------|
|                        |                                                                 | Number of<br>Fire<br>Hydrants | Outlet<br>Size<br>(In.) |                                                                   |
| 4                      | 120                                                             | 1                             | 2-1/2                   | 1                                                                 |
| 6                      | 280                                                             | 1                             | 2-1/2                   | 1                                                                 |
| 8                      | 480                                                             | 1                             | 2-1/2                   | 1                                                                 |
| 10                     | 740                                                             | 1                             | 2-1/2                   | 1                                                                 |
| 12                     | 1100                                                            | 2                             | 2-1/2                   | 1**                                                               |
| 14                     | 1450                                                            | 2                             | 2-1/2                   | 1**                                                               |
| 16                     | 1950                                                            | 3                             | 2-1/2                   | 1**                                                               |

The table shows the rates of flow required to produce a velocity of 3.0 fps in pipes of various sizes and the minimum flushing duration per 100 feet of pipe length

For pipes 18 inches and larger refer to drawings or detailed specifications for flushing requirements.

\* Requires a minimum 40-psi pressure in the main and the hydrant flowing to atmosphere.

\*\* Assumes that the corresponding flow rate is being met.

6. Per AWWA C651, the Contractor shall sample for coliform bacteria contamination. After the water lines have been flushed, the contractor shall sample the lines. Two consecutive samples of water from the end of the disinfected/flushed line must be collected at least 24 hours apart. These samples must be submitted to the State Health Laboratory in Pierre, or other laboratory acceptable to the SD DENR and the Engineer. The samples must show the absence of coliform bacteria contamination before any taps may be made to the main or the main is activated and placed into service. Copies of all sample results shall be submitted to the Engineer within 48 hours of receipt thereof.
  7. Because of the high risk of contamination during sampling, the Contractor shall use certified lab personnel or a trained sampler to collect all samples submitted for testing.
- H. Disposal of Chlorinated Water:
1. When, in the opinion of the Engineer or Contractor, the potential exists for chlorinated water to reach a stream, river, or waterway, the Contractor shall apply a neutralizing chemical to the water to be wasted to neutralize thoroughly the chlorine residual remaining in the water as listed in Appendix B of AWWA Standard C651. The Contractor will be responsible for any damage to fish and/or aquatic life caused by the chlorine residual. If Chlorine reaches or is detected in a stream, river, or other waterway the Contractor will be in violation for that discharge. For more information, contact SD DENR Surface Water Quality Program at (605) 773-3351.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 02810

### SOIL PREPARATION AND SEEDING

#### PART 1 - GENERAL

##### 1.1 Description

- A. Work under this section shall include all labor, equipment, materials and services specified or incidental necessary to complete all work of soil preparation, fine grading, seeding, planting, fertilizing, sodding and any other special items shown on drawings or specified herein.
- B. All materials shall be the best available and source description shall be submitted for review.

#### PART 2 - PRODUCTS

##### 2.1 Fertilizer

- A. The fertilizer shall be 18-46-0 (N/P/K) content commercial fertilizer conforming to State fertilizer laws. This mixture shall be delivered to the site, plan-mixed to ensure proper homogenization with manufacturer's guaranteed analysis attached.
- B. Application Rate.
  - 1. Fertilizer shall be applied at 200 lb./acre unless recommended otherwise by the seed supplier.

##### 2.2 Grass Seed Mixture

- A. Road Ditch Mixture
  - 1. Mixture.
    - 30% Kentucky Bluegrass
    - 25% Timothy
    - 20% Brome grass
    - 10% Tall Fescue
    - 10% Alsike Clover
    - 5% Medium Red Clover
  - 2. Application Rate: 200 lbs./acre.
- B. Quality: Submit labeling of mixture with supplier, origin, purity and germination date.

##### 2.3 Topsoil

- A. Topsoil shall be salvaged material from the grading and clearing operations.
- B. Thickness: Topsoil thickness shall be 4" in all seeded areas.

##### 2.4 Mulch

- A. Hay Mulch: Native or tame grass hay in a friable, air-dry condition.

#### PART 3 - EXECUTION

##### 3.1 Procedure

- A. Work procedures shall follow customary practice and shall commence as soon as the site is available and as soon as weather conditions permit.

### 3.2 Finish Grade

- A. Finish grades, within this contract, shall be those shown on the plans and may have a tolerance of 0.1 foot. Where no grades are shown, areas shall have a smooth and continual grade between existing or fixed controls (such as walks, curbs and elevations at steps of buildings) and elevations shown on plans. All finish grades shall meet approval of the Engineer.
- B. Finish grading shall consist of uniformly and thoroughly cultivating soil to a minimum of 4 inches by approved power equipment. Areas inaccessible to power equipment shall be cultivated by hand.
- C. After tilling, all areas shall be brought to uniform grade by floating or hand raking. Remove stones or foreign matter over two (2) inches in diameter from top two (2) inches of soil.
- D. Soil adjacent to curbs, paved areas or landscape edging shall be finished at one inch below top of edging or pavement.
- E. Grade lawn areas to finish grades, filling as needed or removing surplus dirt and floating areas to a smooth uniform grade as indicated on the plans. All lawn areas shall slope to drain.

### 3.3 Fertilizing

- A. Dry Application: Fertilize using fertilizer attachment to seed drill, drilling in advance of seeding, or by uniform spreading followed by tilling.

### 3.4 Seeding

- A. Plant grass in all areas where construction activity has disturbed the natural grass cover or where shown on plans. All disturbed areas shall be seeded except those where a different type of surface, such as pavement, is specifically shown on the plans. Road Ditch seed mixture shall be used in all areas.
- B. Prior to seeding, the Contractor shall sufficiently water, float and roll seeded areas so as to establish a smooth, uniform, reasonably firm, debris-free surface suitable for seeding.
- C. Dry Application: Seeding shall be performed with seed drill equipment.

### 3.5 Mulching

- A. Hay mulch application rate at 2 tons/acre. Anchor mulch by punching or light disking. Mulch shall be uniformly applied such that approximately 10% of soil is visible through the mulch, and so that mulch is not excessively thick in any area.
- B. Seeding shall be undertaken during one of two periods: August 15 through October 1 or April through June 1.

### 3.6 Maintenance

- A. Contractor shall maintain seeded areas until final project acceptance, including repair of erosion, and replacing mulch damaged by wind or other causes.
- B. Watering and/or mowing seeded areas by the Contractor after project closeout is not required under this contract. The Contractor shall maintain all seeded areas, including mowing and/or watering as necessary up to the time of project closeout.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 03200

### CONCRETE REINFORCEMENT

#### PART 1 - GENERAL

##### 1.1 The Requirements

- A. Contractor shall include all the necessary ties, chairs, and accessories required for support and spacing of the reinforced steel.
- B. All concrete and steel have been designed to conform with ACI 318, and details on all steel shall conform therewith, and with Chapter 5 of ACI 301.
- C. Fabrication tolerances, placement, detailing, and estimating practice shall be in accordance with the "Manual of Standard Practice," latest edition of the CRSI, and as covered in Chapter 8, "Placing Reinforcing Bars."

##### 1.2 Related Work Specified Elsewhere

- A. Cast-in-Place Concrete: Section 03300.

##### 1.3 Reference Specifications, Codes and Standards

- A. Commercial Standards
  - ACI 315 Details and Detailing of Concrete Reinforcement.
  - ASTM A185 Specification for Welded Steel Wire Fabric for Concrete Reinforcement.
  - ASTM A615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

##### 1.4 Submittals

- A. Contractor shall submit four (4) copies and one (1) set of shop drawings to the Engineer for review prior to fabrication. Sizes, dimensions for fabrication and diagram for placement of bars, and type and location of all accessories shall be indicated.

#### PART 2 - PRODUCTS

##### 2.1 Materials

- A. Deformed Billet steel bars shall conform to ASTM A615, Grade 60 as shown in engineering notes on the structural detail plans.
- B. Welded steel wire shall conform to ASTM A185, wire size and location is shown on the plans.
- C. Chairs for slabs exposed to view shall be plastic coated steel, or approved equal, to prevent rust stains on the exposed concrete.

##### 2.2 Spacers

- A. Provide spacers with tie wire at proper intervals to hold slab bars in position and to raise them above forms to distances shown. Support reinforcing on bolsters or chairs and carrying bars whether or not specifically called for on Drawings. Provide wire bar type supports complying with ACI 315, unless otherwise indicated. Do not use wood, brick, and other unacceptable materials.

## PART 3 - EXECUTION

### 3.1 Fabrication

- A. Reinforcing bars shall be bent cold, in the shop, with proper equipment for making cold bends. Field bending of reinforcement will not be allowed.

### 3.2 Cleaning and Storage

- A. Reinforcement upon delivery and before installation shall be cleaned and free of rust, scale, dirt, grease, oil, snow, ice, etc.
- B. Reinforcement shall be protected from rusting in storage. Steel having deposits of scale will be rejected.

### 3.3 Placement

- A. Reinforcement shall be placed accurately according to the plans and secured in position by approved accessories. Minimum clear distance between parallel bars shall not be less than 1-1/2 times the normal size of the coarse aggregate, and shall be as required by ACI 318.
- B. No splices of reinforcement shall be made except as shown on the plans, or as specified or authorized by the Engineer. Reinforcing shall be kept in the proper position during concrete placement.

### 3.4 Reinforcement Cover

- A. The reinforcing shall be protected by the thickness of concrete indicated on the plans. Where not shown otherwise, concrete coverage over the reinforcement shall be 1½ inches.

\*\*\*\*END OF SECTION\*\*\*\*

## SECTION 03300

### CAST-IN-PLACE CONCRETE

#### PART 1 - GENERAL

##### 1.1 The Requirements

- A. Concrete has been designed to conform with ACI 318 (latest edition). Concrete construction shall also conform to ACI 301 and ACI 350. Except where this SECTION is in variance therewith, such publications are hereby made a part of this specification.
- B. Except as mentioned in Paragraph 1.2, this section shall include (but is not limited to) the following:
  - 1. Footings and foundation walls of all descriptions.
  - 2. Installation of vapor barrier under concrete floors of buildings on gravel fill.
  - 3. Bases, pads and footings for equipment.
  - 4. Concrete fill in concrete block and bond beams
  - 5. Concrete accessories, and building in cast-in-place items furnished under other sections
  - 6. Dovetail insert slots as necessary for masonry.
  - 7. All design mixes and tests.
  - 8. Expansion joints in concrete.

##### 1.2 Related Work Specified Elsewhere

- A. Factory Coated Bolted Steel Tank for Water Storage: Section 13610.

##### 1.3 Reference Specifications, Codes and Standards

- A. Commercial Standards
  - ACI 211.1..... Recommended Practice for Selecting Proportions.
  - ACI 212.2R..... Guide for Use of Admixtures in Concrete.
  - ACI 214..... Recommended Practice for Evaluation of Strength Test Results of Concrete.
  - ACI 304..... Recommended Practice for Measuring, Mixing and Placing Concrete.
  - ACI 305..... Recommended Practice for Hot Weather Concreting.
  - ACI 306..... Recommended Practice for Cold Weather Concreting.
  - ACI 308..... Recommended Practice for Curing Concrete.
  - ACI 315..... Details and Detailing of Concrete Reinforcement.
  - ACI 318..... Building Code Requirements for Structural Concrete.
  - ACI 347..... Guide to Formwork for Concrete.
  - ACI 350R..... Environmental Engineering Concrete Structures.
  - ASTM C31..... Methods for Making and Curing Concrete Test Specimens in the Field.
  - ASTM C33..... Specification for Concrete Aggregates.
  - ASTM C39..... Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  - ASTM C94..... Specification for Ready-Mixed Concrete.
  - ASTM C143..... Test Method for Slump of Portland Cement Concrete.
  - ASTM C150..... Specification for Portland Cement.
  - ASTM C192..... Methods for Making and Curing Concrete Test Specimens in the Laboratory.
  - ASTM C260..... Specifications for Air-Entraining Admixtures for Concrete.
  - ASTM C494..... Specifications for Chemical Admixtures for Concrete.

#### 1.4 Submittals

##### A. Mix Design:

The Contractor shall submit a design mix at least 3 weeks prior to scheduled concrete placement for each type and strength of concrete used for compliance with the specifications. An independent testing laboratory shall design a mix for each type of concrete specified.

##### B. Certified Delivery Tickets:

Where ready-mix concrete is used, the Contractor shall provide delivery tickets at the time of delivery of each load of concrete. Each certificate shall show the total quantities by weight of cement, sand, each class of aggregate, admixtures, and the total gallons of water in the load.

Each certificate shall, in addition, state the mix number, total yield in cubic yards and the time of the day when the batch was dispatched.

##### C. Admixture:

When a water-reducing admixture is to be used, the Contractor shall furnish mix designs for concrete with and without admixture.

#### 1.5 Quality Assurance

##### A. Tests on component materials and for compressive strength of concrete will be performed as specified herein.

##### B. Slump

1. Slump test will be done in accordance with ASTM C143.
2. The concrete shall be designed for as low a slump as is practical to fill the form, embed the reinforcing steel, and be free of voids or honeycomb. Use lower range for machine vibration. The Slump shall be as follows:
  - a. 1-inch minimum
  - b. 3-inch maximum for footings, caisson, substructure walls.
  - c. 4-inch maximum for slabs, beams, reinforced walls, columns.

These slump values do not apply when an approved high-range water reducer is used.

3. Slump shall be measured for each mixed batch of concrete, or each load delivered to the site.

##### C. Compression Tests

1. Engineer will take one (1) set of concrete cylinders for each day's pour of 25 cubic yards or less, plus one set for each additional 50 cubic yards poured on that day. Cylinders shall be of representative concrete, taken from mixer discharge at actual time of pouring. Owner will pay all costs of preparing, transporting to laboratory, and making of tests. All such tests shall be made at an independent testing laboratory approved by the Engineer. Contractor shall assist Engineer in making the test cylinders.
2. Each set shall consist of four cylinders. Cylinders shall be prepared as per ASTM C31. For first 24 hours, cylinders shall be stored and cured in 60 to 80 degree temperature range, and protected so no injury to the cylinders will occur. The cylinders from each set shall be sent to the testing laboratory after the initial 24-hour period, and one shall be tested at seven (7) days and two (2) at twenty-eight (28) days. One cylinder shall be held in reserve for later testing if needed. The cylinders shall be numbered consecutively and labeled with date of pour, slump when poured, location in building at which representative concrete is placed and name of Contractor and project. Copies of test shall be sent to the Engineer and Contractor. Compression tests shall be performed in accordance with ASTM C39.
3. Remaining test requirement shall follow ACI 301, except that if the average strength of any set of job-cured cylinders falls below the required strength, the cost of any additional cement found necessary to correct subsequent mixes shall be borne by the Contractor. Also, if the strength is found deficient, the cost of hardened concrete or load tests shall be borne by the Contractor. The Engineer

reserves the right to reject any portions of such questionable areas, if in his opinion, the tests indicate that such areas will not safely carry the design load.

4. All concrete which fails to meet these specifications is subject to removal and replacement at the cost of the Contractor.

D. Construction Tolerances

Finish concrete shall meet the following tolerances:

1. Variations from plumb  $\pm \frac{1}{4}$ -inch per 10 feet but not more than 1-inch maximum for entire length.
2. Variations from level or indicated grade.  $\pm \frac{1}{4}$ -inch per 10 feet but not more than  $\frac{1}{2}$ -inch for entire length.
3. Variations from horizontal  $\pm \frac{1}{4}$ -inch per 10 feet but not more than  $\frac{1}{2}$  inch total variation.
4. Variations in size and locations of openings or sleeves  $\pm \frac{1}{4}$ -inch
5. Reinforcing steel placement ACI 318, Section 7.5.2

Where tolerances are not stated in the specification, permissible deviations will be in accordance with ACI 347.

1.6 Product Delivery, Storage and Handling

- A. The Contractor shall be responsible for the delivery, storage and handling of products.
- B. Damaged or unsuitable product shall be removed promptly from the job site.

1.7 Job Conditions

- A. Methods outlined in ACI 306 shall be followed if concrete is to be placed when ambient temperature is expected to be less than 40° F.
- B. Methods outlined in ACI 305 shall be followed if concrete is to be placed when ambient temperature is expected to exceed 90° F.

PART 2 - PRODUCTS

2.1 Materials

A. Cement:

1. The Portland Cement to be used shall meet the conditions to ASTM Specification C150, or Air-Entraining Cement ASTM C175, (Type II or IIA). All cement shall be from same manufacturer. High early strength cement may be used only upon the Engineer's approval.
2. The C<sub>3</sub>A content of the Portland Cement shall be less than 8 percent in all concrete. Where aggregates are alkali reactive, a cement containing less than 0.60 percent alkalis shall be used. Fly ash shall not be used in the concrete mix design.

B. Aggregate:

1. All fine and coarse aggregate shall be natural sands and gravels or crushed stone washed and cleaned and conforming to ASTM C33 and shall be free of shale, chert, coal, iron oxide and other deleterious material.
2. The maximum size of coarse aggregate shall not be larger than one-fifth the narrowest dimension between forms of the member for which the concrete is to be used, nor larger than three-fourths of the minimum clear spacing between reinforcing bars. The coarse aggregate shall conform to Table II of ASTM Specification C33.

C. Water:

1. Water shall be potable, clean, and free from strong acids, alkalies, oils or organic materials.

D. Admixtures (Air-entrained Concrete):

1. Admixtures for air-entrained concrete shall be used for sidewalks and all concrete exposed to the weather or wastewater.
2. Air-entraining admixtures shall meet the requirements of ASTM C260.
3. The air content of air-entrained concrete shall be 5 to 6 percent for concrete with  $\frac{3}{4}$ " maximum size aggregate and 4 to 5 percent for concrete with 1 -  $\frac{1}{2}$ " maximum size aggregate.
4. Manufacturer or Equal:
  - a. Darex
  - b. Toch Toxement AEA
  - c. Sika AEA
  - d. Protex

E. Chemical Admixture:

1. The use of chemical admixture shall be in accordance with ACI 212.2R and shall be approved by the Engineer.
2. The admixture shall meet the requirements of ASTM C494.
3. No chlorides shall be used.

F. Expansion Joints:

1. Expansion joints in walks and curbs shall be pre-molded cork and asphalt.
2. Manufactures or Equal:
  - a. Brock White #3720

G. Waterstops:

1. PVC waterstops shall be provided as shown in the drawings and shall meet the Corps Of Engineers specification CRD-C572.
2. All waterstops shall be 4" minimum.
3. Waterstops shall be applied continuously and all joints heat welded.
4. Waterstops shall be tied in place prior to pouring of concrete as recommended by the manufacturer.
5. Manufacturer or Equal:
  - a. Greenstreak  
Style 782 (Horizontal Joints)  
Style 703 or 723 (Vertical Joints)  
Style 790 for Labyrinth (Attached Joints)
6. Bentonite based strip type waterstops, American Colloid R or equal, may be used only where detailed on the plans.

H. Non-Shrink Grout

1. All grout shall be non-metallic, non-gaseous which can be poured, pumped or damp packed. The grout shall be suitable for both interior and exterior application. It shall be non-shrink when tested in accordance with ASTM C1107 at a fluid consistency of 20-30 seconds.
2. The grout shall be a one-step product delivered to the job site in bags containing a premixed formulation requiring only the addition of water prior to use.
3. Precision non-shrink grout shall be used on all pumps, blowers, and equipment bases.
4. Manufacturer or Equal:
  - a. General Purpose: (attain 7000 psi strength in 28 days)
    - (1) Masterflow 713
    - (2) Duragrout - L&M 14K
  - b. Pump Bases, Equipment Pads: (shall attain 9000 psi strength in 28 days)
    - (1) Masterflow 928
    - (2) Crystex - L&M
    - (3) Fivestar

I. Water Plug

1. Water plug shall be used to seal any unused existing pipe penetration openings, seepage through floors and walls.
2. Manufacturer or equal
  - a. Brock White C-7160

## 2.2 Concrete Strength

- A. Mixes shall be designed to secure concrete having the compressive strength required by the drawings or stated in these specifications. Water/cement ratio shall be consistent with the concrete strength requirements. Surface water contained in the aggregate shall be included as part of the mixing water. Consistency shall be designed for good workability and plasticity for proper placing.
- B. Concrete of the various mixes indicated and as required in all sections of these specifications of drawings shall be proportioned and mixed for the following requirements:

| Mix Number                      | 1                                             | 2                                                                               | 3                          | 4                           |
|---------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------|----------------------------|-----------------------------|
| Compressive Strength at 28 Days | 4000                                          | 4000                                                                            | 4000                       | 3000                        |
| Minimum Cement Content          | 517 lbs per CY                                | 578 lbs per CY                                                                  | 564 lbs per CY             |                             |
| Maximum Water-Cement Ratio      | 0.45                                          | 0.45                                                                            | 0.45                       | 0.53                        |
| Portion of Structure            | Slabs in contact w/water, wastewater or fill. | Slabs, piers, and walls in contact w/water, wastewater or fill, slabs on grade. | Leveling slabs or topping. | Footings & pipe encasement. |
| Size of Coarse Aggregate        | 1½"                                           | ¾"                                                                              | 3/8" - #8                  | ¾"                          |
| Slump Maximum                   | 4"                                            | 4"                                                                              | 4"                         | 3"                          |
| Air Content                     | 4 ½ - 6 ½ %                                   | 5-7%                                                                            | 5-7%                       |                             |

## 2.3 Ready -Mixed Concrete

- A. At the Contractor's option, ready-mixed concrete may be used meeting the requirements as to materials, batching, mixing, transporting and placing as specified herein and in accordance with ASTM C94.
- B. Ready-mixed concrete shall not be allowed to stand in the truck more than one hour before placing in forms, including time en route.
- C. Each batch of ready-mixed concrete delivered at the job site shall be accompanied by a certified weighmaster delivery ticket furnished to the Engineer in accordance with Paragraph 1.4 C, specified herein.
- D. Water shall not be added at the job site unless authorized by the Engineer.

## PART 3 - EXECUTION

### 3.1 Subgrade Preparation

- A. Subgrade shall be free from standing water, mud and debris at the time of placing concrete.
- B. Earth surface shall be firm and damp.
- C. When concrete is to be placed on highly pervious materials which might allow flowing groundwater to damage fresh concrete, the contact surface shall be covered with a layer of asphalt-impregnated building paper or polyvinyl chloride sheeting prior to placement of the concrete.

### 3.2 Proportioning and Mixing

- A. Proportioning of concrete mix shall conform to the requirements of Chapter 3 of ACI 301.
- B. Mixing of concrete shall conform to the requirements of Chapter 7 of ACI 301.
- C. Slump: Maximum slump shall be as specified in Paragraph 1.5 B.
- D. Retempering: Retempering of concrete or mortar which has partially hardened will not be permitted.

### 3.3 Placing Of Concrete

- A. Placing of concrete shall conform to Chapter 8 of ACI 301.
- B. Plant-mixed concrete shall not be allowed to stand in the truck more than one hour before placing in forms, including time en route.

### 3.4 Curing and Cold Weather Requirements

- A. Curing of concrete shall conform to Chapter 12 of ACI 301 and to these specifications.
- B. Concrete must be kept wet at least five days. Any concrete subject to rapid drying from wind or sun shall be protected by canvas, straw, polyethylene, curing compound, or other approved methods for this period.
- C. Floors or walks shall not be used for any purpose until curing is complete. Floor, when used, shall be kept clean of nails, sand, and all abrasive materials.
- D. For cold weather work, the Contractor shall also follow recommendations in ACI 306. The Contractor shall be familiar with these procedures and shall provide protection as outlined in ACI 306. From October 15 to April 15, the concrete shall be delivered to the site at a temperature not less than 60° F. The Contractor may request a variance on a daily basis if the expected low temperature for the day is to be above 32° F.
- E. The Contractor shall maintain a daily log outlining the cold weather concreting protection methods used. A signed copy of these logs shall be submitted to the Engineer weekly. The log shall be a thorough, dated, daily diary giving clear reference to structure, location and quantity of each concrete pour. At a minimum the following information as outlined in ACI 306 shall be included in the diary:
  - 1. Date, time, and quantity of pour.
  - 2. Daily outside high temperature.
  - 3. Daily outside low temperature.
  - 4. Basic daily weather conditions including wind conditions, cloud conditions, and precipitation.
  - 5. Concrete temperature in truck at time of delivery.
  - 6. Concrete temperature ranges throughout the entire pour at the end of pour of on grade placements with a sketch and the temperature of the concrete at the end of the pour for walls and columns.
  - 7. Protection methods being utilized.
  - 8. Period of protection and temperatures of the concrete at 12-hour intervals during this protection period.
  - 9. If shelters are utilized, interior air temperatures of the shelter at 12 hour intervals.
  - 10. Precautions utilized to prevent the drying and carbonation of the concrete protected by shelters.
  - 11. Relative humidity inside the shelters.
  - 12. Method of gradual cooling of the concrete at the end of the protection period.
  - 13. Preparation and protection of the subgrade, forms, reinforcing steel, etc., prior to placement of the concrete.
- F. Ready mix suppliers log outlining the methods of heating the materials used in the concrete mixture for each pour.
- G. All admixtures to be used for cold weather concreting shall be submitted with the design mix data for approval. No calcium chloride accelerators will be allowed in the concrete.

### 3.5 Placing Reinforcement

- A. Steel shall be placed according to Section 03200, and also according to Section 5.5 of ACI 301, whichever is more rigid.
- B. Immediately after delivery, reinforcing shall be sorted for size, shape and length or by final usage. Store on racks clear of the ground and protect at all times from the weather.
- C. The Contractor shall cooperate with Engineer to permit inspection of reinforcement before concrete is placed. The Contractor shall notify Engineer 24 hours in advance of any concrete pour.
- D. Inspection by the Engineer does not relieve the Contractor of his responsibility to comply with the drawings and specifications. Pouring of the concrete signifies that the Contractor is satisfied with the placing of reinforcement, levels and lines of forms, placement of sleeves and forms for holes, locations of accessories, etc.

### 3.6 Construction Joints

- A. Construction joints shall be made only at points shown on the drawings or approved by the Engineer. All such joints shall be keyed with reinforcement as shown; joining faces shall be thoroughly cleaned, wetted and slushed with neat Portland Cement paste immediately before next pour.

### 3.7 Concrete Finish

- A. Finish on sidewalk shall be trowelled and broomed. Remaining finished concrete floors, tank bottoms, or stairs shall be smooth trowel finish.
- B. Steel trowel finishing shall be done in such manner as to produce a dense, smooth, impervious surface, free of blemishes, waves, dips, humps, pockets, cat-faces, or trowel marks. Care shall be taken that no excess water is present when the finish is started. Trowelling shall be delayed until water sheen produced by floating is disappearing. Apply resin based concrete sealer (Sonneborn SONOCLEAR, L&M Lumiseal Plus, or North Central Klear Kote) immediately after trowelling, then cure as per manufacturer's recommendations. If liquid curing compound is used, do not apply sealer immediately. Sealant is not required on floors which are to be painted. Tank bottoms need not be sealed.
- C. Concrete floors and tank bottoms shall be finished monolithically with no special concrete or cement mortar topping for finish. The slabs shall be brought to an even and true finish slightly above elevations given on the drawings, so that when properly consolidated and finished, the surface will be at the grades shown. Concrete shall then be tamped, straight-edged, floated and finished as above.

### 3.8 Concrete Block Bond Beams

- A. All concrete for concrete block bond beams shall conform to specifications on strength and mixes herein mentioned. All such units shall have concrete block facing units as scheduled, laid in place by a mason with masonry mortar in conventional 3/8" tooled joints, then have steel as required set in place, then filled with well puddled concrete. All corners shall be sharp and undamaged, and units shall be carefully protected from damage until completion of masonry work.

### 3.9 Patching Defective Concrete Work and Finish For Concrete Walls

- A. After removing forms, all concrete surfaces shall be inspected and any poor joints, voids, stone pockets, all tie holes and any other defective areas marked by the Engineer shall be patched.
- B. Where necessary, defective areas shall be chipped away to a depth of not less than one-inch with edges perpendicular to the surface. The area to be patched and a space at least six-inches wide entirely surrounding it shall be wetted to prevent absorption of water from the patching mortar.
- C. A grout of equal parts Portland Cement and sand, with sufficient water to produce a brushing consistency, shall then be well brushed into the surface, followed immediately by the patching mortar.
- D. Patching materials shall be of the same material and approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted. The mortar shall not be richer than one part

cement to three parts sand. The amount of mixing water shall be as little as consistent with the requirements of handling and placing. The mortar shall be re-tempered without the addition of water by allowing it to stand for a period of one hour during which time it shall be mixed occasionally with a trowel to prevent setting.

- E. The mortar shall be thoroughly compacted into place and screeded off so as to leave the patch slightly higher than the surrounding surface. It shall then be left undisturbed for a period of one to two hours to permit initial shrinkage before being finally finished.
- F. The patch shall be finished in such a manner as to match the adjoining surface. On exposed surfaces where unlined forms have been used, the final finish shall be obtained by striking off the surface with straight-edge spanning the patch and held parallel to the direction of the form marks.
- G. All patches shall be cured as herein specified.
- H. Tie holes left by withdrawal of rods or the holes left by removal of ends of ties shall be filled solid with mortar after first being thoroughly wetted. For holes passing entirely through the wall, a plunger type grout gun shall be used to force the mortar through the wall starting at the back face. A piece of burlap or canvas shall be held over the hole on the outside and when the hole is completely filled, the excess mortar shall be struck off with the cloth flush with the surface. Holes not passing entirely through the wall shall be filled with a small tool that will permit packing the hole solid with mortar. Any excess mortar at the surface of the wall shall be struck off flush with a cloth.
- I. All concrete ridges and protrusions, such as left by nail holes or insufficient joining of forms, shall be removed by hammering and grinding to the satisfaction of the Engineer. No grout wash shall be applied until ridges, protrusions and other marks left by the forms have been removed to the satisfaction of the Engineer.

### 3.10 Finish for Concrete Walls

- A. All concrete surfaces to receive paint or exposed above grade shall receive a grout finish. Cleaning operations shall not be undertaken until all contiguous surfaces to be cleaned are completed and accessible. Grout shall consist of one part Portland Cement and 1 - 1/2 parts fine sand with sufficient water to produce a mixture having consistency of thick paint. White Portland Cement shall be substituted for a part of gray Portland Cement to produce a color matching color of surrounding concrete as determined by a trial patch. Surface of concrete shall be wetted sufficiently to prevent absorption of water from grout. Grout shall be uniformly applied with brushes or a spray gun. Immediately after applying grout, surface shall be scrubbed vigorously with a cork float or stone to coat surface and fill all air bubbles and holes. While grout is still plastic all excess grout shall be removed by working surface with a rubber float, sack or other means. After surface whitens from drying (about thirty minutes at normal temperatures), it shall be rubbed vigorously with clean burlap. Surface shall be kept damp for at least 36 hours after final rubbing.
- B. Tie holes left by withdrawal of rods or the holes left by removal of ends of ties shall be filled solid with mortar after first being thoroughly wetted. For holes passing entirely through the wall, a plunger type grout gun shall be used to force the mortar through the wall starting at the back face. A piece of burlap or canvas shall be held over the hole on the outside and when the hole is completely filled, the excess mortar shall be struck off with the cloth flush with the surface. Holes not passing entirely through the wall shall be filled with a small tool that will permit packing the hole solid with mortar. Any excess mortar at the surface of the wall shall be struck off flush with a cloth.
- C. All concrete ridges and protrusions, such as left by nail holes or insufficient joining of forms, shall be removed by hammering and grinding to the satisfaction of the Engineer. No grout wash shall be applied until ridges, protrusions and other marks left by the forms have been removed to the satisfaction of the Engineer.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 06100

### CARPENTRY

#### PART 1 - GENERAL

##### 1.1 Description

- A. Rough carpentry and framing.
- B. Prefabricated wood trusses.
- C. Sidings.
- D. Soffit Panels.

##### 1.2 Additional Requirements Specified Elsewhere

- A. Shop Drawings, Product Data and Samples: Section 01340.

##### 1.3 Quality Assurance

- A. Source Quality Control:
  - 1. Lumber grading rules and wood species: WWPA.
  - 2. Plywood grading rules: Softwood Plywood - APA.
  - 3. Grade marks:
    - a. Identify lumber and plywood by official grade mark.
    - b. Lumber:
      - (1) Grade stamp to contain symbol of grading agency certified by Board of Review, American Lumber Standards Committee, mill number or name, grade of lumber, species or species grouping or combination designation, rules under which graded where applicable, and condition of seasoning at time of manufacture.
      - (2) S-Grn: Unseasoned.
      - (3) S-Dry: Max. 19% moisture content.
      - (4) MC-15: Max. of 15% moisture content.
      - (5) Dense: Density classification applies to Douglas Fir and Southern Pine, when applicable.
    - c. Softwood plywood and OSB: Appropriate grade trademark of American Plywood Association on each plywood panel.
  - 4. Testing: ASTM E-84, max. 25 flame spread rating.
- B. Requirements of Regulatory Agencies:
  - 1. Preservative treated lumber and plywood: American Wood Preservers Bureau, quality mark.
  - 2. Pressure treated material: American Wood Preservers Bureau Standards.
  - 3. Span tables: National Forest Products Association.
  - 4. Working stresses: Softwood Lumber, UBC, WWPA.
  - 5. Uniform Building Code Requirements.
  - 6. Wood Trusses: Truss Plate Institute.

##### 1.4 Product Delivery, Storage and Handling

- A. Immediately upon delivery to job site, place materials in area protected from weather.
- B. Store materials a minimum of 6" above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
- C. Do not store seasoned materials in wet or damp portions of building.
- D. Protect sheet materials from corners breaking and damaging surfaces, when unloading.

## 1.5 Submittals

- A. Wood Truss Shop Drawings:
  - 1. Show species, sizes and stress grades of lumber to be used as members.
  - 2. Show pitch, span, camber, configuration and spacing.
  - 3. Indicate connection types, thicknesses, size, design values.
  - 4. Illustrate bearing details.
  - 5. Shop drawings shall be sealed and signed by a structural engineer licensed to practice in South Dakota.
- B. Product Data.
  - 1. Submit manufacturer's data and color charts for prefinished hardboard siding.
  - 2. Submit manufacturer's data for soffit panel system.

## PART 2 - PRODUCTS

### 2.1 Materials

- A. Lumber:
  - 1. Dimensions:
    - a. Specified lumber dimensions are nominal.
    - b. Actual dimensions to conform to WWPA.
  - 2. Surfacing: Surface 4 sides (S4S), unless specified otherwise.
  - 3. End Jointed Lumber:
    - a. Structural purposes interchangeable with solid saw lumber.
    - b. Glued joints of loadbearing lumber; PS 56.
  - 4. Framing Lumber:
    - a. Hem-fir.
    - b. Light framing:
      - (1) General framing: Construction grade.
      - (2) Plates, blocking, bracing, and nailers: Standard grade.
      - (3) Bracing, blocking, bulk headings, and general utility purpose: Standard grade.
    - c. Studs: Loadbearing: Construction grade.
    - d. All other structural framing: No. 2 or better.
    - e. Plates in contact with concrete or masonry: Construction grade redwood or treated wood.
- B. Plywood and OSB.
  - 1. Comply with American Plywood Association requirements for structural sheathing.
  - 2. Bear APA stamp for span rating and exposure durability classification.
  - 3. Structural I Exposure Class.
- C. Preservative Treated Wood:
  - 1. Water-borne salt preservatives:
    - a. AWPB LP-21 above ground application.
    - b. AWPB LP-22 ground contact applications.
    - c. Lumber redried to maximum moisture content of 19%, stamped "DRY."
- D. Rough Hardware:
  - 1. Bolts:
    - a. FS FF-B-575.
    - b. FS FF-B-584.
  - 2. Nuts: FS FF-N-836.
  - 3. Expansion shields: FS FF-B-561.
  - 4. Lag screws and bolts: FS FF-B-561.
  - 5. Toggle bolts: FS FF-B-588.
  - 6. Wood screws: FS FF-S-111.
  - 7. Nails and staples: FS FF-N-105.
  - 8. Metal nailing discs:
    - a. Flat caps, minimum 1" dia.

- b. Minimum 30 ga. Sheet metal.
  - c. Formed to prevent dishing.
  - d. Bell or cup shapes not acceptable.
- 9. Joist hangers: 18 ga. Zinc-coated steel.
- 10. Metal cross bridging, 16 ga. zinc-coated steel.
  - a. Nailable type with 2 holes in each end.
  - b. Compression type with prongs at each end.
- 11. Bar or strap anchors: ASTM A-525, zinc-coated steel, 18 ga. minimum.
- 12. Ply-clips: Extruded 6063-T6 aluminum alloy.
- E. Siding:
  - 1. Manufactured hardboard with permanent colored finish and simulated wood texture.
  - 2. Nominal 3/8" x 8" dimension.
  - 3. Built-in weather sealing horizontal spline at lap joint.
  - 4. Masonite "Colorlok," or equal.
  - 5. Siding Accessories: Provide starter strips, corner finish, joint moldings, J-trim and colored nails which are specifically manufactured for the siding system and are an exact color match.
- F. Soffit Panel and Facia System.
  - 1. Interlocking prefinished galvanized steel, 26 ga., with permanent baked enamel or PVC color coating.
  - 2. Louvered vent or unvented per drawings.
  - 3. Rollex, System 3 or equal.

## 2.2 Truss Fabrication

- A. Performance and Design Requirements:
  - 1. Uplift Load: 20 psf.
  - 2. Dead Load: 20 psf.
  - 3. Snow Load: 30 psf.
  - 4. Maximum deflection under live load:  $L/360$ .
- B. Manufacture trusses in permanent facility, open to inspection by Engineer.
- C. Cut truss members to accurate length, angle, and size to assure tight fit of joints.
- D. Assemble members in design configuration by securing tightly in jigs or with clamps.

## PART 3 - EXECUTION

### 3.1 Inspection

- A. Verify that surfaces to receive rough carpentry materials are prepared to required grades and dimensions.

### 3.2 Installation

- A. Sills:
  - 1. Set level 1/16" in 6", in mortar bed, flush with exterior face of foundation, or as detailed.
  - 2. Join solid sill members with halved joints, where not continuous and at corners, minimum of 1' lapped joint.
  - 3. Lap built-up sill members minimum distance of 2'.
- B. Post or columns:
  - 1. Provide 2 surfaces on posts at right angles to each other for installation of interior finish materials.
  - 2. Built-up posts: Arranged and nailed together to accommodate type of construction.
  - 3. Erect posts straight, plumb with straight edge and level, and brace with tack boards at plate and sill.
- C. Stud Framing:
  - 1. Plates and stud members.
    - a. Provide single bottom plate and double top plates for loadbearing partitions, thickness as indicated on drawings.

- b. Provide single bottom plates and single plates for nonloading partitions, 2" thick by width of studs.
  - c. Provide studs in continuous lengths without splices.
  - d. End nail studs to bottom plate and end-nail to lower top plate.
  - e. Overlap double top plates minimum of 6" at corners and intersections.
  - f. Face nail upper top plate to lower top plate.
  - g. Anchor bottom plate to concrete structure with anchor bolts.
  - h. Triple studs at corners and partition intersections.
  - i. Anchor studs abutting masonry or concrete with 12" anchor bolts, maximum spacing of 4' o.c.
  - j. Partition parallel with joists: Locate joists directly below studs.
- 2. Headers:
  - a. Continuous headers, same width as studs, depth required to span widest opening, as indicated on drawings.
  - b. Toenail headers to studs and opening framing, or as indicated on drawings.
  - c. Stagger joints in individual header members a minimum of 3 stud spaces, allowing no joints to occur over opening.
  - d. Lap headers at intersections with bearing partitions or tie with metal straps.
- 3. Blocking:
  - a. Install in continuous horizontal row at mid-height of single story partitions over 8' high and multi-story partitions.
  - b. Wedge, align, and anchor blocking with nails.
  - c. Locate blocking to facilitate installation of finishing materials, fixture, specialty items and trim.
- 4. Sheathing.
  - a. Comply with APA nailing tables.
  - b. Use only galvanized nails for exterior sheathing applications.
- D. Miscellaneous Framing:
  - 1. Firestops:
    - a. Stud walls: 2" thick x depth of member blocking at each floor and top story ceiling level.
    - b. Floor and ceiling framing: 2" thick x depth of wood member blocking, fitted to fill openings from one space to another to prevent drafts.
  - 2. Framing for mechanical work:
    - a. Frame members for passage of pipes and ducts to avoid cutting structural members.
    - b. Do not cut, notch, or bore framing members for passage of pipes or conduits without concurrence of Engineer.
    - c. Reinforce framing members where damaged by cutting.
- E. Trusses:
  - 1. Hoist trusses into position, secured at designated lift points.
  - 2. Install temporary horizontal and cross bracing to hold trusses plumb and in safe condition until permanent bracing is installed.
  - 3. Install permanent bracing prior to application of loads to trusses.
  - 4. Tighten loose connectors.
  - 5. Restrict construction loads to prevent overstressing of truss members.
- F. Siding:
  - 1. Install prefinished hardboard siding using manufacturer supplied or recommended nails and sealing trim.
  - 2. Accurately fit siding at corners and adjoining surfaces and caulk with manufacturer recommended colored caulk.
- G. Soffit Panels and Facia System:
  - 1. Provide and install manufacturer supplies supporting channels and framework suited to application conditions indicated by drawings.
  - 2. Where required, provide and install wood blocking for continuous, rigid and substantial support.
  - 3. Install panels snug against adjoining panels.
  - 4. Accurately cut and fit at terminations and where partial panel sections are required.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 07200

### INSULATION

#### PART 1 - GENERAL

##### 1.1 Description

- A. Scope:
  - 1. Fibrous insulation for frame construction.
  - 2. Rigid board insulation for concrete foundation perimeter.

##### 1.2 Additional Requirements Specified Elsewhere

- A. Shop Drawings, Product Data and Samples: Section 01340.

##### 1.3 Related Work Specified Elsewhere

- A. Concrete: Section 03300.
- B. Carpentry: Section 06100.

##### 1.4 Quality Assurance

- A. Source Quality Control:
  - 1. Provide manufacturer's written certification that products intended for use meet specified requirements.
  - 2. Provide certification of proper installation.
- B. Testing: Flame spread ASTM E-84 or less.

##### 1.5 Submittals

- A. Samples: Submit manufacturer's data for each type of required insulation, including:
  - 1. Manufacturer's name.
  - 2. Brand name.
  - 3. R-value.
  - 4. Composition.
- B. Certificates: Compliance with applicable reference standards.

##### 1.6 Product Delivery, Storage and Handling

- A. Delivery:
  - 1. Deliver materials to project site in manufacturer's original packing.
  - 2. Clearly identify manufacturer, contents, brand name, applicable standard and R-value.
- B. Storage:
  - 1. Store materials off ground and under protective covering.
  - 2. Protect against weather, direct sunlight, condensation and damage.
  - 3. Immediately remove damaged material from site.

#### PART 2 - PRODUCTS

##### 2.1 Performance and Design Requirements

- A. Fibrous Insulation:
  - 1. Ceiling: R-19.

2. Walls: R-11.
  3. Other: As indicated on drawings.
- B. Rigid Board:
1. Foundation: 2" thickness, R-10.
  2. Other: As indicated on drawings.

## 2.2 Materials

- A. Fibrous Insulation:
1. Batts Mineral Fiber: FS HH-I-521, Type II, with Kraft paper backing.
  2. Fasteners:
    - a. Staples: Flattened, galvanized steel 7/16" crown by 1/2" shank minimum.
    - b. Wire: Galvanized steel, 18 ga. Minimum.
    - c. Adhesive: As recommended by manufacturer.
- B. Rigid Board Insulation for Foundation Perimeter.
1. Thermal conductivity,  $K = .20 \text{ Btu} \cdot \text{in./hr.} \cdot \text{ft}^2 \cdot ^\circ\text{F}$ , @ 75°F ASTM C-177, (R-5 per inch thickness).
  2. Water absorption: <0.1%, ASTM C-272.
  3. Compressive Strength: 25 psi, ASTM D-1621.
  4. Adhesive: Gunnable type recommended by manufacturer.
  5. Manufacturer:
    - a. Dow Styrofoam SM.
    - b. Certifoam.

## PART 3 - EXECUTION

### 3.1 Inspection

- A. Fibrous Insulation:
1. Examine areas schedule to receive insulation and to insure protection against inclement weather and other hazards and work of preceding trades is completed.
  2. Examine space allocated for insulation for proper depth to receive material.
  3. Remove or protect against construction framing projections which damage or prevent proper installation.
  4. Proceed with installation when conditions are satisfactory.
- B. Rigid Insulation:
1. Verify that masonry joints where insulation is installed are struck flush.
  2. Check surfaces to receive rigid insulation to assure that they are uniform in plane, free of mortar, debris, grease, oil, or other items detrimental to insulation.
  3. Proceed with application when conditions are satisfactory.

### 3.2 Installation

- A. Fibrous Insulation:
1. General:
    - a. Fit insulation snugly between framing.
    - b. Maintain integrity of insulation over entire area to be insulated.
    - c. Insulate small area between closely spaced framing members.
    - d. Carefully cut and fit insulation around pipes, conduits, and other obstructions.
    - e. Where pipes or conduit area located in stud spaces, place insulation between exterior wall and pipe, compressing insulation where necessary.
    - f. Do not install insulation requiring compression in excess of 10%.
    - g. Install insulation to attain minimum R-value indicated.

2. Faced Insulation:

- a. Staple facing flanges to sides of wood framing at 8" centers, or closer as necessary to hold flanges tightly to framing members.
- b. Exercise care to insure integral vapor barrier is continuous over entire surface.
- c. Patch and seal punctures, tears, or voids in integral vapor barrier.
- d. Install faced insulation with integral vapor barrier toward warm-in-winter side of assembly.
- e. Where wood framing exceeds the width of insulation, provide and install supplemental wire lattice or grid to support and prevent sagging of insulation.

B. Rigid Insulation:

1. Adhesive Application:

- a. Press adhesive to insulation in 3/8" dia. Ribbons spaced 6" O.C.
  - b. Press insulation into space using rocking motion.
2. Abut each piece of insulation snug against adjoining pieces.
  3. Fit insulation closely around penetrations.
  4. Stagger vertical joints.

3.3 Clean-Up

- A. Remove accumulations of waste materials, rubbish, excess insulation and containers.
- B. Dispose of waste materials off site.

\*\*\*\* END OF SECTION \*\*\*\*



## SECTION 07312

### ASPHALT SHINGLES

#### PART 1 - GENERAL

##### 1.1 Description

- A. Scope: Asphalt shingle roofing system.

##### 1.2 Additional Requirements Specified Elsewhere

- A. Shop Drawings, Product Data and Samples: Section 01340.

##### 1.3 Related Work Specified Elsewhere

- A. Carpentry: Section 06100.
- B. Flashing and Sheet Metal: Section 07600.

##### 1.4 Quality Assurance

- A. Comply with applicable provisions of Uniform Building Code, latest edition.

##### 1.5 Submittals

- A. Submit manufacturer's data sufficient to verify compliance with specifications.
- B. Submit color charts for color selection by Owner.

##### 1.6 Product Delivery, Storage and Handling

- A. Delivery.
  - 1. Deliver materials to jobsite in manufacturer's original packing with labels intact.
- B. Storage.
  - 1. Store materials off ground and under protective covering.
  - 2. Store rolled goods on end and off ground.

#### PART 2 - PRODUCTS

##### 2.1 Materials

- A. Asphalt Shingle.
  - 1. 3-tab style, 12" x 36", fiberglass reinforced.
  - 2. UL Class A fire and wind resistant rating.
  - 3. 25 year warranty.
  - 4. Owens-Corning "Supreme," or equal.
- B. Asphalt Saturated Roofing Felt.
  - 1. Underlayment: Organic, unperforated, 36" wide per ASTM D-226, 15 lb. weight.
- C. Nails: Galvanized roofing, min. 1 1/4" long.

#### PART 3 - EXECUTION

##### 3.1 Inspection

- A. Inspect roof sheathing and assure that surfaces are uniform, sound, smooth, clean and dry.

- B. Verify that installation of metal flashings is completed.
- C. Verify that work of other trades which may penetrate roof is completed.

### 3.2 Application

- A. Felt Underlayment.
  - 1. Lay one layer of felt horizontally over entire roof.
  - 2. Lap Courses a minimum of 2" horizontally, and 4" at side laps.
  - 3. Lap felt 6" at hips and ridges.
  - 4. Secure felt to deck with adequate fasteners to hold securely until roofing is installed.
- B. Asphalt Shingles.
  - 1. Apply starter course at eave line.
  - 2. Start first course of shingles at eave line to provide a double course at the eave line.
  - 3. Install shingles with 6" weather exposure.
  - 4. Secure each shingle with four (4) nails, concealed below following course.
  - 5. Drive nails flush, but do not crush or damage shingles.
  - 6. Install hips and ridges in similar manner as shingles using concealed nailing.
  - 7. Comply with manufacturer's printed instructions for all work.

### 3.3 Cleaning

- A. Remove excess shingles, waste materials, packing and related debris promptly from the jobsite.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 07600

### FLASHING AND SHEET METAL

#### PART 1 - GENERAL

##### 1.1 Description

###### A. Scope:

1. Flashing and sheet metal work for moisture protection, including gutters and downspouts.

##### 1.2 Additional Requirements Specified Elsewhere

- ###### A. Shop Drawings, Product Data and Samples: Section 01340.

##### 1.3 Related Work Specified Elsewhere

- ###### A. Carpentry: Section 06100.
- ###### B. Asphalt shingles: Section 07312.

##### 1.4 Submittals

- ###### A. Submit specifications, data, catalog cuts, or similar information sufficient to verify compliance with specifications.

##### 1.5 Product Delivery, Storage and Handling

- ###### A. Deliver flashing materials at proper times for incorporation into the work.
- ###### B. Store in weather protected storage area.

#### PART 2 - PRODUCTS

##### 2.1 Basic Materials

- ###### A. Sheet Metal.
1. Galvanized Steel: ASTM A-366 or A-569, zinc coated.
  2. Aluminum: ASTM B-204, Alloy 3003-H14, mill finish.
  3. Fasteners: Same material as metal being fastened.
- ###### B. Roof Flashings (Rake, eave).
1. 0.032 inch aluminum or 24 gauge galvanized.
  2. Profiles and sizes as indicated on plans.
- ###### C. Gutters and Downspouts.
1. Gutters: Style K, .032" aluminum or 24 gauge galvanized steel with baked enamel or PVC finish, sizes per plans. Gutter shall be complete with hangers, end caps, connectors, drop outlets, and similar accessories.
  2. Downspouts: Corrugated rectangular downspouts complete with all necessary elbows and hangers, finish shall be same as gutters.
- ###### D. Ridge Vent.
1. Prefinished baked enamel, one-piece type venting system for installation at ridge line of framed roof.
  2. Provide 18 square inches of net free area per foot of length.
  3. Adjustable to roof pitch.
  4. Lomanco, Inc. Type VUR, or equal.

## PART 3 - EXECUTION

### 3.1 Installation

- A. General.
  - 1. Install sheet metal work generally as indicated on drawings.
  - 2. Do not bend or mar surfaces, replace damaged sections.
  - 3. Exposed or contacting flashings shall be of the same material and finish.
- B. Gutters and Downspouts.
  - 1. Hang and anchor gutters and downspouts using manufacturer supplied or recommended devices.
  - 2. Spacing of gutter supports shall be max. 3' - 0" O.C.
  - 3. Spacing of downspout supports shall be max. 6' - 0" O.C. Downspouts shall be telescoped into adjoining sections not less than 1 1/2".
- C. Miscellaneous.
  - 1. Provide flashings for vents, sleeves and similar projections through roof.
  - 2. Extend flashings 6" to 8" above roof.
- D. Ridge Vent.
  - 1. Install per manufacturer's recommendations.
  - 2. Plug ends.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 07900

### SEALANTS AND CAULK

#### PART 1 - GENERAL

##### 1.1 Description

- A. Scope:
  - 1. Provide sealants and caulking to the extent indicated on drawings or as specified.
- B. The terms "caulking" and "sealing" are used on the drawings and in the specifications synonymously. Either or both terms indicate the materials specified herein.

##### 1.2 Additional Requirements Specified Elsewhere

- A. Shop Drawings, Product Data and Samples: Section 01340.

##### 1.3 Related Work Specified Elsewhere

- A. Metal Doors and Frames: Section 08100.
- B. Painting: Section 09900.

##### 1.4 Quality Assurance

- A. Acceptable manufacturers:
  - 1. Sonneborn.
  - 2. Pecora.
  - 3. Tremco.
  - 4. Or equal.
- B. Reference Standards:
  - 1. FS TT-S-00230, One Component.
  - 2. FS TT-S-00227, Two Components.

##### 1.5 Submittals

- A. Manufacturer's product data and installation recommendations for each material proposed for use.
- B. Color charts and samples.

#### PART 2 - PRODUCTS

##### 2.1 Materials

- A. Exterior, Vertical Joints: Two-component urethane, FS TT-S-00227, Type II, Sonolastic NP-2, Tremco Dymonic, or equal.
- B. Interior, Vertical Joints: One component urethane, FS-TT-S-00230, Type II, Sonolastic NP-1, Tremco Dymeric, or equal.
- C. Exterior, Horizontal Joints: Two-component urethane, FS TT-S-00227, Type I, Sonolastic Paving Joint Sealant, Tremco THC-900, or equal.
- D. Interior, Horizontal Joints: One component urethane, FS TTR-S-00230, Type I, Sonolastic S1-1, or equal.

## 2.2 Accessories

- A. Backup Material: Polyethylene foam, Dow "Ethafoam SB," Grace "Servicised 5401 Foam filler," Harveg "Minicel Backer Rod," or equal.
- B. Primer: Use manufacturer recommended primer on surfaces subject to water immersion.

## PART 3 - EXECUTION

### 3.1 Preparation

- A. Cleaning:
  - 1. Clean surfaces to receive sealant of all dust, grease, oil or wax.
  - 2. Wipe surfaces with clean rag soaked in xylol or suitable solvent.
- B. Backup Material:
  - 1. Where required to control depth of sealant, install backup material.
  - 2. When compressed 25-50% fills the joint space.
  - 3. Rolled or pressed into place avoiding lengthwise stretching.

### 3.2 Installation

- A. Install sealants before painting.
- B. Install sealants only when the air and surface temperatures are above 50° F.
- C. Tool each joint to a smooth, even finish, flush with the edges of the sealing recess.
- D. Keep adjacent surfaces clean and free of overlapping sealant.
- E. Apply to a depth equal to joint width, but not less than 1/2".
- F. Remove sealant and reseal joints at which:
  - 1. Excess sealant is outside the joint and feathered onto surfaces.
  - 2. It is not possible to paint adjacent surfaces to a clean line.

### 3.3 Sealing Schedule

- A. Provide sealing of following:
  - 1. Entire perimeter of doors and louvers.
  - 2. Masonry control joints and/or construction joints.
  - 3. Horizontal joints in interior and exterior concrete.
  - 4. Joints where dissimilar materials abut one another, such as at perimeter of gypsum board ceiling with masonry walls and joint between soffits, walls, eaves, rakes, etc.
  - 5. Other locations as indicated on drawings.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 08100

### DOORS AND FRAMES

#### PART 1 - GENERAL

##### 1.1 Description

- A. Scope:
  - 1. Hollow metal frames for doors.
  - 2. Steel doors, flush type.

##### 1.2 Additional Requirements Specified Elsewhere

- A. Shop Drawings, Product Data: Section 01340.

##### 1.3 Related Work Specified Elsewhere

- A. Finish Hardware: Section 08700.
- B. Painting: Section 09900.

##### 1.4 Quality Assurance

- A. Acceptable manufacturers:
  - 1. Trussbilt, Incorporated.
  - 2. The Ceco Corporation.
  - 3. Mesker Brothers Industries, Incorporated.
  - 4. Fenestra.
  - 5. Or equivalent.
- B. Allowable Clearances:
  - 1. Jambs and heads: 1/8".
  - 2. Meeting stiles on door pairs: 1/4".
  - 3. Bottoms: 3/4".

##### 1.5 Submittals

- A. Drawings and Data:
  - 1. Elevations: Each door type.
  - 2. Details: Each frame type.
  - 3. Location or identification: Each item.
  - 4. Typical and special details of construction.
  - 5. Methods of assembly.
  - 6. Location and installation requirements for hardware.
  - 7. Materials: Size, shape and thickness.
  - 8. Joints.
  - 9. Connections.
  - 10. Finish.

##### 1.6 Product Delivery, Storage and Handling

- A. Delivery and Handling:
  - 1. Frame bottoms: Hold rigidly in place by spreader bars to maintain alignment.
  - 2. Ship and store with support to avoid distortions.

## PART 2 - PRODUCTS

### 2.1 Materials

- A. Doors and Frames: Stretcher leveled quality sheet steel with smooth, clean surface.
- B. Internal Reinforcing: Cold rolled steel.
- C. Fillers for Internally Reinforced Doors: Mineral wool, fiberglass, urethane foam, or polystyrene foam.
- D. Anchoring Devices: Cadmium plated where exposed; cadmium plated or galvanized where concealed.
- E. Expansion Anchors: Specification 03051.

### 2.2 Fabrication and Manufacture

- A. Metal Gauge: U.S. Standard gauge; minimum permissible thickness.
- B. Frames.
  - 1. Type and shape as indicated on drawings.
  - 2. Frame metal gauge:
    - a. Interior: 16 gauge (14 ga. if opening larger than 4' - 0" wide).
    - b. Exterior: 14 gauge.
  - 3. Strong and rigid, neat, no defects.
  - 4. Molded members: Fabricated straight with corner joints with fastenings concealed where practical.
  - 5. Joints:
    - a. Mitered or butted.
    - b. Continuously welded on reverse side.
    - c. Invisible on frame face.
  - 6. Preparation for hardware:
    - a. At factory.
    - b. Mortise, reinforce, drill and tap for mortised hardware.
    - c. Reinforce for surface applied.
    - d. Provide cover boxes behind all cutouts.
    - e. Punch to receive silencers; 3 holes on lock side of single door, 1 hole per leaf in heads of double door.
    - f. Do not punch weather-stripped doors.
    - g. Set out lock strikes, adjust for silencer clearance.
    - h. Provide concealed reinforcements at following minimum thickness:
      - (1) Hinge, 10 ga.
      - (2) Strike, 14 ga.
      - (3) Closer, 11 ga.
      - (4) Other, 14 ga.
  - 7. Reinforcing: Provide structural steel shapes where indicated at mullions, transoms, inside hollow doors, or other locations.
  - 8. Walls and anchors:
    - a. As required.
    - b. Locate near top and bottom of frame and between, not greater than 32" apart.
    - c. Steel construction, gauge not less than frames.
    - d. For masonry (built-in): 10" long, adjustable, corrugated or other deformed type.
    - e. Masonry finished opening: Provide manufacturer's standard anchors system for drilled in hardware.
  - 9. Floor anchors:
    - a. 16 gauge base clip at each jamb.
    - b. Size and drill clips for at least 2 3/8" anchors.
    - c. Place frame bottom at finished floor level by use of adjustable extension clip anchored to structural slab.
  - 10. Stops and beads:
    - a. 18 ga.

- b. At transoms, sidelights, interior glazed panels, and other locations as indicated on drawing.
  - c. Prepare frames to receive glazing beads, stops and gaskets.
  - d. Fasten beads with oval head machine screws, at 9" centers max.
  - e. Miter molded beads at corners.
  - f. Miter or butt rectangular beads at corners.
- C. Doors:
- 1. 1 3/4" thick, full flush type, as indicated on drawings.
  - 2. Face Sheets:
    - a. Interior doors: 18 gauge.
    - b. Exterior doors: 16 gauge.
  - 3. Flush, watertight closed side edges with mechanically interlocked, continuously welded or spot welded (4" center max.) seams filled with filler metal and dressed smooth.
  - 4. Round or beveled edges.
  - 5. Prepared at factory for hardware and openings.
  - 6. Internal polystyrene core:
    - a. Bonded to steel door panels.
    - b. Thermal insulation value: R-4 or better.
  - 7. Finish out-swinging exterior doors flush at top.
  - 8. Preparation for hardware:
    - a. At factory.
    - b. Mortise, reinforce, drill and tap for mortised hardware.
    - c. Provide reinforcement for mortised and surface applied hardware as follows:
      - (1) Hinge, 10 gauge.
      - (2) Closers and hold open arms, 11 gauge.
      - (3) Other, 14 gauge.
    - d. In door heads, provide cutouts, reinforcements and provisions for fasteners, where concealed overhead door closers are required.
    - e. Location per NBHA, "Recommended Locations for Builders Hardware."
  - 9. Finish:
    - a. Prime all ferrous metal surfaces.
    - b. Clean metal surfaces.
    - c. Give metal surface phosphate or equivalent treatment to prevent corrosion and enhance paint adherence.
    - d. Apply drip or spray coat of synthetic resin, rust inhibitive, metallic oxide or zinc chromate primer.
    - e. Bake or oven dry primed surfaces.
    - f. Smooth and free from irregularities.

## PART 3 - EXECUTION

### 3.1 Installation

- A. General:
- 1. Per drawings and manufacturer's recommendations.
  - 2. Before setting permanent anchors, assemble, place, plumb and align frames.
  - 3. Anchor frames per manufacturer's recommendations.
  - 4. Leave spreader bars in place until frames are attached to walls.
  - 5. Paint as specified in Section 09900.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 08700

### FINISH HARDWARE

#### PART 1 - GENERAL

##### 1.1 Description

- A. Hardware and cylinders for metal doors and frames.

##### 1.2 Additional Requirements Specified Elsewhere

- A. Shop Drawings, Product Data and Samples: Section 01340.

##### 1.3 Related Work Specified Elsewhere

- A. Metal Doors and Frames: Section 08100.

##### 1.4 Quality Assurance

- A. Acceptable manufacturers:
  - 1. Butts: Stanley, Hager, Lawrence.
  - 2. Locksets, latchsets, cylinders and padlocks: Schlage, Corbin.
  - 3. Closers and brackets: Yale, Russwin, Corbin.
  - 4. Holders, bumpers and silencers: Glyn-Johnson, Ives, Trimco.
  - 5. Thresholds: Wooster, Reese, American Abrasive Metals.
  - 6. Flush bolts: Cipco, Ives, Trimco, Glyn-Johnson.
  - 7. Surface bolts: Glyn-Johnson, Ives, Trimco.
  - 8. Push plates, pull plates, kick plates: Cipco, Brookline, Trimco.
  - 9. Weather stripping and door bottoms: Reese, Zero, Penko.
- B. Reference Standards:
  - 1. NBHA: Recommended Locations For Builder's Hardware.
  - 2. Contractor shall obtain keying information from Owner.

##### 1.5 Submittals

- A. Schedule of finish hardware:
  - 1. Itemize by:
    - a. Room number or name.
    - b. Opening identification symbol.
    - c. Manufacturer, product identification number and finish.
- B. Product Data: Submit manufacturer's descriptive literature.

##### 1.6 Product Delivery, Storage and Handling

- A. Packaging:
  - 1. Separate packaging with screws, keys, special wrenches, instructions and templates.
  - 2. Identify room number and opening symbol on package.

## PART 2 - PRODUCTS

### 2.1 Materials

#### A. Hardware Group 1:

1. 1 ½ pr. Butts BB1168 (heavy weight) 5 X 5 full mortise, steel; Hager or equal.
2. 1 ea. Lockset; Schlage D53PD (orbit) or equal, stainless steel 32D, keyed.
3. 1 ea. Overhead Holder, Glynn-Johnson GJ-70.
4. 1 set Weatherstrip Reese #92.
5. 1 ea. Sweep Reese D575
6. 1 ea. Threshold S 490 AN

### 2.2 Fabrication and Manufacture

#### A. Templates:

1. Supply door and frame manufacturer with templates for mortised and surface applied hardware.
2. Label templates with manufacturer, room number opening identification symbol, item name, installation location on door.

#### B. Finish:

1. Per catalog numbers (satin finish stainless or aluminum), unless noted otherwise.
2. Screws, bolts and exposed attachments shall match hardware.

## PART 3 - EXECUTION

### 3.1 Installation

#### A. General:

1. Per manufacturer's printed instructions.
2. Protect finishes during installation and replace damaged items.

#### B. Locations of hardware: Per NBHA.

#### C. Thresholds:

1. Notch ends to fit door frame.
2. Field drill to receive flush bolts.
3. Anchor to concrete with min. 5/16" stainless steel flat head countersunk machine screws and expansion anchors at 8" O.C.
4. Set in mastic per FS SS-C-153.

#### D. Keying:

1. Furnish two keys per lock.
2. Coordinate keying with Owner.

### 3.2 Adjustment and Cleaning

#### A. Clean all components after installation.

#### B. Hardware supplier to adjust installed hardware at Contractor's expense.

### 3.3 Hardware Schedule

| <u>Location</u>  | <u>Drawing -</u><br><u>Key</u> | <u>Size</u> | <u>Type</u> | <u>Installation</u> | <u>Hardware</u><br><u>Group</u> |
|------------------|--------------------------------|-------------|-------------|---------------------|---------------------------------|
| Well House Entry | D-1                            | 3668        | Flush       | LHR                 | 1                               |

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 09900

### PAINTING

#### PART 1 - GENERAL

##### 1.1 Description

- A. Preparation and field painting of all new construction.
- B. The term "paint" as used herein, includes emulsions, enamels, stains, sealers, and similar coatings.

##### 1.2 Additional Requirements Specified Elsewhere

- A. Shop Drawings and Product Data: Section 01340.

##### 1.3 Quality Assurance

- A. Container labels shall include manufacturer's name, type of paint, manufacturer's stock number, color, ingredient analysis, federal specification number, instruction for reduction, if applicable and instruction for Use.
- B. Acceptable manufacturers:
  - 1. Tnemec (specified).
  - 2. Koppers (specified).
  - 3. Or Engineer-approved equal.

##### 1.4 Submittals

- A. Submit, at least one month prior to the start of any painting work, a complete schedule listing the painting materials proposed for use, including the type of material as listed in the painting schedule, trade name of the specific product and manufacturer.
- B. Schedule shall include complete information on shop prime coat as well as materials to be used for finish field painting.
- C. Submit color cards in triplicate for each material for tentative color selection.

##### 1.5 Product Delivery, Storage and Handling

- A. Materials shall be delivered in original containers with labels intact and seals unbroken.
- B. Only acceptable materials shall be stored on the project site.
- C. Store in a suitable location, restricting storage to paint materials and related equipment complying with health and fire regulations.

#### PART 2 - PRODUCTS

##### 2.1 General

- A. All painting materials must be delivered in the original containers with seals unbroken and labels intact.
- B. All painting materials shall be pure and of highest quality, and bear an identifying label on the container.
- C. All paints shall be from one manufacturer insofar as possible.
- D. The Contractor shall coordinate the prime coat materials and finish coat materials to insure that both are of the same manufacturer.
- E. Applying one manufacturer's finish coat over another manufacturer's prime will not be permitted.

## 2.2 Mixing

- A. Paints and enamels shall be delivered ready-mixed and factory tinted to job site.
- B. Job mixing and tinting will be permitted only on agreement with the Engineer.

## 2.3 Painting Systems

Paint and related products of the Tnemec and Koppers Company are listed as standards of quality. Products of other manufacturers may be acceptable when comparable in quality and character to those specified.

| Material or Surface to be painted                                                                                                                                | Coats                                        | Tnemec Coatings         | Koppers Coatings      | Coating Thickness Mils (Min. Dry) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|-------------------------|-----------------------|-----------------------------------|
| <b><u>SYSTEM A</u></b>                                                                                                                                           |                                              |                         |                       |                                   |
| Ferrous metals not in contact with water including steel, ductile iron & cast iron (galvanized items 3 <sup>rd</sup> coat to be painted as directed by Engineer) | 1 <sup>st</sup> Prime Coat                   | 37-77 Chem-Prime Primer | No. 9033 Epoxy        | 3 mils                            |
|                                                                                                                                                                  | 2 <sup>nd</sup> Primer Touch-up              | 37-77 Chem-Prime Primer | No. 9033 Epoxy Primer |                                   |
|                                                                                                                                                                  | 3 <sup>rd</sup> Coat                         | 66 Hi-Build Epoxoline   | Hi-Gard Epoxy         | 4 mils                            |
|                                                                                                                                                                  | 4 <sup>th</sup> , Finish Coat Interior Metal | 66 Hi-Build Epoxoline   | Hi-Gard Epoxy         | 4 mils                            |
|                                                                                                                                                                  | Exterior Metal                               | 75-Endura Shield        | 1122 BRS Polyurethane | (2) mils                          |
|                                                                                                                                                                  |                                              |                         | Total:                | 11 (9) mils                       |
| <b><u>SYSTEM B</u></b>                                                                                                                                           |                                              |                         |                       |                                   |
| Field Painting of Factory Finished Equipment                                                                                                                     | 1 <sup>st</sup> Prime Coat by Factory        |                         |                       | 3 mils                            |
|                                                                                                                                                                  | 2 <sup>nd</sup> Coat                         | 50-330 Poly-Ura-Prime   | Hi-Gard Epoxy         | 4 mils                            |
|                                                                                                                                                                  | 3 <sup>rd</sup> Finish Coat Interior Metal   | 66 Hi-Build Epoxoline   | Hi-Gard Epoxy         | 4 mils                            |
|                                                                                                                                                                  | Exterior Metal                               | 74-Endura Shield        | 1122 BRS Polyurethane | (2) mils                          |
|                                                                                                                                                                  |                                              |                         | Total:                | 11 (9) mils                       |

involved. Brushes, rollers and spraying equipment shall be kept clean, dry, free of contaminants and suitable for the finish required.

- B. Application shall comply with paint manufacturer's recommendations for drying time between coats. Additional coats shall not be applied until completed coating has been inspected and approved by the Engineer. Only inspected coats of paint will be considered in determining the number of coats applied. Succeeding coats shall vary slightly in color. The surface shall be sanded and dusted between coats to remove defects visible at 5 feet.

### 3.5 Cleaning

- A. Finish shall be touched up and restored where damaged.
- B. Spilled, splashed or splattered paint shall be removed from all surfaces.
- C. Surface finish or item being cleaned shall not be marred.
- D. Storage space shall be clean and in condition required for equivalent spaces in project.

### 3.6 Piping and Equipment Identification and Painting

- A. Contractor shall paint all exposed piping and equipment, in conformance with the following color schedule:

| Item                                 | Paint Color |
|--------------------------------------|-------------|
| Potable Water Piping and Accessories | Light Blue  |
| Valve Operators                      | Red         |

### 3.7 Paint Schedule for Well House

- A. The following surfaces require painting set forth on drawings, or as set forth hereinbefore for the particular substrate and exposure conditions encountered.
  - 1. Louvers exposed in buildings (except factory finished).
  - 2. Exterior ferrous metal surfaces.
  - 3. Interior ferrous metals including metal doors and frames, hangers, brackets, etc.
  - 4. All exposed surfaces of cast iron and steel piping inside.
  - 5. Exterior galvanized or aluminum flashings which are exposed to view and which are not furnished with a factory applied coating system.
- B. Do not paint the following surfaces:
  - 1. Exposed surfaces of aluminum.
  - 2. Polished or finished stainless steel.
  - 3. Nickel or chromium platings.
  - 4. Concealed piping.
  - 5. Rubber and plastics, including PVC.
  - 6. Concrete which is buried or permanently concealed.
  - 7. Exterior concrete surfaces.
  - 8. Any factory applied coating which is specifically intended to be the permanent exterior coating and which is determined by the Engineer to equal or exceed the field applied coatings specified herein.
  - 9. Electrical enclosures.
  - 10. Interior concrete floors.
  - 11. Pre-finished hardboard siding.
  - 12. Pre-finished sheet metal items such as gutters, downspouts, metal soffits.

\*\*\*\* END OF SECTION \*\*\*\*

| Material or Surface to be painted | Coats                       | Tnemec Coatings                         | Koppers Coatings | Coating Thickness Mils (Min. Dry) |
|-----------------------------------|-----------------------------|-----------------------------------------|------------------|-----------------------------------|
| <b>SYSTEM C</b>                   |                             |                                         |                  |                                   |
| Wood, Exterior                    | 1 <sup>st</sup> Prime Coat  | 36-603 (Alkyd Wood Primer)              |                  | 2 mils                            |
|                                   | 2 <sup>nd</sup> Coat        | Series 7 Tnemec-Cryl SG (Acrylic Latex) |                  | 2.5 mils                          |
|                                   | 3 <sup>rd</sup> Finish Coat | Series 7 Tnemec-Cryl SG (Acrylic Latex) |                  | 2.5 mils                          |
| Total:                            |                             |                                         |                  | 7 mils                            |

\*Omit 1<sup>st</sup> coat on previous painted surface.

### PART 3 - EXECUTION

#### 3.1 Inspection

- A. Contractor shall examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence or quality of work and which cannot be put into acceptable condition through preparatory work as included below.
- B. Contractor shall notify Engineer and General Contractor in writing if unacceptable condition exists.
- C. Contractor shall not proceed with surface preparation or coating applicable until conditions are satisfactory.

#### 3.2 Preparation

- A. General:
  1. All surfaces to be painted must be clean and free of loose dirt, dust, scale or any other defects.
  2. All surfaces and floors adjacent to areas to be painted shall be clean and free of dust.
- B. Ferrous Metal Surfaces:
  1. Prepare surface in accordance with recommendations and directions of coatings manufacturer.
  2. Feather edges of sound paint, or factory applied paints by sanding or grinding as required for uniform finish coating.

#### 3.3 Protection

- A. The Contractor shall furnish and lay drop cloths in all areas where painting is done to protect all adjacent finished surfaces from damage during the prosecution of his work.
- B. Equipment shall be masked and protected from overspray when spray application of coatings is used.

#### 3.4 Application

- A. Paint shall be applied with suitable brushes, rollers or spraying equipment (method requires Engineer's approval), with the rate of application as recommended by the paint manufacturer for the surface

## SECTION 10200

### LOUVERS AND VENTS

#### PART 1 - GENERAL

##### 1.1 Description

- A. Fabricated metal louvers of type and size described and shown on the drawings.

##### 1.2 Related Work Specified Elsewhere

- A. Carpentry: Section 06100.
- B. Sealants and Caulk: Section 07900.

##### 1.3 Quality Assurance

- A. Acceptable manufacturers:
  - 1. Airolite
  - 2. Greenheck
  - 3. Nystrom
  - 4. Or equal.
- B. Reference Standard
  - 1. Bear AMCA Seal.

##### 1.4 Submittals

- A. Shop drawings.
  - 1. Show dimensions and elevations, configuration, support and mountings, thicknesses and finishes.
  - 2. Provide certification of compliance with specified requirements.
  - 3. Submit color chart for selections.
  - 4. Submit standard warranty including finish warranty.

##### 1.5 Measurement and Payment

- A. No measurement of work quantities under this specification will be made. Payment will be taken to be included under the lump sum contract amount for the Basic Project and/or Alternate Bid Item to which it relates.

#### PART 2 - PRODUCTS

##### 2.1 Material and Construction

- A. Frame and Blades: Galvanized steel, minimum 16 ga. (Optional - extruded aluminum, 0.081" blade thickness, 125" frame thickness.
- B. Fasteners: Same basic metal as frame and blades. Use flat head machine screws for exposed locations.
- C. Assemble louvers in shop, do not disassemble unless required for shipping.
- D. Fabricate frames and integral sills to fit openings shown, with allowance for installation tolerance and perimeter sealants.
- E. Provide sill extensions of same materials as louver for drainage to exterior.
- F. Moveable blades shall be operated by hidden drive arms.

## 2.2 Performance Requirements

- A. Design for wind load of 20 psf minimum, inwards or outwards.
- B. Operate satisfactorily with temperature change range of 100° F.
- C. Air and water penetration shall comply with AMCA standard 500.

## 2.3 Adjustable Blade Louver

- A. Frame and blade depth: 4"
- B. Frame and blade thickness: 16 ga.
- C. Blade angle: 45°
- D. Blade spacing: 4"
- E. Performance requirements:
  - 1. Free area: 37% minimum
  - 2. Water penetration: < 0.01 oz. per square foot free area at 690 fpm (15 minute test).

## 2.4 Accessories and Finish

- A. Screen: Non-corrosive insect screen, secured to louver frame.
- B. Extended Sill: Provide finished sill extension per drawings.
- C. Operator: Provide hand crank type operator, operable from interior.
- D. Finish: Kynar 500 (PVF<sub>2</sub>), with 5-year warranty.
- E. Gaskets: Louver blades shall be equipped with edge gaskets and jamb gaskets.

# PART 3 - EXECUTION

## 3.1 Installation

- A. Install units per manufacturer's written instruction, with manufacturer supplied or approved hardware.
- B. Install level, plumb and secure.
- C. Caulk perimeter at exterior per Section 07900.

## 3.2 Cleaning and Adjusting

- A. Clean all surfaces.
- B. Adjust for non-binding operation and weather tightness.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 10990

### MISCELLANEOUS SPECIALTIES

#### PART 1 - GENERAL

##### 1.1 Description

- A. Furnish and install the following specialty items.
  - 1. Splash blocks.
  - 2. Valve & hydrant wrenches.
- B. Pertains to Well House.

##### 1.2 Additional Requirements Specified Elsewhere

- A. Shop Drawings, Product Data and Samples: Section 01340.

##### 1.3 Submittals

- A. Product Data.
  - 1. Submit data to verify compliance with specifications.

#### PART 2 - PRODUCTS

##### 2.1 Product Specifications

- A. Splash Blocks.
  - 1. Precast reinforced concrete.
  - 2. 16" w. X 30" l., curbed three sides.
  - 3. Minimum concrete thickness at any point: 2 ½".
  - 4. Standard manufactured product is required, no site constructed items acceptable.
- B. Valve & hydrant wrenches.
  - 1. Furnish one curb box key, tee handle, 7' long.
  - 2. Furnish one gate valve key for 2" square nut, tee handle, telescoping type, up to 10' length adjustment.
  - 3. Furnish one pentagon type fire hydrant wrench.
  - 4. Furnish wall hanging brackets for each key or wrench.

#### PART 3 - EXECUTION

##### 3.1 Installation

- A. Splash Blocks.
  - 1. Locate at downspout outlets.
  - 2. Set firmly in place prior to laying sod and/or other landscape features.
  - 3. Locate splash block outlet elevation about 1" above finished landscape elevation.
- B. Valve and hydrant operators.
  - 1. Place on hangers within the well house.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 11345

### CHEMICAL FEED EQUIPMENT

#### PART 1 - GENERAL

##### 1.1 Description

- A. The Contractor shall furnish and install chemical feed equipment for chlorination as shown on the plans.
- B. The system shall include, but is not necessarily limited to the following:
  - 1. Diaphragm type metering pump for sodium hypochlorite.
  - 2. Suction and discharge tubing, valves, fittings, mounting brackets, injection assemblies and all related accessory items to provide a complete and functioning system.

##### 1.2 Related Work Specified Elsewhere

- A. Operation and Maintenance Data and Products: Section 01730
- B. Process Piping and Valves: Section 15100

##### 1.3 Submittals

- A. Submit a complete materials list for all items to be furnished under this section.
- B. Submit manufacturer's specifications, product data and drawings for all items.
- C. Submit manufacturer's recommended installation details.
- D. Submit operation and maintenance manuals in accordance with Section 01730.

##### 1.4 Quality Assurance

- A. Acceptable Manufacturers
  - 1. Chemical feed equipment specified herein by reference to LMI is intended to indicate standard of quality and function.
  - 2. Other equipment manufacturers may be acceptable subject to compliance with specifications.
- B. Field Service
  - 1. The chemical equipment supplier shall provide one (1) day service by a qualified service technician to inspect the completed installation and to instruct the Owner's operating personnel in the proper operation and maintenance of the equipment.
  - 2. At completion of the start-up work, the manufacturer's representative shall provide a written report of start-up activities and shall certify that the equipment has been installed properly and is functioning satisfactorily.
  - 3. The manufacturer's representative shall re-visit the site on one subsequent occasion at the request of the Owner to review operations, repair any defects and verify proper operation.

#### PART 2 - PRODUCTS

##### 2.1 Chemical Feed Pumps

- A. General Requirements
  - 1. Equipment to be furnished under this specification shall provide manually-controlled feeding of liquid hypochlorite for water disinfection purposes.
  - 2. These specifications are intended to provide for a complete and operable system.
  - 3. Accessory items for a complete system shall be furnished whether or not specifically described herein.
  - 4. Pump type shall be diaphragm type with variable stroke length and frequency, specifically intended for chemical feed application.

B. Performance Requirements:

| Equipment ID                                         | CP-1                      |
|------------------------------------------------------|---------------------------|
| Number of Units Required                             | 1                         |
| Maximum Capacity                                     | 10 gpd                    |
| Actual Feed Rate Anticipated                         | 1 gpd                     |
| Minimum Rated Discharge Pressure                     | 140 psi                   |
| Actual Backpressure Anticipated At Application Point | 15 psi                    |
| Input Power                                          | 110 vac                   |
| Turn Down Capability                                 | 100:1                     |
| Liquid Pumped                                        | Sodium hypochlorite (15%) |
| Manufacturer/Model                                   | LMI A1, or equal          |

C. Control Requirements

1. Feed pumps shall be manually on-off controllable with external switch.
2. Power to pumps will be provided by flow switch per electrical drawings.

D. Pump Accessories

1. Multi- function anti-siphon, backpressure relief, priming and pressure relief valve with degassing feature for discharge of each pump.
2. Foot valve and strainer assembly.
3. Suction and discharge tubing, vent tubing, fittings and valves.
4. Injection check valve assembly.
5. Ball type sight flow indicator.
6. Wall mounting brackets.
7. Pumps shall be furnished with cord set and plug for 120 vac.

2.2 Start-Up Chemicals

- A. Provide 15-gallon keg of sodium hypochlorite.

PART 3 - EXECUTION

3.1 Installation

A. Chemical Feed Equipment

1. Install generally as indicated on the drawings in accordance with manufacturer recommended procedures.
2. Secure all chemical feed and vent tubing to sidewalls, and provide slack in tubing as required for changing storage drums.
3. Mount pump bracket to building sidewalls at location convenient for operations and for plumbing and electrical connections, approximately 5'- 0" AFF.

3.2 Field Services

- A. Provide required manufacturer's field services at start-up.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 13610

### FACTORY-COATED BOLTED STEEL TANK FOR WATER STORAGE

#### PART 1 - GENERAL

##### 1.1 Description

- A. Scope: Design, fabricate and erect a factory-coated bolted steel tank, including foundation, tank structure and tank appurtenances as shown on the contract drawings and described herein with the following principal features:
  - 1. 21' nominal diameter x 32' sidewall height.
  - 2. Roof vent.
  - 3. Roof guardrail (partial).
  - 4. Ladder and cage.
  - 5. Roof manway.
  - 6. Sidewall access door.
  - 7. Overflow pipe.
  - 8. Influent/effluent pipe.
  - 9. Reinforced concrete foundation.
  - 10. Factory-coated bolted steel floor.
  - 11. Foundation and tank floor drain system.
  - 12. All required labor, materials and equipment to the extent shown on the plans.

##### 1.2 Additional Requirements Specified Elsewhere

- A. Shop Drawings, Product Data and Samples: Section 01340.
- B. Tests and Inspections: Section 01400.
- C. Operation and Maintenance Data and Products: Section 01730.

##### 1.3 Related Work Specified Elsewhere

- A. Structure Excavation and Backfill: Section 02222.
- B. Water Mains and Appurtenances: Section 02550.
- C. Trenching and Backfilling for Pipeline: Section 02221.
- D. Concrete Reinforcement: Section 03200.
- E. Cast-in-Place Concrete: Section 03300.

##### 1.4 Quality Assurance

- A. Reference Standards:
  - 1. AWWA Standard for Factory-Coated Bolted Steel Tanks for Water Storage - ANSI/AWWA D103-97.
- B. Requirements of Regulatory Agencies: OSHA.
- C. Acceptable Manufacturers:
  - 1. Columbian Steel Tank Co.
  - 2. Or equal.

##### 1.5 Submittals

- A. Catalog Data: Submit manufacturer's literature, illustration and data, sufficient to verify compliance with the specifications.

- B. Construction drawings and specifications: Submit complete drawings and specifications stamped by a Registered Professional Engineer licensed in South Dakota for the work covered by this specification, including
  - 1. Foundation reinforcing steel.
  - 2. Anchor bolt plan.
  - 3. Erection drawings.
  - 4. Pipe penetration details for tank floor.
  - 5. Standard details for tank accessories such as ladder, manways, overflow pipe, foundation drain, etc.
- C. Installation Instructions: Submit complete set of manufacturer's installation instructions.
- D. Certification: Submit written certification that tank meets all applicable requirements of ANSI/AWWA D103 -97.
- E. Warranty: Submit tank manufacturer's standard published warranty.
- F. Colors and Patterns: Manufacturer's standard interior and exterior color shall be supplied.

#### 1.6 Product Delivery, Storage and Handling

- A. Deliver materials in original protective packaging with manufacturer's labeling.
- B. Store materials in original protective packing and prevent direct contact with ground.
- C. Cover or otherwise protect products from exposure to weather.
- D. Protect all parts during storage and erection.
- E. Replace damaged products with undamaged products.

#### 1.7 Warranty

- A. Structure: The water tank, foundation, tank appurtenances and all other work covered by this specification shall be warranted against defects in materials and workmanship for a period of one year from the date of completion.

### PART 2 - PRODUCTS

#### 2.1 Performance and Design Requirements

- A. Type of tank: Bolt together steel with factory applied thermoset epoxy coatings, inside and outside.
- B. Tank design standards: The materials, design, fabrication and erection of the bolt together tank shall conform to the AWWA standard for "Factory-Coated Bolted Steel Tanks for Water Storage" - ANSI/AWWA D103-97.
- C. Nominal Dimensions: 21' diameter x 32' sidewall height.
- D. Live load: Water - Specific Gravity = 1.0.
- E. Roof snow load: 30 psf.
- F. Wind load: 100 mph.
- G. Seismic zone: AWWA Zone 1.
- H. Allowable soil bearing capacity: 4000 psf. (Refer to geotechnical report, Appendix A).

#### 2.2 Materials

- A. Plates and sheets: Plates and sheets used in the construction of the tank sheet and tank roof shall comply with the standards of ANSI/AWWA D103, Section 2.4.
- B. Structural shapes: Material shall conform to ASTM A36 or AISI 1010.
- C. Bolts and anchor bolts: Bolts shall meet the requirements of AWWA D103, Section 2.2.
- D. Concrete foundation and slab reinforcing steel: Reinforcing steel and concrete shall comply with the requirements of Specification 03200 and 03300, respectively. Ready mixed concrete shall conform with Mix Number 2 per 03300.2.2.B.
- E. Gaskets and sealants: Materials shall conform to the requirements of AWWA D103, Section 2.10.
- F. Coatings: Coatings shall conform to AWWA D103, Section 10.5.

## 2.3 Fabrication and Manufacture

- A. Tank and appurtenances:
  - 1. Shop fabricate for bolted field assembly.
  - 2. Conform to AWWA D103, Section 7.

## PART 3 - EXECUTION

### 3.1 Installation

- A. Erect in accordance with manufacturer's instructions.
- B. Field erection of factory-coated bolted steel tank shall be in strict accordance with the procedures outlined in the manufacturer's instructions and performed by an authorized dealer of the tank manufacturer regularly engaged in erection of these tanks.
- C. Foundation and Foundation Drain System.
  - 1. The reinforced concrete tank foundation and foundation drain system is per manufacturer's design, and placement and compaction of fill at foundation interior is per Specification 02222.
  - 2. Connect tank foundation drain to well house floor drain and sump as shown on plans.
- D. Floor:
  - 1. The floor is epoxy coated bolted steel per manufacturer's design. Coating underneath side of steel floor is required.
  - 2. Leveling of the starter ring shall be required and the maximum differential elevation within the ring shall not exceed one-eighth inch, nor exceed one-sixteenth inch within any ten feet of length.
- E. Sidewall structure:
  - 1. Specialized erection jacks and building equipment developed and supplied by the manufacturer shall be used to erect the tanks.
  - 2. Particular care shall be taken in handling and bolting of the tank panels and members to avoid abrasion of the coating system. Prior to liquid test, all surface areas may be visually inspected by the Engineer.
  - 3. The placement of gaskets or sealant on each panel may be inspected prior to placement of adjacent panels. However, the Engineer's inspection shall not relieve the erector from his responsibility for liquid tightness.
  - 4. No backfill shall be placed against the tank shell.
  - 5. The Contractor shall ensure that positive surface water drainage away from the structure still exists at the end of the warranty period.
- F. Roof: The roof shall be fabricated panels similar to the sidewall panels and shall be assembled in a similar manner as the sidewall panels utilizing the same sealant and bolting techniques so as to assure a water/air tight assembly.
- G. Appurtenances: All appurtenances required shall be erected as indicated on the drawings per the manufacturer's instructions and meet ANSI/AWWA Section 5 requirements.
- H. Coating repair: Any damage to the factory-applied coatings is to be repaired and restored to the original finish in strict compliance with the manufacturer's recommendations.
- I. Identification plate: A manufacturer's nameplate shall list the tank serial number, tank diameter and height, maximum design capacity, intended storage use, and date of installation. The nameplate shall be affixed to the tank exterior sidewall at a location approximately five feet from grade elevation in a position of unobstructed view.

### 3.2 Field Testing

- A. Hydrostatic:
  - 1. Following completion of erection and cleaning of the tank, the structure shall be tested for liquid tightness by filling tank to its overflow elevation.
  - 2. Any leaks disclosed by this test shall be corrected by the erector in accordance with the manufacturer's recommendations.

3. Water required for testing may be obtained from the existing water production facilities at the site.
4. Labor and equipment for tank testing shall be furnished by the Contractor and is to be included in the contract price.

### 3.3 Disinfection

#### A. Standards:

1. The tank structure shall be disinfected at the time of testing after all necessary repairs have been made by chlorination in accordance with AWWA Standard, *Disinfection of Water Storage Facilities*, AWWA C-652, latest revision.
2. Disinfection shall not take place until tank sealant is fully cured.
3. Acceptable forms of chlorine for disinfection shall be:
  - a. Liquid chlorine as specified in AWWA C-652.
  - b. Sodium Hypochlorite as specified in AWWA C-652.
  - c. Calcium hypochlorite (HTH) is not acceptable.
4. Acceptable methods of chlorination per AWWA C-652:
  - a. Section 4.1.1.
  - b. Section 4.1.2 - chemical feed pump only (4.1.2.1.)
  - c. Section 4.3.
  - d. Section 4.2 is not acceptable.

### 3.4 Field Quality Control

- A. Provide manufacturer's field services. The leak testing shall be performed in the presence of the manufacturer's representative. At the conclusion of the work, the manufacturer shall submit a written report including statements that the tank has been erected according to the manufacturer's erection instruction, that the required testing has been performed, and that any coating damage and leaks have been repaired to the satisfaction of the manufacturer.
- B. On or near the one-year anniversary date of initial tank use, the manufacturer's authorized dealer shall make a visual inspection of the tank interior coating and appurtenances; tank exterior coating and appurtenances; and the immediate area surrounding the tank. A written summary of this inspection will be filed with the tank owner and the tank manufacturer. Any defects shall be noted and a schedule established for warranty repairs.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 15100

### PROCESS PIPING AND VALVES

#### PART 1 - GENERAL

##### 1.1 Description

- A. The Contractor shall furnish and install process piping complete as shown on the plans and as enumerated in this specification. Included shall be all pipe and fittings, valves and other piping appurtenances and supports necessary to complete the installation. Piping systems and corresponding system materials are listed herein and on the drawings.
- B. Applicable to Well House.

##### 1.2 Additional Requirements Specified Elsewhere

- A. Shop Drawings, Product Data and Samples: Section 01340.
- B. Quality Control: Section 01400.

##### 1.3 Related Work Specified Elsewhere

- A. Painting: Section 09900.
- B. Plumbing: Section 15400.

#### PART 2 - PRODUCTS

##### 2.1 Piping, Fittings and Couplings

- A. Ductile Iron Pressure Pipe and Fittings:
  - 1. Ductile iron pipe shall conform to the requirements of ANSI/AWWA C-151 standard specification for centrifugally cast ductile iron pipe for water or other liquids
  - 2. Ductile iron pipe in interior locations shall be provided with flanged type ends as shown on the plans and all interior ductile iron piping shall be ANSI/AWWA thickness Class 51 (minimum).
  - 3. Flanges shall be ductile iron of ANSI/AWWA standard 125 lb. template, or 250 lb. where required for fittings or devices specified to be supplied with 250 lb. flanges.
  - 4. Unless otherwise shown on the plans, ANSI/AWWA standard fittings shall be furnished. Standard fittings shall conform to ANSI/AWWA C110 standard specification for gray iron and ductile iron fittings for water and other liquids. Flanged long radius elbows, reducing on-the-run tees, side outlet fittings, eccentric reducers and laterals shall conform to ANSI B16.1 standard specification for flanged fittings and flanges.
  - 5. Flanged coupling adapters for plain end pipe connection to flanged fittings shall be EBBA Series 1000, Uni-flange, or equal.
  - 6. Ductile iron pipe and fittings shall be furnished with cement mortar interior coating per ANSI A21.4. Pipe used for interior and exposed locations shall not have a bituminous exterior coating but shall be furnished with a shop primed coating to facilitate painting as specified in Section 09900.
  - 7. Polyethylene encasement for buried ductile iron pipe and fittings: ANSI A-21.5, seamless tube, black, ASTM D-1248, Type 1, Class C, Grade G-I, 8 mil thickness.
- B. PVC Pressure Pipe:
  - 1. Buried Locations
    - a. PVC, AWWA C900, Class 150, SDR 18 (4" and larger). PVC per ASTM D2241, SDR 21, 200 psi acceptable for sizes 3" and smaller.
    - b. Joints: Push-on integral bell and rubber ring gaskets, ASTM D-3139.
    - c. Coatings: None.
    - d. Gaskets: Vulcanized rubber.

- e. Fittings:
  - (1) Ductile iron, compact type, ANSI/AWWA C-153/A21.53; or standard, ANSI/AWWA C-110/A21.10; Pressure class 350.
  - (2) Joints: Mechanical joints, ANSI/AWWA C-311/A21.11.
  - (3) Restrained Mechanical Joints: EBBA Series 1100 Megalug, or equal, 350 psi rating.
  - (4) Exterior coating: Bituminous.
  - (5) Interior coating: Cement mortar lining per ANSI/AWWA C104/A21.4.
  - (6) Gaskets: Vulcanized rubber, non-tipped ANSI/AWWA C
- f. Joint Restrainer for Pipe Bell and Spigot Couplings.
  - (1) Uni Flange Series 1300, EBBA Series 1500, or equal.
- 2. Exposed Locations.
  - a. PVC Schedule 80 per ASTM D-1785.
  - b. Joints (2" and larger): Flanged, slip-on SW or VanStone style.
  - c. Joints (1 1/2" and smaller): Solvent weld.
- C. Copper Tubing (2" and smaller).
  - 1. Water tubing:
    - a. Hard drawn: ASTM B-88, Type L.
    - b. Soft Annealed: ASTM B-88, Type K.
  - 2. Instrument Tubing: ASTM B-280, soft annealed.
  - 3. Fittings:
    - a. Flared ANSI B-16.26.
    - b. Solder Joint: ANSI B-16.18, or B-16.22.
    - c. Compression: Bass, Crawford "Swaselok," or equal.
  - 4. Solder: Solid wire, ASTM B-32, Alloy Grade 5b5.
- D. Steel Pipe (2" and smaller).
  - 1. ASTM A-53, seamless (Type 5) or electric resistance welded (Type B), grade A or B, galvanized.
  - 2. Nipples: ASTM A-733, seamless, extra strong, Schedule 80.
  - 3. Fittings: Malleable iron, ANSI B-16.3, class 150, galvanized.
- E. Sewer and Drain Pipe: Refer to Specification 15400.
- F. Polyethylene Pressure Pipe.
  - 1. HDPE per AWWA C901.
  - 2. 200 psi working pressure rating.
  - 3. Fittings per ASTM D2683 or ASTM 03261.
  - 4. Butt type heat fusion joint shall be used wherever possible.
- G. Corrugated Polyethylene Drainage Tubing.
  - 1. AASHTO M 252 and ASTM F-405 with solid and slotted wall.
- H. Process Piping Materials Schedule.

Application

Potable Water, 4" & larger.  
Potable Water, 3" & smaller

Buried

PVC, AWWA C-900, DR 18  
PVC, ASTM D2241, DR 21

Exposed

Ductile Iron or PVC (Schedule 80)  
Ductile Iron or copper (Type L)

## 2.2 Valves

### A. General.

- 1. End Connections.
  - a. Above ground locations:
    - (1) 2 1/2" and smaller: Threaded.
    - (2) 3" and larger: Flanged, ANSI, 125 lb.
  - b. Buried or Submerged:
    - (1) 2 1/2" and smaller: Threaded.
    - (2) 3" and larger: Mechanical joint, ANSI A21.11.
- 2. Coatings.
  - a. Buried or submerged locations:
    - (1) Ferrous substrate: Asphalt varnish, coat tar or coal tar epoxy.

- (2) Bronze or brass: Uncoated.
- b. Exposed interior locations:
  - (1) Ferrous substrate: Rust inhibitive primer, suitable for field painting.
  - (2) PVC construction: Field painted per manufacturer's recommendations.
  - (3) Brass or bronze: Uncoated.
- 3. Actuators.
  - a. Provide manual actuators for all valves not specified to be power actuated or designated for automatic operation.
  - b. Interior Locations:
    - (1) 2 ½" and smaller: Handwheel or T-handle for 1/4 turn valves.
    - (2) 3" and larger: Handwheel.
  - c. Buried locations:
    - (1) 2 ½" and smaller: Solid tee head.
    - (2) 3" and larger: Wrench nuts per AWWA C500.
  - d. Rotation: Counterclockwise to open.
  - e. Valve Boxes:
    - (1) Provide valve boxes for all buried valves.
    - (2) 2 ½" and smaller valves, interior or exterior:  
Structural plastic box, screw type, Mueller H-1300 with cast iron lid.
    - (3) 3" and larger valves: Cast iron extension sleeve type, 5" dia., asphalt varnish coated.
- B. Gate Valves.
  - 1. 3" and larger: Iron body, non-rising stem, resilient seated, AWWA C509, interior epoxy coating.
  - 2. 2 ½" and smaller: Bronze, solid wedge, 125 lb. WOG.
- C. Butterfly Valves.
  - 1. 3" and larger: Short body, cast iron body, rubber seated per AWWA C504, Class 150B, stainless steel shaft, cast iron disc.
  - 2. Disc seating at 90° with pipe axis.
  - 3. Valve position indicator on each exposed operator.
  - 4. Metal mating surfaces shall be stainless steel.
  - 5. Ends shall be flanged per ANSI B16.1 (wafer style not permitted unless specifically scheduled as wafer type on drawings).
  - 6. Handwheel operator: enclosed worm and gear or traveling nut-operator limiting operator pull to 25 lbs. on handwheel, oil filled gear housing; shaft bearing bushings shall be permanently lubricated.
  - 7. Pratt Model 2F II, or equal.
- D. Ball Valves (Bronze).
  - 1. Water Service: 2 ½" and smaller, Watts Series B-6000, or equivalent, lever operator.
- E. Check Valves.
  - 1. Wafer style, iron or semi-steel body, spring loaded center guided "silent" type.
  - 2. Bronze seat and plug, stainless steel spring and hardware.
  - 3. Val Matic, APCO, or equal.
- F. Pressure Relief Valve.
  - 1. Watts BP-30 or equal.
  - 2. Open at 75 psi, adjustable.
- G. Air Release Valve.
  - 1. Pressure type air release valve, cast iron body, NPT inlet and outlet connections, stainless steel fitted.
  - 2. Working pressure: 150 psi.
  - 3. Venting Rate: 14.7 scfm @ 150 psi.
  - 4. Manufacturer: Val Matic, APCO or equal.

## 2.3 Piping Accessories

- A. Water Meter.
  - 1. Magnetic turbine drive, 3" size.
  - 2. Flanged connections for insertion in 3" line.
  - 3. Sensus Series W turbo-Meter, Schlumberger, Badger, or equal.

- B. Pressure Tanks.
  - 1. Vertical mount captive air type with butyl rubber diaphragm.
  - 2. Steel construction, epoxy coated exterior with integral base.
  - 3. 100 psi pressure rating.
  - 4. 115 gal. volume with 35 gal. drawdown at 30-50 psi range.
  - 5. A.O. Smith "Aqua-Air," Well-X-Trol, or equal.
- C. Flow Switch.
  - 1. Mountable in pipeline of 3" diameter using a 1" saddle type connection.
  - 2. 120 V.
  - 3. Actuate at velocity down to 0.5 fps with indicator light.
  - 4. Watts FS-10CL or equal.
- D. Pressure Gauges.
  - 1. 4 1/2" dial, 1/4" stem connection, glycerin filled shock resistant type, 0-100 psi range.
  - 2. Furnish with snubber and shut-off valve.
  - 3. Ashcroft, Ametek, or equal.
- E. Temperature Gauge
  - 1. Locate on reservoir recirculation line.
  - 2. Bi-metal helix type, silicone filed.
  - 3. Adjustable angle 3" dial, 2 1/2" probe, 1/2" NPT connection.
  - 4. Range 25°F to 125°F.
- F. Liquid Level Controller (Tank Level).
  - 1. 4-20 ma input from pressure transducer.
  - 2. LCD display of water level (0 to 35' range).
  - 3. 5 setpoints with relay output, high water and low water alarms to exterior light on well house plus well pump off and pump start.
  - 4. With 24vdc, 300 ohm regulated power supply.
  - 5. Time Mark 4062 Liquid Level Controller or equal, with surface mount kit.
- G. Pressure Transducer.
  - 1. 4-20 ma 2 wire output.
  - 2. 0.15-psi pressure range.
  - 3. Temperature compensation.
  - 4. 1/4" NPT connection to pipe tap, with isolation cock and snubb.
  - 5. Wika 836, or equal with cable to connect to Liquid Level Controller.

## PART 3 - EXECUTION

### 3.1 General Requirements

- A. Exposed Piping:
  - 1. Install piping as detailed, or if not detailed, install as closely as possible to walls, ceilings and equipment (consistent with proper space requirements for maintenance and operational requirements) so as to occupy a minimum of space. Furnish all offsets, fittings, etc. required to accomplish the required results.
  - 2. Provisions for flexibility are not always shown, and the Contractor may add flexible joints where required with review of the Engineer.
  - 3. Install pipe parallel with or at right angles to adjacent walls and floors.
  - 4. Provide a shut-off valve and union at the connection of air, water or gas lines to each fixture or piece of equipment whether shown on the drawings or not.
  - 5. Provide a union within 2' of all threaded valves or other similar items unless other means for easy removal of the valve is provided.
  - 6. Taps for pressure gauge connections shall include nipple, snubber and gauge cock.
  - 7. Provide expansion joints at 50' maximum spacing in rigid PVC piping (exposed or buried). Provide expansion joints in PVC piping adjacent to taps or connections to rigid piping in buried locations.
- B. Buried Piping:
  - 1. Comply with the applicable provisions of Section 02221.

2. Provide polyethylene tube encasement of all buried ductile iron pipe and fittings.
3. Provide expansion joints in buried rigidly jointed PVC piping per paragraph A.7, above.

### 3.2 Jointing Pipe

- A. Threaded (Steel):
  1. Comply with ANSI B2.1, NPT, fully and cleanly cut threads.
  2. No more than three threads exposed after joint complete.
  3. Ream pipe ends to remove burrs.
  4. Use thread tape on all joints in PVC or stainless steel pipe, thread tape or joint compound on steel or cast iron threaded joints.
- B. Compression (Copper):
  1. Cut pipe ends squarely, remove burrs, clean contact surfaces with steel wool.
- C. Flared (Copper):
  1. Cut pipe ends squarely, remove burrs.
  2. Scratches in grooved or flared ends are not permitted.
- D. Flanged (Steel, Ductile Iron):
  1. Tighten bolts loosely until overall equipment setting and pipe alignment accomplished.
  2. Tighten bolts sufficiently to compress gasket and effect a good seal, but not so much as to distort flanges.

### 3.3 Setting Valves and Fittings

- A. Valves and fittings shall be set and fastened generally as described for pipe laying.
- B. Check Valves: Install ball check valves in vertical runs of piping.
- C. Air Release Valves: Pipe exhaust to a floor drain and terminate drain line 6" above drain elevation.
- D. Check and adjust valves and accessories in accordance with manufacturer's instructions.
- E. Pressure Relief Valves: Pipe outlet to floor drain.

### 3.4 Buried Piping Anchorage

- A. Provide reaction blocking, anchors, joint harnesses or other acceptable means of preventing pipe movement caused by internal pressure for all unrestrained buried piping.
- B. Provide concrete thrust blocking on all unrestrained tees, Y- branches, bend 22½° or more, and plugs whether blocking is indicated on the drawings or not. Thrust blocking shall:
  1. Provide bearing area indicated on the drawings, or if not indicated, shall provide a bearing area established by the Engineer.
  2. Blocking shall extend from fitting to solid undisturbed earth and shall be installed so that joints are not covered by concrete.
  3. If adequate support against undisturbed earth cannot be obtained, provide harness, tie bolt or joint restrainer fittings.
- C. When detailed on the drawings, provide mechanical joint restrainers at each fitting, and at all pipe joints within.

### 3.5 Hydrostatic Testing

- A. Process piping shall be field tested for leakage in accordance with the appropriate section (Hydrostatic tests) of AWWA C600-87. Test pressure and duration shall be per AWWA C600-87 and allowable leakage shall be determined in accordance with the formula

$$L = \frac{SD\sqrt{P}}{133,200}$$

L = allowable leakage in gallon per hour

S = length in feet

D = nominal diameter of pipe in inches

P = average test pressure in pounds per square inch

Contractor shall conduct test under supervision of the Engineer. Schedule of test pressure required:

Well House Piping Systems      100 psi

\* Test pressure based on the elevation of the lowest point in the line under test and corrected to the elevation of the test gauge.

- B. General. The inside of all pipe, valves, fittings shall be smooth, clean and free from blisters, mill scale, dirt or other matter before installing. Blow out or flush all lines as appropriate before testing or placing in service.

### 3.6 Pipeline Cleaning

- A. General. The inside of all pipe, valves, fittings shall be smooth, clean and free from blisters, mill scale, dirt or other matter before installing. Blow out or flush all lines as appropriate before testing or placing in service.

### 3.7 Pipeline Disinfection

- A. Disinfect potable water piping in compliance with AWWA C601.  
B. Buried piping may be disinfected using hypochlorite tablets glued to the top of the pipe during installation using Permatex No. 1 adhesive.  
C. Comply with AWWA requirements for 50-ppm dosage, 24 hr. retention period.  
D. Flush system after testing.

### 3.8 Supporting Pipe

- A. In general, hanger and support systems are not indicated or detailed on drawings. The Contractor shall provide a complete system of supports and anchors for pipes, pumps, and other mechanical devices.  
B. Maximum Support Spacing.  
1. Steel or ductile iron.

| <u>Size</u>   | <u>Support Spacing</u> |
|---------------|------------------------|
| ½" - 1 ½"     | 6'                     |
| 2" and larger | 8'                     |

2. PVC Pipe.

| <u>Size</u> | <u>Support Spacing</u> |
|-------------|------------------------|
| Any Size    | 4'                     |

- C. Wall and Ceiling Space. Support pipe to provide minimum 1½" clearance from walls and 3" below ceilings unless detailed otherwise.  
D. Equipment. Do not support equipment from piping unless authorized by the Engineer. Provide supplemental brackets, braces and reinforcing to allow equipment to be self-supporting. Design supports to allow servicing and removal of equipment.

\*\*\*\*END OF SECTION\*\*\*\*

## SECTION 15400

### PLUMBING

#### PART 1 - GENERAL

##### 1.1 Description

- A. Scope: Complete following systems, including materials devices, appliances, fixtures equipment and appurtenances.
  - 1. Floor drains complete with piping.
  - 2. Waste and vent piping with connections to each fixture requiring a waste connection.
  - 3. Plumbing fixtures not specified elsewhere.
  - 4. Service water piping system.
- B. Applicable to Well House.

##### 1.2 Additional Requirements Specified Elsewhere

- A. Shop Drawings, Product Data and Samples: Section 01340.

##### 1.3 Related Work Specified Elsewhere

- A. Trenching, Backfilling and Compacting: Section 02221.
- B. Process Piping and Valves: Section 15100.

##### 1.4 Quality Assurance

- A. Regulatory Requirements:
  - 1. South Dakota Plumbing Code. (National Standard Plumbing Code).

##### 1.5 Submittals

- A. Shop Drawings and Product Data:
  - 1. Submit manufacturer's product data for all fixtures and equipment sufficient to verify compliance.

#### PART 2 - PRODUCTS

##### 2.1 Pipe Materials

- A. PVC Drain, Waste and Vent Pipe.
  - 1. Where permitted by code or scheduled on drawings, provide PVC DWV systems.
  - 2. Pipe and fittings (interior use): ASTM D-2665, Schedule 40, Type 1, Grade 1, SW joints.
  - 3. Pipe and fittings (exterior, buried locations): ASTM D-3034, SDR 35, gasketed joints.
  - 4. Solvent Cement: ASTM D-2564.
- B. Cast iron soil pipe.
  - 1. Where permitted by code or scheduled on drawings, provide either hubless cast iron soil pipe or centrifugally cast service weight soil pipe.
  - 2. Service weight: SV, ASTM A-74.
  - 3. Joints.
    - a. Hubless, CISPI 301.
    - b. Hub and Spigot: Rubber compression gasket per ASTM C-564.

## 2.2 Fixtures and Drains

### A. Floor Drains.

1. Manufacturer: Josam, Smith, Wade, or Zurn.
2. Size: 4" pipe size, 7" strainer size.
3. Materials: Cast iron body and flashing collar, nickel bronze strainer.
4. Construction Features: 2-piece body, threaded collar, adjustable height strainer head, plastic protector cap.

### B. Cleanouts.

1. Interior Floor Cleanout: Cast iron body threaded vertical adjustment, round nickel bronze top, taper thread closure plug, Smith 4020, or equal.
2. Exterior Cleanout: Screwed plug type, bronze, raised square lug.

### C. Hose Valve (Interior).

1. Brass construction, handwheel operator, 5/8" hose connection, with vacuum breaker.
2. Watts HB-1, or equal.

### D. Ball Valves (2" and smaller).

1. Bronze, 2 piece construction
2. 400 psi pressure rating.
3. Screwed or solder ends per application and piping materials.
4. Lever handle, 1/4 turn operator.
5. Watts Series B-6000, or equal.

### E. Sampling Fixture.

1. 1/2" MIP inlet x plain spout outlet.
2. Cast brass, tee handle operator.

## PART 3 - EXECUTION

### 3.1 Installation

#### A. Drainage Piping:

1. Conform generally to locations indicated on drawings.
2. Slope horizontal soil and waste piping at not less than 1/4" per foot.
3. Trenching, pipe embedment and backfill per Section 02221.

#### B. Joints:

1. Solvent Welded: Cut piping square, clean and apply cement in accordance with manufacturer guidelines.
2. Gasketed or no-hub: Per manufacturer's recommended procedures with proper lubricants where required.

#### C. Floor Drains:

1. Locate generally as indicated on drawings.
2. Adjust floor drains to correct elevation for proper drainage.
3. Trap in accordance with code.

#### D. Cleanouts:

1. Y-branch or combination double 1/8-bend fittings.

### 3.2 Supports and Fastenings

- A. Securely and rigidly support all fixtures and piping.
- B. Conceal ends of bolts with hexagonal cap nuts.
- C. Conceal fasteners for mounting accessories, and use toggle bolts to expansion anchors.

### 3.3 Cleaning and Adjustment

#### A. General:

1. Thoroughly clean and flush all parts after installation.
2. Remove all grease, metal cuttings and debris.

### 3.4 Testing

#### A. Drain and Vent Leak Test:

1. Plug openings and fixtures as required.
2. Fill with water to highest level of vent stack.
3. One-hour duration, no detectable leakage.

### 3.5 Pipe Schedule

#### Service

Drain lines outside of buildings

Drainage piping buried under floors

Vent piping exposed in building

Service Water

Other

#### Material

PVC, ASTM D-3034.

Cast iron soil pipe or PVC (Sch. 40 DWV)

Cast iron soil pipe or PVC (Sch. 40 DWV)

Copper or PVC (Sch. 80)

Refer to Section 15100.

\*\*\*\* END OF SECTION \*\*\*\*

A vertical dashed line runs down the left side of the page, consisting of a series of short, thick black horizontal bars separated by gaps.

# **APPENDIX A**

## **Geotechnical Report**

**AMERICAN  
TECHNICAL  
SERVICES, INC.**

7557 Black Hawk Rd • PO Box 558 • Black Hawk, SD 57718-0558 • Phone (605) 787-9303 • FAX (605) 787-9515  
140 Pine Needle Drive • Spearfish, SD 57783 • Phone (605) 642-2742 • Mobile 390-3768

**DUANE ROBBINS**  
4041 Canyon Drive  
Rapid City, South Dakota 57702

August 22, 2005

Attn: Duane Robbins

Re: Transmittal of Boring Logs  
Lots 9B thru 13B & 16 thru 18; Horseshoe Acres Subdivision  
Northeast of Rapid City, South Dakota

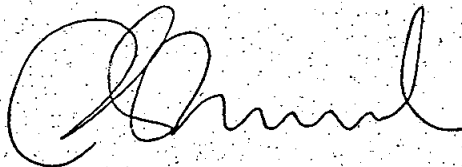
ATS No. 05-5230

As requested, we have completed the drilling and sampling on the proposed Lots 9B thru 13B and Lots 16 thru 18 within the Horseshoe Acres Subdivision located northeast of Rapid City, South Dakota.

We understand that said soils profile borings were required for the platting process of the lots for Meade County. We have attached the logs with our "General Notes" and engineering classification document for your reference.

If there are questions, feel free to call us at (605) 787-9303 and we will be glad to respond.

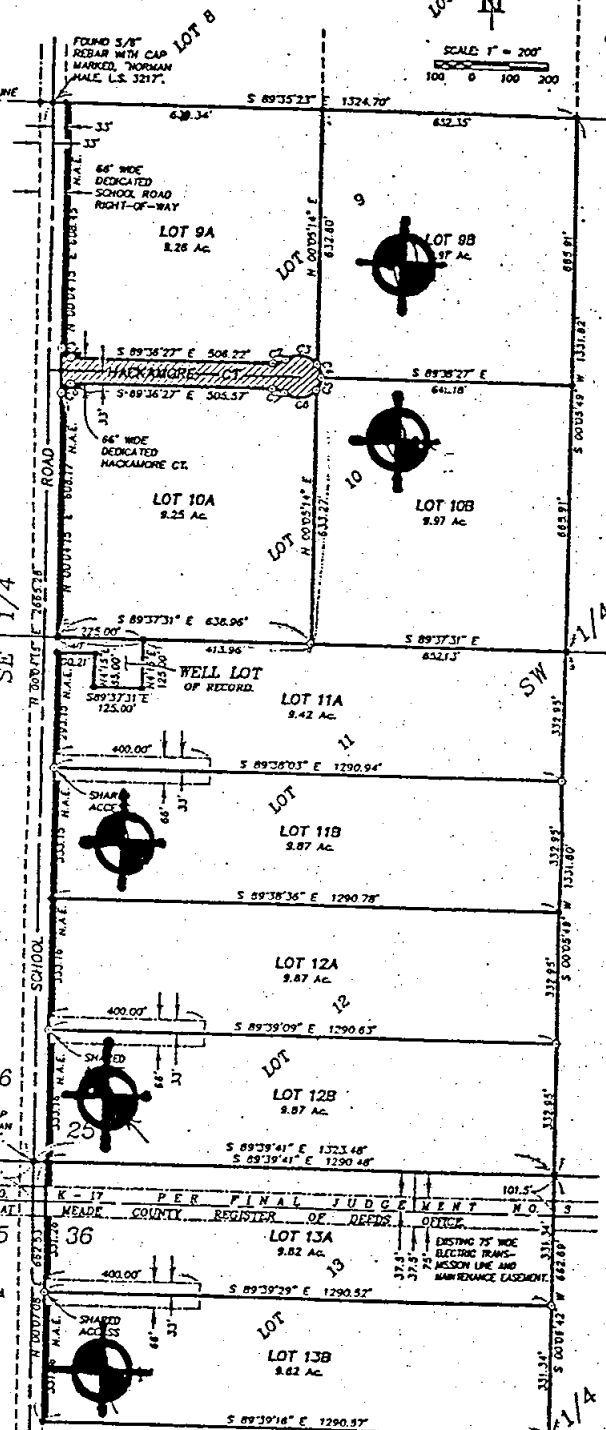
Sincerely,  
American Technical Services, Inc.



Dave G. Bressler, P.E.  
Director of Engineering

Attachments

cc: File



# 

### 

LOT 16, LOT 17, AND LOT 18 OF HORSESHOE ACRES SUBDIVISION,  
AND DEDICATED SADDLE ROAD RIGHT-OF-WAY,  
LOCATED IN THE SE1/4 OF THE NE1/4 AND IN THE SOUTH 33 FEET  
OF THE NE1/4 OF THE NE1/4 OF SECTION 35,  
TOWNSHIP 3 NORTH, RANGE 8 EAST OF THE BLACK HILLS MERIDIAN,  
MEADE COUNTY, SOUTH DAKOTA.

AUGUST, 2005

#### 

- SET 5/8" REBAR WITH CAP MARKED "DEAN SCOTT, L.S. 4897".
- FOUND 5/8" REBAR WITH CAP MARKED "DEAN SCOTT, L.S. 4897", UNLESS OTHERWISE NOTED.
- FOUND ORIGINAL STONE.
- ▨ RIGHT-OF-WAY DEDICATED THIS PLAT.
- EASEMENT LINE.

SCALE: 1" = 300'

#### 

- MINOR DRAINAGE AND UTILITY EASEMENTS ARE HEREBY ESTABLISHED 15 FEET WIDE ON THE INTERIOR SIDE OF ALL LOT LINES.
- PER SDCL 11-3-8.1 AND 11-3-8.2, IF THE SUBDIVISION SHOWN HEREON IS ADJACENT TO OR INCLUDES ANY OF THE WATERS OF THE STATE, THE DEVELOPER OF SUCH SUBDIVISION SHALL BE RESPONSIBLE FOR PROTECTING SUCH BODY OF WATER FROM POLLUTION FROM SEWAGE FROM SUCH SUBDIVISION.
- TOTAL DEDICATED RIGHT-OF-WAY 1.96 AC.
- BEARING ORIENTATION BASED ON ASTRONOMIC OBSERVATION.
- THIS PLAT LIES WITHIN THE ELLSWORTH AIR FORCE BASE AIRCRAFT FLY ZONE.
- BUILDING ENVELOPE: 25' FRONT, 6' SIDE, 35' REAR.
- NO ASSURANCE CAN BE MADE FOR AVAILABILITY OF WATER FROM SHALLOW WELLS ON THIS PROPERTY.

#### 

C1 Δ=90°10'39"  
R=25.00'  
L=39.35'

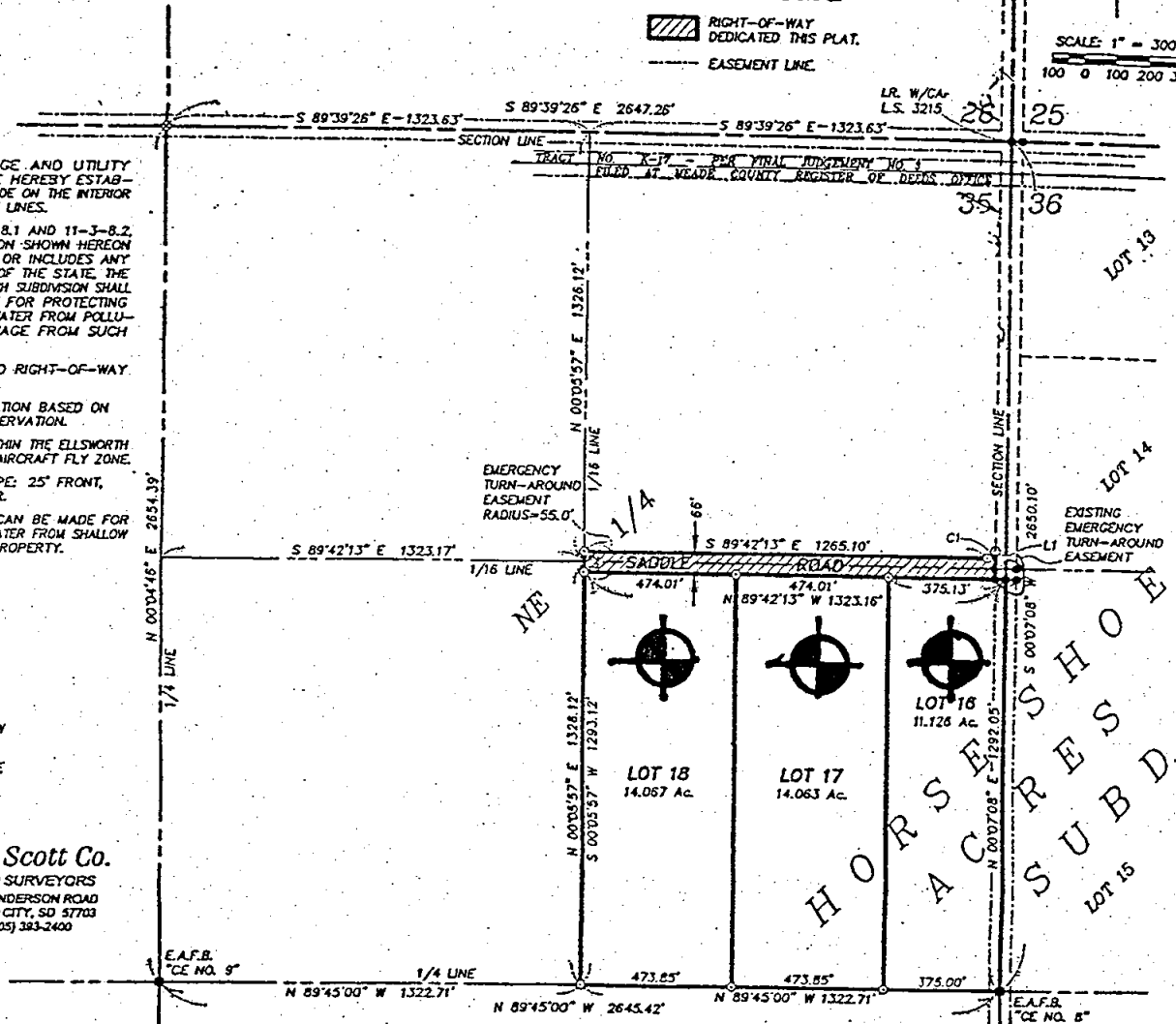
#### 

L1 S 00°07'08" W 91.08'  
L2 N 00°05'57" E 66.00'

PREPARED BY:



**D.C. Scott Co.**  
LAND SURVEYORS  
3163 ANDERSON ROAD  
RAPID CITY, SD 57703  
(605) 383-2400



# TEST BORING LOG

PROJECT TITLE: Lot 9B, Horseshoe Acres Subdivision, Meade County, SD

PROJECT NUMBER: 05-5230

Lot 9B

BORING NUMBER: 1

| DEPTH<br>IN<br>FEET | DESCRIPTION OF MATERIAL                                                 | GEOLOGIC<br>ORIGIN | SAMPLE DATA |   |    |      | LABORATORY TESTS |   |          |    |
|---------------------|-------------------------------------------------------------------------|--------------------|-------------|---|----|------|------------------|---|----------|----|
|                     |                                                                         |                    | WL          | N | NO | TYPE | W                | D | LL<br>PL | QU |
| 0.0'                | Grass/weeds/topsoil-6"                                                  | Alluvium           |             |   |    |      |                  |   |          |    |
|                     | Sandy Fat Clay: Gray-brown<br>dry, v. stiff, (CH w/sand)                |                    |             |   |    |      |                  |   |          |    |
| 2.5'                |                                                                         |                    |             |   | 1  | SB   |                  |   |          |    |
| 5.0'                | Calcite present, sl. moist<br>less stiff                                |                    |             |   | 2  | SB   |                  |   |          |    |
| 6.5'                | Weathered Shale: Brown &<br>gray, sl. moist, hard, (CH)<br>Sand present | Pierre<br>Shale    |             |   | 3  | SB   |                  |   |          |    |
| 7.5'                |                                                                         |                    |             |   |    |      |                  |   |          |    |
| 10.0'               |                                                                         |                    |             | 4 | SB |      |                  |   |          |    |
|                     | End of Boring                                                           |                    |             |   |    |      |                  |   |          |    |
| 15.0'               |                                                                         |                    |             |   |    |      |                  |   |          |    |
| 20.0'               |                                                                         |                    |             |   |    |      |                  |   |          |    |
| 25.0'               |                                                                         |                    |             |   |    |      |                  |   |          |    |

|          |                          |                               |
|----------|--------------------------|-------------------------------|
| DATE:    | WATER TABLE MEASUREMENTS | DATE: 8/18/05                 |
| 08/18/05 | Not Encountered          | METHOD OF DRILLING: 2.25" HSA |
|          |                          | CREW CHIEF: BB                |

AMERICAN TECHNICAL SERVICES, INC. (605) 787-9303

# TEST BORING LOG

PROJECT TITLE: Lot 9B, Horseshoe Acres Subdivision, Meade County, SD

PROJECT NUMBER: 05-5230

Lot 10B

BORING NUMBER: 1

| DEPTH<br>IN<br>FEET | DESCRIPTION OF MATERIAL                                                     | GEOLOGIC<br>ORIGIN       | SAMPLE DATA |                               |    |      | LABORATORY TESTS |   |          |    |
|---------------------|-----------------------------------------------------------------------------|--------------------------|-------------|-------------------------------|----|------|------------------|---|----------|----|
|                     |                                                                             |                          | WL          | N                             | NO | TYPE | W                | D | LL<br>PL | QU |
| 0.0'                | Grass/weeds/topsoil-6"                                                      | Alluvium                 |             |                               |    |      |                  |   |          |    |
| 2.5'                | Sandy Fat Clay: Gray-brown<br>dry, v. stiff, (CH w/sand)<br>calcite present |                          |             |                               | 1  | SB   |                  |   |          |    |
| 4.5'                |                                                                             | Pierre<br>Shale          |             |                               | 2  | SB   |                  |   |          |    |
| 5.0'                | Weathered Shale: Brown &<br>gray, moist, v. stiff, (CH)<br>Sand present     |                          |             |                               |    |      |                  |   |          |    |
| 7.5'                | sl. moist, hard                                                             |                          |             |                               | 3  | SB   |                  |   |          |    |
| 10.0'               | End of Boring                                                               |                          |             |                               | 4  | SB   |                  |   |          |    |
| 15.0'               |                                                                             |                          |             |                               |    |      |                  |   |          |    |
| 20.0'               |                                                                             |                          |             |                               |    |      |                  |   |          |    |
| 25.0'               |                                                                             |                          |             |                               |    |      |                  |   |          |    |
| DATE: 08/18/05      |                                                                             | WATER TABLE MEASUREMENTS |             | DATE: 8/18/05                 |    |      |                  |   |          |    |
| 08/18/05            |                                                                             | Not Encountered          |             | METHOD OF DRILLING: 2.25" HSA |    |      |                  |   |          |    |
|                     |                                                                             |                          |             | CREW CHIEF: BB                |    |      |                  |   |          |    |

AMERICAN TECHNICAL SERVICES, INC. (605) 787-9303

# TEST BORING LOG

PROJECT TITLE: Lot 9B, Horseshoe Acres Subdivision, Meade County, SD

PROJECT NUMBER: 05-5230

Lot 11B

BORING NUMBER: 1

| DEPTH<br>IN<br>FEET | DESCRIPTION OF MATERIAL                                                     | GEOLOGIC<br>ORIGIN | SAMPLE DATA |   |    |      | LABORATORY TESTS |   |    |    |
|---------------------|-----------------------------------------------------------------------------|--------------------|-------------|---|----|------|------------------|---|----|----|
|                     |                                                                             |                    | WL          | N | NO | TYPE | W                | D | LL | QU |
|                     |                                                                             |                    |             |   |    |      |                  |   | PL |    |
| 0.0'                | Grass/weeds/topsoil-6"                                                      | Alluvium           |             |   |    |      |                  |   |    |    |
| 2.5'                | Sandy Fat Clay: Gray-brown<br>dry, v. stiff, (CH w/sand)<br>calcite present |                    |             |   | 1  | SB   |                  |   |    |    |
| 5.0'                | More sand present                                                           |                    |             |   | 2  | SB   |                  |   |    |    |
| 6.5'                |                                                                             |                    |             |   |    |      |                  |   |    |    |
| 7.5'                | Weathered Shale: Brown &<br>gray, sl. moist, hard, (CH)<br>Sand present     | Pierre<br>Shale    |             |   | 3  | SB   |                  |   |    |    |
| 10.0'               |                                                                             |                    |             |   | 4  | SB   |                  |   |    |    |
|                     | End of Boring                                                               |                    |             |   |    |      |                  |   |    |    |
| 15.0'               |                                                                             |                    |             |   |    |      |                  |   |    |    |
| 20.0'               |                                                                             |                    |             |   |    |      |                  |   |    |    |
| 25.0'               |                                                                             |                    |             |   |    |      |                  |   |    |    |

|          |                          |                               |
|----------|--------------------------|-------------------------------|
| DATE:    | WATER TABLE MEASUREMENTS | DATE: 8/18/05                 |
| 08/18/05 | Not Encountered          | METHOD OF DRILLING: 2.25" HSA |
|          |                          | CREW CHIEF: BB                |

AMERICAN TECHNICAL SERVICES, INC. (605) 787-9303

# TEST BORING LOG

PROJECT TITLE: Lot 9B, Horseshoe Acres Subdivision, Meade County, SD

PROJECT NUMBER: 05-5230

Lot 12B

BORING NUMBER: 1

| DEPTH<br>IN<br>FEET | DESCRIPTION OF MATERIAL                                                              | GEOLOGIC<br>ORIGIN                        | SAMPLE DATA     |                               |    |      | LABORATORY TESTS |   |          |    |
|---------------------|--------------------------------------------------------------------------------------|-------------------------------------------|-----------------|-------------------------------|----|------|------------------|---|----------|----|
|                     |                                                                                      |                                           | WL              | N                             | NO | TYPE | W                | D | LL<br>PL | QU |
| 0.0'                | Grass/weeds/topsoil-6"                                                               | Alluvium                                  |                 |                               |    |      |                  |   |          |    |
| 2.5'                | Sandy Fat Clay: Gray-brown<br>dry, v. stiff, (CH w/sand)<br>calcite & gravel present |                                           |                 |                               | 1  | SB   |                  |   |          |    |
| 4.0'                |                                                                                      |                                           |                 |                               |    |      |                  |   |          |    |
| 5.0'                | Weathered Shale: Brown &<br>gray, moist, v. stiff, (CH)<br>Sand present              |                                           | Pierre<br>Shale |                               |    | 2    | SB               |   |          |    |
| 7.5'                | Mostly gray                                                                          |                                           |                 |                               | 3  | SB   |                  |   |          |    |
| 10.0'               | Less stiff                                                                           |                                           |                 |                               | 4  | SB   |                  |   |          |    |
|                     | End of Boring                                                                        |                                           |                 |                               |    |      |                  |   |          |    |
| 15.0'               |                                                                                      |                                           |                 |                               |    |      |                  |   |          |    |
| 20.0'               |                                                                                      |                                           |                 |                               |    |      |                  |   |          |    |
| 25.0'               |                                                                                      |                                           |                 |                               |    |      |                  |   |          |    |
| DATE: 08/18/05      |                                                                                      | WATER TABLE MEASUREMENTS: Not Encountered |                 | DATE: 8/18/05                 |    |      |                  |   |          |    |
|                     |                                                                                      |                                           |                 | METHOD OF DRILLING: 2.25" HSA |    |      |                  |   |          |    |
|                     |                                                                                      |                                           |                 | CREW CHIEF: BB                |    |      |                  |   |          |    |

AMERICAN TECHNICAL SERVICES, INC. (605) 787-9303

# TEST BORING LOG

PROJECT TITLE: Lot 9B, Horseshoe Acres Subdivision, Meade County, SD

PROJECT NUMBER: 05-5230

Lot 13B

BORING NUMBER: 1

| DEPTH<br>IN<br>FEET | DESCRIPTION OF MATERIAL                                                     | GEOLOGIC<br>ORIGIN | SAMPLE DATA |   |    |      | LABORATORY TESTS |   |          |    |
|---------------------|-----------------------------------------------------------------------------|--------------------|-------------|---|----|------|------------------|---|----------|----|
|                     |                                                                             |                    | WL          | N | NO | TYPE | W                | D | LL<br>PL | QU |
| 0.0'                | Grass/weeds/topsoil-6"                                                      | Pierre<br>Shale    |             |   |    |      |                  |   |          |    |
|                     | Weathered Shale: Brown & gray, moist, stiff, (CH)<br>Sand & calcite present |                    |             |   |    |      |                  |   |          |    |
| 2.5'                |                                                                             |                    |             |   | 1  | SB   |                  |   |          |    |
| 5.0'                | v. stiff                                                                    |                    |             |   | 2  | SB   |                  |   |          |    |
| 7.5'                | hard                                                                        |                    |             |   | 3  | SB   |                  |   |          |    |
| 10.0'               | less stiff<br>End of Boring                                                 |                    |             | 4 | SB |      |                  |   |          |    |
| 15.0'               |                                                                             |                    |             |   |    |      |                  |   |          |    |
| 20.0'               |                                                                             |                    |             |   |    |      |                  |   |          |    |
| 25.0'               |                                                                             |                    |             |   |    |      |                  |   |          |    |

|          |                          |                               |
|----------|--------------------------|-------------------------------|
| DATE:    | WATER TABLE MEASUREMENTS | DATE: 8/18/05                 |
| 08/18/05 | Not Encountered          | METHOD OF DRILLING: 2.25" HSA |
|          |                          | CREW CHIEF: BB                |

AMERICAN TECHNICAL SERVICES, INC. (605) 787-9303

# TEST BORING LOG

PROJECT TITLE: Lot 9B, Horseshoe Acres Subdivision, Meade County, SD

PROJECT NUMBER: 05-5230

Lot 16

BORING NUMBER: 1

| DEPTH<br>IN<br>FEET | DESCRIPTION OF MATERIAL                                                           | GEOLOGIC<br>ORIGIN | SAMPLE DATA |   |    |      | LABORATORY TESTS |   |          |    |
|---------------------|-----------------------------------------------------------------------------------|--------------------|-------------|---|----|------|------------------|---|----------|----|
|                     |                                                                                   |                    | WL          | N | NO | TYPE | W                | D | LL<br>PL | QU |
| 0.0'                | Grass/weeds/topsoil-6"                                                            | Alluvium           |             |   |    |      |                  |   |          |    |
| 2.5'                | Sandy Fat Clay: Gray-brown<br>sl. moist, v. stiff, calcite<br>present (CH w/sand) |                    |             |   | 1  | SB   |                  |   |          |    |
| 5.0'                |                                                                                   |                    |             |   | 2  | SB   |                  |   |          |    |
| 6.0'                |                                                                                   |                    |             |   |    |      |                  |   |          |    |
| 7.5'                | Weathered Shale: Brown,<br>moist, hard, sand present<br>(CH w/sand)               | Pierre<br>Shale    |             |   | 3  | SB   |                  |   |          |    |
| 10.0'               | End of Boring                                                                     |                    |             |   | 4  | SB   |                  |   |          |    |
| 15.0'               |                                                                                   |                    |             |   |    |      |                  |   |          |    |
| 20.0'               |                                                                                   |                    |             |   |    |      |                  |   |          |    |
| 25.0'               |                                                                                   |                    |             |   |    |      |                  |   |          |    |

|          |                          |                               |
|----------|--------------------------|-------------------------------|
| DATE:    | WATER TABLE MEASUREMENTS | DATE: 8/18/05                 |
| 08/18/05 | Not Encountered          | METHOD OF DRILLING: 2.25" HSA |
|          |                          | CREW CHIEF: BB                |

AMERICAN TECHNICAL SERVICES, INC. (605) 787-9303

# TEST BORING LOG

PROJECT TITLE: Lot 9B, Horseshoe Acres Subdivision, Meade County, SD

PROJECT NUMBER: 05-5230

Lot 17

BORING NUMBER: 1

| DEPTH<br>IN<br>FEET | DESCRIPTION OF MATERIAL                                                       | GEOLOGIC<br>ORIGIN                        | SAMPLE DATA     |   |    |      | LABORATORY TESTS |   |          |    |
|---------------------|-------------------------------------------------------------------------------|-------------------------------------------|-----------------|---|----|------|------------------|---|----------|----|
|                     |                                                                               |                                           | WL              | N | NO | TYPE | W                | D | LL<br>PL | QU |
| 0.0'                | Grass/weeds/topsoil-6"                                                        | Alluvium                                  |                 |   |    |      |                  |   |          |    |
| 2.5'                | Sandy Clay: Gray-brown<br>sl. moist, v. stiff, calcite<br>present (CL w/sand) |                                           |                 |   | 1  | SB   |                  |   |          |    |
| 5.0'                |                                                                               |                                           |                 |   | 2  | SB   |                  |   |          |    |
| 6.0'                | Weathered Shale: Brown &<br>gray, moist, hard,<br>sand present (CH w/sand)    |                                           | Pierre<br>Shale |   |    | 3    | SB               |   |          |    |
| 7.5'                |                                                                               |                                           |                 |   | 4  | SB   |                  |   |          |    |
| 10.0'               | End of Boring                                                                 |                                           |                 |   |    |      |                  |   |          |    |
| 15.0'               |                                                                               |                                           |                 |   |    |      |                  |   |          |    |
| 20.0'               |                                                                               |                                           |                 |   |    |      |                  |   |          |    |
| 25.0'               |                                                                               |                                           |                 |   |    |      |                  |   |          |    |
| DATE: 08/18/05      |                                                                               | WATER TABLE MEASUREMENTS: Not Encountered |                 |   |    |      |                  |   |          |    |
|                     |                                                                               | DATE: 8/18/05                             |                 |   |    |      |                  |   |          |    |
|                     |                                                                               | METHOD OF DRILLING: 2.25" HSA             |                 |   |    |      |                  |   |          |    |
|                     |                                                                               | CREW CHIEF: BB                            |                 |   |    |      |                  |   |          |    |

AMERICAN TECHNICAL SERVICES, INC. (605) 787-9303

# TEST BORING LOG

PROJECT TITLE: Lot 9B, Horseshoe Acres Subdivision, Meade County, SD

PROJECT NUMBER: 05-5230

Lot 18

BORING NUMBER: 1

| DEPTH<br>IN<br>FEET | DESCRIPTION OF MATERIAL                                                       | GEOLOGIC<br>ORIGIN | SAMPLE DATA |   |    |      | LABORATORY TESTS |   |    |    |
|---------------------|-------------------------------------------------------------------------------|--------------------|-------------|---|----|------|------------------|---|----|----|
|                     |                                                                               |                    | WL          | N | NO | TYPE | W                | D | LL | QU |
|                     |                                                                               |                    |             |   |    |      |                  |   | PL |    |
| 0.0'                | Grass/weeds/topsoil-6"                                                        | Alluvium           |             |   |    |      |                  |   |    |    |
| 2.5'                | Sandy Clay: Gray-brown<br>sl. moist, v. stiff, calcite<br>present (CL w/sand) |                    |             |   | 1  | SB   |                  |   |    |    |
| 5.0'                | Hard                                                                          |                    |             |   | 2  | SB   |                  |   |    |    |
| 7.5'<br>8.0'        |                                                                               |                    |             |   | 3  | SB   |                  |   |    |    |
| 10.0'               | Weathered Shale: Brown,<br>moist, hard, sand present<br>(CH w/sand)           | Pierre<br>Shale    |             |   | 4  | SB   |                  |   |    |    |
|                     | End of Boring                                                                 |                    |             |   |    |      |                  |   |    |    |
| 15.0'               |                                                                               |                    |             |   |    |      |                  |   |    |    |
| 20.0'               |                                                                               |                    |             |   |    |      |                  |   |    |    |
| 25.0'               |                                                                               |                    |             |   |    |      |                  |   |    |    |

|          |                          |                               |
|----------|--------------------------|-------------------------------|
| DATE:    | WATER TABLE MEASUREMENTS | DATE: 8/18/05                 |
| 08/18/05 | Not Encountered          | METHOD OF DRILLING: 2.25" HSA |
|          |                          | CREW CHIEF: BB                |

AMERICAN TECHNICAL SERVICES, INC. (605) 787-9303

# GENERAL NOTES

| DESCRIPTIVE TERMINOLOGY |           | RELATIVE SIZES |            |
|-------------------------|-----------|----------------|------------|
| Density Term            | "N" Value |                |            |
| Very Loose              | 0 - 4     | Boulder        | > 12"      |
| Loose                   | 4 - 10    | Cobble         | 3" - 12"   |
| Medium Dense            | 10 - 16   | Gravel         |            |
| Dense                   | 16 - 30   | Coarse         | 3/4" - 3"  |
| Very Dense              | > 30      | Fine           | #4 - 3/4"  |
|                         |           | Sand           |            |
|                         |           | Coarse         | #4 - #10   |
|                         |           | Medium         | #10 - #40  |
|                         |           | Fine           | #40 - #200 |
|                         |           | Silt & Clay    | <#200 (PI) |

| Consistency Term | "N" Value | Term     | Range    |
|------------------|-----------|----------|----------|
| Very Soft        | 0 - 2     | Trace    | 0 - 5%   |
| Soft             | 2 - 4     | A Little | 5 - 15%  |
| Medium stiff     | 4 - 8     | Some     | 15 - 30% |
| Stiff            | 8 - 15    | With     | 30 - 50% |
| Very stiff       | 15 - 30   |          |          |
| Hard             | < 30      |          |          |

| BORING AND SAMPLING SYMBOLS |                                           |
|-----------------------------|-------------------------------------------|
| SYMBOL                      | DEFINITION                                |
| HSA                         | Hollow Stem Auger - 3 1/4" ID & 4 1/4" ID |
| FA                          | Flight Auger - 4" OD                      |
| HA                          | Hand Auger - 1 1/2" OD                    |
| DC                          | Drive Casing                              |
| PD                          | Pipe Drill or Clean Out Tube              |
| CS                          | Continuous Split Barrel Sampling          |
| DM                          | Drilling Mud                              |
| JW                          | Jetting Water                             |
| SB                          | Split Barrel Sampler                      |
| TW                          | Thin Wall Tube Sampler                    |
| LS                          | Split Barrel Liner Sample                 |
| W                           | Wash Sample                               |
| B                           | Bag Sample                                |
| NSR                         | No Sample Retrieved                       |
| NMR                         | No Water Level Measurement Recorded       |
| WL                          | Water Level                               |
| N                           | Standard Penetration Value                |
|                             | Water Level Symbol                        |

| LABORATORY TEST SYMBOLS |                                                   |
|-------------------------|---------------------------------------------------|
| SYMBOL                  | DEFINITION                                        |
| W                       | Moisture Content-Percent of Dry Weight ASTM D2216 |
| D                       | Dry Density-Pound Per Cubic Foot                  |
| LL & PL                 | Liquid Limit and Plastic Limit ASTM D4318         |
| Qu                      | Unconfined Compressive Strength                   |
|                         | Pounds Per Square Foot ASTM D2166                 |

# CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

ASTM Designation: D 2487 — 69 AND D 2488 — 69

(Unified Soil Classification System)

| Major divisions                                                  |                                                                   |                                                                               | Group symbols                                           | Typical Names                                                      | Classification Criteria                                                                                                                                                                                                                                              |                                                                                                                  |                                                                                                               |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
|------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Coarse-grained soils<br>More than 50% retained on No. 200 sieve* | Gravels<br>50% or more of coarse fraction retained on No. 4 sieve | Clean gravels                                                                 | GW                                                      | Well-graded gravels and gravel-sand mixtures, little or no fines   | Classification on basis of percentage of fines<br>Less than 5% pass No. 200 sieve ..... GW, GP, SW, SP<br>More than 12% pass No. 200 sieve ..... GM, GC, SM, SC<br>5 to 12% pass No. 200 sieve ..... <i>Borderline</i> classifications requiring use of dual symbols | $C_u = \frac{D_{60}}{D_{10}}$ greater than 4;<br>$C_z = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3 |                                                                                                               |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
|                                                                  |                                                                   |                                                                               | GP                                                      | Poorly graded gravels and gravel-sand mixtures, little or no fines |                                                                                                                                                                                                                                                                      | Not meeting both criteria for GW                                                                                 |                                                                                                               |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
|                                                                  |                                                                   | Gravels with fines                                                            | GM                                                      | Silty gravels, gravel-sand-silt mixtures                           |                                                                                                                                                                                                                                                                      | Atterberg limits below "A" line or P.I. less than 4                                                              | Atterberg limits plotting in hatched area are <i>borderline</i> classifications requiring use of dual symbols |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
|                                                                  |                                                                   |                                                                               | GC                                                      | Clayey gravels, gravel-sand-clay mixtures                          |                                                                                                                                                                                                                                                                      | Atterberg limits above "A" line with P.I. greater than 7                                                         |                                                                                                               |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
|                                                                  | Sands<br>More than 50% of coarse fraction passes No. 4 sieve      | Clean sands                                                                   | SW                                                      | Well-graded sands and gravelly sands, little or no fines           |                                                                                                                                                                                                                                                                      | $C_u = \frac{D_{60}}{D_{10}}$ greater than 6;<br>$C_z = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3 |                                                                                                               |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
|                                                                  |                                                                   |                                                                               | SP                                                      | Poorly graded sands and gravelly sands, little or no fines         |                                                                                                                                                                                                                                                                      | Not meeting both criteria for SW                                                                                 |                                                                                                               |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
|                                                                  |                                                                   | Sands with fines                                                              | SM                                                      | Silty sands, sand-silt mixtures                                    |                                                                                                                                                                                                                                                                      | Atterberg limits below "A" line or P.I. less than 4                                                              | Atterberg limits plotting in hatched area are <i>borderline</i> classifications requiring use of dual symbols |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
|                                                                  |                                                                   |                                                                               | SC                                                      | Clayey sands, sand-clay mixtures                                   |                                                                                                                                                                                                                                                                      | Atterberg limits above "A" line with P.I. greater than 7                                                         |                                                                                                               |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
|                                                                  |                                                                   |                                                                               | Fine-grained soils<br>50% or more passes No. 200 sieve* | Sils and clays<br>Liquid limit 50% or less                         |                                                                                                                                                                                                                                                                      | ML                                                                                                               |                                                                                                               | Inorganic silts, very fine sands, rock flour, silty or clayey fine sands                          | <b>Plasticity Chart</b><br>For classification of fine-grained soils and fine fraction of coarse-grained soils.<br>Atterberg Limits plotting in hatched area are <i>borderline</i> classifications requiring use of dual symbols.<br>Equation of A-line:<br>$PI = 0.73 (LL - 20)$<br> |  |
|                                                                  |                                                                   |                                                                               |                                                         |                                                                    |                                                                                                                                                                                                                                                                      | CL                                                                                                               |                                                                                                               | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays |                                                                                                                                                                                                                                                                                      |  |
| OL                                                               | Organic silts and organic silty clays of low plasticity           |                                                                               |                                                         |                                                                    |                                                                                                                                                                                                                                                                      |                                                                                                                  |                                                                                                               |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
| Sils and clays<br>Liquid limit greater than 50%                  | MH                                                                | Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts |                                                         |                                                                    |                                                                                                                                                                                                                                                                      |                                                                                                                  |                                                                                                               |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
|                                                                  | CH                                                                | Inorganic clays of high plasticity, fat clays                                 |                                                         |                                                                    |                                                                                                                                                                                                                                                                      |                                                                                                                  |                                                                                                               |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
|                                                                  | OH                                                                | Organic clays of medium to high plasticity                                    |                                                         |                                                                    |                                                                                                                                                                                                                                                                      |                                                                                                                  |                                                                                                               |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
|                                                                  | Highly organic soils                                              | Pt                                                                            |                                                         | Peat, muck and other highly organic soils                          |                                                                                                                                                                                                                                                                      |                                                                                                                  |                                                                                                               |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |
| * Based on the material passing the 3 in. (76 mm) sieve.         |                                                                   |                                                                               |                                                         |                                                                    |                                                                                                                                                                                                                                                                      |                                                                                                                  |                                                                                                               |                                                                                                   |                                                                                                                                                                                                                                                                                      |  |

\* Based on the material passing the 3 in. (76 mm) sieve.

**BUSINESS PLAN**  
**for**  
**Horseshoe Acres Water System**  
**Meade County, SD**

**Prepared for:**

Horseshoe Acres Water Co., LLC  
c/o Duane Robbins  
4041 Canyon Drive  
Rapid City, SD 57702

**Prepared by:**



1830 West Fulton Street  
P.O. Box 9014  
Rapid City, SD 57709-9014

April 5, 2006



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## Appendices

- A. Application and Supporting Data
  - New Water System Application
  - Certification of Applicant
  - Application for Permit to Appropriate Water
  - Well Completion Report
  - Water Quality Data
- B. Water System Ownership and Operating Entity
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  - Articles of Organization
  - Operating Agreement
  - Membership Units
  - Miscellaneous Documents
- C. Credentials
  - Operator Certification
- D. Plans and Specifications (bound separately)

# **1. FACILITIES PLAN**

## **1.1 Introduction**

### **1.1.1 Background Information**

The Horseshoe Acres Subdivision consists of 27 platted lots in the W ½ W ½ of Section 25, W ½ NW ¼ Section 36, and NE ¼ N ¼ Section 35, T3N, R8E, BHM in Meade County. The general location is 7 miles north of I-90 on Elk Vale Road, then 2 miles east on Horseshoe Road. The location is shown on the vicinity map in Figure 1.

The current subdivision was platted in 2005, with a total land area of 320 acres. Future platting is proposed for 80 acres in Section 35, and this expansion will consist of 15 additional lots. The total number of lots existing or planned for Horseshoe Acres is 42 lots. Figure 2 shows the current and proposed platting for Horseshoe Acres Subdivision. Lot sizes range from 3 acres to 40 acres.

It is proposed to serve the subdivision with a public water supply system. The water source is a 2,560-foot Inyan Kara aquifer well constructed in 2005. Portions of the water distribution and storage system were constructed in 2005. The well is currently serving approximately 8 homes constructed at the site in 2005. Completion of the water supply and storage system serving Phases 1 and 2 of the development is planned for 2006.

### **1.1.2 Purpose and Scope**

The proposed Horseshoe Acres Water System will meet the definition of a Public Water Supply system on the basis that it will serve more than 15 residential lots and 25 people on a year-around basis. South Dakota Drinking Water Standards require that new public water supplies obtain a certificate of approval from the South Dakota Department of Environment and Natural Resources (DENR) before commencing operations as a public supply.

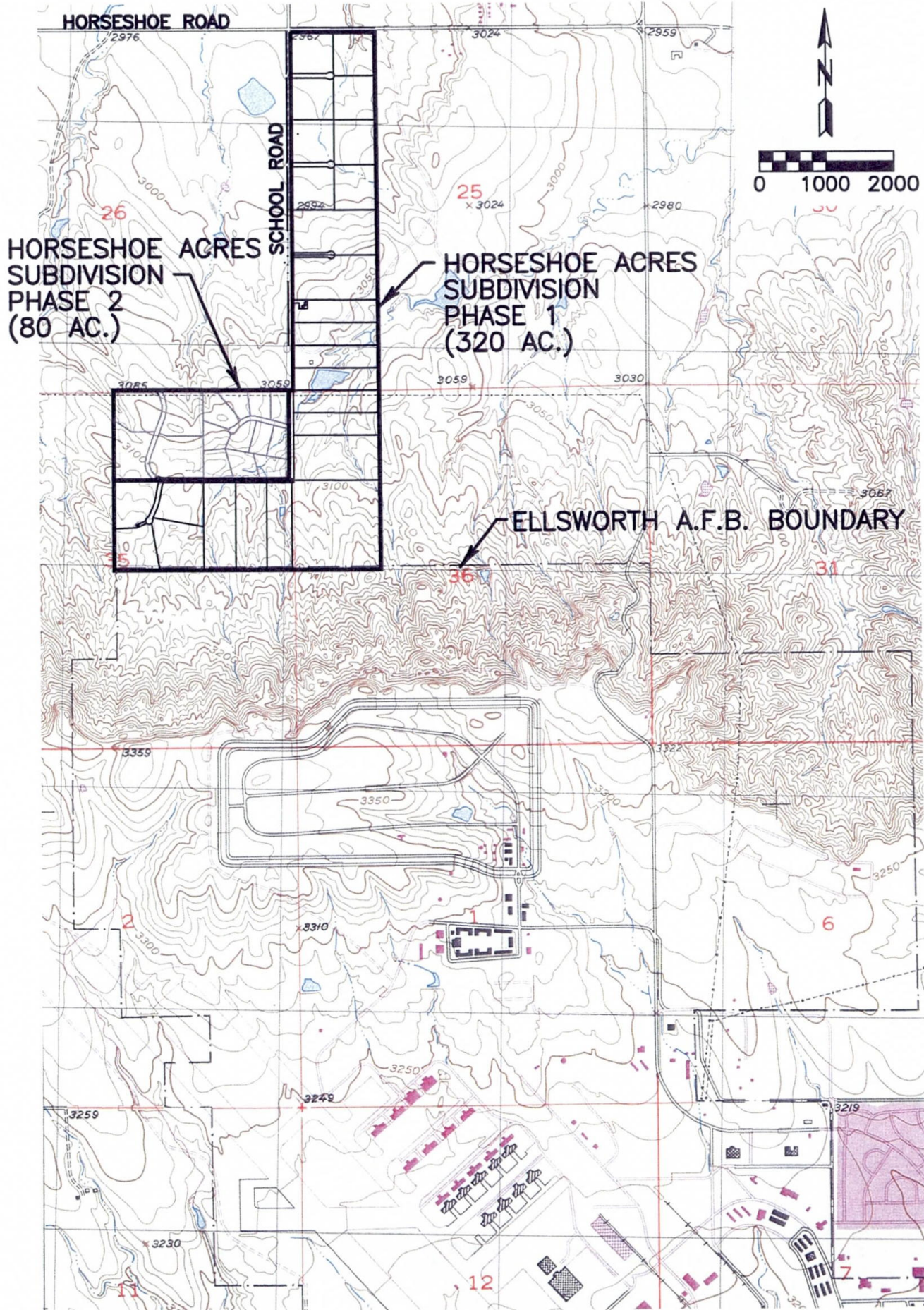
The project developer, Duane Robbins, retained CETEC Engineering Services, Inc. to provide engineering services for design and construction, and to assist with the certification process.

Portions of the existing system, including the well and distribution piping system, were constructed separately, without involvement of CETEC. Information about facilities not designed by CETEC which are described in this document has been obtained from as-built surveys, and information provided by the developer and well driller.

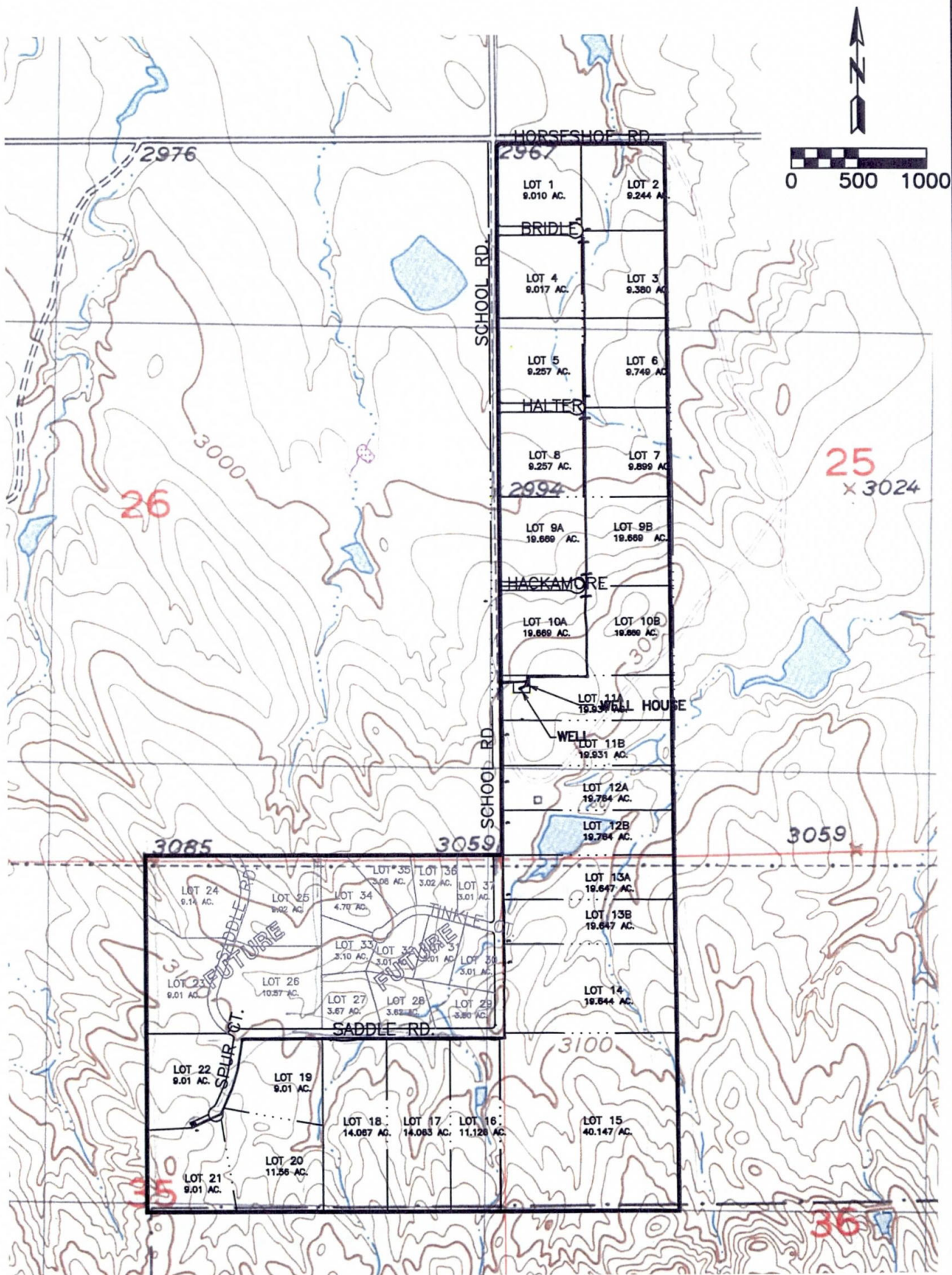
## **1.2 Existing and Future Conditions**

### **1.2.1 Service Area**

The proposed Horseshoe Acres Water System service area consists of all existing and proposed lots within the 400-acre boundary of Phase 1 and Phase 2 of Horseshoe Acres Subdivision as delineated on Figure 2



**FIGURE 1  
VICINITY MAP**



**FIGURE 2  
PLATTING**

The Horseshoe Acres Subdivision, existing and proposed, consists of 42 lots of from 3 acres to 40 acres. Some existing lots were re-subdivided after the initial Phase 1 platting. This subdivision, with lots as small as 3 acres, is classified as a "Medium Density" development in accordance with Meade County Ordinance 20. The ordinance requires a community water system for this type of subdivision.

Other undeveloped properties adjoining Horseshoe Acres may have an interest in future water service from the Horseshoe Acres system, although there has been no specific request from, or communication with adjoining property owners at this time. It is also considered possible that previously platted lots in Horseshoe Acres will be further subdivided in the future. There is no covenant which would prevent further subdivision of large tracts.

For planning purposes, it has been assumed that further subdivision and/or annexation of other properties to the Horseshoe system is possible. This planning report is based upon the following number of residential lots to be served.

**Total Residential Lots in Horseshoe Acres Service Area**

|                   |         |
|-------------------|---------|
| Horseshoe Phase 1 | 27 Lots |
| Horseshoe Phase 2 | 15 Lots |
| Future Lots       | 33 Lots |
| Total             | 75 Lots |

**1.2.2 Population**

The Horseshoe Acres subdivision is anticipated to be single-family residential in character. No multi-family or commercial development is planned for or permitted by covenants. Population estimates are based upon 3 people per dwelling unit which is a conservative average based upon studies of single-family homes in the Rapid City region.

Based upon current market conditions, the developer anticipates that the build-out time frame for Phase 1 and 2 will be 5 years. The projected service population for the period 2005 through 2009 is shown in the following table. This projected rate of development has been used to forecast water demands and evaluate financial requirements for system operations.

**Horseshoe Acres Service Population**

| <u>Year</u> | <u>Developed Lots<br/>with Homes</u> | <u>Population</u> |
|-------------|--------------------------------------|-------------------|
| 2005        | 8                                    | 24                |
| 2006        | 16                                   | 48                |
| 2007        | 24                                   | 72                |
| 2008        | 32                                   | 96                |
| 2009        | 42                                   | 126               |
| Ultimate    | 75                                   | 225               |

**1.2.3 Water Demands**

Water demands for rural subdivisions vary depending upon lawn and garden irrigation needs, livestock watering and other factors. The character of Horseshoe Acres is anticipated to be similar to rural "ranchette" type developments where lawn and garden areas are small, and livestock is limited to horses for recreational

purposes. The existing homes at Horseshoe Acres do not have significant lawn and/or garden areas. Water use projections presented following assume that irrigated lawn areas will be limited to 5,000 square feet or less, similar to urban homes.

The recommended design criteria for water demands in Horseshoe Acres are as follows:

**Water Use Criteria**

Average Day Demand: ..... 100 gpcd\*  
Peak Day Demand: ..... 300 gpcd  
Peak 2-Hour Demand: ..... 800 gpcd

*\*gallons per person (capita) per day.*

These criteria are typical use rates for urban and suburban properties within the Rapid City vicinity, and comply with recommended DENR criteria and Meade County Ordinance 20 requirements.

The following table presents water demand projections for the Horseshoe Acres system.

**Projected Horseshoe Acres Water Demands**

| <u>Year</u> | <u>Design<br/>Population</u> | <u>Average Day</u> | <u>Peak Day</u> | <u>Peak 2-Hr.</u> |
|-------------|------------------------------|--------------------|-----------------|-------------------|
| 2005        | 24                           | 2,400 gpd          | 7,200 gal.      | 13 gpm            |
| 2006        | 48                           | 4,800 gpd          | 14,400 gal.     | 27 gpm            |
| 2007        | 72                           | 7,200 gpd          | 21,600 gal.     | 40 gpm            |
| 2008        | 96                           | 9,600 gpd          | 28,800 gal.     | 53 gpm            |
| 2009        | 126                          | 12,600 gpd         | 37,800 gal.     | 70 gpm            |
| Ultimate    | 225                          | 22,500 gpd         | 67,500 gal.     | 125 gpm           |

### **1.3 Existing System**

The Horseshoe Acres system is partially constructed at the time of preparation of this Facilities Plan. Additional construction is planned to complete the system and to place the system into full operation.

Existing water system components are described following:

▪ ***Well Supply:***

The existing well is 2,560 feet deep and completed into the Inyan Kara sandstone aquifer. Steel casing is 7 inches in diameter to 2,180 feet; and perforated 4 ½ inches in diameter from 2,180 feet to 2,560 feet of depth through the water bearing zone. Static water is 400 feet below surface. The well is equipped with a pitless adapter and a 15-HP submersible pump designed to deliver approximately 50 gpm at 650 feet TDH. This well was completed by Cimarron Drilling in 2005. Well completion reports and pump data is included in Appendix A.

▪ ***Distribution Piping:***

Portions of the distribution piping system were constructed in 2005. The limits of the existing distribution system and additional proposed distribution system are included in the engineering drawings included as Appendix D to this Facilities Plan. In-place piping is 6-inch PVC, AWWA C-900, Cl. 150.

- *Well House:*

The well house and piping system is partially constructed at the time of preparation of this Facilities Plan. The well house construction is in accordance with the design drawings and specifications by CETEC Engineering.

Other system components, including the distribution piping system for Phase 2 and the storage reservoir, are not constructed, but are planned for 2006. The engineering drawings and specifications for the remaining project work are included in Appendix D (bound separately from this document).

## **1.4 Drinking Water Standards**

### **1.4.1 Existing Water Quality Data**

The existing well is completed into the Inyan Kara sandstone aquifer. The Inyan Kara aquifer is widely used for domestic water supplies east of the Black Hills. Water quality is generally acceptable for drinking water, although treatment may be required or desirable.

Water quality sampling of the Horseshoe Acres well was completed in late 2005. To date, no water quality sampling and testing has been completed.

Sampling and testing will be required for all regulated parameters under South Dakota Drinking Water Regulations prior to commencing operations as a public water supply.

### **1.4.2 Compliance Assessment**

[ incomplete pending water quality testing ]

## **1.5 Alternatives Considered**

The Horseshoe Acres development is located in a rural area. The nearest public water supplies are as follows:

|                    |   |                                |
|--------------------|---|--------------------------------|
| City of Box Elder  | - | 5 miles south                  |
| City of Rapid City | - | 5 miles south and 2 miles west |
| Rolling Dice       | - | 4 miles west and 3 miles south |
| Dry Creek Estates  | - | 3 miles north and 4 miles east |

None of the existing public water supplies provided a practical alternative based upon political limitations, inadequate capacity and uneconomical distances, among others.

Other groundwater sources at this location include the Minnelusa and Madison limestone aquifers. These aquifers are at great depth (>4,000 feet) and are known to have unacceptable water quality east of the Black Hills.

The Inyan Kara was judged to be the only practical supply alternative based upon physical, political and economic considerations.

## **1.6 Engineering Description**

### **1.6.1 Existing and Proposed Facilities**

The Horseshoe Acres Water System will consist of the following major components.

- Inyan Kara Well

- Well House and Chemical Feed / Treatment System
- Storage Reservoir
- Distribution Piping System (6-inch PVC)

The facilities have been evaluated and designed for long-term system needs and for compliance with the following standards:

- *Recommended Standards for Water Works*, 1997 (Known as "Ten States Standards")
- *Criteria for Public Water Systems in South Dakota*, SDDENR, 1977.
- *Ordinance No. 20, Regulations for the Subdivision of Land, Development and Improvements*, Meade County, January 4, 2006.

Limited fire protection capability is provided by the system, but the system was not designed to comply with municipal fire protection standards.

### Facility Sizing

#### ▪ *Well and Well Pump*

The well system must be capable of producing not less than the projected peak-day demand (ultimate 67,500 gpd). AWWA standards recommend a production capacity equal to 1.5 times peak-day, although this is not a requirement.

The existing submersible pump unit produces approximately 50 gpm at the projected distribution system hydraulic gradient. The driller estimated that the well could safely yield up to 85 gpm if needed.

The production capacity of the existing well is as follows:

$$\text{Production Capacity: } 50 \text{ gpm} \times 60 \text{ m} \times 24 \text{ hrs.} = 72,000 \text{ gpd}$$

The production safety factor based upon a projected 67,500-gpd peak-day is as follows:

$$\text{Production Safety Factor: } \frac{72,000 \text{ gpd}}{67,500 \text{ gpd}} = 1.1$$

The existing 50-gpm well pump is adequate. The well was pump tested to 85 gpm, thus it is possible to increase production capacity in the future if unanticipated water demands are experienced. Consideration can be given to upgrading the well pump in the future when the ultimate service area and system demands are known.

Well construction must, additionally, comply with State of South Dakota Water Well Construction Standards (ARSD 72:02:04). A review of the site conditions, pitless unit and driller's completion report, indicates that the well was constructed in accordance with the applicable standards.

The existing well and pump system are judged to be constructed satisfactorily and have sufficient capacity to meet projected needs.

#### ▪ *Distribution Piping*

Existing and proposed distribution system piping is 6-inch PVC. Sizing is adequate to meet projected peak 2-hour demands and is in compliance with Meade County Ordinance No. 20.

The distribution system is proposed to be pressurized to above 30 psi using a standpipe type storage tank located at an elevation needed to pressurize the system by gravity. A minimum of 30 psi will be provided in all parts of the distribution system under normal operations with a minimum of 20 psi when the tank is at 50% capacity.

- *Storage*

Water storage requirements for medium density residential subdivisions are specified in Meade County Ordinance No. 20. Section 5.04 requires a storage volume of at least a minimum of 3 days of average demand.

State DENR criteria require storage volume of at least one day of average-day usage, thus Meade County criteria will control.

The necessary storage volume based upon the County criterion is as follows

$$22,500 \text{ gpd (ultimate average-day)} \times 3 \text{ days} = 67,500 \text{ gallons}$$

The proposed storage tank is a 18.5-foot diameter by 48-foot high stainless steel bolted panel type tank with a capacity of 96,000 gallons. The proposed high water elevation is 3,184 feet which provides normal pressure of 30 psi or more at elevations below 3,115.

Figure 3 shows normal working pressures in the Horseshow Estates distribution system. Lots at elevations below 3000 (Lots 1 through 8) will have normal working pressures above 80 psi. A pressure reducing valve is provided in the well house to reduce distribution system pressures to approximately 50 psi for these lots. The operating schematic in Figure 4 shows the two-zone arrangement for maintaining pressures between 30 and 80 psi. Distribution system pressure for Lot 21 (at the reservoir site) will be approximately 25 psi, and an in-home booster pump system will be needed.

- *Well Control*

The well pump is controlled by reservoir level. A level control system in the well house measures tank level via system pressure and cycles on and off to maintain the reservoir level.

The well discharge is metered at the well house. Chlorine and polyphosphate are added at the well house for disinfection and for sequestering dissolved iron.

- *Disinfection*

A sodium hypochlorite feed system provides chlorine disinfection and maintains a chlorine residual in the distribution system. A peristaltic type metering pump is located in the well house and injects liquid hypochlorite solution into the well discharge before it enters the distribution system.

The anticipated chlorine feed rate based upon an anticipated dosage of 2 mg/l of chlorine and 50 gpm pump rate is as follows:

$$\text{Chlorine Feed Rate: } 72,000 \text{ gpd} \times 8.33 \text{ lb./gal.} \times 2 \text{ ppm} = 1.2 \text{ lb./day}$$

$$\text{Metering Pump Rate: } \frac{1.2 \text{ lb./day}}{1.25 \text{ lb. chlorine / gal.} *} = .96 \text{ gpd (.04 gph)}$$

$$* \text{NaOH, 15\%} = 1.25 \text{ lb./gal.}$$

A 10-gpd rated pump with 100:1 turn down capability is provided. The chemical feed pump is activated by a flow switch in the well discharge piping header in the well house so as to feed chlorine when well water is flowing to the system.



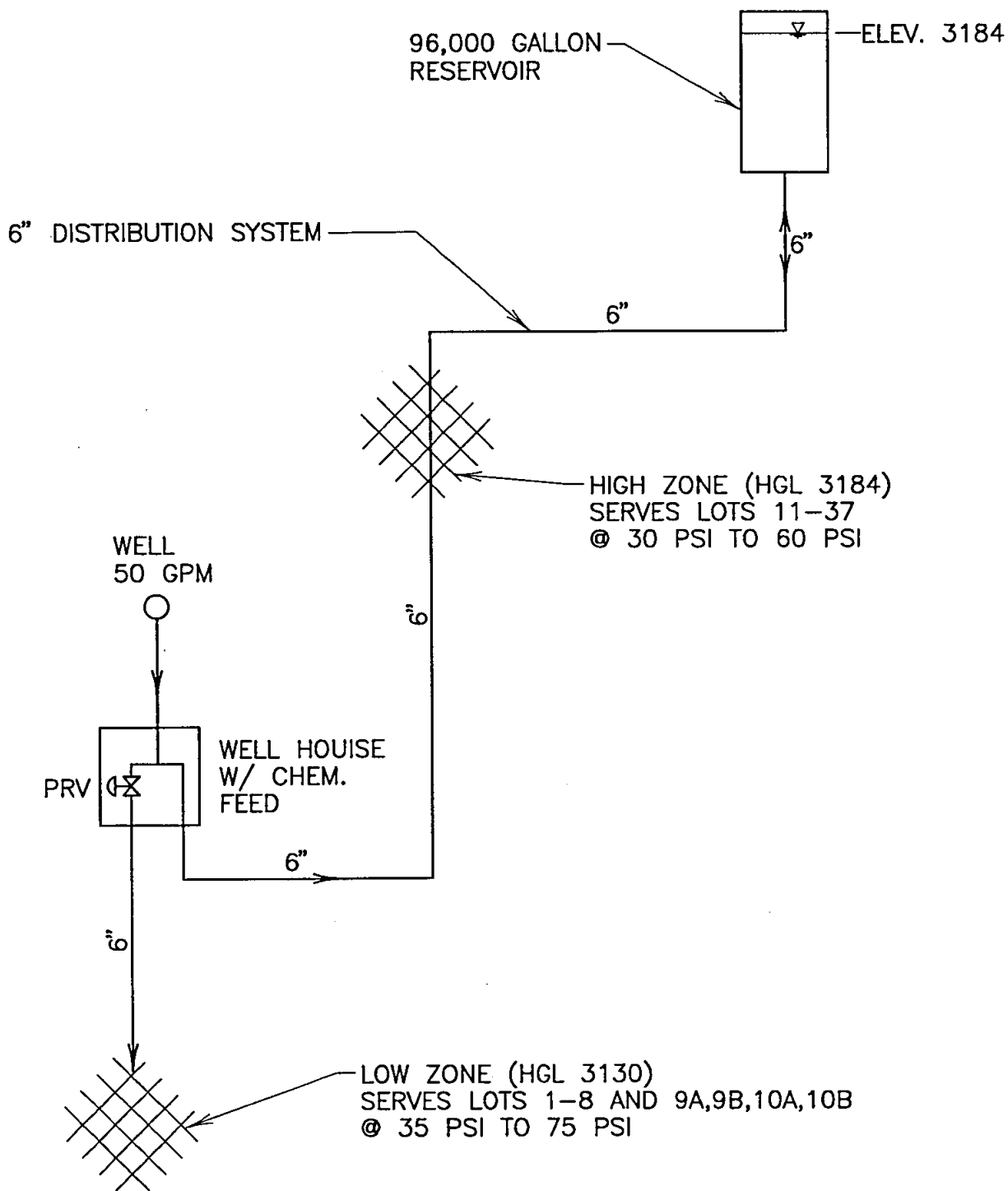


FIGURE 4  
WATER SYSTEM SCHEMATIC

- *Fire Protection*

The Horseshoe Acres system is not designed to provide for municipal level fire protection. However, the line size, storage volume and pressures in the distribution system do provide for the hydraulic capacity to provide fire flows at hydrants in the system. Figure 5 shows the maximum fire flow capacity at various locations in the system. The hydrants also provide water loading capability, thus Meade County Ordinance 20 requirements for cistern fire storage do not apply (5.04.5).

## **1.7 Cost of Construction**

The following tables present estimated capital costs and operating costs for the Horseshoe Acres system. These costs are for planning purposes. Actual costs may vary, and the rate structure outlined in the Financial Plan section will need to be adjusted in future years to reflect actual costs.



### Estimate of Probable Construction Costs – Horseshoe Acres Water System

| <u>Item</u>                                      | <u>Estimated<br/>Quantity</u> | <u>Unit<br/>Cost</u> | <u>Total</u>      |
|--------------------------------------------------|-------------------------------|----------------------|-------------------|
| <b><u>Well</u></b>                               |                               |                      |                   |
| Drill and Case Well, 7" dia. upper, 41/2" lower. | 2,560 v.f.                    | \$ 35                | \$ 89,600         |
| Pitless Adapter and Pumping Equipment            | Lump Sum                      | \$ 21,500            | \$ 21,500         |
| Sub-Total                                        |                               |                      | \$ 111,100        |
| <b><u>Well House</u></b>                         |                               |                      |                   |
| Well House Structure (12' x 16')                 | 192 SF                        | \$ 100               | \$ 19,200         |
| Well House Piping & Valving                      | Lump Sum                      | \$ 15,000            | \$ 15,000         |
| Pressure Tanks (120 gal.)                        | 2 Ea.                         | \$ 800               | \$ 1,600          |
| 3" Water Meter                                   | 1 Ea.                         | \$ 1,000             | \$ 1,000          |
| Well House Electrical / Control                  | Lump Sum                      | \$ 15,500            | \$ 15,500         |
| Chemical Feed System                             | Lump Sum                      | \$ 800               | \$ 800            |
| Yard Piping and Valving                          | Lump Sum                      | \$ 3,500             | \$ 3,500          |
| Gravel Surfacing                                 | 15 Tons                       | \$ 20                | \$ 300            |
| Site Grading and Seeding                         | Lump Sum                      | \$ 1,500             | \$ 1,500          |
| 12" Culvert                                      | 25 l.f.                       | \$ 20                | \$ 500            |
| Incidentals                                      | Lump Sum                      | \$ 2,600             | \$ 2,600          |
| Sub-Total                                        |                               |                      | \$ 61,500         |
| <b><u>Reservoir</u></b>                          |                               |                      |                   |
| Tank Piping                                      | 30 l.f.                       | \$ 50                | \$ 1,500          |
| Reservoir and Foundation (96,800 Gal)            | Lump Sum                      | \$100,000            | \$ 100,000        |
| Site Grading & Restoration                       | Lump Sum                      | \$ 1,500             | \$ 1,500          |
| Site Fencing                                     | 240 l.f.                      | \$ 20                | \$ 4,800          |
| Access Road and Sub fencing                      | 150 L.F.                      | \$ 20                | \$ 3,000          |
| Sub-Total                                        |                               |                      | \$ 110,800        |
| <b><u>Distribution (Phase I)</u></b>             |                               |                      |                   |
| 6" PVC Water Main w/Bedding                      | 9,360 l.f.                    | \$ 14                | \$ 131,000        |
| 6" Tees                                          | 2 Ea.                         | \$ 200               | \$ 400            |
| 6" Bends                                         | 6 Ea.                         | \$ 150               | \$ 900            |
| 6" Gate Valve & Box                              | 8 Ea.                         | \$ 500               | \$ 4,000          |
| 6" Hydrant & Aux. Valve                          | 7 Ea.                         | \$ 2,000             | \$ 14,000         |
| 1" Tapping Saddle & Corp Stop                    | 27 Ea.                        | \$ 150               | \$ 4,050          |
| 1" Service Pipe                                  | 500 l.f.                      | \$ 15                | \$ 7,500          |
| 1" Curb Stops w/Box                              | 27 Ea.                        | \$ 150               | \$ 4,050          |
| Surface Restoration / Seeding                    | 12,500 SY                     | \$ 0.40              | \$ 5,000          |
| Incidental Work                                  | Lump Sum                      | \$ 5,700             | \$ 5,700          |
| Sub-Total                                        |                               |                      | \$ 176,600        |
| <b>Total Construction</b>                        |                               |                      | <b>\$ 460,000</b> |
| <b><u>Professional Fees</u></b>                  |                               |                      |                   |
| Engineering Design                               |                               |                      | \$ 25,000         |
| State Certification Documents                    |                               |                      | \$ 5,000          |
| Geotechnical Investigation                       |                               |                      | \$ 2,000          |
| Construction Staking / Testing                   |                               |                      | \$ 3,000          |
| Legal Fees                                       |                               |                      | \$ 5,000          |
| <b>Total Professional Fees</b>                   |                               |                      | <b>\$ 40,000</b>  |
| <b>Total Capital Cost</b>                        |                               |                      | <b>\$ 500,000</b> |

**Estimated Annual Operation and Maintenance Costs for Horseshoe Acres Water System**

| <u>Item</u>                                | <u>Range of Annual Cost</u> |                       |           |
|--------------------------------------------|-----------------------------|-----------------------|-----------|
| Contracted Services                        |                             |                       |           |
| Certified Operator                         | \$                          | 2,400 to              | \$ 3,600  |
| Manager / Bookkeeper                       | \$                          | 1,200 to              | \$ 1,500  |
| Laboratory Services                        | \$                          | 800 to                | \$ 2,800  |
| Insurance (property and liability)         | \$                          | 300 to                | \$ 500    |
| Chemicals (hypochlorite and polyphosphate) | \$                          | 100 to                | \$ 300    |
| Supplies / Mailings / Incidentals          | \$                          | 200 to                | \$ 300    |
| Electrical Power                           | \$                          | 1,200 to              | \$ 2,300  |
| Propane (building heat)                    | \$                          | 200 to                | \$ 300    |
| Reserve Allowance                          | \$                          | 5,000 to              | \$ 5,000  |
| Total                                      | \$                          | 11,400 to             | \$ 16,600 |
| Average                                    | \$                          | 14,000 /Yr.           |           |
| Allocation                                 | \$                          | 9,000 /Yr. Operations |           |
|                                            | \$                          | 5,000 /Yr. Reserves   |           |

- 1) *Lab services will be about \$2,800 for initial testing, but will reduce significantly in future years.*
- 2) *Chemical consumption and electrical power costs will be low in early years, but increase with system usage.*

## **2. MANAGEMENT PLAN**

### **2.1 Authority and Ownership**

Duane Robbins is the developer of Rolling Dice Subdivision. At the time of preparation of this report, 10 lots are sold and there are 8 homes occupied, with two homes under construction. Mr. Robbins owns all unsold lots.

### **2.2 Operating Plan**

The project developer has organized a limited liability company, Horseshoe Acres Water Co., LLC, to own and operate the water system.

Each property owner within Horseshoe Acres will be required to sign a standard water service contract with Horseshoe Acres Water Co., LLC. The water service agreement is a contract between the system owner and property owners which ensures that responsibilities are clearly defined. The contract sets forth monthly costs for water and property owner obligations.

Figure 6 is an organization chart showing the proposed management structure. The organizational documents for Horseshoe Acres Water Co., LLC are included in Appendix B.

The system will require the services of a certified Class I Treatment and Distribution System Operator. The water company has contracted with Sage Water Works (Allan Sage, Owner) to operate the system.

# Organization Chart

## Horseshoe Acres Water Co., LLC

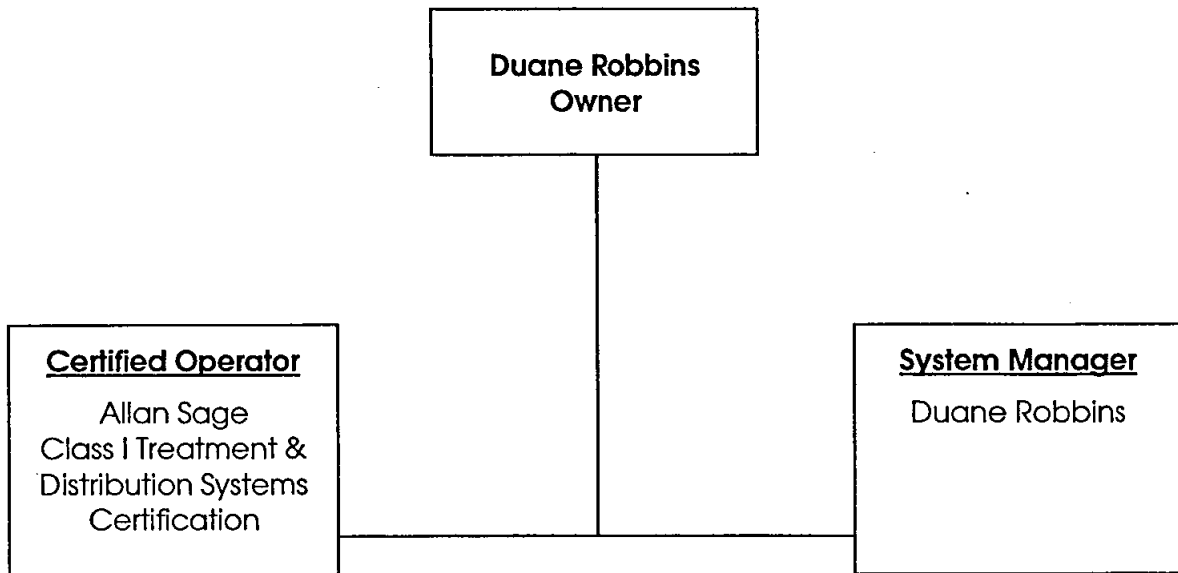


Figure 6 Organizational Chart

The water company will provide all staffing requirements for operation of the water system. The system operator will coordinate operations with the water company manager to provide needed information, supplies, resources and decisions regarding the water supply system. The water company will also perform necessary administrative, billing and accounting services. Contract resources, such as bookkeeping, deemed necessary are the responsibility of the water company.

An operation and maintenance manual will be prepared based on project plans and specifications. The final manual will be prepared after system construction is completed, specific equipment has been selected and purchased, and the system has achieved operational status.

### **2.3 Operator Credentials**

The system operator, Allan Sage, has been certified by DENR as qualified for Class I Water Treatment and Distribution System operations. A copy of the Certificate is included in Appendix C.

### 3. FINANCIAL PLAN

#### 3.1 Developer Obligations

The system costs presented in this business plan include the initial capital costs as well as projected annual operating costs.

The capital costs for the system will be incurred by Duane Robbins, developer. The developer will recover the capital costs to construct the system through the lot purchase price as the lots are sold to individual owners.

Annual operating costs will be recovered by the Horseshoe Acres Water Co., LLC via water user rates that are established by the water service contract.

#### 3.2 Capital Costs

The initial capital costs will consist of previous and planned capital expenditures for system construction as described in this report. Capital cost will also include future improvements and additions to the system by the developer as may be required to comply with State and County standards. Engineering and legal costs to plan and design the system are also considered to be capital costs. As-built plans and specifications for the overall system will be prepared to document all system construction. The system is being constructed by the developer, Duane Robbins, as the general contractor, with other subcontractors employed by Mr. Robbins.

The project is privately owned, developed and constructed by Duane Robbins. Well construction was completed by Cimarron Drilling. Other contractors with appropriate credentials and licensing have been or will be utilized for the remaining construction.

Estimated construction costs for existing and proposed improvements were developed in the Facility Plan Section of this document, and are summarized herein. Engineering services are considered to be capital costs and are to be included in total system cost to be recovered through lot pricing.

##### Capital Costs

|                    |    |         |
|--------------------|----|---------|
| Construction       | \$ | 460,000 |
| Professional Fees  | \$ | 40,000  |
| Total Capital Cost | \$ | 500,000 |

The estimated capital cost allocation per lot for the 42 lots that comprise the Rolling Dice Water System is as follows:

$$\text{Cost Allocation Per Lot} : \frac{\$500,000}{42 \text{ Lots}} = \$11,900 / \text{lot}$$

Expansion of the system is possible up to 75 lots, and the cost allocation per lot will be less than shown above under these circumstances.

### 3.3 Operation and Maintenance

Estimated operation and maintenance costs were developed in Section 1.6.2 of the Facilities Plan. Annual operating costs will not be uniform and some costs will be higher during the early years of operation due to water quality compliance testing requirements.

The projected average operation and maintenance costs over the initial 5-year development period are anticipated to be in the range of \$14,000/year, including reserve allowances.

Water revenue from customer billing will also vary from year to year and will be lower during initial operations due to low water usage before full build-out of the subdivision.

Revenue for system operation will be derived from user fees. The following fee structure is proposed for initial operations.

#### Proposed Rate Structure

- Water Rate:
- \$40/month for 5,000 gal.
  - \$2 per 1,000 gal. for use over 5,000 gal. up to 10,000 gal.
  - \$4 per 1,000 gal. for use over 10,000 gallons.

Revenue from water sales will be based upon metered usage, with a minimum charge of \$40 per month. Revenue derived from metered sales will vary seasonally and from home to home based on individual needs.

It is anticipated that most homes will use less than the 5,000-gallon minimum during non-irrigation periods. Lawn irrigation may result in usage above the minimum for some homes. For purposes of revenue projection, all constructed homes are assumed to use 5,000 gallons/month or less for ten months, and an additional 5,000 gallons/month irrigation demand for two months. Annual revenue from a developed lot is thus estimated as follows:

#### Annual Revenue per Lot from Water Sales

|             |             |              |
|-------------|-------------|--------------|
| 10 months @ | \$40 /month | \$ 400       |
| 2 months @  | \$50 /month | \$ 100       |
| Total       |             | \$ 500 /year |

As discussed in the Facilities Plan, home build-out is projected to extend over a five-year period from 2005 to 2009. For purposes of this analysis, the number of homes using water for a full year is forecasted to be in accordance with the development projections presented in Section 1.2.2.

Table 1 presents a cash flow analysis for the Horseshoe Acres system based on the projected rate of development for 2005 to 2009. The analysis is for the projected 42 lots within Phase 1 and Phase 2 of Horseshoe Acres. If other properties are annexed to the Horseshoe Acres Water Co., LLC, appropriate adjustments to cost and revenue projections will be necessary. For purposes of this analysis, the capital costs associated with water main extensions and service connections for service area expansion are assumed to be borne 100% by the benefiting property.

A beginning cash balance of \$6,000 provided by the developer is assumed for purposes of this analysis.

**Table 1 Cash Flow Analysis 2006 – 2010**

|                                     | 2006<br>(8 homes) | 2007<br>(16 homes) | 2008<br>(24 homes) | 2009<br>(32 homes) | 2010<br>(42 homes) |
|-------------------------------------|-------------------|--------------------|--------------------|--------------------|--------------------|
| 1. Beginning Cash Position          | 6,000             | 1,000              | 0                  | 3,000              | 5,000              |
| 2. Revenue                          |                   |                    |                    |                    |                    |
| Metered Water (\$500/lot)           | 4,000             | 8,000              | 12,000             | 16,000             | 21,000             |
| 3. Operating Expenses               | 9,000             | 9,000              | 9,000              | 9,000              | 9,000              |
| 4. Ending Cash Position             | 1,000             | 0                  | 3,000              | 10,000             | 17,000             |
| 5. Number of Accounts               | 8                 | 16                 | 24                 | 32                 | 42                 |
| 6. Average Revenue Per Account      | 500               | 500                | 500                | 500                | 500                |
| 7. EOY Operating Cash               | 1,000             | 0                  | 3,000              | 5,000              | 12,000             |
| 8. Reserve Allocation (\$5,000/Yr.) | 0                 | 0                  | 0                  | 5,000              | 5,000              |
| 9. Accrued Reserves                 | 0                 | 0                  | 0                  | 5,000              | 10,000             |

The cash flow analysis indicates a negative cash flow during initial operations with a “break even” point in year 2008. The water company proposes to provide initial operating cash of approximately \$6,000 to cover the shortfall. Reserve allocation of \$5,000 per year will begin in 2009.

The analysis shown herein is based upon estimated costs and a forecasted rate of development. Actual costs will vary, and it will be necessary for the water company to review expenses and cash positions regularly to maintain a stable financial condition with adequate reserve funds to cover repairs or other unanticipated costs. Rate adjustments may be required to reflect actual revenue requirements based on actual operating history and the actual rate of development within the service area.

# **Appendix A**

## **Application and Supporting Data**

- **New Water System Application**
- **Certificate of Applicant**
- **Application to Appropriate Water**
- **Well Completion Report**



# Department of Environment and Natural Resources

## New Water System Application

This form is provided by the secretary of the South Dakota Department of Environment and Natural Resources in accordance with § 74:04:09:06 of the Administrative Rules of South Dakota. All new community and nontransient noncommunity water systems must submit this form in order to be considered for a Certificate of Approval. **Complete this form and send to:**

Drinking Water Program  
523 E. Capitol - Joe Foss Building  
Pierre, SD 57501-3181

### Applicant

Owner/Developer:  
Horseshoe Acres Water Company, LLC

Address:  
c/o Duane Robbins, 4041 Canyon Drive

City:  
Rapid City

State:  
SD

Zip:  
57702

### Engineer

Name/Firm:  
Greg Wierenga, P.E., CETEC Engineering Services, Inc.

Address:  
P.O. Box 9014

City:  
Rapid City

State:  
SD

Zip:  
57709-9014

### Contact Person

Name:  
Duane Robbins

Address:  
4041 Canyon Drive

City:  
Rapid City

State:  
SD

Zip:  
57702

### General Information:

County: Meade  
Legal Description (quarter, section, township, range): W 1/2 W 1/2 of Section 25, W 1/2 NW 1/4 Section 36 and NE 1/4 N 1/4 Section 35, T3N, R8E, BHM in Meade County.  
Project Name: Horseshoe Acres Water System  
Water Source: Inyan Kara Well  
Service Population: 25

|                                                                                           |                                                          |
|-------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Has a layout map showing the location of the new water system been attached to this form? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| Have drinking water sample results from the water source been attached to this form?      | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| Has documentation of a valid water right permit been attached?                            | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| Has the business plan been submitted?                                                     | Yes <input type="checkbox"/> No <input type="checkbox"/> |

### Certification

#### Applicant

I certify that I have read this application and that the matters stated are true.

Signature:

Date:

03.20.06

#### Notary Public

Subscribed and sworn to before me this 20 day of

MARCH, 2006.



OFFICIAL SEAL  
GLORIA E. AREVALO  
NOTARY PUBLIC - State of Arizona  
MARICOPA COUNTY

My Comm. Expires Nov. 9, 2009

*Gloria E. Arevalo*

Department of Environment and Natural Resources  
Drinking Water Program  
Joe Foss Building  
523 East Capitol  
Pierre, SD 57501-3181  
Telephone: (605) 773-3754

STATE OF SOUTH DAKOTA  
BEFORE THE SECRETARY OF  
THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

IN THE MATTER OF THE )  
APPLICATION OF Horseshoe Acres )  
Water Company, LLC ) SS CERTIFICATION OF  
(FACILITY NAME) ) APPLICANT  
STATE OF South Dakota )  
COUNTY OF Meade )

I, Duane Robbins, the applicant in the above matter after being duly sworn upon oath hereby certify the following information in regard to this application:

South Dakota Codified Laws Section 1-40-27 provides:

*"The secretary may reject an application for any permit filed pursuant to Titles 34A or 45, including any application by any concentrated swine feeding operation for authorization to operate under a general permit, upon making a specific finding that:*

- (1) *The applicant is unsuited or unqualified to perform the obligations of a permit holder based upon a finding that the applicant, any officer, director, partner, or resident general manager of the facility for which application has been made:*
  - (a) *Has intentionally misrepresented a material fact in applying for a permit;*
  - (b) *Has been convicted of a felony or other crime involving moral turpitude;*
  - (c) *Has habitually and intentionally violated environmental laws of any state or the United States which have caused significant and material environmental damage;*
  - (d) *Has had any permit revoked under the environmental laws of any state or the United States; or*
  - (e) *Has otherwise demonstrated through clear and convincing evidence of previous actions that the applicant lacks the necessary good character and competency to reliably carryout the obligations imposed by law upon the permit holder; or*
- (2) *The application substantially duplicates an application by the same applicant denied within the past five years which denial has not been reversed by a court of competent jurisdiction. Nothing in this subdivision*

FORM 2: Application for uses other than irrigation  
(type or print)

|                                                                                                                    |                                                      |
|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Mail to:<br>Water Rights Program<br>Joe Foss Building<br>523 E. Capitol<br>Pierre, SD 57501-3181<br>(605) 773-3352 | (office use only)<br>No. _____ Hydrologic Unit _____ |
|                                                                                                                    | Basin _____                                          |
|                                                                                                                    | Newspaper _____                                      |
|                                                                                                                    |                                                      |

## Application For Permit To Appropriate Water Within The State Of South Dakota

### Check use(s) of water:

|                                                 |                                                      |                                          |                                          |
|-------------------------------------------------|------------------------------------------------------|------------------------------------------|------------------------------------------|
| <input type="checkbox"/> Municipal              | <input checked="" type="checkbox"/> Suburban Housing | <input type="checkbox"/> Recreational    | <input type="checkbox"/> Institutional   |
| <input type="checkbox"/> Rural Water System     | <input type="checkbox"/> Commercial                  | <input type="checkbox"/> Fish & Wildlife | <input type="checkbox"/> Geothermal Heat |
| <input type="checkbox"/> Domestic (over 18 gpm) | <input type="checkbox"/> Industrial                  | <input type="checkbox"/> Other _____     |                                          |

Type of Application: ☐ New ☐ Vested Right (Use predates Mar 2, 1955) ☐ Future Use Reservation  
(check one) ☐ Place to Beneficial Use Water Reserved by Future Use Permit No. \_\_\_\_\_  
☐ Amendment/Correction to Permit No. \_\_\_\_\_

Description of amendment/correction: (i.e. change diversion point(s), add diversion point(s), change use, etc.) \_\_\_\_\_

- Name of Applicant Duane E Robbins LLC Phone 605-399-1761  
(check one) Owner Tenant/lessee  
Mailing Address 4041 Canyon Dr Rapid City State SD 57702  
(Street, RR, or Box and City) (Zip Code)
- Amount of water claimed \_\_\_\_\_ \*CFS or 137 \*\*GPM 85 \*\*\*AF  
(\*Cubic Feet per Second) (\*\*Gallons per Minute) (\*\*Acre Feet - storage capacity of dam/dugout or annual use if applicable)
- Source of water supply 2560' deep well
- Location of point of diversion (example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W) SE 1/4 Sec 25  
T3N R8E  
County Meade
- County or counties where water will be used Meade County
- Annual period during which water is to be used year around
- Give a description of the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

STATE OF SOUTH DAKOTA) SS

County of Pennington

Attachments: Attach Form 2A if diversion is from a well or dugout, or if storage of water is proposed. Attach map and any other technical information. (see instructions)

I, Duane E Robbins, the applicant, certify that I have read this application, have examined the attached map and that the matters stated are true and that I intend, and am able to complete the necessary construction.

Applicant's signature Duane E Robbins

Subscribed and sworn to before me this 11 day of April, 2006

[Signature]  
Notary Public signature

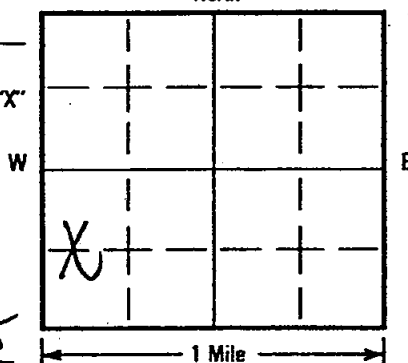
## SOUTH DAKOTA WATER WELL COMPLETION REPORT

07-92

Location  $\frac{1}{4}$  SW  $\frac{1}{4}$  Sec 25 Twp 3-N Rg 8-E

County Meade

Please mark well location with an "X"



Well Completion Date

10-04-05

## LOCATION:

Distance from nearest potential pollution source (septic tank, abandoned well, feed lot, etc.)? ft. from N/A (identify source).

## PROPOSED USE:

☒ Domestic/Stock ☒ Municipal ☐ Business ☐ Test Holes  
☐ Irrigation ☐ Industrial ☐ Institutional ☐ Monitoring well

## METHOD OF DRILLING:

Rotary Air - Water

## CASING DATA:

☒ Steel ☐ Plastic ☐ Other

If other describe

| PIPEWEIGHT | DIAMETER | FROM    | TO      | HOLE DIAMETER |
|------------|----------|---------|---------|---------------|
| 23 LB/FT   | 7 IN     | 0 FT    | 2180 FT | 8 3/4 IN      |
| 14 LB/FT   | 4 1/2 IN | 2150 FT | 2560 FT | 6 1/4 IN      |
| LB/FT      | IN       | FT      | FT      | IN            |

## ROUTING DATA

| Grout Type | No. of Sacks | Grout Weight | From | To      |
|------------|--------------|--------------|------|---------|
| Portland   | 265          | 94 lb./gal   | 0 ft | 2180 ft |
| Type III   |              | lb./gal      | ft   | ft      |

Describe grouting procedure Pressure grout thru casing, displace w water by mud pump

## SCREEN:

☒ Perforated pipe ☐ Manufactured

Diameter 4 1/2 IN Length 150' FEET

Material Steel

Slot Size 1/16 Set From 2300 Feet to 2340 Feet

Other information

WAS A PACKER OR SEAL USED? ☒ YES ☐ NO

so, what material? Neoprene

Describe packer(s) and location? 4 1/2 x 6 1/2 @ 2160

## DISINFECTION: Was well disinfected upon completion?

☒ YES, How: Chlorine☐ NO, Why Not? Pellets

Laboratory sent to for water quality analysis

owner to complete

Well Owner: Duane Robbins  
 Business Name: Horseshoe Acres Sub.  
 Address: 4041 Canyon Drive  
 Rapid City S.D. 57702

## WELL LOG:

| FORMATION              | DEPTH |       |
|------------------------|-------|-------|
|                        | FROM  | TO    |
| Brown Clay             | 0'    | 60'   |
| Blue shale & stone     | 60'   | 1600' |
| Sand, stone & shale    | 1600' | 1800' |
| Blue shale & stone     | 1800' | 2000' |
| Hard blue shale & ss   | 2000' | 2110' |
| Orange-red clay        | 2110' | 2120' |
| Multicolored clay      | 2120' | 2200' |
| BRN SS & sand & shale  | 2200' | 2380' |
| Grey sand & grey shale | 2380' | 2560' |

STATIC WATER LEVEL 400 Feet

If flowing: closed in pressure PSI

GPM flow through inch pipe

Controlled by ☐ Valve ☐ Reducers ☐ Other

Reduced Flowrate GPM

Can well be completely shut in?

## WELL TEST DATA:

☐ Pumped Describe: Air developed☐ Bailed☒ Other

Pumping Level Below Land Surface

700 ft. After 2 Hrs. pumped 50+ GPM

880 ft. After 2 Hrs. pumped 100+ GPM

If pump installed, pump rate 85 GPM @ 800' GPM

## REMARKS

Cased &amp; logged to 2180' Log showed not quite deep enough, drilled &amp; cased to 2560'

This well was drilled under license # 568

And this report is true and accurate.

Drilling firm Cimarron Drilling Inc.

Signature of License Representative: Michael J. Deutsh

Signature of Well Owner or Equitable Property Holder:

Date:

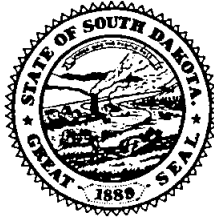


# **Appendix B**

## **Water System Ownership and Operating Entity**

- **Certificate of Organization**
- **Articles of Organization**
- **Operating Agreement**
- **Membership Units**
- **Miscellaneous Documents**

# State of South Dakota



## OFFICE OF THE SECRETARY OF STATE

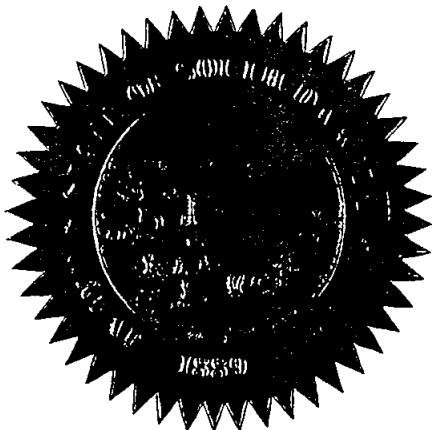
### Certificate of Organization Limited Liability Company

ORGANIZATIONAL ID #: DL010215

I, **Chris Nelson**, Secretary of State of the State of South Dakota, hereby certify that the Articles of Organization of **HORSESHOE ACRES WATER CO., LLC** duly signed and verified, pursuant to the provisions of the South Dakota Limited Liability Company Act, have been received in this office and are found to conform to law.

**ACCORDINGLY** and by virtue of the authority vested in me by law, I hereby issue this Certificate of Organization and attach hereto a duplicate of the Articles of Organization.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the Great Seal of the State of South Dakota, at Pierre, the Capital, this November 23, 2005.



Chris Nelson  
Secretary of State

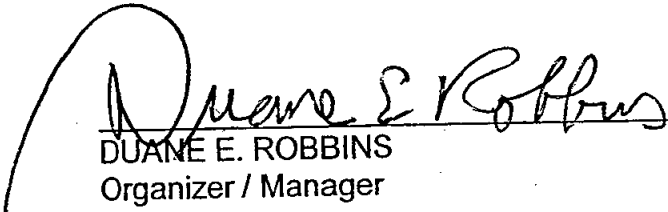
At this 23<sup>rd</sup> day of  
Nov. 2005  
Chris Vidler  
SECRETARY OF STATE

RECEIVED  
NOV 23 '05  
S.D. SEC. OF STATE

ARTICLES OF ORGANIZATION  
OF  
HORSESHOE ACRES WATER CO., LLC

- LLC
1. The name of the Limited Liability Company is Horseshoe Acres Water Co., LLC
  2. The duration of the company is perpetual.
  3. The address of the initial designated office is: 4041 Canyon Drive, Rapid City, SD 57702
  4. The name and address of the initial agent for service of process is:  
  
Duane E. Robbins  
4041 Canyon Drive  
Rapid City, SD 57702
  5. The name and address of each organizer:  
  
Duane E. Robbins  
4041 Canyon Drive  
Rapid City, SD 57702
  6. The name and address of each initial manager:  
  
Duane E. Robbins  
4041 Canyon Drive  
Rapid City, SD 57702
  7. None of the members of the company are to be liable for its debts and obligations under SDCL 47-34A-303(c).

Dated this 18th day of November, 2005.

  
DUANE E. ROBBINS  
Organizer / Manager

**OPERATING AGREEMENT OF  
HORSESHOE ACRES WATER CO., LLC**

The following Operating Agreement is hereby adopted for Horseshoe Acres Water Co., LLC, by its one (1) member as follows:

**ARTICLE I  
ORGANIZATION**

Horseshoe Acres Water Co., LLC has been organized as a South Dakota Limited Liability Company by the filing of Articles of Organization under and pursuant to the South Dakota Limited Liability Act and the issuance of a Certificate of Organization to Horseshoe Acres Water Co., LLC, by the South Dakota Secretary of State, said Articles of Organization dated the 18<sup>th</sup> day of November, 2005, and a Certificate of Organization of Limited Liability Company was issued by the South Dakota Secretary of State's Office on the 23<sup>rd</sup> day November, 2005.

**ARTICLE II**

The member intends that Horseshoe Acres Water Co., LLC (hereinafter referred to as the Company), not be a partnership (including, without limitation, a limited partnership) or joint venture, and that no member or manager be a partner or joint venturer of any other member or manager, for any purposes other than federal and state tax purposes, and these regulations may not be construed to suggest otherwise.

**ARTICLE III**

The initial member of the Company shall be Duane Robbins, and no other person may be admitted as a member to the Company without the consent of Duane Robbins.

**ARTICLE IV**

No member may dispose of his or her membership in the Company without the consent of the other members of the Company.

**ARTICLE V**

No member (other than a manager) has the authority or power to act for or on behalf of the Company, to do any act that would be binding upon the Company, or to incur any expenditures on behalf of the Company.

**ARTICLE IX**

All distributions to members shall be equal with the exception that a member may be compensated by the Company for services rendered to the Company.

**ARTICLE X**

The member shall contribute to the Company, cash, services or real or personal property, that in the judgment of the Manager is necessary to enable to the Company to cause the assets of the Company to be properly operated and maintained, and to discharge its costs, expenses, obligations, and liabilities. The manager shall notify the member of the need for capital contributions, when appropriate, which notice must include a statement in reasonable detail of the proposed uses of the capital contributions, and the date upon which the capital contributions must be made. Provided, however, no member shall be responsible for making any capital contributions or loans to the Company without that member's consent. The member shall have the option, but shall not be required to make advances in the form of cash or otherwise to the Company to pay operating expenses and liabilities, which decision shall be in the sole discretion of the member.

**ARTICLE XI**

If the Company does not have sufficient cash to pay its obligations, the member may agree to do so and this advance may be considered to be a loan from the member to the Company, which shall bear interest at the rate agreed to at the time of the loan, and under the repayment terms as agreed to at the time of the loan. However, no member shall be obligated to make loans to the Company.

**ARTICLE XII**

A capital account shall be established and maintained for the member. The member's capital account shall show the amount of the contributions made by the member in cash or otherwise to his account. The member's capital account shall be established and maintained in such a manner as to continue to qualify the Company as a Limited Liability Company and taxed as such under the rules and regulations of the Internal Revenue Service.

- A. Sell, lease, exchange or otherwise dispose of (other than by way of a pledge, mortgage, deed of trust or trust indenture) all or substantially all the Company's property and assets (with or without good will), other than in the usual and regular course of the Company's business, without complying with the applicable procedures set forth in the South Dakota Limited Liability Act;
- B. Be a party to (i) a merger, or (ii) an exchange or acquisition without complying with the applicable procedures set forth in the South Dakota Limited Liability Act;
- C. Amend or restate the Articles of Organization of the Company, without complying with the applicable procedures set forth in the South Dakota Limited Liability Act.

The manager is an agent of this Company for the purpose of its business and the act of a manager, including the execution in the name of the Company of any instrument for apparently carrying on the usual way of business of the Company, binds the Company, unless the manager so acting otherwise lacks the authority to act for this Company, and the person with whom the manager is dealing has knowledge of the fact that the manager has no such authority.

#### ARTICLE XIV

The manager shall be Duane Robbins and he shall continue to serve as manager until his successor be duly elected.

#### ARTICLE XV

In the event of the death of a member, the Limited Liability Company's existence shall terminate and the death shall operate as a dissolution of the Company and all assets of the Company shall be sold and all debts paid, and any balance of monies or property remaining in the Company shall be distributed to the Estate of the deceased member.

#### ARTICLE XVI

The Company shall maintain those books and records, as provided for by South Dakota Statutes and as it may seem and deem necessary or desirable. The manager shall cause to be prepared a statement of income and expense to the Company, at least on an

NUMBER

FORMED UNDER THE LAWS OF

100

South Dakota



# HORSESHOE ACRES WATER CO., LLC

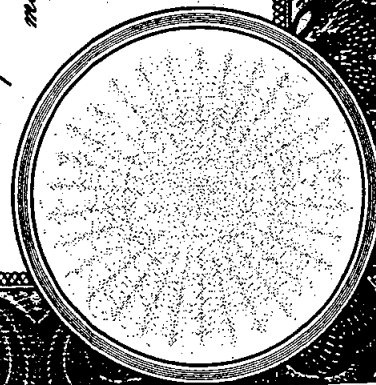
**This Certifies that**

the owner of One Hundred (100) Units

is Duane E. Robbins of the above named Limited Liability Company transferable only on the books of the Limited Liability Company by the holder hereof in person or by duly authorized Attorney upon surrender of this Certificate properly endorsed. The transfer of this Limited Liability Company interest is subject to restrictions set forth in the Limited Liability Company Operating Agreement, and the transfer of the related membership rights may be effected only upon the unanimous consent of members or compliance with any procedure provided in the Operating Agreement.

In Witness Whereof, the said Limited Liability Company has caused this Certificate to be executed on its behalf by its duly authorized manager(s), member(s), officer(s), or agent(s) this 7 day of December A.D. 2005

Duane E. Robbins  
DUANE E. ROBBINS, Manager



## WATER SERVICE CONTRACT

The parties to this Contract are as follows:

- A. Horseshoe Acres Water Co., LLC, whose address is 4041 Canyon Drive, Rapid City, SD 57702, hereinafter referred to as Water Company, and
- B. \_\_\_\_\_, whose address is \_\_\_\_\_, and whose telephone number is (605) \_\_\_\_\_, hereinafter referred to as Owner.

WHEREAS, the Water Company provides water service to Horseshoe Acres Subdivision, located in Meade County, South Dakota, and

WHEREAS, the owner is the owner of real property located within Horseshoe Acres Subdivision, and

WHEREAS, the Water Company agrees to sell and the Owner agrees to purchase water from the Water Company, now therefore,

### THE PARTIES AGREE AS FOLLOWS:

1. The Owner shall provide all labor and materials necessary for connection to the Water Company's water main at the lot line. The shutoff valve at the lot line shall be in the control of the Water Company in order to discontinue service under the provisions herein.

2. The Owner shall supply a water meter with a remote readout, the type and brand of which must be pre-approved by the Water Company. The meter shall be and remain the property of the Owner and the Owner shall be responsible for all maintenance or replacement of the meter if necessary. However, the owner agrees to allow a representative of the Water Company access to the water meter upon twenty-four hours prior notice.

3. Initially, for all water used by the Owner, he/she shall pay to the Water Company a monthly charge at the following rates:

\$40.00 for the first 5,000 gallons; \$2.00 per 1,000 gallons or a fraction thereof over 5,000 gallons. If the water consumption exceeds 10,000 per month, then the number of gallons used over 10,000 gallons per month shall be provided at a rate of \$4.00 per 1,000 gallons.

Upon giving thirty (30) days written notice, by mailing to the home of the Owner at the address set forth above, the Water

in writing, given permission for the Owner to use said water for commercial purposes.

10. The Owner is obligated to maintain his or her service line from his or her residence to the shut-off valve. Any failure to maintain said line in a proper condition shall be authority to the Water Company to discontinue service to the building.

11. The Owner shall at no time assert any claim hereunder against the Water Company for any loss or damage which may result from the inadequacy or non-availability of water as to both pressure or quantity or quality or from leaks or any other defects in the Water Company's system; and the Owner agrees to indemnify the Water Company and save the Water Company harmless from any and all claims of liability for the loss or damages to any person or property resulting from, arising out of, or connected with the rendition or service hereunder in the event of such inadequacy or non-availability of water in the event of leaks or other defects in the Water Company's system.

12. The Owner hereby agrees that in the event of a sale of his or her property, that he or she will notify the new buyer of the requirement that the new buyer must enter into a new water service agreement with the Water Company. The Owner does hereby grant a lien to the Water Company for any unpaid water charges owing by the Owner to the Water Company, which sum must be paid in full at the time of closing of the sale of the property by the Owner to any third party.

13. The undersigned does hereby acknowledge a true and correct copy of this document and further acknowledges that he or she has read said document in full and understands the conditions set forth upon accepting water service from the Water Company.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

HORSESHOE ACRES WATER CO., LLC

BY: \_\_\_\_\_  
DUANE E. ROBBINS  
ITS: MANAGER

\_\_\_\_\_  
OWNER

\_\_\_\_\_  
OWNER

The above agreement pertains to Lot \_\_\_\_\_, Horseshoe Acres  
Subdivision, Meade County, South Dakota.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                               |                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Form SS-4</b><br>(Rev. December 2001)<br>Department of the<br>Treasury<br>Internal Revenue Service                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Application for Employer Identification Number</b><br>(For use by employers, corporations, partnerships, trusts, estates, churches,<br>government agencies, Indian tribal entities, certain individuals, and others.)<br><b>▶ See separate instructions for each line. ▶ Keep a copy for your records.</b> | <b>EIN</b><br><br>20-3893688<br><br>OMB No. 1545-0003                                                                                    |
| <b>1* Legal name of entity (or individual) for whom the EIN is being requested</b><br>HORSESHOE ACRES WATER CO LLC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                               |                                                                                                                                          |
| <b>2 Trade name of business (if different from name on line 1)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                               | <b>3 Executor, trustee, "care of" name</b>                                                                                               |
| <b>4a* Mailing address (room, apt., suite no. and street, or P.O. box)</b><br>4041 CANYON DR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                               | <b>5a Street address (if different) (Do not enter a P.O. box)</b>                                                                        |
| <b>4b* City, state, and ZIP code</b><br>RAPID CITY SD 57702 -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                               | <b>5b City, state, and ZIP code</b>                                                                                                      |
| <b>6* County and state where principal business is located</b><br>County PENNINGTON State SD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                               |                                                                                                                                          |
| <b>7a Name of principal officer, general partner, grantor, owner, or trustor</b><br>DUANE E ROBBINS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                               | <b>7b SSN, ITIN, EIN</b><br>378-44-1389                                                                                                  |
| <b>8a* Type of entity (check only one)</b><br><div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> <input type="checkbox"/> Sole Proprietor (SSN)<br/> <input type="checkbox"/> Partnership<br/> <input type="checkbox"/> Corporation (enter form number to be filed) ▶<br/> <input type="checkbox"/> Personal Service<br/> <input type="checkbox"/> Church or church-controlled organization<br/> <input type="checkbox"/> Other nonprofit organization (specify) ▶<br/> <input checked="" type="checkbox"/> Other (specify) ▶ DISREGARDED ENTITY           </div> <div style="width: 35%;"> <input type="checkbox"/> Estate (SSN of decedent)<br/> <input type="checkbox"/> Plan administrator (SSN)<br/> <input type="checkbox"/> Trust (SSN of grantor)<br/> <input type="checkbox"/> National Guard<br/> <input type="checkbox"/> Farmers' cooperative<br/> <input type="checkbox"/> REMIC<br/> <input type="checkbox"/> Group Exemption NO. (GEN) ▶           </div> <div style="width: 5%;"> <input type="checkbox"/> State/local government<br/> <input type="checkbox"/> Federal government/military<br/> <input type="checkbox"/> Indian tribal government/enterprises           </div> </div> |                                                                                                                                                                                                                                                                                                               |                                                                                                                                          |
| <b>8b If a corporation, name the state or foreign country (if applicable) where incorporated</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                               | <b>State</b> Foreign country                                                                                                             |
| <b>9* Reason for applying (check only one)</b><br><input checked="" type="checkbox"/> Started new business (specify type) ▶ WATER COMPANY<br><input type="checkbox"/> Hired employees (Check the box and see line 12)<br><input type="checkbox"/> Compliance with IRS withholding regulations<br><input type="checkbox"/> Other (specify) ▶<br><input type="checkbox"/> Banking purpose (specify purpose) ▶<br><input type="checkbox"/> Changed type of organization (specify new type) ▶<br><input type="checkbox"/> Purchased going business<br><input type="checkbox"/> Created a trust (specify type) ▶<br><input type="checkbox"/> Created a pension plan (specify type) ▶                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                               |                                                                                                                                          |
| <b>10* Date business started or acquired (month, day, year)</b><br>NOV 23 2005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                               | <b>11 Closing month of accounting year</b><br>DEC                                                                                        |
| <b>12 First date wages or annuities were paid or will be paid (month, day, year) Note: If applicant is a withholding agent, enter date income will first be paid to nonresident alien. (month, day, year) .....</b> ▶                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                               |                                                                                                                                          |
| <b>13 Highest number of employees expected in the next twelve months Note: If the applicant does not expect to have any employees during the period, enter "-0-" .....</b> ▶                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                               | Agriculture <u>0</u> Household <u>0</u> Other <u>0</u>                                                                                   |
| <b>14* Check box that best describes the principal activity of your business</b><br><div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> <input type="checkbox"/> Construction <input type="checkbox"/> Rental &amp; leasing <input type="checkbox"/> Transportation &amp; warehousing<br/> <input type="checkbox"/> Real estate <input type="checkbox"/> Manufacturing <input type="checkbox"/> Finance &amp; insurance<br/> <input checked="" type="checkbox"/> Other (specify) MANAGING WATER COMPANY           </div> <div style="width: 40%;"> <input type="checkbox"/> Health care &amp; social assistance<br/> <input type="checkbox"/> Accommodation &amp; food service<br/> <input type="checkbox"/> Retail<br/> <input type="checkbox"/> Wholesale-agent/broker<br/> <input type="checkbox"/> Wholesale-other           </div> </div>                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                               |                                                                                                                                          |
| <b>15* Indicate principal line of merchandise sold; specific construction work done; products produced; or services provided.</b><br>WATER COMPANY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                               |                                                                                                                                          |
| <b>16a* Has the applicant ever applied for an employer identification number for this or any other business? .....</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>Note If "Yes" please complete lines 16b and 16c                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                               |                                                                                                                                          |
| <b>16b If you checked "Yes" on line 16a, give applicant's legal name and trade name shown on prior application if different from line 1 or 2 above.</b><br>Legal name ▶<br>Trade name ▶                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                               |                                                                                                                                          |
| <b>16c Approximate date when, and city and state where, the application was filed. Enter previous employer identification number if known.</b><br>Approximate date when filed (month, day, year) City and state where filed Previous EIN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                               |                                                                                                                                          |
| Complete section only if you want to authorize the named individual to receive the entity's EIN and answer questions about the completion of this form                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                               |                                                                                                                                          |
| Third Party Designee                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Designee's name<br>DALE R HANSEN<br>Address and ZIP code<br>PO BOX 580 STURGIS SD 57785 - 0580                                                                                                                                                                                                                | Designee's telephone number (include area code)<br>( 605 ) 347 - 2551<br>Designee's fax number (include area code)<br>( 605 ) 347 - 4466 |
| Under penalties of perjury, I declare that I have examined this application, and to the best of my knowledge and belief, it is true, correct, and complete.<br>Name and title (type or print clearly)<br>▶ DUANE E ROBBINS MANAGER<br>Signature ▶ Not Required Date ▶ December 07, 2005 GMT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                               | Applicant's telephone number (include area code)<br>( 605 ) 381 - 7395<br>Applicant's fax number (include area code)<br>( ) -            |

**BILL OF SALE**

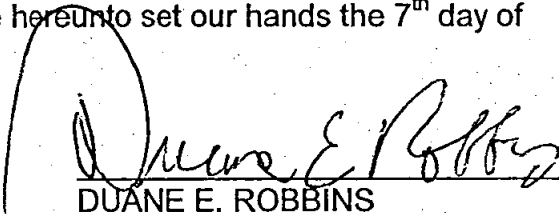
**KNOW ALL MEN BY THESE PRESENTS:**

That **Duane E. Robbin**, of the County of Pennington and State of South Dakota, party of the first part, for and in consideration of the sum of One Dollar (\$1.00) in hand paid, at or before the delivery of these presents, by **Horseshoe Acres Water Co, LLC**, of the County of Pennington and State of South Dakota, party of the second part, the receipt whereof is hereby acknowledged, has bargained, sold, granted and conveyed, and by these presents does bargain, sell and convey unto the said party of the second part, its administrators and assigns, the following-described personal property, namely:

All assets of the water system serving Horseshoe Acres Subdivision,  
Meade County, South Dakota.

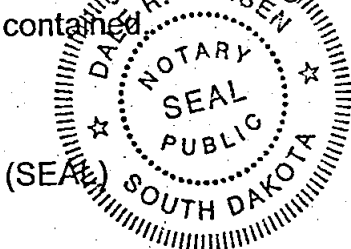
**TO HAVE AND TO HOLD** the same unto the said party of the second part, its, administrators and assigns, forever. And the party of the first part does for himself and his heirs, executors and administrators, covenant and agrees to and with the said party of the second part, to warrant and defend the said property hereby sold unto the said party of the second part, its administrators and assigns, against all and every person and persons whatsoever.

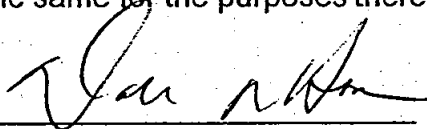
**IN WITNESS WHEREOF**, we have hereunto set our hands the 7<sup>th</sup> day of December, 2005.

  
DUANE E. ROBBINS

STATE OF SOUTH DAKOTA)  
COUNTY OF MEADE)

On this 7<sup>th</sup> day of December, 2005, before me, a Notary Public, within and for said County and State, personally appeared Duane E. Robbins, known to me to be the persons who are described in and who executed the within and foregoing instrument and they acknowledged to me that they executed the same for the purposes therein contained.



  
NOTARY PUBLIC  
Commission Exp.: \_\_\_\_\_

DALE R. HANSEN  
NOTARY PUBLIC  
COMMISSION EXPIRES JANUARY 27, 2010



# **Appendix C**

## **Credentials**

- **Operator Certification**



# CERTIFICATE OF ACHIEVEMENT

By virtue of the authority vested in me by law, and after due consideration of the recommendation of the Board of Operator Certification, I do hereby certify that

**ALLAN SAGE**

is qualified to practice as a

**Class I Water Treatment Operator**

In the State of South Dakota and is entitled to so represent himself and practice for so long as this certificate shall remain unrevoked and maintained in force by payment of renewal fees as required by law.

No 2486

Secretary, Department of Environment and Natural Resources



# CERTIFICATE OF ACHIEVEMENT

By virtue of the authority vested in me by law, and after due consideration of the recommendation of the Board of Operator Certification, I do hereby certify that

ALLAN SAGE

is qualified to practice as a

Class I Water Distribution Operator

in the State of South Dakota and is entitled to so represent himself/herself and practice for so long as this certificate shall remain unrevoked and maintained in force by payment of renewal fees as required by law.

No 2904

Secretary, Department of Environment and Natural Resources



January 18, 2006

DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

Duane Robbins  
Horshoe Acres Sub.  
4041 Canyon Drive  
Rapid City SD 57702

ROBB041 T577022029 1106 05 01/23/06  
RETURN TO SENDER  
ROBBINS  
TEMPORARILY AWAY  
RETURN TO SENDER

Dear Mr. Robbins:



A well driller's report filed with us by Cimarron Drilling Inc. shows a new well has been completed for Horshoe Acres Subdivision. Based on the information in the report, you may need a water permit for this water use.

2. According to state law, if water is to be conveyed to users by a water distribution system diverting more than a peak rate of eighteen gallons per minute, the system will need a water permit.
2. Also, as a new well owner, you need to be aware of some of your responsibilities. Enclosed is a copy of "Well Owner Responsibilities". Please review these responsibilities to ensure you are complying with all of the requirements.

Enclosed are application forms and instruction sheet to apply for a water permit, if necessary. The completed forms with the application fee and map can be returned to: Water Rights Program, 523 E. Capitol, Pierre, SD 57501. Please respond by March 1, 2006.

If you believe your water use does not require a water permit or that you have an existing permit, or if help is needed completing the application forms, please contact Ron Duvall or me at (605) 773-3352. We will be happy to assist you in any way possible.

Sincerely, .

*Karen Schlaak*

Karen Schlaak  
Water Rights Program  
[karen.schlaak@state.sd.us](mailto:karen.schlaak@state.sd.us)

enclosures



April 5, 2006

**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

Duane Robbins  
Horseshoe Acres Sub.  
4041 Canyon Drive  
Rapid City SD 57702

Dear Mr. Robbins:

A well driller's report filed with us by Cimarron Drilling Inc. shows a new well has been completed for Horseshoe Acres Subdivision. Based on the information in the report, you may need a water permit for this water use.

1. According to state law, if water is to be conveyed to users by a water distribution system diverting more than a peak rate of eighteen gallons per minute, the system will need a water permit.
2. Also, as a new well owner, you need to be aware of some of your responsibilities. Enclosed is a copy of "Well Owner Responsibilities". Please review these responsibilities to ensure you are complying with all of the requirements.

Enclosed are application forms and instruction sheet to apply for a water permit, if necessary. The completed forms with the application fee and map can be returned to: Water Rights Program, 523 E. Capitol, Pierre, SD 57501. Please respond by May 1, 2006.

If you believe your water use does not require a water permit or that you have an existing permit, or if help is needed completing the application forms, please contact Ron Duvall or me at (605) 773-3352. We will be happy to assist you in any way possible.

Sincerely,

*Karen Schlaak*

Karen Schlaak  
Water Rights Program  
[karen.schlaak@state.sd.us](mailto:karen.schlaak@state.sd.us)

enclosures

## **Water Rights Program - File Documentation**

---

**NAME:** Greg Wierenga, CETEC

**ADDRESS:** Rapid City SD

**DATE:** 4-21-06      **COUNTY:** PE      **TELEPHONE:** 605 341-7800

**RE:** Application for Duane E Robbins

**COMMENTS:**

I talked with Greg Wierenga, engineer for Horseshoe Acres Estates. Mr. Wierenga indicated that Mr. Robbins is requesting **85 gallons per minute** for this application. The well driller estimated that the well could safely yield up to this amount.



Karen Schlaak  
Environmental Scientist

WATER PERMIT APPLICATION NO. 1861-1  
DUANE E ROBBINS LLC  
July 6, 2006

Water Permit Application No. 1861-1 proposes to appropriate 0.19 cubic feet of water per second (approximately 85 gallons per minute) from one well completed into the Inyan Kara aquifer, located in the SW $\frac{1}{4}$  SW $\frac{1}{4}$  Sec.25, T3N-R8E, Meade County. The water is for suburban housing development use at Horseshoe Acres Subdivision.

**AQUIFER:** Inyan Kara

**GEOLOGY AND AQUIFER CHARACTERISTICS:**

The Inyan Kara aquifer consists of the Fall River Formation and the underlying Lakota Formation. The two formations are probably hydraulically connected and therefore can be considered a single aquifer. In general, the Inyan Kara aquifer consists of interbedded sandstone (thin bedded to massive), siltstone, and shale. The aquifer is areally extensive, underling over 36,000 square miles of western South Dakota (Allen and others, 1985). The aquifer underlies 2,107,520 acres and contains an estimated 36,354,720 acre-feet of recoverable water in storage in Meade County alone (Allen and others, 1985). Recharge to the aquifer occurs primarily through infiltration of precipitation at the outcrop. Average annual recharge to the Inyan Kara aquifer from 1950 through 1998, is estimated to be 11,600 acre-feet annually (Driscoll and Carter, 2001).

The Inyan Kara outcrops about seven miles west of this well site (Strobel and others, 1999). The completion report of the well that is to be used to supply this appropriation suggests that top of the Inyan Kara aquifer is around 2,000-2,100 feet below grade. This depth corresponds well with the aquifer's structure contour map (Strobel and others, 1999) which estimates the Inyan Kara top to be around 2,050 feet below grade. The Inyan Kara is estimated to be nearly 300 feet thick in this area (Allen and others, 1985). The base of the Inyan Kara can be interpreted to be about 2,500 feet below grade from the well log. The completion report submitted for this well indicates the static water level of this well is 400 feet below grade.

**Observation Well Data**

The Water Rights Program monitors seven observation wells completed into the Inyan Kara aquifer in the Black Hills area. Water Rights' Observation Well PE-95E is located about six miles southwest of this well, Observation Well MD-99A is located about nine miles west-northwest of this well. The hydrographs for the wells are shown below (figure 1-2).

The graph illustrates the water level at the top of the column over a ten-year period. The y-axis, labeled 'WATER LEVEL (FT TOP OF COLUMN)', ranges from -203.1 to -168.1 in increments of 5.0. The x-axis shows dates from 11/02/1995 to 06/02/2005. The data is plotted as a line with diamond markers, showing a general downward trend from approximately -172.5 ft in late 1995 to a low of about -199.5 ft in early 2002. Following this, the water level rises sharply, peaking at approximately -168.5 ft in mid-2005, before dropping again to about -188.5 ft by the end of the period.

| Date       | Water Level (ft) |
|------------|------------------|
| 11/02/1995 | -172.5           |
| 01/16/1996 | -178.5           |
| 03/16/1997 | -178.0           |
| 05/16/1997 | -179.0           |
| 07/29/1998 | -182.5           |
| 10/09/1998 | -177.5           |
| 12/11/1999 | -182.5           |
| 02/09/2000 | -185.5           |
| 04/24/2001 | -187.5           |
| 06/24/2001 | -191.5           |
| 08/24/2001 | -199.5           |
| 10/24/2001 | -198.5           |
| 12/24/2001 | -193.5           |
| 02/24/2002 | -187.5           |
| 04/24/2002 | -186.5           |
| 06/24/2002 | -187.5           |
| 08/24/2002 | -188.5           |
| 10/24/2002 | -187.5           |
| 12/24/2002 | -186.5           |
| 02/24/2003 | -185.5           |
| 04/24/2003 | -184.5           |
| 06/24/2003 | -183.5           |
| 08/24/2003 | -182.5           |
| 10/24/2003 | -181.5           |
| 12/24/2003 | -180.5           |
| 02/24/2004 | -179.5           |
| 04/24/2004 | -178.5           |
| 06/24/2004 | -177.5           |
| 08/24/2004 | -176.5           |
| 10/24/2004 | -175.5           |
| 12/24/2004 | -174.5           |
| 02/24/2005 | -173.5           |
| 04/24/2005 | -172.5           |
| 06/02/2005 | -171.5           |
| 08/02/2005 | -170.5           |
| 10/02/2005 | -169.5           |
| 12/02/2005 | -168.5           |
| 02/02/2006 | -167.5           |
| 04/02/2006 | -166.5           |
| 06/02/2006 | -165.5           |
| 08/02/2006 | -164.5           |
| 10/02/2006 | -163.5           |
| 12/02/2006 | -162.5           |
| 02/02/2007 | -161.5           |
| 04/02/2007 | -160.5           |
| 06/02/2007 | -159.5           |
| 08/02/2007 | -158.5           |
| 10/02/2007 | -157.5           |
| 12/02/2007 | -156.5           |
| 02/02/2008 | -155.5           |
| 04/02/2008 | -154.5           |
| 06/02/2008 | -153.5           |
| 08/02/2008 | -152.5           |
| 10/02/2008 | -151.5           |
| 12/02/2008 | -150.5           |
| 02/02/2009 | -149.5           |
| 04/02/2009 | -148.5           |
| 06/02/2009 | -147.5           |
| 08/02/2009 | -146.5           |
| 10/02/2009 | -145.5           |
| 12/02/2009 | -144.5           |
| 02/02/2010 | -143.5           |
| 04/02/2010 | -142.5           |
| 06/02/2010 | -141.5           |
| 08/02/2010 | -140.5           |
| 10/02/2010 | -139.5           |
| 12/02/2010 | -138.5           |
| 02/02/2011 | -137.5           |
| 04/02/2011 | -136.5           |
| 06/02/2011 | -135.5           |
| 08/02/2011 | -134.5           |
| 10/02/2011 | -133.5           |
| 12/02/2011 | -132.5           |
| 02/02/2012 | -131.5           |
| 04/02/2012 | -130.5           |
| 06/02/2012 | -129.5           |
| 08/02/2012 | -128.5           |
| 10/02/2012 | -127.5           |
| 12/02/2012 | -126.5           |
| 02/02/2013 | -125.5           |
| 04/02/2013 | -124.5           |
| 06/02/2013 | -123.5           |
| 08/02/2013 | -122.5           |
| 10/02/2013 | -121.5           |
| 12/02/2013 | -120.5           |
| 02/02/2014 | -119.5           |
| 04/02/2014 | -118.5           |
| 06/02/2014 | -117.5           |
| 08/02/2014 | -116.5           |
| 10/02/2014 | -115.5           |
| 12/02/2014 | -114.5           |
| 02/02/2015 | -113.5           |
| 04/02/2015 | -112.5           |
| 06/02/2015 | -111.5           |
| 08/02/2015 | -110.5           |
| 10/02/2015 | -109.5           |
| 12/02/2015 | -108.5           |
| 02/02/2016 | -107.5           |
| 04/02/2016 | -106.5           |
| 06/02/2016 | -105.5           |
| 08/02/2016 | -104.5           |
| 10/02/2016 | -103.5           |
| 12/02/2016 | -102.5           |
| 02/02/2017 | -101.5           |
| 04/02/2017 | -100.5           |
| 06/02/2017 | -99.5            |
| 08/02/2017 | -98.5            |
| 10/02/2017 | -97.5            |
| 12/02/2017 | -96.5            |
| 02/02/2018 | -95.5            |
| 04/02/2018 | -94.5            |
| 06/02/2018 | -93.5            |
| 08/02/2018 | -92.5            |
| 10/02/2018 | -91.5            |
| 12/02/2018 | -90.5            |
| 02/02/2019 | -89.5            |
| 04/02/2019 | -88.5            |
| 06/02/2019 | -87.5            |
| 08/02/2019 | -86.5            |
| 10/02/2019 | -85.5            |
| 12/02/2019 | -84.5            |
| 02/02/2020 | -83.5            |
| 04/02/2020 | -82.5            |
| 06/02/2020 | -81.5            |
| 08/02/2020 | -80.5            |
| 10/02/2020 |                  |

**WATER RIGHTS' OBSERVATION WELL  
MD-99A**

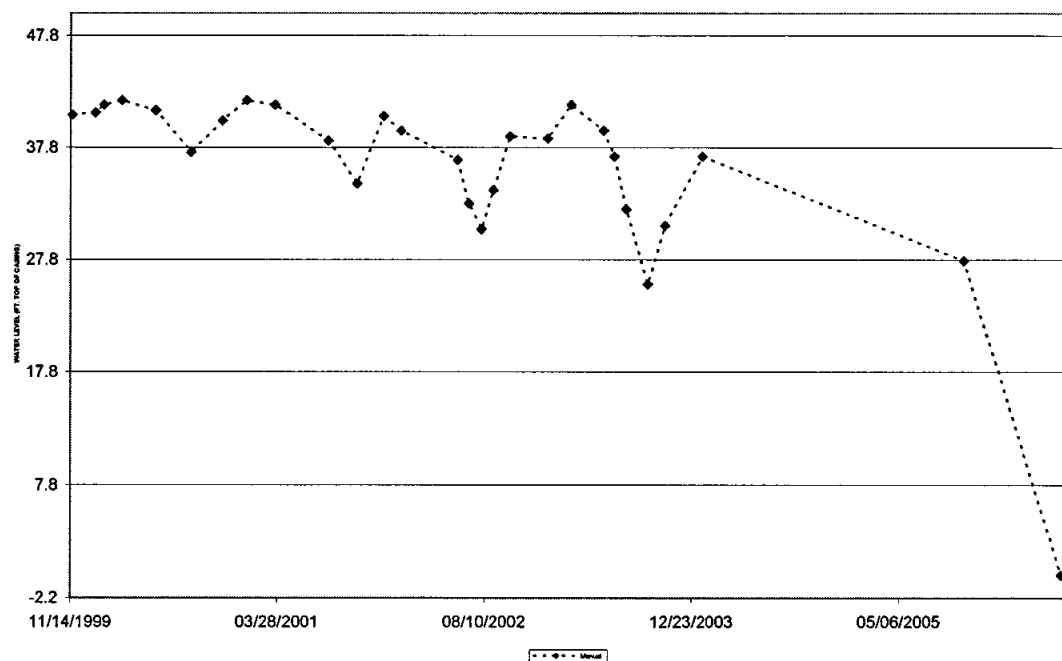


Figure 2. Hydrograph of an observation well completed into the Inyan Kara aquifer approximately nine miles west-northwest of 1861-1

The hydrographs document that the water level of the aquifer has fluctuated over the period of record. It is clear from the data that the aquifer recharges readily (Water Rights, 2006b). Since the wells were completed in 1995 and 1999 respectively, their hydrographs are probably skewed upward by the above normal precipitation and consequently above normal recharge of the 1990's. The period of record for Water Rights' observation wells completed into the Inyan Kara aquifer in the Black Hills area is sufficient to determine if long term water-level declines have occurred.

#### **EXISTING WATER RIGHTS:**

The Inyan Kara aquifer has been developed in at least 23 counties in South Dakota with 150 Water Rights/Permits and one FU (City of New Underwood). The total appropriation from the Inyan Kara is 32.64 cfs for non-irrigation (SHD, RWS, MUN, INS, IND, GEO, FWP, DOM, and COM) uses. There are 12 water rights/permits appropriating 2,381.1 ac-ft/yr water from the Inyan Kara for irrigation purposes.

The actual amount of water used annually from the Inyan Kara is considerably less than the amount appropriated. For example, the average of the annual reported irrigation usage from the Inyan Kara between 1982 and 2004 was 45.7 ac-ft/yr with a maximum of 224.6 ac-ft/yr reported in 1985. The average annual withdrawals from the aquifer from the Black Hills area, where the majority of water rights are located, for the period from 1950-1998 was estimated to be 1,400 acre-feet/year (Driscoll and Carter, 2001).

There are 36 rights/permits appropriating water from the Inyan Kara aquifer in Meade County (Water Rights, 2006c). Six Water Rights/Permits appropriate water from the Inyan Kara aquifer within five miles of the well that is to be used to supply this appropriation, they are shown in table 1.

| PERMIT NO | NAME              | USE | CFS  |
|-----------|-------------------|-----|------|
| 1488-1    | A WAYNE VIG       | SHD | 0.20 |
| 1689-2    | CITY OF BOX ELDER | MUN | 0.36 |
| 591-2     | A WAYNE VIG       | COM | 0.18 |
| 870-2     | CITY OF BOX ELDER | MUN | 0.18 |
| 934-2     | CITY OF BOX ELDER | MUN | 0.24 |
| 1799-1    | KASKI HOMES INC   | SHD | 0.17 |

Table 1. Groundwater appropriations within five miles of 1861-1

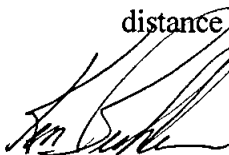
The nearest Inyan Kara Water Permit to the well that is to be used to supply water for this appropriation is No. 1488-1, A. Wayne Vig, located approximately three miles southeast of this well site.

Since the Inyan Kara is under confined (artesian) conditions in this area, pumping from an individual well may cause a decline in the potentiometric surface over a fairly widespread area. The distances from existing Water Rights/Permits from the Inyan Kara aquifer will minimize the effects of pumping this well to nearby wells, and the impact of this appropriation on existing water rights is not likely to be significant, especially when considering the several hundred feet of artesian head pressure in the area.

There are a number of domestic wells in this area supplied from the Inyan Kara aquifer. The potential affect of this appropriation on domestic wells must be considered. An "Adversely impacted domestic well" is defined by ARSD 74:02:04:20(7), as a well that was constructed to allow the pump intake to be set at least 20 feet below the top of the aquifer, in which the water level of the aquifer has declined to a level that the pump will no longer deliver sufficient water for the well owner's needs. It is likely that even if a domestic well completed into the Inyan Kara aquifer in this area experienced interference, it would still be capable of delivering sufficient water with a pump inlet placed near the top of the aquifer. Therefore adverse impact to domestic wells is not probable.

## CONCLUSIONS:

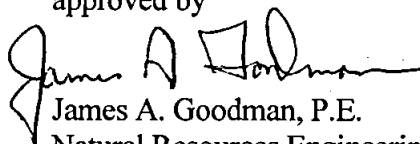
1. The Inyan Kara Aquifer is a viable aquifer in this area, and water is available for this appropriation. Comparison of the estimated annual recharge to the aquifer with the water use estimated from the aquifer, and the observation well data indicate unappropriated water is available from the Inyan Kara aquifer.
2. Well interference should not be a problem at the proposed well site because of the distance from existing wells.



Ken Buhler

Natural Resources Engineering Specialist

approved by



James A. Goodman, P.E.

Natural Resources Engineering Director

## REFERENCES:

- Allen, J.C., Iles, D.L., and Petres, A.K., 1984, Analysis of Groundwater and Streamflow Data Western Dakotas Region of South Dakota, Tasks 3A.B.C. and 4A.B.: Groundwater Resource Inventory: South Dakota Department of Water and Natural Resources,
- Driscoll, D.G., and Carter, J.M., 2001, Hydrologic Conditions and Budgets for the Black Hills of South Dakota, Through Water Year 1998: U.S. Geological Survey Water-Resources Investigations Report 01-4226, 143 p.
- Strobel, M.L., Jarrell, G.J., Sawyer, J.F., Schleicher, J.R., and Fahrenbach, M.D., 1999, Distribution of Hydrogeologic Units in the Black Hills Area, South Dakota: U.S.

Geological Survey Hydrologic Investigations Atlas HA-743, 3 sheets, scale 1:100,000

Strobel, M.L., Galloway, J.M., Hamade, G.R., and Jarrell, G.J., 2000, Potentiometric Surface of the Inyan Kara Aquifer in the Black Hills Area, South Dakota: U.S. Geological Survey Hydrologic Investigations Atlas HA-745, 3 sheets, scale 1:100,000

Water Rights, 2006a, "Domestic Well Log Files" DENR-Water Rights Program, Joe Foss Building, Pierre, SD 57501

Water Rights, 2006b, "Observation Well Files" DENR-Water Rights Program, Joe Foss Building, Pierre, SD 57501

Water Rights, 2006c, "Water Permit Files" DENR-Water Rights Program, Joe Foss Building, Pierre, SD 57501



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

PMB 2020  
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[www.state.sd.us/denr](http://www.state.sd.us/denr)

**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT  
APPLICATION NO. 1861-1, Duane E Robbins LLC**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Water Permit Application No. 1861-1, Duane E. Robbins LLC, 4041 Canyon Drive, Rapid City SD 57702

The Chief Engineer is recommending APPROVAL of Application No. 1860-1 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) it is in the public interest with the following qualification.

The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.

Garland Erbele, Chief Engineer  
August 7, 2006



# AFFIDAVIT OF PUBLICATION

STATE OF SOUTH DAKOTA  
COUNTY OF MEADE

Pam Buhler, being duly sworn, says: That the Meade County Times Tribune/Black Hills Press is, and during all times hereinafter mentioned, is a legal newspaper as defined in SDDCL 17-2-2, as amended, published in Sturgis, Meade County, South Dakota, by Lee Enterprises; that affidavit is and during all of said times, was employed as an Accounting Clerk by the publisher of such newspaper and has personal knowledge of the facts stated in the affidavit, that the notice, order or advertisement, a printed copy which is attached, was published in said newspaper for successive issues, bearing the following dates:

|               |     |          |       |     |       |
|---------------|-----|----------|-------|-----|-------|
| <u>Aug 16</u> | 200 | <u>p</u> | _____ | 200 | _____ |
| <u>Aug 23</u> | 200 | <u>p</u> | _____ | 200 | _____ |
| _____         | 200 | _____    | _____ | 200 | _____ |
| _____         | 200 | _____    | _____ | 200 | _____ |
| _____         | 200 | _____    | _____ | 200 | _____ |

that the full amount of the fee charged for publishing the same, to-wit, the sum of \$ 40.45, insures solely to the benefit of the publisher of said newspaper: that no agreement or understanding for the division of the fee has been made with any person, and that no part of the fee has been agreed to be paid to any other person.

Frank Buhler

Subscribed and sworn to before me this

23 day of Aug, 2006  
Pamela Buhler  
Notary Public, South Dakota

Account No. 20073888  
Total Amount 40.45

RECEIVED  
SEP - 7 2006  
WATER RIGHTS  
PROGRAM

**NOTICE OF APPLICATION NO.**

**1861-1 to Appropriate Water**

Notice is given that Duane E Robbins LLC, 4041 Canyon Dr, Rapid City SD 57702 has filed an application for a water permit to appropriate 0.19 cubic feet of water per second from one well completed into the Inyan Kara Aquifer (2560 feet deep) located in the SW 1/4 SW 1/4 Section 25-T3N-R8E. The water is for use in a suburban housing development.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 1861-1 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the Chief Engineer will act on the application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider the application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by September 5, 2006.

The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application. Steven M. Pirner, Secretary, Department of Environment and Natural Resources.

Publ. Aug. 16, 23, 2006  
Meade County Times-Tribune



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

NOTE: TO BE SURE OF PUBLICATION ON  
THE CORRECT DATES, CONTACT  
THE NEWSPAPER RIGHT AWAY.

August 8, 2006

Duane E Robbins LLC  
4041 Canyon Dr  
Rapid City SD 57702

Dear Mr. Robbins:

Water Permit Application No. 1861-1 for suburban housing development use has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice has been sent to the Publisher of the Meade County Times Tribune printed at Sturgis, SD (Ph # 605-347-2503). You will need to contact the newspaper and authorize publication of this notice. For your information, a copy of the notice, the recommendation of the Chief Engineer and a report on the application are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice and to arrange for payment. Early contact with the paper can eliminate delays. Upon receiving authorization, the publisher has been instructed to publish your notice once each week for two consecutive weeks. The newspaper has also been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the application.

Sincerely,

Eric Gronlund  
Natural Resources Engineer  
(605) 773-3352

enclosures

NOTE: If you plan to contest any part of the Chief Engineer's recommendation, you must file a petition pursuant to the procedures outlined in the attached notice of hearing. The Water Management Board will then consider your concerns during a hearing on the application.

Instruction to Newspaper - Publish first Notice on August 16, 2006 with the second publication 7 days later. The applicant is responsible for payment.

---

NOTICE OF APPLICATION NO. 1861-1 to Appropriate Water

Notice is given that Duane E Robbins LLC, 4041 Canyon Dr, Rapid City SD 57702 has filed an application for a water permit to appropriate 0.19 cubic feet of water per second from one well completed into the Inyan Kara Aquifer (2560 feet deep) located in the SW ¼ SW ¼ Section 25-T3N-R8E. The water is for use in a suburban housing development.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 1861-1 because 1) unappropriated water is available, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. In accordance with SDCL 46-2A-23, the Chief Engineer will act on the application, as recommended, unless a petition is filed opposing the application or the applicant files a petition contesting the Chief Engineer's recommendation. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled and the Water Management Board will consider the application. Notice of the hearing will be given to the applicant and any person filing a petition.

Any person interested in opposing or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by September 5, 2006.

The petition may be informal, but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained. Contact Eric Gronlund at the above Water Rights Program address to request copies of information pertaining to this application. Steven M. Pirner, Secretary, Department of Environment and Natural Resources.



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

August 8, 2006

Meade County Times Tribune  
PO Box 69  
Sturgis SD 57785-0129

ATTENTION: Legal Public Notice

Enclosed is a Notice on Application No. 1861-1 to Appropriate Water to be published twice. Please publish the first notice on August 16, 2006 with the second publication 7 days later. The text of the notice can be e-mailed to your paper by contacting Karen Schlaak at (605) 773-3352.

**Please BILL the APPLICANT for the cost of publication.** The APPLICANT is Duane E Robbins LLC, 4041 Canyon Dr, Rapid City, SD (Ph # 605-399-1761).

**Please send the Water Rights Program the first publication immediately.** The publication is checked for accuracy so any corrections can be made in the second publication. You may use the form below or fax a copy of the first publication. Any fax should be sent to the attention of Karen Schlaak at (605) 773-4068. Publication errors can invalidate the public notice.

After the second publication, **please send us an affidavit or use the enclosed Proof of Publication form.** The applicant pays the cost of publication, but the Water Rights Program records require an affidavit or Proof of Publication. Delays in receiving the affidavit can be costly to the applicant.

Sincerely,

Eric Gronlund  
Natural Resources Engineer  
605 773-3352

enclosures

-----CUT HERE-----

No. 1861-1

TO: Eric Gronlund  
Water Rights Program  
Joe Foss Building  
Pierre SD 57501-3181

Date \_\_\_\_\_

We are in receipt of your letter of August 8, 2006 enclosing Notice to Appropriate Water by Application No. 1861-1 which was first published in our issue of \_\_\_\_\_. **ENCLOSED IS A COPY OF THIS FIRST PUBLICATION.**

\_\_\_\_\_  
Name

\_\_\_\_\_  
Newspaper



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

NOV 03 2003

Duane E Robbins LLC  
4041 Canyon Dr  
Rapid City SD 57702

Dear Mr. Robbins:

Enclosed is Water Permit No. 1861-1 authorizing construction of your water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

Form 10, *Notice of Completion of Works and Application of Water to Beneficial Use*, is enclosed. Please return this completed form after you have finished the system and have put the water to beneficial use. An investigation can then be scheduled so the water license may be issued, thus completing the acquisition of a water right.

An informational sheet *Common Water Right Questions* is also enclosed. This sheet is intended to answer some of the questions associated with obtaining and keeping a water right.

Sincerely,

Garland Erbele, Chief Engineer  
Water Rights Program  
(605) 773-3352

enclosures

1861-1

**NOTICE OF COMPLETION OF WORKS AND  
APPLICATION OF WATER TO BENEFICIAL USE**

Date

11-20-06

TO:

Water Rights Program, DENR  
523 E. Capitol  
Pierre, SD 57501-3181

RECEIVED  
DEC - 4 2006  
WATER RIGHTS  
PROGRAM

FROM:

Duane E Robbins

(name)

4041 Canyon Dr

(address)

Rapid City SD 57702

(city, state, zip)

605-399-1761

(phone)

Cell 605-381-7395

I have completed the construction of the water use system and I have put the water to beneficial use to the maximum extent it is going to be used.

Water Permit No. 1861-1 states that the water use system is to be constructed by

Sept 5, 2011, and water is to be put to beneficial use by Sept 5, 2015.

(date)

(date)

The water use system was completed on

Nov. 10, 2006

(date)

Applying the water to beneficial use was completed on

Nov. 10, 2006

(date)

You may schedule an investigation so that the water license may be issued.

Duane E Robbins  
(signature)



**Permit No. 1861-1**  
**Upper Cheyenne River - Water District**

**Report of Examination of Works and/or Application of Water to Beneficial Use**

TO: Chief Engineer, Water Rights Program, DENR, Foss Bldg., Pierre, SD 57501

I have this day, **27 November 2007**, made a thorough examination of the water use system constructed by **Duane Robbins LLC**, of **8005 Stirrup Ct., Rapid City, SD. 57702** holder of Permit No. **1861-1**, bearing the priority of **20 April 2006** authorizing the diversion of **0.19** cu. ft. per second of the waters of **the Inyan Kara Aquifer** for **suburban housing development** purposes, in **Meade** County.

**A. Works used to divert the water:**

**Well Information:**

- 1) Well Drilling Firm: **Cimarron Drilling**
- 2) No. of Wells: **1**
- 3) Depth(s) **2560** feet
- 4) Well log is available **Y**
- 5) Comment:

**Casing:**

- 1) Diameter **7 / 4.5** inches
- 2) Length **2180 / 510** feet
- 3) Type **steel**

**Screen:**

- 1) Type **Perforated pipe**
- 2) Length **150** feet
- 3) Static water level **400** feet

**Pump:**

- 1) Make **Grundfos**
- 2) Capacity **75** GPM

**Motor:**

- 1) Make **Hitachi**
- 2) Horsepower rating **15** hp

**B. Works used to transport water to place of use:**

- 1) Type C 900      2) Size 6 inches      3) Length 8000 feet

**C. Compliance with Permit Requirements:**

- 1) Permit qualifications being abided by Y
- 2) Irrigation Questionnaires checked to determine if permit owner started irrigation by the end of construction period N
- 3) Exceptions to compliance are: none

The system is in good condition with the point(s) of diversion located as follows: SW ¼ SW ¼ Sec 25-T3N-R8E, approximately 208 feet east and 1405 feet north of the south west corner of section 25, N 44.18732 Latitude and W -103.10999 Longitude. The works are capable of diverting and conveying to the place of use 0.17 cu. ft. per second of water which is to be used for suburban housing development.

The license should be issued for 0.17 cfs.

All structures, wells and lands on map Y

Comments or other permit(s) associated with the project:



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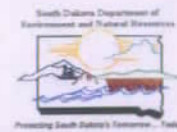
Mark Costello  
Natural Resources Engineer  
DENR, Water Rights Program

Date report completed: 14 December 2007



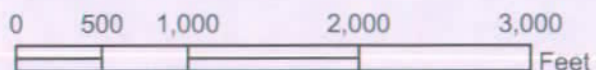
# 1861-1

Duane Robbins LLC  
8005 Stirrup Ct.  
Rapid City, SD. 57702



*Mark Costello*

Mark Costello  
Natural Resources Engineer  
DENR, Water Rights  
14 December 2007





**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

PMB 2020  
JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182  
[www.state.sd.us/denr](http://www.state.sd.us/denr)

JAN 28 2008

1861-1

Duane Robbins LLC  
8005 Stirrup Ct  
Rapid City SD 57702

Dear Mr. Robbins:

Enclosed is Water License No. 1861-1. This is the final water right document completing your process of obtaining a Water Right. Also enclosed is a map prepared by the staff engineer who conducted the field investigation.

For your information SDCL 46-6-27 requires that if the owner of an existing well, such as the well authorized by Water Right No. 1861-1, constructs a replacement well and does not plan to use the old well, the old well is considered abandoned and must be plugged. Also, any well that is being used or is not considered abandoned must be valved and controlled, if flowing, or sealed and capped so that no leaking occurs either underground or at the surface.

As long as you use the water beneficially, as stated in the Water License, the State Water Laws provide that you have a continuing right to use the water. If you have any questions, please contact our office.

Sincerely,

Garland Erbele, Chief Engineer  
Water Rights Program  
(605) 773-3352

enclosures

# STATE OF SOUTH DAKOTA

## WATER LICENSE NO. 1861-1

(1) Duane E Robbins LLC, 8005 Stirrup Ct, Rapid City SD 57702 made Application No. 1861-1, April 20, 2006 for a water permit to divert 0.19 cubic feet of water per second from ground water (one well – Inyan Kara Aquifer), Meade County, South Dakota for suburban housing development purposes. Permit No. 1861-1, with a priority date of April 20, 2006 was approved September 5, 2006 and issued to the applicant for diversion of water with construction of the described water supply system to be completed on or before September 5, 2011 and for the application to beneficial use of said water on or before September 5, 2015.

The Permit holder submitted a "*Notice of Completion of Works and Application of Water to Beneficial Use*" on December 4, 2006. The "*Notice*" stated the water use system was completed and water placed to beneficial use on November 10, 2006.

(2) It is certified that the permit holder has complied with the provisions of South Dakota State Law relating to completion of the construction of the water supply system and is entitled to divert 0.17 cubic feet of water per second for beneficial use. The location of the diversion point is approximately 208 feet east and 1,405 feet north of the SW corner of Section 25, T3N, R8E (SW ¼ SW ¼).

(3) The permit holder has complied with the provisions of South Dakota State Law relating to the application of water to beneficial use for Horseshoe Acres Estates.

(4) Pursuant to South Dakota Water Law 46-5-30.1 Duane E Robbins LLC, 8005 Stirrup Ct, Rapid City SD 57702 the holder and/or owner of Water Right No. 1861-1 is issued a license to appropriate water, the right to use 0.17 cubic feet of water per second (75 gallons per minute) from ground water (one well – Inyan Kara Aquifer) with a priority date of April 20, 2006 from the location specified in (2) of this license for suburban housing development.

This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Right No. 1861-1 and subject to the following qualification:

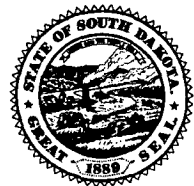
- The well approved under this Permit will be located near domestic wells and other wells which may obtain water from the same aquifer. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.



Garland Erbele, Chief Engineer  
Water Rights Program  
Department of Environment and Natural Resources

JAN 28 2008

date



## NOTICE OF TRANSFER OF OWNERSHIP

For assistance call (605) 773-3352

RECEIVED

FEB 15 2017

WATER RIGHTS  
PROGRAM

Mail to: PMB 2020  
DENR - Water Rights Program  
523 E Capitol Ave  
Pierre, SD 57501-3182

Water Right/Permit No 1861-1Date: January 30, 2017

I/We request that Water Right/Permit No. 1186-1 formerly owned by:  
Duane E. Robbins be transferred to:

New Owner Name: Horseshoe Water Company, Inc.Address: 5310 Ebony PlaceCity, State, Zip Piedmont SD 57769 Telephone No. 605-391-7483

Title to the following described land(s)/property has been transferred as described above:

Well Lot of Horseshoe Acres Subdivision, Meade County, South Dakota, as shown on the plat filed in Plat Book 21 on Pages 321-322

-AND-

Tank Lot No. 2 of Horseshoe Acres Subdivision, Meade County, South Dakota, as shown on the plat filed in Plat Book 21 on Page 360, and as amended by Surveyor's Affidavit recorded January 26, 2017, in Book 879 on Page 1575.

- ☒ I understand that the validity of Water Right/Permit No. 1861-1 ~~1186-1~~ has not been determined by this transfer action. If I have any questions on validity, I understand that only the Water Management Board has the authority to determine if a water right/permit is valid (see note below.)

You are requested to file this "Notice of Transfer" in the appropriate file with the Water Rights Program, as evidence of the change of ownership.

A fee of Fifty Dollars (\$50.00) is included to cover the filing fee as required by SDCL 46-2-13.

I, Horseshoe Water Company, Inc., the new owner, certify that the above information is true and correct.

Mailee Sage  
(signed by new owner)  
Horseshoe Water Company, Inc.  
Vice President

**NOTE:** Water permits may be cancelled for nonconstruction after the five year construction period has expired. Once a water permit is developed and the water used, the permit becomes a right. A water right may be lost for three reasons:

1. Abandonment - no intent to use water and use is abandoned.
2. Forfeiture - no use of water for three year period without legal excuse.
3. For a third violation of a condition of a water permit/right.

RECEIVED

FEB 24 2017

WATER RIGHTS  
PROGRAM

**From:** McMath, Genny <Genny.McMath@state.sd.us>

**To:** 'SWW' <msagebrush@aol.com>

**Subject:** RE: transfer of water right 1861-1

**Date:** Thu, Feb 16, 2017 1:43 pm

---

Thank you Marilee!

**From:** SWW [<mailto:msagebrush@aol.com>]

**Sent:** Thursday, February 16, 2017 1:47 PM

**To:** McMath, Genny

**Subject:** Re: transfer of water right 1861-1

Genny,

Thank you for reminding of the fee. I will get it in the mail ASAP!

Marilee Sage

Vice President

Sage Water Works, Inc.

On Feb 16, 2017, at 6:44 AM, McMath, Genny <[Genny.McMath@state.sd.us](mailto:Genny.McMath@state.sd.us)> wrote:

Marilee,

We have received the transfer form you submitted for changing ownership on Water Right No. 1861-1. A \$50 fee is also required by statute to file an ownership change. Once we receive the fee, Water Right No. 1861-1 will be transferred from Duane E Robbins to Horseshoe Water Company Inc.

The check or money order for the fee can be made payable to the "Water Rights Program". When sending in the fee, include the water right number to ensure correct processing. Mail to: DENR – Water Rights Program, 523 E Capitol Ave., Pierre SD 57501

*Genny McMath*  
*Water Rights Program*  
605.773.5455

# RECEIPT

## WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date 2/24, 20 17

RECEIVED OF Horseshoe Water Co Inc 5310 Ebony Place Piedmont SD 57760

The following amount in fees for services rendered as provided for by law:

|                                                                                                                |       |    |
|----------------------------------------------------------------------------------------------------------------|-------|----|
| Fee for Application for Permit No. _____ to Appropriate Water, to construct and to put water to beneficial use | 50    | 00 |
| Fee for Application for Permit No. _____ to Appropriate Water for Future use                                   |       |    |
| Fee to retain Future Use Permit No. _____ after period of seven years.                                         |       |    |
| Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. _____            |       |    |
| Fee for Filing Transfer Form _____ 1861-1                                                                      |       |    |
| Fee for _____                                                                                                  |       |    |
| Fee for Issuing New Well Driller's License No. _____ for C.Y. _____                                            |       |    |
| Fee for Renewal of Well Driller's License No _____ for C.Y. _____                                              |       |    |
| Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____                                         | 50    | 00 |
| Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____                                      |       |    |
| (Any Other Work Provided by Law)                                                                               | TOTAL |    |
|                                                                                                                | 50    | 00 |

No. **08188**

By Jeanne Hoehner  
Chief Engineer



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

February 28, 2017

1861-1

Marilee Sage  
Horseshoe Water Company, Inc  
5310 Ebony Place  
Piedmont SD 57769

Dear Ms. Sage:

I am writing to acknowledge receipt of the transfer form and filing fee submitted for changing ownership on Water Right No. 1861-1.

The ownership change has been completed. Water Right No. 1861-1 formerly held by Duane E Robbins is now listed in the name of Horseshoe Water Company Inc.

Enclosed for your records is Receipt No. 08188 in the amount of \$50. If you have any questions, please contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Genny McMath". The signature is fluid and cursive, with the first name "Genny" and last name "McMath" clearly distinguishable.

Genny McMath  
Water Rights Program  
(605) 773-3352  
email: genny.mcmath@state.sd.us

enclosure

RECEIVED

DEC 08 2017

WATER RIGHTS  
PROGRAM

SD EForm - 0495LD V2

NOTICE OF TRANSFER OF OWNERSHIP

For assistance call (605) 773-3352

Mail to: PMB 2020  
DENR - Water Rights Program  
523 E Capitol Ave  
Pierre, SD 57501-3182

Water Right/Permit No. 1861-1

Date: November 30, 2017

I/We request that Water Right/Permit No. 1861-1 formerly owned by:  
Horseshoe Water Company, Inc. be transferred to:

New Owner Name: Horseshoe Acres Water Association, Inc.

Address: 22196 School Road

City, State, Zip Piedmont SD 57769 Telephone No. \_\_\_\_\_

Title to the following described land(s)/property has been transferred as described above:

Well Lot of Horseshoe Acres Subdivision, Meade County, South Dakota, as shown on the plat filed in Plat Book 21 on Pages 321-322

AND

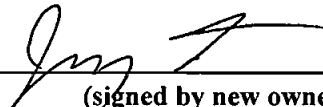
Tank Lot No. 2 of Horseshoe Acres Subdivision, Meade County, South Dakota, as shown on the plat filed in Plat Book 21 on Page 360, and as amended by Surveyor's Affidavit recorded January 26, 2017 in Book 879 on Page 1575

☒ I understand that the validity of Water Right/Permit No. 1861-1 has not been determined by this transfer action. If I have any questions on validity, I understand that only the Water Management Board has the authority to determine if a water right/permit is valid (see note below.)

You are requested to file this "Notice of Transfer" in the appropriate file with the Water Rights Program, as evidence of the change of ownership.

A fee of Fifty Dollars (\$50.00) is included to cover the filing fee as required by SDCL 46-2-13.

I, Horseshoe Acres Water Association, Inc., the new owner, certify that the above information is true and correct.

  
(signed by new owner)

**NOTE:** Water permits may be cancelled for nonconstruction after the five year construction period has expired. Once a water permit is developed and the water used, the permit becomes a right. A water right may be lost for three reasons:

1. Abandonment - no intent to use water and use is abandoned.
2. Forfeiture - no use of water for three year period without legal excuse.
3. For a third violation of a condition of a water permit/right.

# RECEIPT

## WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date December 8, 20 17

RECEIVED OF Thomson Law, PC 1010 Ball Park Road, Ste.6, Sturgis, SD 57785

The following amount in fees for services rendered as provided for by law:

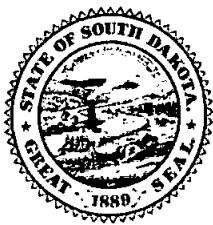
|                                                                                                                |       |       |
|----------------------------------------------------------------------------------------------------------------|-------|-------|
| Fee for Application for Permit No. _____ to Appropriate Water, to construct and to put water to beneficial use | 50    | 00    |
| Fee for Application for Permit No. _____ to Appropriate Water for Future use                                   |       |       |
| Fee to retain Future Use Permit No. _____ after period of seven years.                                         |       |       |
| Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. _____            |       |       |
| Fee for Filing Transfer Form _____ 1861-1                                                                      |       |       |
| Fee for _____                                                                                                  |       |       |
| Fee for Issuing New Well Driller's License No. _____ for C.Y. _____                                            |       |       |
| Fee for Renewal of Well Driller's License No. _____ for C.Y. _____                                             |       |       |
| Fee for Issuing Well Pump Installer's License No. _____ for C.Y. _____                                         |       |       |
| Fee for Renewal of Well Pump Installer's License No. _____ for C.Y. _____                                      |       |       |
| (Any Other Work Provided by Law)                                                                               | TOTAL | 50 00 |

No. **08386**

By

Jeanne Goodman  
Chief Engineer

*vm*



# *South Dakota Secretary of State*

## SHANTEL KREBS

### Filing Information

Name: **Horseshoe Acres Water Association, Inc.**

#### General Information

**SOS Business ID**                      **NS135265**  
**Filing Type:**                      Nonprofit Corporation - Domestic  
                                                  07/21/2017  
**Status:**                              Good Standing  
**Duration Term:**                      Perpetual

#### Registered Agent Address

JERRY TREINEN  
 14702 HACKMORE COURT  
 PIEDMONT, SD 57769

#### Principal Address

22196 SCHOOL ROAD  
 PIEDMONT, SD 57769

The following document(s) was/were filed in this office on the date(s) indicated below:

| Date Filed | Filing Description |
|------------|--------------------|
|------------|--------------------|

| Image # |
|---------|
|---------|

|            |                |
|------------|----------------|
| 07/21/2017 | Initial Filing |
|------------|----------------|

|            |
|------------|
| B0035-2350 |
|------------|

1861-1



**DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES**

JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE SOUTH DAKOTA 57501-3182  
[www.denr.sd.gov](http://www.denr.sd.gov)

December 27, 2017

1861-1

Jerry Treinen  
Horseshoe Acres Water Association Inc  
22196 School Rd  
Piedmont SD 57769

Dear Mr. Treinen:

I am writing to acknowledge receipt of the transfer form and filing fee submitted for filing an ownership change with Water Right No. 1861-1.

The ownership change has been completed. Water Right No. 1861-1, formerly held by Horseshoe Water Company Inc., is now listed in the name of Horseshoe Acres Water Association Inc.

The receipt for the filing is being forwarded by copy of this letter to Thomson Law in Sturgis SD.

Sincerely,

Genny McMath  
Water Rights Program  
(605) 773-3352  
email: [genny.mcmath@state.sd.us](mailto:genny.mcmath@state.sd.us)

c: Thomson Law PC., 1010 Ball Park Rd, Ste 6, Sturgis SD 57785