Considered: Y

WATER PERMIT NO. 5167-3

MAP No. same 627-9113

Name of Applicant City of Volga

Post Office Address 202 Kasan Ave, Volga SD 57071

Amount of Water Claimed 0.45 cfs Total Acres NA

Source of Water Supply groundwater 1 well

Water to be used for municipal purposes County Brookings

About 1 mile W of Volga.

PROOF OF PUBLICATION: Received _____ Not Received _____

APPLICATION: Approved _____ Subject to _____

F.F.& C.L. Adopted _____ Not Approved _____ Deferred _____

PRIORITY Date Received Dec 22, 1987 Fee $250.00 Remarks _____

_____

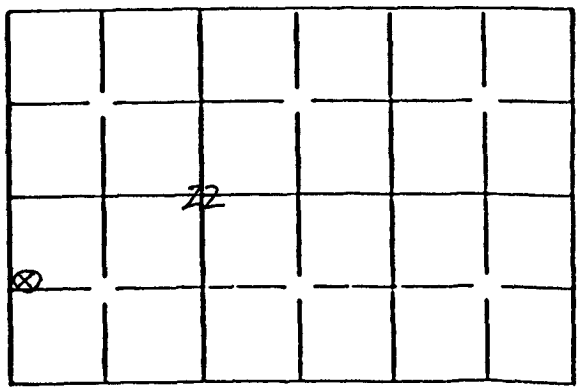
Corrected Application Received _____ Period of Annual Use _____

WATER QUALITY APPROVAL RECEIVED NA APPROVED/CONDITIONAL (Circle one)

WI-1 Description same as Application YES ___ NO ___ REMARKS _____

Diversion Point well: NW¼SW¼ section 22-T110N-R51W

Land to be Irrigated NA



Well Log: Driller _____ Licensed YES ___ NO ___

Depth of Well 30 feet REMARKS _____

Type of Map plat PREPARED BY Assad Baraci Reviewed and the Number assigned on December 24, 1987 BY Ron Duvall

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

Mail to: Water Rights Div.
DWNR, Foss Bldg.
Pierre, SD 57501
(605) 773-3352

No. 5167-3 Hydrologic Unit 10170202
Map No. same Basin Big Sioux R
Newspaper Brookings Daily Register, Box 177

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

Check use of water: Industrial ☐ Commercial ☐ Municipal ☒ Other Common Distribution System ☐
Rural Water System ☐ Suburban Housing ☐ Geothermal Heat ☐ Institutional ☐ Recreational ☐
Domestic ☐ (above 18gpm) Other ☐

2 copies per map

10 AM DEC 1987 DIVISION OF WATER RIGHTS Pierre, SD

Type of Application: Check one or more of the following

New ☒ Vested Right ☐ Future Use ☐ Change Use ☐
☐ Amend Permit No. _____ with old priority date retained
Change diversion point(s) ☐ Add diversion point(s) ☐ Other ☐ _____
☐ Application to: Change diversion point(s) ☐ Add diversion point(s) ☐ on Permit No. _____
☐ Construction to use water reserved by Future Use Permit No. _____

1. Name of Applicant City of Volga Phone No. 627-9113
   Post Office Address 202 Kasan Ave (Street, RR or Box) Volga (City) SD State 57071 Zip Code
2. Amount of water claimed (c.f.s) 0.45 cfs
3. Source of water supply Wells
4. Location of point of diversion Outlot 1 in the SW 1/4 of Sec. 22, T110N, R51W NW¼SW¼
   _____ County Brookings
5. Counties where water will be used Brookings
6. Annual period during which water is to be used continuous January 1 - December 31
7. Give a brief description of proposed 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)

Addition of a new well in the area of our two existing wells. This well would either be submersible or centrifical and use the existing water mains for transportation to the City. Topography and ground water and soil characteristics should be identical to the other two wells which were constructed in 1970.

Attachments: Attach Form 2A if diversion from a well or dugout, or if storage of water, is proposed. Attach map (see instruction)

STATE OF SOUTH DAKOTA)
County of Brookings)ss

I, Steven W. Meyer - City of Volga 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.

Signed Steven W. Meyer

Subscribed and sworn to before me this 21st day of December 1987

Marcia L. Thompson
Notary Public

4-87

EXISTING 7.2/12.5 KV PRIMARY TRANSMISSION LINE 3, 1/c #2 SOLID ALUM. URD CABLE 15KV

GRAVEL ROAD

SECTION LINE

NORTH

SCALE: 1"=40' (HORIZ.)
1"=5' (VERT.)

NEW PRIMARY TRANSMISSION LINE TO NEW CITY WELL No 7

NEW CONTROL CABLE THIS CONTRACT

SEE SPECIFICATION FIGURES "A", "B", AND "C"

CITY OF VOLGA PROPERTY (OUTLOT 1 OF THE SW 1/4 - 22-110-51)

HIGH VOLTAGE SIGN

HIGH VOLTAGE SIGN

EXISTING UNDERGROUND CABLE

EXISTING UNDERGROUND CONTROL CABLE

10'

21'

4'

50'

27½'

23'±

1.5'

10'

21'

50'

13½'

PROPOSED WELL No 7

EXST WELL No 6 COMPLEX

EXST WELL No 5 COMPLEX

0-300

0-200

0-100

0

SHELTER BELT

8+02 - INSTALL 8"x6"x8" TEE CAP AND BLOCK CONNECT TO FINISHED WELL PIPING WITH 6" C.I. PIPE

NEW 6" WATER LINE

10"x6" CONCENTRIC REDUCER THIS CONTRACT

EXISTING 10" WATER LINE

0+07 - INSTALL 10" GATE VALVE THIS CONTRACT

1650

1645

1640

650

645

640

EXISTING GROUND LINE

MAINTAIN 6' MINIMUM COVER

$S_o = 0.00180$ (EXISTING)

PROPOSED 6" WATER LINE

EXISTING 10" WATER LINE

0-400 0-300 0-200 0-100 0

DRAWN BY: D. G. K.	REVIEWED _____ DATE: _____ FOR _____	BANNER ASSOCIATES, INC. • CONSULTING ENGINEERS & ARCHITECTS 410 22ND AVENUE SOUTH • P.O. BOX 248 • BROOKINGS, SD 57006 • (605) 692-6313
DESIGNED BY: D. C. O.		
CHECKED BY: D. C. O.	REVIEWED _____ DATE _____ FOR BANNER ASSOCIATES, INC.	

REVISION	DATE	DESCRIPTION	BY	CK'D

WATER SUPPLY IMPROVEMENTS — CITY OF VOLGA, SOUTH DAKOTA

PLAN & PROFILE
WATER TRANSMISSION LINE

SCALE:	JOB NO:	DATE:
AS SHOWN	7309-01	APR. 1988

SHEET NO: 5167-3 1

TELEDYNE POST 748873

WATER PERMIT

The Water Management Board hereby approves Water Permit Application No. 5167-3

City of Volga (Applicant) 202 Kasan Avenue (Street, RR or Box)

Volga (City) SD (State) 57071 (Zip Code) With the following qualifications.

The wells 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.

Date of first receipt of application December 22, 19 87.

Date of return to applicant for correction, amendments or changes required _____, 19____.

Date of receipt of corrected application _____, 19____. Approved March 3, 19 88.

The Water Management Board approved this Water Permit No. 5167-3 authorizing the construction of the water use system and the placing of water to beneficial use as stated in the Application and as qualified in the Water Permit approval, subject, however, to the following limitations and conditions:

1. The date from which applicant may claim right is December 22, 19 87.
2. The equivalent of at least one-fifth of the specified work is to be completed on or before September 3, 19 90.
3. The whole of said work is to be completed on or before March 3, 19 93.
4. The limit of time for proof of beneficial use of water appropriated in accordance herewith is March 3, 19 97.
5. The water appropriated shall be used for the purpose of municipal use by the City of Volga
6. The prior right of all persons who, by compliance with the laws of the State of South Dakota, have acquired a right to the use of water must not be unlawfully impaired by this appropriation.
7. The amount of the appropriation granted shall not exceed 0.45 cubic feet per second; neither shall it exceed the amount of water needed for the beneficial uses served and to which water is actually and beneficially applied for municipal use on or before March 3, 19 97. The water is to be used during the following described annual period: Jan 1 - Dec 31

WATER MANAGEMENT BOARD

By: John Hatch
Chief Engineer
Division of Water Rights
Dept. of Water and Natural Resources

APR 28 1988, 19____

4-87

Form 2A

Supplemental Information

(type or print in ink)

1. Well Information - Proposed construction

   a) Drill Hole Diameter 60" Depth 30'

   b) Casing Type Steel Diameter 30" Thickness 0.500"

   c) Screen Type Everour slotted Diameter 30" Thickness Length 5'

   d) Gravel Pack Thickness 15" Length of Gravel Pack 30'

   e) Depth to Top of Water Bearing Material 15'

   f) Depth to Water (ground surface to water level) 15'

   g) Distance to nearest existing domestic well:

   On applicants property 400' from existing well On property owned by others 1500 Ft.

2. Dugout Information Estimates

   a) Surface Dimensions _____ Depth _____

   b) Depth to water (ground surface to water level) _____

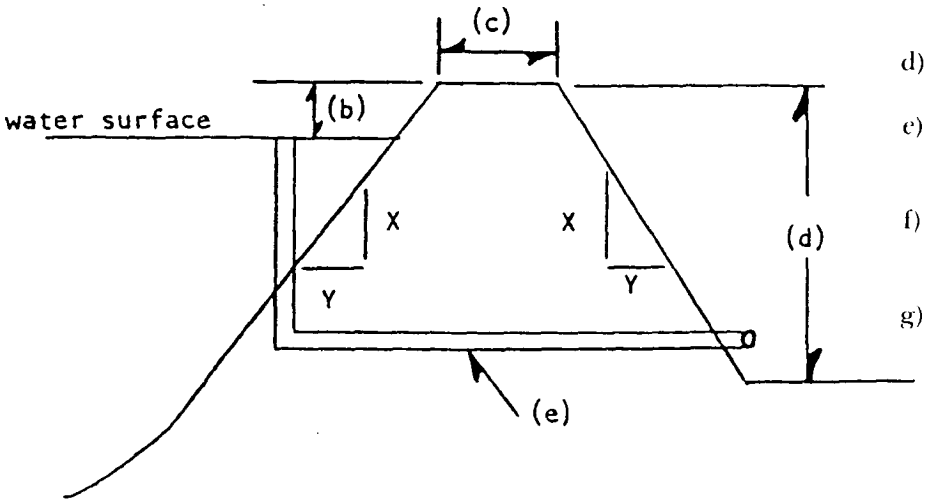
3. Water Storage Dams

   If the proposed water use system contains one or more storage dams, please furnish the information requested below. The locations of each dam should be shown on the map submitted with the application.

   a) If a private engineering firm or government agency was involved in the design of this dam please give their name and address

   _____

   _____



   b) Freeboard _____

   c) Crest Width _____

   Crest Length _____

   d) Height _____

   e) Primary Outlet Capacity _____
   If Pipe, diameter _____

   f) Secondary Spillway Capacity _____
   Spillway width _____

   g) X & Y Slope
   Upstream _____

   Downstream _____

   Surface Area of Impoundment _____

   Storage _____ acre feet

   Drainage area above dam _____

_____
Signature of Applicant

Test Hole No. 22
Location: NW¼NW¼NE¼SE¼ sec. 21, T. 110 N., R. 51 W.
Surface Elevation: 1650 feet
Depth to water: 14 feet

0- 2	Topsoil
2- 10	Sand, tan to brown, fine to medium
10- 21	Sand and gravel, brown
21- 39	Clay, gray, pebbly, (till)

* * *

Test Hole No. 23
Location: SW¼SW¼SE¼SE¼ sec. 21, T. 110 N., R. 51 W.
Surface Elevation: 1655 feet
Depth to water: 20 feet

0- 2	Topsoil
2- 20	Sand and gravel, brown, some clay
20- 34	Sand and gravel, brown, grading to grayish-brown
34- 52	Sand and gravel
52- 59	Clay, grayish-brown, compact, (till)

* * *

Test Hole No. 24
Location: NW¼NW¼SW¼SW¼ sec. 22, T. 110 N., R. 51 W.
Surface Elevation: 1648 feet
Depth to water: 15 feet

0- 2	Topsoil
2- 25	Gravel and very coarse sand
25- 28	Sand, coarse to very coarse
28- 47	Gravel
47- 49	Clay, some sand, (till)

* * *

Test Hole No. 25 (Pump test well drilled by Thorpe Drilling Co.)
Location: SW¼SW¼NW¼SW¼ sec. 22, T. 110 N., R. 51 W.
Surface Elevation: 1645 feet
Depth to water: 15 feet

0- 2	Topsoil
2- 5	Clay, brown
5- 14	Gravel, medium
14- 23	Gravel, fine
23- 45	Gravel, fine to medium
45- 47	Clay

* * *

Test Hole No. 26
Location: SE¼SW¼NW¼SW¼ sec. 22, T. 110 N., R. 51 W.
Surface Elevation: 1645 feet
Depth to water: 15 feet

Test Hole No. 26 (continued)

0- 3	Topsoil
3- 31	Sand and gravel
31- 45	Sand, gray, medium-coarse
45- 54	Clay, yellowish-brown, fairly compact, pebbly, (till)

* * *

Test Hole No. 27
Location: NW¼NW¼NW¼SW¼ sec. 22, T. 110 N., R. 51 W.
Surface Elevation: 1646 feet
Depth to water: 6 feet

0- 2	Topsoil
2- 6	Sand and gravel, high percent of clay
6- 32	Sand, brown, grading to grayish-brown
32- 44	Clay, grayish-yellow, pebbly, fairly compact, (till)

* * *

Test Hole No. 28
Location: SW¼SW¼NE¼SW¼ sec. 22, T. 110 N., R. 51 W.
Surface Elevation: 1645 feet
Depth to water: 16 feet

0- 3	Topsoil
3- 16	Sand and gravel, much clay
16- 44	Sand and gravel, brown, grading to light-gray
44- 59	Clay, dark-brown, very pebbly, compact, (till)

* * *

Test Hole No. 29
Location: NE¼NW¼NW¼SW¼ sec. 22, T. 110 N., R. 51 W.
Surface Elevation: 1643 feet
Depth to water: 11 feet

0- 4	Topsoil, sandy
4- 24	Sand and gravel
24- 29?	Sand, grayish-brown
29?- 94	Clay, light-gray, very pebbly, (till)

* * *

Test Hole No. 30
Location: NW¼NW¼NW¼NW¼ sec. 22, T. 110 N., R. 51 W.
Surface Elevation: 1670 feet
Depth to water: not measured

0- 3	Topsoil
3- 47	Clay, grayish-brown, pebbly
47- 74	Clay, brownish-gray, pebbly, (till)

* * *

RECEIPT

Division of Water Rights

411114

South Dakota Department of Water and Natural Resources

Pierre, December 22, 1987

RECEIVED OF City of Volga, 202 Kasan Avenue, Volga, SD 57071

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

Fee for Application for Permit No. 5167-3 to Appropriate Water, to construct works and to put water to beneficial use	250 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	
Fee for Filing Extension Request	
Fee for Certified Copy of	
Fee for Print Copy of Map	
Fee for Certifying	
Fee for _____ (Any Other Work Provided by Law) **Total**	250 00

By John Hatch
Chief Engineer JOHN HATCH ms

Report on Permit Application No.5167-3
City of Volga
January 20, 1988

Water permit application No.5167-3 proposes to appropriate 0.45 cubic feet of water per second from one well 30 feet deep, to be located in the NW1/4 SW1/4 Sec. 22, T110N-R51W.The water is to be used for municipal purposes by the city of Volga.

Aquifer:Big Sioux-Brookings

Geology and Aquifer Characteristics:

The Big Sioux Aquifer is an alluvium mantled, late Wisconsin Aged outwash, composed of sand and gravel of glacio-fluvial origin, with minor amounts of silt and clay. The Brookings management unit of the Big Sioux Aquifer underlies approximately 74,500 acres of Brookings County and contains and estimated 245,850 acre-feet of recoverable water in storage in the county (Hedges,1982). Test holes drilled for the Volga City Study by the South Dakota Geological Survey indicate the aquifer is approximately 45 feet thick in this area. The aquifer is under water table conditions and the static water level is reported to be 15 feet below land surface in this well. Transmissivity values for the Big Sioux aquifer range from 20,000 - 42,000 ft^2/day and the specific yield of the aquifer ranges from 0.10 to 0.17.

Recharge to the Big Sioux Aquifer is through infiltration of precipitation falling directly on the surface of the aquifer, runoff from adjacent areas onto the surface of the aquifer, and infiltration from the Big Sioux River when the water level of the aquifer is lower than the stage elevation of the Big Sioux River. Average annual recharge to the Big Sioux Aquifer is assumed to be 6.69 inches per year (Koch,1980). This estimate represents a recharge rate somewhat independent of the leakage from the Big Sioux River. Any difference between the "average annual recharge" rate and annual withdrawals from the aquifer would be made up through increased recharge from streamflow from the Big Sioux River.

The Division of Water Rights monitors 8 observation wells in the Big Sioux - Brookings Aquifer within 3 miles of this well site. Observation well Bg-77P is located approximately two miles from this application. Water level measurements indicate the water table fluctuates seasonally in response to recharge events. The observation wells give no indication of a decline of the potentiometric surface of the Big Sioux-Brookings Aquifer (hydrographs included).

Review of Existing Water Rights

The "1986 Irrigation Report" identifies 102 irrigation permits from the Big Sioux-Brookings Aquifer in Brookings County. The 1986 appropriation from this management unit was 43,057.67 acre-feet and the 1986 pumpage from the management unit in Brookings county was reported to be 1,236.88 acre-feet (Division of Water Rights,1987). There are 6 existing Water Permits supplied by the Big Sioux-Brookings Aquifer within approximately three miles of this proposed appropriation. They include:

Permit #	Owner	Location
509-3	Farmers Co-op Creamery	Sec.23,T110N-R51W
1759-3	City of Volga	Sec.14,22,23,T110N-R51W
2169-3	Carol M. Glantz	Sec.26,T110N-R51W
3208-3	Mrs. Leonard Olson	Sec.21,T110N-R51W
3921-3	John L. Wiersma	Sec.11,T110N-R51W
4338-3	Wayne C. Manns	Sec.11,T110N-R51W

The nearest existing Water Permit except for the City of Volga's own permit (1759-3) is located approximately 1500 feet from the applicant's well. All of the existing Water Permits have the standard well interference qualification, and Permits 3208-3, 3921-3, and 4338-3 also have a well spacing qualification of 660 feet between wells.

The Division of Water Rights has Record of several existing domestic wells within approximately 3 miles of the applicant's well.

Conclusions

1. The Big Sioux-Brookings Aquifer is a viable aquifer, and water is available for this appropriation.

2. The Big Sioux-Brookings Aquifer and the Big Sioux River are hydraulically connected and recharge from streamflow from the river theoretically increases with increased withdrawals from the aquifer.

3. Well interference should not be a problem for nearby adequate wells, the effect of withdrawals may cause only a few feet of drawdown in other wells. Should a problem arise, the Division of Water Rights will investigate the concerns. This permit should be qualified with the standard well interference clause.

Kent Buhler
Natural Resources Engineer

References

Hedges,L.S.,S.Burch,D.Iles,R.Barrari,R.Schoon;1982, Evaluation of Groundwater Resources, Eastern South Dakota and Upper Big Sioux River, South Dakota and Iowa, US Army Corps of Engineers contract DACW 45-80-C-0185, SD DWNR-Office of Geological Survey, Vermillion, South Dakota

Koch,N.C.,1982, Appraisal of the Water Resources of The Big Sioux Aquifer, Brookings, Deuel, and Hamlin Counties, South Dakota, USGS,Water Resources Investigation 80-100, Huron, SD,57350

Division of Water Rights,1987, Observation Well, Domestic Well, and Water Permit Files, DWNR-Division of Water Rights, Joe Foss Building, Pierre, SD

Division of Water Rights,1987, 1986 Irrigation Report, DWNR-Division of Water Rights, Joe Foss Building, Pierre SD

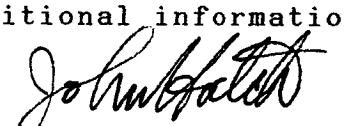
RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 5167-3, City of Volga

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Division, Department of Water and Natural Resources concerning Water Permit Application No. 5167-3, City of Volga, 202 Kasan Avenue, Volga SD.

The Chief Engineer is recommending APPROVAL of Application No. 5167-3 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) in the public interest with the following qualification:

> The wells 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.

See the attached report for additional information.



JOHN HATCH, Chief Engineer
January 22, 1988

DWNR 806-11/85

No. 5167-3

Instruction to Newspaper - Publish first publication of the following Notice on or before **February 3, 1988** with 2nd publication 1 week later. The applicant is responsible for payment.

NOTICE OF HEARING on Application No. **5167-3** to Appropriate Water ~~and/or to Amend Water Permit or Water Right No.~~ _____

Notice is hereby given that **the City of Volga** whose mailing address is **202 Kasan Avenue, Volga**, South Dakota has made an application for a permit

to appropriate 0.45 cubic feet of water per second from one well (Big Sioux-Brookings Aquifer) 30 feet deep to be located in the NW¼SW¼ Section 22-T110N-R51W. Water is to be used for municipal purposes by the City of Volga.

Pursuant to SDCL 46-2A-2 the Chief Engineer of the Water Rights Division recommends **APPROVAL** of Application No. **5167-3** because 1) unappropriated water is available, 2) will be no unlawful impairment of existing rights, 3) is beneficial use of water and 4) is in the public interest.

This application will be considered by the Water Management Board at **room 216, Joe Foss Building, 523 E. Capitol, Pierre, South Dakota, March 2** 19**88** at 10:00 am.

The recommendation of the Chief Engineer is not final or binding upon the Board and the Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny this application after it reaches a conclusion based upon facts presented at the public hearing. Any interested person who may be affected by a Board decision and who intends to participate in the hearing before the Board and present evidence or cross-examine witnesses according to SDCL 1-26, must file a written petition with BOTH the applicant and the Chief Engineer by **February 19, 1988**. The petition may be informal, but it must include a statement describing the petitioners interest in the application, the reasons for the petitioner's opposition to or support of the application, and the signature and mailing address of the petitioner or his legal counsel if legal counsel is obtained. The applicant need not file a petition.

This application is made pursuant to the provisions of SDCL 46-1-1 thru 46-1-9, 46-1-12 thru 46-1-15; 46-2-3.1, 46-2-9, 46-2-11, 46-2-13, 46-2-17; 46-2A-1 thru 46-2A-10, 46-2A-12, 46-2A-14, 46-2A-15; 46-5-1 thru 46-5-11, 46-5-13 thru 46-5-15, 46-5-24, 46-5-25, 46-5-30.2 46-5-30.4, 46-5-31; ~~(ground)~~ 46-6-3, 46-6-3.1, 46-6-6.1, 46-6-10, 46-6-13, 46-6-14; ~~(future use) 46-5-38 thru 46-5-40; (transfer lands) 46-5-30.4, 46-5-33 thru 46-5-35; (10,000 AFA) 46-5-20.1, 46-5-8.1;~~ and Board Rules ARSD 74:02:01:01 thru 74:02:01:15 ~~(future use) 74:02:01:24 thru 74:02:01:25; (10,000 AFA) 74:02:01:15:02 thru 74:02:01:15:05.~~

This hearing is an adversary proceeding. The applicant or any person, after filing a petition, has the right to be present or to be represented by a lawyer. These and other due process rights will be forfeited if they are not exercised. Decisions of the Board may be appealed to the Circuit Court and the State Supreme Court as provided by law.

Any person wishing a copy of the Chief Engineer's recommendation, further information on this application or to assure access to the hearing by the handicapped can contact the Water Rights Division, DWNR, Joe Foss Bldg, Pierre SD (605 773-3352) for assistance prior to the hearing date. The time of the hearing will be automatically extended for at least twenty days upon written request of the applicant or any person who has filed a petition to oppose or support the application. The request for extension must be filed with the Chief Engineer by **February 19, 1988**.

Form 8 - Proof of Publication - Notice of Intent to Appropriate Water

No. 5167-3

PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA)
) ss.
County Brookings)

I, Rob James hereby certify that the annexed printed copy of Notice of Intent to Appropriate Water was taken from the Brookings Daily REgister

A newspaper which during the whole time of publication of said notice herein after stated, has been and is printed and published in the

City of Brookings County of Brookings and State of South Dakota; that the said notice was published in said newspaper on the following two dates:

February 3, 1988

February 10, 1988

(Signature)

Publisher
(Title)

2/12/88
(Date Signed)

FEB 1988 DIVISION OF WATER RIGHTS Pierre, SD

Cost of Printing: $39.10

Legal 47, 2x, Feb 3, 10

NOTICE OF HEARING on Application No. 5167-3 to Appropriate Water

Notice is hereby given that the City of Volga whose mailing address is 202 Kasan Avenue, Volga, South Dakota has made an application for a permit to appropriate 0.45 cubic feet of water per second from one well (Big Sioux - Brookings Aquifer) 30 feet deep to be located in the NW1/4 SW1/4 Section 22-T110N-R51W. Water is to be used for municipal purposes by the City of Volga.

Pursuant to SDCL 46-2A-2 the Chief Engineer of the Water Rights Division recommends APPROVAL of Application No. 5167-3 because 1) unappropriated water is available, 2) will be no unlawful impairment of existing rights, 3) is beneficial use of water and 4) is in the public interest.

This application will be considered by the Water Management Board at room 216, Joe Foss Building, 523 E. Capitol, Pierre, South Dakota, March 2, 1988 at 10:00 a.m. The recommendation of the Chief Engineer is not final or binding upon the Board and the Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny this application after it reaches a conclusion based upon facts presented at the public hearing. Any interested person who may be affected by a Board decision and who intends to participate in the hearing before the Board and present evidence or cross-examine witnesses according to SDCL 1-26, must file a written petition with BOTH the applicant and the Chief Engineer by February 19, 1988. The petition may be informal, but it must include a statement describing the petitioners interest in the application, the reasons for the petitioner's opposition to or support of the application, and the signature and mailing address of the petitioner or his legal counsel if legal counsel is obtained. The applicant need not file a petition.

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This hearing is an adversary proceeding. The applicant or any person, after filing a petition, has the right to be present or to be represented by a lawyer. These and other due process rights will be

WNR-808-7/79
Proof of Publication

BANNER

April 13, 1988

South Dakota Department of Water
and Natural Resources
Joe Foss Building
Pierre, S.D. 57501

Attn: Ray Birchem

RE: Well Field Expansion
City of Volga, S.D.
BAI No. 7309-01

Dear Mr. Birchem:

Transmitted herewith are three (3) copies of plans and specifications for the well field expansion project at Volga, S.D. The project consists of the addition of one well, 400 feet of water line to connect to the transmission line, controls and electrical work for the new well, and miscellaneous inspection and repair work on the existing wells. The City has applied for and received permission for construction from Water Rights.

Please note that the City has established a bid opening date of May 2, 1988 and will begin advertising the project on April 14, 1988. By copy of this letter we are forwarding a copy of the Plans and Specifications to the Water Rights Division of SDDWNR.

The need for additional well field capacity for the City of Volga is urgent and a timely review of the enclosed documents is respectfully requested. If you have any questions please call Fred Rittershaus or me at 692-6342.

Sincerely,

David Odens

David Odens, P.E.

DO/db
Enclosure
cc: Steve Meyer, City of Volga
John Hatch, Water Rights, DWNR

BANNER ASSOCIATES, INC.
CONSULTING ENGINEERS & ARCHITECTS
409 22ND AVENUE SOUTH • P.O. BOX 298
BROOKINGS, SD 57006-0298 • (605) 692-6342

APR 1988
DIVISION OF
WATER RIGHTS
Pierre, SD

SPECIFICATIONS
FOR
WATER SUPPLY WELL NO. 7
CITY OF VOLGA, SOUTH DAKOTA

Prepared For
CITY COUNCIL
VOLGA, SOUTH DAKOTA

Prepared By
BANNER ASSOCIATES, INC.
Consulting Engineers
Brookings, South Dakota

APRIL, 1988

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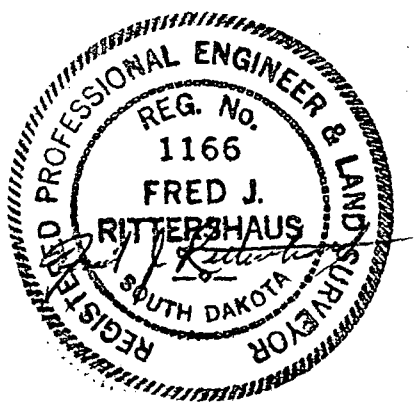

APRIL, 1988

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ADVERTISEMENT FOR BIDS

Notice is hereby given that the City Council of the City of Volga, South Dakota will receive sealed competitive bids for Water Supply Well No. 7. The project consists of the following major items of work:

> Construct one permanent 12" well including test hole, well hole, 12" steel casing, 12" P.S. well screen, pressure grout, well development, production pump test, casing alignment test, installation of submersible pump, 4" pump column with check valve, pitless adaptor, 3/4" drawdown line, 1 meter manhole, 4" mainline meter, 400' - 6" watermain, 20' - 4" watermain, valves, fittings, specials and incidentals, electrical transformers, control panel and wiring, and pump inspection.

The Bids must be prepared on bid forms supplied in the Bidding Documents and filed with the Municipal Finance Officer at the Volga City Hall, 202 Kasan Ave.Volga, South Dakota, 57071, not later than 8:00 P.M. local time, May 2, 1988, at which time and place all Bids will be publicly opened and read aloud in the presence of the Bidders and their representatives. No bids will be received after the specified hour and date, and Bids which are not prepared and filed in accordance with "Instructions to Bidders" may be rejected.

All Bids must be accompanied either by a certified check, cashier's check or bank draft payable to City of Volga, S.D. in the amount of five percent (5%) of the total sum of the Bid, drawn on a State or National Bank, or by a Bid Bond in an amount of ten percent (10%) of the total Bid issued by a Surety authorized to do business in the State of South Dakota, said bond to be made payable to City of Volga, S.D. The check or bond will be retained by the Owner as liquidated damages if the successful Bidder refuses or fails to enter into a contract, performance bond and payment bond in accordance with the Bid when notified of the award.

The proposed Construction Contract together with the Plans and Specifications for the construction work may be seen at the office of the Volga Municipal Finance Officer, 202 Kasan Ave., Volga, South Dakota, 57071, or at the office of Banner Associates, Inc., Consulting Engineers, 409 22nd Avenue South, P.O. Box 298, Brookings, South Dakota 57006, and may be obtained at the latter by depositing the sum of Thirty Dollars ($30.00) for each set. This deposit will be refunded upon return of the Documents in good condition within ten (10) days after Bid opening.

Payment for all work shall be in cash based on monthly estimates.

Bids may not be withdrawn after the time fixed for opening them. The Owner reserves the right to waive irregularities and reject any and all Bids.

BY ORDER OF THE CITY COUNCIL, CITY OF VOLGA, SOUTH DAKOTA.

BY _____
Marcia Thompson, Finance Officer

INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS.

Terms used in these Instructions to Bidders which are defined in the Standard General Conditions of the Construction Contract have the meanings assigned to them in the General Conditions. The term "Bidder" means one who submits a Bid directly to Owner, as distinct from a sub-bidder, who submits a bid to a Bidder. The term "Successful Bidder" means the lowest, qualified, responsible and responsive Bidder to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award. The term "Bidding Documents" includes the Advertisement or Invitation to Bid, Instructions to Bidders, the Bid Form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

2. COPIES OF BIDDING DOCUMENTS.

2.1. Complete sets of the Bidding Documents in the number and for the deposit sum, if any, stated in the Advertisement or Invitation to Bid may be obtained from Engineer (unless another issuing office is designated in the Advertisement or Invitation to bid). The deposit will be refunded in accordance with conditions stated in the Advertisement or Invitation to Bid.

2.2. Complete sets of Bidding Documents must be used in preparing Bids; neither Owner nor Engineer assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.3. Owner and Engineer in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

3. QUALIFICATIONS OF BIDDERS.

To demonstrate qualifications to perform the Work, each Bidder must be prepared to submit within five days of Owner's request written evidence, such as financial data, previous experience and present commitments. Each Bid must contain evidence of Bidder's qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the contract.

4. EXAMINATION OF CONTRACT DOCUMENTS AND SITE.

4.1. It is the responsibility of each Bidder before submitting a Bid, to (a) examine the Contract Documents thoroughly, (b) visit the site to become familiar with local conditions that may affect cost, progress, performance or furnishing of the Work, (c) consider federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work, (d) study and carefully correlate Bidder's observations with the Contract Documents, and (e) notify Engineer of all conflicts, errors or discrepancies in the Contract Documents.

4.2. Reference is made to the Supplementary Conditions for identification of:

4.2.1. Those reports of explorations and tests of subsurface conditions at the site which have been utilized by Engineer in preparation of the Contract Documents. Bidder may rely upon the accuracy of the technical data contained in such reports but not upon non-technical data, interpretations or opinions contained therein or for the completeness thereof for the purposes of bidding or construction.

4.2.2. Those drawings of physical conditions in or relating to existing surface and subsurface conditions (exept Underground Facilities) which are at or contiguous to the site which have been utilized by Engineer in preparation of the Contract Documents. Bidder may rely upon the accuracy of the technical data contained in such drawings but not upon the completeness thereof for the purposes of bidding or construction.

Copies of such reports and drawings will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the technical data contained therein upon which Bidder is entitled to rely as provided in Paragraphs 4.2.1 and 4.2.2 are incorporated therein by reference. Such technical data has been identified and established in the Supplementary Conditions.

4.3. Information and data reflected in the Contract Documents with respect to Underground Facilities at or contiguous to the site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities or others, and Owner does not assume responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in the Supplementary Conditions.

4.4. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders on subsurface conditions, Underground Facilities and other physical conditions, and possible changes in the Contract Documents due to differing conditions appear in Paragraphs 4.2 and 4.3 of the General Conditions.

4.5. Before submitting a Bid, each Bidder will, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance or furnishing of the Work and which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

4.6. On request in advance, Owner will provide each Bidder access to the site to conduct such explorations and tests as each Bidder deems necessary for submission of a Bid. Bidder shall fill all holes, clean up and restore the site to its former condition upon completion of such explorations.

4.7. The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by Contractor in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by Contractor. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by Owner unless otherwise provided in the Contract Documents.

4.8. The submission of Bid will constitute an incontroverible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and such means, methods, techniques, sequences or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

5. INTERPRETATIONS AND ADDENDA.

5.1. All questions about the meaning or intent of the Contract Documents are to be directed to Engineer. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Bidding Documents. Questions received less than ten days prior to date for opening of Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

5.2. Addenda may also be issued to modify the Bidding Documents as deemed advisable by Owner or Engineer.

6. BID SECURITY.

6.1. All Bids must be accompanied either by a certified check, cashier's check, or bank draft payable to the Owner, in the amount of five percent (5%) of the total sum of the Bid, said check to be drawn on a State or National Bank, or by Bid Bond in an amount of ten percent (10%) of the total sum of the Bid, issued by a Surety meeting the requirements of Paragraph 5.1 of the General Conditions.

6.2. The Bid Security of the Successful Bidder will be retained until such Bidder has executed the Agreement and furnished the required Contract Security, whereupon it will be returned. If the successful Bidder fails to execute and deliver the Agreement and furnish the required Contract Security within 15 days after the Notice of Award, Owner may annul the Notice of Award and the Bid Security of that Bidder will be forfeited. The Bid Security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of the seventh day after the "effective date of the Agreement" of the forty-sixth day after the Bid opening, whereupon Bid Security furnished by such Bidders will be returned. Bid Security, with bids which are not competitive will be returned within seven days after the Bid opening.

7. CONTRACT TIME.

The number of days within which, or the dates by which, the Work is to be substantially completed and also completed and ready for final payment (the Contract Time) are set forth in the Bid Form and will be included in the Agreement.

8. LIQUIDATED DAMAGES.

Provisions for liquidated damages, if any, are set forth in the Agreement.

9. SUBSTITUTE OR "OR-EQUAL" ITEMS.

The Contract, if awarded, will be on the basis of materials and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute or "or equal" items. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the "effective date of the Agreement". The procedure for submittal for any such application by Contractor and consideration by Engineer is set forth in paragraphs 6.7.1, 6.7.2 and 6.7.3 of the General Conditions which may be supplemented in the General Requirements.

10. SUBCONTRACTORS, SUPPLIERS AND OTHERS.

10.1. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers and other persons and organizations to be submitted to Owner in advance of the specified date prior to the "effective date of the Agreement", the apparent Successful Bidder, and any other Bidder so requested, shall within seven days after the day of the Bid opening submit to Owner a list of all such Subcontractors, Suppliers and other persons and organizations (including those who are to furnish the principal items of material and equipment) proposed for those portions of the Work for which such indentification is so required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, person and organization if requested by Owner. If Owner or Engineer after due investigation has reasonable objection to any proposed Subcontractor, Supplier, person or organization, either may before the Notice of Award is given request the apparent Successful Bidder to submit an acceptable substitute without an increase in Bid price. If the apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposed to use acceptable Subcontractors, Suppliers and other persons and organizations.

The declining to make requested substitutions will not constitute grounds for sacrificing the Bid Security of any Bidder. Any Subcontractor, Supplier, other person or organization listed and to whom Owner or Engineer does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the "effective date of the Agreement" as provided in Paragraph 6.8.2 of the General Conditions.

10.2. In contracts where the Contract Price is on the basis of Cost-of-the-Work Plus a Fee, the apparent Successful Bidder, prior to the Notice of Award, shall identify in writing to Owner those portions of the Work that such Bidder proposes to subcontract and after the Notice of Award may only subcontract other portions of the Work with Owner's written consent.

10.3. No Contractor shall be required to employ any Subcontractor, supplier, other person or organization against whom Contractor has reasonable objection.

11. BID FORM.

11.1. The Bid Form is attached hereto; additional copies may be obtained from Engineer.

11.2. Bid Forms must be completed in ink or by typewriter. The Bid price of each item on the form must be stated in words and numerals, in case of a conflict, words will take precedence.

11.3. Bids by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.

11.4. Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.

11.5. All names must be typed or printed below the signature.

11.6 The Bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).

11.7. The address and telephone number for communications regarding the Bid must be shown.

12. SUBMISSION OF BIDS.

Bids shall be submitted at the time and place indicated in the Advertisement or Invitation to Bid and shall be included in an opaque sealed envelope, marked with the Project title (and if applicable, the designated portion of the Project for which the Bid is submitted) the Bid Security and other required documents. If the Bid is sent through the mail or other delivery system the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED' on the face thereof.

13. MODIFICATION AND WITHDRAWAL OF BIDS.

13.1. Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

13.2 If, within twenty-four hours after Bids are opened, any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of his Bid, that Bidder may withdraw his Bid and the Bid Security will be returned. Thereafter, that Bidder will be disqualified from further bidding on the Work to be provided under the Contract Documents.

14. OPENING OF BIDS.

Bids will be opened and (unless obviously non-responsive) read aloud publicly. An abstract of the amounts of the base Bids and major alternates (if any) will be made available to Bidders after the opening of Bids.

15. BIDS TO REMAIN SUBJECT TO ACCEPTANCE.

All Bids shall remain subject to acceptance for thirty days after the day of the Bid opening, but Owner may, in his sole discretion, release any Bid and return the Bid Security prior to that date.

16. AWARD OF CONTRACT.

16.1. Owner reserves the right to reject any and all Bids, to waive any and all informalities not involving price, time or changes in the Work and to negotiate Contract terms with the Successful Bidder, and the right to disregard all nonconforming, nonresponsive, unbalanced or conditional Bids. Also, Owner reserves the right to reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubful financial ability or fails to meet any other pertinent standard or criteria established by Owner. Discrepancies in the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

16.2. In evaluating Bids, Owner will consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

16.3. Owner may consider the qualifications and experience of Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work as to which the identity of Subcontractors, Suppliers, and other persons and organizations must be submitted as provided in the Supplementary Conditions. Owner also may consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

16.4. Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of Bidders, proposed Subcontractors, Suppliers and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.

16.5. If the contract is to be awarded, it will be awarded to the lowest Bidder whose evaluation by Owner indicates to Owner that the award will be in the best interests of the Project. The combined low total for all Schedules will be used to determine the low Bid on these Schedules.

16.6. If the contract is to be awarded, Owner will give the Successful Bidder a Notice of Award within thirty days after the day of the Bid opening.

17. CONTRACT SECURITY.

Paragraph 5.1 of the General Conditions and the Supplementary Conditions set forth Owner's requirements as to Performance and Payment Bonds. When the Successful Bidder delivers the executed Agreement to Owner it must be accompanied by the required Performance and Payment Bonds.

18. SIGNING OF AGREEMENT.

When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with all other written Contract Documents attached. Within fifteen days thereafter Contractor shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner with the required Bonds. Within ten days thereafter Owner will deliver one fully signed counterpart to Contractor. Each counterpart is to be accompanied by a complete set of the Drawings with appropriate identification.

B I D

PROJECT IDENTIFICATION: WATER SUPPLY WELL NO. 7
CITY OF VOLGA, S.D.

THIS BID SUBMITTED TO: The City of Volga, S.D.

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. BIDDER accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for thirty days after the day of Bid opening. BIDDER will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within fifteen days after the date of OWNER's Notice of Award.

3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

(a) BIDDER has examined copies of all the Bidding Documents and of the following Addenda (receipt of all which is hereby acknowledged):

DATE	NUMBER

(b) BIDDER has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

(c) BIDDER has studied carefully all reports and drawings of subsurface conditions and drawings of physical conditions which are identified in the Supplementary Conditions as provided in paragraph 4.2 of the General Conditions, and accepts the determination

set forth in paragraph SC-4.2 of the Supplementary Conditions of the extent of the technical data contained in such reports and drawings upon which BIDDER is entitled to rely.

(d) BIDDER has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests and studies (in addition to or to supplement those referred to in (c) above) which pertain to the subsurface or physical conditions at the site or otherwise may affect the cost, progress, performance or furnishing of the Work as BIDDER considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of paragraph 4.2 of the General Conditions; and no additional examinations, investigations, explorations, tests, reports or similar information or data are or will be required by BIDDER for such purposes.

(e) BIDDER has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by BIDDER in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of paragraph 4.3 of the General Conditions.

(f) BIDDER has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.

(g) BIDDER has given ENGINEER written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to BIDDER.

(h) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

(i) The prices bid herein include sales tax and all other applicable taxes and fees.

Bidder must bid all Schedules, and all Schedules must be bid complete. If the BID under any Schedule is to be awarded, it will be awarded to the low, responsive, responsible Bidder for the combined low total for all Schedules, whose evaluation by the OWNER indicates to the OWNER that the award will be in the best interests of the Project.

BIDS shall include sales tax and all other applicable taxes and fees.

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices or lump sum:

BID SCHEDULES

The Bidder must bid every item called for.

SCHEDULE NO. 1: WATER SUPPLY WELL NO. 7, ELECTRICAL SERVICE AND CONTROLS

Item No.	Spec. Ref. No.	Description of Work and Materials	Quantity & Unit Price Written in Words (Ink Only)	Total Cost
1.	3.18A	Mobilization and Demobilization	For the Lump Sum of ___ _____ _____	$_____
2.	3.18B	Test Holes	49 L.F. @ _____ _____ _____($_____/L.F.	$_____
3.	3.18C	Drilling Permanent Well Hole	48 L.F. @ _____ _____ _____($_____/L.F.	$_____
4.	3.18D	Furnish and Install 12-inch O.D. Casing	40 L.F. @ _____ _____ _____($_____/L.F.	$_____

Item No.	Spec. Ref. No.	Description of Work and Materials	Quantity & Unit Price Written in Words (Ink Only)	Total Cost
5.	3.18E	Furnish and Install 12-inch PS Well Screen	10 L.F. @ _____ _____ _____($_____/L.F.	$_____
6.	3.18F	Selected Silica Gravel Pack	36 L.F. @ _____ _____ _____($_____/L.F.	$_____
7.	3.18G	Clay Plug Seal	1 L.F. @ _____ _____ _____($_____/L.F.	$_____
8.	3.18H	Concrete Grout Seal	11 L.F. @ _____ _____ _____($_____/L.F.	$_____
9.	3.18I	Development of Permanent Well	12 Hrs. @ _____ _____ _____($_____/Hr.	$_____
10.	3.18J	Production Pumping Test	24 Hrs. @ _____ _____ _____($_____/Hr.	$_____
11.	3.18K	Furnish and Install 12" O.D. Pitless Adaptor Unit and Valves in Valve Pit. Manufactured By: _____	1 Ea. @ _____ _____ _____($_____/Ea.	$_____

Item No.	Spec. Ref. No.	Description of Work and Materials	Quantity & Unit Price Written in Words (Ink Only)	Total Cost
12.	3.18M	Site Restoration and Finish Grading	For the Lump Sum of ___ _____ _____	$_____
13.	3.18N	Furnish and Install Valve and Meter Pit	1 Ea. @ _____ _____ _____($_____/Ea.	$_____
14.	5.07a	Furnish and Install Submersible Turbine Pump, 180 GPM, in Well No. 7 Manufactured By: _____	1 Ea. @ _____ _____ _____($_____)/Ea.	$_____
15.	6.07b	Electrical and Control Work (To include complete Power and Control Systems and all Connections)	For the Lump Sum of ___ _____ _____	$_____
16.	7.04	Chlorination Equipment (Includes Furnishing and Installing New Tubes & V-Notch Plugs, etc.)	For the Lump Sum of ___ _____ _____	$_____
		TOTAL FOR SCHEDULE NO. 1	$_____	

SCHEDULE NO. 2: WATER TRANSMISSION LINE AND FITTINGS

Item No.	Spec. Ref. No.	Description of Work and Materials	Quantity & Unit Price Written in Words (Ink Only)	Total Cost
1.	4.09a	6" Water Main Pipe CL 150 PVC	400 L.F. @ _____ _____ _____($_____)/L.F.	$_____

Item No.	Spec. Ref. No.	Description of Work and Materials	Quantity & Unit Price Written in Words (Ink Only)	Total Cost
2.	4.09c	10" X 6" Concentric Reducer Ductile Iron	1 Ea. @ _____ _____ _____($_____)/Ea. $_____	
3.	4.09c	6" x 6" x 6" Tee Ductile Iron	1 Ea. @ _____ _____ _____($_____)/Ea. $_____	
4.	4.09c	6" MJ Plug Ductile Iron	1 Ea. @ _____ _____ _____($_____)/Ea. $_____	
5.	4.09d	Concrete for Cradles	1 C.Y. @ _____ _____ _____($_____)/C.Y. $_____	
6.	2.11b	Granular Embedment	50 Tons @ _____ _____ _____($_____)/Ton $_____	
		TOTAL FOR SCHEDULE NO. 2	$_____	

SCHEDULE NO. 3 GATE VALVE ADDITION

Item No.	Spec. Ref. No.	Description of Work and Materials	Quantity & Unit Price Written in Words (Ink Only)	Total Cost
1.	4.09b	10" Gate Valve & Box	1 Ea. @ _____ _____ _____($_____)/Ea. $_____	

Item No.	Spec. Ref. No.	Description of Work and Materials	Quantity & Unit Price Written in Words (Ink Only)	Total Cost
2.	4.09c	10" Steel Sleeve (For Cutting In & Installing 10" Gate Valve in Existing 10" A.C. Line)	2 Ea. @ _____ _____ _____($_____)/Ea. $_____	
		TOTAL FOR SCHEDULE NO. 3	$_____	

SCHEDULE NO. 4 - REMOVAL, INSPECTION AND REPLACEMENT OF EXISTING WELL PUMPS

Item No.	Spec. Ref. No.	Description of Work and Materials	Quantity & Unit Price Written in Words (Ink Only)	Total Cost
1.	5.07b	Pump Removal, Inspection and Replacement (Existing Wells No's 5 & 6)	2 Ea. @ _____ _____ _____($_____)/Ea. $_____	
		TOTAL FOR SCHEDULE NO. 4	$_____	
		TOTAL SCHEDULES NO. 1, 2, 3, AND 4	$_____	

5. BIDDER agrees that the Work will be substantially complete on or before October 17, 1988 and completed and ready for final payment in accordance with paragraph 14.13 of the General Conditions on or before October 31, 1988.

BIDDER accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work on time.

6. The following documents are attached to and made a condition of this Bid:

(a) Required Bid Security in the form of _____.

7. Communications concerning this Bid shall be addressed to:

The address of BIDDER indicated below.

The following address:

8. The terms used in this Bid which are defined in the General Conditions of the Construction Contract included as part of the Contract Documents have the meanings assigned to them in the General Conditions.

SUBMITTED on _____, 19_____.

if BIDDER is:

An Individual

By _____ (SEAL)
(Individual's Name)

doing business as _____

Business address: _____

_____

Phone No.: _____

A Partnership

By _____ (SEAL)
(Firm Name)

_____
(general partner)

Business address: _____

_____

Phone No.: _____

A Corporation

By _____
(Corporation Name)

_____
(state of incorporation)

By _____
(name of person authorized to sign)

_____
(Title)

(Corporate Seal)

Attest _____
(Secretary)

Business address: _____

_____

Phone No.: _____

A Joint Venture

By _____
(Name)

_____
(Address)

By _____
(Name)

_____
(Address)

(Each joint venturer must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above).

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____

_____ as Principal, and

_____ as Surety, are hereby

held and firmly bound unto _____ as

OWNER in the penal sum of _____

for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____, 19_____.

The Condition of the above obligation is such that whereas the Principal has submitted to _____ a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the _____

_____

_____

NOW, THEREFORE,

(a) If said BID shall be rejected, or

(b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID,

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____(L.S.)
Principal

_____
Surety

By:_____

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

VOLGA WATER SUPPLY WELL NO. 7

AGREEMENT

THIS AGREEMENT is dated as of the _____ day of _____, 19___, by and between _____ (hereinafter called OWNER) and _____. _____ (hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE I. WORK.

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

WATER SUPPLY WELL NO. 7
CITY OF VOLGA, S.D.

ARTICLE 2. ENGINEER

The Project has been designed by Banner Associates, Inc., 409 22nd Ave. South, Brookings, South Dakota, 57006 (Telephone No. (605)692-6342, who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

ARTICLE 3. CONTRACT TIME

3.1. The Work will be substantially completed on or before _____, 19____, and completed and ready for final payment in accordance with paragraph 14.13 of the General Conditions on or before _____, 19____.

3.2. Liquidated Damages. OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not complete within the times specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the work is not completed on time. Accordingly, instead of requiring

any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER Three Hundred Dollars Dollars ($300.00) for each day that expires after the time specified in paragraph 3.1 for Substantial Completion until the Work is substantially complete. After Substantial Completion if CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER One Hundred Dollars ($100.00) for each day that expires after the time specified in paragraph 3.1 for completion and readiness for final payment.

ARTICLE 4. CONTRACT PRICE

4.1. OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents in current funds as follows:

Completed and accepted work at Unit Prices in accordance with CONTRACTOR'S BID.

Total of Unit Prices _____ ($_____)

ARTICLE 5. PAYMENT PROCEDURES

Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

5.1. Progress Payments. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as recommended by ENGINEER, on or about the fifteenth (15th) day of each month during construction as provided below. All progress payments will be on the basis of the progress of the Work measured by the schedule of values established for in paragraph 2.9 of the General Conditions (and in the case of Unit Price Work based on the number of Units completed) or, in the event there is no schedule, as provided in the General Requirements.

5.1.1. Prior to Substantial Completion progress payments will be in an amount equal to: 90% of the Work completed, and 90% of materials and equipment not incorporated in the Work but delivered and suitably stored, less in each case the aggregate of payments previously made.

5.1.2. Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 95% of the Contract Price, less such amounts as ENGINEER shall determine, or OWNER may withhold, in accordance with paragraph 14.7 of the General Conditions.

5.2. Final Payment. Upon final completion and acceptance of the Work in accordance with paragraph 14.13 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 14.13.

ARTICLE 6. INTEREST

All monies not paid when due as provided in Article 14 of the General Conditions shall bear interest at the maximum rate allowed by law at the place of the Project.

ARTICLE 7. CONTRACTOR'S REPRESENTATIONS

In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

7.1. CONTRACTOR has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

7.2. CONTRACTOR has studied carefully all reports of explorations and tests of subsurface conditions and drawings of physical conditions which are identified in the Supplementary Conditions as provided in paragraph 4.2 of the General Conditions, and accepts the determination set forth in paragraph SC-4.2 of the Supplementary Conditions of the extent of the technical data contained in such reports and drawings upon which CONTRACTOR is entitled to reply.

7.3. CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies (in addition to or to supplement those referred to in paragraph 7.2 above) which pertain to the subsurface or physical conditions at or contiguous to the site or otherwise may affect the cost, progress, performance or furnishing of the Work as CONTRACTOR considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documemts, including specifically the provisions of paragraph 4.2 of the General Conditions; and no additional examinations, investigations, explorations, tests, reports, studies or similar information or data are or will be required by CONTRACTOR for such purposes.

7.4. CONTRACTOR has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect of said Underground Facilities are or will be required by CONTRACTOR in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of paragraph 4.3 of the General Conditions.

7.5. CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.

7.6. CONTRACTOR has given ENGINEER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

ARTICLE 8. CONTRACT DOCUMENTS

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work consist of the following:

8.1. This Agreement (Pages A-1 to A-7, inclusive).

8.2. Exhibits to this Agreement (pages _____ to _____, inclusive).

8.3. Performance and other Bonds, identified as exhibits _____ and consisting of _____ pages.

8.4. Notice of Award.

8.5. General Conditions (pages 1 to 33, inclusive).

8.6. Supplementary Conditions (pages _____ to _____, inclusive).

8.7. Specifications bearing the title Water Supply Well No. 7 dated April, 1988 and consisting of _____ divisions and _____ pages, as listed in table of contents thereof.

8.8. Drawings, consisting of a sheet numbered 1, bearing the following general title:

PLAN & PROFILE, WATER TRANSMISSION LINE,
CITY OF VOLGA, SOUTH DAKOTA, dated APRIL 1988

8.9. Addenda numbers _____ to _____, inclusive.

8.10. CONTRACTOR's Bid (pages _____ to _____, inclusive) marked exhibit _____.

8.11. Documentation submitted by CONTRACTOR prior to Notice of Award (pages _____ to _____, inclusive).

8.12. The following which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto: All Written Amendments and other documents amending, modifying, or supplementing the Contract Documents pursuant to paragraphs 3.4 and 3.5 of the General Conditions.

8.13. The documents listed in paragraphs 8.2 et seq. above are attached to this Agreement (except as expressly noted otherwise above).

There are no Contract Documents other than those listed above in this Article 8. The Contract Documents may only be amended, modified or supplemented as provided in paragraphs 3.4 and 3.5 of the General Conditions.

ARTICLE 9. MISCELLANEOUS

9.1. Terms used in this Agreement which are defined in Article 1 of the General Conditions will have the meanings indicated in the General Conditions.

9.2. No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

9.3. OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

ARTICLE 10. OTHER PROVISIONS

(This Article intentionally left blank)

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in triplicate. One counterpart each has been delivered to OWNER, CONTRACTOR and ENGINEER. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or by ENGINEER on their behalf.

This Agreement will be effective on _____, 19_____.

OWNER _____

By _____

Name _____
(Typed or Printed)

Title _____

(CORPORATE SEAL)

Attest _____

Name _____
(Typed or Printed)

Title _____

Address for giving notices

_____

_____

CONTRACTOR _____

By _____

Name _____
(Typed or Printed)

Title _____

(CORPORATE SEAL)

Attest _____

Name _____
(Typed or Printed)

Address for giving notices

_____

_____

License No. _____

INSTRUCTIONS FOR EXECUTING CONTRACT

If the Contractor be a corporation, the following certificate shall be executed:

I, _____, certify that I am the Secretary of the Corporation named as Contractor hereinabove; that

_____,

who signed the foregoing contract on behalf of the Contractor was then

_____ of said Corporation; that said contract was duly signed for and in behalf of said Corporation by authority of its governing body, and is within the scope of its corporate powers.

(CORPORATE SEAL) (Sign)_____
Secretary

If the contract be signed by the Secretary of the Corporation, the above certificate shall be executed by some other officers of the corporation, under the corporate seal. In lieu of the foregoing certificate there may be attached to the contract copies of so much of the records of the corporation as will show the official character and authority of the officers signing, duly certified by the Secretary or Assistant Secretary under the corporate seal to be true copies.

Any corporation doing business in the State of South Dakota must first file and receive such authorization from the secretary of State of South Dakota as required by law, Chapters 47-2 and 47-8 of the South Dakota Compiled Laws of 1967, as amended.

The full name and business address of the contractors shall be inserted and the contract shall be signed with his official signature. Please have the name of the signing party or parties typewritten or printed under all signatures to the contract.

If the Contractor should be operating as a partnership, each partner shall sign the contract. If the contract be not signed by each partner there shall be attached to the contract a duly authenticated power of attorney evidencing the signer's (signers') authority to sign such contract for and in behalf of the partnership.

If the Contractor be an individual, the trade name (if the Contractor be operating under a trade name) shall be indicated in the contract and the contract shall be signed by such individual. If signed by one other than the contractor there shall be attached to the contract a duly authenticated power of attorney evidencing the signer's authority to execute such contract for and in behalf of the contractor.

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called Principal,
(Corporation, Partnership or Individual

and _____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto _____

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called OWNER, in the penal sum of _____

_____ Dollars, $(_____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 19____, a copy of which is hereto attached and made a part hereof for the construction of:

_____

_____

_____

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTORS or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time alteration or addition to the terms of the contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

And the further condition of this BOND is that in the event said Principal shall fail to pay all just claims and demands on the part of any employee, persons, firms or corporations for labor and materials furnished for or used in connection with the prosecution of the work under said Contract, or pay all taxes which may accrue to the State of South Dakota under the Provisions of the "Use Tax Act of 1939 and The Excise Tax on Realty Improvements under SDCL 10-46A", and Sections 5-21-3 and 5-21-4 of the South Dakota Compiled Laws of 1967, as amended, then this BOND and the sureties thereon shall be responsible to such persons, firms or corporations, and the _____ for the full payment of the full value of such labor and materials so furnished including the payment of South Dakota Use Tax and the Excise Tax on realty improvements.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of which shall be deemed an original, this the _____ day of _____, 19____.

ATTEST:

_____
(Principal) Secretary

(SEAL)

_____
(Witness as to Principal)

_____
(Address)

_____

_____
Principal

By_____(s)

_____
Address

_____

_____
Surety

ATTEST:

By_____
Attorney-in-Fact

_____
(Surety Secretary)

_____
(Address)

(SEAL)

_____

_____
(Witness as to Surety)

_____
Address

_____

Countersigned By:_____
(South Dakota Resident Agent for Surety)

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is Partnership, all partners should execute bond.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____ hereinafter called Principal, and
(Corporation, Partnership or Individual)

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto _____

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called Owner, in the penal sum of _____

_____ Dollars, $(_____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 19___, a copy of which is hereto attached and made a part hereof for the construction of:

_____

_____

_____

_____

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to WORK to be performed thereunder or the

SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the Owner and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ (number) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 19___.

ATTEST:

_____
Principal

Principal_____ By_____(s)
(Principal Secretary)

(SEAL)

_____
Address

_____ _____
(Witness as to Principal)

_____
(Address)

_____ _____

ATTEST:

_____ _____
(Surety Secretary) (Surety)

(SEAL)

_____ By_____
(Witness as to Surety) Attorney-in-Fact

_____ _____
(Address) (Address)

_____ _____

Countersigned By:_____
(South Dakota Resident Agent of Surety)

NOTE: Date of BOND must not be prior to date of Contract
If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the PROJECT is located.

Form No. 8

NOTICE OF AWARD

TO: _____

_____

_____

_____

PROJECT Description: _____

_____

_____

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dated _____, 19____, and Information for Bidders.

You are hereby notified that your BID has been accepted for Items in the amount of $_____.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND, and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish the BONDS within ten (10) calendar days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____, 19____.

_____

(Owner)

By _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged by _____ this the _____ day of _____, 19____.

By _____

Title _____

NOTICE TO PROCEED

To: _____ Date: _____

_____

_____ Project: _____

_____

_____

You are hereby notified to commence WORK in accordance with the Agreement dated _____, 19____, on or before _____, 19____, and you are to complete the WORK within _____ consecutive calendar days thereafter. The date of completion of all WORK is therefore _____, 19____.

_____
Owner

By _____

Title _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by _____(Name), this the _____ day of _____, 19____.

By _____

Title _____

CHANGE ORDER

Order No. _____
Date _____
Agreement Date _____

NAME OF PROJECT _____

_____

OWNER _____

CONTRACTOR _____

The following changes are hereby made to the CONTRACT DOCUMENTS:

Justification:

Change to CONTRACT PRICE:

Original CONTRACT PRICE: $_____

Current CONTRACT PRICE adjusted by previous CHANGE ORDER $_____

The CONTRACT PRICE due to this CHANGE ORDER will be (Increased/decreased) by $_____

The new CONTRACT PRICE including this CHANGE ORDER will be $_____

Change to CONTRACT TIME _____

The CONTRACT TIME will be (increased/decreased) by _____ calendar days.

The date for completion of all work will be _____ (date).

Approvals Required:

To be effective, this Order must be approved by the Federal agency if it changes the scope or objective of the PROJECT, or as may otherwise be required by the SUPPLEMENTAL GENERAL CONDITIONS.

Requested by _____

Recommended by _____

Ordered by _____

Accepted by _____

Federal Agency Approval (where applicable) _____

STANDARD
GENERAL CONDITIONS
OF THE
CONSTRUCTION CONTRACT

Prepared by

Engineers' Joint Contract Documents Committee

and

Issued and Published Jointly By

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN CONSULTING ENGINEERS COUNCIL

AMERICAN SOCIETY OF CIVIL ENGINEERS

CONSTRUCTION SPECIFICATIONS INSTITUTE

This document has been approved and endorsed by

The Associated General Contractors of America

No. 1910-8 (1983 Edition)

©1983 National Society of Professional Engineers
2029 K Street, N.W., Washington, D.C. 20006

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1015 15th Street, N.W., Washington, D.C. 20005

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GENERAL CONDITIONS

ARTICLE 1—DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

Addenda—Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the bidding documents or the Contract Documents.

Agreement—The written agreement between OWNER and CONTRACTOR covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

Application for Payment—The form accepted by ENGINEER which is to be used by CONTRACTOR in requesting progress or final payments and which is to include such supporting documentation as is required by the Contract Documents.

Bid—The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

Bonds—Bid, performance and payment bonds and other instruments of security.

Change Order—A document recommended by ENGINEER, which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Time, issued on or after the Effective Date of the Agreement.

Contract Documents—The Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post-Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all amendments, modifications and supplements issued pursuant to paragraphs 3.4 and 3.5 on or after the Effective Date of the Agreement.

Contract Price—The moneys payable by OWNER to CONTRACTOR under the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.9.1 in the case of Unit Price Work).

Contract Time—The number of days (computed as provided in paragraph 17.2) or the date stated in the Agreement for the completion of the Work.

CONTRACTOR—The person, firm or corporation with whom OWNER has entered into the Agreement.

defective—An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, or does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER's recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.8 or 14.10).

Drawings—The drawings which show the character and scope of the Work to be performed and which have been prepared or approved by ENGINEER and are referred to in the Contract Documents.

Effective Date of the Agreement—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

ENGINEER—The person, firm or corporation named as such in the Agreement.

Field Order—A written order issued by ENGINEER which orders minor changes in the Work in accordance with paragraph 9.5 but which does not involve a change in the Contract Price or the Contract Time.

General Requirements—Sections of Division 1 of the Specifications.

Laws and Regulations; Laws or Regulations—Laws, rules, regulations, ordinances, codes and/or orders.

Notice of Award—The written notice by OWNER to the apparent successful bidder stating that upon compliance by the apparent successful bidder with the conditions precedent enumerated therein, within the time specified, OWNER will sign and deliver the Agreement.

Notice to Proceed—A written notice given by OWNER to CONTRACTOR (with a copy to ENGINEER) fixing the date on which the Contract Time will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR'S obligations under the Contract Documents.

OWNER—The public body or authority, corporation, association, firm or person with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be provided.

Partial Utilization—Placing a portion of the Work in service for the purpose for which it is intended (or a related purpose) before reaching Substantial Completion for all the Work.

Project—The total construction of which the Work to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.

Resident Project Representative—The authorized representative of ENGINEER who is assigned to the site or any part thereof.

Shop Drawings—All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for CONTRACTOR to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a Supplier and submitted by CONTRACTOR to illustrate material or equipment for some portion of the Work.

Specifications—Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

Subcontractor—An individual, firm or corporation having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the site.

Substantial Completion—The Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER as evidenced by ENGINEER's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended; or if there be no such certificate issued, when final payment is due in accordance with paragraph 14.13. The terms "substantially complete" and "substantially completed" as applied to any Work refer to Substantial Completion thereof.

Supplementary Conditions—The part of the Contract Documents which amends or supplements these General Conditions.

Supplier—A manufacturer, fabricator, supplier, distributor, materialman or vendor.

Underground Facilities—All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

Unit Price Work—Work to be paid for on the basis of unit prices.

Work—The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.

Work Directive Change—A written directive to CONTRACTOR, issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed as provided in paragraph 4.2 or 4.3 or to emergencies under paragraph 6.22. A Work Directive Change may not change the Contract Price or the Contract Time, but is evidence that the parties expect that the change directed or documented by a Work Directive Change will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Time as provided in paragraph 10.2.

Written Amendment—A written amendment of the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly Work-related aspects of the Contract Documents.

ARTICLE 2—PRELIMINARY MATTERS

Delivery of Bonds:

2.1. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish in accordance with paragraph 5.1.

Copies of Documents:

2.2. OWNER shall furnish to CONTRACTOR up to ten copies (unless otherwise specified in the Supplementary Conditions) of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.

Commencement of Contract Time; Notice to Proceed:

2.3. The Contract Time will commence to run on the thirtieth day after the Effective Date of the Agreement, or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within thirty days after the Effective Date of the Agreement. In no event will the Contract Time commence to run later than the seventy-fifth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

Starting the Project:

2.4. CONTRACTOR shall start to perform the Work on the date when the Contract Time commences to run, but no Work shall be done at the site prior to the date on which the Contract Time commences to run.

Before Starting Construction:

2.5. Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown

thereon and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error or discrepancy in the Contract Documents, unless CONTRACTOR had actual knowledge thereof or should reasonably have known thereof.

2.6. Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for review:

2.6.1. an estimated progress schedule indicating the starting and completion dates of the various stages of the Work;

2.6.2. a preliminary schedule of Shop Drawing submissions; and

2.6.3. a preliminary schedule of values for all of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work which will be confirmed in writing by CONTRACTOR at the time of submission.

2.7. Before any Work at the site is started, CONTRACTOR shall deliver to OWNER, with a copy to ENGINEER, certificates (and other evidence of insurance requested by OWNER) which CONTRACTOR is required to purchase and maintain in accordance with paragraphs 5.3 and 5.4, and OWNER shall deliver to CONTRACTOR certificates (and other evidence of insurance requested by CONTRACTOR) which OWNER is required to purchase and maintain in accordance with paragraphs 5.6 and 5.7.

Preconstruction Conference:

2.8. Within twenty days after the Effective Date of the Agreement, but before CONTRACTOR starts the Work at the site, a conference attended by CONTRACTOR, ENGINEER and others as appropriate will be held to discuss the schedules referred to in paragraph 2.6, to discuss procedures for handling Shop Drawings and other submittals and for processing Applications for Payment, and to establish a working understanding among the parties as to the Work.

Finalizing Schedules:

2.9. At least ten days before submission of the first Application for Payment a conference attended by CONTRACTOR, ENGINEER and others as appropriate will be held to finalize the schedules submitted in accordance with paragraph 2.6. The finalized progress schedule will be acceptable to ENGINEER as providing an orderly progression of the Work to completion within the Contract Time, but such acceptance will neither impose on ENGINEER responsibility for the progress or scheduling of the Work nor relieve CONTRACTOR from full responsibility therefor. The finalized schedule of Shop Drawing submissions will be acceptable to ENGINEER as providing a workable arrangement for processing the submissions. The finalized schedule of values will be acceptable to ENGINEER as to form and substance.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

Intent:

3.1. The Contract Documents comprise the entire agreement between OWNER and CONTRACTOR concerning the Work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the Project.

3.2. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any Work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result will be supplied whether or not specifically called for. When words which have a well-known technical or trade meaning are used to describe Work, materials or equipment such words shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or Laws or Regulations in effect at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of OWNER, CONTRACTOR or ENGINEER, or any of their consultants, agents or employees from those set forth in the Contract Documents, nor shall it be effective to assign to ENGINEER, or any of ENGINEER's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.15 or 9.16. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in paragraph 9.4.

3.3. If, during the performance of the Work, CONTRACTOR finds a conflict, error or discrepancy in the Contract Documents, CONTRACTOR shall so report to ENGINEER in writing at once and before proceeding with the Work affected thereby shall obtain a written interpretation or clarification

from ENGINEER; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error or discrepancy in the Contract Documents unless CONTRACTOR had actual knowledge thereof or should reasonably have known thereof.

Amending and Supplementing Contract Documents:

3.4. The Contract Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

3.4.1. a formal Written Amendment,

3.4.2. a Change Order (pursuant to paragraph 10.4), or

3.4.3. a Work Directive Change (pursuant to paragraph 10.1).

As indicated in paragraphs 11.2 and 12.1, Contract Price and Contract Time may only be changed by a Change Order or a Written Amendment.

3.5. In addition, the requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, in one or more of the following ways:

3.5.1. a Field Order (pursuant to paragraph 9.5),

3.5.2. ENGINEER's approval of a Shop Drawing or sample (pursuant to paragraphs 6.26 and 6.27), or

3.5.3. ENGINEER's written interpretation or clarification (pursuant to paragraph 9.4).

Reuse of Documents:

3.6. Neither CONTRACTOR nor any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with OWNER shall have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER; and they shall not reuse any of them on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaptation by ENGINEER.

ARTICLE 4—AVAILABILITY OF LANDS; PHYSICAL CONDITIONS; REFERENCE POINTS

Availability of Lands:

4.1. OWNER shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by OWNER, unless otherwise provided in the Contract Documents. If CONTRACTOR believes that any delay in OWNER's furnishing these lands, rights-of-way or easements entitles CONTRACTOR to an extension of the Contract Time, CONTRACTOR may make a claim therefor as provided in Article 12. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

Physical Conditions:

4.2.1. *Explorations and Reports:* Reference is made to the Supplementary Conditions for identification of those reports of explorations and tests of subsurface conditions at the site that have been utilized by ENGINEER in preparation of the Contract Documents. CONTRACTOR may rely upon the accuracy of the technical data contained in such reports, but not upon nontechnical data, interpretations or opinions contained therein or for the completeness thereof for CONTRACTOR's purposes. Except as indicated in the immediately preceding sentence and in paragraph 4.2.6, CONTRACTOR shall have full responsibility with respect to subsurface conditions at the site.

4.2.2. *Existing Structures:* Reference is made to the Supplementary Conditions for identification of those drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities referred to in paragraph 4.3) which are at or contiguous to the site that have been utilized by ENGINEER in preparation of the Contract Documents. CONTRACTOR may rely upon the accuracy of the technical data contained in such drawings, but not for the completeness thereof for CONTRACTOR's purposes. Except as indicated in the immediately preceding sentence and in paragraph 4.2.6, CONTRACTOR shall have full responsibility with respect to physical conditions in or relating to such structures.

4.2.3. *Report of Differing Conditions:* If CONTRACTOR believes that:

4.2.3.1. any technical data on which CONTRACTOR is entitled to rely as provided in paragraphs 4.2.1 and 4.2.2 is inaccurate, or

4.2.3.2. any physical condition uncovered or revealed at the site differs materially from that indicated, reflected or referred to in the Contract Documents,

CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work in connection therewith (except in an emergency as permitted by paragraph 6.22), notify OWNER and ENGINEER in writing about the inaccuracy or difference.

4.2.4. *ENGINEER's Review:* ENGINEER will promptly review the pertinent conditions, determine the necessity of obtaining additional explorations or tests with respect thereto and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER's findings and conclusions.

4.2.5. *Possible Document Change:* If ENGINEER concludes that there is a material error in the Contract Documents or that because of newly discovered conditions a change in the Contract Documents is required, a Work Directive Change or a Change Order will be issued as provided in Article 10 to reflect and document the consequences of the inaccuracy or difference.

4.2.6. *Possible Price and Time Adjustments:* In each such case, an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, or any combination thereof, will be allowable to the extent that they are attributable to any such inaccuracy or difference. If OWNER and CONTRACTOR are unable to agree as to the amount or length thereof, a claim may be made therefor as provided in Articles 11 and 12.

Physical Conditions—Underground Facilities:

4.3.1. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on information and data furnished to OWNER or ENGINEER by the owners of such Underground Facilities or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

4.3.1.1. OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and,

4.3.1.2. CONTRACTOR shall have full responsibility for reviewing and checking all such information and data, for locating all Underground Facilities shown or indicated in the Contract Documents, for coordination of the Work with the owners of such Underground Facilities during construction, for the safety and protection thereof as provided in paragraph 6.20 and repairing any damage thereto resulting from the Work, the cost of all of which will be considered as having been included in the Contract Price.

4.3.2. *Not Shown or Indicated.* If an Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents and which CONTRACTOR could not reasonably have been expected to be aware of, CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work affected thereby (except in an emergency as permitted by paragraph 6.22), identify the owner of such Underground Facility and give written notice thereof to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility to determine the extent to which the Contract Documents should be modified to reflect and document the consequences of the existence of the Underground Facility, and the Contract Documents will be amended or supplemented to the extent necessary. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility as provided in paragraph 6.20. CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and which CONTRACTOR could not reasonably have been expected to be aware of. If the parties are unable to agree as to the amount or length thereof, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

Reference Points:

4.4. OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work (unless otherwise specified in the General Requirements), shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.

ARTICLE 5—BONDS AND INSURANCE

Performance and Other Bonds:

5.1. CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as otherwise provided by Law or Regulation or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Supplementary Conditions. All Bonds shall be in the forms prescribed by Law or Regulation or by the Contract Documents and be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of the authority to act.

5.2. If the surety on any Bond furnished by CONTRACTOR is declared a bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of

the Project is located or it ceases to meet the requirements of paragraph 5.1, CONTRACTOR shall within five days thereafter substitute another Bond and Surety, both of which must be acceptable to OWNER.

Contractor's Liability Insurance:

5.3. CONTRACTOR shall purchase and maintain such comprehensive general liability and other insurance as is appropriate for the Work being performed and furnished and as will provide protection from claims set forth below which may arise out of or result from CONTRACTOR's performance and furnishing of the Work and CONTRACTOR's other obligations under the Contract Documents, whether it is to be performed or furnished by CONTRACTOR, by any Subcontractor, by anyone directly or indirectly employed by any of them to perform or furnish any of the Work, or by anyone for whose acts any of them may be liable:

5.3.1. Claims under workers' or workmen's compensation, disability benefits and other similar employee benefit acts;

5.3.2. Claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;

5.3.3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;

5.3.4. Claims for damages insured by personal injury liability coverage which are sustained (a) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (b) by any other person for any other reason;

5.3.5. Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom;

5.3.6. Claims arising out of operation of Laws or Regulations for damages because of bodily injury or death of any person or for damage to property; and

5.3.7. Claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

The insurance required by this paragraph 5.3 shall include the specific coverages and be written for not less than the limits of liability and coverages provided in the Supplementary Conditions, or required by law, whichever is greater. The comprehensive general liability insurance shall include completed operations insurance. All of the policies of insurance so required to be purchased and maintained (or the certificates or other evidence thereof) shall contain a provision or endorsement that the coverage afforded will not be cancelled, materially changed or renewal refused until at least thirty days' prior written notice has been given to OWNER and ENGINEER by certified mail. All such insurance shall remain in effect until final payment and at all times thereafter when CONTRACTOR may be correcting, removing or replacing *defective* Work in accordance with paragraph 13.12. In addition, CONTRACTOR shall maintain such completed operations insurance for at least two years after final payment and furnish OWNER with evidence of continuation of such insurance at final payment and one year thereafter.

Contractual Liability Insurance:

5.4. The comprehensive general liability insurance required by paragraph 5.3 will include contractual liability insurance applicable to CONTRACTOR's obligations under paragraphs 6.30 and 6.31.

Owner's Liability Insurance:

5.5. OWNER shall be responsible for purchasing and maintaining OWNER's own liability insurance and, at OWNER's option, may purchase and maintain such insurance as will protect OWNER against claims which may arise from operations under the Contract Documents.

Property Insurance:

5.6. Unless otherwise provided in the Supplementary Conditions, OWNER shall purchase and maintain property insurance upon the Work at the site to the full insurable value thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER and ENGINEER's consultants in the Work, all of whom shall be listed as insureds or additional insured parties, shall insure against the perils of fire and extended coverage and shall include "all risk" insurance for physical loss and damage including theft, vandalism and malicious mischief, collapse and water damage, and such other perils as may be provided in the Supplementary Conditions, and shall include damages, losses and expenses arising out of or resulting from any insured loss or incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers, architects, attorneys and other professionals). If not covered under the "all risk" insurance or otherwise provided in the Supplementary Conditions, CONTRACTOR shall purchase and maintain similar property insurance on portions of the Work stored on and off the site or in transit when such portions of the Work are to be included in an Application for Payment.

5.7. OWNER shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER AND ENGINEER's consultants in the Work, all of whom shall be listed as insured or additional insured parties.

5.8. All the policies of insurance (or the certificates or other evidence thereof) required to be purchased and maintained by OWNER in accordance with paragraphs 5.6 and 5.7 will contain a provision or endorsement that the coverage afforded will not be cancelled or materially changed or renewal refused until at least thirty days' prior written notice has been given to CONTRACTOR by certified mail and will contain waiver provisions in accordance with paragraph 5.11.2.

5.9. OWNER shall not be responsible for purchasing and maintaining any property insurance to protect the interests of CONTRACTOR, Subcontractors or others in the Work to the extent of any deductible amounts that are provided in the Supplementary Conditions. The risk of loss within the deductible amount, will be borne by CONTRACTOR, Subcontractor or others suffering any such loss and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.10. If CONTRACTOR requests in writing that other special insurance be included in the property insurance policy, OWNER shall, if possible, include such insurance, and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the site, OWNER shall in writing advise CONTRACTOR whether or not such other insurance has been procured by OWNER.

Waiver of Rights:

5.11.1. OWNER and CONTRACTOR waive all rights against each other for all losses and damages caused by any of the perils covered by the policies of insurance provided in response to paragraphs 5.6 and 5.7 and any other property insurance applicable to the Work, and also waive all such rights against the Subcontractors, ENGINEER, ENGINEER's consultants and all other parties named as insureds in such policies for losses and damages so caused. As required by paragraph 6.11, each subcontract between CONTRACTOR and a Subcontractor will contain similar waiver provisions by the Subcontractor in favor of OWNER, CONTRACTOR, ENGINEER, ENGINEER's consultants and all other parties named as insureds. None of the above waivers shall extend to the rights that any of the insured parties may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.

5.11.2. OWNER and CONTRACTOR intend that any policies provided in response to paragraphs 5.6 and 5.7 shall protect all of the parties insured and provide primary coverage for all losses and damages caused by the perils covered thereby. Accordingly, all such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any of the parties named as insureds or additional insureds, and if the insurers require separate waiver forms to be signed by ENGINEER or ENGINEER's consultant OWNER will obtain the same, and if such waiver forms are required of any Subcontractor, CONTRACTOR will obtain the same.

Receipt and Application of Proceeds:

5.12. Any insured loss under the policies of insurance required by paragraphs 5.6 and 5.7 will be adjusted with OWNER and made payable to OWNER as trustee for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.13. OWNER shall deposit in a separate account any money so received, and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

5.13. OWNER as trustee shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within fifteen days after the occurrence of loss to OWNER's exercise of this power. If such objection be made, OWNER as trustee shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If required in writing by any party in interest, OWNER as trustee shall, upon the occurrence of an insured loss, give bond for the proper performance of such duties.

Acceptance of Insurance:

5.14. If OWNER has any objection to the coverage afforded by or other provisions of the insurance required to be purchased and maintained by CONTRACTOR in accordance with paragraphs 5.3 and 5.4 on the basis of its not complying with the Contract Documents, OWNER shall notify CONTRACTOR in writing thereof within ten days of the date of delivery of such certificates to OWNER in accordance with paragraph 2.7. If CONTRACTOR has any objection to the coverage afforded by or other provisions of the policies of insurance required to be purchased and maintained by OWNER in accordance with paragraphs 5.6 and 5.7 on the basis of their not complying with the Contract Documents, CONTRACTOR shall notify OWNER in writing thereof within ten days of the date of delivery of such certificates to CONTRACTOR in accordance with paragraph 2.7. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided by each as the other may reasonably request. Failure by OWNER or CONTRACTOR to give any such notice of objection within the time provided shall constitute acceptance of such insurance purchased by the other as complying with the Contract Documents.

Partial Utilization—Property Insurance:

5.15. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, such use or occupancy may be accomplished in accordance with paragraph 14.10; provided that no

such use or occupancy shall commence before the insurers providing the property insurance have acknowledged notice thereof and in writing effected the changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be cancelled or lapse on account of any such partial use or occupancy.

ARTICLE 6—CONTRACTOR'S RESPONSIBILITIES

Supervision and Superintendence:

6.1. CONTRACTOR shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence or procedure of construction which is indicated in and required by the Contract Documents. CONTRACTOR shall be responsible to see that the finished Work complies accurately with the Contract Documents.

6.2. CONTRACTOR shall keep on the Work at all times during its progress a competent resident superintendent, who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the site and shall have authority to act on behalf of CONTRACTOR. All communications given to the superintendent shall be as binding as if given to CONTRACTOR.

Labor, Materials and Equipment:

6.3. CONTRACTOR shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the Work or property at the site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the site shall be performed during regular working hours, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without OWNER's written consent given after prior written notice to ENGINEER.

6.4. Unless otherwise specified in the General Requirements, CONTRACTOR shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

6.5. All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable Supplier except as otherwise provided in the Contract Documents; but no provision of any such instructions will be effective to assign to ENGINEER, or any of ENGINEER's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.15 or 9.16.

Adjusting Progress Schedule:

6.6. CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.9) adjustments in the progress schedule to reflect the impact thereon of new developments; these will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

Substitutes or "Or-Equal" Items:

6.7.1. Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other Suppliers may be accepted by ENGINEER if sufficient information is submitted by CONTRACTOR to allow ENGINEER to determine that the material or equipment proposed is equivalent or equal to that named. The procedure for review by ENGINEER will include the following as supplemented in the General Requirements. Requests for review of substitute items of material and equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR. If CONTRACTOR wishes to furnish or use a substitute item of material or equipment, CONTRACTOR shall make written application to ENGINEER for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will state that the evaluation and acceptance of the proposed substitute will not prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or

royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by ENGINEER in evaluating the proposed substitute. ENGINEER may require CONTRACTOR to furnish at CONTRACTOR's expense additional data about the proposed substitute.

6.7.2. If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to ENGINEER, if CONTRACTOR submits sufficient information to allow ENGINEER to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in paragraph 6.7.1 as applied by ENGINEER and as may be supplemented in the General Requirements.

6.7.3. ENGINEER will be allowed a reasonable time within which to evaluate each proposed substitute. ENGINEER will be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without ENGINEER's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute. ENGINEER will record time required by ENGINEER and ENGINEER's consultants in evaluating substitutions proposed by CONTRACTOR and in making changes in the Contract Documents occasioned thereby. Whether or not ENGINEER accepts a proposed substitute, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's consultants for evaluating each proposed substitute.

Concerning Subcontractors, Suppliers and Others:

6.8.1. CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization (including those acceptable to OWNER and ENGINEER as indicated in paragraph 6.8.2), whether initially or as a substitute, against whom OWNER or ENGINEER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier or other person or organization to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

6.8.2. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of materials and equipment) to be submitted to OWNER in advance of the specified date prior to the Effective Date of the Agreement for acceptance by OWNER and ENGINEER and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's or ENGINEER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the bidding documents or the Contract Documents) of any such Subcontractor, Supplier or other person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case CONTRACTOR shall submit an acceptable substitute, the Contract Price will be increased by the difference in the cost occasioned by such substitution and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER or ENGINEER of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of OWNER or ENGINEER to reject *defective* Work.

6.9. CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create any contractual relationship between OWNER or ENGINEER and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor, Supplier or other person or organization except as may otherwise be required by Laws and Regulations.

6.10. The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

6.11. All Work performed for CONTRACTOR by a Subcontractor will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor which specifically binds the Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER and contains waiver provisions as required by paragraph 5.11. CONTRACTOR shall pay each Subcontractor a just share of any insurance moneys received by CONTRACTOR on account of losses under policies issued pursuant to paragraphs 5.6 and 5.7.

Patent Fees and Royalties:

6.12. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of OWNER

or ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract Documents. CONTRACTOR shall indemnify and hold harmless OWNER and ENGINEER and anyone directly or indirectly employed by either of them from and against all claims, damages, losses and expenses (including attorneys' fees and court and arbitration costs) arising out of any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product or device not specified in the Contract Documents, and shall defend all such claims in connection with any alleged infringement of such rights.

Permits:

6.13. Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids, or if there are no Bids on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees.

Laws and Regulations:

6.14.1. CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to furnishing and performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither OWNER nor ENGINEER shall be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations.

6.14.2. If CONTRACTOR observes that the Specifications or Drawings are at variance with any Laws or Regulations, CONTRACTOR shall give ENGINEER prompt written notice thereof, and any necessary changes will be authorized by one of the methods indicated in paragraph 3.4. If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to such Laws or Regulations, and without such notice to ENGINEER, CONTRACTOR shall bear all costs arising therefrom; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with such Laws and Regulations.

Taxes:

6.15. CONTRACTOR shall pay all sales, consumer, use and other similar taxes required to be paid by CONTRACTOR in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

Use of Premises:

6.16. CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workers to the Project site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by Laws and Regulations, rights-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any land or areas contiguous thereto, resulting from the performance of the Work. Should any claim be made against OWNER or ENGINEER by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly attempt to settle with such other party by agreement or otherwise resolve the claim by arbitration or at law. CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold OWNER and ENGINEER harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any such other party against OWNER or ENGINEER to the extent based on a claim arising out of CONTRACTOR's performance of the Work.

6.17. During the progress of the Work, CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work CONTRACTOR shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery, and surplus materials, and shall leave the site clean and ready for occupancy by OWNER. CONTRACTOR shall restore to original condition all property not designated for alteration by the Contract Documents.

6.18. CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

Record Documents:

6.19. CONTRACTOR shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Directive Changes, Field Orders and written interpretations and clarifications (issued pursuant to paragraph 9.4) in good order and annotated to show all changes made during construction. These record documents together with all approved samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon com-

pletion of the Work, these record documents, samples and Shop Drawings will be delivered to ENGINEER for OWNER.

Safety and Protection:

6.20. CONTRACTOR shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

6.20.1. all employees on the Work and other persons and organizations who may be affected thereby;

6.20.2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

6.20.3. other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and Underground Facilities not designated for removal, relocation or replacement in the course of construction.

CONTRACTOR shall comply with all applicable Laws and Regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property referred to in paragraph 6.20.2 or 6.20.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR). CONTRACTOR's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.13 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.21. CONTRACTOR shall designate a responsible representative at the site whose duty shall be the prevention of accidents. This person shall be CONTRACTOR's superintendent unless otherwise designated in writing by CONTRACTOR to OWNER.

Emergencies:

6.22. In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from ENGINEER or OWNER, is obligated to act to prevent threatened damage, injury or loss. CONTRACTOR shall give ENGINEER prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If ENGINEER determines that a change in the Contract Documents is required because of the action taken in response to an emergency, a Work Directive Change or Change Order will be issued to document the consequences of the changes or variations.

Shop Drawings and Samples:

6.23. After checking and verifying all field measurements and after complying with applicable procedures specified in the General Requirements, CONTRACTOR shall submit to ENGINEER for review and approval in accordance with the accepted schedule of Shop Drawing submissions (see paragraph 2.9), or for other appropriate action if so indicated in the Supplementary Conditions, five copies (unless otherwise specified in the General Requirements) of all Shop Drawings, which will bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's responsibilities under the Contract Documents with respect to the review of the submission. All submissions will be identified as ENGINEER may require. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to enable ENGINEER to review the information as required.

6.24. CONTRACTOR shall also submit to ENGINEER for review and approval with such promptness as to cause no delay in Work, all samples required by the Contract Documents. All samples will have been checked by and accompanied by a specific written indication that CONTRACTOR has satisfied CONTRACTOR's responsibilities under the Contract Documents with respect to the review of the submission and will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended.

6.25.1. Before submission of each Shop Drawing or sample CONTRACTOR shall have determined and verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each Shop Drawing or sample with other Shop Drawings and samples and with the requirements of the Work and the Contract Documents.

6.25.2. At the time of each submission, CONTRACTOR shall give ENGINEER specific written notice of each variation that the Shop Drawings or samples may have from the requirements of the Contract Documents, and, in addition, shall cause a specific notation to be made on

each Shop Drawing submitted to ENGINEER for review and approval of each such variation.

6.26. ENGINEER will review and approve with reasonable promptness Shop Drawings and samples, but ENGINEER's review and approval will be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents and shall not extend to means, methods, techniques, sequences or procedures of construction (except where a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. CONTRACTOR shall make corrections required by ENGINEER, and shall return the required number of corrected copies of Shop Drawings and submit as required new samples for review and approval. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submittals.

6.27. ENGINEER's review and approval of Shop Drawings or samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of submission as required by paragraph 6.25.2 and ENGINEER has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the Shop Drawing or sample approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for errors or omissions in the Shop Drawings or from responsibility for having complied with the provisions of paragraph 6.25.1.

6.28. Where a Shop Drawing or sample is required by the Specifications, any related Work performed prior to ENGINEER's review and approval of the pertinent submission will be the sole expense and responsibility of CONTRACTOR.

Continuing the Work:

6.29. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by paragraph 15.5 or as CONTRACTOR and OWNER may otherwise agree in writing.

Indemnification:

6.30. To the fullest extent permitted by Laws and Regulations CONTRACTOR shall indemnify and hold harmless OWNER and ENGINEER and their consultants, agents and employees from and against all claims, damages, losses and expenses, direct, indirect or consequential (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom and (b) is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder or arises by or is imposed by Law and Regulations regardless of the negligence of any such party.

6.31. In any and all claims against OWNER or ENGINEER or any of their consultants, agents or employees by any employee of CONTRACTOR, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.30 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for CONTRACTOR or any such Subcontractor or other person or organization under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

6.32. The obligations of CONTRACTOR under paragraph 6.30 shall not extend to the liability of ENGINEER, ENGINEER's consultants, agents or employees arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications.

ARTICLE 7—OTHER WORK

Related Work at Site:

7.1. OWNER may perform other work related to the Project at the site by OWNER's own forces, have other work performed by utility owners or let other direct contracts therefor which shall contain General Conditions similar to these. If the fact that such other work is to be performed was not noted in the Contract Documents, written notice thereof will be given to CONTRACTOR prior to starting any such other work; and, if CONTRACTOR believes that such performance will involve additional expense to CONTRACTOR or requires additional time and the parties are unable to agree as to the extent thereof, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

7.2. CONTRACTOR shall afford each utility owner and other contractor who is a party to such a direct contract (or OWNER, if OWNER is performing the additional work with OWNER's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such work, and shall properly connect and coordinate the Work with theirs. CONTRACTOR shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. CON-

TRACTOR shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

7.3. If any part of CONTRACTOR's Work depends for proper execution or results upon the work of any such other contractor or utility owner (or OWNER), CONTRACTOR shall inspect and promptly report to ENGINEER in writing any delays, defects or deficiencies in such work that render it unavailable or unsuitable for such proper execution and results. CONTRACTOR's failure so to report will constitute an acceptance of the other work as fit and proper for integration with CONTRACTOR's Work except for latent or non-apparent defects and deficiencies in the other work.

Coordination:

7.4. If OWNER contracts with others for the performance of other work on the Project at the site, the person or organization who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified in the Supplementary Conditions, and the specific matters to be covered by such authority and responsibility will be itemized, and the extent of such authority and responsibilities will be provided, in the Supplementary Conditions. Unless otherwise provided in the Supplementary Conditions, neither OWNER nor ENGINEER shall have any authority or responsibility in respect of such coordination.

ARTICLE 8—OWNER'S RESPONSIBILITIES

8.1. OWNER shall issue all communications to CONTRACTOR through ENGINEER.

8.2. In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer against whom CONTRACTOR makes no reasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER. Any dispute in connection with such appointment shall be subject to arbitration.

8.3. OWNER shall furnish the data required of OWNER under the Contract Documents promptly and shall make payments to CONTRACTOR promptly after they are due as provided in paragraphs 14.4 and 14.13.

8.4. OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.1 and 4.4. Paragraph 4.2 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions at the site and in existing structures which have been utilized by ENGINEER in preparing the Drawings and Specifications.

8.5. OWNER's responsibilities in respect of purchasing and maintaining liability and property insurance are set forth in paragraphs 5.5 through 5.8.

8.6. OWNER is obligated to execute Change Orders as indicated in paragraph 10.4.

8.7. OWNER's responsibility in respect of certain inspections, tests and approvals is set forth in paragraph 13.4.

8.8. In connection with OWNER's right to stop Work or suspend Work, see paragraphs 13.10 and 15.1. Paragraph 15.2 deals with OWNER's right to terminate services of CONTRACTOR under certain circumstances.

ARTICLE 9—ENGINEER'S STATUS DURING CONSTRUCTION

Owner's Representative:

9.1. ENGINEER will be OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER's representative during construction are set forth in the Contract Documents and shall not be extended without written consent of OWNER and ENGINEER.

Visits to Site:

9.2. ENGINEER will make visits to the site at intervals appropriate to the various stages of construction to observe the progress and quality of the executed Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents. ENGINEER will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. ENGINEER's efforts will be directed toward providing for OWNER a greater degree of confidence that the completed Work will conform to the Contract Documents. On the basis of such visits and on-site observations as an experienced and qualified design professional, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defects and deficiencies in the Work.

Project Representation:

9.3. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in observing the performance of the Work. The duties, responsibilities and limitations of authority of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions. If OWNER designates another agent to represent OWNER at the site who is not ENGINEER's agent or employee, the duties, responsibilities and limitations of authority of such other person will be as provided in the Supplementary Conditions.

Clarifications and Interpretations:

9.4. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as ENGINEER may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. If CONTRACTOR believes that a written clarification or interpretation justifies an increase in the Contract Price or an extension of the Contract Time and the parties are unable to agree to the amount or extent thereof, CONTRACTOR may make a claim therefor as provided in Article 11 or Article 12.

Authorized Variations in Work:

9.5. ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Time and are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER, and also on CONTRACTOR who shall perform the Work involved promptly. If CONTRACTOR believes that a Field Order justifies an increase in the Contract Price or an extension of the Contract Time and the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a claim therefor as provided in Article 11 or 12.

Rejecting Defective Work:

9.6. ENGINEER will have authority to disapprove or reject Work which ENGINEER believes to be *defective*, and will also have authority to require special inspection or testing of the Work as provided in paragraph 13.9, whether or not the Work is fabricated, installed or completed.

Shop Drawings, Change Orders and Payments:

9.7. In connection with ENGINEER's responsibility for Shop Drawings and samples, see paragraphs 6.23 through 6.29 inclusive.

9.8. In connection with ENGINEER's responsibilities as to Change Orders, see Articles 10, 11 and 12.

9.9. In connection with ENGINEER's responsibilities in respect of Applications for Payment, etc., see Article 14.

Determinations for Unit Prices:

9.10. ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review with CONTRACTOR ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decisions thereon will be final and binding upon OWNER and CONTRACTOR, unless, within ten days after the date of any such decision, either OWNER or CONTRACTOR delivers to the other party to the Agreement and to ENGINEER written notice of intention to appeal from such a decision.

Decisions on Disputes:

9.11. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work and claims under Articles 11 and 12 in respect of changes in the Contract Price or Contract Time will be referred initially to ENGINEER in writing with a request for a formal decision in accordance with this paragraph, which ENGINEER will render in writing within a reasonable time. Written notice of each such claim, dispute and other matter will be delivered by the claimant to ENGINEER and the other party to the Agreement promptly (but in no event later than thirty days) after the occurrence of the event giving rise thereto, and written supporting data will be submitted to ENGINEER and the other party within sixty days after such occurrence unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim.

9.12. When functioning as interpreter and judge under paragraphs 9.10 and 9.11, ENGINEER will not show partiality to OWNER or CONTRACTOR and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by ENGINEER pursuant to paragraphs 9.10 and 9.11 with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.16) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such claim, dispute or other matter.

Limitations on ENGINEER's Responsibilities:

9.13. Neither ENGINEER's authority to act under this Article 9 or elsewhere in the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, or any other person or organization performing any of the Work, or to any surety for any of them.

9.14. Whenever in the Contract Documents the terms "as ordered", "as directed", "as required", "as allowed", "as approved" or terms of like effect or import are used, or the adjectives "reasonable", "suitable", "acceptable", "proper" or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of ENGINEER as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate the Work for compliance with the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be

effective to assign to ENGINEER any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.15 or 9.16.

9.15. ENGINEER will not be responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, and ENGINEER will not be responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents.

9.16. ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

ARTICLE 10—CHANGES IN THE WORK

10.1. Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions or revisions in the Work; these will be authorized by a Written Amendment, a Change Order, or a Work Directive Change. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

10.2. If OWNER and CONTRACTOR are unable to agree as to the extent, if any, of an increase or decrease in the Contract Price or an extension or shortening of the Contract Time that should be allowed as a result of a Work Directive Change, a claim may be made therefor as provided in Article 11 or Article 12.

10.3. CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in paragraphs 3.4 and 3.5, except in the case of an emergency as provided in paragraph 6.22 and except in the case of uncovering Work as provided in paragraph 13.9.

10.4. OWNER and CONTRACTOR shall execute appropriate Change Orders (or Written Amendments) covering:

10.4.1. changes in the Work which are ordered by OWNER pursuant to paragraph 10.1, are required because of acceptance of *defective* Work under paragraph 13.13 or correcting *defective* Work under paragraph 13.14, or are agreed to by the parties;

10.4.2. changes in the Contract Price or Contract Time which are agreed to by the parties; and

10.4.3. changes in the Contract Price or Contract Time which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 9.11;

provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.29.

10.5. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Time) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE 11—CHANGE OF CONTRACT PRICE

11.1. The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to CONTRACTOR for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by CONTRACTOR shall be at his expense without change in the Contract Price.

11.2. The Contract Price may only be changed by a Change Order or by a Written Amendment. Any claim for an increase or decrease in the Contract Price shall be based on written notice delivered by the party making the claim to the other party and to ENGINEER promptly (but in no event later than thirty days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered within sixty days after such occurrence (unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by claimant's written statement that the amount claimed covers all known amounts (direct, indirect and consequential) to which the claimant is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Price shall be determined by ENGINEER in accordance with paragraph 9.11 if OWNER and CONTRACTOR cannot otherwise agree on the amount involved. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this paragraph 11.2.

11.3. The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:

11.3.1. Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved (subject to the provisions of paragraphs 11.9.1. through 11.9.3, inclusive).

11.3.2. By mutual acceptance of a lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 11.6.2.1).

11.3.3. On the basis of the Cost of the Work (determined as provided in paragraphs 11.4 and 11.5) plus a CONTRACTOR's Fee for overhead and profit (determined as provided in paragraphs 11.6 and 11.7).

Cost of the Work:

11.4. The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in paragraph 11.5:

11.4.1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workers' or workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. Such employees shall include superintendents and foremen at the site. The expenses of performing Work after regular working hours, on Saturday, Sunday or legal holidays, shall be included in the above to the extent authorized by OWNER.

11.4.2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds and all returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

11.4.3. Payments made by CONTRACTOR to the Subcontractors for Work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from Subcontractors acceptable to CONTRACTOR and shall deliver such bids to OWNER who will then determine, with the advice of ENGINEER, which bids will be accepted. If a subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work Plus a Fee, the Subcontractor's Cost of the Work shall be determined in the same manner as CONTRACTOR's Cost of the Work. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

11.4.4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys and accountants) employed for services specifically related to the Work.

11.4.5. Supplemental costs including the following:

11.4.5.1. The proportion of necessary transportation, travel and subsistence expenses of CONTRACTOR's employees incurred in discharge of duties connected with the Work.

11.4.5.2. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost less market value of such items used but not consumed which remain the property of CONTRACTOR.

11.4.5.3. Rentals of all construction equipment and machinery and the parts thereof whether rented from CONTRACTOR or others in accordance with rental agreements approved by OWNER with the advice of ENGINEER, and the costs of transportation, loading, unloading, installation, dismantling and removal thereof—all in accordance with terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

11.4.5.4. Sales, consumer, use or similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

11.4.5.5. Deposits lost for causes other than negligence of CONTRACTOR, any Subcontractor or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

11.4.5.6. Losses and damages (and related expenses), not compensated by insurance or otherwise, to the Work or otherwise sustained by CONTRACTOR in connection with the performance and furnishing of the Work (except losses and damages within the deductible amounts of property insurance established by OWNER in accordance with paragraph 5.9), provided they have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR's Fee. If, however, any such loss or damage

requires reconstruction and CONTRACTOR is placed in charge thereof, CONTRACTOR shall be paid for services a fee proportionate to that stated in paragraph 11.6.2.

11.4.5.7. The cost of utilities, fuel and sanitary facilities at the site.

11.4.5.8. Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.

11.4.5.9. Cost of premiums for additional Bonds and insurance required because of changes in the Work and premiums for property insurance coverage within the limits of the deductible amounts established by OWNER in accordance with paragraph 5.9.

11.5. The term Cost of the Work shall not include any of the following:

11.5.1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by CONTRACTOR whether at the site or in CONTRACTOR's principal or a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.4.1 or specifically covered by paragraph 11.4.4—all of which are to be considered administrative costs covered by the CONTRACTOR's Fee.

11.5.2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the site.

11.5.3. Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR'S capital employed for the Work and charges against CONTRACTOR for delinquent payments.

11.5.4. Cost of premiums for all Bonds and for all insurance whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by subparagraph 11.4.5.9 above).

11.5.5. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of *defective* Work, disposal of materials or equipment wrongly supplied and making good any damage to property.

11.5.6. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 11.4.

CONTRACTOR's Fee:

11.6. The CONTRACTOR's Fee allowed to CONTRACTOR for overhead and profit shall be determined as follows:

11.6.1. a mutually acceptable fixed fee; or if none can be agreed upon,

11.6.2. a fee based on the following percentages of the various portions of the Cost of the Work:

11.6.2.1. for costs incurred under paragraphs 11.4.1 and 11.4.2, the CONTRACTOR's Fee shall be fifteen percent;

11.6.2.2. for costs incurred under paragraph 11.4.3, the CONTRACTOR's Fee shall be five percent; and if a subcontract is on the basis of Cost of the Work Plus a Fee, the maximum allowable to CONTRACTOR on account of overhead and profit of all Subcontractors shall be fifteen percent;

11.6.2.3. no fee shall be payable on the basis of costs itemized under paragraphs 11.4.4, 11.4.5 and 11.5;

11.6.2.4. the amount of credit to be allowed by CONTRACTOR to OWNER for any such change which results in a net decrease in cost will be the amount of the actual net decrease plus a deduction in CONTRACTOR's Fee by an amount equal to ten percent of the net decrease; and

11.6.2.5. when both additions and credits are involved in any one change, the adjustment in CONTRACTOR's Fee shall be computed on the basis of the net change in accordance with paragraphs 11.6.2.1 through 11.6.2.4, inclusive.

11.7. Whenever the cost of any Work is to be determined pursuant to paragraph 11.4 or 11.5, CONTRACTOR will submit in form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

Cash Allowances:

11.8. It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be done by such Subcontractors or Suppliers and for such sums within the limit of the allowances as may be acceptable to ENGINEER. CONTRACTOR agrees that:

11.8.1. The allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the site, and all applicable taxes; and

11.8.2. CONTRACTOR's costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the allowances have been included in the Contract Price and not in the

allowances. No demand for additional payment on account of any thereof will be valid.

Prior to final payment, an appropriate Change Order will be issued as recommended by ENGINEER to reflect actual amounts due CONTRACTOR on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

Unit Price Work:

11.9.1. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER in accordance with Paragraph 9.10.

11.9.2. Each unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

11.9.3. Where the quantity of any item of Unit Price Work performed by CONTRACTOR differs materially and significantly from the estimated quantity of such item indicated in the Agreement and there is no corresponding adjustment with respect to any other item of Work and if CONTRACTOR believes that CONTRACTOR has incurred additional expense as a result thereof, CONTRACTOR may make a claim for an increase in the Contract Price in accordance with Article 11 if the parties are unable to agree as to the amount of any such increase.

ARTICLE 12—CHANGE OF CONTRACT TIME

12.1. The Contract Time may only be changed by a Change Order or a Written Amendment. Any claim for an extension or shortening of the Contract Time shall be based on written notice delivered by the party making the claim to the other party and to ENGINEER promptly (but in no event later than thirty days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within sixty days after such occurrence (unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Time shall be determined by ENGINEER in accordance with paragraph 9.11 if OWNER and CONTRACTOR cannot otherwise agree. No claim for an adjustment in the Contract Time will be valid if not submitted in accordance with the requirements of this paragraph 12.1.

12.2. The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of CONTRACTOR if a claim is made therefor as provided in paragraph 12.1. Such delays shall include, but not be limited to, acts or neglect by OWNER or others performing additional work as contemplated by Article 7, or to fires, floods, labor disputes, epidemics, abnormal weather conditions or acts of God.

12.3. All time limits stated in the Contract Documents are of the essence of the Agreement. The provisions of this Article 12 shall not exclude recovery for damages (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) for delay by either party.

ARTICLE 13—WARRANTY AND GUARANTEE; TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

Warranty and Guarantee:

13.1. CONTRACTOR warrants and guarantees to OWNER and ENGINEER that all Work will be in accordance with the Contract Documents and will not be *defective*. Prompt notice of all defects shall be given to CONTRACTOR. All *defective* Work, whether or not in place, may be rejected, corrected or accepted as provided in this Article 13.

Access to Work:

13.2. ENGINEER and ENGINEER's representatives, other representatives of OWNER, testing agencies and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their observation, inspecting and testing. CONTRACTOR shall provide proper and safe conditions for such access.

Tests and Inspections:

13.3. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests or approvals.

13.4. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) to specifically be inspected, tested or approved, CONTRACTOR shall assume full responsibility therefor, pay all costs in connection therewith and furnish ENGINEER the required certificates of inspection, testing or approval. CONTRACTOR shall also

be responsible for and shall pay all costs in connection with any inspection or testing required in connection with OWNER's or ENGINEER's acceptance of a Supplier of materials or equipment proposed to be incorporated in the Work, or of materials or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work. The cost of all inspections, tests and approvals in addition to the above which are required by the Contract Documents shall be paid by OWNER (unless otherwise specified).

13.5. All inspections, tests or approvals other than those required by Laws or Regulations of any public body having jurisdiction shall be performed by organizations acceptable to OWNER and CONTRACTOR (or by ENGINEER if so specified).

13.6. If any Work (including the work of others) that is to be inspected, tested or approved is covered without written concurrence of ENGINEER, it must, if requested by ENGINEER, be uncovered for observation. Such uncovering shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR's intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

13.7. Neither observations by ENGINEER nor inspections, tests or approvals by others shall relieve CONTRACTOR from CONTRACTOR's obligations to perform the Work in accordance with the Contract Documents.

Uncovering Work:

13.8. If any Work is covered contrary to the written request of ENGINEER, it must, if requested by ENGINEER, be uncovered for ENGINEER's observation and replaced at CONTRACTOR's expense.

13.9. If ENGINEER considers it necessary or advisable that covered Work be observed by ENGINEER or inspected or tested by others, CONTRACTOR, at ENGINEER's request, shall uncover, expose or otherwise make available for observation, inspection or testing as ENGINEER may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is *defective*, CONTRACTOR shall bear all direct, indirect and consequential costs of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, (including but not limited to fees and charges of engineers, architects, attorneys and other professionals), and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, may make a claim therefor as provided in Article 11. If, however, such Work is not found to be *defective*, CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction; and, if the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

Owner May Stop the Work:

13.10. If the Work is *defective*, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop the Work shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR or any other party.

Correction or Removal of Defective Work:

13.11. If required by ENGINEER, CONTRACTOR shall promptly, as directed, either correct all *defective* Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by ENGINEER, remove it from the site and replace it with *nondefective* Work. CONTRACTOR shall bear all direct, indirect and consequential costs of such correction or removal (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) made necessary thereby.

One Year Correction Period:

13.12. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be *defective*, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions, either correct such *defective* Work, or, if it has been rejected by OWNER, remove it from the site and replace it with *nondefective* Work. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the *defective* Work corrected or the rejected Work removed and replaced, and all direct, indirect and consequential costs of such removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) will be paid by CONTRACTOR. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

Acceptance of Defective Work:

13.13. If, instead of requiring correction or removal and replacement of *defective* Work, OWNER (and, prior to ENGINEER's recommendation of final payment, also ENGINEER) prefers to accept it, OWNER may do so. CONTRACTOR shall bear all direct, indirect and consequential

costs attributable to OWNER's evaluation of and determination to accept such *defective* Work (such costs to be approved by ENGINEER as to reasonableness and to include but not be limited to fees and charges of engineers, architects, attorneys and other professionals). If any such acceptance occurs prior to ENGINEER's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

OWNER May Correct Defective Work:

13.14. If CONTRACTOR fails within a reasonable time after written notice of ENGINEER to proceed to correct and to correct *defective* Work or to remove and replace rejected Work as required by ENGINEER in accordance with paragraph 13.11, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven days' written notice to CONTRACTOR, correct and remedy any such deficiency. In exercising the rights and remedies under this paragraph OWNER shall proceed expeditiously. To the extent necessary to complete corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the site, take possession of all or part of the Work, and suspend CONTRACTOR's services related thereto, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the site and incorporate in the Work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees such access to the site as may be necessary to enable OWNER to exercise the rights and remedies under this paragraph. All direct, indirect and consequential costs of OWNER in exercising such rights and remedies will be charged against CONTRACTOR in an amount approved as to reasonableness by ENGINEER, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. Such direct, indirect and consequential costs will include but not be limited to fees and charges of engineers, architects, attorneys and other professionals, all court and arbitration costs and all costs of repair and replacement of work of others destroyed or damaged by correction, removal or replacement of CONTRACTOR's *defective* Work. CONTRACTOR shall not be allowed an extension of the Contract Time because of any delay in performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies hereunder.

ARTICLE 14—PAYMENTS TO CONTRACTOR AND COMPLETION

Schedule of Values:

14.1. The schedule of values established as provided in paragraph 2.9 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to ENGINEER. Progress payments on account of Unit Price Work will be based on the number of units completed.

Application for Progress Payment:

14.2. At least twenty days before each progress payment is scheduled (but not more often than once a month), CONTRACTOR shall submit to ENGINEER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that OWNER has received the materials and equipment free and clear of all liens, charges, security interests and encumbrances (which are hereinafter in these General Conditions referred to as "Liens") and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect OWNER's interest therein, all of which will be satisfactory to OWNER. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

CONTRACTOR's Warranty of Title:

14.3. CONTRACTOR warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

Review of Applications for Progress Payment:

14.4. ENGINEER will, within ten days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to OWNER, or return the Application to CONTRACTOR indicating in writing ENGINEER's reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application. Ten days after presentation of the Application for Payment with ENGINEER's recommendation, the amount recommended will (subject to the provisions of the last sentence of paragraph 14.7) become due and when due will be paid by OWNER to CONTRACTOR.

14.5. ENGINEER's recommendation of any payment requested in an Application for Payment will constitute a

representation by ENGINEER to OWNER, based on ENGINEER's on-site observations of the Work in progress as an experienced and qualified design professional and on ENGINEER's review of the Application for Payment and the accompanying data and schedules that the Work has progressed to the point indicated; that, to the best of ENGINEER's knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.10, and to any other qualifications stated in the recommendation); and that CONTRACTOR is entitled to payment of the amount recommended. However, by recommending any such payment ENGINEER will not thereby be deemed to have represented that exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work beyond the responsibilities specifically assigned to ENGINEER in the Contract Documents or that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or OWNER to withhold payment to CONTRACTOR.

14.6. ENGINEER's recommendation of final payment will constitute an additional representation by ENGINEER to OWNER that the conditions precedent to CONTRACTOR's being entitled to final payment as set forth in paragraph 14.13 have been fulfilled.

14.7. ENGINEER may refuse to recommend the whole or any part of any payment if, in ENGINEER's opinion, it would be incorrect to make such representations to OWNER. ENGINEER may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

14.7.1. the Work is *defective,* or completed Work has been damaged requiring correction or replacement,

14.7.2. the Contract Price has been reduced by Written Amendment or Change Order,

14.7.3. OWNER has been required to correct *defective* Work or complete Work in accordance with paragraph 13.14, or

14.7.4. of ENGINEER's actual knowledge of the occurrence of any of the events enumerated in paragraphs 15.2.1 through 15.2.9 inclusive.

OWNER may refuse to make payment of the full amount recommended by ENGINEER because claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work or Liens have been filed in connection with the Work or there are other items entitling OWNER to a set-off against the amount recommended, but OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action.

Substantial Completion:

14.8. When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Within a reasonable time thereafter, OWNER, CONTRACTOR and ENGINEER shall make an inspection of the Work to determine the status of completion. If ENGINEER does not consider the Work substantially complete, ENGINEER will notify CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within fourteen days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefor. If, after consideration of OWNER's objections, ENGINEER considers the Work substantially complete, ENGINEER will within said fourteen days execute and deliver to OWNER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, maintenance, heat, utilities, insurance and warranties. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

14.9. OWNER shall have the right to exclude CONTRACTOR from the Work after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

Partial Utilization:

14.10. Use by OWNER of any finished part of the Work, which has specifically been identified in the Contract Docu-

ments, or which OWNER, ENGINEER and CONTRACTOR agree constitutes a separately functioning and useable part of the Work that can be used by OWNER without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following:

14.10.1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees, CONTRACTOR will certify to OWNER and ENGINEER that said part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, OWNER, CONTRACTOR and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers that part of the Work to be substantially complete, the provisions of paragraphs 14.8 and 14.9 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

14.10.2. OWNER may at any time request CONTRACTOR in writing to permit OWNER to take over operation of any such part of the Work although it is not substantially complete. A copy of such request will be sent to ENGINEER and within a reasonable time thereafter OWNER, CONTRACTOR and ENGINEER shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If CONTRACTOR does not object in writing to OWNER and ENGINEER that such part of the Work is not ready for separate operation by OWNER, ENGINEER will finalize the list of items to be completed or corrected and will deliver such list to OWNER and CONTRACTOR together with a written recommendation as to the division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, maintenance, utilities, insurance, warranties and guarantees for that part of the Work which will become binding upon OWNER and CONTRACTOR at the time when OWNER takes over such operation (unless they shall have otherwise agreed in writing and so informed ENGINEER). During such operation and prior to Substantial Completion of such part of the Work, OWNER shall allow CONTRACTOR reasonable access to complete or correct items on said list and to complete other related Work.

14.10.3. No occupancy or separate operation of part of the Work will be accomplished prior to compliance with the requirements of paragraph 5.15 in respect of property insurance.

Final Inspection:

14.11. Upon written notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, ENGINEER will make a final inspection with OWNER and CONTRACTOR and will notify CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or *defective*. CONTRACTOR shall immediately take such measures as are necessary to remedy such deficiencies.

Final Application for Payment:

14.12. After CONTRACTOR has completed all such corrections to the satisfaction of ENGINEER and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, marked-up record documents (as provided in paragraph 6.19) and other documents—all as required by the Contract Documents, and after ENGINEER has indicated that the Work is acceptable (subject to the provisions of paragraph 14.16), CONTRACTOR may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied by all documentation called for in the Contract Documents, together with complete and legally effective releases or waivers (satisfactory to OWNER) of all Liens arising out of or filed in connection with the Work. In lieu thereof and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full; an affidavit of CONTRACTOR that the releases and receipts include all labor, services, material and equipment for which a Lien could be filed, and that all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible, have been paid or otherwise satisfied; and consent of the surety, if any, to final payment. If any Subcontractor or Supplier fails to furnish a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

Final Payment and Acceptance:

14.13. If, on the basis of ENGINEER's observation of the Work during construction and final inspection, and ENGINEER's review of the final Application for Payment and accompanying documentation—all as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application to OWNER for payment. Thereupon ENGINEER will give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.16.

Otherwise, ENGINEER will return the Application to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application. Thirty days after presentation to OWNER of the Application and accompanying documentation, in appropriate form and substance, and with ENGINEER's recommendation and notice of acceptability, the amount recommended by ENGINEER will become due and will be paid by OWNER to CONTRACTOR.

14.14. If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.1, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

Contractor's Continuing Obligation:

14.15. CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by ENGINEER, nor the issuance of a certificate of Substantial Completion, nor any payment by OWNER to CONTRACTOR under the Contract Documents, nor any use or occupancy of the Work or any part thereof by OWNER, nor any act of acceptance by OWNER nor any failure to do so, nor any review and approval of a Shop Drawing or sample submission, nor the issuance of a notice of acceptability by ENGINEER pursuant to paragraph 14.13, nor any correction of *defective* Work by OWNER will constitute an acceptance of Work not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents (except as provided in paragraph 14.16).

Waiver of Claims:

14.16. The making and acceptance of final payment will constitute:

14.16.1. a waiver of all claims by OWNER against CONTRACTOR, except claims arising from unsettled Liens, from *defective* Work appearing after final inspection pursuant to paragraph 14.11 or from failure to comply with the Contract Documents or the terms of any special guarantees specified therein; however, it will not constitute a waiver by OWNER of any rights in respect of CONTRACTOR's continuing obligations under the Contract Documents; and

14.16.2. a waiver of all claims by CONTRACTOR against OWNER other than those previously made in writing and still unsettled.

ARTICLE 15—SUSPENSION OF WORK AND TERMINATION

Owner May Suspend Work:

15.1. OWNER may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than ninety days by notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if CONTRACTOR makes an approved claim therefor as provided in Articles 11 and 12.

Owner May Terminate:

15.2. Upon the occurrence of any one or more of the following events:

15.2.1. if CONTRACTOR commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if CONTRACTOR takes any equivalent or similar action by filing a petition or otherwise under any other federal or state law in effect at such time relating to the bankruptcy or insolvency;

15.2.2. if a petition is filed against CONTRACTOR under any chapter of the Bankruptcy Code as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against CONTRACTOR under any other federal or state law in effect at the time relating to bankruptcy or insolvency;

15.2.3. if CONTRACTOR makes a general assignment for the benefit of creditors;

15.2.4. if a trustee, receiver, custodian or agent of CONTRACTOR is appointed under applicable law or under contract, whose appointment or authority to take charge of property of CONTRACTOR is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of CONTRACTOR's creditors;

15.2.5. if CONTRACTOR admits in writing an inability to pay its debts generally as they become due;

15.2.6. if CONTRACTOR persistently fails to perform the Work in accordance with the Contract Documents

(including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.9 as revised from time to time);

15.2.7. if CONTRACTOR disregards Laws or Regulations of any public body having jurisdiction;

15.2.8. if CONTRACTOR disregards the authority of ENGINEER; or

15.2.9. if CONTRACTOR otherwise violates in any substantial way any provisions of the Contract Documents;

OWNER may, after giving CONTRACTOR (and the surety, if there be one) seven days' written notice and to the extent permitted by Laws and Regulations, terminate the services of CONTRACTOR, exclude CONTRACTOR from the site and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the Work as OWNER may deem expedient. In such case CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct, indirect and consequential costs of completing the Work (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) such excess will be paid to CONTRACTOR. If such costs exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such costs incurred by OWNER will be approved as to reasonableness by ENGINEER and incorporated in a Change Order, but when exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

15.3. Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

15.4. Upon seven days' written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the Work and terminate the Agreement. In such case, CONTRACTOR shall be paid for all Work executed and any expense sustained plus reasonable termination expenses, which will include, but not be limited to, direct, indirect and consequential costs (including, but not limited to, fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs).

Contractor May Stop Work or Terminate:

15.5. If, through no act or fault of CONTRACTOR, the Work is suspended for a period of more than ninety days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within thirty days after it is submitted, or OWNER fails for thirty days to pay CONTRACTOR any sum finally determined to be due, then CONTRACTOR may, upon seven days' written notice to OWNER and ENGINEER, terminate the Agreement and recover from OWNER payment for all Work executed and any expense sustained plus reasonable termination expenses. In addition and in lieu of terminating the Agreement, if ENGINEER has failed to act on an Application for Payment or OWNER has failed to make any payment as aforesaid, CONTRACTOR may upon seven days' written notice to OWNER and ENGINEER stop the Work until payment of all amounts then due. The provisions of this paragraph shall not relieve CONTRACTOR of the obligations under paragraph 6.29 to carry on the Work in accordance with the progress schedule and without delay during disputes and disagreements with OWNER.

Article 16 deleted and pages 31 and 32 omitted intentionally.

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ARTICLE 17—MISCELLANEOUS

Giving Notice:

17.1. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

Computation of Time:

17.2.1. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.2.2. A calendar day of twenty-four hours measured from midnight to the next midnight shall constitute a day.

General:

17.3. Should OWNER or CONTRACTOR suffer injury or damage to person or property because of any error, omission or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim will be made in writing to the other party within a reasonable time of the first observance of such injury or damage. The provisions of this paragraph 17.3 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or repose.

17.4. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon CONTRACTOR by paragraphs 6.30, 13.1, 13.12, 13.14, 14.3 and 15.2 and all of the rights and remedies available to OWNER and ENGINEER thereunder, are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply. All representations, warranties and guarantees made in the Contract Documents will survive final payment and termination or completion of the Agreement.

VOLGA WATER SUPPLY WELL NO. 7

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

ARTICLE 1 - DEFINITIONS

SC-1. The terms used in these Supplementary Conditions which are defined in the General Conditions of the Construction Contract have the meanings assigned to them in the General Conditions.

ARTICLE 2 - PRELIMINARY MATTERS

SC-2.3. Amend the last sentence of paragraph 2.3. of the General Conditions to read as follows:

> In no event will the Contract Time commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

ARTICLE 4 - AVAILABILITY OF LAND; PHYSICAL CONDITIONS; REFERENCE POINTS

Physical Conditions:

SC-4.2. In the preparation of Drawings and Specifications, ENGINEER has relied upon:

4.2.1. The following report of exploration and tests of subsurface conditions at the site of original Well No. 5 and 6.

4.2.1.1. Report of the South Dakota Geological Survey, Vermillion, S.D., Special Report 51, Ground-Water Investigation for the City of Volga by Assad Barari.

4.2.1.2. Logs of Wells No. 5 & 6 taken by Layne-Minnesota Co. dated July 8, 1970 and July 21, 1970.

Copies of this report and well logs, which are not included with Bidding Documents, may be examined at the office the ENGINEER.

ARTICLE 5 - BONDS AND INSURANCE

Contractor's Liability Insurance:

SC-5.3. The limits of liability for the insurance required by paragraph 5.3 of the General Conditions shall provide coverage for not less

than the following amounts or greater where required by Laws and Regulations:

5.3.1 and 5.3.2. Worker's Compensation, etc. under paragraph 5.3.1 and 5.3.2 of the General Conditions:

(1) State:	Statutory
(2) Applicable Federal (e.g. Longshoreman's)	Statutory
(3) Employer's Liablility:	$ 100,000

5.3.3, 5.3.4, 5.3.5 and 5.3.6. Comprehensive General Liability (under paragraphs 5.3.3 through 5.3.6 of the General Conditions):

(1) Bodily Injury (including completed operations and products liability):

$ 1,000,000	Each Occurrence
$ 1,000,000	Annual Aggregate, Products and Completed Operations

(2) Property Damage:

$ 1,000,000	Each Occurrence
$ 1,000,000	Annual Aggregate

or a combined single limit of $ 1,000,000

Property Damage liability insurance will provide Explosion, Collapse and Underground coverages where applicable.

5.3.7. Comprehensive Automobile Liability:

(1) Bodily Injury:

$ 1,000,000	Each Person
$ 1,000,000	Each Accident

(2) Property Damage:

$ 1,000,000	Each Occurrence

or a combined single limit of $ 1,000,000

Contractual Liability Insurance:

SC-5.4. The Contractual Liability required by paragraph 5.4 of the General Conditions shall provide coverage for not less than the following amounts:

5.4.1. Bodily Injury:

$ 1,000,000	Each Occurrence

5.4.2. Property Damage:

$ 1,000,000	Each Occurrence
$ 1,000,000	Annual Aggregate

Owners Liability Insurance:

SC-5.5. OWNER and ENGINEER shall be included by endorsement as additional insureds on CONTRACTOR's General Liability Policy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

SC-6.1 SCOPE OF WORK: The CONTRACTOR will, in good workmanlike manner, perform all work required by this Contract, within the time herein specified, in accordance with the provisions of these CONTRACT DOCUMENTS, SPECIFICATIONS and DRAWINGS and in accordance with the directions of the ENGINEER. The CONTRACTOR shall be subject to all terms, conditions, requirements and limitations of the CONTRACT DOCUMENTS and SPECIFICATIONS and shall complete the entire work to the satisfaction of the ENGINEER and OWNER. The WORK shall be complete and all work, materials and services not expressly called for in the SPECIFICATIONS or not shown on the DRAWINGS which may be necessary for complete and proper construction to carry out the WORK in good faith shall be performed, furnished and installed by the CONTRACTOR at no increase in cost to the Minnehaha Community Water Corporation.

SC-6.2 SITE INVESTIGATION: The CONTRACTOR acknowledges that he has satisfied himself as to the nature and location of the work, the general and local conditions, particularly those bearing on transportation, handling and storage of materials, the character of the equipment and facilities needed during the prosecution of the work and all other matters which can in any way affect the work or the cost thereof under this contract. Any failure of the CONTRACTOR to acquaint himself with the available information concerning those conditions will not relieve him from responsibility for estimating properly the difficulties or cost of successfully performing the work.

SC-6.3 PRESERVATION OF EXISTING VEGETATION: The CONTRACTOR will preserve and protect all existing vegetation such as trees, shrubs and grass on or adjacent to the site, which do not unreasonably interfere with the construction as may be determined by the ENGINEER. The CONTRACTOR shall be responsible for unauthorized cutting or damaging of trees and shrubs, including damage due to careless operation of equipment, stockpiling of materials, or tracking of grass areas by equipment.

Care will be taken by the CONTRACTOR to avoid any unnecessary damage to vegetation that is to remain place. The CONTRACTOR shall be liable for or may be required to replace or restore at his own expense all vegetation not protected and preserved as required herein that may be destroyed or damaged.

SC-6.4 REFERENCE SPECIFICATIONS: The reference to other specifications for the various materials to be furnished by the CONTRACTOR shall include, in addition to the basic specifications, all emergency alternate

specifications which have been promulgated and are in effect on the date bids are received. Where more than one reference specification is referred to for a material, the material may be furnished in accordance with any one of the referred specifications at the Contractor's option, unless otherwise noted.

SC-6.5 UTILITY SERVICE - GENERAL: Arrangements shall be made with the ENGINEER before disconnecting or connecting existing utility services and all temporary service connections made shall be removed after their purpose has been served. All costs of installing, disconnecting and the user fee for utility services shall be paid by the CONTRACTOR.

Existing utility lines shall have right-of-way over all other lines and all such lines encountered by the CONTRACTOR shall be carefully maintained in proper alignment unless adjustment of the existing utility can be made without altering its purpose. Should the grade at which any line is being laid under the Contract cause that line to intersect an existing utility line, then the laying of the line shall be stopped until new grades shall have been established or the matter adjusted by the ENGINEER.

The OWNER shall assist the CONTRACTOR in determining the location of existing electric, water, and sewer utility lines prior to starting work in each area.

SC-6.6 TEMPORARY WATER CONNECTIONS: The CONTRACTOR shall obtain water for the requirements of the construction work at his own expense. All water shall be carefully conserved. Before final acceptance, all temporary connections and piping installed by the CONTRACTOR shall be removed in a manner satisfactory to the ENGINEER. All costs of installing, disconnecting and the user fee for water services shall be paid by the CONTRACTOR.

SC-6.7 TEMPORARY ELECTRICAL SERVICE: The CONTRACTOR shall furnish and install the service lines for the requirements of the construction work at his own expense. All temporary connections shall be subject to the approval of the utility company and the ENGINEER. All permits, licenses, fees and costs for the amount of electricity consumed for the completion of construction shall be paid for by the CONTRACTOR.

All connections to service lines shall be disconnected upon completion of the work at the CONTRACTOR'S expense and as directed by the ENGINEER.

SC-6.8 CONSTRUCTION SEQUENCE. During the construction of the wells, the Contractor shall schedule operations to maintain the existing wells in service at all times. Shutdowns required to make connections to existing electrical and piping systems shall be coordinated with the OWNER to occur during periods of low water usage.

SC-6.9 WORK BY OTHERS. The CONTRACTOR is required, as outlined in the appropriate sections of the Technical Specifications, to furnish, install, check out, and startup all equipment specified for the water supply wells. This shall include coordination of utilities, power company personnel, Owner personnel, manufacturers and equipment representatives,

and such other trades as to make all the various equipment systems functional at check-out time and the subsequent full time on-line status.

SC-6.10 PRIOR APPROVALS. The prior approval submittals on well pumps shall inlcude efficiency and operating curves for the pumps proposed. Prior approval requests must be in the office of the Engineer a minimum of five (5) days prior to bid if they are to be considered. A minimum of six (6) copies shall be submitted.

SC-6.11 SHOP DRAWINGS AND SAMPLES. The Contractor shall submit shop drawings and/or samples as required by these Specifications prior to incorporating the items contained into the work. The shop drawings shall be complete including drawings, brochures, diagrams, illustrations, performance data and other items necessary to demonstrate compliance with the Specifications. Samples shall represent the actual material or item furnished and shall include such certification or documentation necessary to demonstrate full compliance with the Specifications. Approval of shop drawings and/or samples by the Engineer will constitute approval only of the design concept of the project and will in no way relieve the Contractor of responsibility for compliance with the requirements of the specificaitons. Six copies of shop drawings shall be submitted.

Items requiring shop drawing submittals shall include:

Well Pumps
Pitless Adaptor Units
Well Screen
Valves
Meter Pit
Pressure Gauges
Electrical Enclosures, Conduit, Conductors & Equipment
Controls

SC-6.12 INSTALLATION, OPERATION AND MAINTENANCE MANUALS. Manufacturers Installation, Operation and Maintenance (IOM) manuals shall be provided for the following items:

Well Pumps
Pitless Adaptor and Accessories
Valves
Electrical Equipment
Controls

Six (6) sets of IOM manuals shall be furnished to the Engineer. The manuals shall be bound in three-ring binders. The manuals shall have the equipment furnished on the job clearly identified within the manual. Information pertaining to items not furnished shall be crossed out or deleted.

SECTION 1 - CONCRETE

1.01 SCOPE: The work covered by this section consists of furnishing all material and equipment and performing all necessary labor to complete all plain, reinforced concrete and concrete grout work and all incidentals thereto, as shown on the Drawings and as specified in these Specifications.

1.02 GENERAL: The Contractor shall check the Drawings and other sections of these Specifications for specified concrete compressive strength requirements and items of related work. Unless otherwise specified on the Drawings or in these Specifications the concrete furnished and placed shall conform to the Structural Concrete classification of Section 1.05, A(1), herein.

1.03 MATERIALS:

A. Cement: All cement used in concrete work shall be portland cement conforming to all requirements of the "Standard Specifications for Portland Cement" (ASTM C150), and shall be Type _____. (When no type is specified, the requirements of Type I shall govern.)

These specifications cover the types of portland cement listed below:

TYPE I - (Normal). For use in general concrete construction when the special properties of other types are not required.

TYPE II. For use in general concrete construction exposed to moderate sulfate action.

TYPE III. For use when high early strength is required.

TYPE IV. For use when a low heat of hydration is required.

TYPE V. (Sulfate-Resisting). For use when high sulfate resistance is required.

B. Aggregates: Concrete aggregates shall conform to "Specifications for Concrete Aggregates" (ASTM C33), except as modified herein.

The maximum size of aggregate shall be no larger than one-fifth of the narrowest dimension between sides of forms within which concrete is to be cast nor larger than three-fourths of the minimum clear spacing between reinforcing bars, or between reinforcing bars and forms. For unreinforced slabs the maximum size of aggregate shall not be larger than one-third the slab thickness. These requirements may be waived if, in the judgment of the Engineer, the mixture possesses sufficient workability that the concrete can be placed without honeycombs or voids.

(1) Fine Aggregate:

(1.1) Composition: Fine aggregate shall consist of natural sand, composed of clean, hard, durable, uncoated, well rounded grains, preferably of siliceous materials.

(1.2) Deleterious Substances: The maximum percentage of deleterious substances shall not exceed the following values.

Material finer than 200 mesh sieve	2% by weight
Shale	1% by weight
Coal and Lignite	1/4% by weight
Clay Lumps	1% by weight
Other deleterious substances	2% by weight

The sum of the percentages of the above deleterious substances shall not exceed two percent by weight.

All fine aggregates shall be free from injurious amounts of alkali and organic impurities.

(1.3) Grading: Fine aggregate shall be well graded from coarse to fine and when tested by standard laboratory sieves shall conform to the following requirements.

	Percent by Weight	
	Minimum	Maximum
Passing No. 3/8" sieve	100	---
Passing No. 4 sieve	95	100
Passing No. 16 sieve	45	80
Passing No. 50 sieve	10	30
Passing No. 100 sieve	---	8

(2) Coarse Aggregate:

(2.1) Composition: Coarse aggregate shall consist of crushed limestone, trap rock, granite, washed gravel, or other approved inert materials having clean, hard, strong, durable pieces, free from adherent coatings and conforming to the requirements of these Specifications, and approved by the Engineer.

(2.2) Deleterious Substances: The maximum percentage of deleterious substances shall not exceed the following values:

Material finer than 200 mesh sieve	1% by weight
Coal and Lignite	1/4% by weight
Clay lumps	1/4% by weight
Soft Fragments	1% by weight
Shale and other low specific gravity materials	1% by weight

The sum of the percentages of the above deleterious substances shall not exceed two percent by weight.

(2.3) Grading: Coarse aggregate shall be well graded between the limits specified and shall conform to the following requirements by dry weight:

Requirement	Nominal Maximum Size of Aggregate 1½"	1"	3/4"
Passing the 2 inch sieve	100%	---	---
Passing the 1½ inch sieve	95-100%	100%	---
Passing the 1 inch sieve	---	95-100%	100%
Passing the 3/4 inch sieve	35-70%	---	90-100%
Passing the 1/2 inch sieve	---	25-60%	---
Passing the 3/8 inch sieve	10-30%	---	20-55%
Passing the No. 4 sieve	0-5%	0-10%	0-10%

Unless otherwise governed by requirements of these specifications, or authorized by the Engineer, coarse aggregate used in walls or slabs more than eight (8) inches thick shall be 1 1/2" or 1" nominal size aggregate, and coarse aggregate used in walls or slabs less than eight (8) inches thick shall be 1" or 3/4" nominal size aggregate.

C. Mixing Water: Water for concrete shall be clean and free from injurious amounts of mud, oil, acid, alkali, organic matter, or other deleterious substances, and shall be of a quality approved by the Engineer.

D. Metal Reinforcement:

(1) Reinforcing Bars: Unless noted on the Drawings, or otherwise specified in these Specifications, reinforcing bars shall be Grade 60, conforming to the requirements of the "Specifications for Deformed Billet - Steel Bars for Concrete Reinforcement" (ASTM A615).

(2) Bar and Rod Mats: Bar and rod mats for concrete reinforcement shall conform to "Specifications for Fabricated Steel Bar or Rod Mats for Concrete Reinforcement" (ASTM A184).

(3) Wire: Wire for concrete reinforcement shall conform to "Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement (ASTM A82).

(4) Welded Wire Fabric: Welded wire fabric for concrete reinforcement shall conform to "Specifications for Welded Steel Wire Fabric for Concrete Reinforcement" (ASTM A185), except that the weld shear strength requirement of these specifications shall be extended to include a wire size differential up to and including six gages.

E. Preformed Expansion Joint Filler: Unless otherwise shown on the Drawings or specified in these Specifications, expansions joint filler shall be asphalt impregnated strips, 1/2 inch in thickness,

conforming to "Specifications for Preformed Expansion Joint Filler for Concrete" (ASTM D994). Filler shall extend for the full depth of concrete slabs and finish.

F. Preformed Waterstops: Unless otherwise shown on the Drawings or specified in these Specifications, waterstops shall be extruded from virgin polyvinyl chloride plastic resins conforming to U.S. Army Corps of Engineers waterstop specification CRD-C572-71, latest addition.

G. Admixtures: Air-entraining admixtures shall conform to "Specifications for Air-Entraining Admixtures for Concrete" (ASTM C260). Other admixtures, approved for use, shall conform to appropriate ASTM Standards.

H. Curing Compounds: Liquid membrane-forming compounds for curing concrete shall conform to ASTM (C-309). Unless otherwise specified or approved, Type I curing compound shall be used.

I. Form Release Agents: Form coating or releasing agent, shall be a non-oil base compound completely compatible with the membrane curing compound used and which does not stain concrete.

J. Hot-Pour Concrete Joint Sealer: Unless otherwise shown on the Drawings or specified in these specifications, hot-poured elastic joint sealer shall be a mixture of virgin synthetic rubber or reclaimed rubber or a combination of the two, with asphalt and plasticizers and tacifiers conforming to ASTM D-1190.

K. Liquid Neoprene Joint Sealer: Liquid neoprene joint sealer shall be a two component sealing compound consisting of a neoprene base material and a catalyst that are mixed at the job site. The sealer shall conform to Federal Specification SS-S-159b and ASTM D-1850.

L. Preformed Cork Joint Filler: Cork joint filler shall be produced from clean, selected granulated cork bonded together securely with a phenolic resin, conforming to ASTM D-1752, Type II.

M. Concrete Block Masonry Units: Masonry units shall be made with sand-gravel aggregate and shall conform to ASTM C90 or ASTM C145 for Grade N-1 units. The net size of units shall be as indicated on the Drawings. Unless otherwise specified, all units shall be of the normal weight classification.

1.04 STORAGE OF MATERIALS: Cement and aggregates shall be stored so as to prevent deterioration or intrusion of foreign matter. Liquid admixtures shall be protected from freezing and from settling out of solution. Reinforcement steel shall be stored on platforms or other supports which will prevent contact of the steel with the ground or surface water.

1.05 CONCRETE QUALITY:

A. General: The allowable stresses for the design of the structure are based on the specified compressive strength of the concrete cylinder at 28 days or at the earliest age at which the concrete may be expected to receive its full load. Unless otherwise shown on the Drawings or specified in these Specifications, concrete used shall conform to the following strength criterion:

(1) Structural Concrete: Concrete used in the various structures shall have a minimum ultimate 28-day compressive strength of not less than 4000 psi when tested in accordance with the "Standard Method of Test for Compressive Strength of Molded Concrete Cylinders"(ASTM C39).

(2) Fill Concrete: Concrete used to replace unstable soil or excavated material to prevent settlement and to transmit dead load stresses to a stable sub-grade and for embedment where no forms are used, shall attain a minimum ultimate 28-day compressive strength of not less than 2500 psi when tested in accordance with the "Standard Method of Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C39).

B. Concrete Strength and Water-Cement Ratio: The determination of the water-cement ratio for proper quality of paste for the desired strength shall be determined by one of the following methods:

(1) Method 1 - Without Preliminary Tests: When no preliminary strength tests of the concrete to be used are made, the water-cement ratio shall not exceed the following values for specified compressive strength at 28-days.

Specified Compressive Strength fc', psi	**Max. Permissible Water-Cement Ratio	
	Absolute Ratio By Weight	U.S. Gal. per 94-lb. bag
2,500	0.54	6.1
3,000	0.46	5.2
3,500	0.40	4.5
4,000	0.35	4.0
4,500	0.30	3.4
5,000	*	*

*For Specified strengths in excess of 4500 psi, proportions shall be selected by Method 2.

**Including free moisture on aggregates.

(2) Method 2 - For Combination of Materials Previously Evaluated or to be Established by Trial Mixtures: A water-cement ratio other than shown above may be used provided that the relationship between strength and water-cement ratio for the

materials to be used has been previously established by reliable test data and the resulting concrete satisfies the requirements of Paragraph 1.06.

Where previous data is not available, concrete trial mixtures having proportions and consistency suitable for the work shall be made using at least three different water-cement ratios which will produce a range of strengths encompassing those required for the work. For each water-cement ratio, at least four specimens for each age to be tested shall be made and cured in accordance with "Method of Making and Curing Concrete Compression and Flexure Test Specimens in the Laboratory" (ASTM C192) and tested for strength in accordance with "Method of Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C 39). The strength tests shall be made at 28-days, or the earlier age at which the concrete is to receive load. A curve shall be established showing the relationship between water-cement ratio and compressive strength. The maximum permissible water-cement ratio for the concrete to be used in the structure shall be that shown by the curve to produce an average strength to satisfy the requirements of Paragraph 1.06. No substitutions shall be made in the materials used on the work without additional tests in accordance herewith to show that the quality of the concrete is satisfactory.

C. Concrete Proportions and Consistency: The proportions of the concrete shall produce a mixture that will work readily, with the placement method used, into corners and angles of forms and around reinforcement. Segregation of materials in the mixture shall not be permitted nor collection of excess free water on the surface.

The slump of concrete shall be the minimum that is practicable. When vibrators are used to consolidate concrete, the slump shall not exceed 4 in.; otherwise, the slump shall not exceed 6 in.

The ratio of cement to dry fine aggregate shall be that necessary to provide the maximum density of the mixture when used in the resulting concrete. This determination of the proper ratio shall be made by an approved independent testing laboratory, at the expense of the Contractor, using representative samples of the aggregates which will be used, and shall be approved by the Engineer. The batch proportions used shall be such that full bags of cement are used in each batch. Structural concrete shall contain a minimum of six 94 lb. bags of cement per cubic yard of concrete.

All structural concrete shall have air entrained by use of air-entraining cement, or an air-entraining admixture. Air

content of the air-entrained concrete shall conform to the following:

Max.-Size Coarse Aggregate, inch	Air Content, per cent by Volume
1 1/2	4 to 6
3/4 or 1	5 to 7
3/8 or 1/2	6 1/2 to 8 1/2

The methods of measuring concrete materials shall be such that the proportions can be accurately controlled and easily checked at any time during the work. Measurement of materials for Ready-Mixed Concrete shall conform to the Standard Specifications for Ready-Mixed Concrete ASTM C94.

1.06 TESTS ON CONCRETE:

A. Making and Curing Compression Test Specimens: During the progress of the work compression test specimens shall be made and cured in accordance with the "Standard Method of Making and Curing Concrete Compression and Flexure Test Specimens in the Field" (ASTM C31). Each test shall consist of at least three specimens. Not less than one test shall be made for each strength of concrete placed on any one day and at least one test for each pour for each 50 cubic yards of concrete or fraction thereof placed.

Specimens shall be cured under laboratory conditions except that when, in the opinion of the Engineer, there is a possibility of the surrounding air temperature falling below 40°F., he may require additional specimens to be cured under job conditions.

The Contractor shall have available at the job site sufficient approved molds for making the required test cylinders.

B. Test for Compression Strength: Specimens shall be tested in accordance with the "Standard Method of Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C39). For each test, one specimen shall be tested at the age of 7 days and two specimens shall be tested at the age of 28 days. Tests shall be made by an approved independent Testing Laboratory. Two copies of the test reports shall be submitted to the Engineer.

The average of any five consecutive strength tests of the laboratory cured specimens representing each class of concrete shall be equal to or greater than the specified strength and not more than 20% of the strength tests shall have values less than the specified strength.

When it appears that the laboratory-cured specimens will fail to conform to the requirements for strength, the Engineer shall have the right to order changes in the concrete mix proportions for the remaining portion of the structure, sufficient to increase the strength to meet these requirements. The strengths of the specimens cured on the job are intended to indicate the adequacy of protection and curing of the concrete and may be used to determine when the forms may be stripped, shoring removed, or the structure placed in service. When, in the opinion of the Engineer, the strengths of the job-cured specimens are excessively below those of the laboratory-cured specimens the Contractor may be required to improve the procedures for protecting and curing the concrete.

In addition, when concrete fails to conform to the requirements above or when tests of field-cured cylinders indicate deficiencies in protection and curing, the Engineer may require tests in accordance with "Methods of Securing, Preparing and Testing Specimens for Hardened Concrete for Compressive and Flexural Strength" (ASTM C42) or order load tests for that portion of the structure where the questionable concrete has been placed.

C. Tests for Slump: Slump tests shall be made according to "Method of Test for Slump of Portland Cement Concrete" (ASTM C143).

D. Tests for Air Content: Air content of concrete shall be tested according to either "Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method" (ASTM C231) or "Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method" (ASTM C173).

1.07 MIXING AND PLACING CONCRETE:

A. Preparation of Equipment and Place of Deposit: Before placement, all equipment for mixing and transporting the concrete shall be cleaned, and all debris and ice shall be removed from the places to be occupied by the concrete. Forms shall be thoroughly wetted (except in freezing weather) or coated with a releasing agent and masonry filler units that will be in contact with concrete shall be well drenched (except in freezing weather). The reinforcement shall be thoroughly cleaned of ice, dirt, loose rust and mill scale, or other coatings.

Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the engineer. All laitance and other unsound material shall be removed from hardened concrete before additional concrete is added.

B. Mixing:

(1) Ready Mixed Concrete: Ready mixed concrete shall be mixed and delivered in accordance with "Specifications for Ready-Mixed Concrete" (ASTM C94).

The Engineer shall have free access to the mixing plant at all times.

The Subcontractor furnishing ready-mix concrete shall have sufficient plant and transportation facilities to assure continuous delivery of concrete to the project site at the required rate.

(2) Job Mix Concrete: For job-mixed concrete, the mixer shall be rotated at a speed recommended by the manufacturer. If mixer performance tests are not made, each batch of 1 cu.yd. or less shall be mixed for at least 1 minute after all materials are in the mixer. The mixing time shall be increased 15 seconds for each additional cubic yard or fraction thereof. The entire batch shall be discharged before the mixer is recharged.

The concrete shall be mixed only in such quantities as are required for immediate use. No retempering of concrete will be permitted.

C. Conveying: Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent the separation or loss of materials.

Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery end without separation of materials.

D. Placing: Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall be placed at such a rate that it is at all times plastic and flows readily between bars. No concrete that has partially hardened or been contaminated by foreign material shall be deposited on the work, nor shall retempered concrete be used.

When placing is once started, it shall be carried on as a continuous operation until the placement of the panel or section is completed. The top surface shall be generally level. When construction joints are necessary, they shall be made in accordance with Paragraph 1.12F.

All concrete shall be thoroughly compacted by suitable means during the operation of placing, and shall be thoroughly worked around reinforcement, embedded fixtures and into the corners of the forms. Vibrators may be used to aid in the placement of concrete provided they are used under experienced supervision and the forms designed to properly withstand this action.

Surfaces to be finished shall be brought to proper grade, struck off, and finished in a workmanlike manner. No honeycombing, rough spots, or protruding stones shall be left exposed. Floors shall be smooth with uniform grade and the thickness full depth at all locations as shown on the plans.

The Contractor's Superintendent in charge of concrete work shall mark in ink on the Drawings the time and the date of the placing of concrete in the different members. Such Drawings shall be kept on file at the job until the completion of the structure and shall be subject to the inspection of the Engineer at all times.

1.08 CONCRETE GROUT

A. Materials:

(1) Cement: The cement shall be as specified in section 1.03A, herein.

(2) Fine Aggregate: Sand or fine aggregate shall be as specified in section 1.03 B(1), herein.

(3) Coarse Aggregate: Gravel or crushed stone coarse aggregate shall be as specified in section 1.03 B(2), herein.

(4) Water: Water used in mixing shall be as specified in section 1.03 C, herein.

(5) Non-Shrink Non-Metallic Grouting Aggregate: Non-shrink non-metallic grout mix shall be Sealtight V-3 Grout, Sonogrout, or equal, conforming to all the requirements of Corps of Engineers CRD-C 588-70.

(6) Non-Shrink Metallic Grouting Aggregate: Non-shrink metallic grouting aggregate shall be Master Builders Company Embeco, Sonneborn Ferrolith G, or an approved graded metallic aggregate free from oil, grease, and soluble alkaline compounds. The metallic aggregate shall be combined when manufactured with a finely divided plasticizing material, a cement dispersing agent, and an oxidation catalyst.

The metallic portion of this material which shall constitute not less than 70% by weight of the total composition shall comply with the grading:

Screen No.	Percent. Passing
8	90 - 100
16	70 - 85
30	35 - 50
50	5 - 10
100	0 - 5

B. Mixes:

(1) Bond Coat: Where a bond coat is required, the bond coat shall consist of 1 part portland cement and 1 part fine aggregate or 1 part metallic grouting aggregate by weight, thoroughly mixed with sufficient water to produce a grout of brushable consistency.

(2) Neat Cement Grout: Neat cement grout shall be proportioned as follows:

(2.1) Wet or fluid mix: (Up to 1" thick)	1 part cement 1 part fine aggregate (0-8 graded sand)
(2.2) Medium mix: (1" to 2" thick)	1 part cement 2 parts fine aggregate
(2.3) Lean mix: (2" to 3" thick)	1 part cement 2 1/2 parts fine aggregate 3 1/2 parts coarse aggregate (3/8" max.)
(2.4) Dry-pack mix:	1 part cement 2 1/2 parts fine aggregate

(3) Non-Shrink Non-Metallic Grout: Non-shrink non-metallic grout shall be proportioned by mixing a minimum amount of water with commercial pre-mixed grout mix consistent with placeability mix desired. The grout shall be proportioned as follows:

(3.1) Plastic Mix:	4 quarts water 1/2 cubic foot pre-mixed grout
(3.2) Pumpable Mix:	5 quarts water 1/2 cubic foot pre-mixed grout

(4) Non-Shrink Metallic Grout: Non-shrink metallic grout shall be proportioned as follows:

(4.1) Wet mix:	(Up to 1" thick)	1 part cement 1 part fine aggregate 1 part metallic grout aggregate
(4.2) Lean mix:	(Over 1" thick)	1 part cement 1 part fine aggregate 1 part metallic grout aggregate 1 1/2 parts coarse aggregate (3/8" max.)

(5) Concrete Replacement Grout: Grout for large fill areas or repair should consist of a concrete mix having the same water-cement ratio as used for a similar new structure. As large a maximum size of aggregate and as low a slump as consistent with proper placing and thorough vibration should be utilized to minimize water content and consequent shrinkage. The concrete should contain 3 to 5% entrained air. Where surface color is important, the cement should be carefully selected, or blended with white cement, to obtain desired results. To minimize shrinkage, the concrete should be as cool as practicable when placed.

C. Mixing: The grout shall be thoroughly mixed by hand, turning the entire dry mix over sufficient times to insure even distribution of its components, or it shall be mixed in a mechanical type mixer for not less than 3 minutes.

D. Placement:

(1) Preparation: Where equipment supports require grouting, the equipment shall be placed and aligned and/or leveled on shims and the bolts drawn tight. Supports to be grouted shall be at the temperature of the room and/or atmosphere when the grout is placed. The space to be occupied by the grout shall be thoroughly cleaned, removing all dirt, oil, grease, and loose material. The contact concrete surface shall be saturated with water, but no free water shall remain on the surfaces when the grout is placed.

(2) Bond Coat: Immediately prior to placing the grout the bond coat specified in paragraph B(1) shall be brushed onto the saturated surface of the concrete and scrubbed into that surface throughout the contact area or for a distance as far back under the bedplate of the equipment as is practicable. The grout shall be placed before the bonding grout has dried out or taken an initial set.

(3) Grouting: The grout shall be placed by whatever means is most practicable, depending on the equipment to be grouted in. The grout may be dry packed by raming, pressure grouted by gravity, by pneumatic pressure, or by pumping, or poured in place.

Whatever means for placing the grout is employed, the grout shall be thoroughly compacted and all air pockets removed. Chains placed under the equipment at intervals before pouring the grout may be used for this purpose.

Whenever practicable, grout shall be poured from one end or side only to avoid excessive air entrapment.

1.09 CEMENT MORTAR: Mortar used in concrete block construction shall be proportioned 1 part cement to 3 1/2 parts fine aggregate. Cement, fine aggregate, and water shall be as specified in sections 1.03A, 1.03B(1) and 1.03C, herein. Cement and sand shall first be combined in the proper proportions, and then thoroughly mixed with the required amount of water. The quantity of water to be used in the preparation of mortar shall be only that required to produce a mixture sufficiently workable for the purpose intended. Mortar shall be used as soon as possible after mixing and shall show no visible signs of setting prior to use. Retempering of mortar will not be permitted.

1.10 CURING: Provisions shall be made for maintaining concrete in a moist condition for at least 5 days after the placement of the concrete, except that for high-early-strength concretes, moist curing shall be provided for at least the first 3 days.

Curing shall commence as soon as free water has disappeared from the surface after finishing. Curing of formed soffits of beams, girders, floor slabs and similar surfaces shall be accomplished by moist curing with forms in place for the full curing period. Curing may be accomplished by any of the following methods:

A. Moist Curing: Surfaces shall be kept continually wet by covering with burlap, mats or sand, thoroughly saturated with water and covering kept wet by spraying or hosing. Place materials to provide complete coverage and lap all joints a minimum of 3-inches.

B. Impervious - Sheeting Curing · Surfaces shall be thoroughly wetted with a fine spray of water and then covered with waterproof paper, polyethylene sheeting or polyethylene-coated waterproof paper. Edges and ends of sheeting shall be overlapped not less than 4-inches and securely cemented or taped to form a continuous cover.

C. Membrane Curing: Apply curing compound to freshly placed concrete surfaces as soon as initial set is reached and after surface is free of excess water in accordance with Manufacturer's printed instructions. Do not use membrane curing on surfaces required to receive additional concrete or concrete fill, on cement finish coats that are to receive hardening and dustproofing treatment unless compatible, nor on vertical surfaces after removal of forms.

1.11 WEATHER REQUIREMENTS

A. Cold Weather Requirements: Adequate equipment shall be provided for heating the concrete materials and protecting the concrete during freezing or near-freezing weather. No frozen materials or materials containing ice shall be used.

All concrete materials and all reinforcement, forms, fillers, and ground with which the concrete is to come in contact shall be free from frost. Whenever the temperature of the surrounding air is below 40°F., all concrete placed in the forms shall have a temperature of between 50°F., and 70°F., and adequate means shall be provided for maintaining a temperature of not less than 70°F. for 3 days or 50°F. for five days. When high-early-strength concrete is used, the temperature shall be maintained at not less than 70°F. for two days or 50°F. for three days. In either case, additional time necessary to insure proper curing of the concrete shall be provided as directed by the Engineer. The housing, covering or other protection used in connection with curing shall remain in place and intact at least 24 hours after the artificial heating is discontinued. No dependence shall be placed on salt or other chemicals for the prevention of freezing.

Whenever heated enclosures are used, care must be taken to assure that the concrete is kept moist during the curing period. Space heaters that will create carbon dioxide shall be properly vented to the outside.

B. Hot Weather Requirements: In hot weather, suitable precautions shall be taken to avoid drying of the concrete prior to finishing operations. Use of windbreaks, sunshades, fog sprays, or other devices shall be provided as directed by the Engineer.

Concrete deposited in hot weather shall not have a placing temperature that will cause difficulty from loss of slump, flash set, or cold joints. Concrete temperature shall be less than 90 deg.F. unless higher temperatures are permitted by the Engineer.

1.12 FORMS AND DETAILS OF CONSTRUCTION

A. Design and Removal of Forms: Forms shall conform to the shape, lines and dimensions of the members as called for on the Drawings, and shall be substantial and sufficiently tight to prevent leakage

of mortar. They shall be properly braced or tied together so as to maintain position and shape.

No construction loads exceeding the structural design loads shall be supported upon any unshored portion of the structure under construction. No construction load shall be supported upon, nor any shoring removed from any part of the structure under construction until that portion of the structure has attained sufficient strength to support safely its weight and the loads placed thereon. This strength may be demonstrated by a job-cured test specimens and by a structural analysis considering the proposed loads in relation to these test strengths. Such analyses and test data shall be furnished by the Contractor to the Engineer.

Forms shall be removed in such a manner as to insure the complete safety of the structure. Where the structure as a whole is supported on shores, the removable floor forms, beams and girder sides, column and similar vertical forms may be removed after 24 hours, providing the concrete is sufficiently strong not to be injured thereby.

B. Cleaning and Bending Reinforcement: At the time concrete is placed metal reinforcement shall be free from loose, thick rust, mill scale, or other coatings that will destroy or reduce the bond. All bars shall be bent cold, unless otherwise permitted by the Engineer. No bars partially embedded in concrete shall be field-bent except as shown on plans or as specifically permitted by the Engineer.

C. Placing Reinforcement: Metal reinforcement shall be accurately placed according to the Drawings and adequately secured in position by concrete, metal, or other approved chairs, spacers, or ties.

D. Splices in Reinforcement: No splices of reinforcement shall be made except as shown on the drawings, or as specified, or as authorized by the Engineer. All welding shall conform to the "American Welding Society's Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction" (AWS D12.1), unless authorized by the Engineer.

E. Concrete Protection for Reinforcement: The metal reinforcement shall be protected by the thickness of concrete indicated on the Drawings. Where not otherwise shown, the thickness of concrete over the reinforcement shall be as follows:

(1) Where concrete is deposited against ground without the use of forms, not less than 3-inches.

(2) Where concrete is exposed to the weather, or exposed to the ground, but placed in forms, not less than 2-inches for bars larger than #5 and 1½ inch for #5 bars or smaller.

(3) In slabs and walls not exposed to the ground or to the weather, not less than 3/4".

(4) In beams, girders and columns not exposed to the ground or to the weather, not less than 1½-inch.

(5) In concrete joist floors, not less than 3/4-inch.

(6) In all cases the thickness of concrete over the reinforcement shall be at least equal to the diameter of round bars, except for slabs and joists as in (3) and (5).

Exposed reinforcing bars intended for bonding with future extensions shall be protected from corrosion by temporary concrete encasement or other adequate covering.

F. Construction Joints: Joints not indicated on the Drawings shall be so made and located as to least impair the strength of the structure. All construction joints shall be keyed, have water stops where required, and have reinforcing steel extended through the joints except where otherwise required by the Engineer. Directly after concrete placement is completed, reinforcing steel projecting beyond the concrete shall be thoroughly cleaned. Where a joint is to be made, the surface of the concrete shall be thoroughly cleaned and all laitance removed. Before the placing of new concrete, vertical joints shall be thoroughly wetted and slushed with a coat of neat cement grout.

A delay, at least until the column concrete is no longer plastic and at least until the latest time it can still be vibrated, must occur in the columns or walls before depositing in beams, girders, or slabs supported thereon. Beams, girders, brackets, column capitals and haunches shall be considered as part of the floor system and shall be placed integrally therewith.

Construction joints in floors shall be located near the middle of the spans of slabs, beams or girders, unless a beam intersects a girder at this point, in which case the joints in the girders shall be offset a distance equal to twice the width of the beam. Provision shall be made for transfer of shear and other forces through the construction joint.

G. Surface Finish:

(1) Exposed Concrete Other Than Slabs: Immediately after forms are removed, and while temperature of the concrete, ambient air and mortar is above 50°F., surface defects shall be remedied as follows: Fins and loose material shall be removed. Honeycomb, aggregate pockets, voids over 1/2 inch in diameter, and holes left by the rods or bolts shall be cut out to solid concrete, thoroughly wetted, brush-coated with neat cement grout and filled with mortar. Mortar shall be a stiff mix of 1 part blended portland and white cements to 2 parts fine aggregate passing the No. 16 mesh sieve and minimum amount of water. When dry, the

color of the mortar shall approximately match the adjoining concrete color. Mortar shall be thoroughly compacted in place. Holes passing entirely through walls shall be filled from the inside face by forcing mortar through to the outside face. Holes that do not pass entirely through the wall shall be packed full. Patchwork shall finish flush and in the same plane as adjacent surfaces. Exposed patchwork shall be finished to match adjoining surfaces in texture and color. The entire area shall be kept damp during finishing operations to insure no excessive moisture loss in the concrete prior to application of curing compound. Protruding portions of bar supports shall be ground flush with concrete surfaces.

After the above operations have been completed, smooth finish shall be given to concrete surfaces that are exposed to view as finished work. Smooth finish shall consist of thoroughly wetting and then brush-coating the surface with cement grout composed by volume of 1 part cement and 2 parts fine aggregate passing the No. 30 mesh sieve and mixed with water to the consistancy of thick paint. Cement shall be a blend of white cement and portland cement, proportioned as determined by trial mixes, so that the final color of grout, when dry, will be approximately the same as the color of the surrounding concrete. Grout shall be cork or wood floated to fill all pits, air bubbles, and surface holes. Excess grout shall be scraped off with a trowel and the surface rubbed with burlap to remove any visible grout film. In hot, dry weather, the grout shall be kept damp by means of fog spray during the setting period. The finish of any area shall be completed in the same day and the limits of a finished area shall be made at natural breaks in the finished surface.

(2) Interior Floor Slabs & Stairs: The ambient temperature of spaces being finished shall not be less than 50^{0} F. Finished floor slab surfaces shall be true plane surfaces with no deviation in excess of 1/8 inch when tested with 10-foot straightedge. Surfaces shall be pitched to drains. The dusting of finished surfaces with dry materials or additions of water to concrete surfaces will not be permitted. The concrete floor slabs shall be screeded and floated with straightedges to bring the surface to the required finish level with no coarse aggregate visible. The concrete, while still green but sufficiently hardened to bear a man's weight without deep imprint, shall be wood-floated to a true, even plane with no coarse aggregate visible. Sufficient pressure shall be used on the wood floats to bring moisture to the surface. After the surface moisture has disappeared, surfaces shall be steel-troweled to a smooth, even, dense finish, free from blemishes including trowel marks.

(3) Exterior Slabs, Curbs and Gutters, Walks and Stairs: Broom finish shall be given to exterior surfaces. The concrete

shall be screeded and floated to the required finish level with no coarse aggregate visible. After the surface moisture has disappeared and laitance has been removed, surfaces shall be steel troweled to an even smooth finish. The troweled surfaces shall be broomed with a fiber-bristle brush in a direction transverse to that of the main traffic.

H. Embedded Items: All sleeves, inserts, anchors and/or other embedded items required for adjoining work or its support shall be positioned accurately and supported against displacement prior to placement of concrete. Voids in sleeves, inserts and anchor slots shall be temporarily filled with readily removable material to prevent the entry of concrete into the voids.

All anchor bolts to be installed in fresh concrete, except bolts installed in pipe sleeves such as are used for machinery foundation bolts, shall be provided with sufficient threads to permit a nut to be installed on the concrete side of the concrete form or supporting template. When the bolt is installed, a second nut shall be attached to the bolt on the outside of the form or supporting template, and two nuts adjusted and tightened in such a manner that the bolts will be rigidly held in proper alignment.

All anchor bolts which are required to be installed in hardened concrete shall be anchored thereto by means of three unit (unless otherwise required by the Drawings) lead cinch anchors of the size or sizes corresponding to the bolts on which they are used. The size of the drill holes and the methods of installation of these anchors shall be in accordance with the manufacturer's specifications, except that the minimum depth of the holes shall be one inch greater than as stipulated in the manufacturer's tables.

Waterstops that are to be placed in joints shall be positioned accurately in accordance with the Drawings, and supported against displacement prior to placement of concrete.

All contractors, whose work is related to, embedded in or supported by the concrete, shall be given ample notice and opportunity to introduce and/or furnish embedded items before placement of concrete.

I. Openings in Concrete: The Contractor shall provide all necessary openings in concrete for piping or other work to be installed by the Owner or other contractors by inserting steel pipe sleeves cut to exact size and shape, accurately positioned and supported against displacement during placement of concrete.

1.13 MEASUREMENT AND PAYMENT. No separate measurement or payment will be made for the work covered by this section, and all costs in connection therewith shall be included in the contract prices for the various structures or uses to which it pertains.

SECTION 2 - EXCAVATION, TRENCHING AND BACKFILLING

2.01 SCOPE: The work covered by this section consists of furnishing all plant, labor, tools, equipment and materials and performing the necessary operations in connection with excavation, trenching and backfilling for all pipe lines, connecting lines, structures and incidental work thereto; including sheeting and shoring, dewatering, grading, pipe embedment, compaction and clean-up as shown on the Drawings and as specified in these Specifications.

2.02 GENERAL: The Contractor shall do all excavating and trenching work, as shown on the Drawings, through whatever materials may be encountered, to the lines and elevations shown on the Drawings. The Contractor shall do all bedding, filling and backfilling necessary to bring the work to finished grade.

2.03 GUARANTEE: During a period of one year from and after the date of final acceptance by the Owner of the work embraced by this Contract, the Contractor shall make all needed repairs or replace as necessary any damage caused by settlement, at no additional cost to the Owner.

2.04 SITE PREPARATION: The Engineer will establish construction lines and designate all trees, shrubs, plants and other things to remain. All surface objects and all trees, stumps, roots and other obstructions, not designated to remain shall be cleared as required and properly disposed of as directed by the Engineer.

All temporary openings in fences and necessary repairs to replace existing fences in original location and condition shall be performed by the Contractor.

The Contractor shall be responsible for the proper removal, care and resetting of all portable culverts, drainage pipe and other minor structures authorized by the Engineer for temporary relocation from alignment of the work.

2.05 REMOVAL OF WATER:

A. Drainage: The Contractor shall at all times during the construction of the work provide and maintain ample equipment to remove and dispose of all water entering the excavation or other parts of the work. The excavation shall be kept dry until all work therein has been completed and backfilling commenced. During backfilling, the water level shall be maintained at least one foot below deposited backfill. All grading in the vicinity of the excavation shall be performed in such a manner as to provide positive surface drainage away from the site and to prevent surface water from flowing into the excavation.

B. Dewatering: During trenching operations for installation of utilities, when ground water is encountered in sufficient quantities to require continuous pumping with well points or other special handling in order to maintain a satisfactory dry trench condition, it shall be considered wet trench. In such case the Contractor shall submit to the Engineer for approval

his proposed method of disposing of the water prior to initiating the dewatering procedure. When provided for in the schedule of bid items of the Contract Documents, Trench Dewatering shall be measured as an item for payment.

2.06 EXCAVATION AND TRENCHING:

A. General: The Contractor shall perform all excavation of every description and of whatever substances encountered, to the depths indicated on the Drawings or as otherwise specified. Excavated materials shall be piled a sufficient distance from the banks of the excavation to avoid overloading and to prevent slides or cave-ins.

All excavated materials not required for fill or backfill shall be removed and disposed of as indicated or as directed by the Engineer.

All excavation shall be made by open cut method as shown on the Plans. The banks of trenches shall be kept as nearly vertical as practicable and where required shall be properly sheathed and braced. Trenches shall be not less than 12-inches wider nor more than 16-inches wider than the outside diameter of the pipe laid therein, and shall be excavated true to line, so that clear space of not less than 6-inches nor more than 8-inches in width is provided on each side of the pipe. The maximum width of trench specified applies to the width at and below the level of the top of the pipe. The width of trench above that level may be as wide as necessary for sheathing and bracing, and the proper installation of the work. The bottom of trenches shall be accurately graded to provide uniform bearing and support for each section of pipe on stable soil at every point along its entire length, except for portions of the pipe sections where it is necessary to excavate for bell holes. Bell holes shall be dug after the trench bottom has been graded. Bell holes shall be excavated only to an extent sufficient to permit accurate work in the making of the joints and to insure that the pipe, for a maximum of its length, will rest upon the prepared bottom of the trench. The bottoms of all trenches shall be rounded so that at least one-fourth of the circumference of the pipe shall rest firmly on undisturbed or compacted soil. Under no circumstances will it be permissible to leave a pipeline excavation unprotected or unguarded when work is not actually in progress on the pipeline. If it becomes necessary for the Contractor to leave the pipeline excavation for any reason, it shall be the Contractor's responsibility to leave one of his employees at the site to watch the site so unauthorized personnel do not enter the excavation. Unless otherwise required, the pipeline excavation shall be completely backfilled at the end of each day's operation, and reopened when work resumes on this portion of the line. The Contractor shall be responsible to mark the end of the pipe in such a manner that it may be easily found when the ditch is reopened.

Excavation for structures and accessories, including manholes, shall be of sufficient size so as to leave at least twelve (12) inches of clear space between the outer surface of the structure and the embankment or sheathing and bracing which may be used to hold and protect them. Unless otherwise shown on the Drawings or authorized by the Engineer, the bottom of the excavation shall not be undercut below the grades established. Manhole installations shall be completed and completely backfilled the same day in which the excavation was started.

B. Undercutting: Where rock is encountered at the bottom of utility trenches, the rock shall be excavated to a minimum over-depth of six (6) inches below the grade established for the trench bottom and replaced with bedding material.

Where soft, spongy, unstable or other similar material is encountered upon which the bedding material, structure or pipe is to be placed, this unsuitable material shall be removed to a depth ordered by the Engineer and replaced with an approved granular material or fill concrete as directed by the Engineer.

C. Protection of Excavation: The Contractor shall provide suitable sheeting, shoring and bracing to protect all excavations to provide safe working conditions, and in strict conformance with safety regulations. Damage or injury resulting from settlement, slides, cave-ins, water pressure or other causes shall be the responsibility of the Contractor and damage shall be repaired at his own expense.

The Contractor shall provide adequate signs, barricades, red lights and watchmen and take all necessary precautions for the protection of the work and the safety of the public. All barricades and obstructions shall be protected at night by red signal lights which shall be kept burning from sunset to sunrise. Barricades shall be of substantial construction and shall be painted white or whitewashed to increase their visibility at night. Suitable signs shall be so placed as to show in advance where construction, barricades or detours exist.

The Contractor shall at all times so conduct his work as to insure the least possible obstruction to traffic and inconvenience to the general public and the residents in the vicinity of the work, and to insure the protection of persons and property. No road or street shall be closed to the public except with the permission of the proper authority. Any police or other traffic control shall be arranged for by the Contractor and be at his expense. Fire hydrants on or adjacent to the work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the Contractor to insure the use of sidewalks and the proper functioning of all gutters, sewer inlets, drainage ditches, and irrigation ditches, which shall not be obstructed except as approved by the Engineer.

D. Protection of Existing Utilities: Existing utilities shall be protected from damage during the excavation and backfilling operations, and if damaged, shall be repaired by the Contractor, at his expense. It shall be the Contractor's responsibility to arrange with each utility company known to maintain utilities in the area of work to have all underground facilities located and staked by the utility company prior to excavation.

E. Grading and Stockpiling: During excavation, unless otherwise shown on the Drawings or specified herein, material suitable for bedding and backfill shall be placed in stockpiles in approved locations, so selected as not to interfere with the work being performed under this contract or in the normal operation of other unrelated functions. Stockpiles shall be placed a sufficient distance back from the edges of the excavation to avoid overloading, and to prevent slides or cave-ins.

Stockpiles shall be kept in a neat, well drained workable condition at all times.

F. Disposal of Excess Material: Material in excess of that required for the permanent work and/or any material unsuitable for backfill shall be disposed of by the Contractor as shown on the Drawings or as directed by the Engineer.

2.08 BEDDING:

A. General: Bedding shall be defined as that material supporting, surrounding and extending to one (1) foot above the top of the pipe or conduit. Where it becomes necessary to undercut the bottom of the utility trench to remove rock or other interfering objects at subgrade for bedding, any void below such subgrade shall be filled with compacted bedding material as shown on the Drawings or approved by the Engineer.

Where it is necessary to remove soft, spongy, unstable or other similar material which is incapable of properly supporting the structure or pipe, any void below the bottom of the structure or pipe shall be filled with compacted granular embedment material or fill concrete as directed by the Engineer.

Where it is necessary for any reason to undercut below the bottom of concrete poured in place structures, the void below the bottom of the structure shall be filled with concrete at the same time and of the same quality as that of the structure itself, unless otherwise shown on the Drawings or approved by the Engineer. If the necessity for such additional bedding material has been caused by an act or failure to act on the part of the Contractor, the Contractor shall bear the expense of the additional excavation and bedding.

Bedding material shall be first placed so that the pipe is uniformly supported for the full length of the barrel with full bearing on the bottom segment of the pipe equal to a minimum of one-fourth the circumference of the pipe. The remainder of the bedding shall then be placed around and over the pipe in uniform layers approximately four (4) inches in depth. Each layer shall be properly hand compacted.

B. Bedding Material: Bedding material shall be selected material from the excavation stockpile, granular embedment material or concrete, as shown on the Drawings or directed by the Engineer.

Selected bedding material shall be, where possible, free-draining granular material. When approved by the Engineer, excavated earth free from large stones, hard dry lumps, frozen lumps, debris or organic matter may be used. Select material shall be sufficiently pulverized to permit proper compaction.

Granular embedment material shall be screened pit run gravel or crushed aggregate in the general size range of 1/4" to 1".

Fill concrete shall conform to the requirements of Section 1 - CONCRETE.

2.08 BACKFILLING:

A. General: Backfill shall be considered as starting one (1) foot above the top of the pipe or conduit. All material below this point shall be considered as bedding.

Backfill, or fill, as the case may be, for precast or cast-in-place structures, such as, but not limited to, manholes, transition structures, junction structures, vaults, valve boxes and reinforced concrete box conduits shall start at the subgrade for the structure.

Except where the pipe must remain exposed for leakage and exfiltration tests and subject to the provisions herein, the Contractor shall proceed as soon as possible with backfilling operations. Care shall be exercised so that the structure or pipe will not be damaged or displaced. If the pipe is supported by concrete cradle placed between the trench wall and the pipe, backfill above the concrete bedding shall not be placed nor sheeting pulled for at least 24 hours after placement of the concrete.

Unless otherwise specified or authorized by the Engineer, backfill against or over the top of any cast-in-place structure shall not be placed prior to seven (7) days after completion of concrete placement.

Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, the voids remaining shall be backfilled with suitable material and compacted as approved by the Engineer.

Voids left by the removal of sheeting, piles and similar sheeting supports shall be immediately backfilled with clean sand which shall be jetted into place to assure dense and complete filling of the voids.

Backfill shall be placed and mechanically compacted in accordance with the applicable requirements of paragraph 2.10, herein.

Any backfill improperly placed or where settlement occurs, shall be removed to the depth required for proper compaction, then replaced and compacted as required to finished grade.

B. Backfill Material: The material obtained from the project excavations may be used as backfill unless otherwise shown on the Drawings or specified in these Specifications, provided that all organic material, rubbish, debris, rocks greater than six (6) inches in any dimension, and other objectionable materials are first removed.

C. Top Soil: The Contractor shall remove available top soil to surface embankments and excavation backfills of trenches and around structures on the site of the work at the locations requiring top soil. This top soil shall be stock-piled separately and placed on the embankments and backfill after all construction across, over or above such embankments and backfill has been completed. The minimum total depth of top soil shall be 6 inches or of greater depth as may be specified or indicated on the plans.

2.09 COMPACTION OF BACKFILL:

A. General: Backfill shall be mechanically compacted by means of tamping rollers, sheepsfoot rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers. All such equipment shall be of a size and type approved by the Engineer.

Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent ground, existing improvements, or improvements installed under the contract. The Contractor shall make his own determination in this regard.

Material for mechanically compacted backfill shall be placed in lifts which, prior to compaction, shall not exceed the thickness specified below for the various types of equipment:

(1) Impact, free-fall, or "stomping" equipment - maximum lift thickness of three (3) feet.

(2) Vibratory equipment, including vibratory plates, vibratory smooth-wheel rollers, and vibratory pneumatic-tired rollers - maximum lift thickness of two (2) feet.

(3) Rolling equipment including sheepsfoot (both vibratory and non-vibratory), grid, smooth-wheel (non-vibratory), pneumatic-tired (non-vibratory), and segmented wheels - maximum lift thickness of one (1) foot.

(4) Hand-directed mechanical tampers - maximum lift thickness of four (4) inches.

A minimum of three (3) feet of backfill material shall be placed over the top of a pipe before operating vibratory, sheepsfoot, impact, free-fall or "stomping" type compaction equipment.

Mechanically compacted backfill shall be placed in horizontal layers of thickness (not exceeding those specified above) compatible to the material being placed and the type of equipment being used. Each layer shall be evenly spread, moistened (or dried, if necessary), and then tamped or rolled until the specified relative compaction has been attained.

Compaction adjacent to all valve boxes, fittings, end of lines and similar locations shall be performed by the use of hand-directed mechanical tampers with lifts not exceeding that specified above.

B. Backfill in Unimproved Areas: Backfill in areas not containing surface improvements shall be compacted as specified in paragraph 2.09 A, to a density at least equal to that of the surrounding soil.

C. Backfill in Areas Containing Surface Improvements: Backfill in areas containing surface improvements shall be compacted as specified in paragraph 2.09 A, except that backfill material shall be placed in lifts not to exceed six (6) inches in loose depth. Each layer shall be uniformly

compacted to a minimum of 95% of maximum dry density, as defined by ASTM 1557, before successive lifts are placed. The backfill material shall be compacted at a moisture content of no less than four (4) percentage points below the optimum moisture content.

D. Backfill in Sodded Areas: Backfill under lawns or special sodded areas shall be compacted as specified in paragraph 2.09 A, except that backfill material shall be placed in lifts not to exceed eight (8) inches in loose depth. Each layer shall be uniformly compacted to a density of that of the surrounding soil or to a minimum of 90% of maximum dry density, as defined by ASTM 1557, whichever is the greater, before successive lifts are placed. The top six (6) inches of backfill shall be topsoil salvaged from the excavation material.

2.10 SITE CLEANUP: Before final acceptance of the work the Contractor shall clear the entire worksite of equipment, unused materials, and rubbish so as to present a satisfactory clean and neat appearance. Agricultural areas shall be scarified with spring tooth harrows and finely raked to a smooth surface free of rocks and debris.

2.11 MEASUREMENT AND PAYMENT:

A. Excavation, Bedding, Backfilling and Incidentals: All excavation of every description; site preparation; removal of water; sheeting and shoring; bedding; backfilling; compaction; water for compaction; moving and resetting fences, portable culverts and minor structures; grading; shaping; salvaging, stockpiling and placing topsoil; traffic control; site cleanup and other incidentals required to complete the work shall not be measured for payment separately, but shall be considered as a subsidiary obligation of the Contractor in the installation of pipe, structures, specials and other items of measurement and the entire cost thereof shall be included in the Contract unit prices bid for furnishing and installing pipe, structures, specials or other items for which payment is established.

B. Granular Embedment: Granular material furnished and placed as authorized bedding material shall be measured in tons. Payment shall be made at the contract unit price per ton for "Granular Embedment" as stipulated in the Bid, which price and payment shall be full compensation for furnishing granular materials and all tools, labor and equipment required to haul and install the bedding in accordance with the Specifications. Granular embedment material required to replace unauthorized excavated material, or for the control of water shall be furnished and installed by the Contractor at his cost without further compensation.

3. WATER SUPPLY WELLS

3.01 SCOPE. These Specifications are intended to provide the information necessary for all parties concerned with the contract to know the nature and amount of equipment, materials and work required to successfully complete one (1) 200 gpm water well.

All of these specifications are in accordance with the American Water Works Association Standard for Deep Wells (AWWA A100). These specifications are intended to supplement or modify the standards to fit the needs or expected conditions. Also, for more detailed description of the work to be performed, reference is made to a particular section of the AWWA Standard.

3.02 LOCATION. The proposed water supply well to be constructed under these specifications is located approximately one mile west and three quarters mile south of Volga, South Dakota. The more exact location is shown on the attached Location Map.

3.03 LOCATION CONDITIONS. The Contractor shall satisfy himself regarding all local conditions affecting his work by personal investigation. Neither the site information contained in these specifications nor that derived from maps or plans or from the Owner or his agents or employees shall act to relieve the Contractor from any responsibility hereunder from fulfilling any and all of the terms and requirements of his contract.

The Contractor shall make arrangements with the Owner for water required for drilling of the wells. Two existing wells owned by the Owner are located in the vicinity from which the Contractor may obtain water. The water for drilling shall be available to the Contractor from well No. 5 or 6 without cost. Contractor is responsible for temporary piping, fittings, etc.

3.04 PERSONNEL AND DRILLING EQUIPMENT: The Contractor shall supply capable and experienced personnel and suitable drilling equipment to perform this work. Each bidder shall supply a list along with his bid which shows:

A. Experience record of Contractor on wells of similar depth and capacity.

B. Name and experience record of person or persons likely to serve as construction superintendent.

C. Manufacturer's name and model number of drilling machine or machines to be used. This includes mud pump and power unit and other pertinent equipment.

Adequate safety equipment, i.e., hard hats, hard toed shoes, and gloves shall be used by the drilling crew while on the job site.

Drilling method used shall be one of the following; forward rotary, reverse rotary, or forced caisson.

Other methods of drilling shall be submitted in writing to the Engineer for review and approval not less than five (5) days prior to the date for opening of Bids.

3.05 PERMITS: After the award has been made the Contractor shall apply for and acquire permits from authorized agencies, as required. No field operation shall commence until these necessary approvals have been obtained.

3.06 MOBILIZATION AND DEMOBILIZATION: This item in the bid schedule includes moving onto and off the site all the materials and equipment for constructing and developing the wells. It also includes cleaning up the site upon completion of the contract. Mobilization and demobilization will be paid only once for the completion of the wells.

3.07 MATERIALS: The materials required for the construction of these wells shall be in accordance with the following requirements:

A. Drilling Fluid: It is the Contractor's responsibility that equipment for measuring fluid properties shall be immediately available at the rig site.

1. Inorganic drilling fluid-sodium-bentonite base fluid such as Quick Gel (or equal) shall have the following properties:
   a. Maximum fluid weight 9.5 lb./gal.
   b. Maximum marsh funnel viscosity 45 seconds.
   c. Maximum filter cake thickness 3/32-inches.
   d. Maximum 30 minute watter loss 15 cc.
   e. Maximum sand content of drilling fluid entering pump 4% by volume.
   f. Any additives to this fluid shall have the Engineer's approval.

2. Organic drilling fluid. Guar base fluid with self-destroying properties such as Revert (or equal) shall have the following properties:
   a. Maximum fluid weight 10.0 lb./gal.
   b. Maximum marsh funnel viscosity 65 seconds.
   c. Maximum filter cake thickness 2/32 inches.
   d. Maximum 30 minute water loss 25 cc.
   e. Maximum sand content of drilling fluid entering pump 4% by volume.
   f. Any additives to this fluid shall have the Engineer's approval.

3. Organic drilling fluid shall be used only when drilling in aquifer materials; the upper portion of the hole shall be drilled with an inorganic drilling fluid.

B. Well Casings: All well casings shall be new. They shall be of steel and shall conform to AWWA-A100. The casing shall be joined by either (1) welding in accordance with the Standards of the American Welding Society or (2) threaded and coupled joints.

1. Production Casing - This casing shall have an external diameter of 12 inches and a weight of 49.56 lbs. per foot. It shall be approximately 40 feet in length.

2. The Contractor shall deliver two copies of the mill certificate to the Engineer for approval before delivering the casing to the job site.

C. Cement Grout: A mixture of portland cement (ASTM C150) and not more than 6 gallons water per bag (one cubic foot or 94 lbs.) of cement. The water used shall be fresh, clear and potable.

D. Well Screen:

1. Material and aperture opening. The well screen and its fittings shall be manufactured entirely of Type 304 stainless steel. The well screen aperture opening shall be determined by the well screen manufacturer. It shall have sufficient open area to transmit the desired yield of 200 gpm at an aperture entrance velocity equal or less than 0.1 feet per second.

2. The well screen shall be of the continuous slot, wire wound type. It shall have a minimum inside diameter of 12 inches. Intermediate screen sections shall be joined by welded connections. The welding rod shall be of material suitable for joining stainless steel in order not to reduce the corrosion resistance. The rod selected must be approved by the Engineer.

3. The bottom of the screen shall be fitted with a closed bail bottom of the same connecting material as the screen.

4. Well screen shall be similar and equal to Johnson Well Screen Watermark.

E. Gravel Pack Material: The gravel to be used for the gravel wall around the screen and casing shall be well-rounded particles containing not less than 95% siliceous material with not mroe than 5% calcareous materials. The gravel shall be washed and screened to required sizes for maximum aquifer development. Gravel shall be as produced by Northern Sand and Gravel of Muscatine, Iowa, or Eau Claire Sand and Gravel of Eau Claire, Wisconsin. The gravel size and samples shall be submitted to the Engineer along with certified tests prior to installation. Additional samples shall be selected by the Engineer during installation of the gravel wall. All gravel shall be furnished in bags properly labeled.

1. The grading of the gravel pack shall be selected by the screen manufacturer.

2. The gravel shall be delivered to the job site in 100 lb. bags.

F. Pitless Adaptor Unit: The pitless adaptor unit shall be 12-inch I.D. by 7-foot bury and of the positive self-sealing industrial heavy duty type. It shall have the capability for a minimum full 12-inch diameter thru-seal area for well maintenance purposes.

Positive pressure "O" ring seals shall be used throughout, both for internal well sealing and external surface water sealing. Positive threaded well vent, cable entrance, and extra openings shall be provided and capped. A 4-inch mechanical joint discharge connection one foot from the end of the pitless unit shall be provided. A 3/4-inch x 40'± Schedule 80 PVC drop tube attached to port in cover of the pitless unit shall be provided for drawdown measuring.

The pitless adaptor unit shall be a Baker Monitor Division No. 7P51214WBWE2-4T4-S or 7PS1214WBWEO-4T4-S with separate 4" check valve or equal as manufactured by Whitewater, Maas or Thorpe.

A double check valve assembly is included in the Baker pitless adapter unit specified. If a supplier other than Baker is used, the Contractor shall also furnish and install a 4-inch check valve. The check valve shall be installed in the meter pit downstream of the 4" main line meter. The check valve shall have flanged connections and external lever arm.

G. Valves, Gauges, Meters and Meter Pits: Each well head shall be equipped with a 4-inch direct bury gate valve and a pressure gauge and a 4" main line meter installed in a meter pit adjacent to the well. Valves shall be as specified in Section 4.02d of the Specifications.

4-inch main line flow meter shall be a propellor meter with sweep hand and flow totalizer. Meter shall be complete with remote readout. Meter shall be a Badger Meter Recordall Series or equal as manufactured by Sparling.

Pressure gauges shall be minimum of 3-inch diameter gauges with a pressure range of 0 to 100 psig. Gauges shall be equipped with diaphram isolation and a ball valve to isolate the gauge from the line. Gauges shall be connected to the 4-inch water main with threaded bronze connections and copper pipe. Gauges shall be similar to ERNST Figure 23 or Ashcroft Series 1020. Diaphram seals shall be similar to Ashcroft Type 101.

Meter pits shall be fiber reinforced plastic manholes or precast concrete with a clear inside diameter of 48 inches. Fiberglass reinforcing shall be commercial grade "E" type glass. Resin shall be unsaturated isopthalic polyester containing suitable fungicide. Fiber reinforced connectors shall be bonded to the manhole barrell by an approved adhesive. Closure between pipe and connector shall be by means of a rubber sleeve and two Type 301 stainless steel straps. Fiberglass steps shall be provided. The steps shall be attached with stainless steel fasteners. The meter pits shall be similar and equal to Armco Fiber Reinforced Plastic Manholes.

The top of the pit shall be a precast concrete manhole top similar and equal to the Type II manhole top fabricated by Crete Concrete products. The manhole ring and cover shall be similar and equal to Neenah R-1799-M. Manhole ring shall be set in bitumastic seal similar to Ram-Neck.

Precast concrete manholes shall be standard precast concrete manholes conforming to ASTM C-478.

Meter pit floor shall have 3 inches of crushed rock placed uniformly over floor area to serve as a working surface.

3.08 TEST PUMP AND ACCESSORY EQUIPMENT.

A. The Contractor shall furnish and install a test pump into the production well. The test pump shall be a vertical turbine type with sufficient column and shaft to allow for testing the well to 100 percent drawdown if requested. The test pump shall be operated from a diesel engine or electric unit with variable speed drives and of sufficient size to vary pumping rate from 100 gpm to 500 gpm. When the final test is initiated, it shall be conducted continuously without stoppage. The discharge from the pump shall be equipped with sufficient effluent pipe to carry the water away from the test area (minimum length of 500 feet) and shall be equipped with an orifice meter or other acceptable measuring device to observe the rate of discharge from the pump accurately.

    1. A drawdown measuring tube of metal or plastic shall extend from the base of the pump discharge head to a depth no greater than 2 feet above the pump bowls. This tube shall permit the entry and use of a water level measuring device such as an electric sounder or a steel tape.

3.09 TEST HOLE AND OBTAINING SAMPLES. A test hole shall be drilled in the area of the proposed well to determine the thickest acquifer formation. Test holes shall be no smaller than six (6) inches diameter. The test hole shall be drilled to approximately 50' or through the water bearing formation if greater than 50 feet. Inorganic mud may be used as the drilling fluid.

An accurate driller's log of materials penetrated shall be recorded by the driller who must have the skills to determine the depths and thicknesses of the various underlying strata encountered.

A. Formation samples from the rotary drilled test holes shall be collected and handled in accordance with Bulletin 638-S, "Instructions for Taking Formation Samples", published by UOP-Johnson Division.

B. Water samples should be collected as outlined in "Standard Methods for the Examination of Water and Wastewater" (14th Edition 1975), published jointly by APHA, AWWA and WPCF.

C. It is the Contractor's sole responsibility to secure, protect and deliver all formation and water samples collected from the test holes to the Engineer.

D. After the formation testing has been completed, the test holes shall be filled with inert clay prepared and installed in accordance with the standard adopted by the South Dakota Department of Water and Natural Resources. The site shall be obliterated and restored to original contour.

3.10 TESTING OF FORMATION AND WATER SAMPLES.

A. All samples will be sent to an approved laboratory whereby the following tests will be conducted.

1. Formation Samples:

a. Sieve analysis using five or more standard sieves.

b. Determination of effective size, uniformity coefficient and model size.

c. Percent clay.

d. Permeability.

2. Water Samples:

a. Percent sand (as ppm after 15 minutes of pumping at a designated rate).

b. Chemical analysis including:

(1) Total dissolved solids
(2) Total hardness
(3) Total iron
(4) Total manganese
(5) Chlorides
(6) Nitrates
(7) Total alkalinity
(8) Hydrogen sulfide
(9) pH
(10) Ryznar stability index

c. Temperature of water when pumped shall be measured by the driller and recorded on sample.

3.11 CONSTRUCTION OF THE WELL:

A. General: The Contractor shall drill the well at the location designated by the Engineer. The Contractor shall drill the hole and install the materials previously described in order that the finished wells shall conform to the design illustrated in Figure A and any

applicable standards established by local, state or federal regulatory agencies. The mud pits shall be positioned at least 6 feet from the proposed finished base slab. Other methods of drilling shall be submitted in writing to the Engineer for review and approval not less than five (5) days prior to the date for opening of Bids.

The Contractor shall dispose of drilling mud, cuttings and discharged water in a manner prescribed by the Engineer so as not to create damage to public or private property. During the test pumping, however, the water discharged shall be piped to a point of overland drainage.

B. Drilling - Casing Hole: The Contractor shall drill a 18" diameter hole to accommodate the 12" steel casing to a depth of 50'±. If this depth is adjusted because of underground conditions at the site, payment will be on the basis of unit price per lineal foot of the hole drilled.

C. Setting Steel Casing and Screen: The full diameter screen shall be fastened to the casing by welding procedures conforming to the practice of the American Welding Society. The top of the steel casing shall terminate approximately 2 feet above natural ground level.

The casing and screen shall be centered in the hole such that a minimum of 3 inches exists between the face of the hole and the casing. Centering guides shall be so spaced around and along the pipe to insure adequate clearance for the gravel pack and cementing operation.

1. After the casing and screen have been lowered into position and before gravel pack operations begin, the casing and screen shall be tested for plumbness and alignment. This test shall be made in accordance with Sec. 1-6, "Testing for Plumbness and Alignment", of the AWWA Standard A100-66. Should the casing fail to meet the requirements and interfere with the installation and/or operation of the pumping equipment, the plumbness and/or alignment shall be corrected by the Contractor at his own expense.

D. Gravel Packing: The gravel pack shall be introduced in such a manner that it is readily known (with 10% accuracy) how much volume of gravel is in the hole. It shall be placed in a manner uniform and continuous such that hydraulic segregation and bridging are minimized or eliminated.

1. The gravel shall be placed via gravity through two tremie pipes. These tremie pipes shall be located 180° apart in the annular space around the screen and inner casing. They shall terminate no more than 5 feet above the bottom of the hole or level of the gravel pack already placed in the hole. They shall be gradually lifted and sections removed as the level of gravel placed in the hole rises. Funnel fittings at the tops of the tremie pipes shall be used to facilitate the shoveling of the gravel into the tremie. Clean water shall be used to lubricate the

downward movement of the gravel in the tremie pipes - usually from 1 to 3 gpm.

2. Five pounds of calicum hypochlorite (70% available chlorine) per cubic yard will be mixed in with and placed with the gravel. The gravel pack will be placed until it is 11' below natural ground surface. The rest of the annular space will be sealed with cement grout.

E. Grouting: Grouting of the steel casing from 11 feet below the ground level shall be accomplished in the presence of the Engineer. It shall be out in one continuous operation, filling the annular space between the drilled hole and the casing to the land surface. A 1-foot clay plug or seal shall be placed on top of the gravel pack at the 11-foot level prior to placing the cement grout.

1. The grout shall be placed in the annular space between the driled hole and casing by use of a grout pipe outside the casing. (AWWA Standard A100-66 Sec. A1 8.4.2.1). The pipe shall extend to the bottom of the annular space initially and should remain submerged in grout during the entire time that grout is being placed.

The pipe may be left in place, or it may be gradually removed. In the event of interruption of the grouting operations, the bottom of the pipe shall be raised above the grout level and should not be resubmerged until all air and water have been displaced from the grout pipe. The grout may be pumped into the pipe or applied continuously be gravity. The grout returning to the surface shall be wasted until the Engineer determines that the grouting has been satisfactory.

1. No further work shall be done on the well until the grout has firmly set. (A minimum of 72 hours for neat cement and 24 hours for quick-setting cement).

3.12 DEVELOPING THE WELL.

A. The development process shall be accomplished by simultaneous high velocity, horizontal-jetting and pumping. The O.D. of the jetting tool shall be one inch less in diameter than the screen I.D. The minimum exit velocity of the jetting fluid at the jet nozzle shall be 150 ft/sec. The tool shall be rotated at a speed less than 1 rpm. It shall be positioned at one horizon for not less than two minutes and then shall be moved to the next horizon which shall be no more than 6 inches vertically from the previous jetting horizon. The jetting shall proceed from the bottom of the screen to the top. Pumping from the well shall be at a rate from 5% to 15% more than that introduced through the jetting tool. Water to be used for jetting must be free of sand, turbidity and coliform bacteria.

1. Means shall be provided for removal of sand jetted into the screen and which settles to the bottom and which is not being removed by the installed pumping equipment.

B. In conjunction with high velocity, horizontal-jetting and pumping the well shall be surged using a test pump capable of pumping 150% of the design yield. The surging action shall consist of alternately lifting a column of water to ground level and letting the water fall back in the well. The above process is known as rawhiding the well. Any sand damage to the pump is the responsibility of the Contractor.

C. The development shall continue until the Engineer decides further development is unnecessary.

3.13 TESTING THE WELL. The well will be test pumped for a period of 24 hours or until the water level stabilizes over a 3-hour period at a constant rate of 200 gpm. The discharge of the test pump will be measured via a circular orifice meter and the water level measured with a suitable measuring device to the nearest 1/4 inch. Measurements of the yield and water level will be made every minute for the first 10 minutes of the test, every 5 minutes for the next 90 minutes and then every 15 minutes until 3 hours have passed. Measurements between 3 and 5 hours should be made 30 minutes apart and then after 5 hours and until the end of the test they can be made hourly. A one-gallon water sample shall be obtained within 20 minutes after starting the pump and then about 5 minutes before shutting the pump down. After the pump is shut down, recovery measurements of the water level should be made for a period equal to at least one-half of the pumping period or until the water level has reached the original static level. The schedule of the recovery measurements shall be made at the same time intervals that the measurements were made during the pumping portion of the test.

3.14 INSTALLATION OF PITLESS ADAPTER. After the well has been developed and the pump test completed the Contractor will excavate and cut off the 12" casing at the elevation required to install the 7-foot bury 12-inch diameter pitless adapter. The pitless adapter shall be connected to the steel well casing by a continous weld connection.

3.15 DISINFECTING THE WELL. The well shall be disinfected before removing the test pump from the well and before collecting any samples for determining microbiological quality. This shall be done by introducing a chlorine solution into the well such that a concentration of at least 50 ppm of available chlorine exists in all parts of the well at static conditions. The chlorine solution should be introduced into the well in such a manner that the well surfaces above the static level will be completely flushed with the solution. A minimum of 2 hours contact time should be provided before pumping the well to waste. No separate payment shall be made for this work. Disinfection of the well shall be considered subsidiary to this section of the Specifications. At all times the Contractor shall use all reasonable measures to prevent either tampering with the well or the entrance of foreign matter into it. The Contractor shall be responsible for any objectionable material that may fall into the well and its consequences until the completion and acceptance of the work by the Engineer.

3.16 RECORDS.

A. Two copies of the drillers log, signed and dated by the well driller will be given to the Engineer. The log will record the materials penetrated to the nearest foot.

B. All static water level measurements will be recorded. This record along with the times that the measurements were made, will be given to the Engineer.

C. A complete casing and screen location record will be made by the driller and given to the Engineer. This will show the individual length of sections of casing and screen and the location of packers, plugs and seals.

D. Pumping test data will be supplied to the Engineer from all pumping tests conducted on the well. These will show dates, water levels, discharge rates and times of stopping and starting the pump.

3.17 SITE RESTORATION AND FINISH GRADING. Portland cement concrete used in constructing the well slab shall be in full accordance with SECTION 1 - CONCRETE of these Specifications. Concrete shall have a minimum 28-day compressive strength of 4000 psi.

All areas disturbed in the construction of the well shall be graded to provide proper drainage and a neat appearance. The top six inches of all disturbed areas shall be topsoiled and reseeded as directed by the Engineer, which work shall not be a pay item but shall be considered as subsidiary to this section of the Specifications. The Contractor shall provide fill material as necessary, properly graded and compacted to 95% of maximum density and finished to final established elevations as shown on the drawings attached hereto.

3.18 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT.

A. Mobilization and Demobilization: The mobilization and demobilization of all equipment, tools, materials and manpower to the well site for the City of Volga from the Contractor's offices and locally at the site as required to complete the drilling of the well shall be paid for at the Contract lump sum price for "Mobilization and Demobilization" as stipulated in the Proposal, which price and payment shall be full compensation for mobilization and demobilization of all equipment, tools, material and manpower to complete the well.

B. Drilling Test Holes: The drilling of test holes shall be measured by the number of lineal feet of test holes actually drilled to designated bottoms. No other measurement for payment shall be authorized under this item.

The drilling of a test hole shall be paid for at the contract unit price per linear foot for "Test Holes" as stipulated in the Proposal, which price and payment shall be full compensation for all transportation, furnishing all labor, tools, equipment, materials, supplies,

plant and other necessary items required to drill the test holes, logging and sampling of each strata of the formation, filling abandoned test holes, clean-up and other appurtenances required to complete the work under this section.

C. Drilling Permanent Well: The drilling of the well shall be measured in lineal feet of depth which shall be the total depth of the permanent casing plus screen. Payment for drilling shall be made at the Contract unit cost per lineal foot for "Drilling Permanent Well Hole", as stipulated in the Proposal which price and payment shall be full compensation for all transportation, labor, tools, suplies, materials and equipment required to construct the well hole for the permanent casing and the screen, sampling of the formation if requested and all other pertinent work required to complete the hole.

D. Permanent Casing: The permanent casing installed in the well shall be measured by the actual length in feet of casing furnished and installed. Payment for casing shall be made at the Contract unit price per lineal foot for "Furnish and Install 12-inch O.D. Casing", as stipulated in the Proposal, which price and payment shall be full compensation for all transportation, labor, tools, materials, supplies and equipment required to furnish and install the casing in its final location.

E. Well Screen: The well screen installed in the well shall be measured by the actual length in feet of screen furnished and installed, measured from and including the bail bottom to the top of the connection to the casing. Payment for well screen shall be made at the Contract unit price per lineal foot for "Furnish and Install 12-inch PS Well Screen", as stipulated in the Proposal which price and payment shall include all transportation, labor, tools, material, supplies and equipment required to satisfactorily install the well screen to its final location.

F. Selected Silica Gravel Pack: The selected silica gravel used for the gravel wall around the well screen and casing shall be measured in lineal feet of annular space for the total length of selected silica gravel wall. Payment shall be made at the Contract unit price per lineal foot for "Selected Silica Gravel Pack", as stipulated in the Proposal which price and payment shall be full compensation for all transportation, labor, tools, material and equipment required to construct the selected silica gravel pack in a satisfactory manner.

G. Clay Plug Seal: The clay material used for the clay plug seal around the well casing shall be measured in linear feet of annular space for the total length of clay plug seal. Payment shall be made at the Contract unit price per linear foot for "Clay Plug Seal", as stipulated in the Proposal which price and payment shall be full compensation for all transportation, labor, tools, material and equipment required to construct the clay plug seal in a satisfactory manner.

H. Concrete Grout Seal: The concrete grout used for seal around the well casing shall be measured in lineal feet of depth of seal. Payment shall be made at the Contract unit price per lineal foot for "Concrete Grout Seal", as stipulated in the Proposal which price and payment shall

be full compensation for all transportation, labor, tools, materials and equipment required to construct the concrete grout seal in a satisfactory manner.

I. Development of Permanent Well: Complete development of the well shall be measured by the complete item to produce a clear and sand-free effluent from the well. Payment for development shall be made at the Contract unit price per hour for "Development of Permanent Well", based on actual pump operation time, as stipulated in the Proposal, which price and payment shall be full compensation for all transportation, labor, tools, materials and equipment required to develop the well in a satisfactory manner, including surging, backwashing, installation and removal of test pump, disinfecting the well, clean-up and other appurtenances required to complete the work. The period of development shall be not less than 12 hours under this item.

J. Test Pumping: The actual production pumping test shall be measured by the actual number of hours of continuous operation of the pump performed under the test. An unauthorized interruption of the pumping test shall nullify the test up to the time of interruption and no payment shall be made therefor.

The production pumping test shall be paid for at the Contract unit price per hour for "Production Pumping Test", based on actual pump operation time performed without interruption for the period of time as stipulated in the Proposal, which price and payment shall be full compensation for furnishing labor, materials, supplies, tools and equipment to perform the test pumping, record drawdown and discharge readings during the pumping test, water sampling, record recovery readings and other pertinent work required to complete the testing in a satisfactory manner.

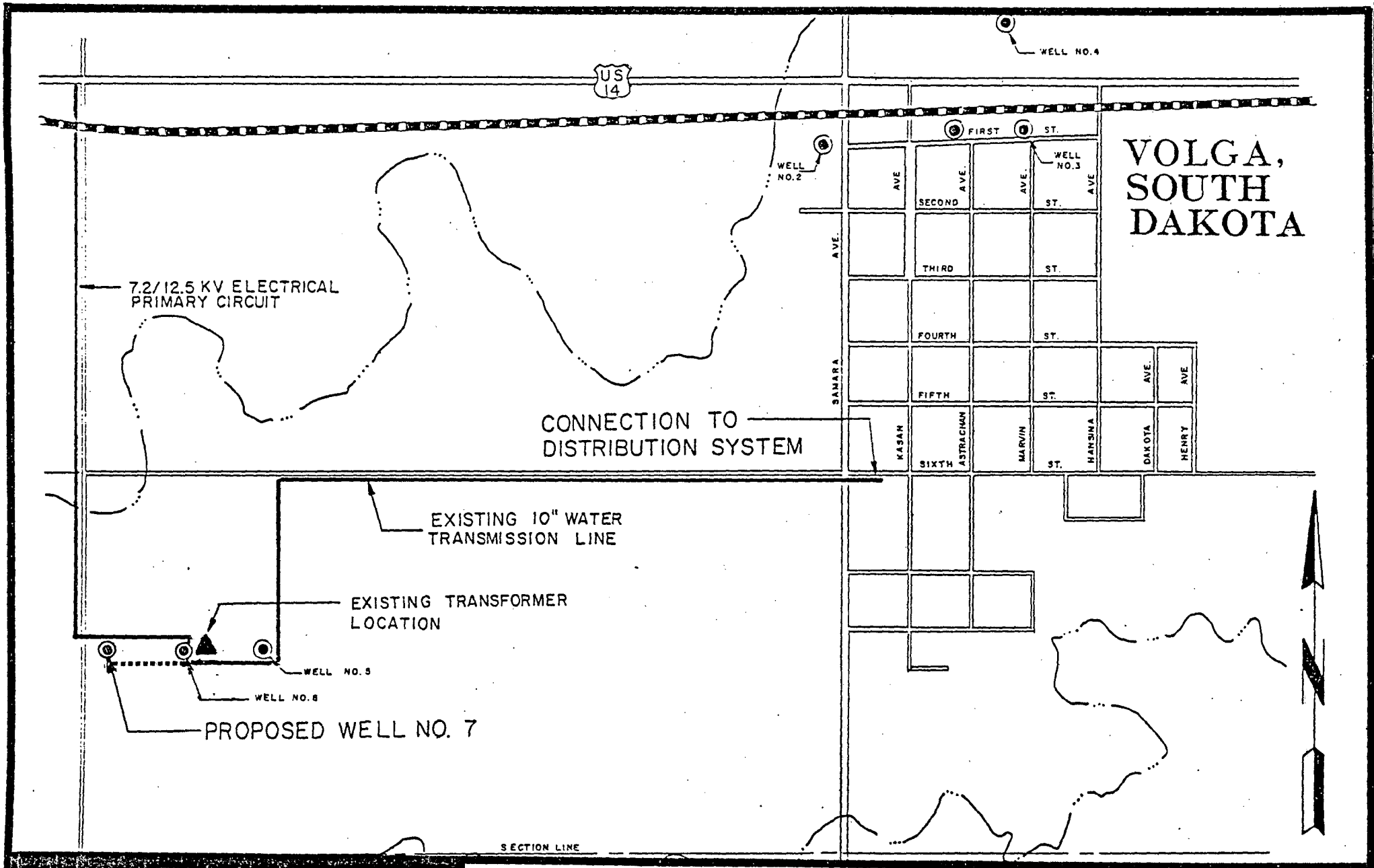
K. Pitless Adaptor Unit: The pitless adaptor unit installed in the well shall be measured as a unit actually furnished and installed as called for on the detailed drawings. Payment for the pitless adaptor unit shall be made at the Contract unit price per each for "Furnish and Install 12-inch I.D. Pitless Adaptor Unit", as stipulated in the Proposal, which price and payment shall be full compensation for all transportation, labor, tools, materials, supplies and equipment required to furnish and install the pitless unit including the 4-inch mechanical joint discharge.

L. Drawdown Line: The 3/4-inch, schedule 80, PVC drawdown line installed in the well shall be measured and paid for as a part of the Contract lump sum price for the pitless adapter unit as stipulated in the Proposal, which price and payment shall be full compensation for providing and installing the drawdown line, including all equipment, tools, material and manpower to install the 3/4"-inch drawdown line complete and ready to operate.

M. Site Restoration and Finish Grading: Site restoration and finish grading as required to complete the restoration of all areas disturbed in the construction of the well, fill material to provide finished grade elevations and concrete slab construction shall be paid for at the

Contract lump sum price for "Site Restoration and Finish Grading", as stipulated in the Proposal, which price and payment shall be full compensation for furnishing of all equipment, tools, material and manpower to complete the item in a satisfactory manner.

N. Valves, Gauges and Meter Pits: The check valve, gate valve, and meter pit shall be measured as a part of the Valve and Meter Pit Unit. Payment for the valves, gauge, meter and meter pit shall be included in the Contract unit price for "Furnish and Install Valve and Meter Pit", as stipulated in the proposal. Price and payment shall be full compensation for all transportation, labor, tools, materials, supplies, and equipment required to furnish and install the valves, gauge, meter and meter pit required.



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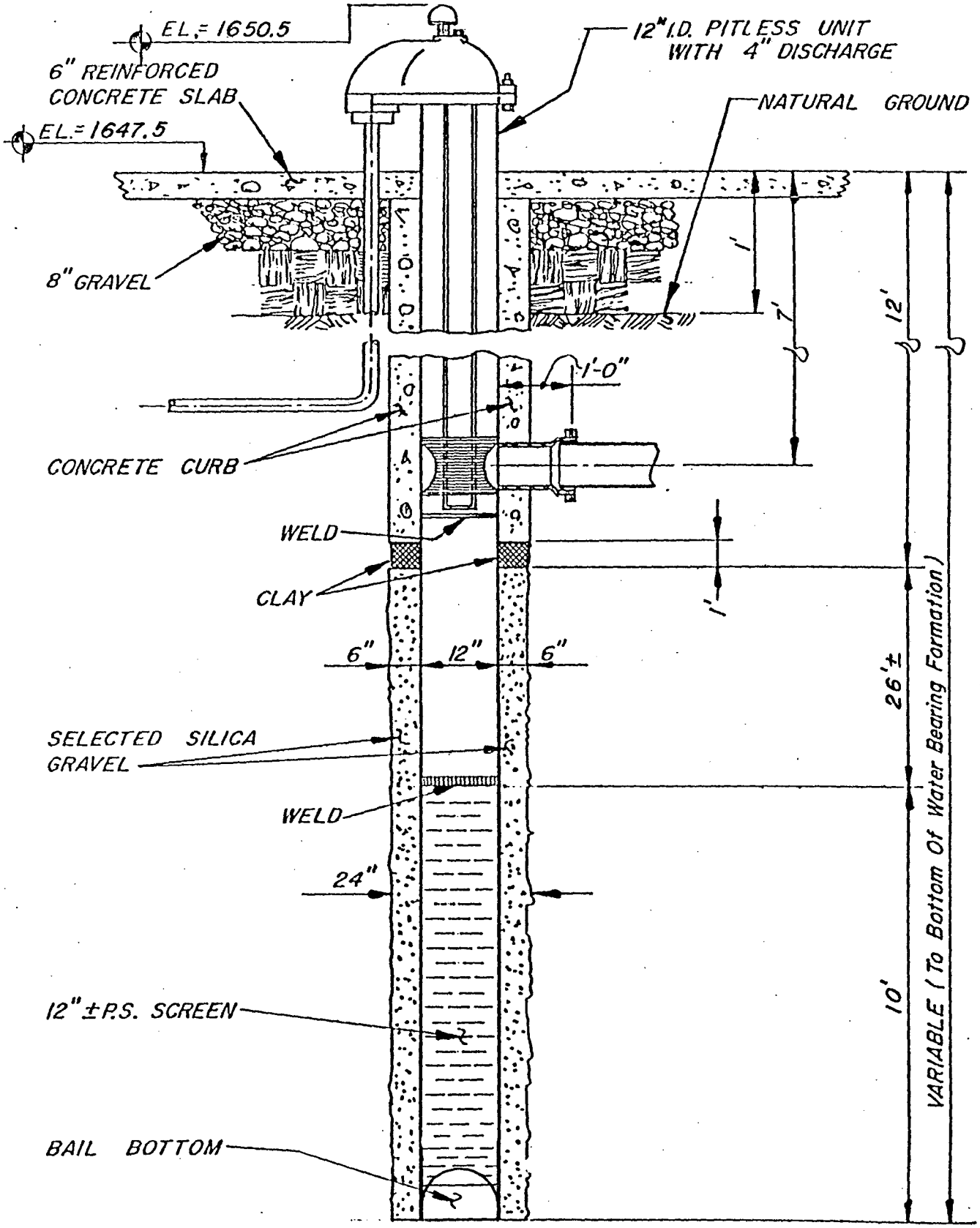
WATER SUPPLY FACILITIES

CITY OF VOLGA

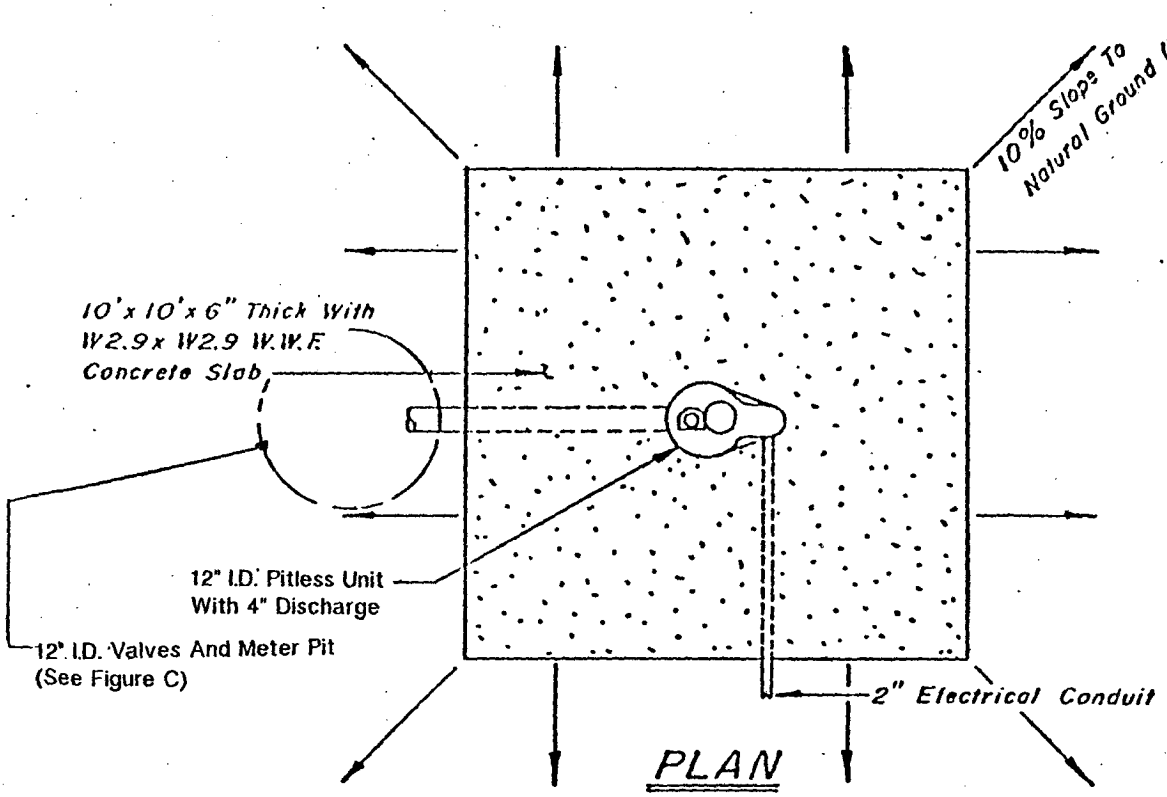
PROPOSED WELL LOCATION MAP
PLATE I



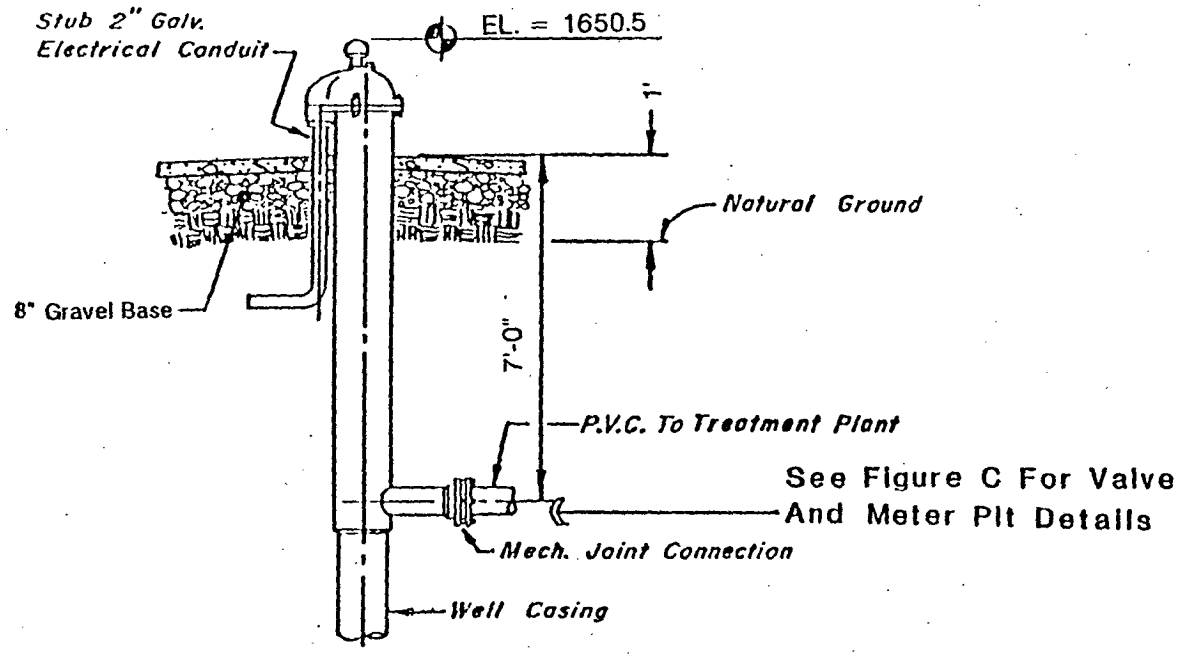
WATER SUPPLY FACILITIES
CITY OF VOLGA, SOUTH DAKOTA
WATER SUPPLY WELL

FINISHED WELL CROSS-SECTION

FIGURE A



PLAN

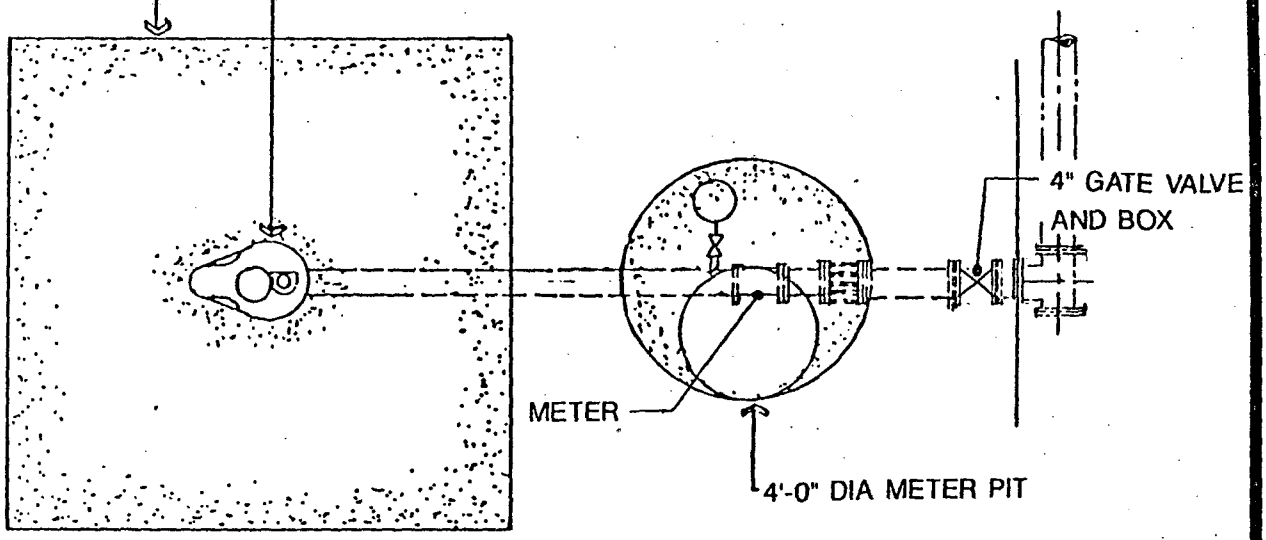


ELEVATION

WATER SUPPLY FACILITIES
CITY OF VOLGA, SOUTH DAKOTA
WATER SUPPLY WELL

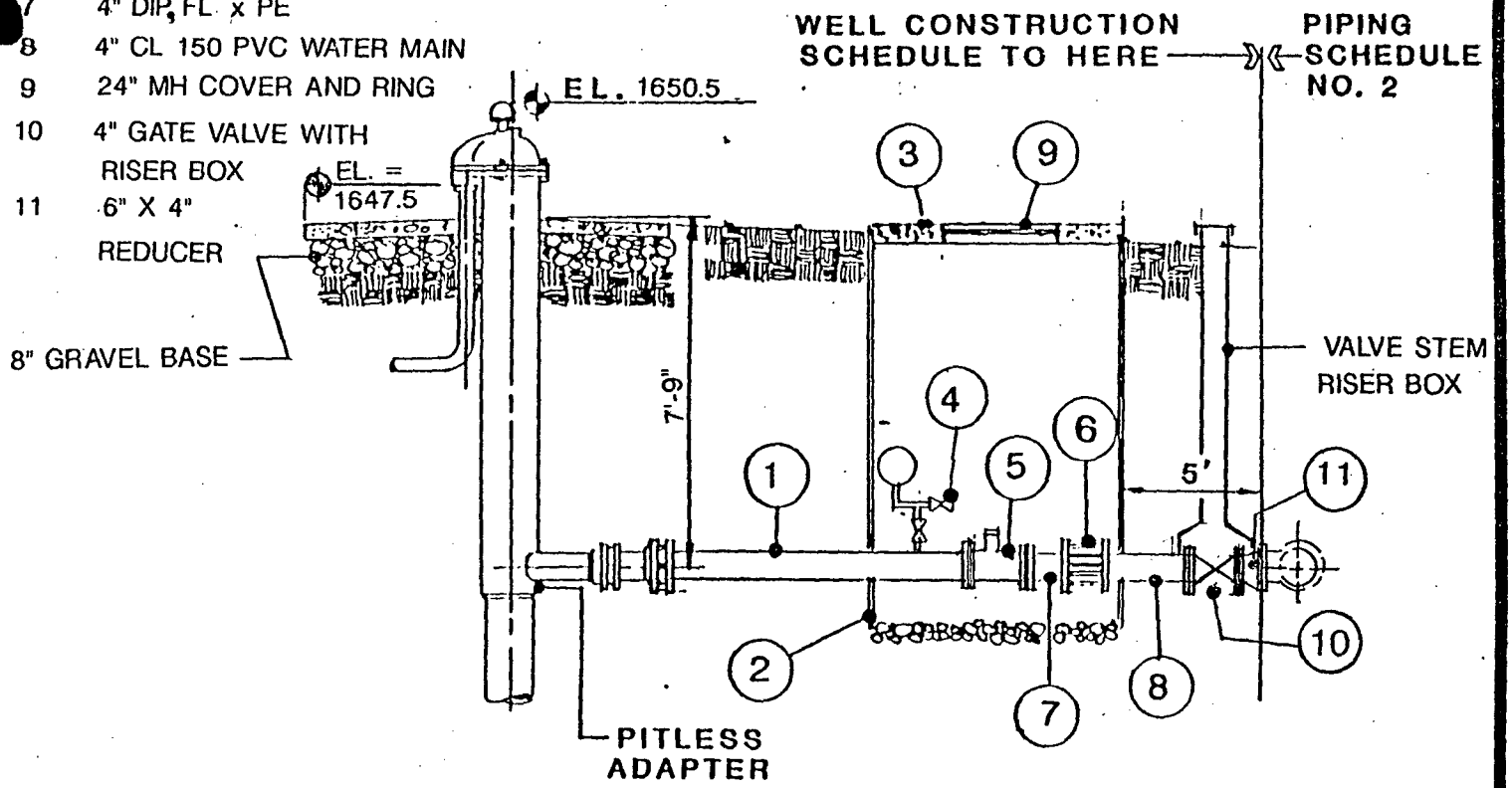
WELL SITE-PLAN & ELEVATION

FIGURE B



PLAN

	DESCRIPTION
1	4" DIP-MJ X FL
2	4' DIA. FRP OR PRECAST CONCRETE METER PIT
3	4' DIA. PRECAST METER PIT COVER
4	0-100 PSIG PRESSURE GAUGE WITH ISOLATION VALVE, AND SAMPLING VALVE
5	4" MAIN LINE METER
6	4" DRESSER COUPLING
7	4" DIP, FL x PE
8	4" CL 150 PVC WATER MAIN
9	24" MH COVER AND RING
10	4" GATE VALVE WITH RISER BOX
11	6" X 4" REDUCER



ELEVATION

WATER SUPPLY FACILITIES
CITY OF VOLGA SOUTH DAKOTA
WATER SUPPLY WELL

VALVES, GAUGES, & METER PIT

FIGURE C

4. WATER SUPPLY PIPING AND CONNECTIONS

4.01 SCOPE. The work covered by this section consists of furnishing and installation of connecting piping, fittings, valves, and other appurtenances required to complete the work in accordance with the Plans and as specified herein.

4.02 MATERIALS. All materials shall conform to the standard specifications referenced herein except as noted otherwise. The Contractor shall bid the water pipe shown on the Drawings or stipulated in the Bid Schedule.

a. Ductile Iron Pipe: Ductile iron pipe shall conform to the requirements of ANSI A21.50 (AWWA C150) and ANSI A21.51 (AWWA C151). All buried or encased piping shall be mechanical joint pipe conforming to the requirements of ANSI A21.11 (AWWA C111). Mechanical joint ductile iron pipe shall be minimum Class 52. Pipe shall be bituminous coated. Pipe shall be cement mortar lined. Certification of inspection and testing shall be provided by the manufacturer. All ductile iron pipe shall be wrapped with polyethylene encasement conforming to the requirements of AWWA Standard C105.

Ductile Iron Fittings shall conform to the requirements of AWWA C-110.

Mechanical joint pipe fittings shall be furnished with a lead tipped gasket. Bolts for mechanical joints shall be of Corten steel. Mechanical joint fittings shall conform to ANSI A21.11.

b. Polyvinyl Chloride (PVC) Pipe: Polyvinyl chloride pressure pipe and fittings shall conform to the requirements of AWWA C900-75 "Poly Vinyl Chloride (PVC) Pressure Pipe", Class 150 meeting the requirements of DR18. Outside pipe diameter shall be the same as that of ductile iron pipe of similar nominal size. Pipe materials shall conform to "Standard Specification for Rigid Poly (Vinyl Chloride) Compounds and Chlorinated Poly (Vinyl Chloride) Compounds" (ASTM D1784). The pipe shall bear the National Sanitation Seal for potable water pipe. Provisions must be made for expansion and contraction at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a solid cross-section elastomeric ring which meets the requirements of the "Standard Specifications for Rubber Rings for Asbestos-Cement Pipe" (ASTM D1869). The bell section shall be designed to be at least as strong as the pipe wall. Each length of pipe, including integral bell, shall be pressure tested to four times the class pressure of the pipe for a minimum of five (5) seconds. Pipe and fittings must be assembled with a non-toxic lubricant. Standard lengths shall be 20 feet for all sizes. At least 85% of the total footage of pipe of any class and size shall be furnished in standard lengths, the remaining 15% in random lengths. Random lengths shall not be less than 10 feet long.

c. Specials and Fittings: Specials and fittings shall be ductile iron conforming to AWWA Standard C110, except that the fitting shall have all bell connections of Standard AWWA dimensions or special dimensions as required for the size pipe as recommended by the pipe manufacturer. Fittings shall be of the slip joint type and two rubber gaskets of the

manufacturer's recommendations shall be furnished with each fitting furnished. The outside of all fittings shall be coated with a bituminous coating. The inside of the fittings shall be coated with a standard thickness cement-mortar lining.

d. Valves: Valves shall be gate valve type. Gate valves shall be designed for a minimum water working pressure of not less than 150 pounds per square inch. Gate valves shall conform to AWWA Standard C509. All gate valves shall be mechanical joint with 2-inch operating nut. Gate valves shall have a stationary stem and shall have a clear waterway opening equal to the full nominal diameter of the valve and shall be opened by turning counter clockwise. The operating nut or wheel shall have an arrow, cast in the metal, indicating the direction of opening. Each valve shall have the maker's monogram or initials, pressure rating and year of manufacture cast on the body.

The seal plate shall be fitted with O-ring seals above and below the thrust collar. The modified wedge disc must be fully supported. The back side of the disc shall be flat and travel along a machined surface in the valve body. The front side of the disc shall provide an angular mounting surface for the resilient rubber seat ring. The seat ring shall be molded separately from the valve disc and mounted securely to the disc with stainless steel screws.

The valve interior shall be fully coated with a material approved for potable water in accordance with applicable AWWA Specifications. Each valve shall be tested for zero leakage past the seat at 200 psi and hydrostatically shell tested at 400 psi.

The valves shall be Mueller Resilient Seat Gate valve A-2370-20 or approved equal.

Valve boxes for gate valves shall be cast iron either screwed or slide type with a minimum wall thickness of 3/16 of an inch.

4.03 EXCAVATION AND BACKFILL. The excavation, trenching and backfilling for the installation of water mains, valves, and other appurtenances shall be in accordance with the applicable portions of Section 2 of these Specifications.

4.04 INSTALLATION OF WATER PIPE.

a. General: Piping for water mains shall be ductile iron or polyvinyl chloride pipe as called for in the Bid. All pipe and accessories shall be new. Pipe and accessories shall be handled in such a manner as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken not to injure the pipe coatings. No other pipe or material of any kind shall be placed inside a pipe or fitting. The interior of the pipe shall be thoroughly cleaned of foreign matter before being lowered into the trench, and shall be kept clean during laying operations by plugging or other approved methods. The full length of each section of pipe shall rest solidly upon the pipe bed of sand with the recesses to accommodate bells and joints, shaped by hand.

Pipe shall not be laid in water; or when a trench or weather conditions are unsuitable for work. Water shall be kept from the trench until the joints have been completed in a satisfactory manner.

When work is not in progress, open ends of pipe and fittings shall be securely closed to prevent the entrance of trench water or other extraneous substances. Any section of pipe found to be defective before or after laying shall be replaced with sound pipe without additional expense to the Owner.

(1) Blocking: Fittings at bends in the pipeline shall be firmly wedged against the vertical face of the trench and blocked with concrete at locations shown on the Drawings or as directed by the Engineer.

(2) Future Connections: Pipe ends left for future connections shall be valved, plugged or capped and anchored as shown on the Drawings or as may be directed by the Engineer.

(3) Cutting Pipe: Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe. Cutting shall be done by means of an approved type of mechanical cutter.

b. Ductile Iron Pipe: All installation of ductile iron pipe shall be in accordance with AWWA Standard C 600. Before installation of ductile iron pipe, the pipe shall be inspected for defects and tapped with a light hammer to detect cracks. Defective, damaged, or unsound pipe will be rejected. Deflections from a straight line or grade, as required by vertical curves, horizontal curves or offsets, shall not exceed 6/D inches per linear foot of pipe, where D represents the nominal diameter of the pipe expressed in inches, between the center lines extended of any two (2) connecting pipes. If the alignment requires deflections in excess of these limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limit set forth, as approved by the Engineer. After a length of pipe is placed in the trench, the packing material for the joint shall be held around the bottom of the spigot so that the packing will enter the bell as the pipe is pushed into position; or rubber gasket may be inserted in bell before pushing into place. The spigot shall be centered in the bell and the pipe pushed into position and brought into the required alignment. Except where necessary in making connections with other lines, or as authorized by the Engineer, pipe shall be laid with the bells facing in the direction of laying.

(1) Joints: Bell and spigot joints - before jointing bell and spigot pipe, all lumps, blisters and excess coating material shall be removed from the bell and spigot ends of the pipes. All oil or grease shall be removed. The outside of the spigot and the inside of the bell shall be wire-brushed and wiped clean and dry.

Joint packing shall be carefully placed and tightly calked to a uniform thickness. No loose or frayed ends of fiber shall protrude into the space to be filled with joint filler. Each joint shall be carefully inspected and checked for proper depth before the joint

runner is attached. Pipe with bells having approved inside contour may be packed with rubber ring gasket without calking if recommended by the pipe manufacturer.

(2) Slip Joints: If slip seal "Tyton" joint pipe or equivalent is used, the materials and work shall be in strict accordance with the manufacturer's recommendations and specifications for the specific joint used.

c. Polyvinyl Chloride Pipe: Polyvinyl chloride pipe, couplings and fittings shall be handled and installed in accordance with the recommendations of the pipe manufacturer. Where rock excavation is encountered, a 6" sand cushion will be placed around the pipe.

4.05 SETTING VALVES AND VALVE BOXES. Valves and valve boxes shall be installed where shown on the Plans and as directed by the Engineer in accordance with AWWA Standard C600 except as further specified herein. Valve boxes shall be centered on the valves. Earth fill shall be carefully tamped around each valve box to a distance of four (4) feet on all sides of the box or to the undisturbed trench face if less than 4 feet. Valves shall have the interiors cleaned of all foreign matter before installation. Stuffing boxes shall be tightened and the valves shall be inspected in open and closed positions to insure that all parts are in working condition.

4.06 TESTS FOR MAINS. It is the intent of this Specification that all joints in piping be watertight and that all joints which are found either by observation or any specified test to leak shall be made watertight by the Contractor. After the pipe is laid, the joints completed, and trench partially backfilled, leaving the joints exposed for examination, the newly laid piping or any valved section of piping shall be subjected to hydrostatic tests in accordance with AWWA C 600 or as specified herein. The pipe shall be subjected for a period of eight (8) hours to a hydrostatic pressure test of 50 pounds per square inch greater than the anticipated static pressure at the points of reading when the system is put in operation. Exposed pipe, joints, fittings and valves shall be carefully examined during the open trench test. Cracked or defective pipe, fittings and valves disclosed in the pressure test shall be replaced by the Contractor with sound material, and the test shall be repeated until the test results are satisfactory to the Engineer. Where an actual visible inspection of each joint cannot be made because of the necessity for immediate backfilling, or where the line is laid below water level and it is impracticable to lower the water level by pumping and the leakage diminished as the material in the joint ages, suitable means shall be provided by the Contractor for determining the quantity of water lost by leakage under normal operating pressure. The water main shall be tested at a minimum pressure of 150 psi for at least 30 minutes. Leakage shall not exceed the amount given by the following formula:

$$L = \frac{ND\sqrt{P}}{7400}$$

Where

L = The allowable leakage in gallons per hour.
N = The number of pipe joints.
D = The nominal pipe diameter in inches.
P = The test pressure in psi.

In calculating leakage, the Engineer will make allowance for added joints in the pipeline above the normal for unit lengths of pipe. Should any test of combined sections of pipeline disclose leakage greater per mile than the hereinbefore specified, or should individual sections show leakage greater than the specified limit, the Contractor shall locate and repair the defective joints until the leakage is within the specified limits.

4.07 CLEAN UP. Upon completion of the work the Contractor shall remove all surplus construction materials and debris resulting from the work, and all areas of work shall be left in an orderly manner.

4.08 DISINFECTION. Each unit of completed supply line shall be disinfected with chlorine before acceptance for domestic operation.

a. Method: Disinfection shall be accomplished as described below or by the system prescribed by the American Water Works Association Standard C 601 as determined by the Engineer. The amount of chlorine applied shall be such as to provide a dosage of not less than 100 parts per million. The chlorinating material shall be introduced into the water lines in a manner approved by the Engineer. If possible to do so, the lines shall be thoroughly flushed before introduction of the chlorinating materials. After a contact period of not less than eight (8) and preferably twenty-four (24) hours, the system shall be flushed with clean water until the residual chlorine content is not greater than 1.0 part per million. All valves in the lines being disinfected shall be opened and closed several times during the contact period.

4.09 Method of Measurement and Basis for Payment: All measurements and payments will be based on completed work performed in strict accordance with the drawings and specifications and the respective prices and payment shall constitute full compensation for all work complete, including incidentals. No separate payment will be made for excavation, trenching, and backfilling for items of work covered under this section of the specifications and all such costs pertinent to these items shall be included in the applicable unit prices therefore.

a. Water Main Pipe: Ductile iron or polyvinyl-chloride pipe for water main shall be measured in lineal feet of pipe actually installed in the completed work. Payment for pipe for water main shall be made at the Contract unit price per lineal foot for "Water Main Pipe", as stipulated in the Proposal for the various sizes and types shown, which price and payment shall be full compensation for all labor, materials, tools, and equipment for furnishing and installing the pipe, including hauling, handling, excavation, laying, jointing, dewatering, backfilling, testing, disinfection and seeding of the finished pipeline in accordance with these Specifications.

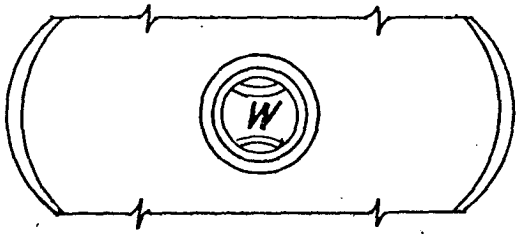
b. Valves and Valve Boxes: Valves and valve boxes shall be measured by the actual number of various sizes and types installed in the system. Payment for valves and boxes shall be made at the Contract unit price each for "Valve & Box", for the various sizes and types, as stipulated in the Proposal, which price and payment shall be full compensation for all labor, materials, tools and equipment required to furnish and install the valves and boxes in proper location including hauling, handling,

excavation, setting, blocking, jointing, dewatering, backfilling, testing and disinfection in accordance with the Plans and Specifications.

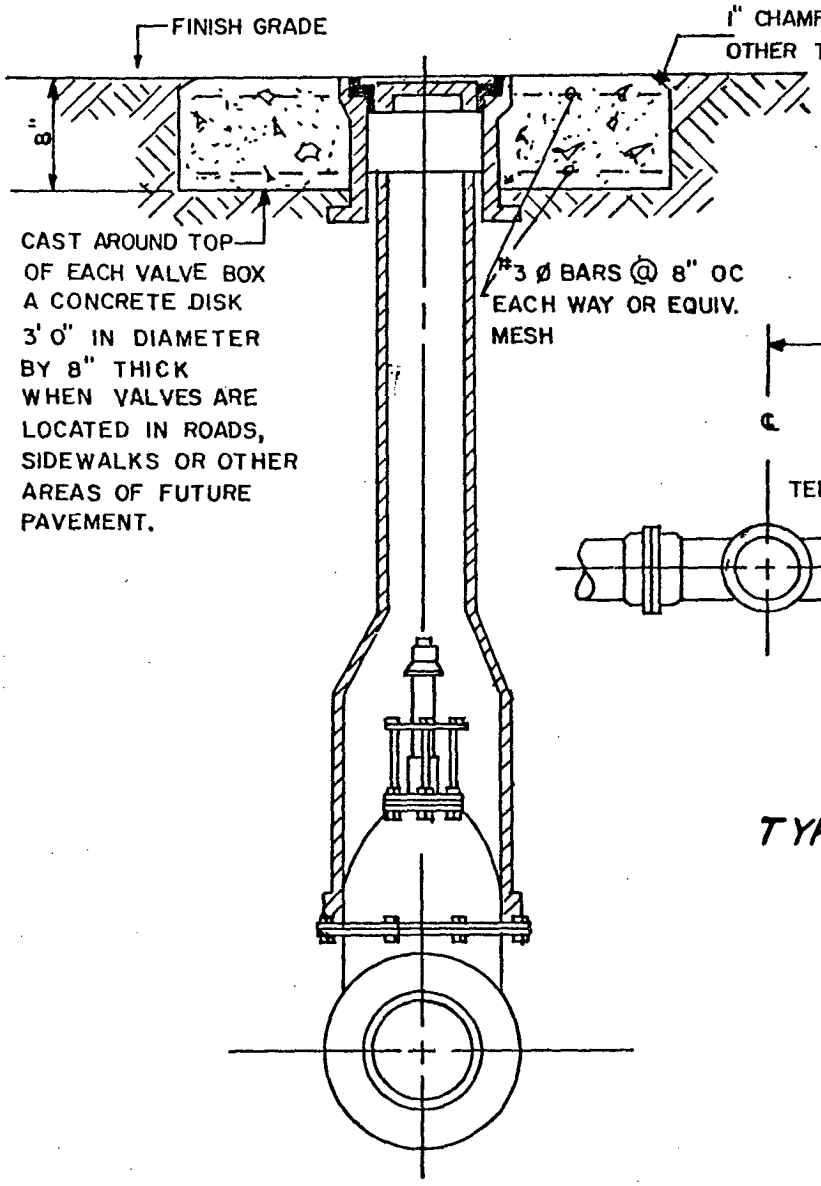
c. Specials and Fittings: Specials and fittings shall be measured by the number of each kind and size actually installed. Payment for this item shall be made at the Contract unit price each for specials and fittings of the various kind and size as stipulated in the Bid Proposal which price and payment shall be full compensation for all labor, tools, equipment and materials for furnishing and installation of the items including handling, excavation, jointing, dewatering, blocking, backfilling, testing and disinfection, all in accordance with the Plans and Specifications.

d. Concrete for Encasement Blocks and Cradles: Concrete used for pipe encasement, cradles, blocks and similar supports required for other reasons than faulty construction methods or negligence on the part of the Contractor will be measured in cubic yards. The unit price per cubic yard shown in the Bid Proposal for "Concrete for Cradles", shall be full compensation for furnishing materials, labor, tools and equipment necessary to install the concrete in final position including all forming or other means of support and curing required to complete the placement of the concrete in a satisfactory method.

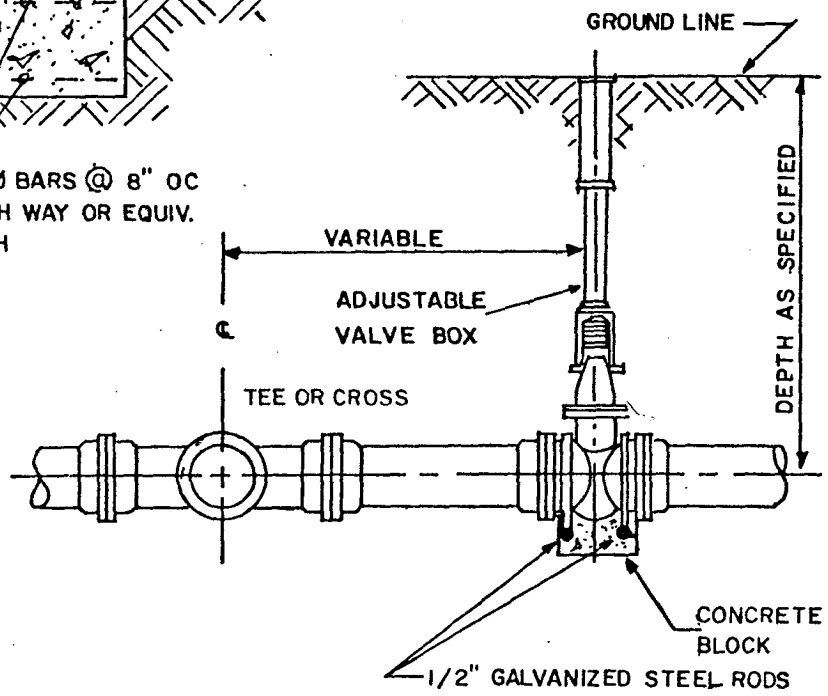
4.10 COORDINATION OF WORK WITH OWNER: The installation of the connections between the existing raw water line and the new raw water lines shall be coordinated with the Owner. Interruption of service shall be kept to a minimum. All service interruptions shall be scheduled for minimum demand periods, generally between midnight and 8:00 A.M. All scheduled service interruptions shall be approved in advance by the Owner and written notification shall be provided to the Engineer.



VALVE BOX TOP



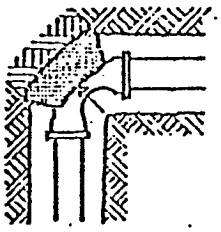
DETAIL VALVE BOX

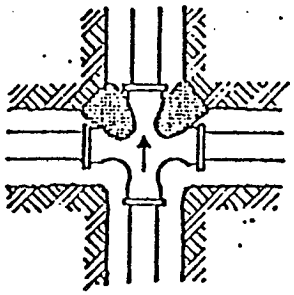


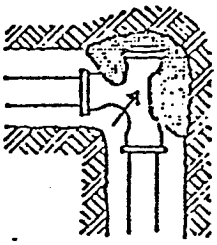
TYPICAL VALVE SETTING

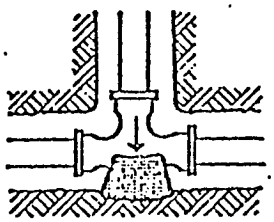
MAINLINE VALVE

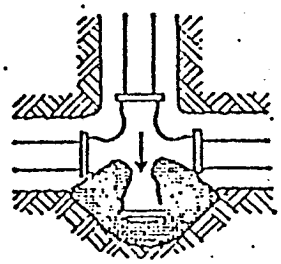
STD. DWG. No. W-1

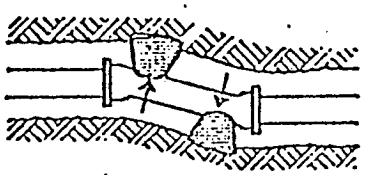


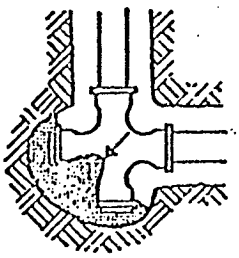








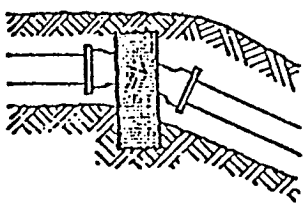




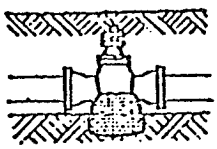
NOTES:

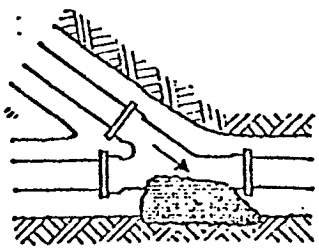
(1) PLACE DOUBLE LAYER OF PAPER BETWEEN CONCRETE BLOCKING AND PLUG.

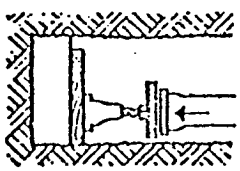
(2) MINIMUM THICKNESS OF CONCRETE BETWEEN FITTING AND UN-DISTURBED SOIL SHALL BE 8".



VERTICAL BEND







TYPICAL BLOCKING DETAILS

STD. DWG. NO. W-2

5. WELL PUMPS

5.01 SCOPE. The work to be done under this section of the Specifications includes all transportation, labor, tools, supplies, plant, and equipment for furnishing and installation of submersible electric motor driven turbine pump in Well No. 7 for the City of Volga, S.D.

5.02 PUMP CONSTRUCTION. The pump to be furnished under these Specifications is to be a standard well-known make by a manufacturer with a past record of building reliable well pumps. The pump must comply in all respects with the applicable regulations of the South Dakota Department of Water and Natural Resources and AWWA Standard E100 Part B.

1. Pumping Conditions:

Well Number	7
Well I.D.	12"
Depth of Well*	47'
Static Water Level Elev.**	1632
Elevation of Top of Well Screen	1609.5±
Design Pump Capacity	180 GPM
Pumping Level Elevation**	1620
Pump Intake Setting Elev.	1610.5±
Static Discharge Elev.	1763
Total Dynamic Head	160'
Minimum Motor Size	10 HP
Discharge Pipe Size	4"

*Variable, measured from existing grade, shall be verified by test boring.

**Based on operating information from existing wells. Shall be verified during well test.
Total dynamic head does not include losses in pumping unit.

The amount shown above shall be the capacity when operating against a total head of 160 feet, exclusive of all losses in the pumping unit, at an operating speed of not to exceed 3500 RPM. The impeller efficiency at the design condition shall not be less than 70 percent, and the design capacity shall be slightly less than capacity at peak efficiency to avoid cavitation. The Contractor must supply efficiency and operating curves for approval prior to bid opening. The entire pump assembly must be capable of passing through the 12-inch diameter opening of the pitless adaptor. The submittal drawings shall include dimension drawings of the pump and motor furnished.

2. Bowl Assembly: The bowls shall be constructed of close-grained cast iron, bronze, or Meehanite, and shall be free of blow holes or sand holes and other defects. Each bowl shall be fitted with a bronze sleeve type bearing.

The impellers shall be of bronze and the closed type. They shall be accurately fitted, smoothly finished and suitably balanced to give smooth, efficient operation. The impeller unit is to be furnished with a sufficient number of stages to efficiently meet the conditions outlind above.

The shaft shall be of stainless steel 416 and be of adequate diameter to safely transmit all loads placed upon it.

The bowl assembly shall be equippped with a suitable, non-corrosive strainer at the suction intake.

3. Discharge Column: The column pipe shall be steel pipe with threaded sleeve type couplings. The column pipe shall be of 4-inch nominal diameter. The pump setting measured from top of the lower bowl assembly to the top of the column pipe where it attaches to the pitless adaptor shall be as required for the pump setting elevation specified. It is estimated that column pipe length will be 29'.

4. Submersible Motor: The motor shall be of the completely enclosed type for continuous underwater operation on 230/460 volts, 60 cycle, 3 phase, A.C. current. The motor shaft shall be stainless steel. The motor shall be filled with high dilectric strength mineral oil and the oil shall be circulated throughout the motor for cooling the rotor, stator windings, and bearings. An approved type of mechanical seal or mercury seal shall isolate the well water from the oil. Mercury seals must be of a type approved by the Environmental Protection Agency and shall have a letter of certification indicating such approval. Motor may be water-filled design for cooling the rotor, stator windings and bearings.

Motor horsepower shall be as follows:

Well No. 7, 10 HP

Bronze bearings shall be provided at each end of the rotor and a heavy thrust bearing shall carry the weight of all rotating parts and the hydraulic thrust of the pump. The oil pressure within the pump shall be hydrostatically balanced with the water outside the pump.

During motor start-up the current shall not exceed the normal running current by more than 500%. The motor manufacturer must provide a suitable means of accomplishing this.

5. Power Cable: The power cable to the motor shall be impervious to moisture in addition to having high abrasion resistance. The cable shall be protected with a steel guard where it passes by the bowl assembly to prevent damage from contact with the well casing. Stainless steel cable clamps shall be provided to support the cable along the column pipe. At least 18 feet of cable beyond the top of the column pipe shall be provided. The cable size shall be No. 4 copper minimum.

6. Low-Level Cutoff: Probe type low-level controller shall be furnished and installed with the pump under this item at the time when the pump is installed. The probe type relays shall be Healy-Ruff or equal. The relays shall

be compatible with the pump control system. The low level cutout system shall have a minimum difference of 3' between low level cutout and restart of the pump.

7. Drawdown Guage: A plastic tubing shall be furnished and installed with the pump as a means of determining water level. End the tubing slightly above the bowl. A drawdown gauge shall be furnished and attached to the pitless adaptor. Minimum diameter of the drawdown tube shall be 3/4" to allow insertion of well level probe.

5.03 PUMP MANUFACTURERS. Well pumps bid for the submersible pump installation shall be Jacuzzi, Grundfos, Berkley, or approved equal. Contractors wishing to bid pumps other than those listed shall submit a prior approval request a minimum of 5 days prior to bid opening.

5.04 PUMP MOTOR STARTER. Starter sized in accordance with motor horsepower shall be furnished and installed as specified in Section 6.

5.05 PLACING PUMPS IN SERVICE. The Contractor shall be responsible for having an experienced person on the site to supervise the installation of the pump and accessories.

Installation shall include the placement and attachment of the low-level cutoff probes.

The pitless adaptor unit for the submersible pump shall be furnished by the Well Contractor. The Contractor shall remove the pitless adaptor, set the pump in place, screw the column pipe to the adaptor and set the entire unit into place sealing the adaptor.

All electrical connections between pump and electrical conductors shall be made at the Well to the starter and control panel.

Prior to installation of the permanent pump in the well, the pump motor, column pipe, pump bowls, tubing, probes, electrical cable and all other components to be placed in the well shall be thoroughly swabbed in a chlorine solution of not less than 50 ppm concentration for disinfection purposes.

5.06 PUMP REMOVAL, INSPECTION AND REPLACEMENT. (Bid Schedule 4)

1. Scope: The work to be performed under this Section of the Specifications shall include all labor, materials and equipment required to remove pumps for inspection and replacement of pumps after inspection and repair. Repairs to be done under the contract shall include replacement of pump intake screens on each pump.

2. Existing Pumps: The existing pumps are Layne-Bowler pumps with 10 H.P. U.S. motors, 35 feet of column pipe with 1" stainless steel shaft and 5 stage 8" DRHC Bowls and a 6" cone strainer. The existing 6" cone strainer shall be replaced with a similar unit constructed of stainless steel.

3. Pump Removal and Replacement: The Contractor shall remove the pumps and motors from Well 5 and 6 for inspection by the Owner. The Owner will determine what repairs are required so the necessary repairs can be made. After the necessary repairs are made, the Contractor will replace the pumps and motors

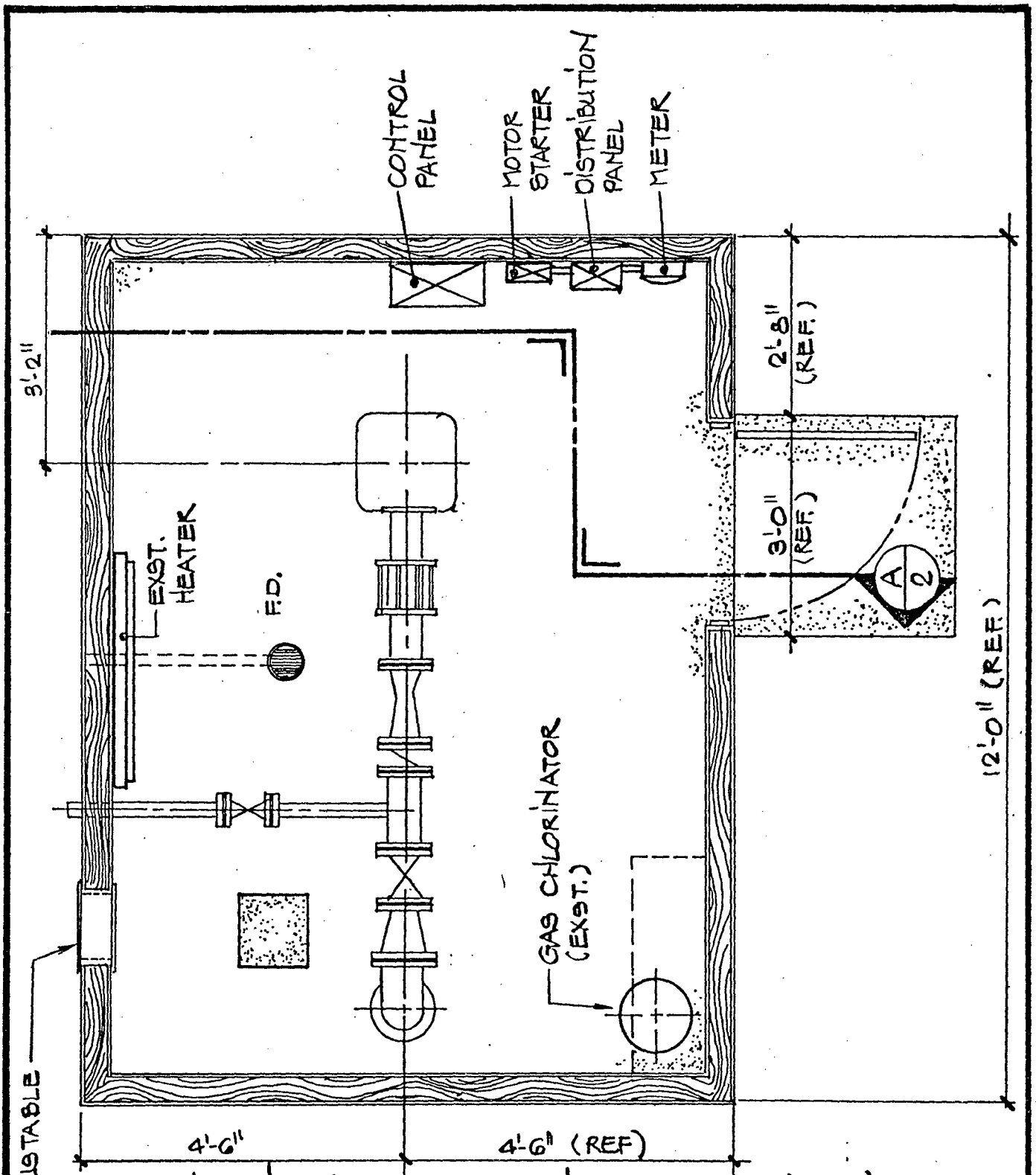
back into the well. The removal and replacement of the pumps shall be coordinated with the City of Volga, S.D. and the Engineer. Pump removal, inspection, and replacement shall be scheduled so that no more than one well is out of service at any time.

5.07 METHOD OF MEASUREMENT AND BASIS OF PAYMENT.

a. Furnish and Install Submersible Pumps: The submersible turbine pump to be furnished and installed shall be measured as one unit actually installed complete and ready for operation. The pumps shall be paid for at the Contract unit price for "Submersible Turbine Pump" as stipulated in the Proposal, which price and payment shall be full compensation for furnishing all labor, materials, tools, and equipment to furnish and install the submersible turbine pumps and other incidentals required to complete the item in accordance with the Specifications.

b. Pump Removal, Inspection and Replacement: The removal, inspection and replacement of the pumps, pump bases and motors from Wells No. 5 and 6 shall be paid for at the Contract Unit price each for "Pump Removal, Inspection, and Replacement" as stipulated in the Proposal, which price and payment shall be full compensation for all equipment, tools, labor and materials required to remove, inspect and replace the pumps, pump bases, and motors including the new part replacement of all:

Electrical Connections
Control Connections
Drawdown Tube
Intake Screen for Pump
Pipe Connections

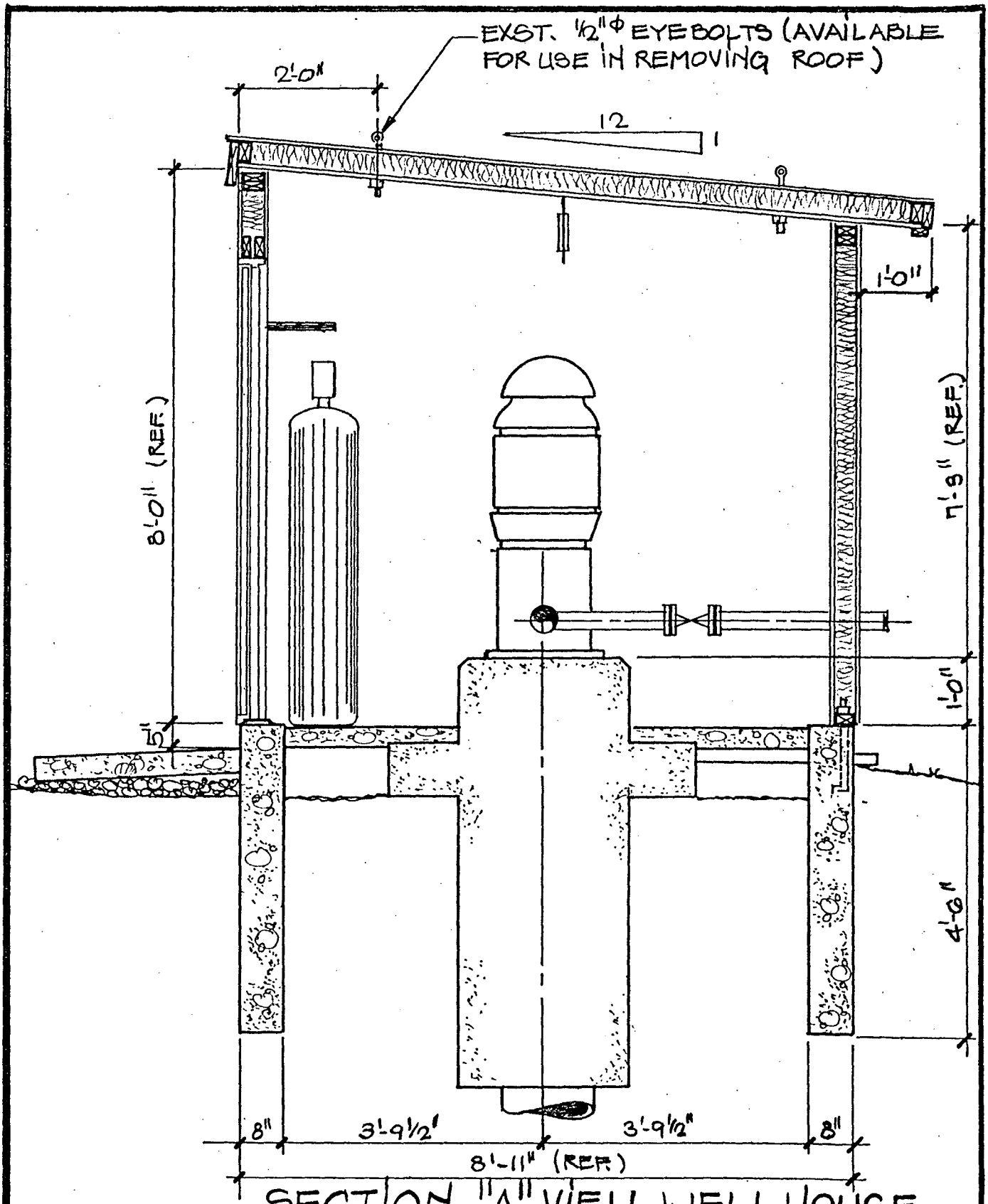


PLAN VIEW - WELL HOUSE (TYPICAL)

NOTES:

1. CONTRACTOR SHALL REASSEMBLE CONNECTING PIPING USING NEW BOLTS AND GASKETS.
2. EQUIPMENT LOCATIONS SHOWN ARE APPROXIMATE, CONTRACTOR SHALL VERIFY.

WATER SUPPLY FACILITIES
CITY OF VOLGA, SOUTH DAKOTA
WATER SUPPLY WELL
PUMP REMOVAL AND REPLACEMENT
Sheet 1 of 2



SECTION "A" VIEW-WELL HOUSE (TYPICAL)

NOTES:

1. PUMP SETTING (TO TOP OF BOWLS) IS APPROXIMATELY 35'.
2. COLUMN PIPE IS 5" DIAMETER.
3. CASING AND WELL SCREEN DIAMETER IS 12".

WATER SUPPLY FACILITIES
CITY OF VOLGA, SOUTH DAKOTA
WATER SUPPLY WELL

PUMP REMOVAL AND REPLACEMENT

Sheet 2 of 2

6. ELECTRICAL SERVICE AND CONTROLS

6.01 SCOPE. The work to be performed under this section of the specifications shall include all labor and materials required for furnishing, installing, start-up and testing of a new power and control system to the new well including secondary service drop, well control cabinet, motor starter, equipment backboard and appurtenances as indicated on the drawings and herein.

6.02 GENERAL.

A. Supervision and Coordination: It is the responsibility of the Contractor to coordinate the work specified herein with the Owner and the Electrical Contractor installing the control cables and control panels at the wells. The controls will be connected to an existing elevated tank level control system. The Contractor shall coordinate work with the Owner to avoid unnecessary downtime on the existing system. Any shutdown of the existing system shall not exceed 30 minutes unless prior approval is granted by the Owner and the Engineer. The new well controls shall be tested independently of the existing well control system to prove proper operation prior to connecting to the existing level control system.

B. Shop Drawings and System Documentation: Shop drawings of the control and electrical system equipment and arrangement shall be submitted for review by the Engineer. The submittal data shall include descriptive data for all materials and equipment proposed, a scaled drawing of the panel front showing proposed equipment installation locations, and a wiring diagram indicating control circuits proposed including wire numbers, terminal numbers, and relay numbers. If catalog cuts are furnished, the specific model number, color, and all requirements of the specifications shall be indicated on each copy of the submittal. A minimum of six (6) sets of submittal data shall be submitted to the Engineer to review.

C. Approved Suppliers for Control Panels: Control panels and equipment for the proposed Well No. 7 shall be supplied by a single supplier. Approved suppliers for this equipment are:

Healy Ruff
Automatic Systems
Dynamic Systems
Instrument Control Systems

If the Contractor wishes to bid equipment furnished by a supplier other than those listed prior approval is required. Prior approval requests must be in the office of the Engineer a minimum of five days prior to bid if they are to be considered.

6.03 BASIC MATERIALS

A. Poles: ANSI Standard 0.51, machine-trimmed by turning, pressure-treated in accordance with AWPS Standard C4; creosote conforming to AWPS Standard

P1, and oil-borne preservatives and petroleum conforming to AWPS Standards P8 and P9. Pressure treatment of Northern White Cedar shall be as specified for Western Red Cedar. Pressure treatment of Western Fir and Western Hemlock shall be as specified for Douglas Fir.

B. Crossarms: EEI Specification TD-90 pressure-treated dense or close-grain Douglas Fir, or EEI Specification TS-91, pressure-treated dense Southern Pine, of sizes specified or indicated; pressure treatment shall conform to AWPS C25.

C. Motor Starters: All starters shall be designed and tested to meet all applicable NEMA, IEEE, and ANSI published industrial standards. All starters shall be full voltage, across the line, circuit breaker type AC combination starters and shall be nonreversing.

Circuit breakers shall be motor circuit protector type with adjustable magnetic trip settings.

All starters shall be for use on a 240 volt, three phase, 60 hertz system and shall be NEMA size 2. Motor protectors shall be supplied to provide single phase, phase reversal, and low voltage protection. Contactor coils shall be rated for 120 volt operation from a separate source.

The motor starters shall be designed as a coordinated circuit breaker, contactor, and overload system.

Overload relays shall be an integral part of the starters. Overload relays shall have a +- 15 percent adjustment. A continuous selection of motor full load currents can be obtained through the size limitations of the starters. Overload relays shall be field convertible from manual reset to automatic reset. The starter shall be inoperative unless thermal units are installed.

Starters shall be supplied complete with two normally open and two normally closed auxiliary contacts and a 3-position selector switch. Each starter shall be provided with two time delay relays as indicated on the drawings. Starters shall be housed in the NEMA 3R well control enclosure. Included with each starter shall be:

1. A micarta nameplate with white cut letters of suitable size to designate the purpose of the circuit. The nameplate shall be fastened to the unit with screws.

2. A permanently mounted illustrated operating and safety instruction card, including abridged renewal parts data.

3. An insulated fuse puller for control fuses (one per unit).

Combination motor starters shall be as manufactured by Square D or equal.

D. Control Panel Enclosures: The control panel enclosures shall be totally enclosed cabinet type with front door and continuous hinge, stainless steel door clamps, padlock hasp and staple, and full size stationary equipment mounting panels. Enclosures shall be of NEMA 3R construction for exterior panel at Well No. 7 and NEMA 1 construction for panel in well house at Well No. 5.

Enclosure shall be 48"H x 36"W x 12"D. (Well 7)

Enclosures and panels shall be 14-gauge (minimum) steel or stainless steel and of formed and welded construction suitable for wall mounting as indicated. Enclosures interior finish including mounting panels shall be white enamel. Exterior finish shall be gray low-gloss industrial lacquer 1 mil dry. No painting of stainless steel enclosures is required.

Control panel enclosure shall be as manufactured by Hoffman Engineering Company or Healy-Ruff or equal.

E. Conduit:

1. Galvanized Rigid Conduit (GRC) for general use shall be sized as required by the NEC or as indicated on the drawings.

2. PVC conduit shall be Schedule 40 sized as indicated on the drawings.

3. Liquid-tight flexible metal conduit for general use shall be galvanized steel, with steel fittings and coated with liquid-tight jacket of flexible polyvinyl chloride.

F. Conductors:

1. Provide factory-fabricated wire of sizes, ratings, materials and types indicated for each service. Where not indicated, provide proper selection as determined by installer to comply with project's installation requirements, NEC standards, and U.L. requirements for termination of wire to circuit breakers, e.g. circuit conductors connected to the terminals must not operate at more than a 75 degrees C. ampacity for breakers rated over 100 amps and must not operate at more than 60 degree C. ampacity for breakers rated 100 amps or less. Select from the following types, materials, conductor configurations, insulation and coverings:

   UL Type: THHN, THWN.
   Minimum Size: 12 AWG
   Material: Copper
   Conductors: Solid (12 AWG to 8 AWG)
   Conductors: Concentric-lay stranded (standard flexibility), (6 AWG and larger).

Direct bury power cable shall have a minimum of 3 No. 2 AWG conductors and a No. 4 AWC neutral. Cable shall have metal jacket or external wire wrap for rodent damage protection.

G. Receptacles: Provide heavy-duty duplex receptacles, 2-pole, 3-wire, grounding 15-amperes, 125-volts, with metal plaster ears, design for side and back wiring, NEMA configuration 5-15R.

H. Switches: Provide general-duty flush, single-pole toggle switches, 15-amperes, 125 volts, with mounting yoke insulated from mechanism, equip with plaster ears, switch handle, and side-wired screw terminals.

I. Incandescent Fixture: Provide keyless porcelain socket rated for 100 watt incandescent lamp at 120 volt. Provide one (1) 100 watt, A19, incandescent lamp per fixture.

J. Service Entrance Heads: Service entrance heads shall be threaded hub vertically mounting type with the number and size of wire knockouts as required to accept the indicated cable. Service entrance heads shall be as manufactured by Killark Electric or equal.

K. Ground Rods: Ground rods shall be copper-clad steel, sized as indicated.

L. Fused Disconnect Switches: Fused disconnect switches shall be heavy-duty single throw type rated at 600 volts. Switches shall be sized and have configuration as shown on the drawings. Disconnect switch shall be UL listed as service entrance equipment where indicated and shall be rated for 10,000 symmetrical RMS ampere fault current.

Switch mechanism shall be the quick-make, quick-break type. Lugs shall be UL listed for copper cables and shall be front removable.

Switch enclosures shall be NEMA Type 4 and shall be provided with water-tight hubs. The enclosure shall employ a hinged cover which shall be interlocked with the operating handle to prevent opening the cover when the switch is in the "ON" position. This interlock shall be constructed so that it can be released with a standard electrician's tool.

The units shall have padlocking provisions in the "ON" or "OFF" position, and the operating handle position shall give positive switch position indication.

Disconnect switches shall be as manufactured by Square D or equal.

M. Enclosed Circuit Breakers: Enclosed circuit breakers shall be molded case type suitable for operation on the services indicated on the drawings. Breaker shall have a NEMA type 1 enclosure with an integral operating handle whose operating position is easily recognizable and is padlockable in the on or off position. Provide lugs suitable for the termination of the conductors indicated.

N. Meter and Meter Socket suitable for outdoor installation on 240 volt, 3 phase service will be furnished by Owner. Contractor shall install equipment.

O. Plywood Backboard: Plywood backboard shall be pressure-treated in accordance with AWPA C9 as required for above ground exposure. Plywood shall have an "exterior" exposure durability classification in accordance with the APA performance rating criteria. Plywood shall be appropriately marked attesting to compliance with the treated drying, retention, and penetration requirements of the AWPB-FDN Standard.

P. Lightning Surge Arrestors: Lightning surge arrestors shall be rated medium duty, maximum 65 KA, 8 x 20uS each line to ground, and suitable for operation on a 240 VAC, 3 phase, 4 wire system. Arrestor shall have nanosecond, bipolar response, no discharge lag, no impulse voltage overshoot and shall be self restoring. Arrestor shall be installed in a steel enclosure with hinged cover and threaded hubs and shall be as manufactured by Lightning Protection Corporation or equal.

Q. Status Indication Lights: Indicating lights shall be the "push to test" type complete with incandescent lamps, lens and contact blocks. Indicating lights shall be heavy duty, oil tight units. Indicating lights shall be as manufactured by General Electric, Allen Bradley, Square D. Co. or an Engineer approved equal.

R. Hand-Off-Auto Selector Switches: Hand-Off-Auto selector switches shall be oil tight switches with maintained contacts. The operating handle of the switches shall be similar in style to the existing well control switches. Switches shall be as manufactured by Square D, General Electric, or Engineer approved equal.

S. Control Relays: Control relays shall be rated for 300 volts with coil voltages and contact arrangement required to implement the control and instrumentation loops indicated. Relays shall have convertible contact cartridges which can be arranged in any combination of normally open and normally closed contacts. Control relays shall be used for switch loads rated at 100 volts AC or DC or greater. Control relays shall be as manufactured by Allen Bradley Bulletin 700, Cutler Hammer, or an Engineer approved equal.

T. Timing Relays: Timing relays shall be of the "ON-DELAY" or "OFF-DELAY" type which begin the time delay upon energizing the coil and reset automatically when deenergized. The timing relays shall contain contacts of the voltage and current ratings required to implement the control functions indicated.

Timing relays for periods of 200 seconds and less shall be electronic with adjustable timing ranges of 10-200 sec., suitable for interior panel mounting, and shall be as manufactured by IDEC, AGASTAT or an Engineer approved equal.

U. Terminal Blocks: Terminal blocks for all external connections shall be rated at 600 volts. Terminal blocks for internal panel connections of AWG No. 14 conductor and smaller shall be rated at 300 volts. White terminal marking strips indicating point identification and diode or capacitor polarity shall be installed on each terminal block. Terminal blocks shall include disconnect switch terminal block sections suitable for interrupting control voltages where a control voltage source enters the enclosure from a remote location.

V. Conductors: Conductors for 120 volt control and indication loads shall be AWG No. 14 stranded copper conductors. All conductors shall be identified at both ends with permanent wire markers utilizing wire numbers matching those on the control system wiring diagrams.

W. Warning Sign: A warning sign shall be placed in the interior of the control panel indicating the presence of externally derived power within the enclosure. The sign shall be a minimum of 5 inches by 7 inches and shall be red in color with white lettering. Materials for the sign shall be as specified in H. Nameplates.

X. Nameplates: Nameplates shall be laminated phenolic sheeting with white core and satin finish melamine overlay. Nameplates shall be black and shall be 0.040 to 0.045 inch thick. Legend engraving shall be through the overlay to expose the core, and all edges shall be beveled to expose the core on the perimeter.

Y. Bi-Directional Transceiver Telemetry Equipment: Bi-directional transceiver telemetry equipment shall be capable of transmitting a pump called for contact and/or receiving a pump run contact simultaneously. The circuit shall be fail safe in that a loss of continuity in the control cable shall cause the signal receiving relays at both units to de-energize. The bi-directional transceiver equipment shall be similar and equal to Healy Ruff Series 6810.

X. Direct Bury Control Cable: Direct bury control cable shall be furnished for transmission of pump called for and pump run signals between Well 5 (existing) and Well 7 (this contract). Resistance of control loop between Well 5 and Well 7 shall not exceed 3000 ohms. Cable shall be jacketed cable with a metal jacket or wire wrap for rodent damage protection. Cable shall also be grounded and shielded to prevent induced voltage interference with control circuit.

6.04 SEQUENCE OF OPERATION: The sequence of operation of the well control shall be as follows:

The control panel at Well Number 7 shall be equipped with a hand-off-auto switch for control of the well pump. When the switch is in the "hand" position the pump shall run until the switch is returned to the "off" position. When the switch is placed in the "Auto" position, the pump shall run when called for by the existing tower level control system. The pump shall be called for whenever the existing control calls for Pump No. 5. Both pumps will normally run simultaneously. The pump shall stop when the tower level stop setpoint is reached.

The control system for Well Number 7 shall be connected to the controls for Well Number 5 so that both pumps will run if both are in automatic. If the switch at the well for either Well 5 or Well 7 is in the hand or off position, the other well shall still function in automatic.

The well control panel furnished for Well 7 shall include a motor protector circuit and a low water cutoff. Occurrence of either of these alarm conditions shall cause the pump motor starter to be de-energized and locked out until reset. Reset of the control circuit shall be accomplished by turning the switch to the "off" position then back to automatic or hand.

The run status of Well Number 7 shall be transmitted back to the control panel for Well Number 5 and indicated at the control panel for Well 5. The run status for Well 7 shall be transmitted to the control panel at the water tower via existing telemetry by parallel connection with the run contact for Well 5. The equipment furnished under this contract shall include the bidirectional telemetry equipment, wiring, isolation relays and lightning protection necessary to connect Well 7 to the existing telemetry at Well 5.

6.05 INSTALLATION.

A. Installation shall comply with NEC-1987 edition and latest State of South Dakota electrical codes.

B. Poles: Poles shall be set in proper alignment and plumb using proper pole auger equipment and by workmen experienced in setting line poles. Poles shall be mechanically tamped or thoroughly hand tamped into place the full depth of set.

C. Motor Starters: Motor starters shall be installed in the control panel enclosures at the new well site. Motor starters shall be connected per the starter manufacturer instruction and as indicated on the drawings.

D. Control Panel Enclosures: Control panel enclosures shall be prewired for connections to external field wiring. Internal wiring shall be secured with nylon cable clamps and ties. Terminal blocks shall be used for all external wiring connections.

The complete installation shall be done such that all control devices, panel instruments, and terminal blocks are completely accessible without major dismantling of panel equipment.

All control panel enclosures shall be installed at the locations shown on the drawings. All enclosures shall be set plumb and level. Conduit connections to enclosures shall be made with threaded conduit hubs. Enclosure finish shall be new and first used quality. Any scratched or damaged surface shall be refinished to match original finish.

E. Conduit: Exposed conduits shall be run parallel or at right angles to structure. All bends shall be made with standard conduit ells or conduit bent to not less than the same radius of screw jointed conduit fittings. All bends shall be free from dents or flattening.

Conduits shall be continuous from outlet to outlet, and from outlets to cabinets, junction, or pull boxes; and they shall enter and be secured to all boxes in such a manner that each system shall be electrically continuous from point of service to all outlets. Terminals of all conduits shall be furnished with bushings. The ends of each conduit shall be plugged with an approved cap or disc to prevent the entrance of foreign materials when exposed during construction.

Couplings and conduit unions shall be of the same material as the raceway. They shall have the conventional dimensions of the trade and shall

be internally threaded with a tapered thread at each end to fit the tapered thread specified for the corresponding size conduit.

The inside and outside of all rigid steel conduit and fittings including bolts and screws shall be protected against corrosion by an even coating of zinc applied by the hot-dip process. Before galvanizing all surfaces shall be cleaned. The cleaning process shall leave the surface in such a condition that the zinc coating will be firmly adherent and will be smooth.

Where conduit has to be cut in the field, it shall be cut square, using a hand or power hacksaw or approved pipe cutter using knives. The use of pipe cutters with cutter wheels will not be permitted. The cut ends of the field cut conduit shall be reamed to remove any burrs and sharp edges. Where threads have to be cut on conduit, the threads shall have the same effective length and shall have the same thread dimensions and taper as specified for factory cut threads on conduit. Conduit installed in the work with threads not complying with these requirements shall be removed and replaced.

All conduit shall be cleaned prior to pulling in wire and cable by pulling a stiff wire brush of the size of the conduit through it. The cleaning shall remove all foreign matter, including water from the conduit.

Exposed conduit runs shall be supported or clamped to structure at intervals not exceeding 8 feet.

All conduit installed exposed shall be rigid steel. All conduit under the slab or underground shall be PVC. PVC to GRC transitions shall be made in the horizontal run.

All exterior conduit connections to NEMA Type 4 and 3R boxes shall be made with threaded, bolt-on hubs.

F. Wiring Methods: All terminating fittings, connections, etc., shall be of a type suitable for the specific cable furnished. All fittings shall be made up tight. Make up all terminations in strict accordance with manufacturer's recommendatiosn using special washers, nuts, etc., as required.

Splices and connections shall be made as follows:

1. Connect 8 AWG and larger wire to panels and apparatus with properly sized, solderless or compression lug connectors.

2. Connect 10 AWG and smaller wire by applying properly insulated wire nuts or pressure connectors.

3. Flashover or insulation values or joints shall be equal to that of the conductors.

G. Receptacles: One duplex receptacle shall be surface mounted in the control panel enclosure at Well No. 7.

H. Switches: Switches shall be installed in the control panel enclosure at Well No. 7 and connected to control the incandescent light fixture in the enclosure.

I. Indancescent Light Fixture: One incandescent light fixture shall be installed in the control panel enclosure at Well No. 7.

J. Service Entrance Heads: Service entrance heads shall be installed at the secondary drop to a well control panel enclosure.

K. Fused Disconnect Switches: Fused disconnect switches shall be installed at the locations indicated on the drawings.

L. Enclosed Circuit Breakers: Enclosed circuit breakers shall be isntalled in the well control panels as indicated on the drawings. Provide micarta nameplates on each conduit breaker engraved to describe circuit function.

M. Meter Socket: Meter socket shall be installed at the location indicated on the drawings in accordance with the local utility company requirements.

N. Plywood Backboard: All penetrations of the plywood backboard required for equipment mounting and the mounting of the backboard itself shall be machine drilled prior to sealing. Backboard shall be sealed with two coats of exterior house paint primer. Backboard shall be painted with two coats of Pratt and Lambert exterior acrylic latex house paint designed for use with primer. Color shall be white.

O. Lightning Surge Arrestors: Lightning surge arrestors shall be installed on the AC power bus in each well control panel in accordance with manufacturer's instruction.

P. Panel Mounted Control Equipment: Panel mounted control equipment such as status indicating lights, hand-off-auto selector switches, control relays, timing relays, terminal blocks, telemetry equipment, and nameplates etc. shall be installed in the control panels at the panel assembly location. Internal wiring shall be prewired to numbered terminal strips. All field connections shall be made at the terminal blocks provided.

Q. Direct Bury Power And Control Cables: Cables shall be installed in the locations indicated on the Plans. The minimum bury depth shall be 24" for the cables. The power cable shall be installed from the existing transformer enclosure at Well 6 to the proposed Well No. 7. The control cable shall be installed from the new control panel to be installed in the pump house at Well No. 5 to the proposed Well No. 7.

6.06 INSTALLATION AND TESTING.

The controls and electrical equipment shall be installed in accordance with the requirements of the National Electric Code and these specifications. The system shall be field tested prior to connecting the controls to the existing level control system. The field test shall be witnessed by the Engineer and the Owner. The Engineer and Owner shall give written notification of the proposed test schedule a minimum of five days in advance of the proposed test schedule. The control panel supplier shall provide a minimum of two (2) eight hour days of on site startup assistance by factory trained personnel.

6.07 METHOD OF MEASUREMENT AND BASIS OF PAYMENT.

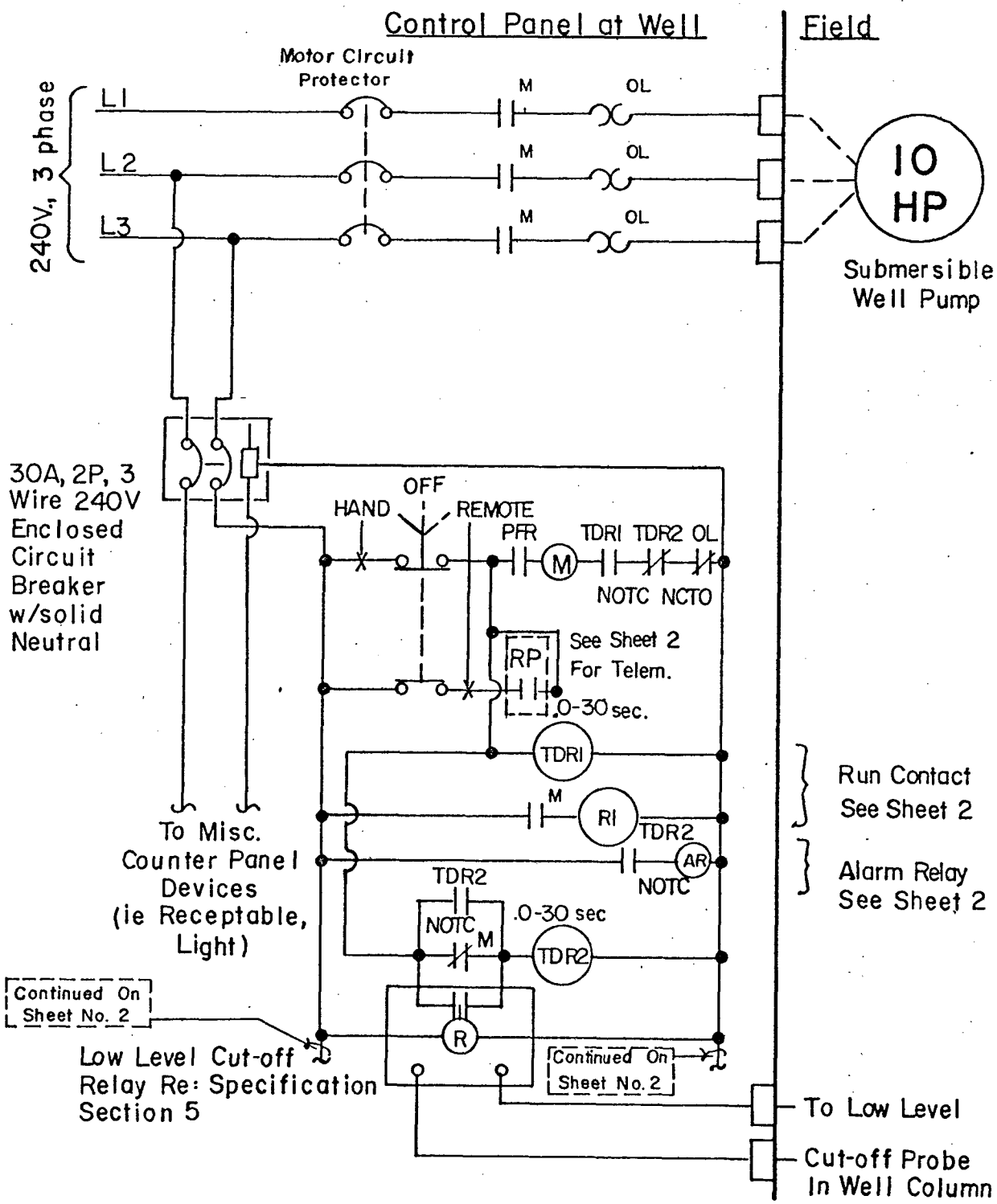
No unit price measurement will be made for the work included in this Section. All costs associated with the work in this section shall be included in the Contract lump sum price for "Electrical and Control Work" as outlined in this section of the Specifications.

These costs shall include all labor, materials, freight, startup and installation services, mobilization and demobilization for the complete electrical and control system described in this section. This work includes the following major items of work:

Furnish and install approximately 400 L.F. of underground electrical service line.
Furnish and install approximately 800 L.F. of underground control cable for Well No. 7.
Furnish and install well control panel in well house at Well No. 5 and provide specified startup services.
Furnish and install well control panel at proposed Well No. 7 and provide specified startup services.
Furnish and install equipment and materials required for electrical service to proposed Well No. 7.

6.08 COORDINATION OF WORK WITH OWNER.

The installation of control system additions included in this Contract shall be coordinated with the Owner. Total interruption of service of the well field shall be avoided. All service interruptions including service interruptions for individual wells shall be scheduled for minimum demand periods. All scheduled service interruptions shall be approved in advance by the Owner. The Contractor shall provide written notice of scheduled interruptions to the Engineer prior to commencing work which requires service interruption.



WIRING DIAGRAM FOR CONTROL PANEL AT WELL NO. 7

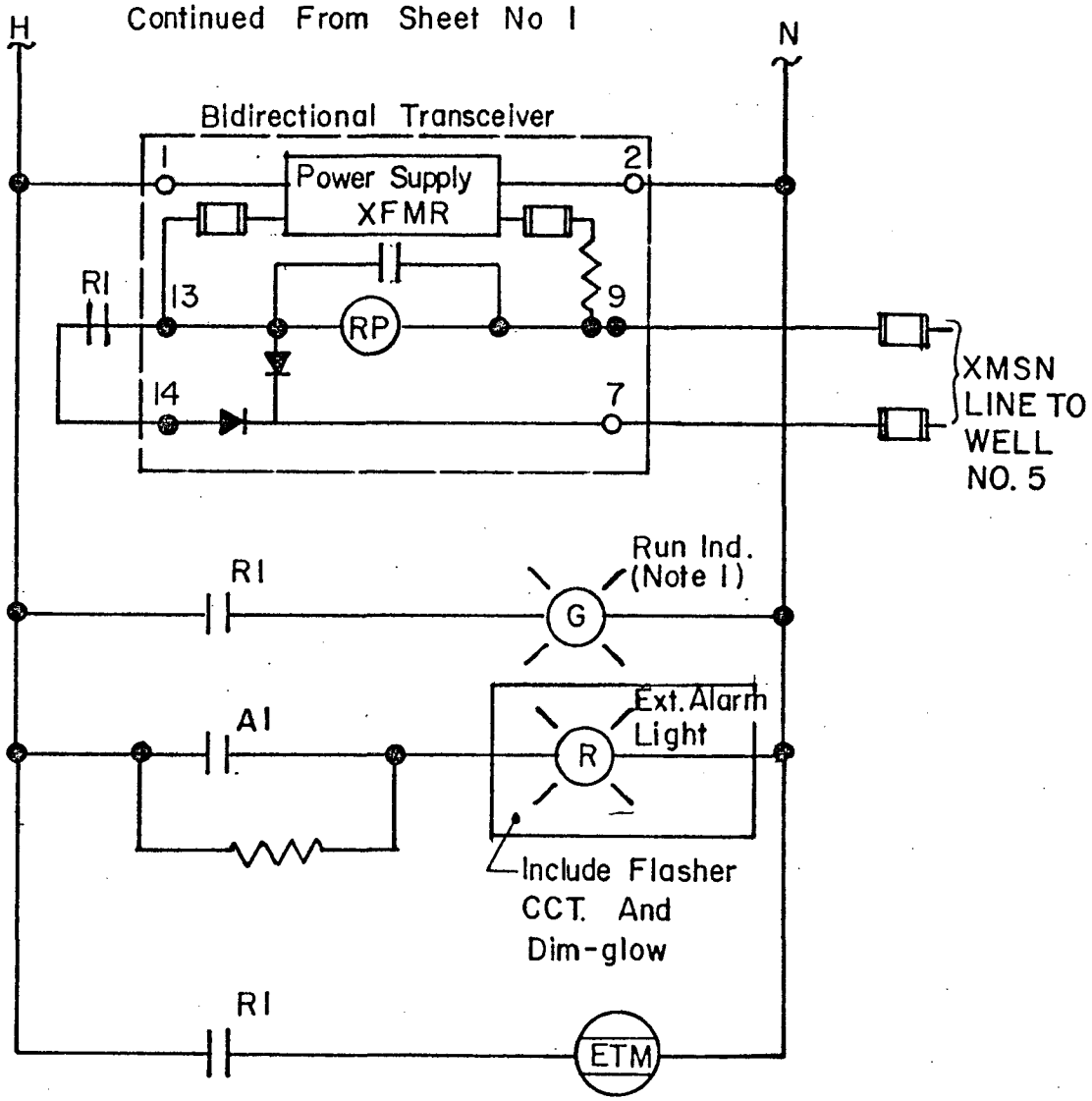
LEGEND

PFR	Phase Failure Relay
TDR	Time Delay Relay
NOTC	Normally Open, Timed Closed
NCTO	Normally Closed, Timed Open

WATER SUPPLY FACILITIES
CITY OF VOLGA, SOUTH DAKOTA
WATER SUPPLY WELL

ELECTRICAL

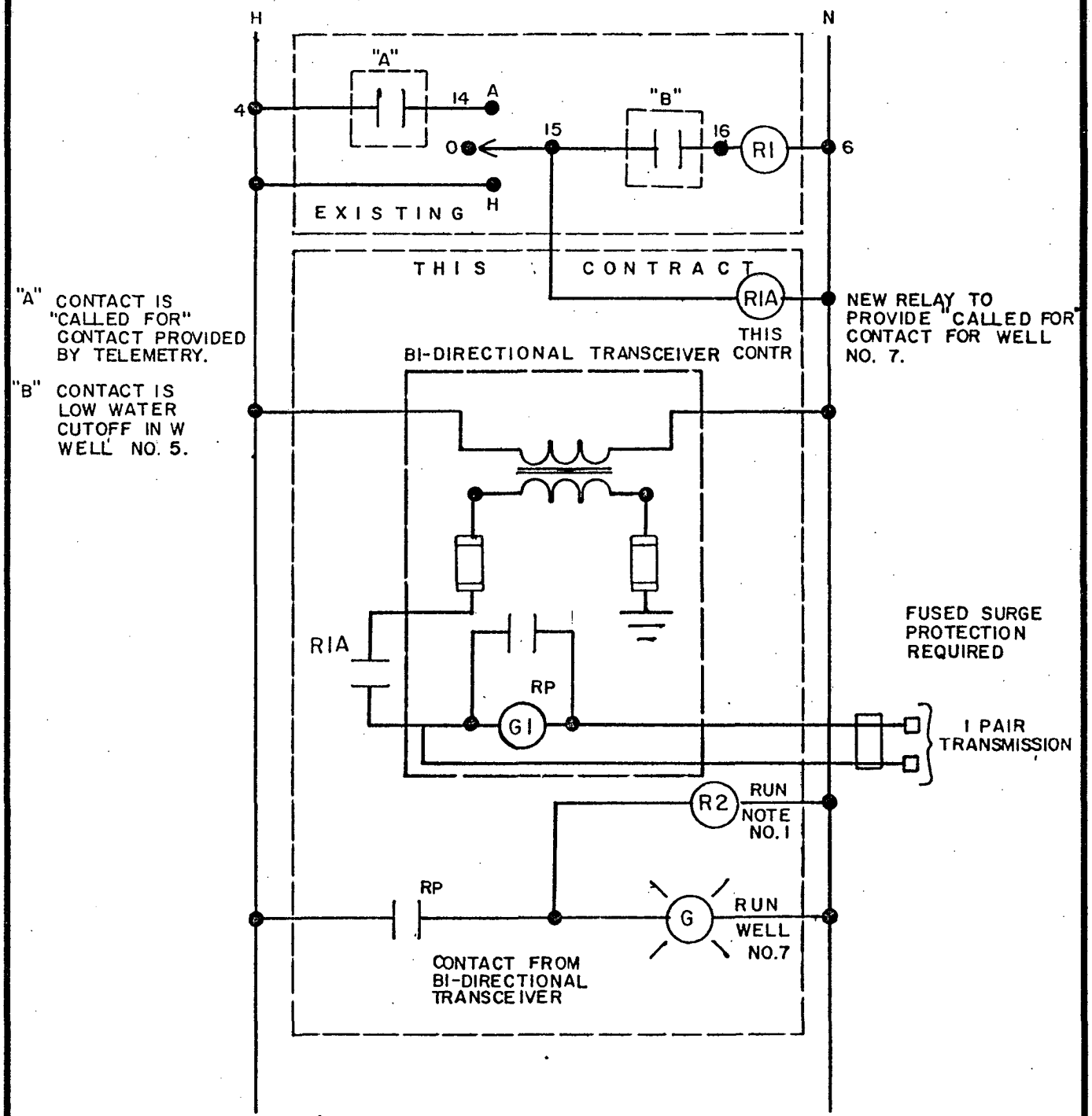
Sheet 1 of 7



WIRING DIAGRAM FOR CONTROL CONTINUED

WATER SUPPLY FACILITIES
CITY OF VOLGA, SOUTH DAKOTA
WATER SUPPLY WELL

ELECTRICAL



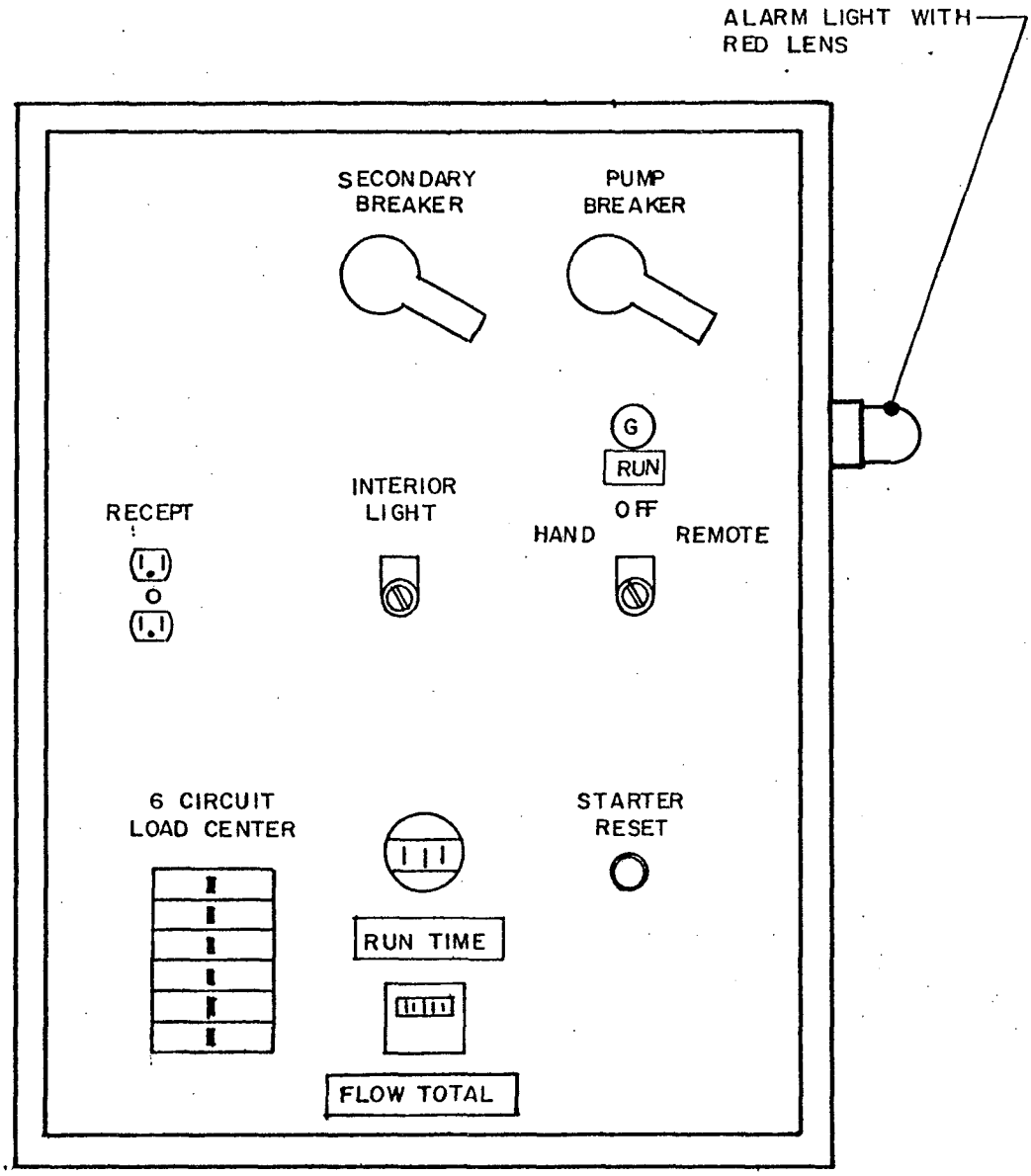
A. CONTROL ADDITIONS AT PANEL IN WELL HOUSE NO. 5

NOTE

1. CONNECT NO CONTACT FROM R2 IN PARALLEL WITH PUMP RUNNING PRESSURE SWITCH AUXILIARY CONTACT (MSA) FOR WELL PUMP NO. 5 SO EITHER PUMP WILL CAUSE A RUN INDICATION AT THE RECEIVER IN THE MAIN PANEL.
2. DIAGRAM IS SCHEMATIC ONLY AND IS INTENDED AS AN ILLUSTRATION OF SPECIFICATIONS.

WATER SUPPLY FACILITIES
CITY OF VOLGA, SOUTH DAKOTA
WATER SUPPLY WELL

ELECTRICAL



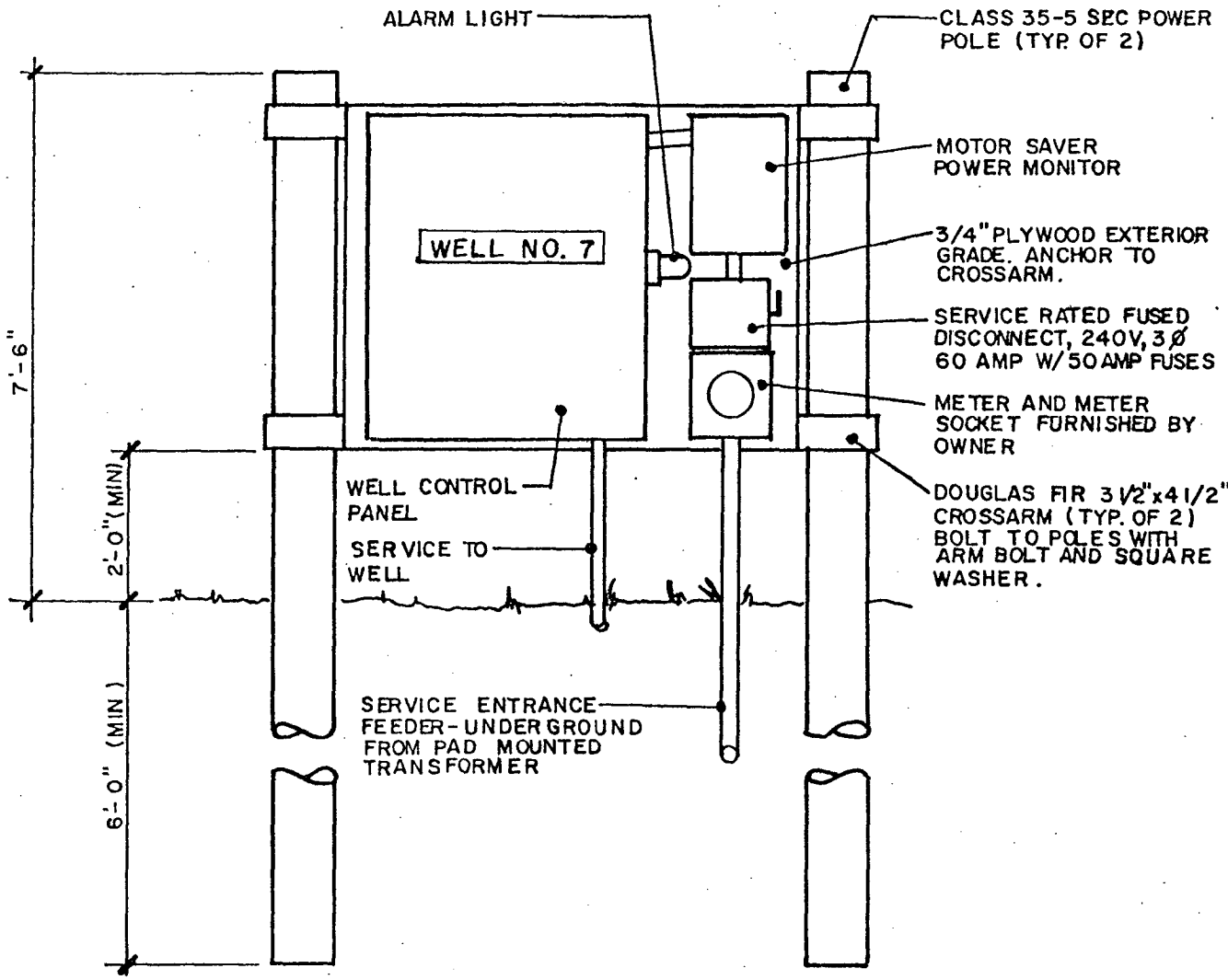
PANEL FRONT ARRANGEMENT (INTERIOR DOOR)

NOTES

1. EXTERIOR DEAD FRONT DOOR (NOT SHOWN) SHALL HAVE 3 POINT LATCHING SYSTEM WITH LOCKING HANDLE.
2. PANEL SHALL BE CONSTRUCTED OF STAINLESS (14 GA. MIN.) OR PAINTED STEEL.
3. PANEL ENCLOSURE SHALL BE RATED NEMA 3R.
4. PANEL ENCLOSURE SHALL INCLUDE THERMOSTAT CONTROLLED HEATER.

WATER SUPPLY FACILITIES
CITY OF VOLGA, SOUTH DAKOTA
WATER SUPPLY WELL

ELECTRICAL



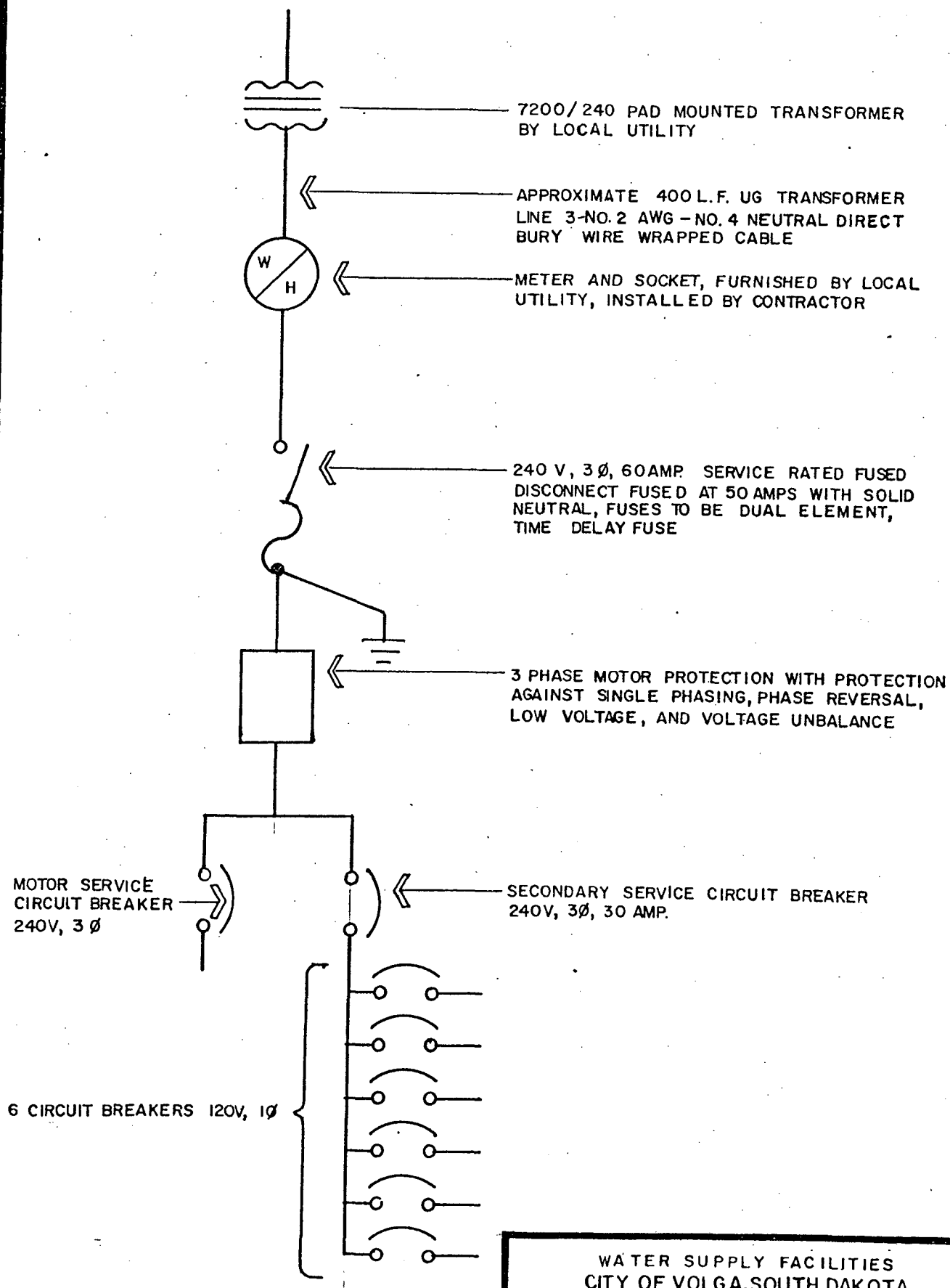
WELL CONTROL PANEL ARRANGEMENT

NOTES:

1. CONTACTOR SHALL DETERMINE BACKBOARD DIMENSIONS BASED ON DIMENSIONS OF EQUIPMENT SUPPLIED.

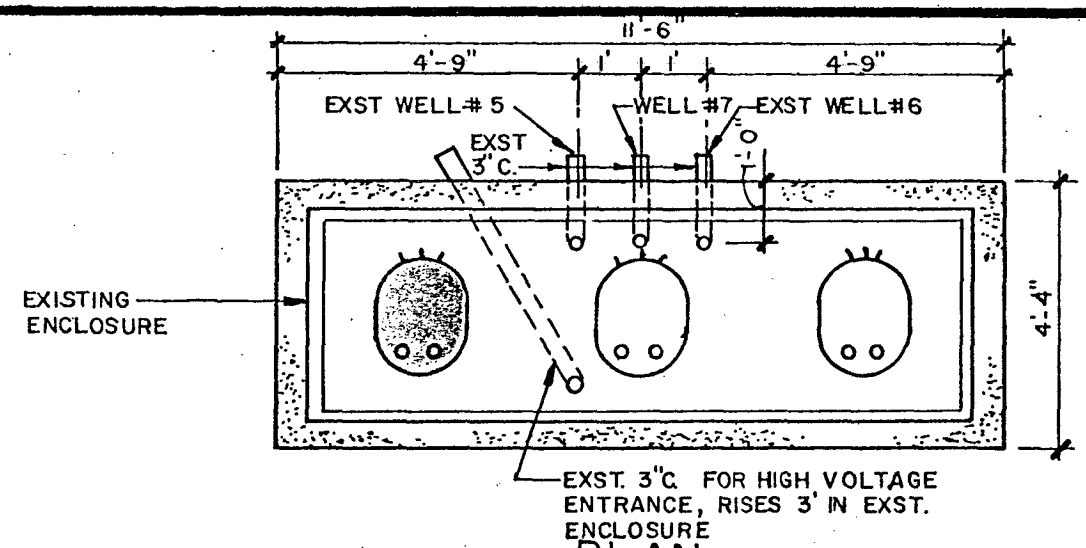
WATER SUPPLY FACILITIES
CITY OF VOLGA, SOUTH DAKOTA
WATER SUPPLY WELL

ELECTRICAL

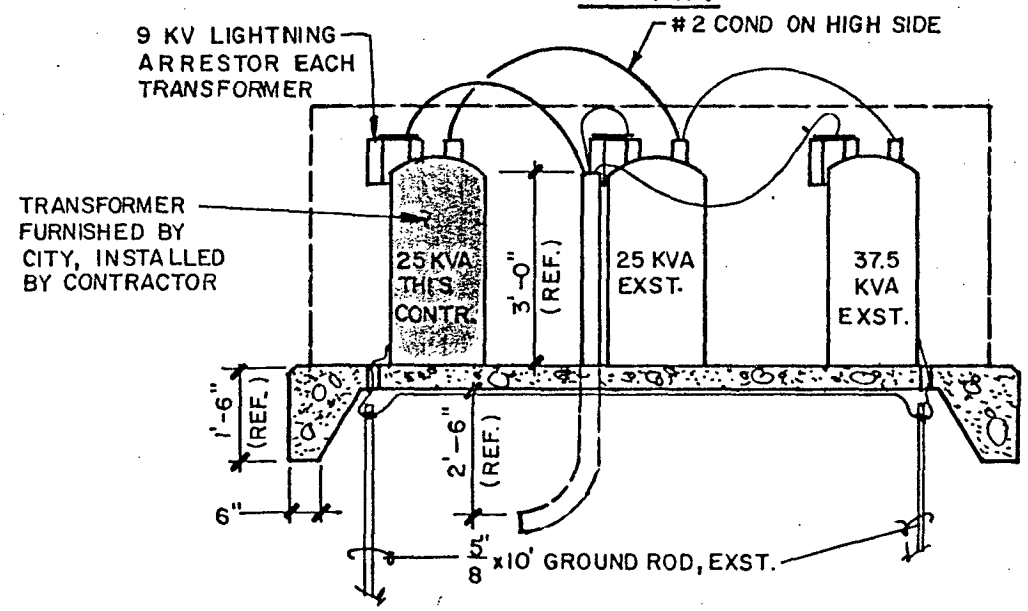


WATER SUPPLY FACILITIES
CITY OF VOLGA, SOUTH DAKOTA
WATER SUPPLY WELL

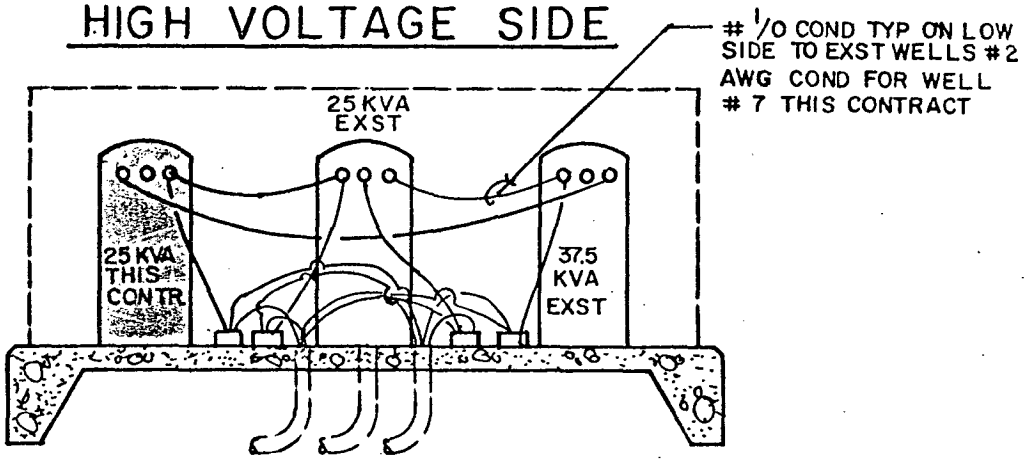
ELECTRICAL



PLAN



HIGH VOLTAGE SIDE



LOW VOLTAGE SIDE

TRANSFORMER DETAILS

WATER SUPPLY FACILITIES
CITY OF VOLGA, SOUTH DAKOTA
WATER SUPPLY WELL

ELECTRICAL

7. CHLORINATION EQUIPMENT

7.01 SCOPE. This section of the Specifications includes all modifications to be made on the existing chlorination systems at Wells 5 and 6. The work consists of removal of the existing 4 ppd chlorine feed tubes and furnishing and installation of 10 ppd chlorine feed tubes in existing chlorinators.

7.02 PRODUCTS. The Contractor shall furnish and install chlorine metering tubes suitable for use in Advance Model VR065A gas chlorinators. The tubes shall have 10 pound per day (ppd) feed rate capacity. Existing tubes shall be removed and turned over to the Owner. The Contractor shall also furnish and install V-notch plugs compatible with the 10 ppd tubes. The plugs shall be capable of controlling chlorine feed rates between 1.5 and 10 ppd.

7.03 INSTALLATION. Chlorine metering tubes shall be installed in existing chlorinators in the well houses at Wells 5 and 6. Contractor shall test for leaks and verify proper operation in the presence of the Owner and the Engineer. Change over of the chlorine metering tubes shall be done with the well pump off. Contractor shall prove satisfactory operation of one chlorinator prior to changing the tube in the second unit.

7.04 METHOD OF MEASURMEMT AND BASIS OF PAYMENT: The work described in this section shall be measured and paid for at the lump sum amount for "Chlorination Equipment". Lump sum amount shall be full payment for all labor, materials, tools, equipment, devices, and incidentals required for installation of the equipment.

BANNER

August 19, 1988

Mr. John Hatch, Chief Engineer
Office of Water Rights
South Dakota Department of Water and
Natural Resources
Joe Foss Building
Pierre, South Dakota 57501

RE: Water Supply Well No. 7
Well Field Expansion
City of Volga, S.D.
BAI No. 7309-01

Dear Mr. Hatch:

Sioux Well Drilling is in the process of completing the referenced project. Therefore, we are enclosing herewith for your records, the following:

1. Well Driller's Report - 8/12/88
2. Water Sample Analysis taken 8/2/88
3. Water Sample Analysis taken 8/4/88

We will notify your office upon project completion and on-line start-up completion.

Respectfully submitted,

Fred Rittershaus, P.E.

FR/db
cc: Steve Meyer, City of Volga
Raymond Birchem, SDDWNR, Pierre
Wayne Wagner, Sioux Well Drilling, Sioux Falls
Hank Williams, BAI Field Engineer

BANNER ASSOCIATES, INC.
CONSULTING ENGINEERS & ARCHITECTS
409 22ND AVENUE SOUTH • P.O. BOX 298
BROOKINGS, SD 57006-0298 • (605) 692-6342

PLEASE COMPLETE ENTIRE FORM

WELL DRILLERS REPORT
Division of Water Rights
Department of Water & Natural Resources

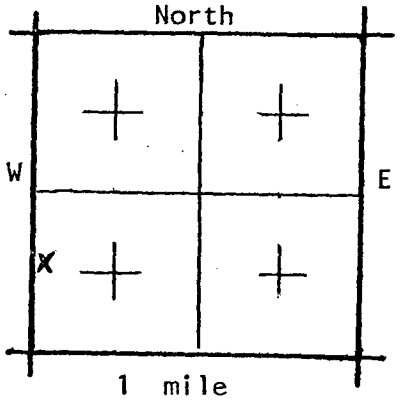
AUG 1988 DIVISION OF WATER RIGHTS Pierre, SD

6/68

Well Owner:
Name City of Volga
Address

Well Location:

Mark location with an "X"



County Brookings
¼ NW ¼ SW ¼ Sec. 22 Twp. 110 Rg. 51

Proposed Use:
[ ] Domestic [X] Municipal [ ] Test Holes
[ ] Irrigation [ ] Industrial [ ] Stock

Method of Drilling:
[X] Forward Rotary [ ] Bored [ ] Jetted
[ ] Reverse Rotary [ ] Cable [X] Other FALSE CASING

Well Construction:
Diameter of Hole 12
Depth 45-6
Casing [X] Steel [ ] Concrete
[ ] Plastic [ ] Other
If other, specify

Was casing end left open no
Was a well screen installed yes
Describe Well Screen
Diameter 12 PS Material SS
Slot size .060
Was well gravel packed yes
Was well grouted yes
Was water sample taken yes

Remarks:

Water Level Information
Static water level 16-2 below land surface
If flowing: closed in pressure ____ PSI
rate of flow ____ GPM
Controlled by:
[ ] Valve [ ] Reducers [ ] Other
If other; specify

Well Test Data:
[X] Pumped motor driven
[ ] Bailed Describe: turbine
[ ] Other

Pumping Level Below Land Surface
24-6 ft. After 24 Hrs. pumped 180 GPM
" " " " "
" " " " "

Well Log:

Formation	Depth From	Depth To
Top soil	0	1
Clay	1	4
Sand M	4	18
Sand M-C	18	30
Sand F-M	30	41
Sand F	41	45-6

(Use Back if Necessary)

Date Completed: July 88

Driller:
Sioux Well Drlg. 129
Driller's or Firm's Name License NO.
1401 E 63 N
Address
Wayne D Wagner 12 Aug 88
Signed By Date

REPORT OF ANALYSIS 08-16-1988
Water Quality Laboratory
Water Resources Research Institute Brookings
South Dakota State University
Brookings, South Dakota 57007

Name:	Brotsky, Bob	Date Rec'd	AUG 02, 1988
Address:	Banner Assoc., Inc.	Sample No.	88-0298
	409 22nd Ave. S.	Source	WELL- 45.50ft.
	Brookings, SD 57006	Legal ID	

WATER ANALYSIS

Calcium (Ca)	114	ppm*	5.69	me/l**
Magnesium (Mg)	39	ppm	3.21	me/l
Sodium (Na)	10	ppm	0.43	me/l
Potassium (K)	5	ppm	0.13	me/l
Sulfate (SO4)	234	ppm	4.87	me/l
Nitrate (as N)	0.31	ppm****	0.02	me/l
Chloride (Cl)	8	ppm	0.23	me/l
Bicarbonate (HCO3)	268	ppm	4.40	me/l
Carbonate (CO3)	0	ppm	0.00	me/l
Iron (Fe)	0.38	ppm	0.01	me/l
Flouride (F)	0.29	ppm	0.01	me/l
Manganese (Mn)	0.94	ppm		
Boron (B)		ppm		
Hardness (EDTA as CaCO3)		ppm		g.p.g.***
Total solids	634	ppm		
Total Cations			9.46	me/l
Total Anions			9.52	me/l
Alkalinity (Methyl Orange)	220	ppm(as CaCO3)		
Alkalinity (Phenolphthalein)	0	ppm(as CaCO3)		
Electrical Conductivity	850	micromhos per cm at 25 C		
Sodium Adsorption Ratio	0.21	Adjusted SAR	0.49	
Sodium	4.60	% of Cations		
Residual Sodium Carbonate	0.00	me/l		
pH	7.43			

Others:

*ppm=parts per million ***g.p.g.=grains per gallon
**me/l=millequivalents per liter

COMMENTS:

SOURCE: #7 WELL Volga, Taken: 8/2/88 1:15 pm

Analysis By: Shirley Mittan

****Recommended Maximum Contaminant Level of 10 ppm for Human Consumption.

Service Performed: Total Cost: $ 39.50
Amount Received: 0.00
Analyses Requested Balance Due: 39.50

Make checks payable to: SDSU Water Quality Lab

Please write lab number on your check!

Lab No. 88-0298

REPORT OF ANALYSIS 08-16-1988

Water Quality Laboratory

Water Resources Research Inst[itu]te Brookings

South Dakota State Universit[y]

Brookings, South Dakota 5700[6]

Name:	Brotsky, Bob	Date Rec'd	AUG 04, 1988
Address:	Banner Assoc., Inc.	Sample No.	88-0312
	409 22nd Ave. S.	Source	#7 WELL
	Brookings, SD 57006	Legal ID	

WATER ANALYSIS

Calcium (Ca)	114	ppm*	5.69	me/l**
Magnesium (Mg)	39	ppm	3.21	me/l
Sodium (Na)	10	ppm	0.43	me/l
Potassium (K)	6	ppm	0.15	me/l
Sulfate (SO4)	234	ppm	4.87	me/l
Nitrate (as N)	1.30	ppm****	0.09	me/l
Chloride (Cl)	6	ppm	0.17	me/l
Bicarbonate (HCO3)	273	ppm	4.48	me/l
Carbonate (CO3)	0	ppm	0.00	me/l
Iron (Fe)	0.13	ppm	0.00	me/l
Flouride (F)	0.30	ppm	0.01	me/l
Manganese (Mn)	0.73	ppm		
Boron (B)		ppm		
Hardness (EDTA as CaCO3)		ppm		g.p.g.***
Total solids	632	ppm		
Total Cations			9.48	me/l
Total Anions			9.61	me/l
Alkalinity (Methyl Orange)	224	ppm(as CaCO3)		
Alkalinity (Phenolphthalein)	0	ppm(as CaCO3)		
Electrical Conductivity	900	micromhos per cm at 25 C		
Sodium Adsorption Ratio	0.21	Adjusted SAR	0.49	
Sodium	4.58	% of Cations		
Residual Sodium Carbonate	0.00	me/l		
pH	7.53			

Others:

*ppm=parts per million ***g.p.g.=grains per gallon

**me/l=milleequivalents per liter

COMMENTS:

VOLGA, Taken: 8/3/88 12:50 pm, Temp: 50 C

Analysis By: Shirley Mittan

****Recommended Maximum Contaminant Level of 10 ppm for Human Consumption.

Service Performed:	Total Cost: $ 39.50
	Amount Received: 0.00
Analyses Requested	Balance Due: 39.50

Make checks payable to: SDSU Water Quality Lab

Please write lab number on your check!

Lab No. 88-0312

SOUTH Dakota Department of
Water & Natural Resources
Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501

Water Rights Division
605 773-3352

APR 28 1988

City of Volga
202 Kasan AVenue
Volga, South Dakota 57071

Dear Sir:

Enclosed herewith is your Water Permit No. 5167-3 as approved by the Water Management Board authorizing you to construct your water diversion system and the water to beneficial use, not exceeding the limits as specified in said Water Permit No. 5167-3 .

Also enclosed is Form 10, Notice of Completion of Works and Application of Water to Beneficial Use, which you are to complete and submit to the Chief Engineer when you have completed the system and/or have put the water to beneficial use. An inspection can then be scheduled so that your Water License may be issued to you, thus completing your acquistion of a Water Right.

Very truly yours,

JOHN HATCH, Chief Engineer
Water Rights Division

JH:ms

enclosure

PLEASE NOTE: Certain changes can be made in your permit within the five year construction period, usually without affecting the priority date provided an application to amend your permit is made within the five year period-i.e. changes in location or number of diversion points (wells) or location of land to be irrigated. Well locations for wells into the same aquifer can be moved up to 660 feet without application.

Applications to amend a permit after the five year construction period will be assigned a new priority date. Applications to change water sources, to add lands or increase original diversion rates, if approved will usually receive the date of the new application as a priority date regardless of the five year construction period.

BANNER

March 21, 1989

Mr. John Hatch, Chief Engineer
Office of Water Rights
South Dakota Department of Water and
Natural Resources
Joe Foss Building
Pierre, South Dakota 57501

RE: Water Supply Well No. 7
Well Field Expansion
City of Volga, S.D.
BAI No. 7309-01

Dear Mr. Hatch:

Sioux Well Drilling has completed the above referenced project. A copy of the "Certificate of Substantial Completion" is enclosed for your records.

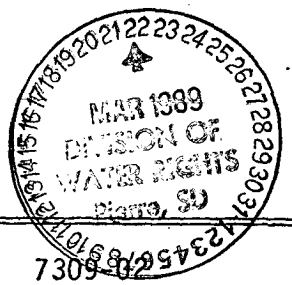
Well No. 7 is on-line and a part of the City's water delivery system. It produces at 180 to 200 gpm.

Respectfully submitted,

Fred Rittershaus, P.E.

FR/db
Enclosures
cc: Steve Meyer, City of Volga (w/enclosure)
Raymond Birchem, SDDWNR, Pierre (w/enclosure)

BANNER ASSOCIATES, INC.
CONSULTING ENGINEERS & ARCHITECTS
409 22ND AVENUE SOUTH • P.O. BOX 298
BROOKINGS, SD 57006-0298 • (605) 692-6342



CERTIFICATE OF SUBSTANTIAL COMPLETION

OWNER's Project No. N/A ENGINEER's Project No. 7309-02

Project Water Supply Well No. 7
City of Volga, South Dakota

CONTRACTOR Sioux Well Drilling, 1401 E. 63rd North, Sioux Falls, S.D. 57104

Contract For Bid Schedules Nos. 1, 2, 3 & 4
Water Supply Well No. 7

Contract Date May 2, 1988

This Certificate of Substantial Completion applies to all Work under the Contract Documents or to the following specified parts thereof:

Applies to all Work

To City of Volga, South Dakota
OWNER

And To Sioux Well Drilling
CONTRACTOR

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on

January 1, 1989
Date of Substantial Completion

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. When this Certificate applies to a specified part of the Work the items in the tentative list shall be completed or corrected by CONTRACTOR within as required days of the above date of Substantial Completion.

NSPE-ACEC 1910-8-D (1978 Edition)

© 1978, National Society of
Professional Engineers

The date of Substantial Completion is the date upon which all guarantees and warranties begin, except as follows:

MAR 1989
DIVISION OF
WATER RIGHTS
Pierre, SD

No Exceptions

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities and insurance shall be as follows:

RESPONSIBILITIES:

OWNER: Security, operation, safety, maintenance, utilities and insurance

CONTRACTOR: As required for completion and 14-day on line testing of Wells No. 5 and No. 6.

The following documents are attached to and made a part of this Certificate:

None

Executed by ENGINEER on January 9, 1989

Banner Associates, Inc.
ENGINEER

By Fred Rittenhaus, P.E.

The CONTRACTOR accepts this Certificate of Substantial Completion on 11 Jan, 1989

Sioux Well Drilling
CONTRACTOR

By Wayne H Wagner 11 Jan 89

FIELD INVESTIGATION REPORT FOR PERMIT NO. 5167-3

DATE OF INVESTIGATION:	8 May 1996
NAME & ADDRESS OF INVESTIGATION CONTACT/ RELATIONSHIP TO PERMIT HOLDER, IF APPLICABLE	Steve Meyer Water Superintendent
NAME & ADDRESS OF PERMIT HOLDER	City of Volga
DIVERSION POINT LEGAL LOCATION	NWSW 22 T110N R51W ≈104'E and ≈1298'S of NW corner of SW¼ section 22 T110N R51W

Other permit(s) associated with the project: 1759-3

WELL INFORMATION:

1) Well Drilling Firm: Sioux Well Drilling
2) No. of Wells 1
3) Depth(s) 45.5 feet
4) Well log is available Y/N
5) Comment: _____

Casing:

1) Diameter 10 inches
2) Length 38 feet
3) Type steel

Screen:

1) Type Stainless Steel
2) Length 10 feet
3) Static water level 16 feet

Pump:

1) Make Grundfla
2) Model _____
3) Size _____
4) Capacity _____ GPM 0.45cfs

Motor:

1) Make _____
2) Model No. _____
3) Horsepower rating 10 hp

DISTRIBUTION LINES OR CANALS:

1) Type steel 2) Size 6 inches 3) Length _____ feet
to City water mains.

SYSTEM TYPE:

Center pivot:

1) Make _____
2) Overall length _____ feet
3) Number of towers _____
4) Distance between towers _____ feet
5) End gun Y/N
6) High or low pressure _____
7) Capacity _____ GPM

Dale N Selken
8 May 1996

Gun:

1) Make _____
2) Nozzle size _____ inches
3) Capacity _____ GPM
4) Hose size _____ inches

Sideroll:

1) Length _____ feet
2) Diameter of pipe _____ inches
3) Sprinkler spacing _____ feet

Towline:

1) Length _____ feet
2) Diameter _____ inches
3) Spacing of gates _____ inches

Siphons:

1) Size _____ inches
2) Number _____

DAM INFORMATION:

1) Height to crest _____ feet
2) Height to primary spillway ____ feet
3) Height to secondary spillway ____ ft
4) Crest width _____ feet
5) Crest length ____ feet
6) Spillway length ____ feet
7) Spillway width ____ feet
8) Approx. storage ____ ac-ft
9) Approx. storage to crest ____ ac-ft
10) Date constructed: _____

CHEMIGATION EQUIPMENT:

1) Does chemigate Y/N
2) Main line check valve Y/N
3) Inspection port/air relief Y/N
4) Low pressure drain Y/N
5) Discharge is 20' from source Y/N
6) Interlock type **electrical or mechanical**
7) Injection pump type **piston or other**
8) Injection check valve Y/N
9) Injection line check valve or positive displacement pump Y/N
10) All chemigation equipment appears to be installed in the proper position and complies with chemigation laws and rules Y/N
11) Comments: _____

PERMIT QUALIFICATIONS:

1) Special qualifications to permit being abided by Y/N
2) All structures, wells and lands on map Y/N
3) Irrigation Questionnaires checked to determine if permit owner started irrigation by the end of construction period Y/N

Form 12

Permit No. 5167-3

_____ Water District

Report Of Examination Of Works And/Or Application Of Water To Beneficial Use

TO: Chief Engineer, Division of Water Rights, DWNR, Foss Bldg., Pierre, SD 57501

I have this day made a thorough examination of the water use system constructed by City of Volga

_____ of Brookings County _____ holder of

Permit No. 5167-3, bearing the priority of 22 December 19 87 authorizing

the diversion of 0.45 cu. ft. per second of the waters of Big Sioux - Brookings Aquifer

for municipal purposes, in Brookings County.

I have to report on the conditions of the same as follows:

A. Works used to divert the water:

well 45.5 feet deep drilled by Sioux Well Drilling.

B. Works used to transport water to place of use:

city water mains

C. Works used to apply water to beneficial use:

city water mains

The system is in the following condition excellent

The point of diversion is located in outlot 1 SW 1/4 section 22 T 110N R 51W approximately 104 east and 1298 Ft south of NW corner of sw 1/4 section 22 T110N R51W

The works are capable of diverting and conveying to the place of use 0.45

cu. ft. per second of water which is to be used for municipal

Water has been put to beneficial use to the maximum extent as follows: well is in used and produces 0.45 cfs of water and is used in conjunction with two wells under 1759-3 City of Volga.

~~comprising a total of _____ acres of land and~~ the license should be issued for 0.45 cfs

Applicable permit qualifications have been complied with X Yes ____ No

Exceptions to compliance are: _____ Date 8 May 1996

Dale N Selken

(signature)

DEPARTMENT of ENVIRONMENT and NATURAL RESOURCES
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

June 18, 1996

5167-3

Marcia Thompson, Finance Officer
City of Volga
P.O. Box 217
Volga, SD 57071-0217

Dear Ms. Thompson:

The inspection of your water use system and the inspection of the extent of application of water to beneficial use, as developed under Water Permit No. 5167-3, has been completed. Your final water right document, the Water License, can now be issued.

Statutes require that we charge a $50.00 fee for the inspection and issuance of the Water License. Upon receipt of the $50.00 fee from you, we will begin processing your Water License.

Please remit fee to:
Department of Environment & Natural Resources
Water Rights Program
523 E. Capitol
Pierre, SD 57501-3181

Sincerely,

Cheryl F. Frost

Cheryl F. Frost
Secretary
Water Rights Program
(605) 773-3352

NOTE: On check or money order, please specify your permit number. This will insure proper handling of the fee.

RECEIPT

414993

Division of Water Rights

South Dakota Department of Environment and Natural Resources

Pierre, June 24, 19 96

RECEIVED OF City of Volga, P.O. Box 217, Volga, SD 57071-0217

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 _____		
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. 5167-3	50	00
Fee for Filing Transfer Form _____		
Fee for Filing Extension Request _____		
Fee for _____		
_____		
_____		
_____		
(Any Other Work Provided by Law) **Total**	50	00

By John Hatch CE
Chief Engineer

STATE OF SOUTH DAKOTA

WATER LICENSE NO. 5167-3

(1) The City of Volga of PO Box 217, Volga, SD 57071-0217 made Application No. 5167-3, December 22, 1987 for a water permit to appropriate 0.45 cubic feet of water per second from ground water (one well), Brookings County, South Dakota for municipal purposes. Permit No. 5167-3, with a priority date of December 22, 1987 was approved March 3, 1988 and issued to the applicant for diversion of water with construction of the described water supply system to be completed on or before March 3, 1993 and for the application to beneficial use of said water on or before March 3, 1997.

(2) It is certified that the applicant 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 0.45 cubic feet of water per second for beneficial use. The location of the diversion point is in outlot 1 of the SW¼ of Section 22, T110N, R51W - approximately 104 feet east and 1298 feet south of the NW corner of the SW¼ Section 22 (NW¼ SW¼).

(3) The applicant has complied with the provisions of South Dakota State Law relating to the application of water to beneficial use. The well described above is used in conjunction with two wells authorized under Water Right No. 1759-3, also held by the City of Volga.

(4) Pursuant to South Dakota Water Law 46-5-30.1 the City of Volga of PO Box 217, Volga, SD 57071-0217 the holder and/or owner of Water Permit No. 5167-3 is issued a license to appropriate water, the right to use 0.45 cubic feet of water per second from ground water (one well) with a priority date of December 22, 1987 from the location specified in (2) of this license, for municipal purposes. This license is subject to any limitations or qualifications listed in Water Permit No. 5167-3 and subject to South Dakota State Law.

John Hatch, Chief Engineer
Water Rights Program
Department of Environment and Natural Resources

JUL 2 1996
date

GREAT FACES. GREAT PLACES.

DEPARTMENT of ENVIRONMENT and NATURAL RESOURCES
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3181

JUL 2 1996

5167-3

Marcia Thompson, Finance Officer
City of Volga
P.O. Box 217
Volga, SD 57071-0217

Dear Ms. Thompson:

Enclosed is Water License No. 5167-3. This is the final water right document completing your process of obtaining a Water Right. Enclosed is Receipt No. 414993 in the amount of $50.00 which you paid for the investigation and issuance of the Water License.

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. 5167-3, 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.

Very truly yours,

JOHN HATCH, Chief Engineer
Water Rights Program
(605) 773-3352

gm
enclosures

SPECIFICATIONS

FOR

EMERGENCY WELL REPLACEMENT - 2000

CITY OF VOLGA, SOUTH DAKOTA

Prepared For

CITY COUNCIL
CITY OF VOLGA, SD

Prepared By

BANNER ASSOCIATES, INC.
CONSULTING ENGINEERS AND ARCHITECTS
BROOKINGS, SOUTH DAKOTA

NOVEMBER, 2000

#20020.00.00

SPECIFICATIONS

FOR

EMERGENCY WELL REPLACEMENT - 2000

CITY OF VOLGA, SOUTH DAKOTA

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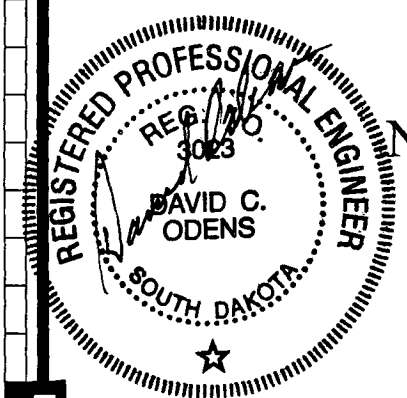

NOVEMBER, 2000

#20020.00.00

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ADVERTISEMENT FOR BIDS

City of Volga, South Dakota
Owner
P.O. Box 217
Address
Volga, South Dakota

Separate sealed BIDS for the construction of Volga Well Replacement - 2000, consisting of Bid Schedule No. 1 - Water Supply Well No.7 (replacement)

will be received by City of Volga at the office of City Finance Officer until 3:00 P.M. local time, November 13, 2000, and then at said office publicly opened and read aloud.

The CONTRACT DOCUMENTS may be examined at the following locations:

City of Volga, Finance Office
Banner Associates, Inc., 409 22nd Ave. So., P.O. Box 298, Brookings, SD 57006

Copies of the CONTRACT DOCUMENTS may be obtained at the office of Banner Associates, Inc. located at 409 22nd Ave. So., P.O. Box 298, Brookings, SD 57006-0298 upon payment of $ 20.00 for each set.

Any BIDDER, upon returning the CONTRACT DOCUMENTS promptly and in good condition, will be refunded his payment, and any non-bidder upon so returning the CONTRACT DOCUMENTS will be refunded $ 20.00.

DATE: November 7, 2000

Authorized by City Council, November 6, 2000.

INFORMATION FOR BIDDERS

BIDS will be received by City of Volga, South Dakota (herein called the "OWNER"), at the City Finance Office until 3:00 P.M. Local Time, November 13, 2000, and then at said office publicly opened and read aloud.

Each BID must be submitted in a sealed envelope, addressed to City of Volga, SD at P.O. Box 217, Volga, South Dakota Each sealed envelope containing a BID must be plainly marked on the outside as BID for Volga Well Replacement - 2000 and the envelope should bear on the outside the name of the BIDDER, his address, his license number (if applicable), and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at P.O. Box 217, Volga, South Dakota.

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, ink or typewritten, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required.

The bidder may attach a substitute Bid Schedule printed by a computer in lieu of completing the bound Bid Schedules in ink. All of the provisions of the bound Bid section must be fully complied with except, if a computer printed substitute Bid Schedule is used the unit bid prices need not be written in words. If a substitute Bid Schedule is used it shall be attached to the bound Bid Schedule. Such computer printed substitute Bid Schedule shall include the following at the top of each page:

A. Bid Date
B. Title of Project
C. Bid Schedule
D. Name of Owner (Volga, SD)
E. Bidder's Name and Address

The substitute computer printed Bid Schedule(s) shall identify the Bid Schedule Number and have column headings that include the Item Number, Spec. Ref. No., Item Description, Quantity, Unit Designation, Unit Bid Price, Amount Bid for each item, Total or Gross Sum Bid below the last bid item and bidder's name, signature in ink and title at the end of the Bid Schedule. The Bidder shall complete Page B-1, including acknowledgement of addendum, and signature(s) on the last page of the Bid. The signature on the substitute computer printed Bid Schedule shall be the same as that in the bound proposal. The total or gross sum bid shall also be written in ink in the designated space for each Bid Schedule in the bound proposal. In case of a discrepancy between the line number, bid item description, and/or quantity shown in the bound proposal and those shown on the substitute computer printed bid schedule, the bid item description and the quantity shown in the bound proposal shall govern. The unit bid price shown on the substitute computer printed bid schedule shall govern whether or not the amount bid shown is correct. The substitute bid schedule page size and size of printed characters shall be approximately the same as the bound bid schedule. Solid lines for separating columns and line numbers need not be printed. At least one blank line or space shall separate each line number. Columns may be arranged either vertically or horizontally on the substitute bid schedule. Any irregularities which are not waived by the City Council as a technicality will result in rejection of the bid.

The OWNER may waive any informalities for minor defects or reject any and all BIDS. Any BID may be withdrawn prior to the above scheduled time for the opening of BIDS or authorized postponement thereof. Any BID received after the time and date specified shall not be considered. No BIDDER may withdraw a BID until 30 days after the actual date of the opening thereof, if no contract has been awarded in that time. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID Schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

The OWNER shall provide to BIDDERS prior to BIDDING, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him from fulfilling any of the conditions of the contract.

Each BID must be accompanied by a BID BOND payable to the OWNER for ten percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three lowest responsible BIDDERS. When the Agreement is executed, the bonds of the two remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will be retained until the PAYMENT BOND and PERFORMANCE BOND have been executed and approved, after which it will be returned. A certified check, cashier's check, or bank draft in the amount of five percent (5%) of the total sum of the BID may be used in lieu of a BID BOND.

A PERFORMANCE BOND and a PAYMENT BOND, in the amount of 100 percent of the CONTRACT PRICE with a corporate surety approved by the OWNER will be required for the faithful performance of the contract.

Attorneys-in-fact who sign BID BONDS or PAYMENT BONDS and PERFORMANCE BONDS must file with each BOND a certified and effective dated copy of their power of attorney.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the PERFORMANCE BOND and PAYMENT BOND within ten (10) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall be accompanied by the necessary Agreement and BOND forms. In case of failure of the BIDDER to execute the Agreement, the OWNER may at his option consider the BIDDER in default in which case the BID BOND accompanying the proposal shall become the property of the OWNER.

The OWNER within ten (10) days of receipt of acceptable PERFORMANCE BOND, PAYMENT BOND, and Agreement signed by the party to whom the Agreement was awarded shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the OWNER not execute the Agreement within such period, the BIDDER may by WRITTEN NOTICE, withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The NOTICE TO PROCEED shall be issued within ten (10) days of the execution of the Agreement by the OWNER. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period, the time may be extended by mutual agreement between the OWNER and CONTRACTOR. If the NOTICE TO PROCEED has not been issued within the ten (10) day period or within the period mutually agreed upon, the CONTRACTOR may terminate the Agreement without further liability on the part of either party.

The OWNER may make such investigations as he deems necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carry out the obligations of the Agreement and to complete the WORK contemplated therein.

A conditional or qualified BID will not be accepted.

Award will be made to the lowest responsible BIDDER.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to his BID.

The low BIDDER shall supply the names and addresses of major material SUPPLIERS and SUBCONTRACTORS when requested to do so by the OWNER.

ENGINEER/ARCHITECT INFORMATION

The Engineering/Architectural firm is Banner Associates, Inc.
The Engineering/Architectural firm's contact person is David Odens
The firm's address is: Banner Associates, Inc.
P.O. Box 298, 409 22nd Avenue South
Brookings, SD 57006-0298
605-692-6342

INSPECTION TRIPS

Inspection trips for prospective BIDDERS shall be arranged through the City of Volga Finance office by calling Steve Meyer at 605-627-9101.

BID PROPOSAL

Proposal of _____ (hereinafter called "BIDDER"), organized and existing under the laws of the State of _____ doing business as _____*. To the CITY COUNCIL, CITY OF VOLGA, SOUTH DAKOTA, (hereinafter called "OWNER").

In compliance with your advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of an Emergency Replacement Well, in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID each party thereto certifies as to his own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to substantially complete the project on or before December 7, 2000 and to fully complete the PROJECT on or before May 15, 2001. BIDDER further agrees to pay as liquidated damages, the sum of $200.00 for each consecutive calendar day thereafter as provided in Part H, of the CDBG General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

_____

_____

*Insert "a corporation", "a partnership", or "an individual" as applicable.

NOTE: BIDS shall include sales tax and all other applicable taxes and fees.

> BIDDER must bid all items in the Bid Schedule. If the BID is to be awarded, it will be awarded to the low, responsive Bidder for the low total for the Bid Schedule, whose evaluation by the OWNER indicates to the OWNER that the award be in the best interests of the Project.

The City of Volga reserves the right to reduce or delete bid items and/or quantities to stay within budget funding amounts.

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices or lump sum:

UNIT PRICE BID

The Bidder must bid every item called for.

Item No.	Spec. Ref.No.	Description Work and Materials	Quantity & Unit Price Written In Words (Ink Only)	Total Cost
1.	2C-4.01	Mobilization and Demobilization	For the Lump Sum of _____ _____ _____	$_____
2.	2C-4.02	Formation Test Hole	50 L.F. @ _____ _____ _____($_____)/L.F.	$_____
3.	2C-4.03	Drilling Permanent Well	50 L.F. @ _____ _____ _____($_____)/L.F.	$_____
4.	2C-4.04	12-Inch O.D. Permanent Casing	32 L.F. @ _____ _____ _____($_____)/L.F.	$_____
5.	2C-4.05	12-Inch PS Well Screen	24 L.F. @ _____ _____ _____($_____)/L.F.	$_____

Item No.	Spec. Ref.No.	Description Work and Materials	Quantity & Unit Price Written In Words (Ink Only)	Total Cost
6.	2C-4.06	Selected Silica Gravel Pack	35 L.F. @ _____ _____ _____($_____)/L.F.	$_____
7.	2C-4.07	Clay Plug Seal	1 L.F. @ _____ _____ _____($_____)/L.F.	$_____
8.	2C-4.08	Concrete Grout Seal	14 L.F. @ _____ _____ _____($_____)/L.F.	$_____
9.	2C-4.09	Development of Permanent Well	12 Hrs. @ _____ _____ _____($_____)/Hr.	$_____
10.	2C-4.10	Test Pumping	24 Hrs. @ _____ _____ _____($_____)/Hr.	$_____

Item No.	Spec. Ref.No.	Description Work and Materials	Quantity & Unit Price Written In Words (Ink Only)	Total Cost
11.	2C-4.11	Remove and Re-install Pitless Adaptor Unit.	For the Lump Sum of_____ _____ _____($_____)	$_____
12.	2C-4.12	Remove and Re-install Column Pipe and Pump	For the Lump Sum of_____ _____ _____($_____)	$_____
13.	2C-4.14	Furnish and Install 12" Steel Pipe and Cap on Existing well	For the Lump Sum of_____ _____ _____($_____)	$_____
14.	2C-4.15	Site Restoration and Finish Grading	For the Lump Sum of _____ _____ _____	$_____
15.	2B-4.06	Install Fire Hydrant , Furnished by Owner	1 Ea. @ _____ _____ _____($_____)/Ea.	$_____

Item No.	Spec. Ref.No.	Description Work and Materials	Quantity & Unit Price Written In Words (Ink Only)	Total Cost
16.	2B-4.02	6" PVC Watermain	50 L.F. @ _____ _____ _____($_____)/L.F.	$_____
17.	2B-4.02	4" PVC Watermain	20 L.F. @ _____ _____ _____($_____)/L.F.	$_____
18.	2B-4.03	6" x 6" x 6" D.I. Tee and Plug	1 Ea. @ _____ _____ _____($_____)/Ea.	$_____
19.	2B-4.03	4" 90° Bend	1 Ea. @ _____ _____ _____($_____)/Ea.	$_____
20.	2B-4.04	6" Gate Valve & Box	2 Ea. @ _____ _____ _____($_____)/Ea.	$_____
		TOTAL FOR UNIT PRICE BID SCHEDULE		_____

Quantities are not guaranteed. Final payment will be based on actual quantities.

The undersigned bidder hereby expressly acknowledges his understanding of and his agreement to comply during the performance of any work under any contract resulting from this bid with all equal opportunity obligations as set forth in 41 CFR Part 60:1 and Part 60:4 and 40 CFR Part 8.

Respectfully submitted:

_____
Signature and Address

_____
Title and Date

_____
License Number (if applicable

(SEAL - if BID is by a corporation)

ATTEST _____

END OF BID

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____

_____ as Principal, and

_____ as Surety, are hereby held

and firmly bound unto _____ as OWNER

in the penal sum of_____ for the

payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____, 20 _____.

The Condition of the above obligation is such that whereas the Principal has submitted to

_____ a certain BID, attached hereto

and hereby made a part hereof to enter into a contract in writing, for the _____

_____

_____

NOW, THEREFORE,

(a) If said BID shall be rejected, or

(b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID,

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by an extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____ (L.S.)
Principal

_____
Surety

By: _____

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

AGREEMENT

THIS AGREEMENT is dated as of the _____ Day of _____, 20 _____, by and Between _____

(hereinafter called OWNER) and _____

_____

(hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE I. WORK.

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

EMERGENCY WELL REPLACEMENT - 2000
CITY OF VOLGA, SOUTH DAKOTA

ARTICLE 2. ENGINEER

The Project has been designed by Banner Associates, Inc., 409 22nd Ave. South, Brookings, South Dakota, 57006, Telephone No. (605) 692-6342, who is hereinafter called ENGINEER and who will assume all duties and responsibilities and will have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

ARTICLE 3. CONTRACT TIME

3.1. The Work will be substantially completed on or before December 7, 2000. All other work shall be completed and ready for final payment in accordance with paragraph 14.13 of the General Conditions on or before May 15, 2001.

3.2. Liquidated Damages: OWNER and CONTRACTOR recognize that time is of the essence under this Agreement and that OWNER will suffer financial loss if the Work is not complete within the time specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER Two Hundred Dollars ($200.00) for each day that expires after the time specified in paragraph 3.1 for Substantial Completion until the Work is substantially complete. After Substantial Completion if

CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER One Hundred Dollars ($100.00) for each day that expires after the time specified in paragraph 3.1 for completion and readiness for final payment.

ARTICLE 4. CONTRACT PRICE.

4.1. OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents in current funds as follows:

Completed and accepted work at Unit Prices in accordance with CONTRACTOR'S BID.

Combined Total of Unit Prices _____

_____ ($ _____)

ARTICLE 5. PAYMENT PROCEDURES.

Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

5.1. Progress Payments: OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as recommended by ENGINEER, on or about the twentieth (20th) day of each month during construction as provided below. All progress payments will be on the basis of the progress of the Work measured by the schedule of values provided for in paragraph 14.1 of the General Conditions.

5.1.1. Prior to Substantial Completion, progress payments will be in an amount equal to: 90% of the Work completed, and 90% of materials and equipment not incorporated in the Work but delivered and suitably stored, less in each case the aggregate of payments previously made.

5.1.2. Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 95% of the Contract Price, less such amounts as ENGINEER shall determine, in accordance with paragraph 14.7 of the General Conditions.

5.2. Final Payment: Upon final completion and acceptance of the Work in accordance with paragraph 14.13 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 14.13.

ARTICLE 6. INTEREST.

All monies not paid when due as provided in Article 14 of the General Conditions shall bear interest at the maximum rate allowed by law at the place of the Project.

ARTICLE 7. CONTRACTOR'S REPRESENTATIONS.

In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

7.1. CONTRACTOR has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.

7.2. CONTRACTOR has studied carefully all reports of explorations and tests of subsurface conditions and drawings of physical conditions which are identified in the Supplementary Conditions as provided in paragraph 4.2 of the General Conditions, and accepts the determination set forth in paragraph SC-4.2 of the Supplementary Conditions of the extent of the technical data contained in such reports and drawings upon which CONTRACTOR is entitled to reply.

7.3. CONTRACTOR has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests, reports and studies (in addition to or to supplement those referred to in paragraph 7.2 above) which pertain to the subsurface or physical conditions at or contiguous to the site or otherwise may affect the cost, progress, performance or furnishing of the Work as CONTRACTOR considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of paragraph 4.2 of the General Conditions; and no additional examinations, investigations, explorations, tests, reports, studies or similar information or data are or will be required by CONTRACTOR for such purposes.

7.4. CONTRACTOR has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect of said Underground Facilities are or will be required by CONTRACTOR in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of paragraph 4.3 of the General Conditions.

7.5. CONTRACTOR has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.

7.6. CONTRACTOR has given ENGINEER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

ARTICLE 8. CONTRACT DOCUMENTS.

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work consist of the following:

8.1. This Agreement (Pages A-1 to A-7, inclusive).

8.2. Exhibits to this Agreement (pages None to _____, inclusive).

8.3. Performance and other Bonds, identified as PyB-1 & 2, PeB-1 & 2, and consisting of 4 pages.

8.4. Notice of Award, Notice to Proceed and Change Order, consisting of 3 pages.

8.5. General Conditions (pages 1 to 33, inclusive).

8.6. Supplementary Conditions (pages SC-1 to SC-3 inclusive).

8.7. Specifications bearing the title "Emergency Well Replacement - 2000", and dated November, 2000, and consisting of 3 divisions, as listed in table of contents thereof.

8.8. Drawings, consisting of sheets numbered 1 through 3, inclusive with each sheet bearing the following general title: EMERGENCY WELL REPLACEMENT – 2000, CITY OF VOLGA, SOUTH DAKOTA, dated November, 2000.

8.9 Addenda numbers _____ to _____, inclusive.

8.10. CONTRACTOR'S Bid (pages B-1 to B-6, inclusive).

8.11. Documentation submitted by CONTRACTOR prior to Notice of Award (NONE) .

8.12. The following which may be delivered or issued after the Effective Date of the Agreement and are not attached hereto: All Written Amendments and other documents amending, modifying, or supplementing the Contract Documents pursuant to paragraphs 3.4 and 3.5 of the General Conditions.

8.13. The documents listed in paragraphs 8.2 et seq. above are attached to this Agreement (except as expressly noted otherwise above).

There are no Contract Documents other than those listed above in this Article 8. The Contract Documents may only be amended, modified or supplemented as provided in paragraphs 3.4 and 3.5 of the General Conditions.

ARTICLE 9. MISCELLANEOUS.

9.1. Terms used in this Agreement which are defined in Article 1 of the General Conditions will have the meanings indicated in the General Conditions.

9.2. No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

9.3. OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

ARTICLE 10. OTHER PROVISIONS.

(This Article intentionally left blank)

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in triplicate. One counterpart each has been delivered to OWNER, CONTRACTOR and ENGINEER. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or by ENGINEER on their behalf.

This Agreement will be effective on _____ , 20 _____ .

OWNER _____	CONTRACTOR _____
By _____	By _____
Name _____	Name _____
(Typed or Printed)	(Typed or Printed)
Title _____	Title _____
(CORPORATE SEAL)	(CORPORATE SEAL)
Attest _____	Attest _____
Name _____	Name _____
(Typed or Printed)	(Typed or Printed)
Title _____	Title _____
Address for giving notices	Address for giving notices
_____	_____
_____	_____
	License No. _____
	Agent for service of process: _____
	_____

INSTRUCTIONS FOR EXECUTING CONTRACT

If the Contractor be a corporation, the following certificate shall be executed:

I, _____ , certify that I am the Secretary of the Corporation named as Contractor hereinabove; that _____ , who signed the foregoing contract on behalf of the Contractor was then _____ of said Corporation; that said contract was duly signed for and in behalf of said Corporation by authority of its governing body, and is within the scope of its corporate powers.

(CORPORATE SEAL)

(Sign)_____
Secretary

If the Contract be signed by the Secretary of the Corporation, the above certificate shall be executed by some other officers of the corporation, under the corporate seal. In lieu of the foregoing certificate there may be attached to the contract copies of so much of the records of the corporation as will show the official character and authority of the officers signing, duly certified by the Secretary or Assistant Secretary under the corporate seal to the be true copies.

Any corporation doing business in the State of South Dakota must first file and receive such authorization from the Secretary of State of South Dakota as required by law, Chapters 47-2 and 47-8 of the South Dakota Compiled Laws of 1967, as amended.

The full name and business address of the contractors shall be inserted and the contract shall be signed with his official signature. Please have the name of the signing party or parties typewritten or printed under all signatures to the contract.

If the Contractor should be operating as a partnership, each partner shall sign the contract. If the contract be not signed by each partner there shall be attached to the contract a duly authenticated power of attorney evidencing the signer's (signers') authority to sign such contract for and in behalf of the partnership.

If the Contractor be an individual, the trade name (if the Contractor be operating under a trade name) shall be indicated in the contract and the contract shall be signed by such individual. If signed by one other than the contractor there shall be attached to the contract a duly authenticated power of attorney evidencing the signer's authority to execute such contract for and in behalf of the contractor.

END OF AGREEMENT

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____ hereinafter called Principal,
(Corporation, Partnership or Individual)

and _____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto _____

_____
(Name of Owner)

_____
(Address of Owner)

hereinafter called OWNER, in the penal sum of _____

_____Dollars, $(_____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

_____

_____

_____

_____

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall

in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the Owner and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts,
(number)
each one of which shall be deemed an original, this the _____ day of _____, 20_____.

ATTEST: _____

Principal _____ By_____(s)
(Principal Secretary)
(SEAL) _____
Address

_____ _____
(Witness as to Principal)

_____
(Address)

_____ _____

ATTEST:

_____ _____
(Surety Secretary) (Surety)

(SEAL)

_____ By_____
(Witness as to Surety) Attorney-in-Fact

_____ _____
(Address) (Address)

_____ _____

Countersigned By:_____
(South Dakota Resident Agent for
Surety)

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is Partnership, all partners should execute bond.

IMPORTANT: Surety companies executing BONDS must be authorized to transact business in the State where the PROJECT is located.

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____

(Name of Contractor)

_____

(Address of Contractor)

a _____ hereinafter called Principal,

(Corporation, Partnership or Individual)

and _____

(Name of Surety)

_____

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto _____

_____

(Name of Owner)

_____

(Address of Owner)

hereinafter called OWNER, in the penal sum of _____

_____Dollars, $(_____)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

_____

_____

_____

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTORS or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time alteration or addition to the terms of the contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

And the further condition of this BOND is that in the event said Principal shall fail to pay all just claims and demands on the part of any employee, persons, firms or corporations for labor and materials furnished for or used in connection with the prosecution of the work under said Contract, or pay all taxes which may accrue to the State of South Dakota under the Provisions of the "Use Tax Act of 1939 and The Excise Tax on Realty Improvements under SDCL 10-46A", and Sections 5-21-3 and 5-21-4 of the South Dakota Compiled Laws of 1967, as amended, then this BOND and the sureties thereon shall be responsible to such persons, firms or corporations, and the _____ for the full payment of the full value of such labor and materials so furnished including the payment of South Dakota Use Tax and the Excise Tax on realty improvements.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20_____.

ATTEST:

_____
(Principal) Secretary

(SEAL)

_____
(Witness as to Principal)

_____
(Address)

_____

_____
Principal

By_____(s)

_____
Address

_____

_____
Surety

ATTEST:

By_____
Attorney-in-Fact

_____
(Surety Secretary)

_____
(Address)

(SEAL)

_____
(Witness as to Surety)

_____
Address

Countersigned By:_____
(South Dakota Resident Agent for Surety)

NOTE: Date of BOND must not be prior to date of Contract.
If CONTRACTOR is Partnership, all partners should execute bond.

IMPORTANT: Surety companies executing BONDS must be authorized to transact business in the State where the PROJECT is located.

NOTICE OF AWARD

TO: _____
_____
_____
_____

PROJECT Description: _____
_____
_____

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dated _____, 20____, and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of $ _____ .

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND and certificates of insurance within fifteen (15) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said BONDS within fifteen (15) days from the date of this Notice, said Owner will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____ , 20 ____ .

_____
OWNER

By: _____

Title: _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD
is hereby acknowledged by _____
this the _____ day of
_____ , 20 _____

By _____

Title _____

NOTICE TO PROCEED

TO: _____ Date: _____

_____ Project: _____

_____ _____

_____ _____

_____ _____

_____ _____

You are hereby notified to commence WORK in accordance with the Agreement dated _____, 20 ____ on or before _____, 20 ____ and you are to Complete the WORK within _____ consecutive calendar days thereafter. The date of completion of all WORK is therefore _____, 20 _____.

_____

Owner

By: _____

Title: _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED

is hereby acknowledged by _____

this the _____ day of

_____, 20 _____

_____

By _____

Title _____

CHANGE ORDER

Order No. _____

Date: _____

Agreement Date: _____

NAME OF PROJECT: _____

_____

OWNER: _____

CONTRACTOR: _____

The following changes are hereby made to the CONTRACT DOCUMENTS:

JUSTIFICATION:

Change to CONTRACT PRICE:

Original CONTRACT PRICE: $_____

Current CONTRACT PRICE adjusted by previous CHANGE ORDER $_____

The CONTRACT PRICE due to this CHANGE ORDER will be (increased) (decreased) by:

$_____ .

The new CONTRACT PRICE including this CHANGE ORDER will be $_____

Change to CONTRACT TIME:

The CONTRACT TIME will be (increased)(decreased) by _____ calendar days.

The date for completion of all work will be _____ (Date).

Approvals Required:

To be effective this Order must be approved by the Federal agency if it changes the scope or objective of the PROJECT, or as may otherwise be required by the SUPPLEMENTAL GENERAL CONDITIONS.

Requested by: _____

Recommended by: _____

Ordered by: _____

Accepted by: _____

Federal Agency Approval (where applicable) _____

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the Controlling Law.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By

AMERICAN CONSULTING ENGINEERS COUNCIL

National Society of Professional Engineers
Professional Engineers in Private Practice

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN CONSULTING ENGINEERS COUNCIL

AMERICAN SOCIETY OF CIVIL ENGINEERS

This document has been approved and endorsed by

The Associated General Contractors of America

Construction Specifications Institute

Advancement of Construction Technology

These General Conditions have been prepared for use with the Owner-Contractor Agreements (No. 1910-8-A-1 or 1910-8-A-2) (1996 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the EJCDC User's Guide (No. 1910-50). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. 1910-17) (1996 Edition).

EJCDC No. 1910-8 (1996 Edition)

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National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314

American Consulting Engineers Council
1015 15th Street N.W., Washington, DC 20005

American Society of Civil Engineers
345 East 47th Street, New York, NY 10017

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GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Contract Documents and printed with initial or all capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof.

1. *Addenda*--Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the Contract Documents.

2. *Agreement*--The written instrument which is evidence of the agreement between OWNER and CONTRACTOR covering the Work.

3. *Application for Payment*--The form acceptable to ENGINEER which is to be used by CONTRACTOR during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*--Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*--The offer or proposal of a bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

7. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid form with any supplements.

8. *Bonds*--Performance and payment bonds and other instruments of security.

9. *Change Order*--A document recommended by ENGINEER which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*--The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*--The Contract Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEER's written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR are not Contract Documents.

13. *Contract Price*--The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*--The number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and (ii) complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment.

15. *CONTRACTOR*--The individual or entity with whom OWNER has entered into the Agreement.

16. *Cost of the Work*--See paragraph 11.01.A for definition.

17. *Drawings*--That part of the Contract Documents prepared or approved by ENGINEER which graphically shows the scope, extent, and character of the Work to be performed by CONTRACTOR. Shop Drawings and other CONTRACTOR submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *ENGINEER*--The individual or entity named as such in the Agreement.

20. *ENGINEER's Consultant*--An individual or entity having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

21. *Field Order*--A written order issued by ENGINEER which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

22. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

23. *Hazardous Environmental Condition*--The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.

24. *Hazardous Waste*--The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

25. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens*--Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

27. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

28. *Notice of Award*--The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.

29. *Notice to Proceed*--A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform the Work under the Contract Documents.

30. *OWNER*--The individual, entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.

31. *Partial Utilization*--Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

32. *PCBs*--Polychlorinated biphenyls.

33. *Petroleum*--Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

34. *Project*--The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part as may be indicated elsewhere in the Contract Documents.

35. *Project Manual*--The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

36. *Radioactive Material*--Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

37. *Resident Project Representative*--The authorized representative of ENGINEER who may be assigned to the Site or any part thereof.

38. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

39. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

40. *Site*--Lands or areas indicated in the Contract Documents as being furnished by OWNER upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by OWNER which are designated for the use of CONTRACTOR.

41. *Specifications*--That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

42. *Subcontractor*--An individual or entity having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the Site.

43. *Substantial Completion*--The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

44. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

45. *Supplier*--A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.

46. *Underground Facilities*--All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

47. *Unit Price Work*--Work to be paid for on the basis of unit prices.

48. *Work*--The entire completed construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

49. *Work Change Directive*--A written statement to CONTRACTOR issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

50. *Written Amendment*--A written statement modifying the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

1.02 *Terminology*

A. *Intent of Certain Terms or Adjectives*

1. Whenever in the Contract Documents the terms "as allowed," "as approved," or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of ENGINEER as to the Work, it is intended that such action or determination will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The

use of any such term or adjective shall not be effective to assign to ENGINEER any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.10 or any other provision of the Contract Documents.

B. *Day*

1. The word "day" shall constitute a calendar day of 24 hours measured from midnight to the next midnight.

C. *Defective*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract Documents or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER's recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.04 or 14.05).

D. *Furnish, Install, Perform, Provide*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of CONTRACTOR, "provide" is implied.

E. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 *Delivery of Bonds*

A. When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish.

2.02 *Copies of Documents*

A. OWNER shall furnish to CONTRACTOR up to ten copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

A. CONTRACTOR shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *CONTRACTOR's Review of Contract Documents:* Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, ambiguity, or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless CONTRACTOR knew or reasonably should have known thereof.

B. *Preliminary Schedules:* Within ten days after the Effective Date of the Agreement (unless otherwise specified

in the General Requirements), CONTRACTOR shall submit to ENGINEER for its timely review:

1. a preliminary progress schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal; and

3. a preliminary schedule of values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

C. *Evidence of Insurance:* Before any Work at the Site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with Article 5.

2.06 *Preconstruction Conference*

A. Within 20 days after the Contract Times start to run, but before any Work at the Site is started, a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.05.B, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

2.07 *Initial Acceptance of Schedules*

A. Unless otherwise provided in the Contract Documents, at least ten days before submission of the first Application for Payment a conference attended by CONTRACTOR, ENGINEER, and others as appropriate will be held to review for acceptability to ENGINEER as provided below the schedules submitted in accordance with paragraph 2.05.B. CONTRACTOR shall have an additional ten days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to CONTRACTOR until acceptable schedules are submitted to ENGINEER.

1. The progress schedule will be acceptable to ENGINEER if it provides an orderly progression of the Work to completion within any specified Milestones and the Contract Times. Such acceptance will not impose on ENGINEER responsibility for the progress schedule, for sequencing, scheduling, or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefor.

2. CONTRACTOR's schedule of Shop Drawing and Sample submittals will be acceptable to ENGINEER if it provides a workable arrangement for reviewing and processing the required submittals.

3. CONTRACTOR's schedule of values will be acceptable to ENGINEER as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided whether or not specifically called for at no additional cost to OWNER.

C. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in Article 9.

3.02 *Reference Standards*

A. *Standards, Specifications, Codes, Laws, and Regulations*

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids),

except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual or code, or any instruction of a Supplier shall be effective to change the duties or responsibilities of OWNER, CONTRACTOR, or ENGINEER, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall any such provision or instruction be effective to assign to OWNER, ENGINEER, or any of ENGINEER's Consultants, agents, or employees any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

1. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, CONTRACTOR shall report it to ENGINEER in writing at once. CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as required by paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.04; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity, or discrepancy unless CONTRACTOR knew or reasonably should have known thereof.

B. *Resolving Discrepancies*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways: (i) a Written Amendment; (ii) a Change Order; or (iii) a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways: (i) a Field Order; (ii) ENGINEER's approval of a Shop Drawing or Sample; or (iii) ENGINEER's written interpretation or clarification.

3.05 *Reuse of Documents*

A. CONTRACTOR and any Subcontractor or Supplier or other individual or entity performing or furnishing any of the Work under a direct or indirect contract with OWNER: (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER or ENGINEER's Consultant, including electronic media editions; and (ii) shall not reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaption by ENGINEER. This prohibition will survive final payment, completion, and acceptance of the Work, or termination or completion of the Contract. Nothing herein shall preclude CONTRACTOR from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. OWNER shall furnish the Site. OWNER shall notify CONTRACTOR of any encumbrances or restrictions not of general application but specifically related to use of the Site with which CONTRACTOR must comply in performing the Work. OWNER will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If CONTRACTOR and OWNER are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in OWNER's furnishing the Site, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

B. Upon reasonable written request, OWNER shall furnish CONTRACTOR with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and OWNER's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports of explorations and tests of subsurface conditions at or contiguous to the Site that ENGINEER has used in preparing the Contract Documents; and

2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that ENGINEER has used in preparing the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER, or any of ENGINEER's Consultants with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the Site that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which CONTRACTOR is entitled to rely as provided in paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *ENGINEER's Review:* After receipt of written notice as required by paragraph 4.03.A, ENGINEER will promptly review the pertinent condition, determine the necessity of OWNER's obtaining additional exploration or tests with respect thereto, and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER's findings and conclusions.

C. *Possible Price and Times Adjustments*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in CONTRACTOR's cost of, or time required for, performance of the Work; subject, however, to the following:

a. such condition must meet any one or more of the categories described in paragraph 4.03.A; and

b. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of paragraphs 9.08 and 11.03.

2. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Contract Times if:

a. CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for CONTRACTOR prior to CONTRACTOR's making such final commitment; or

c. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.03.A.

3. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in paragraph 10.05. However, OWNER, ENGINEER, and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to OWNER or ENGINEER by the owners of such Underground Facilities, including OWNER, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and

2. the cost of all of the following will be included in the Contract Price, and CONTRACTOR shall have full responsibility for:

a. reviewing and checking all such information and data,

b. locating all Underground Facilities shown or indicated in the Contract Documents,

c. coordination of the Work with the owners of such Underground Facilities, including OWNER, during construction, and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility.

2. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price of Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, OWNER or CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

4.05 *Reference Points*

A. OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work, shall protect and preserve the established reference points and property

monuments, and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the ENGINEER in the preparation of the Contract Documents.

B. *Limited Reliance by CONTRACTOR on Technical Data Authorized:* CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any Claim against OWNER, ENGINEER or any of ENGINEER's Consultants with respect to:

1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any CONTRACTOR interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. CONTRACTOR shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. CONTRACTOR shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by CONTRACTOR, Subcontractors, Suppliers, or anyone else for whom CONTRACTOR is responsible.

D. If CONTRACTOR encounters a Hazardous Environmental Condition or if CONTRACTOR or anyone for whom CONTRACTOR is responsible creates a Hazardous Environmental Condition, CONTRACTOR shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by paragraph 6.16); and (iii) notify OWNER and ENGINEER (and promptly thereafter confirm such notice in writing). OWNER shall promptly consult with ENGINEER concerning the necessity for OWNER to retain a qualified expert to evaluate such condition or take corrective action, if any.

E. CONTRACTOR shall not be required to resume Work in connection with such condition or in any affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by CONTRACTOR, either party may make a Claim therefor as provided in paragraph 10.05.

F. If after receipt of such written notice CONTRACTOR does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then OWNER may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If OWNER and CONTRACTOR cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in paragraph 10.05. OWNER may have such deleted portion of the Work performed by OWNER's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, OWNER shall indemnify and hold harmless CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing

in this paragraph 4.06.E shall obligate OWNER to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by CONTRACTOR or by anyone for whom CONTRACTOR is responsible. Nothing in this paragraph 4.06.F shall obligate CONTRACTOR to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of paragraphs 4.02, 4.03, and 4.04 are not intended to apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. CONTRACTOR shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Contract Documents.

B. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

C. If the surety on any Bond furnished by CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.01.B, CONTRACTOR shall within 20 days thereafter substitute another Bond and surety, both of which shall comply with the requirements of paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All Bonds and insurance required by the Contract Documents to be purchased and maintained by OWNER or CONTRACTOR shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue Bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

A. CONTRACTOR shall deliver to OWNER, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by OWNER or any other additional insured) which CONTRACTOR is required to purchase and maintain. OWNER shall deliver to CONTRACTOR, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by CONTRACTOR or any other additional insured) which OWNER is required to purchase and maintain.

5.04 *CONTRACTOR's Liability Insurance*

A. CONTRACTOR shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from CONTRACTOR's performance of the Work and CONTRACTOR's other obligations under the Contract Documents, whether it is to be performed by CONTRACTOR, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of CONTRACTOR's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than CONTRACTOR's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by CONTRACTOR, or (ii) by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance so required by this paragraph 5.04 to be purchased and maintained shall:

1. with respect to insurance required by paragraphs 5.04.A.3 through 5.04.A.6 inclusive, include as additional insureds (subject to any customary exclusion in respect of professional liability) OWNER, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include completed operations insurance;

4. include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.07, 6.11, and 6.20;

5. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least thirty days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to paragraph 5.03 will so provide);

6. remain in effect at least until final payment and at all times thereafter when CONTRACTOR may be correcting, removing, or replacing defective Work in accordance with paragraph 13.07; and

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment (and CONTRACTOR shall furnish OWNER and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to OWNER and any such additional insured of continuation of such insurance at final payment and one year thereafter).

5.05 *OWNER's Liability Insurance*

A. In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.04, OWNER, at OWNER's option, may purchase and maintain at OWNER's expense OWNER's own liability insurance as will protect OWNER against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

A. Unless otherwise provided in the Supplementary Conditions, OWNER shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as an additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER;

5. allow for partial utilization of the Work by OWNER;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR, and ENGINEER with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

B. OWNER shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and any other individuals or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.07.

D. OWNER shall not be responsible for purchasing and maintaining any property insurance specified in this paragraph 5.06 to protect the interests of CONTRACTOR, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by CONTRACTOR, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

E. If CONTRACTOR requests in writing that other special insurance be included in the property insurance policies provided under paragraph 5.06, OWNER shall, if possible, include such insurance, and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the Site, OWNER shall in writing advise CONTRACTOR whether or not such other insurance has been procured by OWNER.

5.07 *Waiver of Rights*

A. OWNER and CONTRACTOR intend that all policies purchased in accordance with paragraph 5.06 will protect OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. OWNER and CONTRACTOR waive all rights against each other and their respective officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.

B. OWNER waives all rights against CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to OWNER's property or the Work caused by, arising out of, or resulting from fire or other peril whether or not insured by OWNER; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by OWNER during partial utilization pursuant to paragraph 14.05, after Substantial Completion

pursuant to paragraph 14.04, or after final payment pursuant to paragraph 14.07.

C. Any insurance policy maintained by OWNER covering any loss, damage or consequential loss referred to in paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against CONTRACTOR, Subcontractors, ENGINEER, or ENGINEER's Consultants and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by paragraph 5.06 will be adjusted with OWNER and made payable to OWNER as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.08.B. OWNER shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

B. OWNER as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to OWNER's exercise of this power. If such objection be made, OWNER as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, OWNER as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, OWNER as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either OWNER or CONTRACTOR has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by paragraph 2.05.C. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the Bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. CONTRACTOR shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of OWNER or ENGINEER in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

B. At all times during the progress of the Work, CONTRACTOR shall assign a competent resident superintendent thereto who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the Site and shall have authority to act on behalf of CONTRACTOR. All communications given to or received from the superintendent shall be binding on CONTRACTOR.

6.02 *Labor; Working Hours*

A. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out, and construct the Work as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without OWNER's written consent (which will not be unreasonably withheld) given after prior written notice to ENGINEER.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the General Requirements, CONTRACTOR shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of OWNER. If required by ENGINEER, CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. CONTRACTOR shall adhere to the progress schedule established in accordance with paragraph 2.07 as it may be adjusted from time to time as provided below.

1. CONTRACTOR shall submit to ENGINEER for acceptance (to the extent indicated in paragraph 2.07) proposed adjustments in the progress schedule that will not result in changing the Contract Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of Article 12. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to ENGINEER for review under the circumstances described below.

1. *"Or-Equal" Items:* If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by ENGINEER as an "or-equal" item, in which case review and approval of the proposed item may, in ENGINEER's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment ENGINEER determines that: (i) it is at least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;

b. CONTRACTOR certifies that: (i) there is no increase in cost to the OWNER; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items*

a. If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under

paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR.

c. The procedure for review by ENGINEER will be as set forth in paragraph 6.05.A.2.d, as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances.

d. CONTRACTOR shall first make written application to ENGINEER for review of a proposed substitute item of material or equipment that CONTRACTOR seeks to furnish or use. The application shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application will state the extent, if any, to which the use of the proposed substitute item will prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute item and whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute item. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute item.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.05.A.2.

C. *Engineer's Evaluation:* ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.05.A and 6.05.B. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized until ENGINEER's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an "or equal." ENGINEER will advise CONTRACTOR in writing of any negative determination.

D. *Special Guarantee:* OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute.

E. *ENGINEER's Cost Reimbursement:* ENGINEER will record time required by ENGINEER and ENGINEER's Consultants in evaluating substitute proposed or submitted by CONTRACTOR pursuant to paragraphs 6.05.A.2 and 6.05.B and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER approves a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed substitute.

F. *CONTRACTOR's Expense:* CONTRACTOR shall provide all data in support of any proposed substitute or "or-equal" at CONTRACTOR's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. CONTRACTOR shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to OWNER as indicated in paragraph 6.06.B), whether initially or as a replacement, against whom OWNER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or

entities to be submitted to OWNER in advance for acceptance by OWNER by a specified date prior to the Effective Date of the Agreement, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. CONTRACTOR shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of OWNER or ENGINEER to reject defective Work.

C. CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between OWNER or ENGINEER and any such Subcontractor, Supplier or other individual or entity, nor shall it create any obligation on the part of OWNER or ENGINEER to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR.

E. CONTRACTOR shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with ENGINEER through CONTRACTOR.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.06, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against OWNER, CONTRACTOR, ENGINEER, ENGINEER's Consultants, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

6.07 *Patent Fees and Royalties*

A. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of OWNER or ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract Documents. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees or agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, CONTRACTOR shall obtain and pay for all construction permits and licenses. OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits

and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto, such as plant investment fees.

6.09 *Laws and Regulations*

A. CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither OWNER nor ENGINEER shall be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations.

B. If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve CONTRACTOR of CONTRACTOR's obligations under paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work may be the subject of an adjustment in Contract Price or Contract Times. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in paragraph 10.05.

6.10 *Taxes*

A. CONTRACTOR shall pay all sales, consumer, use, and other similar taxes required to be paid by CONTRACTOR in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. CONTRACTOR shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly attempt to settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant, and the officers, directors, partners, employees, agents, and other consultants of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, ENGINEER, or any other party indemnified hereunder to the extent caused by or based upon CONTRACTOR's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work CONTRACTOR shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work CONTRACTOR shall clean the Site and make it ready for utilization by OWNER. At the completion of the Work CONTRACTOR shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. CONTRACTOR shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work

Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to ENGINEER for OWNER.

6.13 *Safety and Protection*

A. CONTRACTOR shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. CONTRACTOR shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any property referred to in paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER's Consultant, or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them). CONTRACTOR's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. CONTRACTOR shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, CONTRACTOR is obligated to act to prevent threatened damage, injury, or loss. CONTRACTOR shall give ENGINEER prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If ENGINEER determines that a change in the Contract Documents is required because of the action taken by CONTRACTOR in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

A. CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals. All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show ENGINEER the services, materials, and equipment CONTRACTOR proposes to provide and to enable ENGINEER to review the information for the limited purposes required by paragraph 6.17.E.

B. CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample

submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers, and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.17.E. The numbers of each Sample to be submitted will be as specified in the Specifications.

C. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER as required by paragraph 2.07, any related Work performed prior to ENGINEER's review and approval of the pertinent submittal will be at the sole expense and responsibility of CONTRACTOR.

D. *Submittal Procedures*

1. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

a. all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto; and

d. CONTRACTOR shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

2. Each submittal shall bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of that submittal.

3. At the time of each submittal, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to ENGINEER for review and approval of each such variation.

E. *ENGINEER's Review*

1. ENGINEER will timely review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals acceptable to ENGINEER. ENGINEER's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. ENGINEER's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. ENGINEER's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of each submittal as required by paragraph 6.17.D.3 and ENGINEER has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6.17.D.1.

F. *Resubmittal Procedures*

1. CONTRACTOR shall make corrections required by ENGINEER and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submittals.

6.18 *Continuing the Work*

A. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except

as permitted by paragraph 15.04 or as OWNER and CONTRACTOR may otherwise agree in writing.

6.19 *CONTRACTOR's General Warranty and Guarantee*

A. CONTRACTOR warrants and guarantees to OWNER, ENGINEER, and ENGINEER's Consultants that all Work will be in accordance with the Contract Documents and will not be defective. CONTRACTOR's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than CONTRACTOR, Subcontractors, Suppliers, or any other individual or entity for whom CONTRACTOR is responsible; or

2. normal wear and tear under normal usage.

B. CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents:

1. observations by ENGINEER;

2. recommendation by ENGINEER or payment by OWNER of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by ENGINEER or any payment related thereto by OWNER;

4. use or occupancy of the Work or any part thereof by OWNER;

5. any acceptance by OWNER or any failure to do so;

6. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by ENGINEER;

7. any inspection, test, or approval by others; or

8. any correction of defective Work by OWNER.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage:

1. is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom; and

2. is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such individual or entity.

B. In any and all claims against OWNER or ENGINEER or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of CONTRACTOR under paragraph 6.20.A shall not extend to the liability of ENGINEER and ENGINEER's Consultants or to the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

ARTICLE 7 - OTHER WORK

7.01 *Related Work at Site*

A. OWNER may perform other work related to the Project at the Site by OWNER's employees, or let other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to CONTRACTOR prior to starting any such other work; and

2. if OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in paragraph 10.05.

B. CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (and OWNER, if OWNER is performing the other work with OWNER's employees) proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, CONTRACTOR shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating, or otherwise altering their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

C. If the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, CONTRACTOR shall inspect such other work and promptly report to ENGINEER in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of CONTRACTOR's Work. CONTRACTOR's failure to so report will constitute an acceptance of such other work as fit and proper for integration with CONTRACTOR's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If OWNER intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, OWNER shall have sole authority and responsibility for such coordination.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through ENGINEER.

8.02 *Replacement of ENGINEER*

A. In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer to whom CONTRACTOR makes no reasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER.

8.03 *Furnish Data*

A. OWNER shall promptly furnish the data required of OWNER under the Contract Documents.

8.04 *Pay Promptly When Due*

A. OWNER shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.01 and 4.05. Paragraph 4.02 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations

and tests of subsurface conditions and drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by ENGINEER in preparing the Contract Documents.

8.06 *Insurance*

A. OWNER's responsibilities, if any, in respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. OWNER is obligated to execute Change Orders as indicated in paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. OWNER's responsibility in respect to certain inspections, tests, and approvals is set forth in paragraph 13.03.B.

8.09 *Limitations on OWNER's Responsibilities*

A. The OWNER shall not supervise, direct, or have control or authority over, nor be responsible for, CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. OWNER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. OWNER's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER's obligations under the Contract Documents, OWNER's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *OWNER'S Representative*

A. ENGINEER will be OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER's representative during construction are set forth in the Contract Documents and will not be changed without written consent of OWNER and ENGINEER.

9.02 *Visits to Site*

A. ENGINEER will make visits to the Site at intervals appropriate to the various stages of construction as ENGINEER deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of CONTRACTOR's executed Work. Based on information obtained during such visits and observations, ENGINEER, for the benefit of OWNER, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. ENGINEER will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. ENGINEER's efforts will be directed toward providing for OWNER a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defective Work.

B. ENGINEER's visits and observations are subject to all the limitations on ENGINEER's authority and responsibility set forth in paragraph 9.10, and particularly, but without limitation, during or as a result of ENGINEER's visits or observations of CONTRACTOR's Work ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more extensive observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.10 and in the Supplementary Conditions. If OWNER designates another

representative or agent to represent OWNER at the Site who is not ENGINEER's Consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Clarifications and Interpretations*

A. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a written clarification or interpretation, a Claim may be made therefor as provided in paragraph 10.05.

9.05 *Authorized Variations in Work*

A. ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR, who shall perform the Work involved promptly. If OWNER and CONTRACTOR are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of a Field Order, a Claim may be made therefor as provided in paragraph 10.05.

9.06 *Rejecting Defective Work*

A. ENGINEER will have authority to disapprove or reject Work which ENGINEER believes to be defective, or that ENGINEER believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER will also have authority to require special inspection or testing of the Work as provided in paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.07 *Shop Drawings, Change Orders and Payments*

A. In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraph 6.17.

B. In connection with ENGINEER's authority as to Change Orders, see Articles 10, 11, and 12.

C. In connection with ENGINEER's authority as to Applications for Payment, see Article 14.

9.08 *Determinations for Unit Price Work*

A. ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review with CONTRACTOR the ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decision thereon will be final and binding (except as modified by ENGINEER to reflect changed factual conditions or more accurate data) upon OWNER and CONTRACTOR, subject to the provisions of paragraph 10.05.

9.09 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work, the quantities and classifications of Unit Price Work, the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, and Claims seeking changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing, in accordance with the provisions of paragraph 10.05, with a request for a formal decision.

B. When functioning as interpreter and judge under this paragraph 9.09, ENGINEER will not show partiality to OWNER or CONTRACTOR and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by ENGINEER pursuant to this paragraph 9.09 with respect to any such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.07) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter.

9.10 *Limitations on ENGINEER's Authority and Responsibilities*

A. Neither ENGINEER's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority

or responsibility or the undertaking, exercise, or performance of any authority or responsibility by ENGINEER shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. ENGINEER will not supervise, direct, control, or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the performance of the Work. ENGINEER will not be responsible for CONTRACTOR's failure to perform the Work in accordance with the Contract Documents.

C. ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. ENGINEER's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this paragraph 9.10 shall also apply to ENGINEER's Consultants, Resident Project Representative, and assistants.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If OWNER and CONTRACTOR are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in paragraph 3.04, except in the case of an emergency as provided in paragraph 6.16 or in the case of uncovering Work as provided in paragraph 13.04.B.

10.03 *Execution of Change Orders*

A. OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER (or Written Amendments) covering:

1. changes in the Work which are: (i) ordered by OWNER pursuant to paragraph 10.01.A, (ii) required because of acceptance of defective Work under paragraph 13.08.A or OWNER's correction of defective Work under paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.18.A.

10.04 *Notification to Surety*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility. The amount of each applicable Bond will be adjusted to reflect the effect of any such change.

10.05 *Claims and Disputes*

A. *Notice:* Written notice stating the general nature of each Claim, dispute, or other matter shall be delivered by the claimant to ENGINEER and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. Notice of the amount or extent of the Claim, dispute, or other matter with supporting data shall be delivered to the ENGINEER and the other party to the Contract within 60 days after the start of such event (unless ENGINEER allows additional time for claimant to submit additional or more accurate data in support of such Claim, dispute, or other matter). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of paragraph 12.01.B. A Claim for an adjustment in Contract Time shall be prepared in accordance with the provisions of paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to ENGINEER and the claimant within 30 days after receipt of the claimant's last submittal (unless ENGINEER allows additional time).

B. *ENGINEER's Decision:* ENGINEER will render a formal decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any. ENGINEER's written decision on such Claim, dispute, or other matter will be final and binding upon OWNER and CONTRACTOR unless:

1. an appeal from ENGINEER's decision is taken within the time limits and in accordance with the dispute resolution procedures set forth in Article 16; or

2. if no such dispute resolution procedures have been set forth in Article 16, a written notice of intention to appeal from ENGINEER's written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within 30 days after the date of such decision, and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction within 60 days after the date of such decision or within 60 days after Substantial Completion, whichever is later (unless otherwise agreed in writing by OWNER and CONTRACTOR), to exercise such rights or remedies as the appealing party may have with respect to such Claim, dispute, or other matter in accordance with applicable Laws and Regulations.

C. If ENGINEER does not render a formal decision in writing within the time stated in paragraph 10.05.B, a decision denying the Claim in its entirety shall be deemed to have been issued 31 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

D. No Claim for an adjustment in Contract Price or Contract Times (or Milestones) will be valid if not submitted in accordance with this paragraph 10.05.

ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to CONTRACTOR will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items, and shall not include any of the costs itemized in paragraph 11.01.B.

1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Such employees shall include without limitation superintendents, foremen, and other personnel employed full time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by OWNER.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

3. Payments made by CONTRACTOR to Subcontractors for Work performed by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from subcontractors acceptable to OWNER and CONTRACTOR and shall deliver such bids to OWNER, who will then determine, with the advice of ENGINEER, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as CONTRACTOR's Cost of the Work and fee as provided in this paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

a. The proportion of necessary transportation, travel, and subsistence expenses of CONTRACTOR's employees incurred in discharge of duties connected with the Work.

b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of CONTRACTOR.

c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from CONTRACTOR or others in accordance with rental agreements approved by OWNER with the advice of ENGINEER, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

d. Sales, consumer, use, and other similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

e. Deposits lost for causes other than negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by CONTRACTOR in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining CONTRACTOR's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, expressage, and similar petty cash items in connection with the Work.

i. When the Cost of the Work is used to determine the value of a Change Order or of a Claim, the cost of premiums for additional Bonds and insurance required because of the changes in the Work or caused by the event giving rise to the Claim.

j. When all the Work is performed on the basis of cost-plus, the costs of premiums for all Bonds and insurance CONTRACTOR is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnerships and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by CONTRACTOR, whether at the Site or in CONTRACTOR's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.01.A.1 or specifically covered by paragraph 11.01.A.4, all of which are to be

considered administrative costs covered by the CONTRACTOR's fee.

2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the Site.

3. Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments.

4. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraphs 11.01.A and 11.01.B.

C. *CONTRACTOR's Fee:* When all the Work is performed on the basis of cost-plus, CONTRACTOR's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, CONTRACTOR's fee shall be determined as set forth in paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to paragraphs 11.01.A and 11.01.B, CONTRACTOR will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

11.02 *Cash Allowances*

A. It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:

1. the allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

2. CONTRACTOR's costs for unloading and handling on the Site, labor, installation costs, overhead, profit, and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

B. Prior to final payment, an appropriate Change Order will be issued as recommended by ENGINEER to reflect actual amounts due CONTRACTOR on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER subject to the provisions of paragraph 9.08.

B. Each unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

C. OWNER or CONTRACTOR may make a Claim for an adjustment in the Contract Price in accordance with paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by CONTRACTOR differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect any other item of Work; and

3. if CONTRACTOR believes that CONTRACTOR is entitled to an increase in Contract Price as a result of having incurred additional expense or OWNER believes that OWNER is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in paragraph 11.01) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 12.01.C).

C. *CONTRACTOR's Fee:* The CONTRACTOR's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under paragraphs 11.01.A.1 and 11.01.A.2, the CONTRACTOR's fee shall be 15 percent;

b. for costs incurred under paragraph 11.01.A.3, the CONTRACTOR's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of paragraph 12.01.C.2.a is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by CONTRACTOR to OWNER for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in CONTRACTOR's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in CONTRACTOR's fee shall be computed on the basis of the net change in accordance with paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times (or Milestones) may only be changed by a Change Order or by a Written Amendment. Any Claim for an adjustment in the Contract Times (or Milestones) shall be based on written notice submitted by the party making the claim to the ENGINEER and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. Any adjustment of the Contract Times (or Milestones) covered by a Change Order or of any Claim for an adjustment in the Contract Times (or Milestones) will be determined in accordance with the provisions of this Article 12.

12.03 *Delays Beyond CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in paragraph 12.02.A. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect by OWNER, acts or neglect of utility owners or other contractors performing other work as contemplated by

Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

12.04 *Delays Within CONTRACTOR's Control*

A. The Contract Times (or Milestones) will not be extended due to delays within the control of CONTRACTOR. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of CONTRACTOR.

12.05 *Delays Beyond OWNER's and CONTRACTOR's Control*

A. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay.

12.06 *Delay Damages*

A. In no event shall OWNER or ENGINEER be liable to CONTRACTOR, any Subcontractor, any Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from:

1. delays caused by or within the control of CONTRACTOR; or

2. delays beyond the control of both OWNER and CONTRACTOR including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

B. Nothing in this paragraph 12.06 bars a change in Contract Price pursuant to this Article 12 to compensate CONTRACTOR due to delay, interference, or disruption directly attributable to actions or inactions of OWNER or anyone for whom OWNER is responsible.

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which OWNER or ENGINEER has actual knowledge will be given to CONTRACTOR. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. OWNER, ENGINEER, ENGINEER's Consultants, other representatives and personnel of OWNER, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspecting, and testing. CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR's Site safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.04.B shall be paid as provided in said paragraph 13.04.B; and

3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, CONTRACTOR shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish ENGINEER the required certificates of inspection or approval.

D. CONTRACTOR shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for OWNER's and ENGINEER's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to OWNER and ENGINEER.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by CONTRACTOR without written concurrence of ENGINEER, it must, if requested by ENGINEER, be uncovered for observation.

F. Uncovering Work as provided in paragraph 13.03.E shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR's intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of ENGINEER, it must, if requested by ENGINEER, be uncovered for ENGINEER's observation and replaced at CONTRACTOR's expense.

B. If ENGINEER considers it necessary or advisable that covered Work be observed by ENGINEER or inspected or tested by others, CONTRACTOR, at ENGINEER's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as ENGINEER may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment. If it is found that such Work is defective, CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If, however, such Work is not found to be defective, CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a Claim therefor as provided in paragraph 10.05.

13.05 *OWNER May Stop the Work*

A. If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop the Work shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. CONTRACTOR shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by ENGINEER, remove it from the Project and replace it with Work that is not defective. CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for CONTRACTOR's use by OWNER or permitted by Laws and Regulations as contemplated in paragraph 6.11.A is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions: (i) repair such defective land or areas, or (ii) correct such defective Work or, if the defective Work has been rejected by OWNER, remove it from the Project and replace it with Work that is not defective, and (iii) satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, OWNER may have the defective Work corrected or repaired or may have the rejected Work removed and replaced, and all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR.

B. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that

item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

C. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

D. CONTRACTOR's obligations under this paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this paragraph 13.07 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, OWNER (and, prior to ENGINEER's recommendation of final payment, ENGINEER) prefers to accept it, OWNER may do so. CONTRACTOR shall pay all Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to OWNER's evaluation of and determination to accept such defective Work (such costs to be approved by ENGINEER as to reasonableness) and the diminished value of the Work to the extent not otherwise paid by CONTRACTOR pursuant to this sentence. If any such acceptance occurs prior to ENGINEER's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and OWNER shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, OWNER may make a Claim therefor as provided in paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

13.09 *OWNER May Correct Defective Work*

A. If CONTRACTOR fails within a reasonable time after written notice from ENGINEER to correct defective Work or to remove and replace rejected Work as required by ENGINEER in accordance with paragraph 13.06.A, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provision of the Contract Documents, OWNER may, after seven days written notice to CONTRACTOR, correct and remedy any such deficiency.

B. In exercising the rights and remedies under this paragraph, OWNER shall proceed expeditiously. In connection with such corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the Site, take possession of all or part of the Work and suspend CONTRACTOR's services related thereto, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees, OWNER's other contractors, and ENGINEER and ENGINEER's Consultants access to the Site to enable OWNER to exercise the rights and remedies under this paragraph.

C. All Claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by OWNER in exercising the rights and remedies under this paragraph 13.09 will be charged against CONTRACTOR, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, OWNER may make a Claim therefor as provided in paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of CONTRACTOR's defective Work.

D. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies under this paragraph 13.09.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The schedule of values established as provided in paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to ENGINEER. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments*

1. At least 20 days before the date established for each progress payment (but not more often than once a month), CONTRACTOR shall submit to ENGINEER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that OWNER has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect OWNER's interest therein, all of which must be satisfactory to OWNER.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of CONTRACTOR stating that all previous progress payments received on account of the Work have been applied on account to discharge CONTRACTOR's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications*

1. ENGINEER will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to OWNER or return the Application to CONTRACTOR indicating in writing ENGINEER's reasons for refusing to recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application.

2. ENGINEER's recommendation of any payment requested in an Application for Payment will constitute a representation by ENGINEER to OWNER, based on ENGINEER's observations on the Site of the executed Work as an experienced and qualified design professional and on ENGINEER's review of the Application for Payment and the accompanying data and schedules, that to the best of ENGINEER's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.08, and to any other qualifications stated in the recommendation); and

c. the conditions precedent to CONTRACTOR's being entitled to such payment appear to have been fulfilled in so far as it is ENGINEER's responsibility to observe the Work.

3. By recommending any such payment ENGINEER will not thereby be deemed to have represented that: (i) inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to ENGINEER in the Contract Documents; or (ii) that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or entitle OWNER to withhold payment to CONTRACTOR.

4. Neither ENGINEER's review of CONTRACTOR's Work for the purposes of recommending payments nor ENGINEER's recommendation of any payment, including final payment, will impose responsibility on ENGINEER to supervise, direct, or control the Work or for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for CONTRACTOR's failure to comply with Laws and Regulations applicable to CONTRACTOR's performance of the Work. Additionally, said review or recommendation will not impose responsibility on ENGINEER to make any examination to ascertain how or for what purposes CONTRACTOR has used the moneys paid on account of the Contract Price, or to determine that title to any of the Work, materials, or equipment has passed to OWNER free and clear of any Liens.

5. ENGINEER may refuse to recommend the whole or any part of any payment if, in ENGINEER's opinion, it would be incorrect to make the representations to OWNER referred to in paragraph 14.02.B.2. ENGINEER may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests,

revise or revoke any such payment recommendation previously made, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Written Amendment or Change Orders;

c. OWNER has been required to correct defective Work or complete Work in accordance with paragraph 13.09; or

d. ENGINEER has actual knowledge of the occurrence of any of the events enumerated in paragraph 15.02.A.

C. *Payment Becomes Due*

1. Ten days after presentation of the Application for Payment to OWNER with ENGINEER's recommendation, the amount recommended will (subject to the provisions of paragraph 14.02.D) become due, and when due will be paid by OWNER to CONTRACTOR.

D. *Reduction in Payment*

1. OWNER may refuse to make payment of the full amount recommended by ENGINEER because:

a. claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where CONTRACTOR has delivered a specific Bond satisfactory to OWNER to secure the satisfaction and discharge of such Liens;

c. there are other items entitling OWNER to a set-off against the amount recommended; or

d. OWNER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.02.B.5.a through 14.02.B.5.c or paragraph 15.02.A.

2. If OWNER refuses to make payment of the full amount recommended by ENGINEER, OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action and promptly pay CONTRACTOR any amount remaining after deduction of the amount so withheld. OWNER shall promptly pay CONTRACTOR the amount so withheld, or any adjustment thereto agreed to by OWNER and CONTRACTOR, when CONTRACTOR corrects to OWNER's satisfaction the reasons for such action.

3. If it is subsequently determined that OWNER's refusal of payment was not justified the amount wrongfully withheld shall be treated as an amount due as determined by paragraph 14.02.C.1.

14.03 *CONTRACTOR's Warranty of Title*

A. CONTRACTOR warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Promptly thereafter, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of the Work to determine the status of completion. If ENGINEER does not consider the Work substantially complete, ENGINEER will notify CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within 14 days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefor. If, after consideration of OWNER's objections, ENGINEER considers the Work substantially complete, ENGINEER will within said 14 days execute and deliver to OWNER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibili-

ties pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

B. OWNER shall have the right to exclude CONTRACTOR from the Site after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Use by OWNER at OWNER's option of any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which OWNER, ENGINEER, and CONTRACTOR agree constitutes a separately functioning and usable part of the Work that can be used by OWNER for its intended purpose without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following conditions.

1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, OWNER, CONTRACTOR, and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers that part of the Work to be substantially complete, the provisions of paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

2. No occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, ENGINEER will promptly make a final inspection with OWNER and CONTRACTOR and will notify CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment*

1. After CONTRACTOR has, in the opinion of ENGINEER, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance certificates of inspection, marked-up record documents (as provided in paragraph 6.12), and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.04.B.7; (ii) consent of the surety, if any, to final payment; and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in paragraph 14.07.A.2 and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, CONTRACTOR may furnish a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

B. *Review of Application and Acceptance*

1. If, on the basis of ENGINEER's observation of the Work during construction and final inspection, and ENGINEER's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application for Payment to OWNER for payment. At the same time ENGINEER will also give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.09. Otherwise, ENGINEER will return the Application for Payment to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due*

1. Thirty days after the presentation to OWNER of the Application for Payment and accompanying documentation, the amount recommended by ENGINEER will become due and, when due, will be paid by OWNER to CONTRACTOR.

14.08 *Final Completion Delayed*

A. If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed, and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by OWNER against CONTRACTOR, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by CONTRACTOR against OWNER other than those previously made in writing which are still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.01 *OWNER May Suspend Work*

A. At any time and without cause, OWNER may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if CONTRACTOR makes a Claim therefor as provided in paragraph 10.05.

15.02 *OWNER May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. CONTRACTOR's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.07 as adjusted from time to time pursuant to paragraph 6.04);

2. CONTRACTOR's disregard of Laws or Regulations of any public body having jurisdiction;

3. CONTRACTOR's disregard of the authority of ENGINEER; or

4. CONTRACTOR's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in paragraph 15.02.A occur, OWNER may, after giving CONTRACTOR (and the surety, if any) seven days written notice, terminate

the services of CONTRACTOR, exclude CONTRACTOR from the Site, and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the Site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the Work as OWNER may deem expedient. In such case, CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by OWNER arising out of or relating to completing the Work, such excess will be paid to CONTRACTOR. If such claims, costs, losses, and damages exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such claims, costs, losses, and damages incurred by OWNER will be reviewed by ENGINEER as to their reasonableness and, when so approved by ENGINEER, incorporated in a Change Order. When exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

C. Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

15.03 *OWNER May Terminate For Convenience*

A. Upon seven days written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy of OWNER, elect to terminate the Contract. In such case, CONTRACTOR shall be paid (without duplication of any items):

1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. for all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. for reasonable expenses directly attributable to termination.

B. CONTRACTOR shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *CONTRACTOR May Stop Work or Terminate*

A. If, through no act or fault of CONTRACTOR, the Work is suspended for more than 90 consecutive days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within 30 days after it is submitted, or OWNER fails for 30 days to pay CONTRACTOR any sum finally determined to be due, then CONTRACTOR may, upon seven days written notice to OWNER and ENGINEER, and provided OWNER or ENGINEER do not remedy such suspension or failure within that time, terminate the Contract and recover from OWNER payment on the same terms as provided in paragraph 15.03. In lieu of terminating the Contract and without prejudice to any other right or remedy, if ENGINEER has failed to act on an Application for Payment within 30 days after it is submitted, or OWNER has failed for 30 days to pay CONTRACTOR any sum finally determined to be due, CONTRACTOR may, seven days after written notice to OWNER and ENGINEER, stop the Work until payment is made of all such amounts due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.04 are not intended to preclude CONTRACTOR from making a Claim under paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping the Work as permitted by this paragraph.

ARTICLE 16 - DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Dispute resolution methods and procedures, if any, shall be as set forth in the Supplementary Conditions. If no method and procedure has been set forth, and subject to the provisions of paragraphs 9.09 and 10.05, OWNER and CONTRACTOR may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.

ARTICLE 17 - MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Agreement.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

EMERGENCY WELL REPLACEMENT - 2000
VOLGA, SOUTH DAKOTA

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

ARTICLE 1 - DEFINITIONS

SC-1. The terms used in these Supplementary Conditions which are defined in the Standard General Conditions of the Construction Contract have the meanings assigned to them in the General Conditions.

ARTICLE 4 - AVAILABILITY OF LAND; PHYSICAL CONDITIONS; REFERENCE POINTS

SC-4.02 There are no reports of explorations and tests, or drawings of physical conditions in or relating to existing surface and subsurface conditions which are at or contiguous to the site which have been used by Engineer in preparation of the Contract Documents.

ARTICLE 5 - BONDS AND INSURANCE

Contractor's Liability Insurance:

SC-5.04 The limits of liability for the insurance required by paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

5.04.A.1 and 5.04.A.2.

Worker's Compensation, etc. under paragraph 5.04.A.1 and 5.04.A.2 of the General Conditions:

(1) State:	Statutory
(2) Applicable Federal (e.g. Longshoreman's)	Statutory
(3) Employer's Liability:	$ 100,000

5.04.A.3, 5.04.A.4, and 5.04.A.5.

Comprehensive General Liability (under paragraphs 5.04.A.3 through 5.04.A.5 of the General Conditions):

(1) Bodily Injury (including completed operations and products liability).

$ 1,000,000	Each Occurrence
$ 1,000,000	Annual Aggregate, Products and Completed Operations

(2) Property Damage:

$ 1,000,000	Each Occurrence
$ 1,000,000	Annual Aggregate

or a combined single limit of $ 1,000,000

Property Damage liability insurance will provide Explosion, Collapse and Underground coverages where applicable.

5.04.A.6. Comprehensive Automobile Liability:

(1) Bodily Injury:

$ 1,000,000	Each Person
$ 1,000,000	Each Accident

(2) Property Damage:

$ 1,000,000	Each Occurrence

or a combined single limit of $ 1,000,000

Contractual Liability Insurance:

SC-5.04.B.4 The Contractual Liability Insurance required by paragraph 5.04.B.4 of the General Conditions shall provide coverage for not less than the following amounts:

5.04.B.4.1. Bodily Injury:

$ 1,000,000	Each Occurrence

5.04.B.4.2. Property Damage:

$ 1,000,000	Each Occurrence
$ 1,000,000	Annual Aggregate

Owners Liability Insurance:

SC-5.05. OWNER and ENGINEER shall be included by endorsement as additional insured on CONTRACTOR's General Liability Policy.

Property Insurance:

SC-5.06. Contractor shall provide "all-risk" insurance in accordance with paragraph 5.06.A.

of the General Conditions.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

Labor, Materials and Equipment

SC-6.03.A. With regard to utilities it is the intent of these documents that the CONTRACTOR will furnish all the necessary utilities needed for completion of the work at no cost to the OWNER.

ARTICLE 16 - DISPUTE RESOLUTION

Methods and Procedures:

SC-16.01 This section of the General Conditions is hereby revised to allow for optional arbitration upon the specific agreement of both parties. It is further required that if arbitration is selected, that the arbitration panel in rendering any award, must issue a written explanation of the rationale for any award, including a detailed findings of fact, conclusions of law and an allocation of the award to specific items of work.

END OF SUPPLEMENTARY CONDITIONS

DIVISION 1 - GENERAL REQUIREMENTS

EMERGENCY WELL REPLACEMENT - 2000
VOLGA, SOUTH DAKOTA
SECTION 1A - GENERAL REQUIREMENTS

I. SUMMARY OF THE WORK.

1.01 Work Under this Contract: The work to be performed under this Contract consists of the construction of the Water Supply Improvements, Volga, South Dakota.

A. Construction shall include the following improvements as detailed on the Drawings and as specified herein:

1. UNIT PRICE BID SCHEDULE: One (1) replacement well for Well #7, connection to existing water transmission lines, relocation of pump and pitless adapter unit, and incidentals. Owner will reconnect electrical and controls.

1.02 Character of Work: It is intended that the Contract Documents include all items requisite and necessary to finish the entire work properly, even though every item necessarily involved may not be particularly mentioned. All work when finished shall be turned over to the Owner in complete and undamaged state. The work shall be executed in the best and most workmanlike manner by qualified and efficient mechanics, in strict accordance with the Contract Documents.

1.03 Use of Site: The Contractor shall confine operations to those areas indicated in the Contract Documents and permitted by law, ordinances and permits. He shall not unreasonably encumber the site with any materials or equipment.

1.04 Use of Completed Portions - Owner Occupancy: The Owner shall have the right to take possession of and use any completed or partially completed portions of the work. Such taking possession and use shall not be deemed as acceptance of any work not completed in accordance with the Contract Documents. If such prior use increases the cost or delays to the work, the Contractor shall be entitled to such extra compensation, or extension of time, or both, as the Engineer may determine.

1.05 Drawings: The following Drawings are a part and parcel hereof, and wherever the word Contract appears herein, the same shall be held to include the Plan Sheets attached to these specifications.

1.06 Surveys: The Contractor shall provide competent engineering personnel to execute the work in accordance with the Contract requirements. He shall verify the figures shown on the survey and approved drawings before undertaking any construction work and shall be responsible for the accuracy of the finished work.
The Engineer shall establish such reference points as will, in his judgement, enable the Contractor to proceed with the work. If the Contractor finds that any previously established referenced points have been destroyed or displaced, he shall promptly notify the Engineer.

The Contractor shall protect and preserve the established bench marks and monuments and shall

The Contractor shall protect and preserve the established bench marks and monuments and shall make no changes in locations without approval of the Engineer.

II. PROGRESS AND PAYMENT.

2.01 Progress Payments: On or about the fifteenth day of each month the Contractor shall submit to the Engineer a request for payment for the work performed during the previous month. The request shall indicate the value of the work done including materials delivered for and stored on the site of the work. The Engineer shall check the request and recommend the amount of the payment to be made. Progress payments and retention from progress payments shall be made according to conditions outlined in the General Conditions which form a part of these Specifications.

III. SUBMITTALS.

3.01 Subcontractors and Suppliers: Within ten days after receipt of the Notice to Proceed, the Contractor shall submit to the Engineer a list, including names and addresses, of the subcontractors he proposes to use on the project and the suppliers of major equipment or material items.

3.02 Construction Schedules: Within ten days after receipt of the Notice to Proceed, the Contractor shall submit to the Engineer a schedule showing the proposed progress of the construction. The schedule shall show the proposed starting and completion dates for the various stages of the construction and shall be prepared such that it can be used to plot actual progress against proposed progress. No progress payments will be made until the construction schedule is received.

3.03 Equivalent Products: Whenever in the Drawings or Specifications any material or process is indicated or specified by patent or proprietary name and/or by name of manufacturer, such Specifications shall be deemed to be used for the purpose of facilitating description of the material and/or process desired and shall be deemed to be followed by the words "or equivalent", and the Contractor may offer any material or process which shall be equal in every respect to that so indicated or specified; provided, however, that if the material, process, or article offered by the Contractor is not, in the opinion of the Engineer, equal in every respect, then the Contractor must furnish the material, process or article specified or one that, in the opinion of the Engineer, is equal thereof in every respect.

A. Prior Approval: The items of materials and/or equipment listed in the Appendix attached to this Section must receive approval prior to bidding if it is intended to furnish products other than those specifically named in the Specifications. The requirements for obtaining such approval is specified in the Instructions to Bidders. Submittals for prior approval shall include shop drawings and/or samples as required by these Specifications. The shop drawings shall be complete, including drawings, diagrams, illustrations, performance charts, brochures or other data necessary to demonstrate compliance of the

item with the requirements of the Specifications. Samples shall represent the actual material or item to be furnished and shall include such necessary certification or documentation as to fully demonstrate compliance with the Specifications. Approval for equivalent products for items not listed herein will be given after the time of award of the Contract.

3.04 Shop Drawings and Samples:

A. General: The Contractor shall submit six (6) copies of shop drawings and/or samples as required by these Specifications prior to incorporating the items contained into the work. The shop drawings shall be complete, including drawings, diagrams, illustrations, performance charts, brochures or other data necessary to demonstrate compliance of the item with the requirements of the Specifications. Samples shall represent the actual material or item to be furnished and shall include such necessary certification or documentation as to fully demonstrate compliance with the Specifications. Submittals for shop drawings and samples shall be as specified under the appropriate section for the item and/or as listed in the Appendix attached to this Section.

B. Engineer's Review: Engineer's review action stamp, appropriately completed, will appear on all shop drawings of Contractor when returned by Engineer.

Checking is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action shown is subject to the requirements of the Drawings and Specifications. Contractor is responsible for: Dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of his work with that of all other trades and the satisfactory performance of his work.

Review status designations listed on Engineer's action stamp are defined as follows:

"No Exception Taken": Signifies equipment or material represented by the submittal conforms with the design concept and complies with the intent of the Contract Documents and can be incorporated into the Work. Contractor is to proceed with fabrication or procurement of the items and with related Work.

"Make Corrections Noted": Signifies equipment or materials represented by the submittal conforms with the design concept and complies with the intent of the Contract Documents and can be incorporated into the Work in accordance with Engineer's notations. Contractor is to proceed with the Work in accordance with Engineer's notations and is to submit a revised submittal responsive to notations marked on the returned submittal or written in the letter of transmittal.

"Revise and Resubmit": Signifies equipment or material represented by the submittal does not conform with the design concept or comply with the intent of the Contract Documents and cannot be incorporated into the Work. Contractor is to submit compliance submittals responsive to the Contract Documents.

"Submit Specified Item": Signifies submittals of such preliminary nature that a determination of conformance with the design concept or compliance with the intent of the Contract Documents must be deferred until additional information is furnished. Contractor is to submit such additional information to permit layout and related activities to proceed.

"For Reference Only": Signifies submittals which are for supplementary information only; pamphlets, general information sheets, catalog cuts, standard sheets, bulletins, and similar data, all of which are useful to Engineer and Owner in design, operation, or maintenance, but which by their nature do not constitute a basis for determining that items represented thereby conform with the design concept or comply with the intent of the Contract Documents. Engineer reviews such submittals for general content but not for substance.

"Distribution Copy": Signifies submittals which have been previously reviewed and are being distributed to Contractor, Owner, Resident Project Representative, and others for coordination and construction purposes.

IV. TESTING LABORATORY SERVICES. The services of an approved independent testing laboratory shall be secured by the Contractor, at his own expense, to provide the following tests which are specified elsewhere:

SECTION	ITEM
2C	Formation Testing for Wells
3A	Concrete Field and Laboratory Tests

The Contractor shall secure an approved independent testing laboratory to perform the necessary tests as specified herein. Two (2) certified copies of the test results shall be submitted to the Engineer for review.

The Contractor shall perform all hydrostatic testing for water lines with his employees.

V. TEMPORARY FACILITIES AND TRAFFIC CONTROLS.

5.01 Construction Area: The Contractor shall limit his construction operations to the areas indicated on the Drawings as construction areas. This shall include the operation and storage of equipment and the storage of materials for use on the project. The construction areas shall be

maintained in a neat and orderly condition at all times. The Contractor shall not occupy space that will interfere with Utility Department operation.

5.02 Security: The Contractor shall provide security as required at the site. It shall be the Contractor's responsibility to provide such additional security as may be required to protect the construction and any materials and/or equipment stored on the site.

5.03 Access Roads: Access roads within the project area shall be kept open and maintained in a passable condition at all times.

5.04 Barricades and Warning Signs: The Contractor shall provide, erect, and maintain necessary barricades, suitable and sufficient lights, danger signals, signs and traffic control devices. The Contractor shall take all necessary precautions for the protection of the work and safety of the public. Highways and streets closed to traffic shall be protected by barricades. Obstructions shall be illuminated during hours of darkness. Warning signs shall be provided to control and direct traffic.

The Contractor shall erect warning signs in advance of the project where operations may interfere with the use of the road by traffic.

All traffic control devices and methods shall conform with the Manual on Uniform Traffic Control Devices for Streets and Highways issued by the United States Department of Transportation and adopted by the South Dakota Department of Transportation.

The work specified in the foregoing shall be incidental to other items of the Contract.

VI. MATERIAL AND EQUIPMENT.

6.01 Storage and Protection: The Contractor shall, at all times, carefully and properly protect all materials and equipment, both before and after being used on the job, and all work performed by him, and provide any special protection from weather deemed necessary without additional cost to the Owner. The Contractor shall coordinate with the Engineer for designating storage areas and for the requirements for storage and protection. Storage of materials and equipment shall be within the area designated on the Drawings as the Construction Area.

6.02 Materials Sources: It shall be the responsibility of the Contractor to locate sources for all materials specified herein and for any other material or item required to produce or complete the materials and/or work specified. The Contractor shall bear all costs in connection with acquisition, transportation, preparation, fabrication and/or installation of the material or item in the final work.

VIII. CONSTRUCTION SEQUENCE.

7.01 General: During the construction of the water distribution system improvements, the Contractor shall schedule operations to maintain the operation of the existing water supply system. Any scheduled interruptions in water service shall be coordinated with and approved by the OWNER prior to interrupting water service. Any water service interruptions shall be kept within a maximum duration of two hours. If possible, service interruptions shall be scheduled to occur during minimum demand periods.

VIII. PROJECT CLOSEOUT.

8.01 Clean-Up: Upon completion of the work, the Contractor shall clean up the construction site and all of the facilities constructed thereon in such a manner that the site and facilities will be acceptable to the Owner for placing the work in service. The clean-up shall include the removal of all debris and matter not intended to be left on the site or in or around the site facilities. All areas and facilities shall be thoroughly cleaned and all work specified shall be completed prior to final acceptance of the project.

8.02 Acceptance of the Work: After the Contractor has completed the testing, and finished site clean-up of the completed job, a final inspection shall be conducted by the Engineer and the Contractor to ascertain that all items of the work are complete and in conformance with the requirements of the Contract Documents in all respects. In the event any discrepancies are found in the work, these discrepancies shall be rectified prior to acceptance of the work. At such time as all items of the work, including clean-up and testing of the work, are acceptable to the Engineer and the Owner, the Contractor shall be so notified in writing and the period of posting and publication prior to final payment shall begin.

8.03 Completion of the Work: The Contractor shall begin and complete the work within the times stated in the Proposal. The capacity of the Contractor's construction plant and the forces employed shall be such as to insure the completion of the work within the specified period of time. The damages that may result from any delay in completion of the work by the time agreed upon will be difficult to ascertain. If the work, or any part of it, is not completed on or before the date fixed for its completion by terms of the Contract, the Contractor shall pay the Owner liquidated damages in the amount as determined by the terms of the Contract.

8.04 Guarantee and Completion of the Contract: All work under this Contract will have a normal one year warranty after the date of final acceptance by the Owner.

During the warranty period, the Contractor shall be responsible for all repairs arising out of defective workmanship or materials, or both, which in the judgment of the Owner, shall become necessary during such period. If, within ten days after the mailing of a notice in writing to the Contractor or his agent, the said Contractor shall neglect to make, or undertake with due diligence, to make the aforesaid repairs, the Owner is hereby authorized to make such repairs at the Contractor's expense; providing however, that in case of an emergency where, in the judgment of

the Owner, delay would cause serious loss or damage, repairs may be made without notice being sent to the Contractor and the Contractor shall pay the cost thereof. The terms of the Contract shall not be deemed to be completed until such time that the warranty period has ended and any remedial action required by the warranty has been performed by the Contractor. The Contractor's performance and payment bond shall remain in full force until such completion of the Contract.

8.05 Project Record Drawings: The Contractor shall keep one set of Plans and Specifications on the job, in good order, which shall be labeled "Record Copy". This set of Plans and Specifications shall be filed separately, kept clean and readable, and protected. Whenever changes and/or deviations from the original Contract Documents are made, the Contractor shall record such changes and deviations on the Record Copy and upon completion of the work shall certify and forward the Record Copy to the Engineer as "As-Constructed Documents".

8.06 Operation and Maintenance Data: The Contractor shall submit to the Engineer complete and detailed operation and maintenance data for the required items of equipment incorporated in the work. The data shall provide sufficient information for the Owner to properly and correctly operate and maintain the facilities with a minimum of expense and down time. Operation and maintenance data shall be submitted for the items which are specified elsewhere and which are listed in the Appendix attached to this Section. Six copies shall be submitted.

APPENDIX A

ITEMS REQUIRING PRIOR APPROVAL

Section 2B - Gate Valves

Section 2C - Well Screen,

APPENDIX B

ITEMS REQUIRING SHOP DRAWING SUBMITTALS

Section 2B - Site Utilities
- Watermain Piping and Fittings
- Valves and Accessories

Section 2C - Water Supply Wells and Pumps
- Well Casing, Screens,

Section 3A - Concrete Work
- Mix Designs
- Concrete Admixtures and Accessories

APPENDIX C

ITEMS REQUIRING OPERATION AND MAINTENANCE DATA SUBMITTALS

Section 2B - Site Utilities
Valves

END OF SECTION 1A

I. GENERAL.

1.01 Description: This section of the Specifications includes all earthwork for site grading, building excavation, roadways, demolition, structures, and trenching for water lines and utilities and all work incidental thereto, as shown on the Drawings and as specified herein.

1.02 Job Conditions: The Contractor shall operate his equipment only in those areas designated on the Drawings, or by the Engineer as construction areas. Indiscriminate operation of equipment outside of designated construction areas will not be permitted.

1.03 Related Work Specified Elsewhere: The following items of related work are specified and included in other sections of the Specifications:

Site Utilities
Concrete Work
Landscaping-Seeding

1.04 Tests: It shall be the responsibility of the Contractor to obtain test results showing the moisture-density relationship (Standard Proctor) of a representative sample of materials to be used in all backfill and embankment areas, including excavated material, engineered fill, borrow material, gravel surfacing material and gravel base course. Such tests shall be conducted by an independent testing laboratory in accordance with the procedure specified by ASTM D698. In-place Density Tests shall be taken at locations directed by the Engineer. The number of tests to be taken are as called out in the "Bid". All in-place density testing will be performed by the Contractor through the use of an independent testing laboratory. All areas where the compaction tests fail to meet the specified density, the Contractor shall remove the material in the failed area, replace and recompact the material and have the testing laboratory retest the area for compaction. All costs for removal, replacement, recompaction and retesting of the material shall be paid for by the Contractor.

1.05 Guarantee: During a period of one year from and after the date of final acceptance by the Owner of the work embraced by this Contract, the Contractor shall make all needed repairs or replace as necessary any damage caused by settlement, at no additional cost to the Owner.

II. MATERIALS.

2.01 Select Engineered Fill Material: The engineered fill used for select fill beneath structures shall consist of 1-1/2" maximum size screened pit run gravel with less than 5% material finer than the 200 sieve.

2.02 Gravel Surfacing: Gravel surfacing for streets, drives, parking lots, and at locations shown on the Drawings shall conform to the requirements of the South Dakota Department of

Transportation, Division of Highways, Standard Specification for Gravel Surfacing, unless otherwise shown on the Drawings or approved by the Engineer. Gravel surfacing will be furnished and installed by Owner.

2.03 Bedding Material: The bedding material shall be Class I graded stone or crushed aggregate in the general size range of 1/4" to 3/4" as defined in ASTM D2321 or fill concrete as specified in Division 3 of these Specifications. Suitable material from the excavation stockpile may be used when directed by the Engineer.

The bedding material shall be free-draining granular material free from large stones, hard dry lumps, frozen lumps, rocks, broken asphalt pieces, broken concrete pieces, debris or organic material.

III. EXECUTION.

3.01 Site Preparation: The Engineer will establish construction lines and designate all trees, shrubs, plants and other things to remain. All surface objects and all trees, stumps, roots and other obstructions not designated to remain, shall be cleared as required and properly disposed of.

All temporary openings in fences and necessary repairs to replace the existing fence in its original location and condition shall be performed by the Contractor.

The Contractor shall be responsible for the proper removal, care and resetting of all portable culverts, drainage pipe and other minor structures authorized by the Engineer for temporary relocation from alignment of the work.

Removal of surface improvements such as street paving, curbs, gutters and sidewalks shall be held to a minimum. When it is necessary to cut through existing asphalt paving, concrete paving sidewalks and curb and gutter before excavating a trench, the cut shall be first made with a concrete saw for the full depth of the existing surface. All material removed and the method employed to replace the surface improvement to its original grade, depth and alignment shall be first authorized and approved by the Engineer. All material removed shall be disposed of by the Contractor at a site provided by the Contractor.

3.02 Topsoil: Topsoil (full depth) in excavation areas shall be stripped from the site and stored in stockpiles. Topsoil (no less than 6") including vegetation in site grading areas to receive embankment shall be stripped and stockpiled.

3.03 Removal of Water:

A. Drainage: The Contractor shall at all times during the construction of the work provide and maintain ample equipment to remove and dispose of all water entering the excavation or other parts of the work. The excavation shall be kept dry until all work therein has been completed and backfilling commenced. All grading in the vicinity of the excavation shall

be performed in such a manner as to provide positive surface drainage away from the site and to prevent surface water from flowing into the excavation.

No reinforcing steel shall be placed in water, and no water shall be allowed to rise over any reinforcing steel before the concrete has been placed. No water will be allowed to come in contact with any concrete within twenty-four (24) hours after placement unless shown on the Drawings or authorized by the Engineer.

B. Dewatering:

1. Trench Dewatering: During trenching operations for installation of utilities, when groundwater is encountered in sufficient quantities to require continuous pumping with well points or other special handling in order to maintain a satisfactory dry trench condition, it shall be considered wet trench. In such case, the Contractor shall submit to the Engineer for approval, his proposed method of disposing of the water prior to initiating the dewatering procedure. The Contractor shall be responsible for any damage occurring from disposal of water. Trenches for utilities shall be dewatered to an elevation of at least one (1) foot below the pipe invert elevation. No separate measurement or payment will be made for dewatering.

2. Structure Excavation Dewatering: During excavation for structures other than utility trenches, the Contractor shall provide suitable equipment including, if necessary, pumping with well points or other special handling to keep the excavation dry as required by paragraph 3.03 A, above. The Contractor shall be responsible for any damage occurring from disposal of water. Excavation for structures shall be dewatered to an elevation of at least two (2) feet below the bottom of the excavation. No separate measurement or payment will be made for dewatering.

3.04 Site Grading: This section of the Specifications covers all earthwork required for general site grading. The entire project site shall be constructed to the lines, grades, and cross sections shown on the Drawings or designated by the Engineer.

A. Embankment shall be constructed in uniformly spread lifts not to exceed twelve inches (loose). The embankment shall be compacted to 90% of maximum density in conformance with ASTM D-698. The moisture content of the material being compacted shall be within +/- 3% of optimum. In areas designated for future roadway surfacing, compaction shall be 95%.

B. Excavations and embankments shall be finished to provide a smooth, uniform surface. Excavations shall be blended to the natural surfaces by rounding the top of the cuts. All slopes shall be trimmed and dressed to provide a surface acceptable to the Engineer.

C. It shall be the responsibility of the Contractor to provide all materials, including borrow, earth cover, and topsoil.

D. Excavation shall be unclassified and shall consist of the removal and disposal of whatever substance or material is encountered.

E. Embankment shall be constructed of materials from the excavation that are acceptable to the Engineer. Prior to placing embankment, the top six inches of the subgrade shall be scarified and compacted to 90% of maximum density in conformance with ASTM D-698.

F. Topsoil previously stockpiled shall be placed uniformly over all areas disturbed by construction operations after completion of those operations. The topsoil shall be spread to a uniform minimum thickness of six (6) inches as directed by the Engineer and in such a manner that seeding can be accomplished with a minimum of additional soil preparation or tillage. If there is not adequate topsoil available from the site, the Contractor shall provide an approved topsoil material in accordance with 3.04 C above.

G. Control of erosion and sediment of all site grading shall be in conformance with SDDWNR guide for Best Management Practices for sediment and erosion control on wastewater management treatment sites in South Dakota.

3.05 Excavation, Trenching, and Backfilling for Utilities: This section of the specification includes excavation, trenching, and backfilling for underground utility lines and miscellaneous utility structures such as manholes and thrust blocks.

A. Excavation and Trenching:

1. General: The Contractor shall perform all excavation of every description and of whatever substances encountered, to the depths indicated on the Drawings or as otherwise specified. Excavated materials shall be piled a sufficient distance from the banks of the excavation to avoid overloading and to prevent slides or cave-ins.

All excavated materials not required for fill or backfill shall be removed and disposed of as indicated or as directed by the Engineer.

All excavation shall be made by open cut method unless otherwise shown on the Plans. The banks of trenches shall be kept as nearly vertical as practicable and where required shall be properly sheathed and braced. Trenches shall be not less than 12 inches wider nor more than 16 inches wider than the outside diameter of the pipe laid therein, and shall be excavated true to line, so that clear space of not less than 6 inches nor more than 8 inches in width is provided on each side of the pipe. The maximum width of trench specified applies to the width at and below the level of the top of the pipe. The width of trench above that level may be as wide as necessary for sheathing and bracing, and the proper installation of the work. The bottom of trenches shall be accurately graded to provide uniform bearing and support for each section of pipe on stable soil at every point along its entire length, except for portions of the pipe sections where it is necessary to excavate for bell holes. Bell holes shall be dug after the trench bottom has been graded. Bell holes shall be excavated only to an extent sufficient to permit

accurate work in the making of the joints and to insure that the pipe, for a maximum of its length, will rest upon the prepared bottom of the trench. The bottoms of all trenches shall be rounded so that at least one-fourth of the circumference of the pipe shall rest firmly on undisturbed or compacted soil. Under no circumstances will it be permissible to leave a pipeline excavation unprotected or unguarded when work is not actually in progress on the pipeline. If it becomes necessary for the Contractor to leave the pipeline excavation for any reason, it shall be the Contractor's responsibility to leave one of his employees at the site to watch the site so unauthorized personnel do not enter the excavation. Unless otherwise required, the pipeline excavation shall be completely backfilled at the end of each days operation, and reopened when work resumes on this portion of the line. The Contractor shall be responsible to mark the end of the pipe in such a manner that it may be easily found when the ditch is reopened.

Excavation for structures and accessories, including manholes, shall be of sufficient size so as to leave at least twelve (12) inches of clear space between the outer surface of the structure and the embankment or sheathing and bracing which may be used to hold and protect them. Unless otherwise shown on the Drawings or authorized by the Engineer, the bottom of the excavation shall not be undercut below the grades established. Manhole installations shall be completed and completely backfilled the same day in which the excavation was started.

2. Undercutting: Where rock is encountered at the bottom of utility trenches, the rock shall be excavated to a minimum over-depth of six (6) inches below the grade established for the trench bottom and replaced with bedding material.

Where soft, spongy, unstable or other similar material is encountered upon which the bedding material, structure or pipe is to be placed, this unsuitable material shall be removed to a depth ordered by the Engineer and replaced with an approved granular material or fill concrete as directed by the Engineer. No additional payment will be made for undercutting.

3. Protection of Excavation: The Contractor shall provide suitable sheeting, shoring and bracing to protect all excavations to provide safe working conditions, and in strict conformance with safety regulations. Damage or injury resulting from settlement, slides, cave-ins, water pressure or other causes shall be the responsibility of the Contractor and damage shall be repaired at his own expense.

The Contractor shall provide adequate signs, barricades, flashing lights and watchmen and take all necessary precautions for the protection of the work and the safety of the public. All barricades and obstructions shall be protected at night by flashing signal lights which shall be kept burning from sunset to sunrise. Barricades shall be of substantial construction and shall be painted white or whitewashed to increase their visibility at night. Suitable signs shall be so placed as to show in advance where construction, barricades or detours exist.

The Contractor shall at all times so conduct his work as to insure the least possible obstruction to traffic and inconvenience to the general public and shall at all times maintain access to existing public and private property.

4. Protection of Existing Utilities: Existing utilities shall be protected from damage during the excavation and backfilling operations, and if damaged, shall be repaired by the Contractor, at his expense. It shall be the Contractor's responsibility to arrange with each utility company known to maintain utilities in the area of work to have all underground facilities located and staked by the utility company prior to excavation.

5. Grading and Stockpiling: During excavation, unless otherwise shown on the Drawings or specified herein, material suitable for bedding and backfill shall be placed in stockpiles in approved locations, so selected as not to interfere with the work being performed under this contract or in the normal operation of other unrelated functions. Stockpiles shall be placed a sufficient distance back from the edges of the excavation to avoid overloading and to prevent slides or cave-ins.

Stockpiles shall be kept in a neat, well-drained workable condition at all times.

6. Disposal of Excess Material: Material in excess of that required for the permanent work and/or any material unsuitable for backfill shall be disposed of by the Contractor as directed by the Engineer.

B. Bedding:

1. General: Bedding shall be defined as that material supporting, surrounding and extending to one (1) foot above the top of the pipe or conduit. Where it becomes necessary to undercut the bottom of the utility trench to remove rock or other interfering objects at subgrade for bedding, any void below such subgrade shall be filled with compacted bedding material as shown on the Drawings or approved by the Engineer.

Where it is necessary to remove soft, spongy, unstable or other similar material which is incapable of properly supporting the structure or pipe, any void below the bottom of the structure or pipe shall be filled with compacted granular embedment material or fill concrete as directed by the Engineer.

Where it is necessary for any reason to undercut below the bottom of concrete poured in place structures, the void below the bottom of the structure shall be filled with concrete at the same time and of the same quality as that of the structure itself, unless otherwise shown on the Drawing or approved by the Engineer. If the necessity for such additional bedding material has been caused by an act or failure to act on the part of the Contractor, the Contractor shall bear the expense of the additional excavation and bedding.

Bedding material shall be first placed so that the pipe is uniformly supported for the full length of the barrel with full bearing on the bottom segment of the pipe equal to a minimum of one-fourth the circumference of the pipe. The remainder of the bedding shall then be placed around and over the pipe in uniform layers approximately four (4) inches in depth. Each layer shall be properly hand compacted.

2. Bedding Material: Bedding material shall be selected material from the excavation stockpile, granular embedment material or concrete as shown on the Drawings or directed by the Engineer.

Selected bedding material shall be, where possible, free-draining granular material. When approved by the Engineer, excavated earth free from large stones, hard dry lumps, frozen lumps, debris or organic matter may be used. Select material shall be sufficiently pulverized to permit proper compaction.

Granular embedment material shall be Class I graded stone or crushed aggregate in the general size range of 1/4" to 1-1/2" as defined in ASTM D2321.

Fill concrete shall conform to the requirements of these Specifications for CONCRETE.

C. Backfilling:

1. General: Backfill shall be considered as starting one (1) foot above the top of the pipe or conduit. All material below this point shall be considered as bedding.

Backfill, or fill, as the case may be, for precast or cast-in-place structures, such as, but not limited to, manholes, transition structures, junction structures, vaults, valve boxes and reinforced concrete box conduits shall start at the subgrade for the structure.

Except where the pipe must remain exposed for leakage and exfiltration tests and subject to the provisions herein, the Contractor shall proceed as soon as possible with backfilling operations. Care shall be exercised so that the structure or pipe will not be damaged or displaced. If the pipe is supported by concrete cradle placed between the trench wall and the pipe, backfill above the concrete bedding shall not be placed nor sheeting pulled for at least 24 hours after placement of the concrete.

Unless otherwise specified or authorized by the Engineer, backfill against or over the top of any cast-in-place structure shall not be placed prior to seven (7) days after completion of concrete placement.

Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, the voids remaining shall be backfilled with suitable material and compacted as approved by the Engineer.

Voids left by the removal of sheeting, piles and similar sheeting supports shall be immediately backfilled with clean sand which shall be jetted into place to assure dense and complete filling of the voids.

Backfill shall be placed and mechanically compacted in accordance with the applicable requirements of paragraph 3.05 D, herein.

Any backfill improperly placed or where settlement occurs, shall be removed to the depth required for proper compaction, then replaced and compacted as required to finished grade.

2. Backfill Material: The material obtained from the project excavations may be used as backfill unless otherwise shown on the Drawings or specified in these Specifications, provided that all organic material, rubbish, debris, rocks greater than six (6) inches in any dimension, and other objectionable materials are first removed. Broken Portland cement concrete and bituminous type pavements obtained from the project excavations will not be permitted in the backfill.

The top three (3) inches, or of greater depth if indicated on the plans, of backfill in gravel surfaced street areas shall be compacted granular material conforming to the requirements of the South Dakota Department of Transportation, Division of Highways, Standard Specifications for Gravel Surfacing, unless otherwise shown on the Drawings or approved by the Engineer.

The top of the compacted backfill below asphalt surfaced street areas shall be held to the depth of the existing surface treatment, including base course, or twelve (12) inches below finished surface grade, whichever is the greater. The surfacing improvements shall be replaced in kind but no less than 3" in thickness, in accordance with the applicable provisions of these Specifications. Base course material for use in surfacing improvements shall conform to the requirements of the South Dakota Department of Transportation, Division of Highways, Standard Specification for Base Course.

3. Topsoil: The Contractor shall remove available topsoil from surface embankments and excavation backfill of trenches and around structures on the site of the work at the locations requiring topsoil. This topsoil shall be stockpiled separately and placed on the embankments and backfill after all construction across, over or above such embankments and backfill has been completed. The minimum total depth of topsoil shall be 6 inches or of greater depth as may be specified or indicated on the plans. If there is not adequate topsoil available from the site, the contractor shall provide an approved topsoil material in accordance with 3.04C above.

D. Compaction of Backfill:

1. General: Backfill shall be mechanically compacted by means of tamping rollers, sheepsfoot rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers.

All such equipment shall be of a size and type approved by the Engineer.

Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent ground, existing improvements, or improvements installed under the contract. The Contractor shall make his own determination in this regard.

Material for mechanically compacted backfill shall be placed in lifts which, prior to compaction, shall not exceed the thickness specified below for the various types of equipment:

a. Impact, free-fall, or "stomping" equipment - maximum lift thickness of three (3) feet.

b. Vibratory equipment, including vibratory plates, vibratory smooth-wheel rollers, and vibratory pneumatic-tired roller - maximum lift thickness of one (1) foot.

c. Rolling equipment including sheepsfoot (both vibratory and non-vibratory), grid, smooth-wheel (non-vibratory), pneumatic-tired (non-vibratory), and segmented wheels - maximum lift thickness of one (1) foot.

d. Hand-directed mechanical tampers - maximum lift thickness of four (4) inches.

A minimum of three (3) feet of backfill material shall be placed over the top of a pipe before operating vibratory, sheepsfoot, impact, free-fall or "stomping" type compaction equipment.

Mechanically compacted backfill shall be placed in horizontal layers of thickness (not exceeding those specified above) compatible to the material being placed and the type of equipment being used. Each layer shall be evenly spread, moistened (or dried, if necessary), and then tamped or rolled until the specified relative compaction has been attained.

Compaction adjacent to all manholes, catch basins, valve boxes, curb boxes, end of sewer services and similar structures shall be performed by the use of hand-directed mechanical tampers with lifts not exceeding that specified above.

2. Backfill in Unimproved Areas: Backfill in areas not containing surface improvements shall be compacted as specified in paragraph 3.05 D1, to a density at least equal to that of the surrounding soil.

3. Backfill in Areas Containing Surface Improvements or Future Surface Improvements: Backfill in areas containing surface improvements or designated for future surfacing shall be compacted as specified in paragraph 3.05 D1, except that

backfill material shall be placed in lifts not to exceed six (6) inches in loose depth. Each layer shall be uniformly compacted to a minimum of 95% of maximum dry density, as defined by ASTM D698, before successive lifts are placed. The backfill material shall be compacted at a moisture content of no less than four (4) percentage points below the optimum moisture content.

4. Backfill in Seeded and Sodded Areas: Backfill under lawns, seeded and sodded areas , pastures and cultivated sodded areas shall be compacted as specified in paragraph 3.05 D1 except that backfill material shall be placed in lifts not to exceed eight (8) inches in loose depth. Each layer shall be uniformly compacted to a density of the surrounding soil or to a minimum of 90% of maximum dry density, as defined by ASTM D698, whichever is the greater, before successive lifts are placed. The top six (6) inches of backfill shall be topsoil salvaged from the excavation material.

5. Trench Backfill Adjacent to Buildings shall also meet any special requirements of 3.06 of these Specifications.

6. Testing: Testing for backfill compaction and density shall be the responsibility of the Contractor through use of an approved independent testing laboratory.

E. Site Cleanup: Before final acceptance of the work, the Contractor shall clear the entire work site of equipment, unused materials, and rubbish so as to present a satisfactory clean and neat appearance. Agricultural areas shall be scarified with a farm type disc and smoothed out with an agriculture type drag. The final surface shall be smooth and free of rocks and debris.

3.06 Gravel Surfacing: Gravel surfacing on drives, parking lots, streets, and at other locations shown on the Drawings will be installed to the thickness and widths shown on the Drawings. The thickness of installation shall be compacted thickness. In no case shall the compacted thickness be less than 3 inches unless specifically called out on the Drawings.

IV. MEASUREMENT AND PAYMENT.

4.01 Excavation, Bedding, Backfilling and Incidentals: All excavation of every description; site preparation; sheeting and shoring; dewatering; bedding material from the excavation stockpile; backfilling; compaction; water for compaction; removal of trees and shrubs; moving and resetting fences, portable culverts and minor structures; grading; shaping; salvaging, stockpiling and placing topsoil; traffic control; site cleanup and other "incidentals" required to complete the work shall not be measured for payment separately, but shall be considered as a subsidiary obligation of the Contractor in the installation of pipe, structures, specials and other items of measurement, and the entire cost thereof shall be included in the Contract unit prices bid for furnishing and installing pipe, structures, specials or other items for which payment is established.

END OF SECTION 2A

DIVISION 2 - SITE WORK

EMERGENCY WELL REPLACEMENT - 2000
VOLGA, SOUTH DAKOTA
SECTION 2B - SITE UTILITIES

I. GENERAL.

1.01 Description: This section of the Specifications includes all potable water lines, hydrants, valves, fittings, appurtenant equipment and facilities, and all work incidental thereto, as shown on the Drawings and specified herein.

1.02 Related Work Specified Elsewhere: The following items of related work are specified and included in other sections of these Specifications.

Earthwork for Site Grading, Wells and Site Utilities
Water Supply Well
Concrete Work
Landscaping-Seeding

1.03 Shop Drawings: Shop drawings shall be submitted in accordance with "General Requirements": for the following items:

All pipe, fittings, valves, and valve boxes with dimensions, details and materials of construction.

II. PRODUCTS.

2.01 Pipe Materials:

A. General: Pipe furnished for installation on this project shall be of size and type shown on the Drawings. The pipe shall be manufactured from one of the materials designated for specified line and application as shown in the following Subsections.

B. Class 150, AWWA C-900 PVC Pipe: Polyvinyl chloride pressure pipe and fittings shall conform to the requirements of AWWA C-900-81 "Poly Vinyl Chloride (PVC) Pressure Pipe", Class 150 meeting the requirements of DR-18. Outside pipe diameter shall be the same as that of cast iron pipe of similar nominal size. Pipe materials shall conform to "Standard Specification for Rigid Poly (Vinyl Chloride) Compounds and Chlorinated Poly (Vinyl Chloride) Compounds" (ASTM D-1784). The pipe shall bear the National Sanitation Seal for potable water pipe. Provisions must be made for expansion and contraction at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a solid cross-section elastomeric ring which meets the requirements of ASTM 1869 and E-477. The bell section shall be designed to be at least as strong as the pipe wall. Each length of pipe, including integral bell, shall be pressure tested to four times the class pressure of the pipe for a minimum of five (5) seconds. Pipe and fittings must be assembled with a non-toxic lubricant. Standard lengths shall be 20 feet for all sizes. At least 85% of the total footage of pipe of any class and size shall be furnished in standard lengths, the remaining 15% in random lengths. Random lengths shall not be less than 10 feet long. Pipe may be furnished with separate couplings in lieu of integral bell in order to

achieve high deflection. Separate couplings shall pass a hydrostatic integrity test at the factory at four times the pressure class of the coupling for five seconds.

C. Pipe Fittings: All fittings for water pipe piping shall be ductile iron compact fittings conforming to the requirements of AWWA C-153 and ANSI Standards A21.53. All fittings shall be cement mortar lined conforming to AWWA C-104 and ANSI A21.4.

1. Push-on type joint or mechanical joint pipe fittings shall be furnished with a single rubber gasket conforming to AWWA C111 and ANSI A21.11. Special gaskets shall be provided if ASTM 2241 pressure Class 200 PVC watermain is used. Bolts for mechanical joints shall be ductile iron.

2. Flanged Fittings shall conform to ASA B16.1 Class 125. Bolts for flanged fittings shall be Corten steel.

3. Direct buried fittings shall be wrapped with polyethylene encasement conforming to the requirements of AWWA C105.

2.02 Valves:

A. Gate Valves: Gate valves shall be resilient wedge type designed for a minimum water working pressure of not less than 150 pounds per square inch. Gate valves shall conform to AWWA Standard C509. All gate valves shall be manual operated by 2-inch operating nut. Gate valves shall have a stationary stem and shall provide a smooth unobstructed waterway and shall be opened by turning counter clockwise. The operating nut shall have an arrow, cast in the metal, indicating the direction of opening. Each valve shall have the maker's monogram or initials, pressure rating and year of manufacture cast on the body. Valves shall be furnished with joints compatible with the pipe to which they are connected.

The seal plate shall be fitted with O-ring seals above and below the thrust collar. The modified wedge disc must be fully supported. The disc or wedge shall provide an angular mounting surface for the resilient rubber seat.

The valve interior and exterior shall be fully coated with a material approved for potable water in accordance with applicable AWWA Specifications. Each valve shall be tested for zero leakage past the seat at 200 psi and hydrostatically shell tested at 400 psi.

The valves and boxes shall be wrapped with polyethylene encasement conforming to AWWA C105.

The valves shall be American Flow Control; Mueller Resilient Seat Gate Valve A-2370-20; Kennedy Valve Div. of I.T.T. Grinnel Valve Co., Inc. or Engineer Approved equivalent.

B. Valve Boxes: Valve boxes for gate valves shall be two piece cast iron, buffalo type (screw), with a 5-1/4 inch shaft diameter. Valve box castings shall be hot coated inside and outside with a rust resisting coating. The bottom part of the box shall have a bell conforming to the perimeter of the valve. The valve box covers shall be extra deep and fit the valve box snugly to prevent rattles or tipping due to traffic. Covers shall be provided with slots for easy and quick removal and supplied with the word "WATER" cast into the lid for potable water lines.

2.03 Fire Hydrants: One Fire Hydrant will be furnished by the Owner for installation by the Contractor. The hydrant will be a single dry-barrel non-jacket type conforming to AWWA Standard C-502. Each hydrant shall be furnished with two 2-1/2 inch hose nozzles and one pumper connection. The thread patterns shall be compatible with Owner's fire fighting equipment. The hydrants shall be designed for a working pressure of 150 pounds per square inch and tested at 300 pounds per square inch hydrostatic test pressure. Working parts shall be bronze.

The main valve shall be compression type designed to close and open against main pressure. All operating parts, including the valve seat, shall be removable through the hydrant barrel with the hydrant in place. The operating threads shall be oil or grease lubricated. A safety flange shall be located near the ground line to prevent barrel breakage should the hydrant be struck by vehicles. Hydrants shall be connected to mains with 6-inch diameter pipe. Hydrants shall open counterclockwise and have No.6 square operating nut. Minimum cover from ground line to the top of the connecting pipe shall be 7 feet. Nozzle caps shall be furnished with No.6 square nut and be provided with chains attached to hydrants.

Hydrants shall be painted with one coat of primer and two finish coats of approved red paint. The buried portion of the hydrant shall be wrapped with polyethylene wrapping in accordance with AWWA C105.

Hydrants shall be Waterous, American Darling or Engineer Approved equivalent.

2.04 Transition Couplings: Transition couplings shall be of gasketed, sleeve type, with diameter to properly fit the new water pipe to the existing water pipe as shown on the drawings. The coupling shall consist of gray or ductile iron body with ductile iron flanges, two rubber-compounded wedge section gaskets and sufficient track head stainless steel bolts to properly compress the gaskets. The sleeve shall be wrapped on the exterior with polyethylene wrapping in accordance with AWWA C105.

III. INSTALLATION.

3.01 General: The contractor shall saw cut and remove surface improvements, excavate and trench, remove water, bed, backfill, and restore surface improvements in accordance with the requirements outlined in the provision for Earthwork for Site Utilities, pavements and walks and details shown on the Drawings.

At all times when work is not in progress all open ends of pipe and fittings shall be securely closed so that no trench water, earth or other substance will enter the pipe.

If the maximum width of the trench at the top of the pipe specified in the provision for Earthwork for Site Utilities is exceeded for any reason other than by direction of the Engineer, the Contractor shall, at his own cost, install such concrete encasement or granular embedment material as may be required to satisfactorily support the added backfill load.

3.02 Laying Pipe: The installation of water pipe shall conform to the applicable sections of the "AWWA PVC Pipe, Design and Installation, Manual of Water Supply Practices (AWWA No. M23), Uni-Bell Plastic Pipe Association and manufacturer's recommendations except as otherwise directed by the Engineer or noted herein.

No other pipe or material of any kind shall be placed inside a pipe or fitting. The interior of the pipe shall be thoroughly cleaned of foreign matter before being lowered into the trench, and shall be kept clean during laying operations by plugging or other approved methods. The full length of each section of pipe shall rest solidly upon the pipe bed with the recesses to accommodate bells and joints, shaped by hand. Pipe shall not be laid in water, or when a trench or weather conditions are unsuitable for work. Water shall be kept from the trench until the joints have been completed in a satisfactory manner.

3.03 Blocking: Fittings at bends in the pipeline shall be firmly wedged against the vertical face of the trench and blocked with concrete as detailed on the Drawings or as directed by the Engineer.

3.04 Cutting Pipe: Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe. Cutting shall be done by means of an approved type of mechanical cutter.

3.05 Couplings and Fittings: Pipe, couplings and fittings shall be handled and installed in accordance with the recommendations of the pipe manufacturer.

3.06 Jointing: The type of joint used shall conform to the requirement for the applicable type of pipe. Jointing operations shall be carried out in strict adherence with the manufacturer's recommendations. When joining PVC pipe to cast iron fittings, the bevel on the PVC shall be made the same as the bevel required for the cast iron fitting (normally shorter and steeper than factory pipe bevel). When joining to mechanical joint fittings, there shall be no pipe bevel.

3.07 Joint Restraints: Joint Restraints shall be installed on the pressure pipe fittings and valves at the locations shown on the Drawings.

3.08 Future Connections: Pipe ends left for future connections shall be valved, plugged, or capped and anchored as shown on the Drawings or as directed by the Engineer.

3.09 Concrete Cradles: The pipe shall be supported on concrete cradles where directed by the Engineer. The concrete shall meet, as a minimum, the requirements for Fill Concrete as outlined in Division 3 of these Specifications.

3.10 Setting Valves, Valve Boxes and Fire Hydrants: Valves, valve boxes and fire hydrants shall be installed where shown on the Plans and as directed by the Engineer in accordance with AWWA Standard C-600 except as further specified herein. Valve boxes shall be centered on the valves. Earth fill shall be carefully tamped around each valve box to a distance of four (4) feet. Fire hydrants shall be set at such elevations that the connecting pipe will not have less cover than the distributing mains. The hydrant shall be set upon a slab of stone or concrete not less than four (4) inches thick and not less than fifteen (15) inches square. The back of the hydrant, opposite the pipe connection, shall be firmly wedged against the vertical face of the trench to prevent the hydrant from blowing off the line. If the character of the soil is such that in the opinion of the Engineer the hydrant cannot be securely wedged, bridle rods and rod collars of not less than 3/4 inch stock protected by a coat of acid-resisting paint shall be used. Not less than seven (7) cubic feet of broken stone or coarse gravel shall be placed around the base of the hydrant to insure drainage. The backfill around hydrants shall be thoroughly compacted to the grade line in accordance with Section 2A of these Specifications. Hydrants and valves shall have the interiors cleaned of all foreign matter before installation. Stuffing boxes shall be tightened and the hydrant or valves shall be inspected in opened and closed positions to insure that all parts are in working condition. Valve boxes located in roads or sidewalks shall be protected by a concrete slab in accordance with the details shown on the Drawings. All underground ductile iron and cast iron valves, fittings and fire hydrant bodies shall be installed with polyethylene wrap protection installed in accordance with AWWA Standard C-105.

3.11 Disinfection: Each unit of completed potable water line shall be disinfected with chlorine and tested for bacteriological quality before acceptance for domestic operation.

A. Method: Disinfection shall be completed in accordance with American Water Works Association Standard C651, Tablet Method for Disinfecting Watermains.

The Tablet Method consists of placing both calcium hypo-chlorite granules and tablets in the watermain as it is being installed and filling the main with potable water when installation is completed.

The Tablet Method shall give an average chlorine dose of 25 mg/l.

1. Placing of Calcium Hypochlorite Granules: During construction, calcium hypochlorite granules shall be placed at the upstream end of the first section of pipe, at the upstream end of each branch main, and at 500-foot intervals. The quantity of granules shall be as shown in the following table:

TABLE OF
OUNCES OF CALCIUM HYPOCHLORITE GRANULES TO BE PLACED
AT BEGINNING OF MAIN AND AT EACH 500-FOOT INTERVAL

Pipe Diameter (Inches)	Calcium Hypochlorite Granules (Ounces)
4	0.5
6	1.0
8	2.0
12	4.0
16 and larger	8.0

2. Placing of Calcium Hypochlorite Tablets: During construction, 5 gram calcium hypochlorite tablets shall be placed in each section of pipe and also one such tablet shall be placed in each hydrant, hydrant branch, and other appurtenances. The number of 5 gram tablets required for each pipe section shall be $0.0012\ d^2L$ rounded to the next highest integer, where d is the inside pipe diameter, in inches, and L is the length of the pipe section, in feet. The following table shows the number of 5 gram tablets required for commonly used sizes of pipes:

TABLE OF
NUMBER OF 5-GRAM CALCIUM HYPOCHLORITE TABLETS
REQUIRED FOR DOSE OF 25 MG/L*

Pipe Diameter (Inches)	Length of Pipe Section				
	13 or Less	18	20	30	40
	Number of 5-gram Hypochlorite Tablets				
4	1	1	1	1	1
6	1	1	1	2	2
8	1	2	2	3	4
10	2	3	3	4	5
12	3	4	4	6	7
16	4	6	7	10	13

*Based on 3.25 grams available chlorine per tablet.

The tablets shall be attached by an adhesive Permatix* or equal. There shall be no adhesive on the tablet except on the broad side attached to the surface of the pipe.

Attach all tablets inside and at the top of the main, with approximately equal numbers of tablets at each end of a given pipe length.

3. Filling and Contact: When installation has been completed, the main shall be filled with water at a rate such that water within the main will flow at a velocity no greater than 1 foot per second. This water shall remain in the pipe for at least 24 hours. If the water temperature is less than 41°F, the water shall remain in the pipe for at least 48 hours. Valves shall be positioned so that the strong chlorine solution in the treated main will not flow into water mains in active service.

B. Final Flushing:

1. Clearing the Main of Heavily Chlorinated Water: After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the system or is acceptable for domestic use.

2. Disposing of Heavily Chlorinated Water: The environment to which the chlorinated water is to be discharged (including point of storm sewer discharge) shall be inspected. If there is any question that the chlorinated discharge will cause damage to the environment, including creeks, streams, ponds or lakes that support aquatic life, then a reducing agent shall be applied to the water to be wasted to neutralize thoroughly the chlorine residual remaining in the water.

C. Bacteriological Tests: After final flushing and before the watermain is placed in service, a sample or samples shall be collected from the end of the line and shall be tested for bacteriological quality in accordance with "Standard Methods for the Examination of Water and Wastewater", and shall show the absence of Coliform organisms.

D. Re-disinfection: If the initial disinfection fails to produce satisfactory bacteriological samples, the main may be re-flushed and shall be resampled. If check samples show the presence of Coliform organisms, then the main shall be re-chlorinated by the Continuous Feed Method or Slug Method in accordance with AWWA.

E. Alternate Methods: The Contractor may, at his option, use either the Continuous Feed or Slug Method in lieu of the specified Tablet Method. The procedures for the alternate methods are described in AWWA C651 Sections 5.2 and 5.3.

It should be noted that the specified Tablet Method shall be used only if the pipes and appurtenances are kept clean and dry during construction.

3.13 Hydrostatic Testing for Water Lines:

1. General: It is the intent of this Specification that all joints in piping be watertight and that all joints which are found either by observation or any specified test to leak shall be made watertight by the Contractor. The watermain shall be tested in accordance with AWWA C-600 or as specified herein.

2. Pressure Test: After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 x the working pressure at the point of testing.

a. Test Pressure Restrictions: Test pressures shall

- Not be less than 150% x the working pressure at the highest point along the test section.
- Not exceed pipe or thrust restraint design pressures.
- Be of at least 2 hour duration.
- Not vary by more than± 5 psi.
- Not exceed twice the rated pressure of the valves or hydrants when the pressure boundary of the test section includes closed gate valves or hydrants.
- Not exceed the rated pressure of the valves if resilient-seated butterfly valves are used. (150 psi).

b. Pressurization: Each valved section of pipe shall be filled with water slowly and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gage, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer.

c. Air Removal: Before applying the specified test pressure, air shall be expelled completely from the pipe, valves and hydrants. If permanent air vents are not located at all high points, the Contractor shall install corporation stops at such points so that air can be expelled as the line is filled with water. After all the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be left in-place.

d. Examination: All exposed pipe, fittings, valves, hydrants and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves or hydrants that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated until it is satisfactory to the Engineer.

3. Leakage Test:

a. General: A leakage test shall be conducted concurrently with the pressure test.

Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.

b. Allowable Leakage: No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{ND(P)^{1/2}}{7400}$$

Where

L = The allowable leakage in gallons per hours.
N = The number of pipe joints.
D = The nominal pipe diameter in inches.
P = The average test pressure during the leakage test in psi gage.

When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gallon per hour per inch of nominal valve size shall be allowed.

When hydrants are in the test section, the test shall be made against the closed hydrant.

c. Acceptance of Installation: Acceptance shall be determined on the basis of allowable leakage. If any test of pipe disclosed leakage greater than that specified in paragraph 3.b. "Allowable Leakage", above, the Contractor shall, at his expense, locate and repair the defective material until the leakage is within the specified allowance.

All visible leaks are to be repaired regardless of the amount of leakage.

3.14 Maintaining Water Service: During the replacement of existing watermains and installation of new watermains the water service shall be maintained during construction, except for brief shutdowns to connect into existing watermains. The shutdowns for "cut-in" shall be during low demand periods and adequate notice shall be given to the affected water consumers. During the replacement of an existing watermain, the Contractor shall supply water to the consumers by a temporary above ground piping system. The necessary pipe, fitting, valves etc. required for the temporary water services shall be considered incidental to the Watermain Pipe and Pipe Fittings and will not be measured for payment separately.

3.15 Abandonment & Removal of Existing Watermain: Watermain, fire hydrants, water services, valves, etc. shall be abandoned or removed as indicated on the plans.

3.16 Clean-Up: Upon completion of the work the Contractor shall remove all surplus construction materials and debris resulting from the work, and all areas of work shall be left in an orderly manner.

IV. MEASUREMENT AND PAYMENT.

4.01 General: All measurements and payments will be based on completed work performed in strict accordance with the Drawings and Specifications and the respective prices and payment shall constitute full compensation for all work completed, including incidentals. No separate payment will be made for excavation, trenching, dewatering, backfilling, utility identification, seeding and sodding for items of work covered under this section of the Specifications and all such costs pertinent to these items shall be included in the applicable unit prices therefore.

4.02 Watermain Pipe: Polyvinyl-chloride pipe for watermain shall be measured in lineal feet along the centerline of the pipe without deducting for fittings or valves for the various sizes of watermain satisfactorily installed. Payment shall be made at the Contract unit price per lineal foot for "PVC Watermain", as stipulated in the Bid for the various sizes and types shown, which price and payment shall be full compensation for all labor, materials, tools, and equipment for furnishing and installing the pipe, including hauling, handling, excavation, laying, jointing, dewatering, backfilling, compaction, removal and replacement of fences and culverts, protection and adjustment of utilities and landscaping which may be encountered by the work, disinfection, disposal of excess excavation, clean-up, seeding or sodding, and testing of the finished pipeline in accordance with these Drawings and Specifications.

4.03 Watermain Pipe Specials and Fittings: Watermain pipe specials and fittings shall be measured by the number of each kind and size actually installed. Payment shall be made at the Contract unit price each for specials and fittings of the various kind and size as stipulated in the Bid, which price and payment shall be full compensation for all labor, tools, equipment and materials for furnishing and installation of the items including handling, excavation, jointing, dewatering, backfilling, testing and disinfection, all in accordance with the Plans and Specifications.

4.04 Gate Valves: Gate valves and boxes shall be measured by the number of each size actually installed. Payment shall be made at the Contract unit price for each "Gate Valve and Box" of various sizes as stipulated in the Bid, which price and payment shall be full compensation for all labor, tools, equipment and materials for furnishing and installation of the items including handling, excavation, jointing, dewatering, backfilling, compaction, testing and disinfection, all in accordance with these Specifications and the Drawings.

4.05 Joint Restraints: Mechanical joint restraints shall be measured by the number of each kind and size actually installed. Payment shall be made at the Contract unit price for "Mechanical Joint Restraint" of the various sizes as stipulated in the Bid which price and payment shall be full compensation for all labor, tools, equipment and materials for furnishing and installation of the items including handling, excavation, jointing, dewatering, backfilling, compaction, testing, clean-up and incidentals all in accordance with the Drawings and Specifications.

4.06 Fire Hydrants: Fire hydrants shall be measured by the number actually installed. Payment shall be made at the Contract unit price for each "Fire Hydrant" as stipulated in the Bid, which price and payment shall be full compensation for all labor, tools, equipment and materials for installation of the fire hydrant supplied by the Owner including handling, excavation, jointing, dewatering, drainage rock, backfilling, compaction, testing and disinfection, all in accordance with these Specifications and the Drawings.

END OF SECTION 2B

DIVISION 2 - SITE WORK

EMERGENCY WELL REPLACEMENT - 2000
VOLGA, SOUTH DAKOTA
SECTION 2C - WATER SUPPLY WELL

I. GENERAL.

1.01 Scope: These Specifications are intended to provide the information necessary for all parties concerned with the contract to know the nature and amount of equipment, materials and work required to successfully complete one (1) 200 gpm water well in accordance with the South Dakota Well Construction Standards (ARSD 74:02:04).

These Specifications are in accordance with the American Water Works Association Standard for Deep Wells (AWWA A100). These Specifications are intended to supplement or modify the standards to fit the needs or expected conditions. Also, for more detailed description of the work to be performed, reference is made to a particular section of the AWWA Standard.

1.02 Location: The proposed water supply well to be constructed under these Specifications is a replacement for existing Well #7 and will be constructed within approximately 50 feet of the existing well. The well site is located one mile west of Volga and approximately three quarters mile south of Highway 14. The more exact location is shown on the Location Map, Sheet No. 1 of the Drawings.

1.03 Location Conditions: The Contractor shall satisfy himself regarding all local conditions affecting his work by personal investigation. Neither the site information contained in these Specifications nor that derived from maps or plans or from the Owner or his agents or employees shall act to relieve the Contractor from any responsibility hereunder from fulfilling any and all of the terms and requirements of his contract.

The Contractor shall make arrangements with the Owner for water required for drilling of the wells. Contractor is responsible for temporary piping, fittings, etc.

1.04 Personnel and Drilling Equipment: The Contractor shall supply capable and experienced personnel and suitable drilling equipment to perform this work. Each bidder shall supply a list along with his bid which shows:

A. Experience record of Contractor on wells of similar depth and capacity.

B. Name and experience record of person or persons likely to serve as construction superintendent.

C. Manufacturer's name and model number of drilling machine or machines to be used. This includes mud pump and power unit and other pertinent equipment.

Adequate safety equipment, i.e., hard hats, hard toed shoes, and gloves shall be used by the drilling crew while on the job site.

Drilling method used shall be one of the following; forward rotary, reverse rotary, forced caisson, or boring with an auger bucket.

1.05 Permits: The Owner shall apply for and acquire permits from authorized agencies, as required.

1.06 Mobilization and Demobilization: This item in the bid schedule includes moving onto and off the site all the materials and equipment for constructing and developing the well. It also includes cleaning up the site upon completion of the contract. Mobilization and demobilization will be paid only once for the completion of the well.

II. PRODUCTS.

2.01 Monitoring Well: The existing 12" well will be converted to a monitoring well. The pitless adapter unit shall be removed and steel casing installed to bring the well screen to an elevation 2 feet above grade at the well. The steel well casing extension shall be fitted with a removable cap at the top. The cap shall be changed to the casing and shall have provisions for locking using a padlock to be furnished by the Owner.

2.02 Well Casings: All well casings shall be new. They shall be of steel and shall conform to AWWA-A100. The well casing may not be mill reject. The casing shall be joined by either (1) welding in accordance with the Standards of the American Welding Society or (2) threaded and coupled joints.

A. Production Casing - This casing shall have an external diameter of 12.75 inches, wall thickness of not less than 0.562 inch, and a weight of 73.22 lbs. per foot.

B. The Contractor shall deliver two copies of the mill certificate to the Engineer for approval before delivering the casing to the job site.

2.03 Cement Grout: A mixture of Portland cement (ASTM C150) and not more than 6 gallons water per bag (one cubic foot or 94 lbs.) of cement. The water used shall be fresh, clear and potable.

2.04 Well Screen:

A. Material and aperture opening. The well screen and its fittings shall be manufactured entirely of Type 304 stainless steel. The well screen aperture opening shall be determined by the well screen manufacturer. It shall have sufficient open area to transmit the desired yield of 200 gpm at an aperture entrance velocity equal or less than 0.1 feet per second.

B. The well screen shall be of the continuous slot, wire wound type. It shall have a minimum inside diameter of 12 inches. Intermediate screen sections shall be

joined by welded connections. The welding rod shall be of material suitable for joining stainless steel in order not to reduce the corrosion resistance. The rod selected must be approved by the Engineer.

C. The bottom of the screen shall be fitted with a closed bail bottom of the same connecting material as the screen.

D. Well screen shall be similar and equal to Johnson Well Screen Watermark.

2.05 Gravel Pack Material: The gravel to be used for the gravel wall around the screen and casing shall be well-rounded particles containing not less than 95% siliceous material with not more than 5% calcareous materials. The gravel shall be washed and screened to required sizes for maximum aquifer development. Gravel shall be as produced by Northern Sand and Gravel of Muscatine, Iowa, or Eau Claire Sand and Gravel of Eau Claire, Wisconsin. The gravel size and samples shall be submitted to the Engineer along with certified tests prior to installation. Additional samples shall be selected by the Engineer during installation of the gravel wall. All gravel shall be furnished in bags properly labeled.

A. The grading of the gravel pack shall be selected by the screen manufacturer.

B. The gravel shall be delivered to the job site in 100 lb. bags.

2.06 Pitless Adapter Unit and Drop Tube: The pitless adapter unit and column pipe from existing well #7 shall be removed from Well #7 and re-installed in the replacement well.

The pitless adapter unit is a Maas pitless adapter.

2.07 Air Release Valve, Meter and Manhole: The discharge from the replacement will shall be connected to the piping leading into the existing valve and meter manhole. The general arrangement of the piping shall be as shown in the drawings. Existing meter and pressure gage equipment will remain in service.

2.08 Well Pump and Control Work:

A. Scope: The work to be done under this section of the Specifications includes all transportation, labor, tools, supplies, and equipment for removing the pump from the existing Well #7 and installation of the pump and motor driven into the new well.

1. Power Cable: The power cable for the well pump shall be brought to a junction box for connection of necessary extension wiring to permit re-use of the existing motor starters and controls for the well. The existing power cable to the motor is impervious to moisture in addition to having high abrasion resistance. The cable is protected with a steel guard where it passes by the bowl assembly to prevent damage from contact with the well casing. Stainless

steel cable clamps shall be provided to support the cable along the column pipe. The cable size shall be No.4 copper. Power cable shall be a 4 wire cable with ground.

2. Low-Level Cutoff: Probe type low-level controllers shall be removed from the existing well and re-installed in the new well by the Contractor (Well Contractor). The probe cables shall be attached to the column pipe and insulated from the pipe to assure proper operation.

3. Drawdown Gauge: Plastic tubing shall be furnished and installed with the pump as a means of determining water level. End the tubing slightly above the bowl. A drawdown gauge shall be furnished and attached to the pitless adapter. Minimum diameter of the drawdown tube shall be 3/4" to allow insertion of well level probe.

4. Check/Foot Valve: A 6-inch check valve is included in the existing well. The valve shall be re-installed in the replacement well. The check valve shall have threaded connections and shall be Flowmatic or equivalent.

III. EXECUTION.

3.01 Monitoring Wells, Test Holes and Obtaining Samples: The existing well will be converted to a monitoring well by adding steel casing in the place of the pitless adapter unit. A rotary drilled pilot hole shall be drilled to obtain a formation sample for the location of the replacement well.

An accurate driller's log of materials penetrated shall be recorded by the driller who must have the skills to determine the depths and thicknesses of the various underlying strata encountered.

A. Formation samples from the rotary drilled pilot hole shall be collected and handled in accordance with Bulletin 638-S, "Instructions for Taking Formation Samples", published by UOP-Johnson Division.

B. Water samples should be collected as outlined in "Standard Methods for the Examination of Water and Wastewater" (17th Edition 1989), published jointly by APHA, AWWA and WPCF.

C. It is the Contractor's sole responsibility to secure, protect and deliver all formation and water samples collected from the test holes to the Engineer.

3.02 TESTING OF FORMATION AND WATER SAMPLES:

A. All samples will be sent to an approved laboratory whereby the following tests will be conducted.

1. Formation Samples: The Contractor shall pay all costs associated with sampling and testing the formation.

a. Sieve analysis using five or more standard sieves.

b. Determination of effective size, uniformity coefficient and model size.

c. Percent clay.

d. Permeability.

2. Water Samples: The Owner will pay for testing the water samples.

a. Percent sand (as ppm after 15 minutes of pumping at a designated rate).

b. Chemical analysis including:

(1) Total dissolved solids
(2) Total hardness
(3) Calcium Hardness
(4) Total iron
(5) Total manganese
(6) Chlorides
(7) Nitrates
(8) Total alkalinity
(9) Hydrogen sulfide
(10) Sulfates
(11) pH
(12) Langelier Stability index

c. Temperature and pH of water when pumped shall be measured by the driller and recorded on sample.

3.03 Construction of the Well:

A. General: The Contractor shall drill the wells at the locations designated by the Engineer. The Contractor shall drill the hole and install the materials previously described in order that the finished wells shall conform to the design illustrated in the Drawings and any applicable standards established by local, state or federal regulatory agencies. The mud pits shall be positioned at least 6 feet from the proposed finished base slab.

The Contractor shall dispose of cuttings and discharged water in a manner prescribed by the Engineer so as not to create damage to public or private property. During the test pumping, however, the water discharged shall be piped to a point of overland drainage.

B. Drilling - Casing Hole: The Contractor shall drill a 20-inch diameter hole to accommodate the 12" steel casing and screen to the depths shown on the Drawings. If the depths are adjusted because of underground conditions at the site, payment will be on the basis of unit price per lineal foot of the hole drilled.

C. Setting Steel Casing and Screen: The full diameter screen shall be fastened to the casing by welding procedures conforming to the practice of the American Welding Society. The top of the steel casing shall terminate approximately 6 feet below natural ground level where a 12-inch O.D. pitless adapter unit shall be welded to the well casing.

The casing and screen shall be centered in the hole such that a minimum of 3 inches exists between the face of the hole and the casing. Centering guides shall be so spaced around and along the pipe to insure adequate clearance for the gravel pack and cementing operation.

1. After the casing and screen have been lowered into position and before gravel pack operations begin, the casing and screen shall be tested for plumbness and alignment. This test shall be made in accordance with Sec. 8, "Testing for Plumbness and Alignment", of the AWWA Standard A100. Should the casing fail to meet the requirements and interfere with the installation and/or operation of the pumping equipment, the plumbness and/or alignment shall be corrected by the Contractor at his own expense.

D. Gravel Packing: The gravel pack shall be introduced in such a manner that it is readily known (with 10% accuracy) how much volume of gravel is in the hole. It shall be placed in a manner uniform and continuous such that hydraulic segregation and bridging are minimized or eliminated.

1. The gravel shall be placed via gravity through two tremie pipes. These tremie pipes shall be located 180° apart in the annular space around the screen and inner casing. They shall terminate no more than 5 feet above the bottom of the hole or level of the gravel pack already placed in the hole. They shall be gradually lifted and sections removed as the level of gravel placed in the hole rises. Funnel fittings at the tops of the tremie pipes shall be used to facilitate the shoveling of the gravel into the tremie. Clean water shall be used to lubricate the downward movement of the gravel in the tremie pipes - usually from 1 to 3 gpm.

2. Five pounds of calcium hypochlorite (65% available chlorine) per cubic yard will be mixed in with and placed with the gravel. The gravel pack will be placed until it is 14' below natural ground surface. The rest of the annular space will be sealed with cement grout.

E. Grouting: Grouting of the steel casing shall be accomplished in the presence of the Engineer. It shall be grouted in one continuous operation, filling the annular space between the drilled hole and the casing to the land surface. A 1-foot clay plug or seal shall be placed on top of the gravel pack at the indicated level prior to placing the cement grout.

1. The grout shall be placed in the annular space between the drilled hole and casing by use of a grout pipe outside the casing. (AWWA Standard Section 7). The pipe shall extend to the bottom of the annular space initially and should remain submerged in grout during the entire time that grout is being placed.

The pipe may be left in place, or it may be gradually removed. In the event of interruption of the grouting operations, the bottom of the pipe shall be raised above the grout level and should not be resubmerged until all air and water have been displaced from the grout pipe. The grout may be pumped into the pipe or applied continuously by gravity. The grout returning to the surface shall be wasted until the Engineer determines that the grouting has been satisfactory.

1. No further work shall be done on the well until the grout has firmly set. (A minimum of 72 hours for neat cement and 24 hours for quick-setting cement).

3.04 Developing the Well:

A. The development process shall be accomplished by simultaneous high velocity, horizontal-jetting and pumping. The O.D. of the jetting tool shall be one inch less in diameter than the screen I.D. The minimum exit velocity of the jetting fluid at the jet nozzle shall be 150 ft/sec. The tool shall be rotated at a speed less than 1 rpm. It

shall be positioned at one horizon for not less than two minutes and then shall be moved to the next horizon which shall be no more than 6 inches vertically from the previous jetting horizon. The jetting shall proceed from the bottom of the screen to the top. Pumping from the well shall be at a rate from 5% to 15% more than that introduced through the jetting tool. Water to be used for jetting must be free of sand, turbidity and Coliform bacteria.

1. Means shall be provided for removal of sand jetted into the screen and which settles to the bottom and which is not being removed by the installed pumping equipment.

B. In conjunction with high velocity, horizontal-jetting and pumping the well shall be surged using a test pump capable of pumping 150% of the design yield. The surging action shall consist of alternately lifting a column of water to ground level and letting the water fall back in the well. The above process is known as raw-hiding the well. Any sand damage to the pump is the responsibility of the Contractor.

C. The development shall continue until the Engineer decides further development is unnecessary.

3.05 Testing the Wells:

A. Test Pump and Accessory Equipment: The Contractor shall furnish and install a test pump into each production well. The test pump shall be a vertical turbine with sufficient column and shaft to allow for testing the well to 100 percent drawdown if requested. The test pump shall be operated from a diesel engine or electric unit with variable speed drives and of sufficient size to vary pumping rate from 100 gpm to 300 gpm. When the final test is initiated, it shall be conducted continuously without stoppage. The discharge from the pump shall be equipped with sufficient effluent pipe to carry the water away from the test area (minimum length of 500 feet) and shall be equipped with an orifice meter or other acceptable measuring device to observe the rate of discharge from the pump accurately.

1. A drawdown measuring tube of metal or plastic shall extend from the base of the pump discharge head to a depth no greater than 2 feet above the pump bowls. This tube shall permit the entry and use of a water level measuring device such as an electric sounder or a steel tape.

B. Pump Test: The well will be test pumped for a period of 24 hours at a constant rate of 200 gpm. The discharge of the test pump will be measured via a circular orifice meter and the water level measured with a suitable measuring device to the nearest 1/4 inch. Measurements of the yield and water level will be made every minute for the first 10 minutes of the test, every 5 minutes for the next 90 minutes and then every 15 minutes until 3 hours have passed. Measurements between 3 and

5 hours should be made 30 minutes apart and then after 5 hours and until the end of the test they can be made hourly. A one-gallon water sample shall be obtained within 20 minutes after starting the pump and then about 5 minutes before shutting the pump down. After the pump is shut down, recovery measurements of the water level should be made for a period equal to at least one-half of the pumping period or until the water level has reached the original static level. The schedule of the recovery measurements shall be made at the same time intervals that the measurements were made during the pumping portion of the test.

3.06 Installation of Pitless Adapter: After the well has been developed and the pump test completed, the Contractor will excavate and cut off the 12" casing at the elevation required to install the 7-foot bury 12-inch diameter pitless adapter. The pitless adapter shall be connected to the 12" steel well casing by welding.

3.07 Disinfecting the Well: The well shall be disinfected before removing the test pump from the well and before collecting any samples for determining microbiological quality. This shall be done by introducing a chlorine solution into the well such that a concentration of at least 50 ppm of available chlorine exists in all parts of the well at static conditions. The chlorine solution should be introduced into the well in such a manner that the well surfaces above the static level will be completely flushed with the solution. A minimum of 2 hours contact time should be provided before pumping the well to waste. No separate payment shall be made for this work. Disinfection of the well shall be considered subsidiary to this section of the Specifications. At all times the Contractor shall use all reasonable measures to prevent either tampering with the well or the entrance of foreign matter into it. The Contractor shall be responsible for any objectionable material that may fall into the well and its consequences until the completion and acceptance of the work by the Engineer.

3.08 Records:

A. Two copies of the driller's log, signed and dated by the well driller will be given to the Engineer. The log will record the materials penetrated to the nearest foot.

B. All static water level measurements will be recorded. This record along with the times that the measurements were made, will be given to the Engineer.

C. A complete casing and screen location record will be made by the driller and given to the Engineer. This will show the individual length of sections of casing and screen and the location of packers, plugs and seals.

D. Pumping test data will be supplied to the Engineer from all pumping tests conducted on the well. These will show dates, water levels, discharge rates and times of stopping and starting the pump.

3.09 Placing Pump in Service: The Contractor shall be responsible for having an experienced person on the site to supervise the installation of the pump and accessories.

Installation shall include the placement and attachment of the low-level cutoff probes. The probes shall be installed so that the low-level cutoff will stop the pump when the water level is 1 foot above the intake. Pump restart shall be permitted when the water level is at least 3 feet above the pump intake.

The pitless adapter unit for the submersible pump shall be installed by the well Contractor. The Contractor shall remove the pitless adapter, set the pump in place, screw the column pipe to the adapter and set the entire unit into place sealing the adapter.

All electrical connections between pump and electrical conductors shall be made at the Well to the starter and control panel.

Prior to installation of the permanent pump in the well, the pump motor, column pipe, pump bowls, tubing, probes, electrical cable and all other components to be placed in the well shall be thoroughly swabbed in a chlorine solution of not less than 50 ppm concentration for disinfection purposes.

3.10 Site Restoration and Finish Grading: Portland cement concrete used in constructing the well slab shall be in full accordance with DIVISION 3 - CONCRETE of these Specifications. Concrete shall have a minimum 28-day compressive strength of 4000 psi.

All areas disturbed in the construction of the wells shall be restored to the grades shown on the Drawings or original grade. Temporary construction access roads necessary for equipment shall be removed by the Contractor at the conclusion of the project and restored to the same grade as before construction.

All areas disturbed in the construction of the well shall be graded to provide proper drainage and a neat appearance. The top six inches of all disturbed areas shall be topsoiled and reseeded as directed by the Engineer, which work shall not be a pay item but shall be considered as subsidiary to this section of the Specifications. The Contractor shall provide fill material as necessary, properly graded and compacted to 95% of maximum density and finished to final established elevations as shown on the Drawings. Grading shall conform with Section 2A of these Specifications. The gravel surfacing shall be placed to a depth of approximately 6 inches.

3.11 Electrical and Controls: The Owner shall furnish and install the direct buried conductors, junction manholes and appurtenances, as shown on the Drawings. Contractor shall compact around the buried power and control cables in order to prevent rodent damage to cables. Contractor shall take care not to damage the cables during installation, including compaction.

IV. MEASUREMENT AND PAYMENT:

4.01 Mobilization and Demobilization: The mobilization and demobilization of all equipment, tools, materials and manpower to the well site for the City of Volga from the Contractor's offices and locally at the site as required to complete the drilling of the well shall be paid for at the Contract lump sum price for "Mobilization and Demobilization" as stipulated in the Bid, which price and payment shall be full compensation for mobilization and demobilization of all equipment, tools, material and manpower to complete the well.

4.02 Drilling Test Holes: The drilling of the formation test holes shall be measured by the number of lineal feet of test holes actually drilled to designated bottoms. No other measurement for payment shall be authorized under this item.

The drilling of the formation test hole shall be paid for at the contract unit price per linear foot for "Test Hole" as stipulated in the Bid, which price and payment shall be full compensation for all transportation, labor, tools, equipment, materials, supplies, plant and other necessary items required to drill the test holes, logging and sampling of each strata of the formation, filling abandoned test holes, clean-up and other appurtenances required to complete the work under this section.

4.03 Drilling Permanent Well: The drilling of the well shall be measured in lineal feet of depth which shall be the total depth of the permanent casing plus screen. Payment shall be made at the Contract unit cost per lineal foot for "Drilling Permanent Well", as stipulated in the Bid which price and payment shall be full compensation for all transportation, labor, tools, supplies, materials and equipment required to construct the well hole, including the pilot hole, logging, sampling of each strata of the formation, filling abandoned pilot holes, drilling for both the permanent casing and the screen, cleanup and all other pertinent work required to complete the hole.

4.04 Permanent Casing: The permanent casing installed in the well shall be measured by the actual length in feet of casing furnished and installed. Payment shall be made at the Contract unit price per lineal foot for "12-Inch O.D. Permanent Casing", as stipulated in the Bid, which price and payment shall be full compensation for all transportation, labor, tools, materials, supplies and equipment required to furnish and install the casing in its final location.

4.05 Well Screen: The well screen installed in the well shall be measured by the actual length in feet of screen furnished and installed, measured from and including the bail bottom to the top of the connection to the casing. Payment shall be made at the Contract unit price per lineal foot for "12-Inch PS Well Screen", as stipulated in the Bid which price and payment shall include all transportation, labor, tools, material, supplies and equipment required to satisfactorily install the well screen to its final location.

4.06 Selected Silica Gravel Pack: The selected silica gravel used for the gravel wall around the well screen and casing shall be measured in lineal feet of annular space for the total length of selected silica gravel wall. Payment shall be made at the Contract unit price per lineal foot for "Selected Silica Gravel Pack", as stipulated in the Bid which price and payment shall be full compensation for all transportation, labor, tools, material and equipment required to construct the selected silica gravel pack in a satisfactory manner.

4.07 Clay Plug Seal: The clay material used for the clay plug seal around the well casing shall be measured in linear feet of annular space for the total length of clay plug seal. Payment shall be made at the Contract unit price per linear foot for "Clay Plug Seal", as stipulated in the Bid which price and payment shall be full compensation for all transportation, labor, tools, material and equipment required to construct the clay plug seal in a satisfactory manner.

4.08 Concrete Grout Seal: The concrete grout used for seal around the well casing shall be measured in lineal feet of depth of seal. Payment shall be made at the Contract unit price per lineal foot for "Concrete Grout Seal", as stipulated in the Bid which price and payment shall be full compensation for all transportation, labor, tools, materials and equipment required to construct the concrete grout seal in a satisfactory manner.

4.09 Development of Permanent Well: Complete development of the well shall be measured by the complete item to produce a clear and sand-free effluent from the well. Payment shall be made at the Contract unit price per hour for "Development of Permanent Well", based on actual pump operation time, as stipulated in the Bid, which price and payment shall be full compensation for all transportation, labor, tools, materials and equipment required to develop the well in a satisfactory manner, including surging, backwashing, installation and removal of test pump, disinfecting the well, clean-up and other appurtenances required to complete the work.

4.10 Test Pumping: The actual production pumping test shall be measured by the actual number of hours of continuous operation of the pump performed under the test. An unauthorized interruption of the pumping test shall nullify the test up to the time of interruption and no payment shall be made therefore.

The production pumping test shall be paid for at the Contract unit price per hour for "Test Pumping", based on actual pump operation time performed without interruption for the period of time as stipulated in the Bid, which price and payment shall be full compensation for furnishing labor, materials, supplies, tools and equipment to perform the test pumping, record drawdown and discharge readings during the pumping test, water sampling, record recovery readings and other pertinent work required to complete the testing in a satisfactory manner.

4.11 Pitless Adapter Unit: The pitless adapter unit from existing Well #7 shall be removed from the existing well and installed in the replacement well. The removal and installation of the pitless adapter unit shall be measured as a complete unit of work actually furnished and installed as shown for on the detailed drawings. Payment shall be made at the Contract unit price for "Remove and Re-install. Pitless Adapter Unit", as stipulated in the Bid, which price and payment shall be full compensation for all transportation, labor, tools, materials, supplies and equipment required to furnish and install the pitless unit including the 6-inch mechanical joint discharge adapter in its final location and the 3/4-inch, Schedule 80, PVC drawdown line.

4.12 Column Pipe: The existing 6-inch column pipe shall be removed and re-installed in the replacement well. No separate Payment shall be made for this item. Removal and re-installation of the column pipe shall be considered incidental to the removal and re-installation of the existing pump.

4.13 Submersible Turbine Pump: The existing submersible turbine pump shall be removed and re-installed in the replacement well. Removal and re-installation shall be measured as a complete unit of work actually furnished and installed complete and ready for operation. Payment shall be made at the Contract unit price for "Remove and Re-Install Column Pipe and Pump" as stipulated in the Bid, which price and payment shall be full compensation for furnishing all transportation, labor, materials, tools, supplies and equipment to remove and re-install the submersible turbine pump and column pipe including check valve and other incidentals required to complete the item of work in accordance with the Specifications.

4.14 Furnish and Install 12" Steel Pipe and Cap on Existing Well: A 12" steel casing pipe extension shall be furnished and installed on existing well #7 when the pitless adapter unit is removed. The 12-inch pipe extension and cap shall be measured as a complete unit actually furnished and installed. Payment shall be made at the Contract unit price for each "Furnish and Install 12" Steel Pipe and Cap on Existing Well" as stipulated in the Bid, which price and payment shall be full compensation for furnishing all transportation, labor, materials, tools, supplies and equipment required to complete the item of work in accordance with the Specifications.

4.15 Site Restoration and Finish Grading: Site restoration and finish grading as required to complete the restoration of all areas disturbed in the construction of the well, fill material to provide finished grade elevations and concrete slab construction shall be paid for at the Contract lump sum price for "Site Restoration and Finish Grading", as stipulated in the Bid, which price and payment shall be full compensation for furnishing of all equipment, tools, material and manpower to complete the item in a satisfactory manner.

4.16 Install Fire Hydrant furnished by Owner: Contractor shall install a fire hydrant furnished by the Owner on the water main adjacent to the well site. The work to install the hydrant shall be paid for at the Contract lump sum price for "Install Fire Hydrant Furnished

by Owner", as stipulated in the Bid, which price and payment shall be full compensation for furnishing of all equipment, tools, material and manpower to complete the item in a satisfactory manner.

END OF SECTION 2C

DIVISION 2 - SITE WORK

EMERGENCY WELL REPLACEMENT - 2000
VOLGA, SOUTH DAKOTA
SECTION 2E - LANDSCAPING AND SEEDING

I. GENERAL.

1.01 Description: This section of the Specifications includes all seeding and mulching, and replanting, and all work incidental thereto, as shown on the Drawings and as specified herein.

1.02 Related Work Specified Elsewhere: The following items of related work are specified and included in other sections of these Specifications.

Topsoil

1.03 Job Conditions: The Contractor shall meet all the requirements of the applicable chapters of Title 38 - Agriculture and Horticulture of the South Dakota Codified Laws.

II. PRODUCTS.

2.01 Seed shall be labeled in accordance with U.S. Department of Agriculture Rules and Regulations and shall be furnished in sealed containers. Labels shall indicate compliance with the Federal Seed Act. The pure live grass seed mixture to be used shall be as follows:

A. Seed Mixture for Disturbed Areas Within Public Right-of-Way and Easements:

Type Seed	Minimum Wt. of Pure Live Seed lbs/acre
Brome Grass	18.0
Intermediate Wheat Grass	16.0
Perennial rye grass (Lolium perenne)	6.0

B. Pure Live Seed: The following formula shall be used to determine the amount of commercial seed required to provide in each kind of seed the specified quantities of pure live seed.

$$\frac{\text{Pure Live Seed} \times 100 \times 100}{\text{Purity} \times \text{Germination}} = \text{Pounds Commercial Seed Required}$$

2.02 Fertilizer shall consist of a 2:1:1 ratio of nitrogen, phosphorus, and potassium which will supply 45 pounds of available nitrogen per acre for seeded areas. Fertilizer shall

conform to State fertilizer laws, shall be granular or pelleted in form and furnished in the manufacturer's labeled bags. Delivery containers shall be unopened at delivery and the labels shall show grade furnished, in conformance with the State fertilizer laws.

2.04 Mulch shall consist of small grain straw, grass hay, small-stemmed grass, leaf compost, or other approved locally available material. Mulch shall be free of noxious weeds or other seed-bearing weeds that would be detrimental to the seeded area.

III. EXECUTION.

3.01 Inspection and Tests: Materials shall be subject to inspection and testing to determine if furnished in accordance with applicable Federal and State laws and are equal to the requirements stated in the PRODUCTS paragraph.

3.02 Soil Preparation:

A. Topsoil previously placed on areas to be seeded shall be smoothed, then tilled to a depth of four inches. The soil shall be in a firm but uncompacted condition immediately in advance of the seeding operations. Vegetation and debris unearthed shall be removed. Fertilizer shall be incorporated uniformly into the soil to a depth of not more than 1 inch at the rate of 45 pounds of available nitrogen per acre for seeded areas. The surface of the seedbed shall conform to the established grades.

3.03 Seeding:

A. Seeding shall be done between the dates of April 1 and June 15 for spring planting and September 1 and October 15 for fall planting except as otherwise directed in writing by the Engineer.

B. Seed shall be sown by means of a disc drill. The drills shall be set for uniform rows not to exceed six inches apart. The seed shall be drilled in a depth of one-half to three-quarters inch. The seed shall be sown in two passes with the second pass perpendicular to the first. Broadcast sowing shall be permitted only in areas inaccessible to drills. Seed shall be sown at the rate of 4 pounds of pure live seed per 1,000 square feet for disturbed lawns and 40 lb/acre for disturbed roadside ditches. The seed shall be lightly covered by harrowing or raking.

C. Mulch shall be applied to all seeded areas in a uniform, continuous blanket at the rate of 1½ to 3 tons per acre. Mulch shall be spread in such a manner that the individual stems are not pulverized or broken excessively. After the mulch has been spread it shall be anchored in the soil a minimum of one inch by means of a mulch disk to provide a standing stubble mulch.

3.04 Watering: Immediately upon completion of the mulching operation, the seeded areas shall be given one watering unless otherwise directed. Sufficient water shall be applied to penetrate the seedbed to a depth of two (2) inches. All watering shall be done in a manner which will provide uniform coverage but which will not cause erosion or damage to the finished surface. Subsequent watering of seeded areas shall be in compliance with Paragraph 3.05 Maintenance.

3.05 Maintenance: The seeded areas and trees to be replanted shall be watered as necessary, or as directed by the Engineer, and be maintained until all work in the entire contract or designated portions thereof have been completed and accepted. Maintenance shall consist of providing protection against traffic and of repairing any damage. Mulch material that has been dislodged by wind or from other causes shall be replaced and secured.

3.06 Repair: If at any time before completion and acceptance of the entire contract work, the seeded areas are damaged by erosion, trespass or other cause, the areas shall be repaired and reseeded, as originally specified.

IV. MEASUREMENT AND PAYMENT:

4.01 Seeding: All seeding of every description, site preparation, mulching, watering, bedding, water for maintenance, fertilizing, site cleanup and other incidentals required to complete the seeding in grassed areas disturbed by construction shall be considered incidental to the Contract unit price for "Site Restoration and Finish Grading", as stipulated in the Bid, which price and payment shall be full compensation for furnishing all materials, tools, plant, equipment and labor to seed areas disturbed in the construction.

END OF SECTION 2E

DIVISION 3 - CONCRETE

EMERGENCY WELL REPLACEMENT - 2000
VOLGA, SOUTH DAKOTA
SECTION 3A - CONCRETE WORK

I. GENERAL.

1.01 Description: This section of the Specifications includes the concrete work and all work incidental thereto, as shown on the Drawings and specified herein.

1.02 Related Work Specified Elsewhere. The following items of related work are specified and included in other sections of these Specifications:

Site Utilities

1.03 Compliance With Standard and Industry Specifications: Any material or operation specified by reference to the published specifications of a manufacturer, The American Society for Testing and Materials (ASTM), The American Concrete Institute (ACI), The Portland Cement Association, The Concrete Reinforcing Steel Institute, the local Building Code, or other published standard, shall comply with the requirements of the current specification or standard listed.

1.04 Shop Drawings: Submit copies of shop drawings in accordance with "GENERAL REQUIREMENTS" for reinforcing steel which shall indicate bending diagrams; assembly diagrams; splicing and laps of rods; shapes; dimension and details of bar reinforcing and accessories. Drawings shall be prepared in accordance with the "Manual of Standard Practice for Detailing Reinforced Concrete Structures," ACI 315. Scaled dimensions from structural drawings shall not be used in determining the lengths of reinforcing rods.

1.05 Tests: All tests of cement, aggregates and concrete shall be made by a testing laboratory, approved by the Engineer, and at the expense of the Contractor. The Contractor shall furnish reports of all concrete tests from the testing laboratory. Two (2) copies of such reports shall be sent as promptly as possible to the Engineer. It shall be the Contractor's responsibility to cause all specimens and tests to be made in accordance with these Specifications under the direct supervision of the Engineer and at no additional cost to the Owner.

A. Field Concrete Tests:

1. Making and Curing Compression Test Specimens:

a. During the progress of the work compression test specimens shall be made and cured in accordance with the "Standard Method of Making and Curing Concrete Test Specimens in the Field" (ASTM C31). Each test shall consist of at least three specimens. Not less than one test shall be made for each strength of concrete placed on any one day and at least one test for each pour for each 100 cubic yards of concrete or fraction thereof placed.

b. Specimens shall be cured under laboratory conditions except that when, in the opinion of the Engineer, there is a possibility of the surrounding air temperature falling below 40°F., he may require additional specimens to be cured under job conditions.

c. The Contractor shall have available at the job site sufficient approved molds for making the required test cylinders.

2. Test for Compression Strength:

a. Specimens shall be tested in accordance with the "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens" (ASTM C39). For each test, one specimen shall be tested at the age of 7 days and two specimens shall be tested at the age of 28 days. Tests shall be made by an approved independent Testing Laboratory. Two copies of the test reports shall be submitted to the Engineer.

b. The average of any five consecutive strength tests of the laboratory cured specimens representing each class of concrete shall be equal to or greater than the specified strength and not more than 20% of the strength tests shall have values less than the specified strength.

c. When it appears that the laboratory-cured specimens will fail to conform to the requirements for strength, the Engineer shall have the right to order changes in the concrete mix proportions for the remaining portion of the structure, sufficient to increase the strength to meet these requirements. The strengths of the specimens cured on the job are intended to indicate the adequacy of protection and curing of the concrete and may be used to determine when the forms may be stripped, shoring removed, or the structure placed in service. When, in the opinion of the Engineer, the strengths of the job-cured specimens are excessively below those of the laboratory-cured specimens the Contractor may be required to improve the procedures for protecting and curing the concrete.

d. In addition, when concrete fails to conform to the requirements of Paragraph B2b or when tests of field-cured cylinders indicate deficiencies in protection and curing, the Engineer may require tests in accordance with "Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete" (ASTM C42) or order load tests for that portion of the structure where the questionable concrete has been placed.

3. Tests for Slump: Slump tests shall be made according to "Standard Test Method for Slump of Portland Cement Concrete" (ASTM C143).

4. Tests for Air Content: Air content of concrete shall be tested according to either "Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method" (ASTM C231) or "Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method". (ASTM C173).

1.06 Storage of Materials:

A. Cement: All cement shall be stored in suitable, dry, weather-proof buildings, on floors raised above the ground, or in weather-tight, moisture- and damp-proof bins. No cement shall be used which has become caked or lumpy.

B. Aggregates: Concrete aggregates shall be so stored that the inclusion of foreign materials is prevented. They shall be so stored and piled that coning and segregation cannot occur.

C. Reinforcement Steel shall be stored on platforms or other supports which will prevent contact of the steel with the ground or surface water.

II. PRODUCTS.

2.01 Materials:

A. Cement: All cement used in concrete work shall be Portland cement conforming to all requirements of the "Standard Specifications for Portland Cement" (ASTM C150), and shall be Type II.

B. Aggregates: Concrete aggregates shall conform to "Standard Specification for Concrete Aggregates" (ASTM C33, except as modified herein).

The maximum size of aggregate shall be no larger than one-fifth of the narrowest dimension between sides of forms within which concrete is to be cast nor larger than three-fourths of the minimum clear spacing between reinforcing bars, or between reinforcing bars and forms. For unreinforced slabs the maximum size of aggregate shall not be larger than one-third the slab thickness. These requirements may be waived if, in the judgment of the Engineer, the mixture possesses sufficient workability that the concrete can be placed without honeycombs or voids.

1. Fine Aggregate:

a. Composition: Fine aggregate shall consist of natural sand, composed of clean, durable, uncoated, well-rounded grains, preferably of siliceous materials.

b. Deleterious Substances: The maximum percentage of deleterious substances shall not exceed the following values.

Material finer than 200 mesh sieve	3% by weight
Shale	1% by weight
Clay Lumps	1% by weight
Other deleterious substances	2% by weight

The sum of the percentages of the above deleterious substances shall not exceed five percent by weight.

All fine aggregates shall be free from injurious amounts of alkali and organic impurities.

c. Grading: Fine aggregate shall be well graded from coarse to fine and when tested by standard laboratory sieves shall conform to the following requirements.

	Percent by Weight	
	Minimum	Maximum
Passing No. 3/8" sieve	100	---
Passing No. 4 sieve	95	100
Passing No. 16 sieve	45	80
Passing No. 50 sieve	10	30
Passing No. 100 sieve	--	8

2. Coarse Aggregate:

a. Composition: Coarse aggregate shall consist of crushed limestone, trap rock, granite, washed gravel, or other approved inert materials having clean, hard, strong, durable pieces, free from adherent coatings and conforming to the requirements of these Specifications, and approved by the Engineer.

b. Deleterious Substances: The maximum percentage of deleterious substances shall not exceed the following values:

Material finer than 200 mesh sieve	1% by weight
Coal and Lignite	1/4% by weight
Clay Lumps	1/4% by weight
Soft Fragments	3% by weight
Other deleterious substances	2% by weight

The sum of the percentages of the above deleterious substances shall not exceed five percent by weight.

c. Grading: Coarse aggregate shall be well graded between the limits specified and shall conform to the following requirements by dry weight:

Requirement	Nominal Maximum Size of Aggregate 1-1/2"	1"	3/4"
Passing the 2-inch sieve	100%	---	---
Passing the 1-1/2 inch sieve	95-100%	100%	---
Passing the 1-inch sieve	---	---	100%
Passing the 3/4-inch sieve	35-70%	90-100%	90-100%
Passing the 1/2-inch sieve	---	25-60%	---
Passing the 3/8-inch sieve	10%-30%	---	20-55%
Passing the No.4 sieve	0-5%	0-10%	0-10%

Unless otherwise governed by requirements of these specifications, or authorized by the Engineer, coarse aggregate used in walls or slabs more than eight (8) inches thick shall be 1-1/2" or 1" nominal size aggregate, and coarse aggregate used in walls or slabs less than eight (8) inches thick shall be 1" or 3/4" nominal size aggregate.

C. Mixing Water: Water for concrete shall be clean and free from injurious amounts of mud, oil, acid, alkali, organic matter, or other deleterious substances, and shall be of a quality approved by the Engineer.

D. Metal Reinforcement:

1. Unless noted on the Drawings, or otherwise specified in these Specifications, reinforcing bars shall be Grade 60, conforming to the requirements of the "Standard Specification for Deformed Billet - Steel Bars for Concrete Reinforcement" (ASTM C615).

2. Bar and rod mats for concrete reinforcement shall conform to "Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement" (ASTM A184).

E. Preformed Expansion Joint Filler: Unless otherwise shown on the Drawings or specified in these Specifications, expansion joint filler shall be asphalt impregnated strips, 1/2 inch in thickness, conforming to "Standard Specification for Preformed Expansion Joint Filler for Concrete" (ASTM D994). Filler shall extend for the full depth of concrete slabs and finish.

F. Admixtures: Air-entraining admixtures shall conform to "Standard Specification for Air-Entraining Admixtures for Concrete" (ASTM C260). Other admixtures, approved for use, shall conform to appropriate ASTM Standards. Admixtures containing chloride ions will not be allowed.

G. Curing Compounds: Liquid membrane-forming compounds for curing concrete shall conform to ASTM C309. Unless otherwise specified or approved, Type I curing compound shall be used.

H. Form Release Agents: Form coating or releasing agent, shall be a non-oil base compound completely compatible with the membrane curing compound used and which does not stain concrete.

I. Hot-Pour Concrete Joint Sealer: Unless otherwise shown on the Drawings or specified in these specifications, hot-poured elastic joint sealer shall be a mixture of virgin synthetic rubber or reclaimed rubber or a combination of the two, with asphalt and plasticizers and tacifiers conforming to ASTM D-1190.

J. Liquid Neoprene Joint Sealer: Liquid neoprene joint sealer shall be a two component sealing compound consisting of a neoprene base material and a catalyst that are mixed at the job site. The sealer shall conform to Federal Specification SS-S 1596 and ASTM D-1850.

K. Preformed Cork Joint Filler: Cork joint filler shall be produced from clean, selected granulated cork bonded together securely with a phenolic resin, conforming to ASTM D-1752, Type II.

L. Vapor Barrier: Vapor barrier shall be polyethylene sheeting conforming to Commercial Standard, not less than 6 mil thickness.

M. Metal Accessories: Include all spacers, chairs, bolsters, ties and other devices necessary for properly placing, spacing, supporting and fastening reinforcement in place.

N. Quick-Set Hydraulic Cement: A quick-set hydraulic cement shall be used for grouting and sealing around pipes, anchor bolts, or as directed by the Engineer. The compound shall instantly stop running water or seepage through concrete or masonry walls and floors. The compound shall be "Waterplug" or "equal".

O. Moldable Waterstop/Joint Sealer: Waterstop shall be placed at the locations shown on the drawings. Moldable Waterstop/Joint Sealer shall be equal to "Waterstop-RX" as manufactured by American Colloid Company.

P. Neoprene Bearing Pads: Neoprene bearing pads shall be Neoprene synthetic rubber grade (durometer A) 50, and manufactured by duPont, Uniroyal, or equal.

Q. Structural Sealant: Caulking material for all concrete process area and structural sealing shall be 2-part polysulfide sealant with polyethylene foam backer rod stock where required. Polysulfide sealant shall conform to Fed. Spec. TT-S-00227E, type 2, Class A & B; CRD-C506, Type II, Class A; ANSI A116.1, Class B. Sealant shall be Seal-tight CM-60, 2 Part; Hornflex-Two Component; Sonolastic Two-Part; or an approved equal.

R. Rebar Splice System: Rebar splice system shall be Grade 60 and as manufactured by Richmond Screw Anchor Co., Inc. or an approved equal. For dowel bar substitution and rebar splice systems other than Richmond Screw Anchor Co., Inc., the contractor shall submit manufacturer's literature, product samples and certified test reports to the engineer. Test reports shall show yield and ultimate tensile load capacities. All male threads shall be rolled (UN or UNC); cut threads are not permitted. Tension failure must occur in the nominal bar diameter of the Dowel-In.

S. Concrete Surface Finisher: All exposed to view concrete walls shall be finished with a cementitious material with a latex or acrylic based bonding agent. Concrete surface finisher shall be "Thoroseal Plaster Mix" as manufactured by Thoro System Products, Inc., or "Concrete Surface Finisher" as manufactured by Akona Corp., "Concrete Finisher" as manufactured by Tamms Industries Co.

T. Concrete Bonding Agent: A bonding agent shall be used on all surfaces where structural topping is to be installed, and any other areas where fresh concrete is to be installed on or over existing concrete or precast concrete. All construction joints in water or sewage containment basins and below grade basements and dry wells shall have a bonding agent applied to the construction joint prior to placing the next lift or section of new concrete. The bonding agent shall be mixed and applied according to the manufacturer's recommendations. Bonding agents shall be Thorobond, Acryl 60 or an equivalent.

2.02 Concrete Quality:

A. General: The allowable stresses for the design of the structure are based on the specified compressive strength of the concrete cylinder at 28 days or at the earliest age at which the concrete may be expected to receive its full load. Unless otherwise shown on the Drawings or specified in these Specifications, concrete used shall conform to the following strength criterion:

1. Structural Concrete: Concrete used in the various structures shall have a minimum ultimate 28-day compressive strength of not less than 4000 psi when tested in accordance with the "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens" (ASTM C39). Concrete used in precast/prestressed units shall have a minimum ultimate compressive strength of 5000 psi (28-day).

2. Fill Concrete or Concrete Fill: Concrete used to replace unstable soil or excavated material to prevent settlement and to transmit dead load stresses to a stable sub-grade and for embedment where no forms are used, shall attain a minimum ultimate 28-day compressive strength of not less than 2500 psi when tested in accordance with the "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens" (ASTM C39).

B. Concrete Strength and Water-Cement Ratio: The determination of the water-cement ratio for proper quality of paste for the desired strength shall be determined by one of the following methods:

1. Method 1 - Without Preliminary Tests: When no preliminary strength tests of the concrete to be used are made, the water-cement ratio shall not exceed the following values for specified compressive strength at 28 days.

Specified Compressive Strength fc', psi	**Max. Permissible Water-Cement Ratio Absolute Ratio By Weight	U.S. Gal. per 94-lb. bag
2,500	0.54	6.1
3,000	0.46	5.2
3,500	0.40	4.5
4,000	0.35	4.0
4,500	0.30	3.4
5,000	*	*

*For specified strengths in excess of 4500 psi, proportions shall be selected by Method 2.

**Including free moisture on aggregates.

2. Method 2 - For Combination of Materials Previously Evaluated or to be Established by Trial Mixtures: A water-cement ratio other than shown above may be used provided that the relationship between strength and water-cement ratio for the materials to be used has been previously established by reliable test data and the resulting concrete satisfies the requirements of Paragraph 1.05.

Where previous data is not available, concrete trial mixtures having proportions and consistency suitable for the work shall be made using at least three different water-cement ratios which will produce a range of strengths encompassing those required for the work. For each water-cement ratio, at least four specimens for each age to be tested shall be made and cured in accordance with "Standard Method of Making and Curing Concrete Test Specimens in the Laboratory" (ASTM C192) and tested for strength in accordance with "Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens" (ASTM C39). The strength tests shall be made at 28 days, or the earlier age at which the concrete is to receive load. A curve shall be established showing the relationship between water-cement ratio and compressive strength. The maximum permissible water-cement ratio for the concrete to be used in the structure shall be that shown by the curve to produce an average strength to satisfy the requirements of Paragraph 1.05. No substitutions shall be made in the materials used on the work without additional tests in accordance herewith to show that the quality of the concrete is satisfactory.

C. Concrete Proportions and Consistency:

1. The proportions of the concrete shall produce a mixture that will work readily, with the placement method used, into corners and angles of forms and around reinforcement. Segregation of materials in the mixture shall not be permitted nor collection of excess free water on the surface.

2. The slump of concrete shall be within the following limits:

	Slump, in Inches	
Types of Construction	Maximum	Minimum
Reinforced foundation walls and footings	3	1
Unreinforced footings, caissons, and substructure walls	3	1
Reinforced slabs, beams and walls	4	1
Building columns	4	1
Bridge decks	3	2
Pavements	2	1
Sidewalks, driveways, and slabs on ground	4	2
Heavy mass construction	2	1

3. The ratio of cement to dry fine aggregate shall be that necessary to provide the maximum density of the mixture when used in the resulting concrete. This determination of the proper ratio shall be made by an approved independent testing laboratory, at the expense of the Contractor, using representative samples of the aggregates which will be used, and shall be approved by the Engineer. The batch proportions used shall be such that full bags of cement are used in each batch. Structural concrete shall contain a minimum of six 94 lb. bags of cement per cubic yard of concrete.

4. All structural concrete shall have air entrained by use of air-entraining cement, or an air-entraining admixture. Air content of the air-entrained concrete shall conform to the following:

Max. Size Coarse Aggregate, Inch	Air Content, per cent by Volume
1-1/2	4 to 6
3/4 or 1	5 to 7
3/8 or 1/2	6-1/2 to 8-1/2

5. The methods of measuring concrete materials shall be such that the proportions can be accurately controlled and easily checked at any time during the work. Measurement of materials for Ready-Mixed Concrete shall conform to the "Standard Specification for Ready-Mixed Concrete" (ASTM C94).

2.03 Mixing and Placing Concrete:

A. Preparation of Equipment and Place of Deposit:

1. Before placement, all equipment for mixing and transporting the concrete shall be cleaned, and all debris and ice shall be removed from the places to be occupied by the concrete. Forms shall be thoroughly wetted (except in freezing weather) or coated with a releasing agent and masonry filler units that will be in contact with concrete shall be well drenched (except in freezing weather). The reinforcement shall be thoroughly cleaned of ice, dirt, loose rust and mill scale, or other coatings.

2. Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the Engineer. All laitance and other unsound material shall be removed from hardened concrete before additional concrete is added.

B. Mixing:

1. Ready Mixed Concrete:

a. Ready mixed concrete shall be mixed and delivered in accordance with "Standard Specification for Ready-Mixed Concrete" (ASTM C94).

b. The Engineer shall have free access to the mixing plant at all times.

c. The Subcontractor furnishing ready-mix concrete shall have sufficient plant and transportation facilities to assure continuous delivery of concrete to the project site at the required rate.

C. Conveying:

1. Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent the separation or loss of materials.

2. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery end without separation of materials.

D. Placing:

1. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall be placed at such a rate that it is at all times plastic and flows readily between bars. No concrete that has partially hardened or been contaminated by foreign material shall be deposited on the work, nor shall retempered concrete be used.

2. When placing is once started, it shall be carried on as a continuous operation until the placement of the panel or section is completed. The top surface shall be generally level. When construction joints are necessary, they shall be made in accordance with Paragraph 3.01F.

3. All concrete shall be thoroughly compacted by suitable means during the operation of placing, and shall be thoroughly worked around reinforcement, embedded fixtures and into the corners of the forms. Vibrators may be used to aid in the placement of concrete provided they are used under experienced supervision and the forms designed to properly withstand this action.

4. Surfaces to be finished shall be brought to proper grade, struck off, and finished in a workmanlike manner. No honeycombing, rough spots, or protruding stones shall be left exposed. Floors shall be smooth with uniform grade and the thickness full depth at all locations as shown on the Plans.

5. The Contractor's Superintendent in charge of concrete work shall mark in ink on the Drawings the time and the date of the placing of concrete in the different members. Such Drawings shall be kept on file at the job until the completion of the structure and shall be subject to the inspection of the Engineer at all times.

2.04 Concrete Grout:

A. Materials:

1. Cement: The cement shall be as specified in Section 2.01A, herein.

2. Fine Aggregate: Sand or fine aggregate shall be as specified in Section 2.01 B1, herein.

3. Coarse Aggregate: Gravel or crushed stone coarse aggregate shall be as specified in Section 2.01 B2, herein.

4. Water: Water used in mixing shall be as specified in Section 2.01C, herein.

5. Non-Shrink Non-Metallic Grouting Mixture: Non-shrink non-metallic grout mix shall be Sealtight V-3 Grout, Sonogrout, or equal, conforming to all the requirements of Corps of Engineers CRD-C 588.

6. Non-Shrink Metallic Grouting Aggregate: Non-shrink metallic grouting aggregate shall be Master Builders Company Embeco, Sonneborn Ferrolith G, or an approved graded metallic aggregate free from oil, grease, and soluble alkaline compounds. The metallic aggregate shall be combined when manufactured with a finely divided plasticizing material, a cement dispersing agent, and an oxidation catalyst.

   The metallic portion of this material which shall constitute not less than 70% by weight of the total composition shall comply with the grading:

Screen No.	Percent Passing
8	90-100
16	70-85
30	35-50
50	5-10
100	0-5

B. Mixes:

1. Bond Coat: Where a bond coat is required, the bond coat shall consist of 1 part Portland cement and 1 part fine aggregate or 1 part metallic grouting aggregate by weight, thoroughly mixed with sufficient water to produce a grout of brushable consistency.

2. Neat Cement Grout: Neat cement grout shall be proportioned as follows:

a.	Wet or fluid mix: (Up to 1" thick)	1 part cement 1 part aggregate (0-8 graded sand)
b.	Medium mix: (1" to 2" thick)	1 part cement 2 parts fine aggregate
c.	Lean mix: (2" to 3" thick)	1 part cement 2-1/2 parts fine aggregate 3-1/2 parts coarse aggregate (3/8" max.)
d.	Dry-pack:	1 part cement 2-1/2 parts fine aggregate

3. Non-Shrink Non-Metallic Grout: Non-shrink non-metallic grout shall be proportioned by mixing a minimum amount of water with commercial pre-mixed grout mix consistent with placeability mix desired. The grout shall be proportioned as follows:

a.	Plastic Mix:	4 quarts water 1/2 cubic foot pre-mixed grout
b.	Pumpable Mix:	5 quarts water 1/2 cubic foot pre-mixed grout

4. Non-Shrink Metallic Grout: Non-shrink metallic grout shall be proportioned as follows:

a.	Wet Mix: (Up to 1" thick)	1 part cement 1 part fine aggregate 1 part metallic grout aggregate
b.	Lean Mix: (Over 1" thick)	1 part cement 1 part fine aggregate 1 part metallic grout aggregate 1-1/2 parts coarse aggregate (3/8" max.)

5. Concrete Replacement Grout: Grout for large fill areas or repair should consist of a concrete mix having the same water-cement ratio as used for a similar new structure. As large a maximum size of aggregate and as low a slump as consistent with proper placing and thorough vibration should be utilized to minimize water content and consequent shrinkage. The concrete should contain 3 to 5% entrained air. Where surface color is important, the cement should be carefully selected, or blended with white cement, to obtain desired results. To minimize shrinkage, the concrete should be as cool as practicable when placed.

C. Mixing: The grout shall be thoroughly mixed by hand, turning the entire dry mix over sufficient times to insure even distribution of its components, or it shall be mixed in a mechanical type mixer for not less than 3 minutes. All grout mixes where applicable shall satisfy ASTM C287, C191 and C109 for non-shrink performance, workability and compressive strength respectively.

D. Placement:

1. Preparation: Where equipment supports require grouting, the equipment shall be placed and aligned and/or leveled on shims and the bolts drawn tight. Supports to be grouted shall be at the temperature of the room and/or atmosphere when the grout is placed. The space to be occupied by the grout shall be thoroughly

cleaned, removing all dirt, oil, grease, and loose material. The contact concrete surface shall be saturated with water, but no free water shall remain on the surfaces when the grout is placed.

2. Bond Coat: Immediately prior to placing the grout the bond coat specified in paragraph 2.04 B1 shall be brushed onto the saturated surface of the concrete and scrubbed into that surface throughout the contact area or for a distance as far back under the bedplate of the equipment as is practicable. The grout shall be placed before the bonding grout has dried out or taken an initial set.

3. Grouting:

   a. The grout shall be placed by whatever means is most practicable, depending on the equipment to be grouted in. The grout may be dry packed by ramming, pressure grouted by gravity, by pneumatic pressure, or by pumping, or poured in place.

   b. Whatever means for placing the grout is employed, the grout shall be thoroughly compacted and all air pockets removed. Chains placed under the equipment at intervals before pouring the grout may be used for this purpose.

   c. Whenever practicable, grout shall be poured from one end or side only to avoid excessive air entrapment.

III. EXECUTION.

3.01 Forms and Details of Construction:

A. Design and Removal of Forms:

1. Forms shall conform to the shape, lines and dimensions of the members as called for on the Drawings, and shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together so as to maintain position and shape.

2. No construction loads exceeding the structural design loads shall be supported upon any unshored portion of the structure under construction. No construction load shall be supported upon, nor any shoring removed from any part of the structure under construction until that portion of the structure has attained sufficient strength to support safely its weight and the loads placed thereon. This strength may be demonstrated by job-cured test specimens and by a structural analysis considering the proposed loads in relation to these test strengths. Such analyses and test data shall be furnished by the Contractor to the Engineer.

3. Forms shall be removed in such a manner as to insure the complete safety of the structure. Where the structure as a whole is supported on shores, the removable floor forms, beams and girder sides, column and similar vertical forms may be removed after 24 hours, providing the concrete is sufficiently strong not to be injured thereby.

B. Cleaning and Bending Reinforcement: At the time concrete is placed, metal reinforcement shall be free from loose, thick rust, mill scale, or other coatings that will destroy or reduce the bond. All bars shall be bent cold, unless otherwise permitted by the Engineer. No bars partially embedded in concrete shall be field-bent except as shown on Plans or as specifically permitted by the Engineer.

C. Placing Reinforcement: Metal reinforcement shall be accurately placed according to the Drawings and adequately secured in position by concrete, metal, or other approved chairs, spacers, or ties.

D. Splices in Reinforcement: No splices of reinforcement shall be made except as shown on the Drawings, or as specified, or as authorized by the Engineer. All welding shall conform to the "American Welding Society's Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction" (AWS D12.1), unless authorized by the Engineer.

E. Concrete Protection for Reinforcement:

1. The metal reinforcement shall be protected by the thickness of concrete indicated on the Drawings. Where not otherwise shown, the thickness of concrete over the reinforcement shall be as follows:

   a. Where concrete is deposited against ground without the use of forms, not less than 3 inches.

   b. Where concrete is exposed to the weather, or exposed to the ground, but placed in forms, not less than 2 inches.

2. Exposed reinforcing bars intended for bonding with future extensions shall be protected from corrosion by temporary concrete encasement or other adequate covering.

F. Construction Joints:

1. Joints not indicated on the Drawings shall be so made and located as to least impair the strength of the structure. All construction joints shall be keyed, have water stops and have reinforcing steel extended through the joints except where otherwise required by the Engineer. Directly after concrete placement is completed, reinforcing steel projecting beyond the concrete shall be thoroughly

cleaned. Where a joint is to be made, the surface of the concrete shall be thoroughly cleaned and all laitance removed. Before the placing of new concrete, vertical joints shall be thoroughly wetted and slushed with a coat of neat cement grout.

2. A delay, at least until the concrete in walls is no longer plastic must occur before casting beams or slabs supported thereon. Beams, girders, brackets, column capitals and haunches shall be considered as part of the floor system and shall be placed monolithically therewith.

3. Construction joints in floors shall be located near the middle of the spans of slabs, beams or girders, unless a beam intersects a girder at this point, in which case the joints in the girders shall be offset a distance equal to twice the width of the beam. Provision shall be made for transfer of shear and other forces through the construction joint.

G. Surface Finish:

1. Exposed Concrete Other Than Slabs: Immediately after forms are removed, and while temperature of the concrete, ambient air and mortar is above 50°F., surface defects shall be remedied as follows: Fins and loose material shall be removed. Honeycomb, aggregate pockets, voids over 1/2 inch in diameter, and holes left by the rods or bolts shall be cut out to solid concrete, thoroughly wetted, brush-coated with neat cement grout and filled with mortar. Mortar shall be a stiff mix of 1 part blended portland and white cements to 2 parts fine aggregate passing the No. 16 mesh sieve and minimum amount of water. When dry, the color of the mortar shall approximately match the adjoining concrete color. Mortar shall be thoroughly compacted in place. Holes passing entirely through walls shall be filled from the inside face by forcing mortar through to the outside face. Holes that do not pass entirely through the wall shall be packed full. Patchwork shall finish flush and in the same plane as adjacent surfaces. Exposed patchwork shall be finished to match adjoining surfaces in texture and color. The entire area shall be kept damp during finishing operations to insure no excessive moisture loss in the concrete prior to application of curing compound. Protruding portions of bar supports shall be ground flush with concrete surfaces.

   After the above operations have been completed, smooth finish shall be given to concrete surfaces that are exposed to view as finished work. Smooth finish shall consist of applying a cement like material with a latex or acrylic based bonding agent, as specified in the materials section of this specification (3A.2.01.T). The coating shall be approximately 1/8 inch thick. The surface to be coated must be clean and free of chemical deposits, dirt, form oils, grease, oil, paint, etc. The finish shall be applied and mixed in accordance with the manufacturers recommendations. The finish of any area shall be completed in the same day and

the limits of the finished area shall be made a natural breaks in the finished surface.

2. Exterior Slabs: Broom finish shall be given to exterior surfaces. The concrete shall be screeded and floated to the required finish level with no coarse aggregate visible. After the surface moisture has disappeared and laitance has been removed, surfaces shall be steel troweled to an even smooth finish. The troweled surfaces shall be broomed with a fiber-bristle brush in a direction transverse to that of the main traffic.

H. Embedded Items:

1. All sleeves, inserts, anchors and/or other embedded items required for adjoining work or its support shall be positioned accurately and supported against displacement prior to placement of concrete. Voids in sleeves, inserts and anchor slots shall be temporarily filled with readily removable material to prevent the entry of concrete into the voids.

2. All anchor bolts to be installed in fresh concrete, except bolts installed in pipe sleeves such as are used for machinery foundation bolts, shall be provided with sufficient threads to permit a nut to be installed on the concrete side of the concrete form or supporting template. When the bolt is installed, a second nut shall be attached to the bolt on the outside of the form or supporting template, and two nuts adjusted and tightened in such a manner that the bolts will be rigidly held in proper alignment.

3. All anchor bolts which are required to be installed in hardened concrete shall be anchored thereto by means of three unit (unless otherwise required by the Drawings) lead cinch anchors of the size or sizes corresponding to the bolts on which they are used. The size of the drill holes and the methods of installation of these anchors shall be in accordance with the manufacturer's specifications, except that the minimum depth of the holes shall be one inch greater than as stipulated in the manufacturer's tables.

4. Waterstops that are to be placed in joints shall be positioned accurately in accordance with the Drawings, and supported against displacement prior to placement of concrete.

5. All contractors, whose work is related to, embedded in or supported by the concrete, shall be given ample notice and opportunity to introduce and/or furnish embedded items before placement of concrete.

I. Openings in Concrete: The Contractor shall provide all necessary openings in concrete for piping or other work to be installed by the Owner or other contractors by inserting steel pipe sleeves cut to exact size and shape, accurately positioned and supported against displacement during placement of concrete.

3.02 Curing: Provisions shall be made for maintaining concrete in a moist condition for at least 5 days after the placement of the concrete, except that for high-early strength concrete, moist curing shall be provided for at least the first 3 days.

Curing shall commence as soon as free water has disappeared from the surface after finishing. Curing of formed soffits of beams, floor slabs and similar surfaces shall be accomplished by moist curing with forms in place of the full curing period. Curing may be accomplished by any of the following methods unless noted otherwise on the Plans:

A. Moist Curing: Surfaces shall be kept continually wet by covering with burlap, mats or sand, thoroughly saturated with water and covering kept wet by spraying or hosing. Place materials to provide complete coverage and lap all joints to a minimum of 3 inches.

B. Impervious - Sheeting Curing: Surfaces shall be thoroughly wetted with a fine spray of water and then covered with waterproof paper, polyethylene sheeting or polyethylene-coated waterproof paper. Edges and ends of sheeting shall be overlapped not less than 4 inches and securely cemented or taped to form a continuous cover.

C. Membrane Curing: Apply curing compound to freshly placed concrete surfaces as soon as initial set is reached and after surface is free of excess water in accordance with manufacturer's printed instructions. Do not use membrane curing on surfaces required to receive additional concrete or concrete fill, on cement finish coats that are to receive hardening and dustproofing treatment unless compatible, nor on vertical surfaces after removal of forms.

3.03 Weather Requirements:

A. Cold Weather Requirements:

1. Adequate equipment shall be provided for heating the concrete materials and protecting the concrete during freezing or near-freezing weather. No frozen materials or materials containing ice shall be used.

2. All concrete materials and all reinforcement, forms, fillers, and ground with which the concrete is to come in contact shall be free from frost. Whenever the temperature of the surrounding air is below 40°, all concrete placed in the forms shall have a temperature of between 50°F and 70°F, and adequate means shall be provided for maintaining a temperature of not less than 70°F for 3 days or 50°F for five days. When high-early-strength concrete is used, the temperature shall be maintained at not less than 70°F for two days or 50°F for three days. In either

case, additional time necessary to insure proper curing of the concrete shall be provided as directed by the Engineer. The housing, covering or other protection used in connection with curing shall remain in place and intact at least 24 hours after the artificial heating is discontinued. No dependence shall be placed on salt or other chemicals for the prevention of freezing.

3. Whenever heated enclosures are used, care must be taken to assure that the concrete is kept moist during the curing period. Space heaters that will create carbon dioxide shall be properly vented to the outside.

B. Hot Weather Requirements:

1. In hot weather, suitable precautions shall be taken to avoid drying of the concrete prior to finishing operations. Use of windbreaks, sunshades, fog sprays, or other devices shall be provided as directed by the Engineer.

2. Concrete deposited in hot weather shall not have a placing temperature that will cause difficulty from loss of slump, flash set, or cold joints. Concrete temperature shall be less than 90°F unless higher temperatures are permitted by the Engineer.

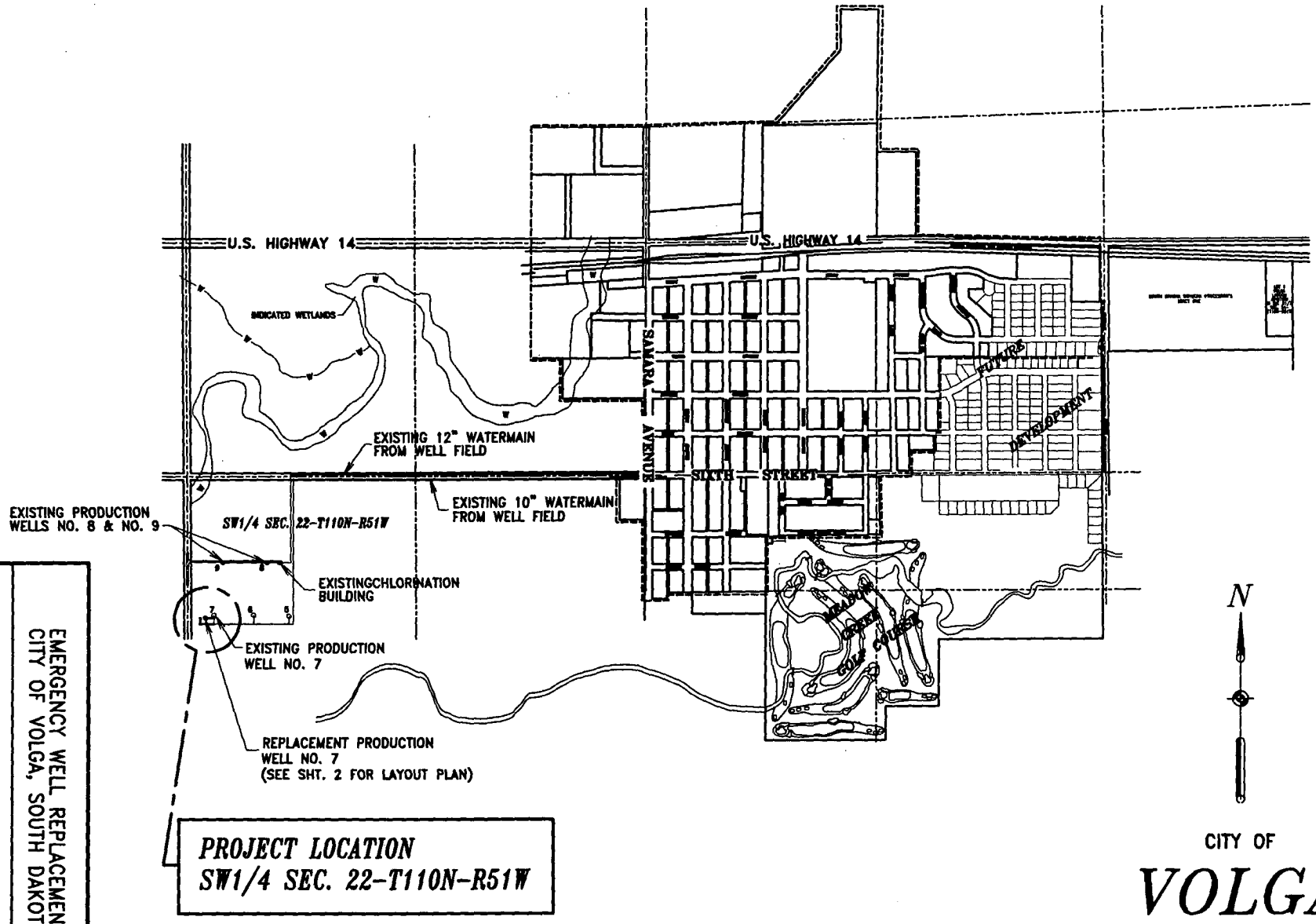
3.04 Form Ties: Form ties shall be factory-fabricated, removable or snap-off metal ties of a design that will not permit form deflection and will not spall concrete upon removal. Solid backing shall be provided for each tie. Ties shall be fitted with devices that will leave holes in the concrete surface not less than 3/8 inch nor more than 1 inch in diameter and not more than 1 inch deep. That portion of the tie remaining permanently in the concrete shall not project beyond the surface of the concrete and shall be at least 1 inch back from any concrete surface that will be exposed, painted, dampproofed, or will receive direct applications of plaster. Bolts and rods that are to be completely withdrawn shall be coated with a non-staining bond breaker. All form ties shall be snapped off inside the wall surfaces on all wall construction

Form ties used for the foundation walls and other liquid retaining structures shall be fitted on both sides of the wall with cones which will form a void at least 1-1/2 inches deep at least 1 inch diameter at the surface in order to provide suitable space for dry-patching mortar. In lieu of this, at the Contractor's option, similar recesses may be formed by reaming with power tools as approved immediately after forms are removed. Form ties to be completely removed from the wall shall not be used for the foundation walls. The ties used for these walls shall be fitted with integral water seals on the portion remaining within the wall.

IV. METHOD OF MEASUREMENT AND BASIS FOR PAYMENT.

4.01 General: No separate measurement or payment will be made for the work covered by this section, and all costs in the connection therewith shall be included in the contract prices for the various structures, buildings, or uses to which it pertains.

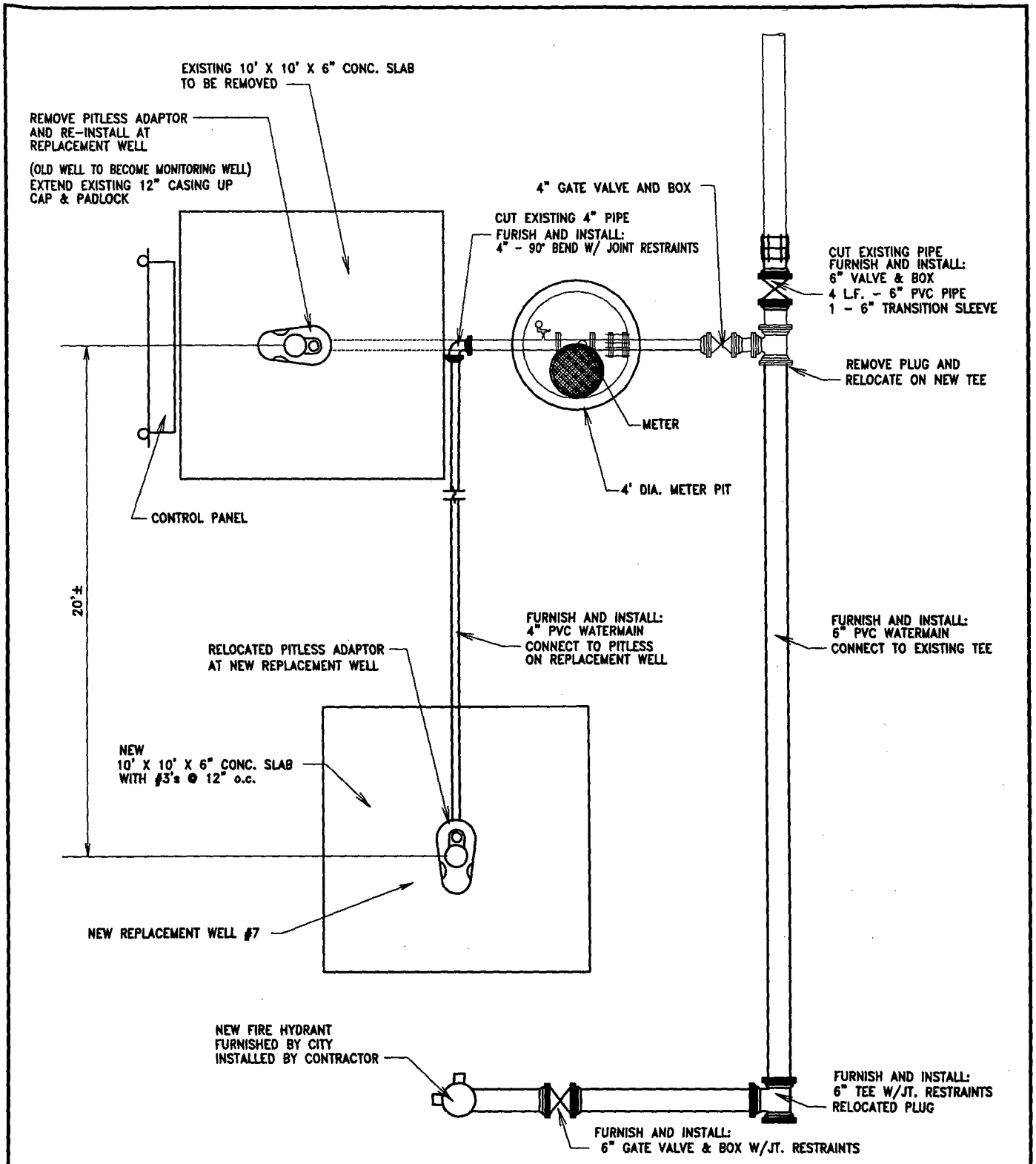
END OF SECTION 3A



LOCATION MAP

EMERGENCY WELL REPLACEMENT
CITY OF VOLGA, SOUTH DAKOTA

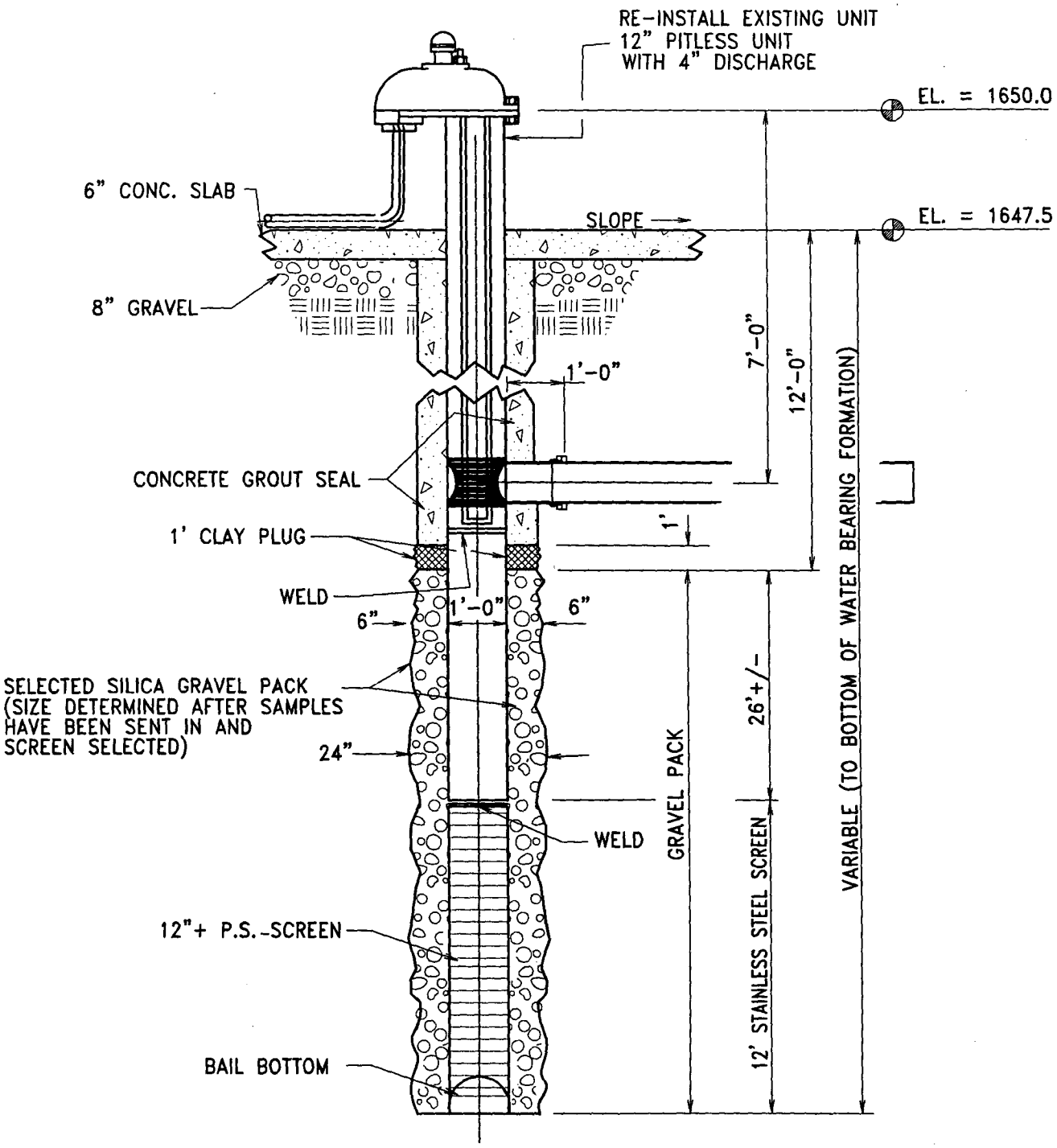
SHT. 1



EMERGENCY WELL REPLACEMENT
CITY OF VOLGA, SOUTH DAKOTA

DEMOLITION PLAN AND REPLACEMENT WELL LAYOUT

SHT. 2



EMERGENCY WELL REPLACEMENT
CITY OF VOLGA, SOUTH DAKOTA

WELL CROSS SECTION

SHT. 3

Banner Associates, Inc.

409 22nd Avenue South - P.O. Box 298
Brookings, South Dakota 57006
Ph. # (605) 692-6342

LETTER OF TRANSMITTAL

Date:	Job #:
November 10, 2000	20020.00.00
Attention: Ray Birchem	
RE: Emergency Well Project	
Volga, SD	
Water Right No. 5167-3	

TO: SD Department of Environment and Natural Resources - Drinking Water Program
Joe Foss Building, 523 East Capitol
Pierre, South Dakota 57501

WE ARE SENDING YOU: ☐ Attached ☒ Delivered via **Express Mail** the following items

☐ Shop Drawings ☐ Prints ☐ Plans ☐ Samples ☒ Specifications

☐ Copy of Letter ☐ Change Order ☐ _____

Copies	Date	No.	Description
2			Specifications for emergency well replacement at Volga, SD

THESE ARE TRANSMITTED as checked below:

☒ For Approval ☐ Approved as Submitted ☐ Resubmit ___ Copies for Approval

☐ For Your Use ☐ Approved as Noted ☐ Submit ___ Copies for Distribution

☐ As Requested ☐ Returned for Corrections ☐ Return ___ Corrected Prints

☐ For Review & Comment ☐ _____

☐ For Bids Due: _____ 19 ____ ☐ Print Returned After Loan to Us

REMARKS:

Existing Well #7 at Volga has failed and the City needs to replace the well in order to meet water demands. The City is planning to solicit bids under emergency conditions and open the bids on November 13.

The enclosed copies of the specifications for the replacement well are for your review. A copy of this letter will also be forwarded to Eric Gronlund at Div. Of Water Rights. The new well is proposed to be constructed within 50 ft. of the existing well and will utilize the pitless adapter unit and pump from the existing well.

CC: Steve Meyer, Volga, SD
Eric Gronlund, Div. Of Water Rights
South Dakota, DENR, Foss Building, Pierre, SD

SIGNED: David Odens, PE

If enclosures are not as noted, please notify us at once.

DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES
JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182
www.state.sd.us/denr

January 17, 2001

Steven, Meyer, Water Superintendent
City of Volga
PO Box 217
Volga SD 57071-0217

Dear Mr. Meyer:

I am writing in regard to the city of Volga's request to authorize a replacement well under Water Right No. 5167-3. The city undertook emergency replacement of Well No. 7 in November, 2000.

Water Right No. 5167-3 appropriates 0.45 cubic feet of water per second (200 gpm) from one well located in the NW¼ SW¼ Section 22, T110N, R51W. The replacement well is also located in the NW¼ SW¼ Section 22, T110N, R51W and is constructed into the same water source as the existing wells. No additional water will be appropriated. The original well No. 7 will be converted to a monitoring well

Upon review of the request and pursuant to SDCL 46-5-13.1, the replacement well is authorized without application or publication of a notice of hearing pursuant to SDCL 46-2A-4. A new water right permit will be necessary if the well is set up to divert at a rate greater than 200 gallons per minute.

If you have any questions, please contact Eric Gronlund at (605) 773-3352.

Sincerely,

Garland Erbele

Garland Erbele, Chief Engineer
Water Rights Program

C: David Odens, Banner Associates, PO Box 298, Brookings SD 57006

File No. 5167-3

Approval of an Replacement Well

NAME: City of Volga

ADDRESS: PO Box 217, Volga, SD 57071-0217

DATE: January 3, 2001 **COUNTY:** Brookings **TELEPHONE:**

BACKGROUND:

The city of Volga holds Water Right No. 5167-3 appropriating 0.45 cubic feet of water per second (200 gpm) from one well, 45.5 feet deep, located in the NW¼ SW¼ Section 22, T110N, R51W. This well is known as the Volga Well No. 7 in their municipal water supply system.

The city submitted specification for emergency replacement of Well No. 7 to the Department of Environment and Natural Resources in November, 2000. These specification we sent to Ray Birchem for approval of the specifications and to Eric Gronlund for authorization of the replacement well under their existing water right.

The replacement well will be located approximately 50 feet west of the existing well in the NW¼ SW¼ Section 22, T110N, R51W. The old Well No. 7 will be converted to a monitoring well.

AUTHORITY:

Pursuant to SDCL 46-5-13.1, the location of a diversion point may be changed or additional diversion points may be licensed provided the following conditions are met and the potential for interference with other existing diversions is not increased:

- **Developed water source same as permitted source and no additional water appropriated**

  The well authorized under Water Right No. 5167-3 is constructed into the Brooking Management Unit of the Big Sioux Aquifer at a depth of 45.5 feet. The well cross-section diagram included with the specifications indicates an approximate depth of 50 feet for the new well. This replacement well is constructed into the same aquifer.

  No additional appropriation of water is requested. The original water permit appropriates 0.45 cfs (200 gpm). The bid packet states specifically that the well is to be developed to produce 200 gpm.

- **Review of Existing Diversions**
  There are a number of domestic wells and existing water rights in the vicinity of this replacement well. The wells in closest proximity are held by the city. This is a request

solely for a replacement well located approximately 50 feet away from old Well No. 7 and no effect to other wells is anticipated. The old well will be converted to a monitoring well

CONCLUSION

- This replacement well does not appropriate additional water.
- The replacement well is constructed into the Brookings Management Unit of the Big Sioux Aquifer which is the same water source as the original well authorized by Water Right No. 5167-3.
- Existing domestic wells will not be adversely impacted by authorizing this replacement well.
- There has been no record of any complaint on Volga's diversion of water adversely impacting neighboring wells.
- The original well may be converted to a monitoring well.

RECOMMENDED ACTION

Based on the above criteria, it is recommended that the replacement diversion point be authorized by Water Right No. 5167-3.

Eric Gronlund
Water Rights Program

The Chief Engineer makes a finding pursuant SDCL 46-5-13.1 and ARSD 74:02:01:14.01 that:

This replacement well will not increase the potential for adverse effects to existing diversions.

Garland Erbele, Chief Engineer
Water Rights Program

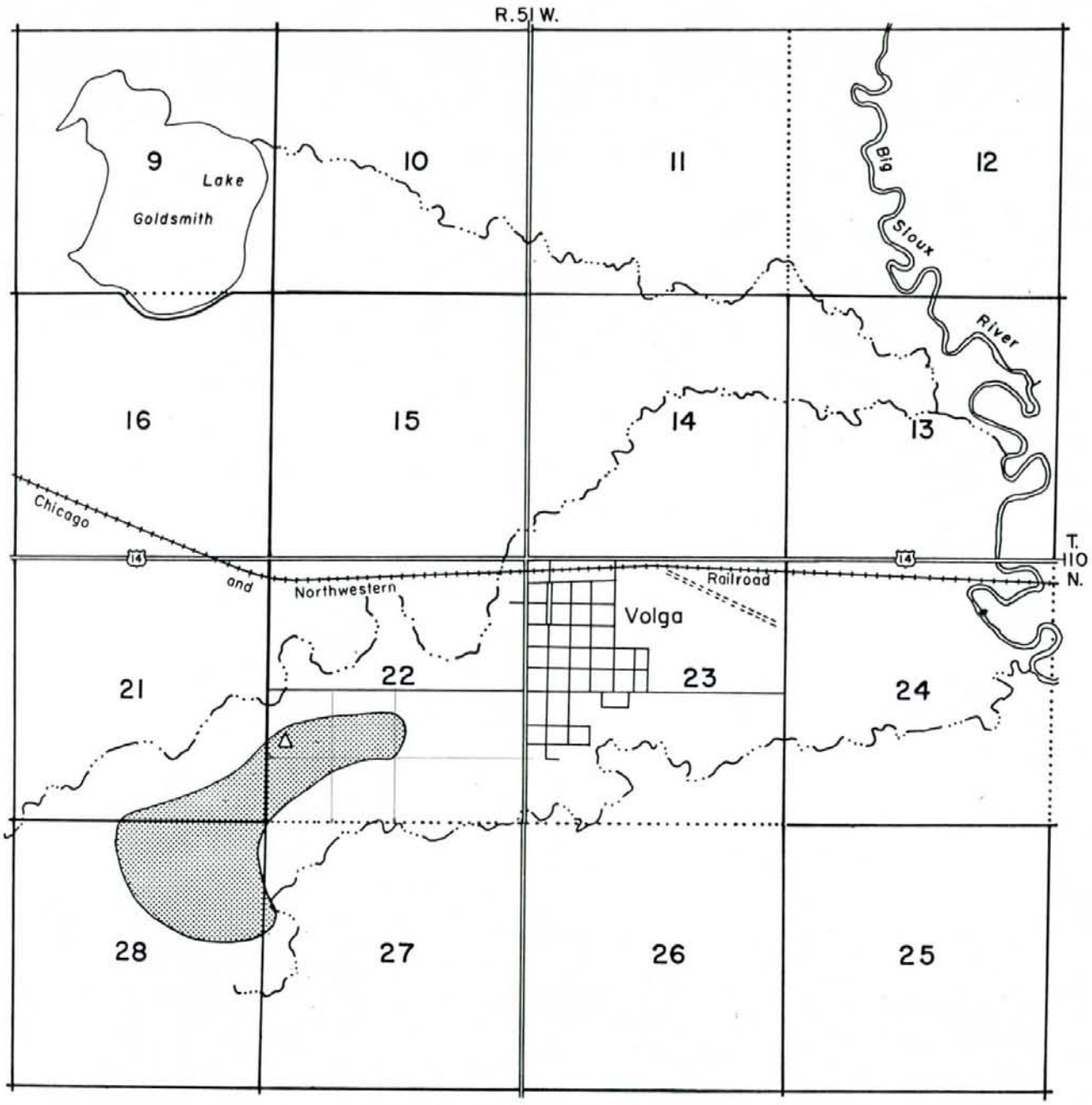


Figure 2. Map showing location of the recommend area for additional water supplies at Volga.

Appl. No. 5167-3

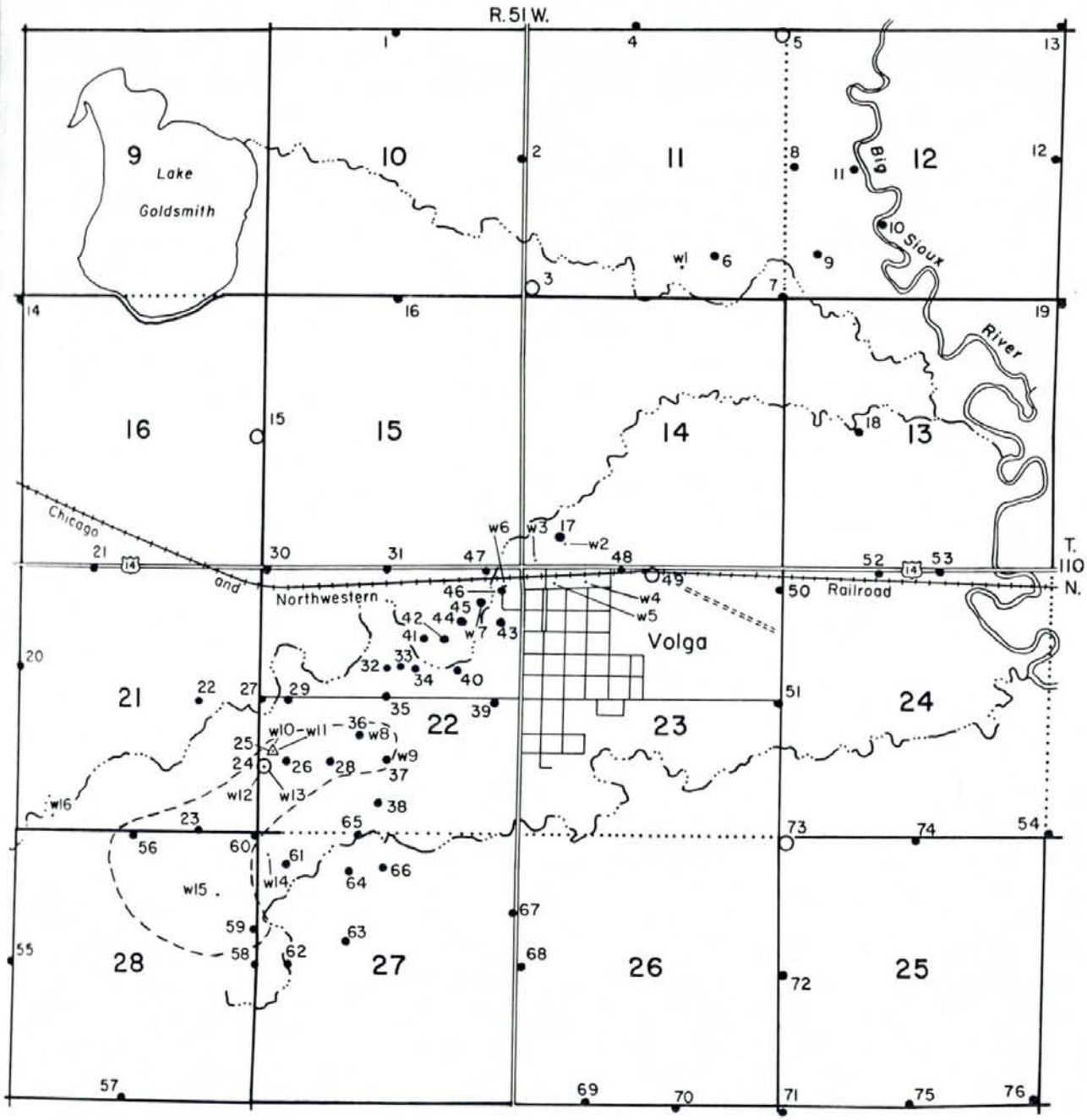
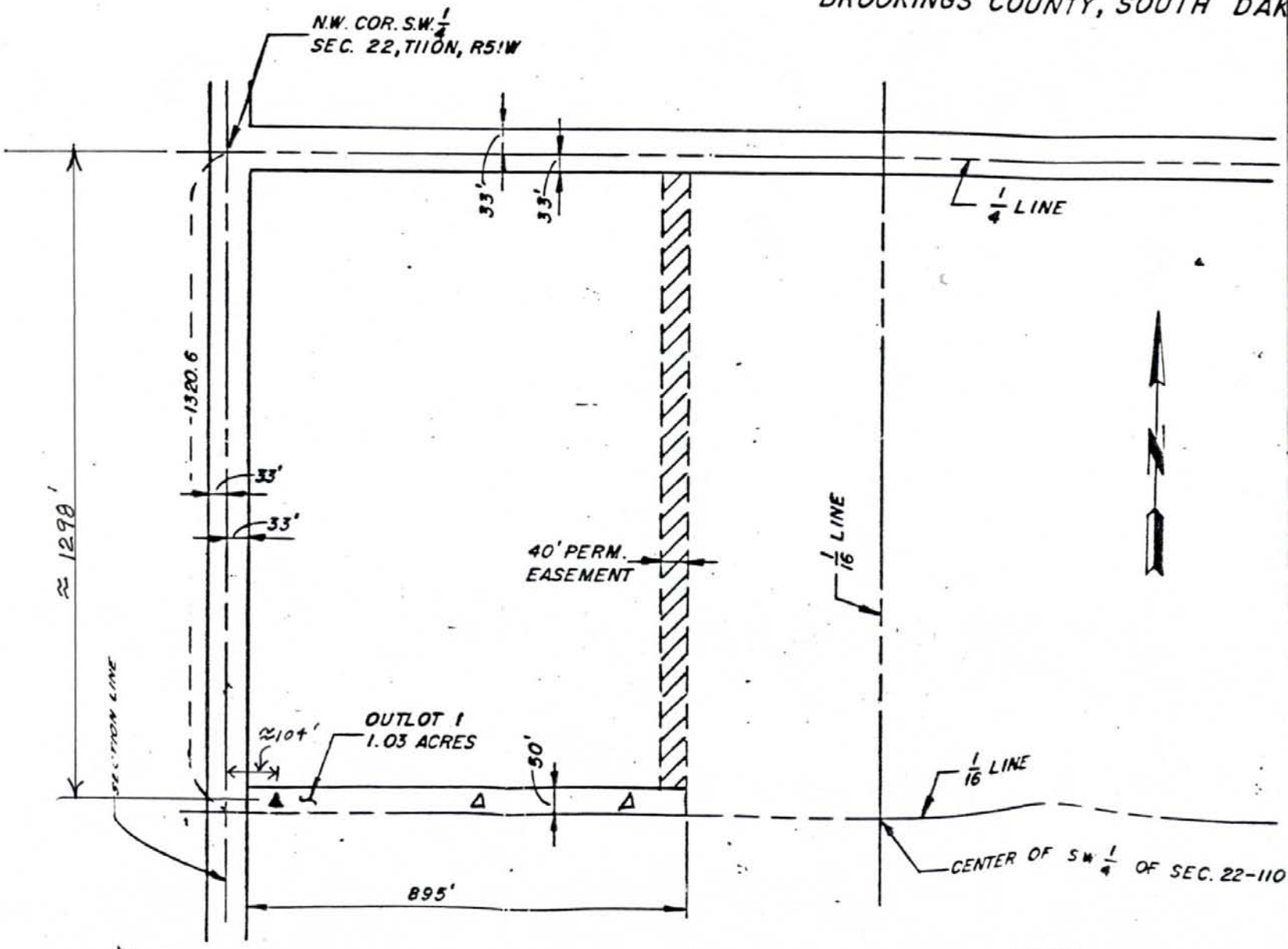


Figure 5. Data map of the Volga area.

Appl. No. 5167-3

PLAT OF

OUTLOT 1 IN THE SW.¼ OF SEC. 22
& EASEMENT FOR UNDERGROUND WATER TRA
BROOKINGS COUNTY, SOUTH DAK



5167-3

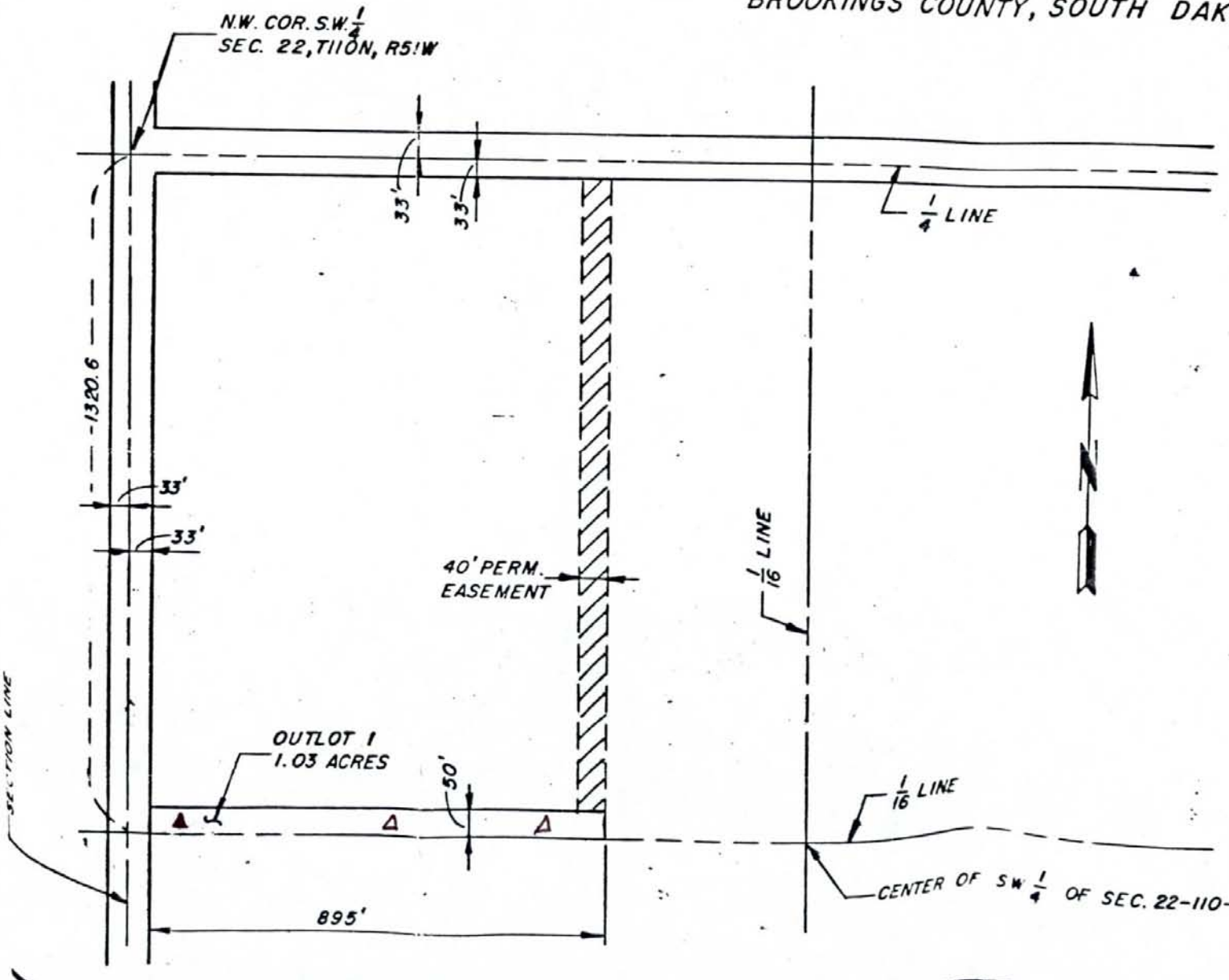
field verified
8 May 1996
Dale N Selken

▲ Proposed well
△ Existing wells

SURVEYOR'S CERTIFICATE

PLAT OF

OUTLOT 1 IN THE SW.1/4 OF SEC. 22-
& EASEMENT FOR UNDERGROUND WATER TRANS
BROOKINGS COUNTY, SOUTH DAKO



▲ Proposed well

△ Existing wells

SURVEYOR'S CERTIFICATE

Appl. No. 5167-3