

1. Considered 5-1, 1962

1027-3

2. Name of Applicant U.S. Bureau of Reclamation

3. Post Office Address BILLINGS MONTANA

4. Amount of water claimed 2,495 acre feet storage

5. Source of water supply James River

6. Water to be used for Municipal use
Acres to be irrigated _____

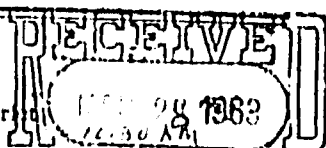
7. Water to be diverted and used in Billings County
about 15 miles N of _____

8. Proof of Publication Received ☒
Not Received _____

9. Application Approved ☒
Subject to _____
Not Approved _____
Action deferred _____

10. Remarks:

A 20 cfs By Pass

No. 1027-3Water Division No. 3 JAMES RIVER
(Blanks to be filled by the Engineer for the W. R. C.)STATE WATER RESOURCES COM.
S.D. 12-28-62

APPLICATION FOR PERMIT To appropriate Water within the State of South Dakota

(NOTE—Draw a line through items not applicable.)

1. Name of applicant United States of America acting through Bureau of Reclamation,
Department of Interior
Postoffice address Billings, County Yellowstone, State Montana

I. If a corporation

(a) Name of same

(b) Date and place of incorporation

(c) Amount of capital stock

(d) Amount paid in

(e) Names and addresses of directors

(NOTE—A certified copy of articles of incorporation must accompany the application.)

II. Method of accomplishing the work and financial resources of the applicant:

(a) Method of accomplishing work (Whether by contract, employment of others, or by direct labor)

Contract funds appropriated by the United States Congress

(b) Cash on hand, \$

(c) Treasury stock, \$

(d) Bonds to be issued, \$

(e) Other resources, \$ Funds to be appropriated
by United States Congress2. Name of diversion work James Diversion Dam3. Amount of water claimed 2,495 acre-feet annually * See remarks
cubic feet per second4. Source of water supply James River5. Location of point of diversion Dam SW 1/4 NW 1/4 Section 13, T. 113, R. 62 W., Fifth Principal Meridianlocated on James River on bank Beadle County.6. Annual period or periods during which water is to be used continuous

7. To be used for:

I. Irrigation or domestic use: Gravity, overhead sprinkling or combination system?

(a) Number of acres to be irrigated acres.

(b) Legal subdivisions to be irrigated

(NOTE—A list of lands to be irrigated, giving each subdivision and fraction with acreage thereof, should be written here, or may be appended as a part of this application. Same must also be shown on accompanying map.)

(c) Statement as to domestic use (giving location, etc.) The water is to be used by theCity of Huron, South Dakota, for municipal purposes.

II. Stockwatering, mining, milling, power, fish culture, fire protection and public recreation:

(a) Nature of use Municipal use includes fire protection, recreation, industrial.

Name any of the above uses claimed

(b) Amount of power to be generated horsepower.

Amount claimed for engine cooling

(c) Location of plant

(d) Method of developing power

(e) Point where water will be returned to stream Through City of Huron, sewage disposal
plant located in the NE 1/4 NE 1/4 Section 7, T. 110 N., R. 61 W.

MAP NO 643-3

8. Estimated cost of work:

(a) Head-gates, \$----- (b) Pumping plant, \$-----
 (c) Fluming, \$----- (d) Canal earth, \$-----
 (e) Other structures Dam \$430,000
 Total, \$-----

9. Description of diversion works:

I. Nature of works: (Reservoir, dam, ditch, flume, pumping plant, etc.)

Concrete weir type dam forming reservoir on the James River.

II. Dimensions of works.

(a) Dam: Height 15.5 feet; length at bottom 50 feet; length at top 50 feet; thickness at bottom 19.6 feet; thickness at top 4.5 feet; slope at front water face vertical; slope at back face 3/4:1
 material used in construction reinforced concrete

(b) Reservoir: Capacity when filled 4875 acre feet. Surface area at highwater normal water surface is 990 acres. * See remarks

Elev.
(ft. - msl)

1270.0
1230.0
1235.0
1240.0
1240.5
1245.0
1250.0

DEPTH AT OUTLET-Feet	SURFACE AREA AT EACH DEPTH AT OUTLET-ACRES	FEET	ACRE-Feet CAPACITY
0	0		0
3	80		76
8	418		1,213
13	905		4,493
13.5	990 crest of overflow section		4,875
18.0	1,534		10,352
23.0	3,573		23,067

Because of land surface irregularities, capacities were computed from numerous cross-sectional areas rather than from contour areas.

Sluiceway

(c) Head-gate: Width 2 - 6'x6' slide gates feet; height feet;
 Material Steel - Releases from reservoir into river made through these two gates.
 (d) Canal: Total length miles.

LOCATION BELOW HEADGATE	DEPTH	BOTTOM WIDTH	WIDTH AT WATER LINE	GRADE PER MILE
At ----- Mile	----- feet	----- feet	----- feet	----- feet
At ----- Mile	----- feet	----- feet	----- feet	----- feet
At ----- Mile	----- feet	----- feet	----- feet	----- feet
At ----- Mile	----- feet	----- feet	----- feet	----- feet
At ----- Mile	----- feet	----- feet	----- feet	----- feet
At ----- Mile	----- feet	----- feet	----- feet	----- feet

(Give dimensions where reductions in size are made.)

10. Time required for completion of work two years.
 11. Time required for complete application of water to the proposed beneficial use two years.
 12. Choice of newspaper for publication of notice of intention to appropriate Daily Plaindealer, Huron, South Dakota

STATE OF SOUTH DAKOTA MONTANA

County of Yellowstone ss.

I, H. G. Arthur, being first duly sworn on my oath depose and say: That my relation to the above described undertaking is that of owner, that I have read the above foregoing statement, examined the map accompanying the same, and that I know of my own personal knowledge that the matters therein stated and shown are true.

Signed

Director, Region 6, Bureau of Reclamation

Subscribed and sworn to before me this 18th day of March 1942

Notary Public (or other qualified officer.)

Remarks by State Water Resources Commission:

This permit is subject to downstream prior water rights and provisions must be made for passage of 20 c.f.s. of water inflows to the reservoir for such water rights and downstream domestic use. This permit also includes the transfer of 280 acre feet of storage from the 3rd Street Dam (vested right #1022-3) and 2100 acre feet ^{of storage} from the Spink County Reservoir, (vested right #1023-3)

STATE OF SOUTH DAKOTA
County of Hughes ss.

Pierre, South Dakota, December 31, 1963

This is to certify that the foregoing application was received by the Commission at 10:30 o'clock a.m. upon the 28th day of March, 1963

State Water Resources Commission

By:

Durston Jones
for Chief Engineer, Executive Officer

Number of permit 1027-3

Date of first receipt of application March 28, 1963

Date of return to applicant for correction, amendments or changes required as follows: _____, 19____

Date of receipt of corrected application _____, 19____

Date from which applicant claims right 280 acre feet of storage 1936 (3rd St Dam)
2100 acre feet of storage 1937 (SPINK Co. Dam)
2445 acre feet of storage March 28, 1963 (New)
Approved May, 1963, Recorded in Book 8 Page 146

This is to certify that we have examined the foregoing application for a permit to appropriate water of the State of South Dakota, and we hereby grant the same as stated herein, subject, however, to the following limitations and conditions:

1st. The equivalent of at least one-fifth of the work above specified is to be completed on or before _____

May 1, 1964

2nd. The whole of said work is to be completed on or before _____

May 1, 1965

3rd. The limit of time for proof of beneficial use of water appropriated in accordance herewith is _____

May 1, 1965

4th. The water appropriated shall be used for the purpose of municipal use

5th. 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 injuriously affected by this appropriation.

6th. The amount of the appropriation herein granted shall not exceed 4875 acre feet annually ~~cubic feet per second~~; neither shall it exceed the capacity of the above described system of diversion works, nor the least amount of water that experience may hereafter indicate as necessary for the production of crops in the exercise of the best husbandry, and further said appropriation must be limited to not more than one-seventieth (1/70) of one cubic foot of water per second of time for each acre of land to which water is actually

used for municipal purposes

and beneficially ~~applied for irrigation~~ on or before May 1, 1965; said water to be used during the following described annual period:

Witness my hand this 31ST day of December, 1963

State Water Resources Commission

By:

W. C. Sullivan
Chief Engineer, Executive Officer

Certificate of Construction issued APRIL 4, 1966

Water License Issued APRIL 4, 1966

Remarks by the Applicant: The James Diversion Dam is to be constructed on the James River 15 miles north and 1 mile west of the City of Huron, South Dakota, in the SW $\frac{1}{4}$ NW $\frac{1}{4}$, Section 13, T. 113 N., R. 62 W., fifth principal meridian. The water stored in the reservoir, formed by the dam, is for a municipal supply for the City of Huron, South Dakota.

The dam consists of a concrete overflow section 50 feet wide, a sluiceway 12 feet wide controlled by 2 - 6'x6' steel slide gates. The end sections which protect the concrete overflow section and sluiceway are of compacted earth protected with rock riprap. Including the end sections the overall length of the dam is about 320 feet.

Water from the reservoir will be released through the 2 - 6'x6' sluiceway gates into the James River, and flow down the river to the City of Huron's raw water intake located on the west bank of the James River at a point N 22° 30' E. 245 feet from the SW corner of the SE $\frac{1}{4}$ NE $\frac{1}{4}$ Section 6, T. 110 N., R. 61 W.

The land that will be flooded by the water in this reservoir will be acquired in fee by the United States or a flowage easement taken thereon.

The total storage capacity behind James Diversion Dam is 4,875 acre-feet. This includes 2,495 acre-feet of new storage for which the United States is filing this application for a permit. It also includes 280 acre-feet behind Third Street Dam and 2,100 acre-feet in Spink County Reservoir. Transfer of South Dakota's rights in Spink County Reservoir, of the City of Huron's storage rights in Spink County Reservoir, and of 280 acre-feet of the City of Huron's storage rights in its Third Street Dam, to James Diversion Dam under their original priorities is hereby requested; title to said transferred storage to remain in the State and City, respectively. The United States hereby consents to a condition or limitation being incorporated in the permit herein requested, to the effect that the reservoir formed by the proposed James Diversion Dam must be operated in a manner that will fully protect the State's and City's storage rights.

Spink County Dam may be destroyed or breached upon completion of James Diversion Dam. Documents by which the State, and City of Huron agree to removal of Spink County Dam and transfer of certain storage rights to James Diversion Dam are attached.

STATE OF SOUTH DAKOTA

WATER LICENSE No. 1027-3

WHEREAS, On the 28th day of March A. D. 1963
the United States Bureau of Reclamation

of Huron County of Beadle and State of South Dakota
duly made application (No. 1027-3) to us for a permit to use 4875 acre feet
annually of the waters of the James River
County of Beadle, State of South Dakota, for municipal and recreation
purposes; and

WHEREAS, On the 31st day of December A. D. 1963
Permit No. 1027-3 was issued to said applicant for the storage
completion of the works of diversion therein described on or before the 1st
day of May A. D. 1965 and for the application to beneficial use of said
water on or before the 1st day of May A. D. 1965
and,

WHEREAS, On the 13th day of December A. D. 1965
the holder of said permit duly made proof of the completion of adequate works for the storage
feet annually of said waters, as evidenced by our Certificate No. 1027-3
dated April 4, 1966 confirming the completion of works of sufficient capacity for
diverting and conveying to the place of intended use 4875 acre feet annually
priority of 1936, 1937 March 28, 1963 and,

WHEREAS, On the 13th day of December A. D. 1965
proof was duly made of the application to beneficial use of 4875 acre feet annually
for municipal use by the City of Huron, South Dakota, and for recreational use.

NOW, THEREFORE, By the virtue of the authority vested in us by the laws of the State of South Dakota,
We hereby grant and confirm to the United States Bureau of Reclamation
of Huron the holder and owner of said permit No. 1027-3
a water right, dating from 1936, 1937, and March 28, 1963 to the use of 4875 acre feet
annually
~~under the provisions of~~ the waters of the James River
in the County of Beadle and State of South Dakota, or so much thereof as may be
necessray for the purposes hereinbelow mentioned, to be diverted at a point in the SW 1/4 NW 1/4 Section 13,
T113N, R62W
and ~~XXXXXX~~ stored in place

for the purpose of municipal use and recreation

subject, however, to the laws of the State of South Dakota applicable to a license for the use of the waters of the State, and subject, also to the local or community customs, rules and regulations which have been or may be adopted from time to time by a majority of the users from a common source of supply, canal or lateral from which such water may be taken, when such rules and regulations have for their object the economical use of such water.

WITNESS, My hand and seal of our office at Pierre, South Dakota,
this 4th day of April A. D. Nineteen
Hundred and Sixty-Six

State Water Resources Commission

By:

J. W. GRIMES
Chief Engineer, Executive Officer

STATE OF SOUTH DAKOTA

Water License No. _____

To _____

Source of Supply _____

County _____

Am't _____ c. f. s.

Point of Diversion _____

Place of Use _____

Purpose _____

Date of Priority _____

Recorded _____

In Book _____ of _____ Page _____

Permit No. 1027-3Water Division No. 3 James River
Water District**Certificate of Completion of Works**

TO ALL WHOM IT MAY CONCERN:

This is to Certify, That the United States Bureau of Reclamationof Huron, County of Beadle, and State of South Dakotathe holder of Permit No. 1027-3, issued upon Application No. 1027-3, bearing date of priority of 1936, 1937 and March 28, 1963 storageauthorizing the ~~XXXXXX~~ of 4875 acre feet annually ~~XXXXXX~~ of the waters of the James RiverCounty of Beadle State of South Dakota, at a point in theSW 1/4 NW 1/4 Section 13, T113N, R62Wfor municipalpurposes, has fully complied with the provisions of the laws of the State of South Dakota relating to proof of completion of the works of diversion set out and described in said Permit; that said works are found in satisfactory condition for diverting and conveying to the place of intended use 4875 acre feet annually ~~XXXXXX~~of water; and that the ~~XXXXXX~~ use of said water are described as follows, to-wit: to be used for municipal water supply for the City of Huron, South Dakota, and for recreational purposes.Witness my hand this 4th day of April A. D. 1966

State Water Resources Commission

By: J. W. GRIMES
Chief Engineer, Executive Officer

No. 1027-3

on or before
(First Publication) April 5, 1963

APPROPRIATION OF WATER

Office of State Water Resources Commission,

Pierre, S. Dak, April 1, 1963

Notice is hereby given that the United States Bureau of Reclamation whose postoffice address is Billings, Montana

the provisions of the water laws of South Dakota for a permit to appropriate for **storage** **acre feet annually** **beneficial use** **2,195**
~~the amount of water per second of time~~ from the James River
James Diversion Dam through the

~~XXXXXXXXXXXX~~
 tank or sand stream in the SW ¼ of the NW ¼ of Section 13
 Twp. 113N Range 62W Said water to be used for the purpose of providing irrigation for the
~~XXXXXXXXXXXX~~

XXXXXX

This application will be taken up by the State Water Resources Commission at their office at Pierre for consideration upon the 1st day of May, 1963, at 2 P. M. All interested persons may appear and be heard.

Appropriate action will be taken by the Water Resources Commission after suitable time has elapsed for the consideration of any or all information presented.

State Water Resources Commission

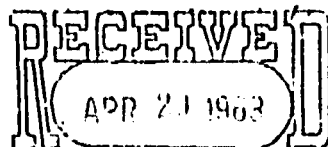
By:

BURTON F. JONES
Water Fight Specialist.

Copy: Publisher
Daily Plainsman
Huron, S. Dak.

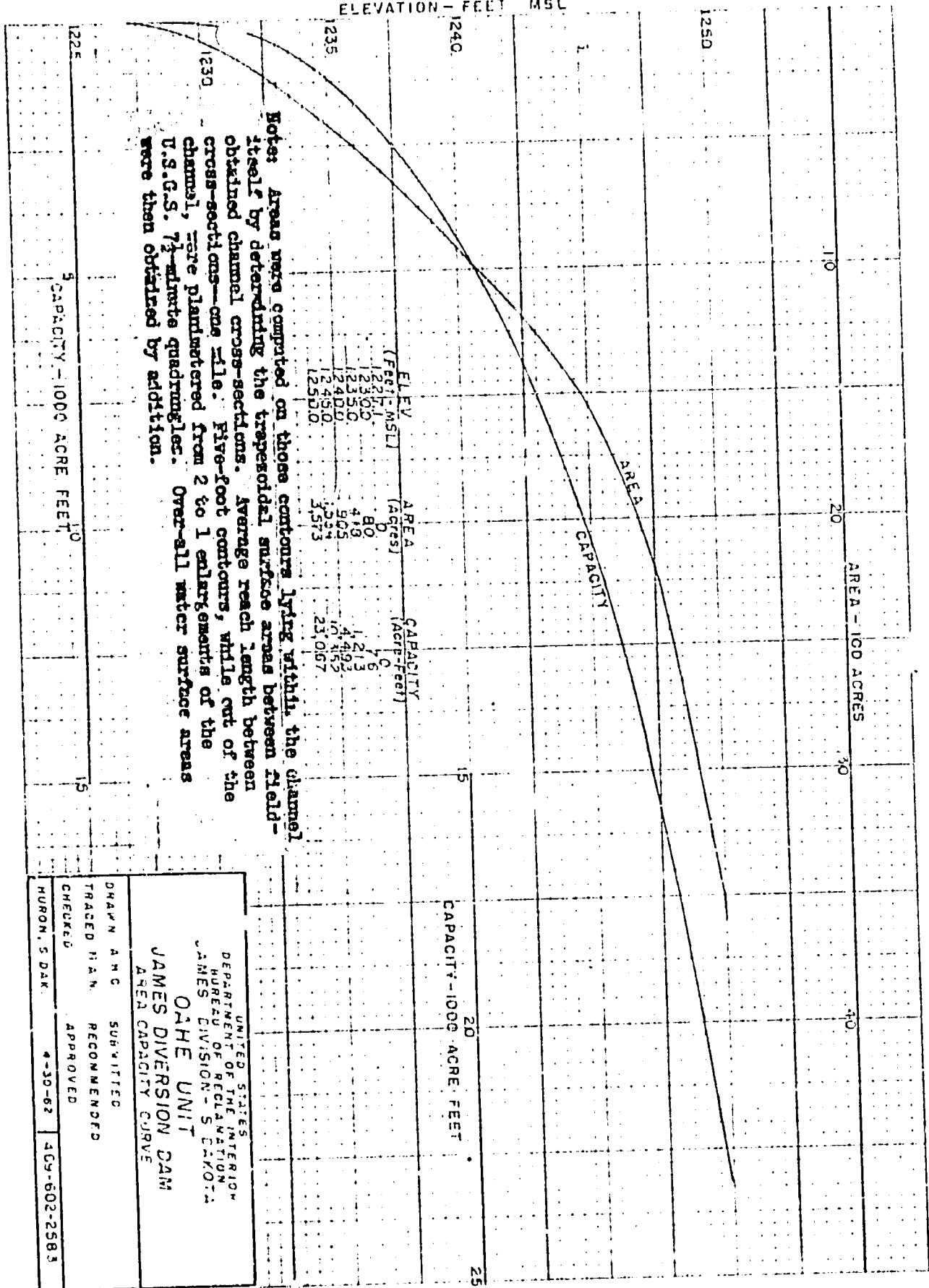
CC: Mr. H. E. Von Soggern

PROOF OF PUBLICATION

STATE OF SOUTH DAKOTA }
County BEADLE } ss.I, Jeannette C. Lust being duly sworn, deposes and says the annexed printed copy of Notice of Intention to Appropriate Water was taken from the _____Daily Plainsman 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 Huron County of _____Beadle and State of South Dakota; that the said notice was published in said newspaper on the following dates:April 5, April 12, April 19, and April 26in each and every issue of the full number thereof, the first publication being made on the 5 day of April 1963 and the last publication on the 26 day of April 1963, upon which days or times of publication aforesaid the newspaper was regularly published, and that during the whole time of said publication he was _____ the printer and publisher of the said newspaper.Jeannette C. LustSubscribed and sworn to before me this 26 day of April A. D. 1963.STATE WATER RESOURCES COMM.
PIERRE, SOUTH DAKOTANotary Public Beadle County, S. D.

FP 43-61
 APPROPRIATION OF WATER
 Office of State Water Resources
 Commission
 Pierre, S. Dak., April 1, 1963
 Notice is hereby given that the United States Bureau of Reclamation whose post-office address is Billings, Montana, has made an application in accordance with the provisions of the water laws of South Dakota for a permit to appropriate for storage 2,495 acre feet annually from the James River through the James Inversion Dam, the point of diversion of which is to be located in the SW 1/4 of the NW 1/4 of Section 13 Twp. 11 N Range 62 W. Said water to be used for the purpose of providing municipal supplies for the City of Huron.
 This application will be taken up by the State Water Resources Commission at their office at Pierre for consideration upon the 1st day of May, 1963, at 2 P.M. All interested persons may appear and be heard. Appropriate action will be taken by the Water Resources Commission after suitable time has elapsed for the consideration of any or all information presented.
 By: Burton F. Jones,
 State Water Resources Commission,
 Water Right Specialist, 1324
 No. 136 (adv.)

ELEVATION - FEET MSL



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
JAMES DIVISION - S. E. 100-1
O&HE UNIT
JAMES DIVISION DAM
AREA CAPACITY CURVE

DRAWN AND SUBMITTED
TRACED MAN. RECOMMENDED
CHECKED APPROVED
HURON, S. DAK. 4-30-62 409-602-2583

2.

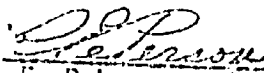
CERTIFICATE

STATE OF SOUTH DAKOTA }
COUNTY OF BEADLE } ss.

I, the undersigned, duly appointed, qualified and acting City Auditor of the City of Huron, South Dakota, do hereby certify that the attached is a full, true and correct copy of a Resolution as recorded in the original and official minutes of a regular meeting of the Board of City Commissioners of the said City of Huron held on the 4th day of February, 1963, in so far as the original minutes relate to the subject matter of the Transfer of Vested Water Storage Rights of the City of Huron, South Dakota, from the Third Street Dam Reservoir and the Spink County Dam Reservoir to the James Diversion Dam Reservoir upon completion of the James Diversion Dam in the James River, Beadle County, South Dakota.

In Witness Whereof, I have hereunto set my hand and the SEAL of said City of Huron, South Dakota, this 5th day of February, 1963.




R. E. Peterson, City Auditor
Huron, South Dakota

RESOLUTION

WHEREAS, The City of Huron owns and operates the Third Street Reservoir in the James River, Beadle County and the Spink County Reservoir in the James River, Spink County, South Dakota, in which it stores water for municipal use. The City of Huron now finds that these reservoirs, together with its other sources of water supply, are inadequate for its present and projected future use, and

WHEREAS, the City of Huron signed a Contract No. 14-05-W-129, dated September 10, 1962, for the Purchase of Water from the James Diversion Dam Reservoir in the James River, a feature of the Oahe Unit of the Missouri River Basin Project, which the United States of America will construct to impound an ample water supply for municipal use by the City of Huron, South Dakota, and

WHEREAS, the James Diversion Dam Reservoir will inundate the Spink County Dam, Spink County Dam Reservoir and extend partially into the area of the Third Street Reservoir in the James River, Beadle County; therefore, a consolidation of water storage rights for the City of Huron, South Dakota, in the James Diversion Dam Reservoir is deemed a necessity and in accord with the provisions of Contract No. 14-05-W-129, dated September 10, 1962.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS OF THE CITY OF HURON, BEADLE COUNTY, SOUTH DAKOTA:

That the Board of Commissioners of the City of Huron hereby authorizes and requests the United States of America, and the State of South Dakota Water Resources Commission and their authorized officers to take appropriate action to accomplish the following items in accordance with the provisions of contract for purchase of water Contract No. 14-05-W-129 dated September 10, 1962, between the City of Huron and the United States of America:

1. Transfer 280 acre-feet of water storage rights in the Third Street Reservoir to the James Diversion Dam Reservoir in the name of and for the City of Huron.
2. Transfer 2,100 acre-feet of water storage rights in the Spink County Dam Reservoir to the James Diversion Dam Reservoir in the name of and for the City of Huron.
3. If deemed necessary by the United States, the right is granted to breach or demolish as it sees fit the Spink County Dam Structure and inundate the Spink County Dam Reservoir with the James Diversion Dam Reservoir when the James Diversion Dam has been completed, and accepted by the City of Huron.

Voting for the approval and adoption of the Resolution: Yeas (5) Larson, Ambrosius, Anderson, Sanford and Denison. Nays (0) None.

Dated this 4th day of February, 1963.

G. W. Denison
Mayor, City of Huron
Beadle County, South Dakota

Attest: R. E. Peterson
City Auditor

January 1965

TENTATIVE OPERATING CRITERIA FOR JAMES DIVERSION DAM

Contract No. 14-C6-W-129 dated September 10, 1962, between the United States and the City of Huron, South Dakota, provides for the City to operate and maintain the James Diversion Dam and Reservoir and all appurtenant structures, which includes the auxiliary spillway.

The following operating criteria are intended to supplement the contract but are subject to change whenever considered appropriate:

1. When there is flow in the James River in excess of municipal and industrial demands for the City of Huron and downstream prior rights, the reservoir formed by the James Diversion Dam and the reservoir formed by the Third Street Dam will be maintained as near full pool level as is practicable.
2. When accretions to the James River below the James Diversion Dam are not sufficient to satisfy prior rights which total 20 c.f.s., inflows to the reservoir will be passed downstream to the extent necessary to meet these prior rights.
3. During floodflow periods and whenever the reservoir water surface level behind the James Diversion Dam is at or above elevation 1241.0, the slide gate should be in an open position.

Informational elevation data

Crest of Third Street Dam	1231.02 feet
Invert of sluiceway at James Diversion Dam	1227.0 feet
Crest of James Diversion Dam	1240.5 feet
Crest of auxiliary spillway at James Diversion Dam	1242.0 feet
Top Crest of James Diversion Dam	1247.0 feet
Crest of Spink County Dam (To be demolished)	1239.3 feet

The staff gage on the face of the James Diversion Dam has a zero setting at elevation 1230.0.

100-100000-100

REPORT ON WATER POLLUTION PROBLEMS - JAMES RIVER ABOVE HURON
DIVISION OF SANITARY ENGINEERING - STATE DEPARTMENT OF HEALTH
May 7, 1962

HURON WATER SUPPLY

Statement of Problem

The City of Huron obtains its raw water for domestic purposes from the James River. Proper protection of the James River from pollution upstream from Huron is mandatory to insure against public health hazards and to improve raw water quality. Discharge of raw or inadequately treated wastes from a number of municipalities above Huron constitutes the major sources of pollution. Raw sanitary sewage wastes are presently discharged into the James River or adjacent tributaries by the towns of Frankfort, Doland, Ashton, and Melleotte. The effluent from the Aberdeen sewage treatment plant is discharged to a tributary of the James River, however, complete treatment is provided for the municipal wastes. Recommendations have been made to the City of Aberdeen to engage a consulting engineering firm for studies and cost estimates of necessary treatment improvements. The treatment plant is not seriously overloaded, however, modernization of the facilities is indicated. The City of Aberdeen is expected to be cooperative in such a program.

A summary of program activities for each of the municipalities presently discharging raw wastes follows:

1. Frankfort

Numerous reports have been provided to the City and personal contacts made regarding provisions for sewage treatment. A listing of reports and correspondence follows:

July 21, 1944 - Report
May 10, 1954 - Report
May 16, 1958 - Report
November 16, 1960 - Report
December 2, 1960 - Official Letter of Ratification
December 27, 1960 - Letter
January 4, 1961 - Letter
May 8, 1961 - Letter

As a result of all of the previous reports, correspondence and numerous personal contacts, no action has been taken by the Town of Frankfort toward providing for waste treatment facilities.

2. Doland

The need for proper waste treatment has long been established with the Town of Doland as indicated by the following listing of reports and correspondence:

July 17, 1944 - Report
August 14, 1953 - Report

April 26, 1954 - Report
 May 12, 1958 - Report
 December 2, 1960 - Official Letter of Notification
 May 8, 1961 - Letter

The Town of Doland has completely ignored correspondence with recommendations for providing waste treatment facilities. No reply has been received to the official letter of notification dated December 2, 1960 in spite of repeated contacts.

3. Ashton

Raw sewage is discharged into the James River at Ashton. Some action has been initiated by the Town of Ashton in this matter. A consulting engineer has apparently been instructed to make preliminary investigations and prepare an engineering report for sewage treatment facilities. Continued delays by either the City or their consulting engineer has brought about little progress toward completion of this facility.

4. Mellette

Action was taken in 1959 toward construction of waste treatment facilities. A consulting engineering firm was engaged and final plans and specifications were prepared. A grant under the provisions of the Federal Water Pollution Control Act was made to the City of Mellette on May 4, 1959. This grant is still being held for the City as a result of repeated requests for time extensions. The plans and specifications for the project have been approved by the State Department of Health and the Public Health Service.

Further progress toward completion of the project ceased after the above actions were completed in 1959. Repeated contacts and correspondence directed to the City has brought no further action toward construction of the facilities.

Action Proposed

Attendance at a council meeting in each of the above municipalities has been arranged for the week of May 7, 1962. The attitude of the municipal officials with respect to action required toward completion of the facilities will serve as a guide for future action by the regulatory agencies. From past experience, it is doubtful that any of these four municipalities will proceed without a forceful attitude by the regulatory agencies.

The potential seriousness of discharging raw wastes upstream from a domestic raw water intake indicates a need for a program to bring about prompt construction of the necessary facilities. All four of these municipalities are located in Spink County so that they could be collectively called to an official hearing of the Committee on Water Pollution. Such a hearing would, of course, be held in the County Seat of Spink County.

A resolution indicating the action that the Committee on Water Pollution intends to take, unless corrective measures are initiated within a specified time, would

be most helpful in contacts with the municipal officials. September 1, 1962 would seem to be a reasonable date by which time the projects should be under contract for construction. Intermediate dates could also be established to check on progress being made toward completion of the projects if desired. Such intermediate dates would probably need to be in the form of recommendations rather than specific deadlines.

ABERDEEN WATER SUPPLY

Statement of Problem

The City of Aberdeen obtains its raw water source from the Elm River at a point near Ordway, which is approximately seven miles northeast of the City. The Town of Frederick is located approximately twenty stream miles above this water plant intake on a tributary of the Elm River. Raw sewage from that municipality is discharged directly into the stream.

Repeated contacts, reports and other correspondence have failed to bring about any action at Frederick toward providing waste treatment facilities. A listing of the reports and correspondence recommending adequate sewage treatment works follows:

May 5, 1944 - Report
 May 15, 1954 - Report
 March 23, 1956 - Letter
 March 30, 1956 - Letter
 December 23, 1957 - Report
 September 23, 1960 - Report
 December 2, 1960 - Official Letter of Notification
 May 8, 1961 - Letter

No acknowledgement of the reports and letters of any type has been received.

Action Proposed

Action similar to that recommended for the municipalities above Huron is indicated at Frederick. The problem is of a similar type and equally as significant.

SUMMARY

A map indicating the location of these municipalities with respect to the sources of water supply has been prepared. Further consideration and discussion by the Committee together with recommendations for future action would be appreciated.



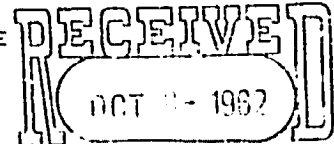
IN REPLY
REFER TO: 400

1024.2

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

REGION 6
MISSOURI-OAHE PROJECTS OFFICE
P. O. BOX 825
HURON, SOUTH DAKOTA

OCT 5 1962



STATE WATER RESOURCES COMM.
PIERRE, SOUTH DAKOTA

Mr. J. W. Grimes
Chief Engineer and Executive Officer
State Water Resources Commission
Pierre, South Dakota

Dear Mr. Grimes:

Enclosed for your files is a copy of the contract between the United States and the City of Huron for the purchase of water from the James Diversion Dam and Reservoir.

Sincerely yours,

N. L. Baker

Acting
Project Manager

Enclosure

Contract No. 14-06-W-129

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

Oahe Unit
Missouri River Basin Project

RECEIVED
OCT 11 1962
STATE WATER RESOURCES COMM.
PIERRE, SOUTH DAKOTA

CONTRACT FOR PURCHASE OF WATER

THIS CONTRACT, Made this 10th day of September, 1962, pursuant to the Act of Congress approved June 17, 1902 (32 Stat. 388), and Acts amendatory thereof and supplementary thereto, and the Act of December 22, 1944 (58 Stat. 887), between the UNITED STATES OF AMERICA, hereinafter called the United States, represented by the officer executing this contract, hereinafter called the Contracting Officer, and the CITY OF HURON, SOUTH DAKOTA, hereinafter called the City.

WITNESSETH, That:

WHEREAS, the following statements are made in explanation:

A. The City owns and operates the Third Street Reservoir in Beadle County and the Spink County Reservoir in Spink County, South Dakota, in which it stores water for municipal use. It now finds that these reservoirs, together with its other sources of supply, are inadequate for its present and future needs.

B. The United States proposes to construct, as a feature of the Oahe Unit of the Missouri River Basin Project, the James Diversion Dam in the James River, which will, in part, lie in the bed of the Third Street Reservoir and which will impound water that will inundate the Spink County Dam and Reservoir. This will make additional water available for beneficial uses.

C. The City wants to purchase all of the water the United States impounds by means of the James Diversion Dam.

NOW, THEREFORE, in consideration of the mutual promises herein contained, it is agreed:

TERM OF CONTRACT

1. This contract will be effective upon execution and will continue in force for twenty (20) years from the first day of the first water year.

RIGHTS-OF-WAY

2. The City, by appropriate instruments, will authorize the United States to build the James Diversion Dam partially in the bed

DATE MICROFILMED

CAMERA OPERATED

of its Third Street Reservoir and also the right to breach or demolish, as it sees fit, its Spink County Dam and to flood and inundate Spink County Reservoir when the Diversion Dam is completed. The City will convey to the United States all lands or interests in lands it now owns that will be occupied by the James Diversion Dam and Reservoir. The United States will acquire at its expense all other lands or interests in lands required for said dam and reservoir and will hold the City free from any costs or damages incurred by reason of the construction or existence thereof. The United States will, thereafter, store in the James Diversion Reservoir Two Hundred and Eighty (280) acre-feet of the City's Third Street Reservoir storage and the entire Two Thousand One Hundred (2,100) acre-feet of its Spink County Reservoir storage.

TRANSFER OF WATER RIGHTS

3. The City and the United States will jointly request the South Dakota Water Resources Commission to transfer to the James Diversion Reservoir Two Hundred and Eighty (280) acre-feet of the City's Third Street Reservoir storage right and all of its Spink County Reservoir storage right. Title to said water will remain in the City.

FURNISHING OF AND PAYMENT FOR WATER

4. The first day of the month following that in which the United States notifies the City that water is available from the James Diversion Reservoir will be the first day of the first water year under this contract. On or before the first day of the first water year, and semi-annually thereafter, the City will pay to the United States the following sums:

<u>Payment Period</u>	<u>Amount Each Period</u>
First and second	\$ 7,200
Third and fourth	8,100
Fifth and sixth	9,900
Seventh and eighth	11,700
Ninth and tenth	13,500
Eleventh and twelfth	15,300
Thirteenth and all subsequent	17,100

which will entitle the City, during the period for which each payment is made, to use all of the water stored in said Reservoir, to be delivered at the outlet works of the Dam.

OPERATION AND MAINTENANCE

5. (a) On the first day of the first water year under this contract the City will assume the operation and maintenance of the James Diversion Dam and Reservoir under the general direction and supervision of the Contracting Officer and will maintain the Dam and Reservoir and all appurtenant structures in full compliance with the terms of this contract and in such manner that they shall remain in good and efficient condition to perform the storage and diversion of water as well and efficiently as on the date of assumption by the City of such operation and maintenance.

(b) If the Contracting Officer finds it advisable, for any reason, the United States may assume the operation and maintenance of the Dam and Reservoir. In such a contingency, the City will, within ten (10) days, advance to the United States its estimated cost of operating and maintaining the Dam and Reservoir for the remainder of the water year. Thereafter, on the first day of each water year in which the United States operates and maintains the Dam and Reservoir, the City will advance to it the estimated cost of that year's operation and maintenance as determined by the Contracting Officer who will adjust such amount to take care of any deficit or over-payment of such cost in the previous year. In the event the United States assumes the operation and maintenance of the Dam and Reservoir, it may retransfer such operation and maintenance to the City at any time and the City will accept such retransfer.

(c) On account of drouth, hostile diversion, or other causes there may be years in which the United States has no storage in the James Diversion Reservoir but this will not excuse the City from making the payments required hereunder. In no event will liability accrue against the United States, its officers, agents, or employees for any damage, direct or indirect, arising out of such lack of water or arising from any lack of purity or potability of the water furnished the City hereunder.

OAHE UNIT WATER AVAILABLE

6. When water is available for use by the City through other works of either the Oahe or Garrison Units of the Missouri River Basin Project, the United States may, and will, upon the execution by the City of a new contract satisfactory to the Contracting Officer, terminate this contract. The new contract will provide for the purchase of such amounts of Oahe Unit or Garrison Unit water as the City then needs.

WATER RATES

7. The water charges due the United States by the City hereunder will be operation and maintenance costs of the City's water system. The City will establish water rates adequate to maintain its municipal water system in good condition and to meet all payments due under this contract.

DEFAULT

8. (a) Interest will be paid at the rate of one-half per cent per month on any sums due the United States and unpaid, Provided that no penalty shall be charged to or paid by the City unless such delinquency continues for more than thirty (30) days.

(b) No waiver by the United States of its rights with respect to default or any other matter arising in connection with this contract will be deemed to be a waiver with respect to any subsequent default or matter or a waiver of its rights to bring suit for the collection of any funds due or owing it by the City. All rights of action for breach of this contract are reserved to the United States as provided in Section 3737 of the Revised Statutes of the United States, as amended (41 U.S.C. 15).

CONTINGENT UPON APPROPRIATIONS OR ALLOTMENT OF FUNDS

9. The expenditure of any money or the performance of any work by the United States herein provided for which may require appropriations of money by the Congress or the allotment of funds, will be contingent upon such appropriations or allotments being made. The failure of an allotment of funds will not relieve the City from any obligations then accrued under this contract and no liability will accrue to the United States in case such funds are not appropriated or allotted.

OFFICIALS NOT TO BENEFIT

10. No Member of or Delegate to Congress or Resident Commissioner will be admitted to any share or part of this contract nor to any benefit that may arise herefrom, but this restriction will not be construed to extend to this contract if made with a corporation or company for its general benefit.

DISCRIMINATION AGAINST EMPLOYEES OR APPLICANTS FOR EMPLOYMENT PROHIBITED

11. (a) In connection with the performance of work under this contract, the contractor agrees as follows:

- (1) The contractor will not discriminate against any employee, or applicant, for employment because of race, creed, color, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this nondiscrimination clause.
- (2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.
- (3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency Contracting Officer, advising the said labor union or workers' representative of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- (4) The contractor will comply with all provisions of Executive Order No. 10925 of March 6, 1961, and of the rules, regulations, and relevant orders of the President's Committee on Equal Employment Opportunity created thereby.
- (5) The contractor will furnish all information and reports required by Executive Order No. 10925 of March 6, 1961, and by the rules, regulations and orders of the said Committee, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Committee for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- (6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled in whole or in part and the contractor may be declared ineligible for further government contracts in accordance with procedures authorized in Executive Order No. 10925 of March 6, 1961, and such other sanctions

may be imposed and remedies invoked as provided in the said Executive Order or by rule, regulation, or order of the President's Committee on Equal Employment Opportunity, or as otherwise provided by law.

(7) The contractor will include the provisions of the foregoing paragraphs (1) through (6) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the President's Committee on Equal Employment Opportunity issued pursuant to Section 303 of Executive Order No. 10925 of March 6, 1961, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

(b) To carry out the regulations (41 CFR, Section 60-1.3) issued under Executive Order No. 10925 of March 6, 1961, the City is hereby bound and agrees to include in each subcontract which it shall make with a subcontractor paragraphs (1) through (7) of Section 301 of said Executive Order.

(c) The City further shall require each of its subcontractors (first tier) to include in every subcontract with each of their subcontractors (second tier) the following clause: "The here identify the subcontractor of the second tier by name/ shall incorporate by reference in each subcontract or purchase order with a subcontractor or supplier paragraphs (1) through (6) of Section 301 of Executive Order 10925 of March 6, 1961, unless exempted pursuant to Section 303 thereof."

IN WITNESS WHEREOF, the parties hereto have affixed their names the day and year first above written.

UNITED STATES OF AMERICA

By /s/ Kenneth Holun

Title Asst. Secy.
Department of Interior
CITY OF HURON, SOUTH DAKOTA

By /s/ Gene W. Denison

Title Mayor, City of Huron

ATTEST:

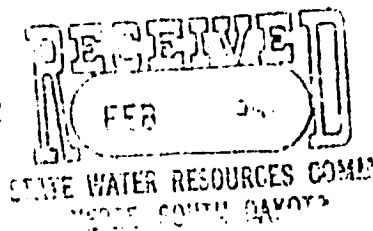
/s/ R. E. Petersen

Title City Auditor



UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SOLICITOR

P. O. Box 1538
Billings, Montana



January 31, 1963

South Dakota Water Resources Commission
Capitol Building
Pierre, South Dakota

Gentlemen:

The United States intends soon to file an application with you for permission to build the James Diversion Dam on the James River in the vicinity of Jamestown, South Dakota. This dam will inundate a dam known as the Spink County Reservoir, also on the James and will intercept a portion of the storage in another dam belonging to the City of Jamestown, known as the Third Street Reservoir. At the time of applying for a permit to build the Jamestown Diversion Dam, we will also request the transfer of the Spink County Reservoir storage right to the new James Diversion Dam Reservoir, title to the right to remain in the City, and also the transfer of some 250 acre-feet of storage in the Third Street Reservoir to the James Diversion. Title to this is also to remain in the City. The United States will apply for a right to store water in the space remaining in the James Reservoir.

We will appreciate receipt of any informational material which the Commission may have published concerning the form and content of such applications and copies of your current regulations, if published, together with any published forms or information as to drafting such applications. If possible, we would like to have this material in duplicate so that the Regional office of the Bureau of Reclamation may have one set.

Sincerely yours,

A. E. Bielefeld
A. E. Bielefeld
Field Solicitor

cc.

Regional Director, Reclamation, Billings, Montana - Attention: 400
Project Manager, Reclamation, Huron, South Dakota - Attn: 400

1027-3

App - Request
to James Reservoir

February 11, 1963

Mr. A. E. Bielefeld
Department of the Interior
P. O. Box 1538
Billings, Montana

Dear Mr. Bielefeld:

Your letter of January 31, 1963, requests information concerning application for water rights to cover construction of the James Diversion Dam.

Application forms and instructions are enclosed.

Also, enclosed is a pamphlet copy of the water statutes. Section 61.0123 provides special procedures through which the United States may secure withdrawal of unappropriated water and may perfect the water right upon completion of works and application of water to beneficial use. You may wish to proceed under these special procedures. However, since the authorization, funding and definite plans for the James Diversion Project are accomplished, it seems preferable to proceed as specified in Sections 61.0110 through 61.0114 for the permit and as specified in Sections 61.0115 through 61.0119 for perfecting the water right.

I believe that the Huron office of the Bureau of Reclamation is working with officials of the City of Huron with respect to the various storage capacities to be adjusted among the Third Street reservoir, the Spink County reservoir and the proposed James Diversion reservoir. I suggest that such adjustments by the City of Huron proceed before the Water Resources Commission at the same time as your application if such can be arranged.

I shall be pleased to help in this matter if desired.

Sincerely,

JWG:ls

J. W. GRIMES

Enc. 3 sets forms, instructions, copy of statute



DEPARTMENT OF AGRICULTURE
BUREAU OF PLANT INDUSTRY
PIERCE, SOUTH DAKOTA

NO: 700

Table with 4 columns and 10 rows, containing handwritten data. The columns are labeled 'No.', 'Date', 'Description', and 'Remarks'. The data includes various numbers and dates, such as '100', '100', '100', '100', '100', '100', '100', '100', '100', '100'.

Dear Mr. Von Rosenberg:

We consider that the Spirit County Dam about 10 miles north of
Laramie River must be demolished. We recognize that the
rubble as you suggested would be beneficial to King, Harvey
tribes of view, it would be even better if this rubble could be
disposed of in scattered smaller piles or stacks rather than in one large
rubble field. Our feeling is that if you are forced to land some of that
rubble on trucks to move it a short distance from the front of the site,
that you should consider moving it from 100 yards to one half mile up or
down stream and dump the rubble in scattered piles. This practice would
allow more time for feeding soon close to the safety of rocks.

Please remember that we feel that this suggestion is economically sound
only if you plan to use trucks to move some of the rubble. If you use
only blasting powder and believe in to remove the dam, then simply remove
the rubble as you suggested.

Have you asked the U. S. Fish and Wildlife Service for its opinion on

Very truly yours,

W. H. H. Von Rosenberg
Director, Bureau of Plant Industry

W. H. H. Von Rosenberg

January 10, 1930

Mr. W. H. Von Rosenberg
Bureau of Plant Industry
U. S. Fish and Wildlife
Service, South Dakota

Permit No. 1027-3.

Water Division No. 3 James River Water District

NOTICE OF COMPLETION OF WORKS

This blank must be filled out by the holder of permit and forwarded to the Executive Officer at least 60 days before the time set for completion of works

(P. O.) Box 2553, Billings, Montana

(Date) December 2, 1964

TO THE STATE WATER RESOURCES COMMISSION
SOUTH DAKOTA, PIERRE:

DEAR SIR: Notice is hereby given of the completion of the works for the diversion of 4875 acre-feet annually through the James Diversion Dam Reservoir for municipal purposes

In accordance with the terms and conditions of a certain permit heretofore issued by the Water Resources Commission of the State of South Dakota.

1. The name of the person or corporation holding said permit is United States of America

2. The postoffice address of such person or the place of business of such corporation is Billings County of Yellowstone State of Montana

3. The number of such permit is 1027-3 and the date set for the completion of such work is February 1, 1965

4. Said water to be used for municipal purposes.

5. Said ~~work of diversion~~ ^{dam} will be fully completed on the date set for such completion, and the amount of water which said works are capable of conducting to the place of intended use, in accordance with the plans accompanying the application for such permit, is 4875 acre-feet annually. cubic feet per second.

6. ~~The amount of land for which said water is available is~~ particularly described as follows: The water is to be used by the City of Huron, South Dakota, for municipal purposes.

I hereby certify that the facts set forth in the above notice are true.

UNITED STATES OF AMERICA

(Signature of Owners)

E. Richard Aron

For

Regional Director, Region 6

Bureau of Reclamation

Permit No. 1027-3Water Division No. 3 James River Water District

Notice of Application of Water to Beneficial Use

(This blank must be filled out by holder of permit and forwarded to the State Water Resources Commission at least sixty days before the time set for application of water.)

(P. O.) Box 2553, Billings, Montana(Date) December 2, 1964

TO THE STATE WATER RESOURCES COMMISSION OF SOUTH DAKOTA, PIERRE:

DEAR SIR: Notice is hereby given that on the 1st day of February 1965, at Huron County of Beadle State of South Dakota, before an officer of the Water Resources Commission proof will be submitted of the application to beneficial use of 4875 acre-feet annually of the waters of James River through James Diversion Dam Reservoir in accordance with the terms and conditions of Permit No. 1027-3 heretofore issued by the Water Resources Commission of South Dakota

- The name and postoffice address of the person or corporation holding said permit are United States of America
- The use to which said water has been applied is municipal by the City of Huron, South Dakota
- The amount applied to beneficial use is 4875 acre-feet annually
- The place where said water is used is (if for irrigation, give full and accurate description of the lands irrigated) In city of Huron, South Dakota
- The name of the canal or ditch or other works by which said water is conducted to such place of use is James River Channel to the City of Huron's raw water intake
- The right to take the water from such works is based upon permit No. 1027-3
- The source of supply from which such water is diverted is James River via James Diversion Dam Reservoir
- The date of priority which said user is prepared to establish is March 28, 1963

UNITED STATES OF AMERICA

(Sign) E. Richard Brown
for Regional Director, Region 6
Bureau of Reclamation

Permit No. 1027-3Water Division No. 3James River Water District

Certificate of Examination of Works

Report of Examining Engineer

To the State Water Resources Commission, Pierre, South Dakota:

Dear Sirs: I hereby certify that in accordance with your letter of authorization dated _____

1965, I have this day made a thorough examination of the diversion works constructed by U.S. of America
 through Bureau of Reclamation, Dept. Interior, of Billings,
Yellowstone County, Montana, holder of Permit No. 1027-3, issued
 upon Application No. 1027-3, bearing date of priority of May 28, 1963 and other dates _____, authorizing the
^{storage} diversion of 2495 Ac. Ft. annually cu. ft. per second of the waters of James River for municipal
 purposes. I have to report on the condition of the same as follows:

The diversion works comprise: 50' x 6 1/2' opening concrete spillway, C.C. Type 62' long
compacted & ripraped abutments
6' x 6' steel gate & concrete sluiceway
Grassed secondary spillway 150' x 1700'

and the system is in the following condition: ExcellentThe point of diversion is located in SW 1/4 N 4 1/4, Section 13, T113N, R62W, S4 PM

The works are capable of ^{storing} ~~diverting and conveying~~ to the place of use 2495 Ac. Ft.
~~cu. ft. per second~~ of water,
 which is to be used for municipal uses

The legal sub-divisions to be irrigated are: _____

_____ comprising a total of _____ acres of land.

The domestic use intended comprises incidental livestock watering

The utilization for power, mining, or other beneficial uses comprises: _____

Public recreation usesWitness my hand, this 13th day of December, A. D. 1965.

-SEAL-

Donald Haiscull

Examining Engineer.

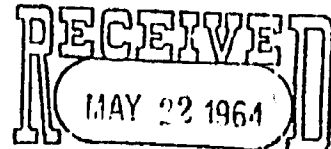
Deputy Chief Engineer
State Water Resources Commission



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

IN REPLY
REFER TO: 700

REGION 6
MISSOURI-OAHE PROJECTS OFFICE
P. O. BOX 825
HURON, SOUTH DAKOTA 57350



STATE WATER RESOURCES COMM.
PIERRE, SOUTH DAKOTA

Mr. J. W. Grimes
Chief Engineer and Executive Officer
Water Resources Commission
State Capitol Office Building
Pierre, South Dakota

Dear Mr. Grimes:

Enclosed are the revised studies of the James Reservoir Operation, requested during your visit on May 19, 1964.

These studies reflect the requirement for releases of 20 cfs to satisfy irrigation water rights immediately downstream from Huron's 3rd Street Dam during the period May through September.

The following additional criteria were used in revising the original study:

1. No releases to satisfy this 20 cfs demand will be needed in those months when spills and/or inflows bypassed in the original study for downstream rights exceed 20 cfs or 1200 acre-feet monthly. That is--no additional releases will be required when the sum of Columns 11 and 16 in the study total or exceed 1200 acre-feet.
2. The City of Huron's senior right of 10 cfs must initially be considered in meeting the total municipal water demand exerted on reservoir inflows before any available inflow will be bypassed to satisfy the 20 cfs requirement below the 3rd Street Dam. That is--when the sum of Column 12 and Column 11 is equal to or greater than Column 10 and as long as Column 12 does not exceed Column 7, then no additional inflows are to be bypassed.

You will note that this revised study does not change the shortages for M & I water as shown in Column 15.

A review of this new study indicates that during the latter part of the irrigation season the natural flows of the James River are usually insufficient to meet demands downstream from Huron. It is apparent that a "feast or famine" situation exists on the reach of the river in the vicinity of Huron, and any additional water rights should be accompanied with provisions for storage if they are to be of any significant value.

Sincerely yours,

H. C. Van Sledright

Project Manager

9-3; 755-3; 1022-3; 1023-3; & 1027-3

May 9, 1967

Mr. NORM Van Sickle
City Engineer
City of Huron
Huron, South Dakota 57350

Dear Mr. Van Sickle:

Reference is made to your telephone conversation of May 9, 1967. The City of Huron has the following water rights involving the flows of the James River.

9-3	Allows diversion of 10 c.f.s. of flows of James River
755-3	Allows storage of 600 acre feet in 3rd Street Dam
1022-3	Allows storage of 2100 acre feet in 3rd Street Dam
1023-3	Allows storage of 2100 acre feet in Spink County Dam
1027-3	Allows storage of 2405 acre feet in James River Extension Dam. (1027-3 is held in the name of U.S. Bureau of Reclamation)

As long as your total diversions from the James River does not exceed 10 c.f.s. plus the releases from storage as authorized in water rights 755-3, 1022-3, 1023-3 and 1027-3 you can divert water directly from flows of the James River upstream from the 3rd Street Dam for watering of park areas.

Under such circumstances it does not seem advisable for you to make application for an additional water right.

Incidentally I note that a water license has not been issued on water right permit 755-3. A member of the Commission Staff will make a final inspection soon so that the water license can be issued.

Sincerely,

JWC/AD/A

J.W. GRIMM



UNITED STATES
DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

REGION 6

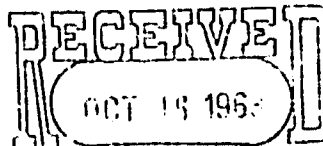
MISSOURI-OAHE PROJECTS OFFICE

P. O. BOX 825

HURON, SOUTH DAKOTA

IN REPLY
REFER TO: 400

OCT 15 1963



STATE WATER RESOURCES COMM.
PIERRE, SOUTH DAKOTA

Mr. J. W. Grimes
Chief Engineer and Executive Officer
State Water Resources Commission
Pierre, South Dakota

Dear Mr. Grimes:

By a letter dated April 10, 1963, the Regional Director, Bureau of Reclamation, Region 6, made application for a permit for a water right in James Diversion Dam. With this letter he enclosed a copy of Specifications No. DC-5896 for "Earthwork and Structures-James Diversion Dam."

Since that time these specifications have been revised and a copy of the revision "Specifications No. DC-5973" is enclosed for your records. The dam is being built in accordance with the revised specifications. Storage in the reservoir is not changed.

Sincerely yours,

J. E. Van Loggelen
Project Manager

Enclosure

Copy to: Regional Director, 400, Billings

See map file for spec

DATE MICROFILMED
CAMERA OPERATOR



CITY OF HURON
SOUTH DAKOTA

RECEIVED
JAN 22 1969

STATE WATER RESOURCES COMMISSION

Office of the Mayor
LOWELL SCHMIDT

January 22, 1969

Mr. J. W. Grimes
Chief Engineer and Executive Officer
Water Resources Commission
Pierre, South Dakota

Dear Mr. Grimes:

We are investigating several sites around the city of Huron for the ultimate development of an 18-hole municipal golf course. Final selection will be dependent upon several factors. The availability of suitable and adequate water for irrigation of the greens and fairways is one of the very important considerations.

The city of Huron has Water Right No. 93 from the James River which provides for the diversion of 10.0 c.f.s. We assume this water right permits the diversion of James River water for use on a municipal golf course as well as for all other municipal uses.

Two areas are presently under consideration for a golf course using James River water. One proposal considers pumping from the James River into Ravine Lake and then pumping from Ravine Lake to the present municipal golf course area immediately north of the Huron municipal airport in the S $\frac{1}{2}$ SW $\frac{1}{4}$ of Sec. 25, T. 111 N., R. 62 W. On the basis of some previous exploratory drilling by others in this area, it is very doubtful whether ground water would be available; however, we are not ruling out a test for ground water if this area is selected.

The second area is situated between the east city limits of Huron and the James River. Water could be pumped directly from the river for this golf course area. The point of diversion would be near where the effluent for the Huron sewerage stabilization ponds enters the James River within the SE $\frac{1}{4}$ SE $\frac{1}{4}$ of Sec. 6, T. 110 N., R. 61 E.

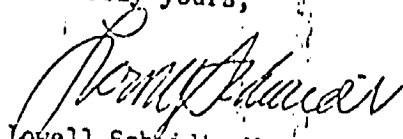
It is expected that the annual irrigation water requests for an 18-hole golf course would be about 200 acre-feet.

Please advise whether water Right No. 9-3 will permit city of Huron to divert James River water for the irrigation of a municipal golf course.

Page 2 -- J. W. Grimes letter -- January 22, 1969

I would appreciate your reply within the next few days so we can begin to make appropriate plans for the proposed golf course.

Sincerely yours,


Lowell Schmidt, Mayor

LS:ecn

cc: Mr. Tal Lockwood, Chairman
Golf Course Committee

Mr. Darles Erickson
City Commissioner

Mr. R. E. Peterson
City Auditor

January 24, 1969

Mayor Lowell Schmidt
City of Huron
Huron, South Dakota 57350

Dear Mayor:

This concerns your letter of January 22 about the water supply for your proposed municipal golf course.

Water for the golf course may be used under Huron's three water rights in James River waters (water right 9-3 for diversion of 10 cubic feet per second; 755-3 and 1022-3 for storage by the 3rd Street dam) and under water right 1027-3 held by the Bureau of Reclamation and under contract for water use by Huron.

No complications are involved if you locate the golf course north of Huron (SE1/4 Sec. 25) and pump from the 3rd Street reservoir into Ravine Lake then to the golf course.

If you locate the golf course east of Huron (SE1/4 Sec. 6), releases past the 3rd Street dam from the 3rd Street reservoir or from the James River reservoir will be necessary at the rate that you pump for the golf course, except when there are ample flows in the James River (spills over the 3rd Street dam) to satisfy prior downstream water rights. The return flows from the stabilization ponds are appropriated by these other water users because of the long period of time that Huron's sewage effluent flows have been a part of James River flows.

If the maximum rate of diversion of water (city use, parks, golf course, etc.) will exceed 10 c.f.s., it may be desirable to establish a new rate of diversion in the city's water right record.

Sincerely,

J. W. Grimes

SWG:ls



GREAT FACES. GREAT PLACES.

DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3181

July 26, 1991

1027-3
1067-3

Craig Kjar
US Bureau of Reclamation
Beile Fourche Projects Office
PO Box 226
Hewell, SD 57760

Dear Mr. Kjar:

This is in regard to your request on the status of Water Permit Nos. 1027-3 and 1067-3. Water Right No. 1027-3 was licensed in 1966 and we still have the water right on active status.

Future Use Permit No. 1067-3 was listed under the Oahe Conservancy Sub-District has been under the South Dakota Conservancy District after the Sub-District was dissolved. The status of this future use permit is still active.

I also checked to see if there were any more permits under the Bureau of Reclamation in East River and I did not find any.

If you have any further requests, feel free to contact me.

Sincerely,

Mark D. Rath
Natural Resources Engineer II
Water Rights Division
(605) 773-3352

enclosure

SOUTH DAKOTA

VESTED WATER RIGHT CLAIM NO. 1027-3

Date of Receipt of Claim March 28, 1963.

Date of Validation March 4, 1992.

The Water Management Board validated Vested Water Right Claim No. 1027-3 for the U.S. Bureau of Reclamation, P.O. Box 36900, Billings, Montana 59107 with the following limitations, conditions and qualifications:

1. Vested Water Right No. 1027-3 appropriates 2380 acre feet of water per year from the James River (James River diversion dam) with the point of diversion located in the SW1/4 NW1/4 Section 13, T113N, R62W.
2. The appropriated water is used for supplying water for the City of Huron and may not exceed the amount of water needed for beneficial use for municipal and recreational purposes.

The water is to be used during the following annual period:
January 1 - December 31
3. The priority dates of the Vested Water Right are: January 1, 1936 for 280 acre feet per year and January 1, 1937 for 2100 acre feet per year.
4. The water use system has been constructed and water has been applied to beneficial use.
5. Water Rights obtained in compliance with the laws of the State of South Dakota must not be unlawfully impaired by this appropriation.

QUALIFICATIONS

This water right is subject to downstream prior water rights and provisions must be made for passage of 20 cubic feet per second of water inflows to the reservoir for such water rights and downstream domestic use. This permit also includes the transfer of 280 acre feet of storage from the 3rd Street Dam (vested right #1022-3) and 2100 acre feet of storage from the Spink County Reservoir (vested right #1023-3).

WATER MANAGEMENT BOARD

By: John A. Little
Chief Engineer

MAY 12 1992
date

Division of Water Rights
Dept. of Environment and Natural Resources



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE SOUTH DAKOTA 57501-3181

MAY 12 1992

U. S. Bureau of Reclamation
PO Box 36900
Billings MT 59107

Dear Sir:

The Water Management Board has validated the enclosed Vested Water Right No. 1027-3. This validation gives legal status to the claim and is the final document for your vested right.

As long as you use the water beneficially, as stated in the validation, State Water Laws provide that you have a continuing right to use the water.

Very truly yours,

JOHN HATCH, Chief Engineer
Water Rights Division
605 773-3352

enclosure

NOT TO SCALE

(13)

General
Cor.

Y

14.5

Jerald Tschetter

Tschetter Tract

178-1751

11.3

Y

Y

James
River

4.4

3.6

W.A.
Schwan

13

Brady Tschetter

Y

23.2

35

4.4

59.0

Y

Y

113-62

License No. 1027-3

(13)

(13)

Ron Duvall
52.6 Natural Resources Eng
5/2/85

12.2

3.8
3.8

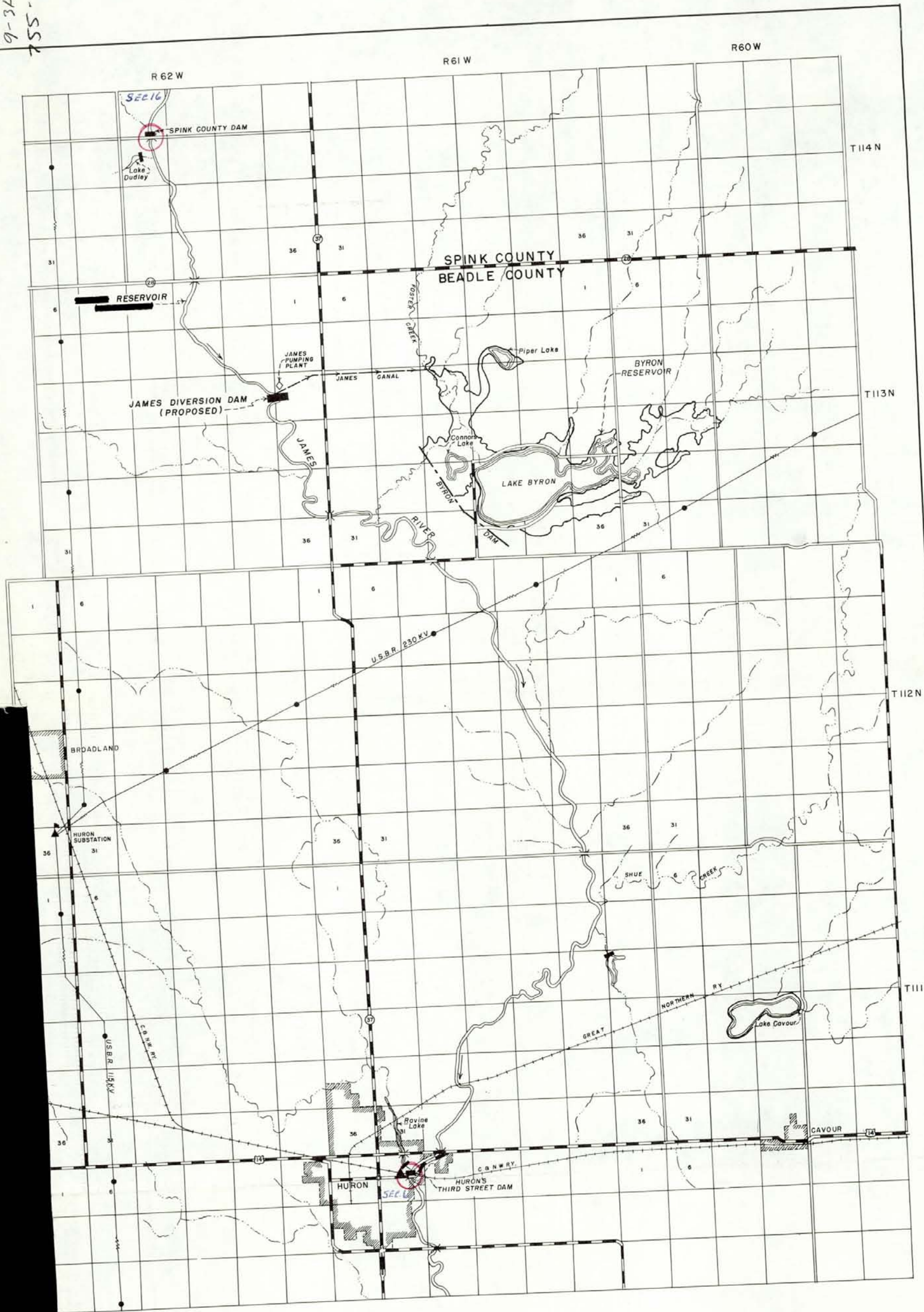
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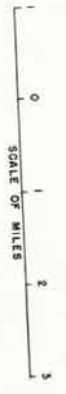
V/R Permit # 1022-3

App. #1022-3
1027-3
9-3
9-34
755-3



LEGEND:

- Dam and Reservoir (Potential)
- James Diversion Dam (Proposed)
- Canal (Potential)
- Pumping Plant Site (Potential)
- Stream Gaging Station
- Hard Surfaced Highways
- Secondary Roads
- Substations
- Transmission Line



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MISSOURI RIVER BASIN PROJECT
JAMES DIVISION-OAHE UNIT-S. DAKOTA
BYRON SECTION
PROPOSED AND POTENTIAL FEATURES

1022-3

DC-5973

Map # 668-3

SET ASIDE FOR SMALL BUSINESS

Specifications No. DC-5973
Readvertisement of DC-5896

=====

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

- - -

Schedule, General Provisions, Specifications, and Drawings

- - -

EARTHWORK AND STRUCTURES
JAMES DIVERSION DAM

- - -

Oahe Unit, South Dakota
James Division
Missouri River Basin Project

=====

Bids will be received at the office of the Bureau of Reclamation, Huron,
South Dakota, until 10 a.m., Central standard time, June 27, 1963.

(PRICE \$1.75)

file under map # 668-3

(W/R # 10273)

These specifications issued by
Chief Engineer
Building 53, Denver Federal Center
Denver 25, Colorado

CONTENTS

Bid Form (Standard Form 21)
Notice of Small Business Set-
Aside

Bidding Schedule
Schedule (a-c)
Budgetary Information
Noncollusive Bidding Certifi-
cation
Parent Company and Employer
Identification Number
Representations by Bidder Pur-
suant to "Buy American Act"

General Provisions (Standard
Form 23A) (Clauses No. 1 to 21)
Supplement to General Provisions
(Clause No. 22)
Labor Standards Provisions
(Standard Form 19A)

SPECIFICATIONS

General Conditions:

1. Bonds
2. Climatic Conditions
3. Rights-of-way
4. Contractor's Cost Data
5. Sanitation
6. Cleaning Up
7. Extras
8. Protests
9. Federal, State, and
Local Taxes
10. Safety and Health

Special Conditions:

11. The Requirement
12. Description of Work
13. Rates of Wages
14. Payments and Funds
15. Commencement, Prosecu-
tion, and Completion of
Work

16. Liquidated Damages
17. Quantities and Unit Prices
18. Equipment Allowances for
Contract Adjustments
19. Staking Out Work
20. Backcharges to Contractor
21. Taxes
22. Performance and Supervision
of Work by Contractor
23. Utilization of Small Business
Concerns

Materials:

24. Materials
25. Weights of Metal Parts
26. Reference Specifications

Local Conditions:

27. Campsites
28. Access to the Work
29. Use and Maintenance of Access
Road
30. Existing Fences
31. Transmission, Telegraph, and
Telephone Lines
32. Diversion and Care of River
during Construction and
Removal of Water from
Foundations

Earthwork:

33. Clearing
34. Grubbing
35. Explosives and Blasting
36. Records of Subsurface Investi-
gations
37. Deleted
38. Classification of Excavation
39. Excavation for Diversion Dam
40. Excavation for Auxiliary
Spillway Channel
41. Backfill
42. Compacting Backfill
43. Materials from Borrow for
Embankments and Backfill

CONTENTS--Continued

- 44. Preparation of Surfaces Under Embankments
- 45. Construction of Embankments
- 46. Compacting Earth Materials
- 47. Disposal of Excavated Materials
- 48. Riprap and Coarse Gravel Protection
- 49. Gravel Surfacing
- 50. Construction of Access Road and Parking Area

Pipe Culvert:

- 51. Pipe Culvert

Structures:

- 52. Construction of Structures
- 53. Joints in Concrete
- 54. Elastic Filler Material
- 55. Rubber Water Stop
- 56. Rubber-covered Dowel Bars
- 57. Filter

Slide Gate and Metalwork:

- 58. Right to Operate and Use Unsatisfactory Materials or Equipment
- 59. Drawings and Data to be Furnished by the Contractor
- 60. Cast Iron Slide Gate and Lift
- 61. Frame and Insulated Covers
- 62. Miscellaneous Metalwork
- 63. Cleaning and Painting Metalwork

Concrete:

- 64. Composition
- 65. Cement
- 66. Admixtures
- 67. Water
- 68. Sand
- 69. Coarse Aggregate
- 70. Batching

- 71. Mixing
- 72. Temperature of Concrete
- 73. Forms
- 74. Preparations for Placing
- 75. Placing
- 76. Repair of Concrete
- 77. Finishes and Finishing
- 78. Protection
- 79. Curing
- 80. Reinforcement Bars
- 81. Tolerances for Concrete Construction
- 82. Measurement of Concrete
- 83. Payment

Drawings:

- 84. Drawings

BID FORM
(CONSTRUCTION CONTRACT)

REFERENCE

SPECIFICATIONS NO. *

Read the Instructions to Bidders (Standard Form 22)
This form to be submitted in **SINGLE**

DATE OF INVITATION

**

NAME AND LOCATION OF PROJECT

**

NAME OF BIDDER (Type or print)

*

*

(Date)

TO: DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

In compliance with the above-dated invitation for bids, the undersigned hereby proposes to perform all work for

SPECIFICATIONS NO. *

in strict accordance with the General Provisions (Standard Form 23-A), Labor Standards Provisions Applicable to Contracts in Excess of \$2,000 (Standard Form 19-A), specifications, schedules, drawings, and conditions, for the amount(s) stated in the accompanying Bidding Schedule(s).

The undersigned agrees that, upon receipt of written notice that a preliminary examination of the bids indicates that he will be the successful bidder, or upon written notice of the acceptance of this bid mailed, or otherwise furnished, within 60 days after the date of opening of the bids (if no shorter period be specified), whichever of these events occurs first, he will within 10 days (unless a longer period is allowed) after receipt of the prescribed forms, execute Standard Form 23, Construction Contract, and give performance bond and payment bond on Government standard forms, with good and sufficient surety or sureties: Provided, that contract and bond forms furnished by the bidder prior to award of contract will become effective only if his bid actually is accepted within said 60 days after the date of opening of the bids (or within such shorter period as may be specified in the bid by the bidder).

The undersigned agrees, if awarded the contract, to commence the work within the specified number of calendar days after the date of receipt of notice to proceed, and that he will complete the work within the number of calendar days after the date of receipt of notice to proceed as stated in the specifications.

* To be filled in by bidder.

** Not necessary for bidder to fill in.

Receipt of Amendments: The undersigned acknowledges receipt of the following amendments (Supplemental Notices) of the invitation for bids, drawings, and/or specifications, etc. (Give number and date of each):

*

The bidder represents (Check appropriate boxes):

* (1) That he ☐ is, ☐ is not, a small business concern. (For this purpose, a small business concern is a business concern, including its affiliates, which (a) is independently owned and operated, (b) is not dominant in its field of operation, and (c) had average annual receipts for the preceding three fiscal years not exceeding \$7,500,000. For additional information see governing regulations of the Small Business Administration.)

* (2) (a) That he ☐ has, ☐ has not, employed or retained any company or person (other than a full-time bona fide employee working solely for the bidder) to solicit or secure this contract, and (b) that he ☐ has, ☐ has not, paid or agreed to pay any company or person (other than a full-time bona fide employee working solely for the bidder) any fee, commission, percentage or brokerage fee, contingent upon or resulting from the award of this contract; and agrees to furnish information relating to (a) and (b) above as requested by the Contracting Officer.

(For interpretation of the representation, including the term "bona fide employee," see Code of Federal Regulations, Title 41, Subpart 1-1.5.)

* (3) That he operates as an ☐ individual, ☐ partnership, ☐ joint venture, ☐ corporation, incorporated in State of _____

Enclosed is bid guarantee, consisting of *

in the amount of *

NAME OF BIDDER (Type or print) *	FULL NAME OF ALL PARTNERS (Type or print)
BUSINESS ADDRESS (Type or print)	
BY (Signature in ink. Type or print name under signature)	
TITLE (Type or print)	

DIRECTIONS FOR SUBMITTING BIDS

Envelopes containing bids, guarantee, etc., must be sealed, marked, and addressed to the BUREAU OF RECLAMATION office indicated on the cover of the specifications as the office for receiving bids.

The following properly filled out bid identification must be placed on the left side of the envelope containing the bid:

BID for (SPECIFICATIONS NO. _____)
To be opened (Time and date of opening)
BID of (Name of bidder)

CAUTION: Bids should not be qualified by exceptions to the bidding conditions.

NOTICE OF SMALL BUSINESS SET-ASIDE

a. Restriction.--Bids or proposals for construction under these specifications are solicited from small business concerns only and contract will be awarded only to one or more small business concerns. This action is based on a determination by the contracting officer, alone or in conjunction with a representative of the Small Business Administration, that it is in the interest of maintaining or mobilizing the Nation's full productive capacity, in the interest of war or national defense programs, or in the interest of assuring that a fair proportion of Government procurement is placed with small business concerns. Bids or proposals received from firms which are not small business concerns shall be considered nonresponsive.

b. Definitions.--A "small business concern" is a concern that (i) is certified as a small business concern by the Small Business Administration, or (ii) is independently owned and operated, is not dominant in the field of operation in which it is bidding on Government contracts, and, for the purpose of bidding on construction contracts, any concern is small if its average annual receipts for the preceding three fiscal years do not exceed \$7,500,000; except that if the concern is located in Alaska, such receipts do not exceed \$9,375,000. ("Annual receipts" means the annual receipts, less returns and allowances, of a concern and its affiliates.)

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. DC-5973

EARTHWORK AND STRUCTURES
JAMES DIVERSION DAM

OAHE UNIT, SOUTH DAKOTA
JAMES DIVISION
MISSOURI RIVER BASIN PROJECT

Bids will be considered on the following schedule, but no bid will be considered for only a part of the schedule.

Bids under these specifications are solicited from and award will be made only to small business concerns (see form in these specifications titled "Notice of Small Business Set-Aside").

The bidder is requested to submit with his bid, in the space provided therefor in the schedule, a description of the work which he will perform with his own organization and what percentage of the total contract price such description represents.

For schedule items designated with the symbol * see Paragraph 17.

SCHEDULE

Item No.	Work or material	Quantity and unit	Unit price	Amount
1	Diversion and care of James River during construction and removing water from foundations	For the lump	sum of	\$ _____
*2	Excavation for access road	11,700 cu yd	\$ _____	_____
*3	Excavation for auxiliary spillway channel	76,500 cu yd	_____	_____
*4	Excavation for diversion dam	30,500 cu yd	_____	_____
*5	Compacting embankments	28,700 cu yd	_____	_____
*6	Backfill	7,360 cu yd	_____	_____
*7	Compacting backfill	7,360 cu yd	_____	_____
*8	Riprap	1,080 cu yd	_____	_____
*9	Sand and gravel bedding for riprap	540 cu yd	_____	_____

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. DC-5973

SCHEDULE--Continued

Item No.	Work or material	Quantity and unit	Unit price	Amount
*10	Coarse gravel protection	240 cu yd	\$ _____	\$ _____
11	Graded sand and gravel for filter	50 cu yd	_____	_____
*12	Gravel surfacing	1,630 cu yd	_____	_____
13	Furnishing and laying 4-inch clay pipe for drain filter	300 lin ft	_____	_____
*14	Concrete in structures except spillway weir	990 cu yd	_____	_____
*15	Concrete in spillway weir	460 cu yd	_____	_____
*16	Furnishing and handling cement	2,175 barrels	_____	_____
*17	Furnishing and placing reinforcement bars	198,000 pounds	_____	_____
18	Furnishing and placing 1/2-inch elastic filler material in joints	400 sq ft	_____	_____
19	Furnishing and placing 9-inch, Type A, rubber water stop	520 lin ft	_____	_____
20	Furnishing and placing dowels with rubber sleeves	60 dowels	_____	_____
21	Furnishing and laying 18-inch-diameter No. 16-gage, corrugated-metal pipe	40 lin ft	_____	_____
22	Furnishing and installing one 72- by 72-inch cast iron slide gate and lift	For the lump sum of	_____	_____
23	Furnishing and installing frame and insulated covers	For the lump sum of	_____	_____

SCHEDULE -- Continued

C

BIDDING SCHEDULE FOR
SPECIFICATIONS NO. DC-5973

BUDGETARY INFORMATION
(Construction)

For informational and budgetary purposes only, and not as part of the bid or the contract, the bidder shall fill in the following blanks showing his estimated progress earnings under this contract by fiscal years ending June 30, assuming, for such purposes, commencement of work 30 days after the opening of bids:

FY64 (7-1-63 to 6-30-64) \$ _____

FY65 (7-1-64 to 6-30-65) \$ _____

BIDDING SCHEDULE

NONCOLLUSIVE BIDDING CERTIFICATION

By the submission of this bid, the bidder certifies that:

- a. The bid has been arrived at by the bidder independently and has been submitted without collusion with any other bidder of construction, alteration or repair of the type described in the Invitation for Bids; and
- b. The contents of the bid have not been communicated by the bidder, nor, to its best knowledge and belief, by any of its employees or agents, to any person not an employee or agent of the bidder or its surety on any bond furnished herewith, and will not be communicated to any such person prior to the official opening of the bid.

PARENT COMPANY AND EMPLOYER IDENTIFICATION NUMBER

Each bidder will furnish the following information by filling in the appropriate blocks:

- a. Is the bidder owned or controlled by a parent company as described below? Yes () No ()

(For the purpose of this bid, a parent company is defined as one which either owns or controls the activities and basic business policies of the bidder. To own another company means the parent company must own at least a majority (more than 50%) of the voting rights in that company. To control another company, such ownership is not required; if another company is able to formulate, determine or veto basic business policy decisions of the bidder, such other company is considered the parent company of the bidder. This control may be exercised through the use of dominant minority voting rights, use of proxy voting, contractual arrangements, or otherwise.)

- b. If the answer to a. above is "Yes," bidder will insert in the space below the name and principal office address of the parent company.

(Name)

(Address)

- c. Bidder will insert in the space(s) below the Employer's Identification Number (E. I. No.) (Federal Social Security Number used on Employer's Quarterly Federal Tax Return, U. S. Treasury Department Form 941).

E. I. No. of Bidder _____

E. I. No. of Parent Company (if any) _____

NOTE: Unless bidder intends to furnish **NONDOMESTIC** construction materials it is unnecessary to complete this form, but it should be returned with the bid.

REPRESENTATIONS BY BIDDER PURSUANT TO "BUY AMERICAN ACT"

Bidder represents that all construction materials to be used, other than those specifically exempt from the requirements of the Buy American Act as listed on the back of this form, will be domestic materials conforming to Clause No. 19, "Buy American," of the General Provisions (Standard Form 23-A) except as noted below:

<u>Name of each item of nondomestic material</u>	<u>Quantity (weight, feet, no., etc.)</u>	<u>Cost delivered to the job site</u>
Total		\$

The contractor will be limited in the use of nondomestic materials to those listed above and those specifically exempt from the requirements of the Buy American Act as listed on the back of this form.

List below the lowest cost of domestic material comparable to each item of nondomestic material shown above, based upon bidder's canvass of domestic suppliers (as required by Paragraph C. on the back of this form).

<u>Name of each item of domestic material comparable to offered nondomestic material</u>	<u>Quantity (weight, feet, no., etc.)</u>	<u>Cost delivered to the job site</u>
Total		\$

If nondomestic construction materials are listed above, an alternate bid may be submitted offering comparable domestic materials as described in Paragraph D on the reverse hereof. However, unless the bidder specifically states alternate bid prices for specific items of the schedule, based upon use of comparable domestic materials, the bid will be evaluated only on the basis of the foreign materials listed above.

(over)

INFORMATION REGARDING BUY AMERICAN ACT

A. The Buy American Act (41 U.S.C. 10a-10d) generally requires that only domestic construction material be used in the performance of this contract. (See the clause entitled "Buy American" in the General Provisions.) This requirement does not apply to the following construction material or components:

- (1) Asbestos, amosite
- (2) Cork, wood or bark and waste
- (3) Nickel, primary, in ingots, pigs, shot, cathodes, or similar forms, nickel oxide and nickel salts
- (4) Tin, in bars, blocks and pigs

B. Furthermore, bids or proposals offering use of additional nondomestic construction material may be acceptable for award, if the Government determines that use of comparable domestic construction material is impracticable or would unreasonably increase the cost or that domestic construction material (in sufficient and reasonably available commercial quantities and of a satisfactory quality) is unavailable. Reliable evidence shall be furnished justifying such use of additional nondomestic construction material.

C. Where it is alleged that use of domestic construction material would unreasonably increase the cost:

(1) Data shall be included by the bidder, based on a reasonable canvass of suppliers, demonstrating that the cost of each such domestic construction material would exceed by more than 6 percent the cost of comparable nondomestic construction material. (All costs of delivery to the construction site shall be included, as well as any applicable duty.)

(2) For evaluation purposes, 6 percent of the cost of all additional nondomestic construction material, which qualifies under Paragraph (1) above, will be added to the bid or proposal.

D. When offering additional nondomestic construction material, bids or proposals may also offer, at stated prices, any available comparable domestic construction material, so as to avoid the possibility that failure of a nondomestic construction material to qualify under C. above will cause rejection of the entire bid.

or may hereafter be, for reasons of national security, ordered by the Government to be kept secret or otherwise withheld from issue) arising out of the performance of this contract or out of the use or disposal by or for the account of the Government of supplies furnished or construction work performed hereunder.

16. ADDITIONAL BOND SECURITY

If any surety upon any bond furnished in connection with this contract becomes unacceptable to the Government, or if any such surety fails to furnish reports as to his financial condition from time to time as requested by the Government, the Contractor shall promptly furnish such additional security as may be required from time to time to protect the interests of the Government and of persons supplying labor or materials in the prosecution of the work contemplated by this contract.

17. COVENANT AGAINST CONTINGENT FEES

The Contractor warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business. For breach or violation of this warranty the Government shall have the right to annul this contract without liability or in its discretion to deduct from the contract price or consideration, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

18. OFFICIALS NOT TO BENEFIT

No Member of Congress or resident Commissioner shall be admitted to any share or part of this contract, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

19. BUY AMERICAN

(a) Agreement. In accordance with the Buy American Act (41 U.S.C. 10a-10d) and Executive Order 10582, December 17, 1954 (3 CFR Supp.), the Contractor agrees that only domestic construction material will be used (by the Contractor, subcontractors, materialmen, and suppliers) in the performance of this contract, except for nondomestic material listed in the contract.

(b) Domestic construction material. "Construction material" means any article, material, or supply brought to the construction site for incorporation in the building or work. An unmanufactured construction material is a "domestic construction material" if it has been mined or produced in the United States. A manufactured construction material is a "domestic construction material" if it has been manufactured in the United States and if the cost of its components which have been mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. "Component" means any article, material, or supply directly incorporated in a construction material.

(c) Domestic component. A component shall be considered to have been "mined, produced, or manufactured in the United States" (regardless of its source in fact) if the article, material, or supply in which it is incorporated was manufactured in the United States and the component is of a class or kind determined by the Government to be not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities and of a satisfactory quality.

20. CONVICT LABOR

In connection with the performance of work under this contract, the Contractor agrees not to employ any person undergoing sentence of imprisonment at hard labor.

21. NONDISCRIMINATION IN EMPLOYMENT

In connection with the performance of work under this contract, the Contractor agrees as follows:

(a) The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this Nondiscrimination clause.

(b) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.

(c) The Contractor will send to each labor union or representative of workers with which he has a collective-bargaining agreement or other contract or understanding, a notice, to be provided by the agency Contracting Officer, advising the said labor union or workers' representative of the Contractor's commitments under this Nondiscrimination clause, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) The Contractor will comply with all provisions of Executive Order No. 10925 of March 6, 1961, and of the rules, regulations, and relevant orders of the President's Committee on Equal Employment Opportunity created thereby.

(e) The Contractor will furnish all information and reports required by Executive Order No. 10925 of March 6, 1961, and by the rules, regulations, and orders of the said Committee, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Committee for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of the Contractor's noncompliance with the Nondiscrimination clause of this contract or with any of the said rules, regulations, or orders, this contract may be canceled in whole or in part and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 10925 of March 6, 1961, and such other sanctions may be imposed and remedies invoked as provided in the said Executive order or by rule, regulation, or order of the President's Committee on Equal Employment Opportunity, or as otherwise provided by law.

(g) The Contractor will include the provisions of the foregoing paragraphs (a) through (f) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the President's Committee on Equal Employment Opportunity issued pursuant to section 303 of Executive Order No. 10925 of March 6, 1961, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including sanctions for non-compliance: *Provided, however*, that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

STANDARD FORM 23-A
APRIL 1961 EDITION
GENERAL SERVICES ADMINISTRATION
FED. PROC. REG. (41 CFR) 1-16.401

GENERAL PROVISIONS (CONSTRUCTION CONTRACT)

1. DEFINITIONS

(a) The term "head of the agency" or "Secretary" as used herein means the Secretary, the Under Secretary, any Assistant Secretary, or any other head or assistant head of the executive or military department or other Federal agency; and the term "his duly authorized representative" means any person or persons or board (other than the Contracting Officer) authorized to act for the head of the agency or the Secretary.

(b) The term "Contracting Officer" as used herein means the person executing this contract on behalf of the Government and includes a duly appointed successor or authorized representative.

2. SPECIFICATIONS AND DRAWINGS

The Contractor shall keep on the work a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawings and specifications, the specifications shall govern. In case of discrepancy either in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the Contracting Officer, who shall promptly make a determination in writing. Any adjustment by the Contractor without such a determination shall be at his own risk and expense. The Contracting Officer shall furnish from time to time such detail drawings and other information as he may consider necessary, unless otherwise provided.

3. CHANGES

The Contracting Officer may, at any time, by written order, and without notice to the sureties, make changes in the drawings and/or specifications of this contract if within its general scope. If such changes cause an increase or decrease in the Contractor's cost of, or time required for, performance of the contract, an equitable adjustment shall be made and the contract modified in writing accordingly. Any claim of the Contractor for adjustment under this clause must be asserted in writing within 30 days from the date of receipt by the Contractor of the notification of change unless the Contracting Officer grants a further period of time before the date of final payment under the contract. If the parties fail to agree upon the adjustment to be made, the dispute shall be determined as provided in Clause 6 of these General Provisions; but nothing provided in this clause shall excuse the Contractor from proceeding with the prosecution of the work as changed. Except as otherwise provided in this contract, no charge for any extra work or material will be allowed.

4. CHANGED CONDITIONS

The Contractor shall promptly, and before such conditions are disturbed, notify the Contracting Officer in writing of: (a) subsurface or latent physical conditions at the site differing materially from those indicated in this contract, or (b) unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in this contract. The Contracting Officer shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of this contract, an equitable adjustment shall be made and the contract modified in writing accordingly. Any claim of the Contractor for adjustment hereunder shall not be allowed unless he has given notice as above required; or unless

the Contracting Officer grants a further period of time before the date of final payment under the contract. If the parties fail to agree upon the adjustment to be made, the dispute shall be determined as provided in Clause 6 of these General Provisions.

5. TERMINATION FOR DEFAULT—DAMAGES FOR DELAY—TIME EXTENSIONS

(a) If the Contractor refuses or fails to prosecute the work, or any separable part thereof, with such diligence as will insure its completion within the time specified in this contract, or any extension thereof, or fails to complete said work within such time, the Government may, by written notice to the Contractor, terminate his right to proceed with the work or such part of the work as to which there has been delay. In such event the Government may take over the work and prosecute the same to completion, by contract or otherwise, and may take possession of and utilize in completing the work such materials, appliances, and plant as may be on the site of the work and necessary therefor. Whether or not the Contractor's right to proceed with the work is terminated, he and his sureties shall be liable for any damage to the Government resulting from his refusal or failure to complete the work within the specified time.

(b) If fixed and agreed liquidated damages are provided in the contract and if the Government so terminates the Contractor's right to proceed, the resulting damage will consist of such liquidated damages until such reasonable time as may be required for final completion of the work together with any increased costs occasioned the Government in completing the work.

(c) If fixed and agreed liquidated damages are provided in the contract and if the Government does not so terminate the Contractor's right to proceed, the resulting damage will consist of such liquidated damages until the work is completed or accepted.

(d) The Contractor's right to proceed shall not be so terminated nor the Contractor charged with resulting damage if:

(1) The delay in the completion of the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God, acts of the public enemy, acts of the Government in either its sovereign or contractual capacity, acts of another contractor in the performance of a contract with the Government, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather, or delays of subcontractors or suppliers arising from unforeseeable causes beyond the control and without the fault or negligence of both the Contractor and such subcontractors or suppliers; and

(2) The Contractor, within 10 days from the beginning of any such delay (unless the Contracting Officer grants a further period of time before the date of final payment under the contract), notifies the Contracting Officer in writing of the causes of delay.

The Contracting Officer shall ascertain the facts and the extent of the delay and extend the time for completing the work when, in his judgment, the findings of fact justify such an extension, and his findings of fact shall be final and conclusive on the parties, subject only to appeal as provided in Clause 6 of these General Provisions.

(e) If, after notice of termination of the Contractor's right to proceed under the provisions of paragraph (a) of this clause, it is determined that the delay is excusable under the provisions of paragraph (d) of this clause, such notice of ter-

mination shall be deemed to have been issued pursuant to the clause of this contract entitled "Termination for Convenience of the Government," and the rights and obligations of the parties hereto shall in such event be governed by such clause. (This paragraph (e) applies only if this contract contains such termination clause.)

(f) The rights and remedies of the Government provided in this clause are in addition to any other rights and remedies provided by law or under this contract.

6. DISPUTES

(a) Except as otherwise provided in this contract, any dispute concerning a question of fact arising under this contract which is not disposed of by agreement shall be decided by the Contracting Officer, who shall reduce his decision to writing and mail or otherwise furnish a copy thereof to the Contractor. The decision of the Contracting Officer shall be final and conclusive unless, within 30 days from the date of receipt of such copy, the Contractor mails or otherwise furnishes to the Contracting Officer a written appeal addressed to the head of the agency involved. The decision of the head of the agency or his duly authorized representative for the determination of such appeals shall be final and conclusive. This provision shall not be pleaded in any suit involving a question of fact arising under this contract as limiting judicial review of any such decision to cases where fraud by such official or his representative or board is alleged: *Provided, however*, that any such decision shall be final and conclusive unless the same is fraudulent or capricious or arbitrary or so grossly erroneous as necessarily to imply bad faith or is not supported by substantial evidence. In connection with any appeal proceeding under this clause, the Contractor shall be afforded an opportunity to be heard and to offer evidence in support of his appeal. Pending final decision of a dispute hereunder, the Contractor shall proceed diligently with the performance of the contract and in accordance with the Contracting Officer's decision.

(b) This Disputes clause does not preclude consideration of questions of law in connection with decisions provided for in paragraph (a) above. Nothing in this contract, however, shall be construed as making final the decision of any administrative official, representative, or board on a question of law.

7. PAYMENTS TO CONTRACTOR

(a) The Government will pay the contract price as herein after provided.

(b) The Government will make progress payments monthly as the work proceeds, or at more frequent intervals as determined by the Contracting Officer, on estimates approved by the Contracting Officer. If requested by the Contracting Officer, the Contractor shall furnish a breakdown of the total contract price showing the amount included therein for each principal category of the work, in such detail as requested, to provide a basis for determining progress payments. In the preparation of estimates the Contracting Officer, at his discretion, may authorize material delivered on the site and preparatory work done to be taken into consideration. Material delivered to the Contractor at locations other than the site may also be taken into consideration (1) if such consideration is specifically authorized by the contract and (2) if the Contractor furnishes satisfactory evidence that he has acquired title to such material and that it will be utilized on the work covered by this contract.

(c) In making such progress payments, there shall be retained 10 percent of the estimated amount until final completion and acceptance of the contract work. However, if the Contracting Officer, at any time after 50 percent of the work has been completed, finds that satisfactory progress is being made, he may authorize any of the remaining progress payments to be made in full. Also, whenever the work is substantially complete, the Contracting Officer, if he considers

the amount retained to be in excess of the amount adequate for the protection of the Government, at his discretion, may release to the Contractor all or a portion of such excess amount. Furthermore, on completion and acceptance of each separate building, public work, or other division of the contract, on which the price is stated separately in the contract, payment may be made therefor without retention of a percentage.

(d) All material and work covered by progress payments made shall thereupon become the sole property of the Government, but this provision shall not be construed as relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work, or as waiving the right of the Government to require the fulfillment of all of the terms of the contract.

(e) Upon completion and acceptance of all work, the amount due the Contractor under this contract shall be paid upon the presentation of a properly executed voucher and after the Contractor shall have furnished the Government with a release, if required, of all claims against the Government arising by virtue of this contract, other than claims in stated amounts as may be specifically excepted by the Contractor from the operation of the release. If the Contractor's claim to amounts payable under the contract has been assigned under the Assignment of Claims Act of 1940, as amended (31 U.S.C. 203, 41 U.S.C. 15), a release may also be required of the assignee.

8. ASSIGNMENT OF CLAIMS

(a) Pursuant to the provisions of the Assignment of Claims Act of 1940, as amended (31 U.S.C. 203, 41 U.S.C. 15), if this contract provides for payments aggregating \$1,000 or more, claims for moneys due or to become due the Contractor from the Government under this contract may be assigned to a bank, trust company, or other financing institution, including any Federal lending agency, and may thereafter be further assigned and reassigned to any such institution. Any such assignment or reassignment shall cover all amounts payable under this contract and not already paid, and shall not be made to more than one party, except that any such assignment or reassignment may be made to one party as agent or trustee for two or more parties participating in such financing. Unless otherwise provided in this contract, payments to an assignee of any moneys due or to become due under this contract shall not, to the extent provided in said Act, as amended, be subject to reduction or setoff. (The preceding sentence applies only if this contract is made in time of war or national emergency as defined in said Act and is with the Department of Defense, the General Services Administration, the Atomic Energy Commission, the National Aeronautics and Space Administration, the Federal Aviation Agency, or any other department or agency of the United States designated by the President pursuant to Clause 4 of the proviso of section 1 of the Assignment of Claims Act of 1940, as amended by the Act of May 15, 1951, 65 Stat. 41.)

(b) In no event shall copies of this contract or of any plans, specifications, or other similar documents relating to work under this contract, if marked "Top Secret," "Secret," or "Confidential," be furnished to any assignee of any claim arising under this contract or to any other person not entitled to receive the same. However, a copy of any part or all of this contract so marked may be furnished, or any information contained therein may be disclosed, to such assignee upon the prior written authorization of the Contracting Officer.

9. MATERIAL AND WORKMANSHIP

(a) Unless otherwise specifically provided in this contract, all equipment, material, and articles incorporated in the work covered by this contract are to be new and of the most suitable grade for the purpose intended. Unless otherwise specifically provided in this contract, reference to any equipment, mate-

rial, article, or patented process, by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition, and the Contractor may, at his option, use any equipment, material, article, or process which, in the judgment of the Contracting Officer, is equal to that named. The Contractor shall furnish to the Contracting Officer for his approval the name of the manufacturer, the model number, and other identifying data and information respecting the performance, capacity, nature, and rating of the machinery and mechanical and other equipment which the Contractor contemplates incorporating in the work. When required by this contract or when called for by the Contracting Officer, the Contractor shall furnish the Contracting Officer for approval full information concerning the material or articles which he contemplates incorporating in the work. When so directed, samples shall be submitted for approval at the Contractor's expense, with all shipping charges prepaid. Machinery, equipment, material, and articles installed or used without required approval shall be at the risk of subsequent rejection.

(b) All work under this contract shall be performed in a skillful and workmanlike manner. The Contracting Officer may, in writing, require the Contractor to remove from the work any employee the Contracting Officer deems incompetent, careless, or otherwise objectionable.

10. INSPECTION AND ACCEPTANCE

(a) Except as otherwise provided in this contract, inspection and test by the Government of material and workmanship required by this contract shall be made at reasonable times and at the site of the work, unless the Contracting Officer determines that such inspection or test of material which is to be incorporated in the work shall be made at the place of production, manufacture, or shipment of such material. To the extent specified by the Contracting Officer at the time of determining to make off-site inspection or test, such inspection or test shall be conclusive as to whether the material involved conforms to the contract requirements. Such off-site inspection or test shall not relieve the Contractor of responsibility for damage to or loss of the material prior to acceptance, nor in any way affect the continuing rights of the Government after acceptance of the completed work under the terms of paragraph (f) of this clause, except as hereinabove provided.

(b) The Contractor shall, without charge, replace any material or correct any workmanship found by the Government not to conform to the contract requirements, unless in the public interest the Government consents to accept such material or workmanship with an appropriate adjustment in contract price. The Contractor shall promptly segregate and remove rejected material from the premises.

(c) If the Contractor does not promptly replace rejected material or correct rejected workmanship, the Government (1) may, by contract or otherwise, replace such material or correct such workmanship and charge the cost thereof to the Contractor, or (2) may terminate the Contractor's right to proceed in accordance with Clause 5 of these General Provisions.

(d) The Contractor shall furnish promptly, without additional charge, all facilities, labor, and material reasonably needed for performing such safe and convenient inspection and test as may be required by the Contracting Officer. All inspection and test by the Government shall be performed in such manner as not unnecessarily to delay the work. Special, full size, and performance tests shall be performed as described in this contract. The Contractor shall be charged with any additional cost of inspection when material and workmanship are not ready at the time specified by the Contractor for its inspection.

(e) Should it be considered necessary or advisable by the Government at any time before acceptance of the entire work

to make an examination of work already completed, by removing or tearing out same, the Contractor shall, on request, promptly furnish all necessary facilities, labor, and material. If such work is found to be defective or nonconforming in any material respect, due to the fault of the Contractor or his subcontractors, he shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, an equitable adjustment shall be made in the contract price to compensate the Contractor for the additional services involved in such examination and reconstruction and, if completion of the work has been delayed thereby, he shall, in addition, be granted a suitable extension of time.

(f) Unless otherwise provided in this contract, acceptance by the Government shall be made as promptly as practicable after completion and inspection of all work required by this contract. Acceptance shall be final and conclusive except as regards latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Government's rights under any warranty or guarantee.

11. SUPERINTENDENCE BY CONTRACTOR

The Contractor shall give his personal superintendence to the work or have a competent foreman or superintendent, satisfactory to the Contracting Officer, on the work at all times during progress, with authority to act for him.

12. PERMITS AND RESPONSIBILITIES

The Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any applicable Federal, State, and municipal laws, codes, and regulations, in connection with the prosecution of the work. He shall be similarly responsible for all damages to persons or property that occur as a result of his fault or negligence. He shall take proper safety and health precautions to protect the work, the workers, the public, and the property of others. He shall also be responsible for all materials delivered and work performed until completion and acceptance of the entire construction work, except for any completed unit of construction thereof which theretofore may have been accepted.

13. CONDITIONS AFFECTING THE WORK

The Contractor shall be responsible for having taken steps reasonably necessary to ascertain the nature and location of the work, and the general and local conditions which can affect the work or the cost thereof. Any failure by the Contractor to do so will not relieve him from responsibility for successfully performing the work without additional expense to the Government. The Government assumes no responsibility for any understanding or representations concerning conditions made by any of its officers or agents prior to the execution of this contract, unless such understanding or representations by the Government are expressly stated in the contract.

14. OTHER CONTRACTS

The Government may undertake or award other contracts for additional work, and the Contractor shall fully cooperate with such other contractors and Government employees and carefully fit his own work to such additional work as may be directed by the Contracting Officer. The Contractor shall not commit or permit any act which will interfere with the performance of work by any other contractor or by Government employees.

15. PATENT INDEMNITY

Except as otherwise provided, the Contractor agrees to indemnify the Government and its officers, agents, and employees against liability, including costs and expenses, for infringement upon any Letters Patent of the United States (except Letters Patent issued upon an application which is now

22. SUPPLEMENT TO GENERAL PROVISIONS AND LABOR STANDARDS PROVISIONS

a. Clause No. 5. --In the last line of Clause No. 5(d)(2) the period after the word "delay" is deleted, a colon is substituted therefor, and the following is added:

"Provided, That the contractor shall be excused for delays of suppliers only if the contracting officer shall determine that the materials or supplies to be furnished are not procurable in the open market."

Paragraph (e) of Clause No. 5 is deleted and the following Paragraph (e) is substituted therefor:

"(e) If, after notice of termination of the Contractor's right to proceed under the provisions of this clause, it is determined for any reason that the contractor was not in default under the provisions of this clause, or that the delay was excusable under the provisions of this clause, the rights and obligations of the parties shall, if the contract contains a clause providing for termination for convenience of the Government, be the same as if the notice of termination had been issued pursuant to such clause. If, in the foregoing circumstances, this contract does not contain a clause providing for termination for convenience of the Government, the contract shall be equitably adjusted to compensate for such termination and the contract modified accordingly; failure to agree to any such adjustment shall be a dispute concerning a question of fact within the meaning of the clause of this contract entitled 'Disputes'."

b. Clause No. 7. --The following is added at the end of Clause No. 7(c):

"If the original total contract price is \$1,000,000 or more, the contracting officer may, at his discretion, in addition to making partial payments in full for satisfactory progress after 50 percent of the work has been completed, reduce the retained funds to an amount equal to 10 percent of the value of the work remaining to be done, based on the original total contract price; except that when the retained amount has been reduced to 1 and 1/2 percent of the total bid for all schedules comprising the contract, this amount will be held until completion and acceptance of all work under the contract."

c. Clause No. 12. --At the end of Clause No. 12 the following is added:

"Upon completion of the contract, or final acceptance of any completed unit thereof, the work shall be delivered complete and undamaged."

d. Clause No. 15. --At the end of Clause No. 15 the following is added:

"Any patented invention, the use of which by these specifications is required or permitted in the alternative to be used and which the United States has the right to use royalty free, shall be available to the contractor without the payment of the royalty."

e. Clause No. 21. --The following is added at the end of Clause No. 21 entitled "Nondiscrimination in Employment."

"In compliance with the Rules and Regulations (41 CFR, Section 60-1.3(a)) issued under Executive Order 10925 of March 6, 1961, the contractor is hereby bound and agrees to include in each subcontract which it shall make with a subcontractor or supplier Paragraphs (1) through (7) of Section 301 of said Executive Order, unless exempted pursuant to the rules, regulations, and relevant orders of the President's Committee on Equal Employment Opportunity.

(Explanatory note: The purpose of the above addition to the clause is to extend the requirement for inclusion of Paragraphs (a) through (f) of the clause in second-tier subcontracts and purchase orders. Paragraphs (a) through (f) of the clause are the same as Paragraphs (1) through (6) of Section 301 of the Executive Order.)

(over)

Clause No. 21 is not applicable to contracts:

- (1) Which do not exceed \$10,000,
- (2) Where work is to be performed entirely outside the United States and no recruitment of workers within the United States is involved,
- (3) For standard commercial supplies or raw materials not exceeding \$100,000, or
- (4) Which are specifically exempt by the Executive Vice Chairman of the President's Committee on equal Employment Opportunity. "

f. Labor Standards Provisions, Standard Form 19-A. --Clause No. 2 of Standard Form 19-A entitled "Eight-Hour Laws--Overtime Compensation" is deleted and the following Clause No. 2 is substituted therefor:

"2. WORK HOURS ACT OF 1962--OVERTIME COMPENSATION

"(a) No contractor or subcontractor contracting for any part of the contract work shall require or permit any laborer or mechanic to be employed on such work in excess of eight hours in any calendar day or in excess of forty hours in any workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times his basic rate of pay for all hours worked in excess of eight hours in any calendar day or in excess of forty hours in such workweek, whichever is the greater number of overtime hours.

"(b) In the event of any violation of the provisions of paragraph (a), the contractor and any subcontractor responsible for such violation shall be liable to any affected employee for his unpaid wages. In addition, such contractor or subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed, with respect to each individual laborer or mechanic employed in violation of the provisions of paragraph (a), in the sum of \$10 for each calendar day on which such employee was required or permitted to work in excess of eight hours or in excess of forty hours in a workweek without payment of the required overtime wages.

"(c) The Contracting Officer may withhold, or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor, the full amount of wages required by this contract and such sums as may administratively be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for liquidated damages as provided in paragraph (b). "

The Labor Standards Provisions (Standard Form 19-A), including the above change to Clause No. 2, must be inserted physically in all subcontracts for construction work under the specifications. (Incorporation of these provisions by reference is not in compliance with this requirement.)

Within 7 days after the making of each subcontract, the contractor shall provide a copy of the subcontract for review by the contracting officer to determine compliance with this requirement. Such copy need not contain the subcontract prices.

LABOR STANDARDS PROVISIONS

APPLICABLE TO CONTRACTS IN EXCESS OF \$2,000

1. DAVIS-BACON ACT (40 U.S.C. 276a-a(7))

(a) All mechanics and laborers employed or working directly upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Copeland Act (Anti-Kickback) Regulations (29 CFR, Part 3)) the full amounts due at time of payment, computed at wage rates not less than those contained in the wage determination decision of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor or subcontractor and such laborers and mechanics; and a copy of the wage determination decision shall be kept posted by the Contractor at the site of the work in a prominent place where it can be easily seen by the workers.

(b) In the event it is found by the Contracting Officer that any laborer or mechanic employed by the Contractor or any subcontractor directly on the site of the work covered by this contract has been or is being paid at a rate of wages less than the rate of wages required by paragraph (a) of this clause, the Contracting Officer may (1) by written notice to the Government Prime Contractor terminate his right to proceed with the work, or such part of the work as to which there has been a failure to pay said required wages, and (2) prosecute the work to completion by contract or otherwise, whereupon such Contractor and his sureties shall be liable to the Government for any excess costs occasioned the Government thereby.

(c) Paragraphs (a) and (b) of this clause shall apply to this contract to the extent that it is (1) a prime-contract with the Government subject to the Davis-Bacon Act or (2) a subcontract under such prime contract.

2. EIGHT-HOUR LAWS—OVERTIME COMPENSATION

No laborer or mechanic doing any part of the work contemplated by this contract, in the employ of the Contractor or any subcontractor contracting for any part of said work contemplated, shall be required or permitted to work more than eight hours in any one calendar day upon such work, except upon the condition that compensation is paid to such laborer or mechanic in accordance with the provisions of this clause. The wages of every laborer and mechanic employed by the Contractor or any subcontractor engaged in the performance of this contract shall be computed on a basic day rate of eight hours per day and work in excess of eight hours per day is permitted only upon the condition that every such laborer and mechanic shall be compensated for all hours worked in excess of eight hours per day at not less than one and one-half times the basic rate of pay. For each violation of the requirements of this clause a penalty of five dollars shall be imposed for each laborer or mechanic for every calendar day in which such employee is required or permitted to labor more than eight hours upon said work without receiving compensation computed in accordance with this clause, and all penalties thus imposed shall be withheld for the use and benefit of the Government: *Provided*, That this stipulation shall be subject in all respects to the exceptions and provisions of the Eight-Hour Laws as set forth in 40 U.S.C. 321, 324, 325, 325a, and 326, which relate to hours of labor and compensation for overtime.

3. APPRENTICES

Apprentices will be permitted to work only under a bona fide apprenticeship program registered with a State Apprenticeship Council which is recognized by the Federal

Committee on Apprenticeship, U.S. Department of Labor; or if no such recognized Council exists in a State, under a program registered with the Bureau of Apprenticeship, U.S. Department of Labor.

4. PAYROLL RECORDS AND PAYROLLS

(a) Payroll records will be maintained during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records will contain the name and address of each such employee, his correct classification, rate of pay, daily and weekly number of hours worked, deductions made and actual wages paid. The Contractor will make his employment records available for inspection by authorized representatives of the Contracting Officer and the U.S. Department of Labor, and will permit such representatives to interview employees during working hours on the job.

(b) A certified copy of all payrolls will be submitted weekly to the Contracting Officer. The Government Prime Contractor will be responsible for the submission of certified copies of the payrolls of all subcontractors. The certification will affirm that the payrolls are correct and complete, that the wage rates contained therein are not less than the applicable rates contained in the wage determination decision of the Secretary of Labor attached to this contract, and that the classifications set forth for each laborer or mechanic conform with the work he performed.

5. COPELAND (ANTI-KICKBACK) ACT—NONREBATE OF WAGES

The regulations of the Secretary of Labor applicable to Contractors and subcontractors (29 CFR, Part 3), made pursuant to the Copeland Act, as amended (40 U.S.C. 276c) and to aid in the enforcement of the Anti-Kickback Act (18 U.S.C. 874) are made a part of this contract by reference. The Contractor will comply with these regulations and any amendments or modifications thereof and the Government Prime Contractor will be responsible for the submission of statements required of subcontractors thereunder. The foregoing shall apply except as the Secretary of Labor may specifically provide for reasonable limitations, variations, tolerances, and exemptions.

6. WITHHOLDING OF FUNDS TO ASSURE WAGE PAYMENT

There may be withheld from the Contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics employed by the Contractor or any subcontractor the full amount of wages required by this contract. In the event of failure to pay any laborer or mechanic all or part of the wages required by this contract, the Contracting Officer may take such action as may be necessary to cause the suspension, until such violations have ceased, of any further payment, advance, or guarantee of funds to or for the Government Prime Contractor.

7. SUBCONTRACTS—TERMINATION

The Contractor agrees to insert Clauses 1 through 7 hereof in all subcontracts and further agrees that a breach of any of the requirements of these clauses may be grounds for termination of this contract. The term "Contractor" as used in such clauses in any subcontract shall be deemed to refer to the subcontractor except in the phrase "Government Prime Contractor."

SPECIFICATIONS
GENERAL CONDITIONS

The contractor shall comply fully with the provisions of the Bureau of Reclamation publication, "Safety Requirements for Construction by Contract," and amendments or revisions thereto. The contractor shall: (1) Submit a proposed safety program to the contracting officer for his approval prior to start of construction operations, (2) Provide for weekly 5-minute "tool-box" safety meetings, conducted by his foremen and attended by all mechanics and laborers at the work site, (3) Provide adequate facilities and trained personnel to insure prompt and efficient first aid and medical care of injured employees. Such facilities shall meet the minimum requirements set forth in the manual "Safety Requirements for Construction by Contract," and shall be satisfactory to the contracting officer, (4) Designate a competent supervisory employee to carry out the contractor's accident prevention program. Where the nature or size of the job warrants, the contracting officer may, at his option, request the contractor to employ a full-time, qualified Safety Engineer, and (5) The contractor shall arrange for first aid training for his foremen, in order to insure that every supervisor of workmen shall be a holder of a current Bureau of Mines or American Red Cross first aid certificate. This requirement may be waived by written consent of the authorized representative of the contracting officer where the nature of the operation or length of contract would make adherence to the provisions impractical.

If the contractor fails or refuses to comply promptly with the above safety requirements, including the provisions of the publication "Safety Requirements for Construction by Contract," the contracting officer or his authorized representative shall notify the contractor in writing of any noncompliance and indicate to the contractor the action to be taken. The contractor shall, following receipt of such notice, immediately correct the conditions to which attention has been directed. Such notice, when served on the contractor or his representative(s) at the site of the work shall be deemed sufficient.

In the event the contractor fails or refuses to promptly comply with the written safety directive, the contracting officer may issue an order to suspend all or any part of the work. When satisfactory corrective action is taken, an order to resume work will be issued. The contractor shall not be entitled to any extension of time, nor to any claim for damage or to excess costs by reason of either the directive or the suspension order.

The contractor shall maintain an accurate record of, and shall report to the contracting officer in the manner, and on the forms prescribed by the contracting officer, all cases of death, occupational diseases or traumatic injury arising out of or in the course of employment incident to performance of work under this contract.

1. Bonds

a. Bid guarantee. --The bidder shall furnish guarantee with each bid in an amount not less than 20 percent of the amount of the bid: Provided, That guarantee in excess of \$3,000,000 will not be required.

Bid bonds or other bid securities which are not received prior to the time specified for receipt of bids will not be acceptable unless the lateness was due solely to delay in the mails for which the bidder was not responsible.

b. The contractor shall furnish bonds as follows:

(1) Performance bond. --The performance bond shall be furnished in accordance with the following table:

Amount of contract	Performance bond
Up to \$1,000,000	50 percent of contract
\$1,000,000 to \$5,000,000	40 percent of contract
\$5,000,000 to \$10,000,000	30 percent of contract
\$10,000,000 to \$25,000,000	20 percent of contract
\$25,000,000 and over	\$5,000,000

Bonds in amounts of \$1,000 or less will be made in multiples of \$100; in amounts exceeding \$1,000 but not exceeding \$5,000, in multiples of \$500; in amounts exceeding \$5,000, in multiples of \$1,000: Provided, That the amount of the bond shall be fixed by the contracting officer at the lowest sum that fulfills all conditions of the contract.

(2) Payment bond. --If the amount of the contract exceeds \$2,000, the contractor shall furnish to the United States, in addition to the bond required under b. (1) hereof, a payment bond with a surety or sureties satisfactory to the officer awarding the contract, for the protection of all persons supplying labor and material in the prosecution of the work provided for in the contract, for the use of each such person. Whenever the total amount payable by the terms of the contract shall be not more than \$1,000,000, the payment bond shall be in the sum of one-half of the total amount payable by the terms of the contract. Whenever the total amount payable by the terms of the contract shall be more than \$1,000,000 and not more than \$5,000,000, the payment bond shall be in the sum of 40 percent of the total amount payable by the terms of the contract. Whenever the total amount payable by the terms of the contract shall be more than \$5,000,000, the payment bond shall be in the sum of \$2,500,000.

2. Climatic Conditions

The contracting officer may order the contractor to suspend any work that may be subject to damage by climatic conditions, and the contractor shall not be entitled to any additional compensation by reason of such order.

3. Rights-of-way

The Government will provide the right-of-way or the site for permanent works or installations, the site for borrow pits, channels, spoil banks, and ditches, and right-of-way for access thereto over routes established by the contracting officer. The contractor will be permitted to use such land for construction purposes, but any additional right-of-way or land desired by the contractor for construction purposes shall be provided by the contractor without expense to the Government.

4. Contractor's Cost Data

The contracting officer, through his authorized agents, shall have access to all pay rolls, records of personnel, invoices of materials, records of plant and equipment, and any and all other data relevant to the performance of the contract or necessary to determine its costs.

5. Sanitation

The contracting officer may establish sanitary and police rules and regulations for all forces employed under this contract, and if the contractor fails to enforce these rules the contracting officer may enforce them at the expense of the contractor.

6. Cleaning Up

Upon completion of the work the contractor shall remove from the vicinity of the work all plant, buildings, rubbish, unused materials, concrete forms and other like material, belonging to him or used under his direction during construction, and in the event of his failure to do so the same may be removed by the Government, at the expense of the contractor, and his surety or sureties shall be liable therefor.

7. Extras

The contractor shall, when ordered in writing by the contracting officer, in accordance with Clause No. 3 of the General Provisions, perform extra work and furnish extra material, not required by the specifications or included in the schedule, but forming an inseparable part of the work contracted for. Extra work and material will ordinarily be paid for at the lump-sum or unit price stated in the order. Whenever, in the judgment of the contracting officer, it is impracticable, because of the nature of the work or for any other reason to otherwise fix the price in the order, the extra work and material shall be paid for at the actual necessary cost as determined by the contracting officer, plus an allowance, not to exceed 15 percent of such actual necessary cost of the extra work and materials, for superintendence, general expense, and profit. The actual necessary cost will include all reasonable expenditures for material, labor (including compensation insurance and social security taxes), and supplies furnished by the contractor, and a reasonable allowance for the use of his plant and equipment, where required, but will in no case include any allowance for office expenses, general superintendence, or other general expenses.

8. Protests

If the contractor considers any work demanded of him to be outside of the requirements of the contract, or considers any record or ruling of the contracting officer or of the inspectors to be unfair, he shall immediately upon such work being demanded or such record or ruling being made, ask, in writing, for written instructions or decision, whereupon he shall proceed without delay to perform the work or to conform to the record or ruling, and, within thirty (30) calendar days after date of receipt of the written instructions or decision (unless the contracting officer shall grant a further period of time prior to commencement of the work affected) he shall file a written protest with the contracting officer, stating clearly and in detail the basis of his protest. Except for such protests as are made of record in the manner herein specified and within the time limit stated, the records, rulings, instructions, or decisions of the contracting officer shall be final and conclusive. Instructions and/or decisions of the contracting officer contained in letters transmitting drawings to the contractor shall be considered as written instructions or decisions subject to protest as herein provided.

9. Federal, State, and Local Taxes

a. As used throughout this paragraph, the term "tax inclusive date" means the date of negotiated contracts and the date set for the opening of bids for contracts entered into through formal advertising. As to additional supplies or services procured by modification to this contract, the term "tax inclusive date" means the date of such modification.

b. Except as may be otherwise provided in this contract, the contract price includes all Federal, State, and local taxes and duties in effect and applicable to this contract on the tax inclusive date, except taxes from which the Government, the contractor, or the transactions or property covered by this contract are then exempt. Unless specifically excluded, duties are included in the contract price.

c. (1) If the contractor is required to pay or bear the burden (i) of any tax or duty, which either was not to be included in the contract price pursuant to the requirements of subparagraph b., or was specifically excluded from the contract price by a provision of this

contract; or (ii) of an increase in rate of any tax or duty, whether or not such tax or duty was excluded from the contract price; or of any interest or penalty thereon, the contract price shall be correspondingly increased: Provided, That the contractor warrants in writing that no amount for such tax, duty or rate increase was included in the contract price as a contingency reserve or otherwise: and Provided further, That liability for such tax, duty, rate increase, interest, or penalty was not incurred through the fault or negligence of the contractor or its failure to follow instructions of the contracting officer.

(2) If the contractor is not required to pay or bear the burden, or obtains a refund or drawback, in whole or in part, of any tax, duty, interest, or penalty which (i) was to be included in the contract price pursuant to the requirements of subparagraph b., (ii) was included in the contract price, or (iii) was the basis of an increase in the contract price, the contract price shall be correspondingly decreased or the amount of such relief, refund, or drawback shall be paid to the Government, as directed by the contracting officer. The contract price also shall be correspondingly decreased if the contractor, through its fault or negligence or its failure to follow instructions of the contracting officer, is required to pay or bear the burden, or does not obtain a refund or drawback of any such tax, duty, interest, or penalty. Interest paid or credited to the contractor incident to a refund of taxes shall inure to the benefit of the Government to the extent that such interest was earned after the contractor was paid or reimbursed by the Government for such taxes.

(3) Invoices or vouchers covering any adjustment of the contract price pursuant to this subparagraph c., shall set forth the amount thereof as a separate item and shall identify the particular tax involved.

(4) Nothing in this subparagraph c., shall be applicable to social security taxes; net income taxes; excess profit taxes; capital stock taxes, unemployment compensation taxes, or any State and local taxes; except those levied on or measured by the contract or sales price of the services or completed supplies furnished under this contract, including gross income taxes, gross receipts taxes, sales and use taxes, excise taxes, or franchise or occupation taxes measured by sales or receipt from sales.

(5) No adjustment of less than \$100 shall be made in the contract price pursuant to this subparagraph.

d. Unless there does not exist any reasonable basis to sustain an exemption the Government agrees upon request of the contractor, without further liability except as otherwise provided in this contract, to furnish evidence appropriate to establish exemption from (i) any Federal tax, which the contractor warrants in writing was excluded from the contract price, or (ii) any State or local tax: Provided, That evidence appropriate to establish exemption from duties will be furnished, and Government bills of lading will be issued, only at the discretion of the contracting officer. In addition, the contracting officer may furnish evidence appropriate to establish exemption from any tax that may, pursuant to this paragraph, give rise to either an increase or decrease in the contract price.

e. (1) The contractor shall promptly notify the contracting officer of all matters pertaining to Federal, State, and local taxes and duties that reasonably may result in either an increase or decrease in the contract price.

(2) Whenever an increase or decrease in the contract price may be required under this paragraph, the contractor shall take action as directed by the contracting officer, and the contract price shall be equitably adjusted to cover the costs of such action, including any interest, penalty, and reasonable attorney's fees.

10. Safety and Health

The contractor shall at all times exercise reasonable precaution for the health and safety of his employees engaged in the performance of the work under this contract. He shall comply with all applicable provisions of Federal, state, and municipal safety, health, and sanitation statutes and codes. It is recommended that the Manual of Accident Prevention in Construction, published by The Associated General Contractors of America, also be used as a guide in establishing safe practices for construction work.

(continued on page 4)

SPECIAL CONDITIONS

11. The Requirement

It is required that there be constructed and completed, in accordance with the Standard Form of Construction Contract 23, including the General Provisions (Standard Form 23A), Labor Standards Provisions (Standard Form 19A), these specifications, and the drawings listed in Paragraph 84 hereof, the earthwork and structures, James Diversion Dam, James Division, Oahe Unit, South Dakota, Missouri River Basin Project. The work is situated north of Huron, South Dakota, in Beadle County as shown on the location map.

12. Description of Work

The principal components of the work to be performed under these specifications include the following:

- a. Earthwork for and construction of a compacted earthfill base for the concrete portion of the diversion dam.
- b. Excavation for the construction of approximately 1,900 linear feet of auxiliary spillway channel with bottom width of 150 feet.
- c. Earthwork for approximately 0.4 mile of access road and earthwork for parking area adjacent to the roadway and diversion dam.
- d. Earthwork for and construction of concrete structures for the diversion dam including upstream apron, wingwalls, sluiceway, spillway and right abutment wall.
- e. Furnishing and installing slide gates and miscellaneous metalwork.

13. Rates of Wages

Pursuant to the provisions of the Davis-Bacon Act, as amended (49 Stat. 1011, 40 U.S.C. 276(a)), the Secretary of Labor has determined that the following rates of wages are the prevailing rates of wages for the classifications specified in the locality of the work covered by these specifications, and said rates of wages shall be the minimum rates per hour to be paid for the work covered by these specifications:

Classification

Rate per hour

(The classifications and wage rates will be furnished by supplemental notice before bids are opened.)

Par. 13

Any class of laborers and mechanics not listed above, which will be employed on this contract, shall be classified or reclassified conformably to the foregoing schedule. In the event the interested parties cannot agree on the proper classification or reclassification of a particular class of laborers and mechanics to be used, the question, accompanied by the recommendation of the contracting officer, shall be referred to the Secretary of Labor for final determination.

The wage rates contained in this decision are straight hourly wage rates. In some areas management and labor organizations in the construction industry have collectively bargained for health and welfare fund contributions. Such contributions are not included in wage rates determined by the Secretary of Labor for construction projects.

While the wage rates shown are the minimum rates required by these specifications to be paid during the life of the contract, it is the responsibility of bidders to inform themselves as to local labor conditions such as the length of workday or workweek, overtime compensation, health and welfare contributions, labor supply, and prospective changes or adjustments of wage rates. No increase in the contract price will be allowed or authorized on account of the payment of wage rates in excess of those listed herein.

The regulations of the Secretary of Labor, effective July 1, 1951, provide in Title 29, Subtitle A, Part 5.4(b), Code of Federal Regulations, as follows: "All actions changing or modifying an original wage determination prior to the award of the contract or contracts for which the determination was sought shall be applicable thereto but modifications received by the agency later than 5 days before the opening of bids shall not be effective if the award is made within 30 days after the opening of the bids or 90 days from the date of the original wage determination whichever is the earlier."

14. Payments and Funds

In preparing estimates for partial payments as provided in Clause No. 7 of the General Provisions, consideration will be given to the delivery on the site of items of materials which will become a part of the finished construction work and for which the contractor presents invoices receipted by the supplier showing that payment in full has been made: Provided, That no consideration will be given to individual purchase of less than three hundred dollars (\$300) for any one item. At the discretion of the contracting officer, consideration may also be given to material delivered to the contractor at locations other than the site subject to the above provisions. No consideration will be given to any other preparatory work done.

Special provisions relating to payments and funds are as follows:

- a. Section 12 of the Reclamation Project Act of 1939, provides as follows: "When appropriations have been made for the commencement or continuation of construction or operation and maintenance of any project, the Secretary may, in connection with such construction or operation and

maintenance, enter into contract for miscellaneous services, for materials and supplies, as well as for construction, which may cover such periods of time as the Secretary may consider necessary but in which the liability of the United States shall be contingent upon appropriations being made therefor" (43 U. S. C. 388).

b. Under the contract to be entered into under these specifications, the liability of the United States is contingent on the necessary appropriations and reservation of funds therefor.

c. When funds become available for payment to the contractor to cover earnings under the schedule items, materials delivered to the site, and all other payments which may be due under the contract or any contract adjustments thereunder, including retained percentages, the Government will notify the contractor of the sum that has been reserved and is available for such payment purposes.

d. If at any time it becomes apparent to the contracting officer that the balance of this reservation is in excess of the estimated amount required to meet all payments due and to become due the contractor because of work performed or to be performed prior to July 1, 1964, the right is reserved to reduce said reservation by the amount of such excess. The contractor will be advised of any reduction so made.

e. If the rate of progress of the work is such that it becomes apparent to the contracting officer that the balance of the reservation is less than the estimated amount required to meet all payment due and to become due because of work performed prior to July 1, 1964, the Government may reserve additional funds for payments under this contract if there be funds available for such purpose. The contractor will be advised of any additional reservation so made.

f. It is expected that Congress will make additional appropriations applicable to work under this contract, but as to this it must be distinctly understood and agreed that the Government is in no case to be made liable for damages in connection with this contract on account of delays in payments on same due to lack of available funds. Should it become apparent to the contractor that existing fund reservations will be exhausted within the next 30 days, the contractor shall give written notice to the contracting officer of such fund exhaustion. If additional funds can be made available, the contracting officer will issue an additional fund reservation as provided for in Subparagraph e. hereof. If additional funds cannot be made available, the contracting officer will give written notice to the contractor that work may be suspended by the contractor; but if the contractor so elects, he may continue work under the conditions and restrictions of the specifications, after the time set by such notice, so long as there are funds for inspection and superintendence, concerning which he will be advised; with the understanding, however, that no payment will be made for such work until sufficient additional funds have been provided by the Congress. When funds again become available, the contractor will be notified

Par. 14

in writing as to the amount thereof reserved for payments under this contract. The amount so reserved shall be subject to decrease or increase in a manner similar to that provided in Subparagraphs d. and e. hereof. Should work be thus suspended, additional time for completion will be allowed equal to the period during which the work is necessarily so suspended as determined by the dates specified in the above-mentioned notices.

g. So long as funds are available, payments will be made in accordance with the provisions of the contract. Unless otherwise authorized in writing by the contracting officer, the items of work for which payment will be made shall be limited to those listed and enumerated in the contract. The unit or lump-sum price or prices stated in the contract will be used in determining the amount to be paid and shall constitute full and final compensation for all work.

h. The procedure above described in this paragraph shall be repeated as often as necessary on account of exhaustion of available funds and the necessity of awaiting the appropriation of additional funds by Congress.

i. Should Congress fail to provide the expected additional funds during its regular session, the contract may be terminated and considered to be completed at the option of the contractor, without prejudice to him at any time not later than 30 days after payments are discontinued, or if payments have been previously discontinued, not later than 30 days after passage of the Act which would ordinarily carry an appropriation for continuing the work, or after the adjournment of Congress without passing such Act.

15. Commencement, Prosecution, and Completion of Work

a. Completion period. -- The contractor shall begin work within thirty (30) calendar days after date of receipt of notice to proceed, and shall complete all of the work within four hundred (400) calendar days from the date of receipt of such notice: Provided, That the period allowed for the completion of the work, or any part thereof for which separate completion period is stated, shall be reduced by one (1) calendar day for each calendar day in excess of ten (10) calendar days, or any extension thereof, elapsing between the contractor's receipt of and return of properly executed contract, and performance and payment bonds as required in the Bid Form (Standard Form 21).

The drawings required to be submitted for approval under these specifications are described in Paragraph 59. The contracting officer will require twenty-five (25) calendar days for each approval of data or drawings to be submitted by the contractor. If the contracting officer uses time in excess of the above-stated number of days to approve any submittal, the excess time will be added to the time allowed the contractor for completion of the work. The number of calendar days required for approval of data or drawings will include the date the data or drawings are received by the contracting officer and will extend through the date of return mailing to the contractor either approved or for correction.

b. Prosecution of the work. --The capacity of the contractor's construction plant, sequence of operations, method of operation, and the forces employed shall, at all times during the continuance of the contract, be subject to the approval of the contracting officer and shall be such as to insure the completion of the work within the specified period of time.

c. Priorities. --If performance under these specifications is delayed by operations of any United States national priorities or material allocation system, the time for performance will be extended to compensate for such delays.

16. Liquidated Damages

The contractor shall pay to the Government, as fixed, agreed, and liquidated damages, the sum of one hundred and twenty-five dollars (\$125) per day for each calendar day's delay in completion of the work.

17. Quantities and Unit Prices

a. The quantities stated in the schedule are estimated quantities for comparison of bids, and, except as hereinafter provided in this paragraph, no claim shall be made against the Government for excess or deficiency therein. Payment at the prices agreed upon will be in full for the completed work and will cover materials, supplies, transportation, labor, tools, machinery, and all other expenditures incident to satisfactory compliance with the contract, unless otherwise specifically provided.

b. The following Subparagraphs c. through f. shall be applicable only to the following unit-price pay items and the quantities noted in the bidding schedule with the symbol *.

c. Where the actual quantity of an item is more than 120 percent or less than 80 percent of the estimated quantity in the bidding schedule, an equitable adjustment in the contract price shall be made on written demand of either party. Any claim of the contractor for an adjustment under this paragraph due to the actual quantity being less than 80 percent of the estimated quantity must be asserted in writing within 30 days after completion of the item. In case a contractor's claim for adjustment is based on the actual quantity being more than 120 percent of the estimated quantity, such claim must be asserted in writing within 30 days after the date the actual quantity exceeded 120 percent of the estimated quantity.

d. For overruns, the equitable adjustment shall be limited to the number of units by which the actual quantity exceeds 120 percent of the estimated quantity. In case the parties to the contract cannot agree upon such equitable adjustment, such adjustment may, at the option of the contracting officer, be based on the contractor's actual necessary costs of performing the excess units as determined by the contracting officer, plus a

reasonable allowance, not to exceed 15 percent of such actual necessary costs, for superintendence, general expense, and profit, all in accordance with Paragraph 7 (Extras).

e. When the actual quantity of an item is less than 80 percent of the estimated quantity, final payment for the item will be computed by applying the unit-price bid in the schedule to the actual quantity, and then adding to the result an amount obtained by applying to the number of units of underrun below the 80 percent of the estimated quantity, a reasonable allowance per unit for the contractor's mobilization and other fixed costs relating thereto.

f. If the parties fail to agree upon the adjustment to be made, including any adjustment made at the option of the contracting officer as provided in Subparagraph d. of this paragraph, the dispute shall be determined as provided in Clause No. 6 of the General Provisions.

18. Equipment Allowances for Contract Adjustments

a. General. --If the contractor is ordered to perform extra work in accordance with Paragraph 7 of the specifications, the allowance made for the equipment used on the extra work shall, except for shift rates, be determined from the schedule of average ownership expense listed in "Contractors' Equipment Ownership Expense" as published by the Associated General Contractors of America and in effect on the date of the contract. The provisions of this paragraph shall apply only for items of the contractor's equipment (including equipment owned by members of joint ventures or subcontractors) used or to be used on the original work contracted for under these specifications. Equipment shall be in good operating condition when starting work covered by the order. Rates allowed for equipment ownership expense for use of items of equipment not listed in the pamphlet shall be established conformably with the items listed.

When extra work is ordered, the contractor shall furnish a complete description of each item of equipment to be used on such extra work, listing the make, model, size, capacity, mounting, type of power, and cost. The cost to be used for establishing equipment allowance rates shall be determined by dividing by 2 the sum of the cost of the equipment, fob factory, when purchased by the original owner and the replacement cost of equal equipment fob factory, such cost in no case to exceed replacement cost. The contractor shall furnish evidence of both costs.

Rates determined in accordance with this paragraph make no allowance for the cost of operating equipment such as operating crew labor, servicing labor and equipment, labor and parts for minor field repairs, fuel, oil, grease, and supplies. Allowance will be made in extra work orders for these items in addition to the amounts allowed for equipment use.

- b. Monthly rates. --Rates allowed as ownership expense to the contractor shall be determined by multiplying the cost of the equipment, as computed under the provisions of Subparagraph a. hereof, by the percentage unit listed under the heading entitled "Expense Per Working Month Percent." In the application of ownership expense rates for the use of equipment, a month for each item will be considered as a period of thirty (30) calendar days measured consecutively, beginning with the first day the equipment is operated on the work covered by the order. The monthly rates will not be subject to deductions for Sundays or holidays and will be allowed for the full calendar period of use.
- c. Shift rates. --Shift rates will be determined by dividing the monthly rate by 26. A shift will be considered as a continuous operating period of 8 hours, and the shift rate shall be used whenever regular use is required for less than 1 month. Allowances for use for less than one full shift when working on a shift basis will be made at a rate proportional to the full shift rate and allowance will not be made for idle time, except as specifically provided for in Subparagraph e. hereof. No allowance will be made for Sundays and holidays when work is not actually performed. Shift rates shall be applicable to all extra work unless monthly rates are stipulated by the contracting officer in advance of performance of the work.
- d. Extra shift rates. --Extra shift rates shall be applied to the second and third shifts whenever the equipment is used for more than one shift in any 1 day. The extra shift rate shall be 50 percent of the basic single-shift rate for each extra shift of actual use. Allowances for use, for less than a full extra shift, will be made at a rate proportional to the extra shift rate.
- e. Idle time. --Ownership expense allowance for idle time of equipment actually employed on the extra work will be made on the basis of 50 percent of the first shift rate for each regular working day, if the contracting officer determines that the equipment could be used advantageously on other work under the contract and that such use is precluded by impracticability of moving. For any period of idle time less than 8 hours within a regular working day, allowance will be made at a rate proportional to 50 percent of the first shift rate. No payment will be made when equipment is idle because of major repairs. Short periods of idle time normal to regular servicing and for minor repair or maintenance requirements will not be deducted from use or operating time.
- f. Changes. --In determining the equitable adjustment to be allowed for changes ordered by the contracting officer pursuant to Clause No. 3 or 4 of the General Provisions, the allowance for equipment used in the performance of work under the order for changes may at the option of the contracting officer be determined in accordance with the provisions of this paragraph.

19. Staking Out Work

a. Lines and grades. --The contracting officer will establish lines and grades required for proper execution of the work. The contractor shall, without additional cost to the Government give such assistance and provide such drill holes, forms, ladders, spikes, nails, and light as may be required by the contracting officer in establishing lines and grades. The contractor shall adjust his construction operations at such points and for such reasonable time as may be necessary to assist with the work of transferring lines and marking points for line and grade.

The Government will provide only the minimum of survey crew services essential to orderly performance of the work, and Government survey crews will not be available at all times for the work under these specifications. The contractor shall keep the contracting officer advised, on a current basis, of construction survey requirements so that survey work may be coordinated with the contractor's sequence of operations.

b. Replacement of survey stakes. --Where construction operations require removal of the Government's stakes or other survey marks, the contractor shall reference such points in an approved manner. Survey stakes or marks established by the Government shall be preserved by the contractor unless he is authorized to remove them, and in case of their destruction or removal by the contractor's forces, they will be replaced by the Government at the contractor's expense. The actual cost to the Government of replacing survey stakes or marks will be deducted from payments due the contractor. Such actual cost will include a reasonable charge for use of Government supplies and equipment plus 15 percent overhead as provided elsewhere in these specifications.

20. Backcharges to Contractor

Where these specifications or the General Provisions provide for charges to the contractor for costs incurred by the Government for services, materials, or use of equipment, such charges will include the costs of labor and materials, a reasonable allowance for use of plant and equipment, and other expenditures which can be directly assigned to the services or materials furnished, plus 15 percent of such total costs for Government overhead.

21. Taxes

In accordance with Paragraph 9 of these specifications, it shall be the responsibility of the contractor to fully inform himself regarding all Federal, state, and local tax laws, rules, or regulations which, in any way, may relate to the materials and services to be furnished under this contract, including all exemption provisions and procedures.

Within 60 days after date of award of contract, the contractor shall advise the contracting officer in writing of any Federal, state or local taxes which he has excluded from the prices bid in the schedule. Should the contractor fail to submit this information within the prescribed 60-day period or any extension thereof, no adjustment in the contract price under Paragraph 9 will be made except for an increase or decrease in the rate of any tax or for any new tax. The contractor shall also furnish such additional information as the contracting officer may require as to the item or items of material or services which he has considered to be exempt from taxation under the terms of this paragraph, and the cost thereof. The information submitted by the contractor will become a part of the contract.

22. Performance and Supervision of Work by Contractor

- a. Performance of work. --The contractor shall perform on the site, and with his own organization, work equivalent to at least 30 percent of the total amount of the original contract price. The cost of contractor-furnished material installed by labor carried on the contractor's own payroll may be included in the 30 percent.
- b. Supervision of work. --If the contractor does not give personal superintendence to the work at all times during its progress, he shall provide a superintendent or foreman fully authorized to act in his behalf, as required under Clause No. 11 of the General Provisions. Said superintendent or foreman shall be an employee of the contractor and on the contractor's payroll. The superintendent or foreman shall give personal supervision to the work, including coordinating, directing, and expediting of all subcontracted work, until completion of all work under the contract. All directions given to such superintendent or foreman shall be considered as given to the contractor and shall be binding on the contractor.

23. Utilization of Small Business Concerns

It is the policy of the Government as declared by the Congress that a fair proportion of the purchases and contracts for supplies and services for the Government be placed with small business concerns.

The contractor agrees to accomplish the maximum amount of subcontracting to small business concerns that the contractor finds to be consistent with the efficient performance of this contract.

MATERIALS

24. Materials

- a. General. --The contractor shall furnish all materials required for completion of the work.

Unless otherwise specified, all materials which will become a part of the completed work shall be new and shall conform to the Federal or other specifications referred to herein.

When a separate item, which includes the furnishing of any material, is provided in the schedule, the cost of furnishing, hauling, storing, and handling shall be included in the price bid for that item. When a separate item is not provided in the schedule for furnishing any material required to be furnished by the contractor, the cost of furnishing, hauling, storing, and handling shall be included in the price bid for the work for which the material is required.

Materials furnished by the contractor shall be of the type and quality described in these specifications. The contractor shall make diligent effort to procure the specified materials from any and all sources, but where because of Government priorities or other causes, materials required by the specifications become unavailable, substitute materials may be used: Provided, That no substitute materials shall be used without prior written approval of the contracting officer, said written approval to state the amount of the adjustment, if any, to be made in favor of the Government. The contracting officer's determination as to whether substitution shall be permitted and as to what substitute materials may be used shall be final and conclusive. If the substitute materials approved are of less value to the Government or involve less cost to the contractor than the materials specified, an adjustment shall be made in favor of the Government, and where the amount involved or the importance of the substitution warrants, an order for changes will be issued; otherwise the adjustment will be handled by deduction from payments to the contractor on the basis of prices stated in the written approval. No payments in excess of prices bid in the schedule will be made because of substitution of one material for another, or because of the use of one alternate material in place of another.

b. Inspection of materials. --Materials and equipment, furnished by the contractor which will become a part of the completed construction work, shall be subject to inspection in accordance with Clauses No. 9 and 10 of the General Provisions at any one or more of the following locations as determined by the contracting officer; at the place of production or manufacture, at the shipping point, or at the site of the work. To allow sufficient time to provide for inspection, the contractor shall submit to the contracting officer, at the time of issuance, copies in triplicate of purchase orders, including drawings and other pertinent information, covering materials and equipment on which inspection will be made as advised by the contracting officer, or shall submit other evidence in the event such purchase orders are issued verbally or by letter.

The inspection of materials and equipment or the waiving of the inspection thereof shall in no way relieve the contractor of the responsibility for furnishing materials and equipment meeting the requirements of these specifications.

25. Weights of Metal Parts

The weights of metalwork, reinforcing steel, and other metal parts, the furnishing, installing, handling, or placing of which is to be paid for on the basis of weight, will be determined by the contracting officer. The Government will not provide scales for actually weighing all of the material, but the contracting officer will determine the weight of each part or item involved in the most practicable manner and will use for the purpose railroad shipping weights, manufacturer's weights, catalog weights, and estimated weights, subject to the provisions of Clause No. 6 of the General Provisions in case of dispute.

Net weights only will be paid for and the weight of all tare, packing, and blocking will be deducted. Weights of mortar or grout, shims, wedges, lead and other calking materials, gaskets, oil, grease, welds, paint, coating materials, joint materials other than bolts, nuts, and washers, and similar materials as are required to be applied at the site of construction, will not be included in the weights for which payment is made. Regardless of whether applied at the fabricating plant or at the site of construction, protective wrappings, mortar or concrete coating or lining, and bituminous or coal tar coating or lining also will not be included in the weights for which payment is made.

26. Reference Specifications

The materials to be furnished by the contractor which are specified by reference to Federal Specifications, Federal Standards or other standard specifications shall be in compliance with the latest editions or revisions thereof in effect on the date bids are received, including any amendments or supplements. Where more than one reference specifications 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.

The references to materials, wherein manufacturer's products or brands are specified, are made as standards of comparison only as to type, design, character, or quality of the article desired, and do not restrict bidders to the manufacturer's products or to the specified brands named.

Copies of the Federal Specifications may be examined at the office of the Bureau of Reclamation, Building 53, Denver Federal Center, Denver, Colorado, or Billings, Montana.

Copies of Federal Specifications may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Single copies of Federal Specifications required for bidding purposes may be secured without charge at Business Service Centers of Regional Offices of the General Services Administration. Standards published by associations or other standardizing agencies should be obtained directly from those agencies.

Copies of Bureau of Reclamation Specifications and information as to the availability of other specifications may be obtained from the Chief Engineer, Building 53, Denver Federal Center, Denver 25, Colorado.

LOCAL CONDITIONS

27. Campsites

The contractor will be permitted to use for construction-camp purposes any land available in the vicinity of the work that is the property of the Government and under the control of the Bureau of Reclamation: Provided, That such use shall not interfere with any part of the work or of the work of other contractors or of the Government in the vicinity. If private land is used by the contractor for camp or other construction purposes, the contractor shall make all necessary arrangements with the owner and shall pay all rentals or other costs connected therewith. The location, construction, maintenance, operation, and removal of the contractor's camps, and of the camps or establishments of all persons or parties in the vicinity, operating or associated with the contractor, shall be subject to the approval of the contracting officer.

28. Access to the Work

Rights-of-way for access to the work from existing roads will be provided by the Government in accordance with Paragraph 3 and as provided in Paragraph 50. All other work on the rights-of-way necessary for access to the site shall be performed by the contractor at his expense. The Government assumes no responsibility for the condition or maintenance of any road or structure thereon that may be used by the contractor for performing the work under these specifications and for traveling to and from the site of the work. No direct payment will be made to the contractor for constructing temporary roads used for construction operations, or for improving, repairing, or maintaining any existing road or structure thereon that may be used by the contractor for performance of the work under these specifications. The cost of all work described in this paragraph shall be included in the prices bid in the schedule for other items of work.

29. Use and Maintenance of Access Road

After its completion, the access road will be accepted by the Government and will be available for the use of the contractor in his construction operations for the remaining work under the contract. The contractor shall maintain the surfacing in a smooth condition until completion and acceptance of all work under the contract. At no time after original completion of the surfacing will the contractor be required to place additional surfacing material on the access road.

The cost of maintaining the surfacing as described in this paragraph shall be included in the prices bid in the schedule for other items of work. Acceptance of the access road as provided herein shall not require a release of the percentages withheld from partial payments under Clause No. 7 of the General Provisions.

30. Existing Fences

Fences on the right-of-way shall be removed by the contractor where necessary for the performance of the work, and where required, shall be rebuilt in as good condition as found. Where designated, fences shall be maintained until the work is completed or their removal is authorized. Where the contractor removes existing fences to facilitate the work, temporary fence protection for lands adjacent to the right-of-way shall be provided at all times during the continuation of the contract. Such temporary fence protection shall be adequate to prevent livestock from straying from or onto adjacent lands and shall be constructed complete with gates and/or cattle guards. Temporary fencing constructed on the right-of-way shall be removed by the contractor as part of the cleanup operations prior to final acceptance of the completed work. The cost of all work described in this paragraph shall be included in the prices bid in the schedule for other items of work.

31. Transmission, Telegraph, and Telephone Lines

The contractor shall make all necessary or required provisions and shall perform all work required by his operations under the contract and incident to any interference with transmission, telegraph, or telephone lines, existing on the date bids are received, with their operation or with the maintenance or service thereon, all in a manner satisfactory to the owners or operators thereof and to the contracting officer. The cost of providing and maintaining all necessary temporary structures; of making any necessary repairs, replacements, or similar operations; of furnishing indemnity or other bonds, if required; and all or any other costs required by this paragraph shall be paid by the contractor and shall be included in the unit prices bid in the schedule for other items of work.

32. Diversion and Care of River During Construction and Removal of Water from Foundations

a. General. -- The contractor shall construct and maintain all necessary cofferdams, channels, flumes, drains, sumps, and/or other temporary diversion and protective works; shall furnish all materials required therefor; shall furnish, install, maintain, and operate all necessary pumping and other equipment for removal of water from the various parts of the work and for maintaining the foundations and other parts of the work free from water as required for constructing each part of the work. After having served their purpose, all cofferdams or other protective works

shall be removed from the river channel, or leveled to give a slightly appearance, so as not to interfere in any way with the operation or usefulness of the diversion dam, and in a manner approved by the contracting officer. The contractor shall be responsible for and shall repair at the contractor's expense any damage to the foundations, structures, or any other part of the work caused by floods, water, or failure of any part of the diversion of protective works.

b. Plan for diversion and care of river during construction. --The contractor's plan for the diversion and care of the river during construction shall be subject to approval. The plan may be placed in operation upon approval, but nothing in this paragraph shall relieve the contractor from full responsibility for the adequacy of the diversion and protective works. The hydrographs of the James River are shown on the drawings solely for the information of the contractor in timing his construction operations to prepare for such floods and to bypass such flow as may be necessary. The Government does not guarantee the reliability or accuracy of any of these curves and assumes no responsibility for any deductions, interpretations, or conclusions which may be made from the curves.

To satisfy water right demands downstream from the dam during construction, the contractor shall provide for the release of 100-cubic-feet-per-second flow through the site. The water right demands downstream from the site occur during the season of irrigation from May 1 to October 1.

c. Removal of water from foundations. --The contractor's method of removal of water from foundation excavations shall be subject to the approval of the contracting officer. Dewatering shall be accomplished in a manner that will maintain stability of the excavated slopes and will result in all monolithic-concrete construction operations being performed in the dry.

d. Payment. --The cost of furnishing all labor, equipment, and materials for constructing cofferdams, dikes, channels, flumes, and other diversion and protective works; removing or leveling such works, where required; diverting the river; maintaining the work free from water as required; disposing of materials in cofferdams; and all other work required by this paragraph shall be included in the lump-sum price bid in the schedule for diversion and care of James River during construction and removal of water from foundations.

Prior to beginning any work on diversion and care of the river and removal of water from foundations, the contractor shall submit a water control plan showing his proposed method for diversion and removal of water from foundations. The water control plan shall be in such form as to allocate the total lump-sum price bid for the item in the schedule for diversion and care of the James River during construction and removal of water from foundations, to not more than four major divisions of the work to be performed under this item. Such major divisions of work

shall be outlined and shall be identified by titles. For each division of the work to be performed under the item for diversion and care of the river during construction and removal of water from foundations, the water control plan shall show the proportionate part of the total lump-sum price allocated thereto. The above allocation of the lump-sum price shall be subject to the approval of the contracting officer, and when approved, shall become a part of the contract. Monthly estimates for progress payments will include the amount allocated to each major division of work for the month during which such work has been completed.

EARTHWORK

33. Clearing

The right-of-way, where in the judgment of the contracting officer clearing is necessary, shall be cleared of all trees, brush, rubbish, and other objectionable matter, and such materials shall become the property of the contractor, and shall be burned or removed from the site of the work before the date of completion of the contract, or otherwise disposed of as approved by the contracting officer.

The cost of clearing and of all work incident thereto shall be included in the unit prices bid in the schedule for excavation.

34. Grubbing

The ground surface under all embankments as shown on the drawings and the surface of all excavation that is to be used for embankments shall be cleared of all stumps, roots, and vegetable matter of every kind. The stumps shall be pulled or otherwise removed, the roots shall be grubbed, and the stumps and roots shall be burned with other combustible material removed. The cost of grubbing and of all work incident thereto, including disposal of the grubbed materials, shall be included in the unit prices bid in the schedule for excavation.

35. Explosives and Blasting

a. Explosives. --Caps or other detonators or fuses shall in no case be stored, transported, or kept in the same place in which dynamite or other explosives are stored, transported, or kept. The location and design of powder magazines, the methods of transporting explosives and the precautions taken to prevent accidents shall be subject to the provisions of Paragraph 10 of these specifications, but the contractor shall be liable for all injuries to or deaths of persons or damage to property caused by blasts or explosives.

In addition to requirements for handling and storing explosives as provided for in Paragraph 10, the contractor shall maintain an inventory record for storage and withdrawal of powder stocks and detonators, and the contracting officer shall be notified immediately of any loss or theft of explosives. The contractor's inventory record shall be subject to inspection at all times. The contractor shall provide such reasonable and adequate protective facilities as may be necessary to prevent loss and theft of explosives and to minimize hazards of subversive action or sabotage to Government property. Overnight storage of explosives and detonators outside of the magazine will not be permitted. Only reliable personnel shall be permitted to store and handle explosives.

b. **Blasting.** --Blasting will be permitted only when proper precautions are taken for the protection of persons, the work, and public or private property, and any damage done to the work or public or private property by blasting shall be repaired by and at the expense of the contractor.

Approval by the contracting officer of any of the contractor's blasting operations shall not relieve the contractor of his responsibility under this paragraph.

36. Records of Subsurface Investigations

The drawings included in these specifications show the available records of subsurface investigations for the work covered by these specifications. The Government does not represent that the available records show completely the existing conditions and does not guarantee any interpretation of these records or the correctness of any information shown on the drawings relative to geological or ground-water conditions. All available samples and cores recovered in the subsurface investigations may be examined by bidders at the site of the work. Bidders and the contractor must assume all responsibility for deductions and conclusions which may be made as to the nature of the materials to be excavated, the difficulties of making and maintaining the required excavations, and of doing other work affected by the geology and the ground-water elevations at the site of the work.

37. Deleted.

38. Classification of Excavation

Materials excavated will not be classified for payment. Except as otherwise provided in these specifications, material excavated will be measured in excavation, to the lines shown on the drawings or as provided in these specifications, and all materials so required to be excavated will be paid for at the unit prices per cubic yard bid in the schedule for excavation. No additional allowance above the unit price bid in the schedule will be made on account of any of the material being wet or frozen. Bidders and the contractor must assume all responsibility for deductions and conclusions as to the nature of the materials to be excavated and the difficulties of making and maintaining the required excavations.

39. Excavation for Diversion Dam

a. **General.** --The excavation requirements for the diversion dam are shown on the drawings, but the undetermined stability or porosity of the material which will form the slopes and embankment foundations or other factors, may make it necessary or desirable during the progress of the work to vary the slopes and the depths of excavation including dimensions

dependent thereon. Any increase or decrease of quantities excavated as a result of such variations will be included in the estimates which shall be subject to the provisions of Paragraph 17. However, if the contracting officer determines that the contractor's costs of performing the work will be increased by reason of such variations an equitable adjustment will be made to cover such increased costs. Otherwise the work will be paid for at the unit price bid therefor in the schedule regardless of such variations, except as may be covered under Paragraph 17.

If at any point, the foundation material is excavated beyond the lines required to receive the compacted embankment, the overexcavation shall be filled with suitable materials and compacted in accordance with Paragraph 46. If at any point in excavation, the natural foundation material is disturbed or loosened during the excavation process or otherwise, it shall be compacted in place or, where directed, it shall be removed and replaced with suitable material and compacted in accordance with Paragraph 46. Any and all excess excavation or overexcavation performed by the contractor for any purpose or reason except for additional excavation as may be prescribed by the contracting officer, and whether or not due to the fault of the contractor, shall be at the expense of the contractor. Fill and compacting of fill for such excess excavation or overexcavation shall be at the expense of the contractor.

b. Measurement and payment. --Measurement, for payment, of excavation for the diversion dam will be made to the lines shown on the drawings or as prescribed by the contracting officer.

Payment for excavation for diversion dam will be made at the unit price per cubic yard bid therefor in the schedule. Except as provided in Paragraph 32, the unit price bid in the schedule for excavation for diversion dam shall include the costs of blasting or ripping, placing the material in embankment at locations directed or otherwise disposing of the excavated materials, and other work necessary to maintain the excavations in good order during construction.

40. Excavation for Auxiliary Spillway Channel

a. General. --The channel section is shown on the drawings, but the undetermined stability or porosity of the material in which this section will be constructed and which will form the banks, or other factors, may make it necessary or desirable during the progress of the work to vary the slopes of excavations or the slopes of spoil banks and the dimensions dependent thereon. Any increase or decrease of quantities excavated as a result of such variations will be included in the estimates which shall be subject to the provisions of Paragraph 17. However, if the contracting officer determines that the contractor's costs of performing the work will be increased by reason of such variations an equitable adjustment will be made to cover such increased costs. Otherwise the work will be paid for at the unit price bid therefor in the schedule regardless of such variations, except as may be covered under Paragraph 17.

The channel shall be excavated to the full depth and width required and shall be finished uniformly to the prescribed lines and grades. Insofar as practicable, the required finishing operations shall be performed by the contractor simultaneously with the canal excavation.

b. Measurement and payment. --Measurement, for payment, of excavation for auxiliary spillway channel will be made to the lines shown on the drawings, as specified herein or as prescribed by the contracting officer.

Payment for excavation for auxiliary spillway channel will be made at the unit price per cubic yard bid therefor in the schedule. Except as provided in Paragraph 32, the unit price bid in the schedule for excavation for auxiliary spillway channel shall include the costs of blasting, hauling and placing the material in embankment at locations directed or disposing of the excavated materials in spoil banks, of pumping or unwatering, and all work necessary to maintain the excavations in good order during construction. Haul in excess of 1,500 feet will not be required. The haul distance will be measured by the shortest practicable route as determined by the contracting officer.

41. Backfill

a. General. --The item of the schedule for backfill includes all fill and refill about the concrete structures shown on the drawings as backfill and compacted backfill. All other material below and outside the lines for backfill and compacted backfill shall be placed as compacted embankment. Backfill about structures shall be placed to the lines shown on the drawings or as directed. Backfill designated on the drawings as compacted pervious backfill shall be cohesionless free-draining material and where designated as compacted backfill on the drawing shall be composed of earth materials containing appreciable amounts of clay and of an impervious nature. However, the type of material used for backfill, the amount thereof, and the manner of depositing the material shall be subject to approval. Insofar as practicable, backfill material shall be obtained from material moved in excavating for the diversion dam, but when sufficient suitable material is not available from this source, additional material shall be obtained from auxiliary spillway excavation or borrow area "A" and from the pervious backfill borrow area shown on the drawings. Compaction of the backfill shall conform to Paragraph 42.

b. Measurement and payment. --Backfill required to be placed about the concrete diversion dam structure will be measured in place to the lines shown on the drawings.

Payment for backfill will be made at the unit price per cubic yard bid therefor in the schedule, which unit price shall include the cost of all work connected therewith, including the excavation and haul of the necessary material: Provided, That material from required excavation

Par. 41

used for backfill will be paid for both as excavation when removed from original position and as backfill when placed. Where additional material is obtained from borrow and used for backfill, payment will be made for the backfill only, and the costs of excavating and hauling of such material shall be included in the unit price bid in the schedule for backfill.

42. Compacting Backfill

a. General. --The item of the schedule for compacting backfill includes the backfill required to be compacted about the diversion dam structures. Unless otherwise directed, backfill shall be compacted to the lines and dimensions shown on the drawings.

To provide adequate protection for compacted backfill about a structure, the Government reserves the right to direct the contractor to place a sufficient amount of backfill or embankment material over the compacted backfill within 72 hours after compacting of the backfill has been completed.

b. Material and compacting. --The material used for backfill to be compacted shall be selected material, containing no stones larger than 3 inches in diameter, approved by the contracting officer, and obtained from required excavation or from borrow. All materials in backfill to be compacted shall be placed, moistened, and compacted as provided in Paragraph 46.

c. Measurement and payment. --Measurement, for payment, of compacting backfill will be made to the lines shown on the drawings, or as directed and will be made only for the quantities actually compacted within the limits of the established pay lines for backfill. Payment for compacting backfill will be made at the unit price per cubic yard bid therefor in the schedule and will be in addition to the payment made for backfill.

43. Materials from Borrow for Embankments and Backfill

a. General. --Where the required excavation does not furnish sufficient suitable material for embankments, or for backfill, such materials shall be obtained from borrow. Borrowed materials for use in embankments and backfill shall be obtained from required excavations which are in the opinion of the contracting officer, suitable and needed, otherwise materials shall be obtained from borrow area "A" and the pervious backfill borrow area.

b. Borrow area. --The Government has removal rights from borrow area "A" and no charges will be made to the contractor for materials obtained from the borrow area for use in embankment and backfill. The location and extent of all borrow pits within the borrow area shall be as directed. The Government reserves the right to change the limits or

location of borrow pits within the borrow area, in order to obtain suitable material. All materials taken from the borrow area shall be subject to approval and shall meet the requirements in Paragraph 45. Drainage ditches shall be excavated by the contractor, where, in the opinion of the contracting officer, such drainage ditches are necessary to prevent the accumulation of standing water in borrow pits. The surfaces of wasted material shall be left in a reasonably smooth and even condition.

If required, the borrow areas shall be cleared as specified in Paragraph 33. Borrow pits will be designated by the contracting officer as the work progresses, and stripping operations shall be limited to such designated borrow pits. The contractor shall carefully strip the sites of designated borrow pits of sod, loam, and other materials which are unsuited for the required purposes. Materials from stripping shall be disposed of as directed.

c. Measurement and payment. --Measurement, for payment, of material taken from borrow area "A" for embankments will be made in excavation, except that, where determined to be necessary by the contracting officer, the quantity of excavated material may be computed by application of a factor to the quantity of borrowed material as measured in embankment. Measurement, for payment, of excavation from borrow area "A" will be made of only such quantities as are required for embankments, or such as by direction of the contracting officer are excavated and wasted or laid aside. Payment for excavation of material from borrow area "A" required for embankments and for materials excavated and wasted or laid aside as directed when excavating for embankment material will be made at the unit price bid in the schedule for excavation for auxiliary spillway channel, which price shall include the cost of hauling the material and placing in embankment or otherwise disposing of the material to be wasted or laid aside. No direct payment will be made for material excavated from borrow area "A" for backfill and the costs of borrowing material for use as backfill shall be included in the price bid in the schedule for backfill as provided in Paragraph 41.

44. Preparation of Surfaces under Embankments

The ground surface under roadway embankments, shall be scored with a plow making open furrows not less than 8 inches deep below the natural ground surface at intervals of not more than 3 feet. The foundations for the compacted embankments for the diversion dam shall be scarified or plowed thoroughly to a depth of not less than 6 inches.

The cost of all work described in this paragraph shall be included in the unit prices bid in the schedule for excavation.

45. Construction of Embankments

a. General. --Embankments shall be constructed to top widths and side slopes as shown on the drawings; and for the roadway where directed to provide an allowance for settlement, the embankment shall be built to heights as directed above those shown on the drawings. Before the material for the first layer of the embankment is placed, the foundation for the embankment shall be prepared as provided in Paragraph 44 and the foundation for the embankments to be compacted shall be moistened and compacted in the manner hereinafter specified for each layer of compacted embankment to be placed thereon. All materials shall be deposited in embankments so that cobbles, gravel, and other such material will be well distributed through the other materials and not nested in any position within or under the embankment. Embankments shall not be made of frozen materials or placed on frozen surfaces.

b. Embankments not to be compacted. --Embankments shall be built in approximately horizontal layers carried across the entire width of the embankments to the required slopes. Embankments shall not be widened with loose material dumped from the top. Embankments may be built by excavating and hauling equipment, or by excavating machinery depositing the materials directly from the excavation. Embankments built by excavating and hauling equipment shall be made in horizontal layers and shall be kept as close to level as practicable. The travel over the embankments during construction shall be routed so as to distribute the compacting effect of the equipment to the best practicable advantage.

Embankments built by excavating machinery depositing the material directly from the excavation shall be made in horizontal layers having a thickness of approximately the depth of the material as deposited by the excavating machine. Finer portions of the material excavated shall be placed in that part of the embankment nearest the water, and the coarser materials shall be placed in outer part of the embankment.

c. Embankments to be compacted. --The materials used for the compacted embankments shall be suitable materials, as determined by the contracting officer, and shall be obtained from required excavation or from borrow as provided in Paragraph 43. The embankments shall be compacted to the elevation and to the top widths and side slopes shown on the drawings or prescribed by the contracting officer. All materials in embankments to be compacted shall be placed, moistened, and compacted as provided in Paragraph 46.

The contractor's operations in the excavation of materials for the compacted embankment shall be such as will result in an acceptable gradation of materials to provide for impermeability and stability when compacted. The maximum dimensions of stones placed in the compacted embankment shall not exceed 5 inches; and should stones larger than 5 inches be found in otherwise approved material, they shall be removed prior to compacting operations.

Measurement, for payment, of compacting embankments will be made of the embankments in place, including a 6-inch layer of the foundation for the embankment scarified or plowed as provided in Paragraph 44 will include only such portions of the embankments and foundation as have been actually compacted at the direction of the contracting officer and as provided in this paragraph. Payment for compacting embankments will be made at the unit price per cubic yard bid therefor in the schedule, which unit price will be in addition to the unit price bid in the schedule for excavating the material placed in compacted embankments, and shall include the cost of placing the materials in layers, furnishing water, moistening, and compacting as provided in this paragraph.

46. Compacting Earth Materials

a. General. --Where compacting of earth materials is required, the materials shall be deposited in horizontal layers and compacted as specified in this paragraph. The distribution of materials shall be such that the compacted material will be uniformly compacted throughout the required section, and will be homogeneous, free from lenses, pockets, streaks, or other imperfections.

b. Compacting clayey and silty materials. --Where compacting of earth materials containing appreciable amounts of clay or silt are required, the materials shall be deposited in horizontal layers not more than 6 inches thick after being compacted. The excavating and placing operations shall be such that the materials, when compacted, will be blended sufficiently to secure the highest practicable unit weight, and best impermeability and stability. Prior to and during compaction operations, the material shall have a moisture content of not greater than 2 percent wet or less than 2 percent dry of optimum moisture, as determined by the contracting officer and the moisture content shall be uniform throughout each layer.

Insofar as practicable, as determined by the contracting officer, moistening of the material shall be performed at the site of excavation but such moistening shall be supplemented by sprinkling at the site of compaction, if necessary. If the moisture content is less than optimum for compaction by more than 2 percentage points or is greater than optimum for compaction by more than 2 percentage points, the compaction operations shall not proceed, except with the specific approval of the contracting officer, until the material has been wetted or allowed to dry out, as may be required, to obtain optimum moisture content within the tolerances permitted above, and no adjustment in price will be made on account of any operations of the contractor in wetting or drying the materials or on account of any delays occasioned thereby.

When the material has been conditioned as hereinbefore specified, it shall be compacted by tamping rollers having staggered and uniformly spaced knobs and of sufficient weight for proper compaction, or by hand

or power tampers. Where hand or power tampers are used to compact soils in confined areas such as under pipe, they shall be equipped with suitably shaped heads to obtain the required density. When tamping rollers are used the tamping knobs and cleaner bars shall be properly maintained and the spaces between the tamping feet shall be kept clear of materials which impair the effectiveness of the tamping roller.

The density (dry) of the soil fraction in the compacted material shall not be less than 95 percent of the laboratory standard maximum soil density (dry) as determined by the Bureau of Reclamation Proctor Compaction Test for the materials being compacted.

(1) Compaction test. --The compaction tests will be made by the Government. The standard maximum soil density is the dry weight per cubic foot of the soil compacted at optimum moisture content by laboratory procedure. The compaction test is the same as ASTM Designation: D 698-57T, Method A, except that a 1/20-cubic foot compaction mold is used and the rammer is dropped from a height of 18 inches.

c. Compacting cohesionless free-draining materials. --Where compacting of cohesionless free-draining materials, such as sands and gravels, is required, the materials shall be deposited in horizontal layers and compacted to the relative density specified below. The excavating and placing operations shall be such that the materials, when compacted, will be blended sufficiently to secure the highest practicable unit weight and best stability. Water shall be added to the materials as may be required to obtain the specified density by the method of compaction being used.

The thickness of the horizontal layers after compaction shall not be more than 6 inches if compaction is performed by tampers or rollers, not more than 12 inches if compaction is performed by treads of crawler-type tractors, surface vibrators, or similar equipment, and not more than the penetrating depth of the vibrator if compaction is performed by internal vibrators.

The relative density of the compacted material shall be not less than 70 percent as determined by the standard Bureau of Reclamation relative density tests for cohesionless free-draining soils.

(1) Relative density test. --The relative density tests will be made by the Government. The relative density of a cohesionless free-draining soil, expressed as a percentage, is defined as its state of compactness with respect to the loosest and most compact states at which it can be placed by laboratory procedures. The relative density will be based on the following formula, wherein the maximum density is the highest unit weight of the soil, minimum density is the lowest unit weight of the soil, and in-place density is the unit weight of the soil in place. Tests for moisture content are made on the materials and the unit weights are expressed in terms of oven-dry weights.

$$\text{Rel. Den. (\%)} = \frac{\text{max. den.} \times (\text{in-place den.} - \text{min. den.})}{\text{in-place den.} \times (\text{max. den.} - \text{min. den.})} \times 100$$

d. Costs. --The cost of compacting earth materials as described in this paragraph shall be included in the unit prices bid in the schedule for compacting embankments, compacting backfill, and for other items of work where earth materials are required to be compacted under these specifications.

47. Disposal of Excavated Materials

All suitable materials removed in excavation or as much thereof as may be needed, shall be used in the construction of embankments or for the backfill.

Material removed in excavation and not suitable for embankment construction, for backfill or for the other earthwork required under these specifications, and any suitable material not required for embankments or for backfill shall be deposited in spoil banks or waste banks on right-of-way owned by the Government at points directed by the contracting officer: Provided, That hauling of materials in excess of 1,500 feet will not be required.

The cost of all work described in this paragraph shall be included in the unit prices bid in the schedule for excavation.

48. Riprap and Coarse Gravel Protection

a. General. --The contractor shall furnish and place riprap and coarse gravel protection to the prescribed outlines and thicknesses as shown on the drawings for the protection of the diversion dam structure, auxiliary spillway channel and roadway drain channels.

b. Material. --The rock shall be hard, dense, and durable. Either quarried rock or boulders may be used for riprap. The rock in riprap and the gravel protection shall be reasonably well graded from the maximum size down to the minimum size as shown in the table.

Samples of material taken from the rock and gravel deposits shown on the drawings indicate that these sources contain materials that can be processed to meet the requirements of these specifications. Any royalties or other charges required to be paid for materials taken from deposits not owned by the Government and controlled by the Bureau of Reclamation shall be paid by the contractor. The approval of deposits by the contracting officer shall not be construed as constituting approval of all or any specific materials taken from the deposits and the contractor will be held responsible for the suitability of all materials used in the work.

The sizes of rock to be used in the different thicknesses of riprap and the range of grading for coarse gravel protection are as follows:

Nominal thickness	24 inches	12 inches	Coarse gravel
Overall thickness, including bedding	36 inches	18 inches	As prescribed on drawings
Maximum size rock	1 1/4 cu yd	1 cu ft	1/8 cu ft
Minimum size rock	1/10 cu ft	1 and 1/2 inches	3/16 inch

c. Placing. --The rock in riprap and coarse gravel need not be hand placed, but shall be dumped and smoothed by moving rocks into position in such a manner as to insure that the material when in place is stable and without tendency to slide, and so that there will be no unreasonably large unfilled spaces within the riprap. The inclusion of rock spalls or gravel in an amount to fill the voids in riprap, but not in excess of that amount, as determined by the contracting officer, will be required. The inclusion of earth, sand, or rock dust in excess of 5 percent, by volume, in riprap or coarse gravel protection will not be permitted.

Unless otherwise prescribed, all riprap shall be bedded in a continuous layer of sand and gravel or sand and crushed rock 6 inches thick, reasonably well graded to a maximum of 1 and 1/2 inches in size.

d. Measurement and payment. --Measurement, for payment, of riprap or coarse gravel protection will be made to the outlines of the riprap or coarse gravel protection directed to be placed on the basis of the nominal thickness prescribed. Payment for riprap or for coarse gravel protection will be made at the applicable unit price per cubic yard bid therefor in the schedule, which unit price shall include the cost of procuring or furnishing, hauling, and placing the rock for riprap or gravel for coarse gravel protection, including the rock spalls and gravel to fill the voids in the riprap.

Measurement, for payment, of sand and gravel or sand and crushed-rock bedding for riprap will be made to the specified 6-inch thickness, and to the prescribed outlines of the bedding directed to be placed. Payment for sand and gravel or sand and crushed-rock bedding for riprap will be made at the unit price per cubic yard bid in the schedule for sand and gravel bedding for riprap, which unit price shall include the cost of procuring or furnishing, hauling, and placing the bedding.

49. Gravel Surfacing

a. General. --The contractor shall furnish and place gravel surfacing on the access road, parking area and dam crest. The surfacing material

shall be placed to the width and thickness shown on the drawings or as directed.

b. Material. --The gravel surfacing material shall consist of sand and gravel from which all stones having a maximum dimension of more than 1 and 1/2 inches have been removed. The material from gravel sources shall be selected to include a sufficient quantity of natural cementitious or binding material such that the surfacing will bond readily under the action of traffic.

Samples of material taken from the sand and gravel deposit shown on the drawings indicate that this source contains materials that can be processed to meet the requirements of these specifications. The Government has removal rights from this source and no charge will be made to the contractor for materials from this source. Otherwise, any royalties or other charges required to be paid for materials taken from deposits not owned by the Government and controlled by the Bureau of Reclamation shall be paid by the contractor. The approval of deposits by the contracting officer shall not be construed as constituting approval of all or any specific materials taken from the deposits and the contractor will be held responsible for the suitability of all materials used in the work. The final surfaces of the borrow area shall be left reasonably even with provisions for the use of the farm road crossing the borrow area.

c. Placing. --Surfaces to receive the gravel shall be bladed or dragged to secure a uniform subgrade. The surfacing material shall be spread uniformly on the prepared subgrade to the required depth and dimensions, and moistened if required. Rolling of the material will not be required but hauling equipment shall be routed over the entire width of surfacing so as to distribute the compacting effect of the equipment to the best practicable advantage.

d. Measurement and payment. --Measurement, for payment, of gravel surfacing will be made in the most practicable manner as determined by the contracting officer: in place to the outlines of the areas covered and to the specified thickness or in approved vehicles at the point of delivery. Payment for gravel surfacing will be made at the unit price per cubic yard bid therefor in the schedule, which unit price shall include the cost of furnishing or procuring the gravel with binder; preparing the subgrade; hauling, moistening, and spreading the material; and the cost of operations within the borrow area or gravel deposit.

50. Construction of Access Road and Parking Area

An access road and parking area shall be constructed as shown on Drawing No. 3 (469-D-53). The road and parking area shall conform to the lines, grades, and cross section shown on the drawing, or as directed. Side or cross drains shall be constructed as shown on the drawings. Where required, the drains shall receive coarse gravel protection and the lower

ends shall diverge sufficiently to prevent erosion. The material from excavation for the road shall be placed in required road embankments if suitable, and if unsuitable shall be wasted as directed. All additional material required for embankments shall be obtained from adjacent side drains and borrow as provided in Paragraph 43. The ground surfaces under all embankments shall be prepared as provided in Paragraph 44: Provided, That where stripping of surface materials are required payment will be made at the unit price bid in the schedule for excavation for access road. The road embankments shall be constructed, if directed, in accordance with the provisions of Paragraphs 45 and 46. Where there is a choice of materials, the best material shall be used in the tops of the embankments for at least 1 foot in depth. Cobbles or rocks more than 6 inches in size shall not be placed in the upper 2 feet of the embankment.

Payment for the required excavation for the access road, parking area and associated drainage ditches will be made at the unit price per cubic yard bid in the schedule for excavation for access road. No separate payment will be made for hauling and placing materials in the road embankments and the cost thereof shall be included in the prices bid for excavation: Provided, That haul in excess of 1,500 feet will not be required. Where compaction of the material is required, payment will be made for compacting embankments as provided in Paragraph 45. Materials excavated which are unsuitable for use in embankments and wasted or laid aside will be paid for as excavation for access road. Materials obtained from borrow used in roadway embankments shall conform to the requirements of Paragraph 43 and will be paid for at the unit price bid in the schedule for excavation for auxiliary spillway channel.

PIPE CULVERT

51. Pipe Culvert

a. General. --The pipe culvert for the access road shall be of corrugated-metal pipe and shall be constructed as shown on the drawings.

b. Excavation and bedding. --The trench for the pipe shall be excavated to bottom widths equal to the outside diameter of the pipe plus 1 foot and to slopes of 1:1. The trench in which pipe is to be laid shall be excavated carefully to provide a firm and uniform bearing for the entire length of the pipe. Where the character of the material at any point in the bottom of the trench is such as might cause unequal settlement or provide unequal bearing for the pipe, the unsuitable material shall be removed to such depth as may be directed and the additional excavation shall be back-filled with approved material which shall be tamped thoroughly to insure an even and unyielding foundation for the pipe. The cost of preparing the bedding for the pipe, and of all excavation and backfill for the pipe shall be included in the unit price per linear foot bid in the schedule for furnishing and laying the pipe.

c. Backfilling. --As each unit of pipe is laid, sufficient backfill material shall be tamped under and about the pipe to hold it rigidly in place until the joints are completed. After the joints have been completed, the backfilling shall be completed and compacted to a depth of 2 feet over the top of the culvert, to a transverse top width equal to the outside width of the barrel of the culvert and to slopes of 1:1 before any hauling equipment is used over the culvert. The backfill shall be brought up approximately even on each side of the pipe.

The material used for backfill, the amount thereof, and the manner of depositing the material shall be subject to approval. Insofar as practicable, backfill material shall be obtained from material moved in excavating for the culvert, but when sufficient suitable material is not available from this source or from adjacent roadway excavation, additional material shall be obtained from other required excavation or from approved borrow pits.

The material to be compacted shall be compacted as provided in Paragraph 46.

The cost of excavation, hauling, moistening, and compacting the backfill material shall be included in the unit price per linear foot bid in the schedule for furnishing and laying the pipe.

d. Furnishing and laying corrugated-metal pipe. --

(1) Furnishing pipe. --Galvanized corrugated-metal pipe and connecting bands for culverts shall be furnished by the contractor and shall be in accordance with Federal Specification QQ-C-806a, Type I, full circle, Class 2.

The pipe shall be hauled and handled in such a manner as to avoid damaging the coating. No damaged pipe shall be placed except as approved. Any pipe unit that, in the opinion of the contracting officer, is damaged beyond repair by the contractor in hauling, handling, or otherwise, shall be removed from the site of the work and replaced.

(2) Laying pipe. --The pipe shall be laid to the established lines and grades with the separate sections jointed firmly together by means of coupling bands furnished for that purpose and with the outside lap of circumferential joints pointing upgrade, and with the longitudinal joints at the sides.

(3) Measurement and payment. --Measurement for payment will be made along the centerline at midheight of the pipe, from end to end of the pipe in place, and no allowance will be made for lap at joints. Payment for furnishing and laying 18-inch-diameter, No. 16-gage, corrugated-metal pipe will be made at the unit price per linear foot bid therefor in the schedule, which unit price shall include the cost of: excavation and backfill for the pipe; preparing a suitable and even bedding; and attaching the connecting bands.

STRUCTURES

52. Construction of Structures

The structures to be constructed for the diversion dam will include:

- a. Upstream apron.
- b. Upstream and downstream wingwalls.
- c. Sluiceway.
- d. Spillway.
- e. Right abutment wall.

The structures are located as shown on the drawings. The sequence of construction shall be subject to approval of the contracting officer. The contractor shall prepare the foundation for the structures so as to provide firm foundations and the surfaces of foundation shall be finished to the prescribed dimensions. Where the thickness of any portion of a concrete structure is variable, it shall vary uniformly between the dimensions shown. The contractor shall place and attach all timber, metal, or other accessories necessary for its completion, as shown on the drawings. The cost of such work, for which specific unit prices are not provided in the schedule, shall be included in the prices bid in the schedule for the work to which it is appurtenant.

The structures shall be built to the lines, grades, and dimensions shown on the drawings. The dimensions of each structure as shown on the drawings will be subject to such modifications as may be found necessary by the contracting officer to adapt the structure to the conditions disclosed by the excavation or to meet other conditions.

The contractor shall be entitled to no additional allowance above the unit prices bid in the schedule by reason of the dimensions fixed by the contracting officer or by reasons of any modifications or extensions of a minor character to adapt the structures to the structure site, as determined by the contracting officer.

Concrete in structures shall conform to the requirements of Paragraphs 64 through 83.

For the purposes of payment, concrete in the diversion dam structure will be separated into two schedule items: (1) concrete in structures except spillway weir and (2) concrete in spillway weir. Concrete in structures except concrete in spillway weir will include all concrete for the diversion dam structure except a portion of the spillway concrete within the following boundary limits: The item of the schedule for concrete in spillway weir includes the spillway concrete extending 32 feet downstream from the contraction joint joining the upstream apron concrete to the spillway concrete, and

the spillway concrete for a width of 46 feet 8 inches which is between the contraction joint joining the sluiceway and the spillway and a plane as extended along the inside face of the right abutment wall.

53. Joints in Concrete

a. Construction joints. --Construction joints are joints which are either purposely placed in structures to facilitate construction or which occur in structures as a result of inadvertent delays in concrete placing operations. Construction joints are located to facilitate the contractor's operations, to reduce initial shrinkage stresses and cracks, to allow time for the installation of embedded metalwork, or to allow for the subsequent placing of other concrete, backfill concrete, or second-stage concrete. Bond is required at construction joints regardless of whether or not reinforcement is continuous across the joint.

The location of all construction joints in concrete work shall be subject to approval, and the joints shall be constructed in accordance with Paragraphs 74 and 75. The entire cost of constructing the joints shall be included in the price bid in the schedule for concrete in which the joints are required.

b. Contraction joints. --Contraction joints are joints placed in structures or slabs to provide for volumetric shrinkage of a monolithic unit or movement between monolithic units. The joints shall be so constructed that there will be no bond between the concrete surfaces forming the joint. Except as otherwise provided for dowels, reinforcement is never continuous across a contraction joint.

Contraction joints of the types shown on the drawings shall be constructed at the locations shown. The joints shall be made by forming the concrete on one side of the joint and allowing it to set before concrete is placed on the other side of the joint. The surface of the concrete first placed at a contraction joint shall be coated with sealing compound before the concrete on the other side of the joint is placed. The sealing compound shall conform to Bureau of Reclamation "Specifications for Sealing Compound for Curing Concrete," dated June 1, 1961.

Except as otherwise provided for furnishing and placing joint materials, the entire cost of constructing contraction joints shall be included in the prices bid in the schedule for the concrete in which the joints are required.

54. Elastic Filler Material

a. General. --Elastic filler material consisting of sponge rubber shall be furnished and placed in the concrete joints where shown on the drawings.

Par. 54

b. Materials. --Sponge rubber shall conform to Federal Specification HH-F-341a, for Type I, Class A, sponge rubber. Sponge rubber shall be stored in as cool a place as practicable, preferably at 70° F or less and in no case shall the rubber be stored in the open, exposed to the direct rays of the sun.

Copper nails shall conform to Federal Specification FF-N-105 for common copper wire nails.

c. Installation. --The elastic filler material shall be cut to size and shape of the joint surface. Elastic filler material shall be secured to the concrete, in an approved manner, with copper nails at approximately 12-inch centers. Joints between adjoining portions of the filler materials shall be sufficiently tight to prevent mortar from seeping through such joints. Unless otherwise directed, the edges of the elastic filler material shall be placed flush with the finished surface of the concrete or to the bottom edge of chamfers. Surfaces of concrete to be in contact at the joint shall be painted with sealing compound.

d. Measurement and payment. --Measurement, for payment, of elastic filler material will be made of the area of material in place. Payment for furnishing and placing elastic filler material in joints will be made at the unit price per square foot bid therefor in the schedule.

55. Rubber Water Stop

a. General. --Rubber water stop shall be furnished and placed in the joints at the locations shown on the drawings or where directed. Rubber water stop shall be furnished in accordance with the details shown on Drawings No. 22 (40-D-2867) and 12 (469-D-60). The contractor shall also furnish all labor and materials for making field splices in rubber water stop. The contractor shall take suitable precautions to support and protect the water stop during the progress of the work and shall repair or replace any damaged water stop. All water stops shall be stored in as cool a place as practicable, preferably at 70° F or less. Water stop shall not be stored in the open or where it will be exposed to the direct rays of the sun. All water stops shall be protected from oil or grease.

b. Material. --

(1) Rubber water stop. --The rubber water stop shall be fabricated from a high-grade, tread-type compound. The basic polymer shall be natural rubber or a synthetic rubber. The material shall be compounded and cured to have the following physical characteristics:

	<u>Natural rubber</u>	<u>Synthetic rubber</u>
Tensile strength, pounds per square inch, minimum	3,500	3,000
Tensile strength, at 300-percent modulus, pounds per square inch, minimum	1,450	1,150
Elongation at break, percent, minimum	500	450
Shore durometer (Type A)	60 to 70	60 to 70
Specific gravity	1.15 ± 0.03	1.15 ± 0.03
Change in weight, water immersion, percent maximum (2 days at 70° C)	5	5
Compression set (constant deflection) percent of original deflection, maximum	30	30
Tensile strength after oxygen pressure test (48 hours, 70° C, 300 pounds per square inch) percent of tensile strength before aging, minimum	80	80
Elongation after oxygen pressure test (48 hours, 70° C, 300 pounds per square inch) percent of elongation before aging, minimum	80	80

(2) Gum rubber and rubber cement. --Gum rubber and rubber cement shall be suitable for making field connections in rubber water stops as described in Subparagraph e. (2) below.

c. Fabrication. --

(1) General. --The rubber water stop may be molded or extruded. All material shall be molded or extruded and cured in such a manner that any cross section will be dense, homogeneous, and free from porosity and other imperfections. The following minor surface defects will be acceptable:

(a) Lumps and depressions not exceeding 1/4 inch in longest lateral dimensions and 1/16 inch deep with no limit to the frequency of occurrence.

(b) Lumps and depressions between 1/4 and 1/2 inch in longest lateral dimension and 3/32 inch deep as long as the frequency of occurrence does not exceed six in a 50-foot length, and there are at least 2 inches between any two such defects.

(c) Marks resulting from the tubing operation or handling during manufacture with no limit to width or frequency of occurrence as long as the thickness of material below the mark is not less than the minimum thickness.

(d) Coarse or grainy surface texture.

(e) Suck-back along flash lines of molded goods if not more than 1/16 inch wide, 1/16 inch deep, and not more than 2 feet long.

The tolerances, shown on the drawing, shall govern all cross-sectional dimensions. Any defects which are not within the above limitations either shall be repaired as approved by the contracting officer or shall be removed from the finished product by cutting out a length of water stop containing such defects and splicing the water stop at that point. All factory splices shall be molded splices. Molded splices shall be made by vulcanizing the splices in a steel mold for a time sufficient to produce maximum strength in the splice. All molded splices shall withstand being bent 180° around a 2-inch-diameter pin without any separation at the splice.

(2) Special intersections. --The Government owns and will furnish to the contractor for the manufacturer's use, if requested, fob cars at Denver, Colorado; steel molds for molding 90° tees and cross required to be furnished under the contract. These molds will mold 90° flat tees, and cross with legs extending 10 and 3/4 inches from the centerlines of the intersections to the end of each leg, and the vertical tee with legs of 11 and 1/4 inches, and 3 and 5/8 inches from the centerline to the ends of the respective legs. Molds for splicing water stop and dowel bars for making the center hole will not be furnished by the Government.

The contractor will be held responsible for, and shall make good, any and all damage to the Government-owned molds due to improper handling at the manufacturer's plant, or elsewhere. After no longer needed for this contract, the Government-owned molds shall be returned to the Government fob cars at Denver, Colorado. No rental will be charged for the use of the Government-owned molds.

Special intersections shall be fabricated by molding and splicing as shown on Drawing No. 12 (469-D-60), and as described below:

(a) Intersections, Type 1. --Rubber water stop intersections shall be full molded as shown on the drawing.

(b) Intersection, Type 2. --Rubber water stop intersections shall be fabricated as follows. The 90° flat tee and 90° vertical tee portions of the intersections shall be full molded and spliced together to form the finished intersection as shown on the drawing.

Molded splices shall be made by beveling the ends of the water stop to be spliced at an angle of 45° or flatter and, after buffing and applying suitable rubber cement and gum rubber to the beveled ends, the splice shall be vulcanized in a mold for a time sufficient to produce maximum strength in the splice. Molds for splicing water stop will not be furnished by the Government. All molded splices shall withstand being bent 180° around a 2-inch-diameter pin without any separation at the splice.

d. Laboratory tests. --

(1) General. --Rubber water stop shall be subject to laboratory tests before shipment. Material for tests shall be furnished by the manufacturer and all tests shall be made at the place of the manufacturer of the rubber water stop.

Except as otherwise provided below, general sampling procedures shall be in accordance with Section 6 of Federal Test Method Standard No. 601.

(2) Sampling for tests. --Samples for laboratory tests to determine physical properties of the compound shall be taken at random to obtain the following number of test units from each separate purchase order:

<u>Size of purchase order</u>	<u>No. of test units</u>
500 lin ft or less	1
501 lin ft to 1,000 lin ft	2
1,001 lin ft to 5,000 lin ft	4
5,001 lin ft to 10,000 lin ft	8
Over 10,000 lin ft	15

At the option of the manufacturer, laboratory tests to determine physical properties of the rubber water stop required to be furnished under these specifications shall be performed on test specimens cut from (a) test units taken from the finished rubber product, or (b) substitute samples furnished in accordance with Paragraph 3.5 of Section 6, Federal Test Method Standard No. 601.

(3) Methods of tests. --Tests shall be made in accordance with the following methods described in Federal Test Method Standard No. 601:

Tensile strength	Method 4111
Elongation	Method 4121
Durometer	Method 3021
Specific gravity	Method 14011
Change in weight	Method 6251
Compression set	Method 3311
Oxygen pressure test	Method 7111, except the time interval of test shall be 48 ± 1/2 hours

(4) Data to be furnished by manufacturer. --One certified copy of all laboratory test reports representing each shipment of water stop shall be mailed to the Bureau of Reclamation, Building 53, Denver Federal Center, Denver 25, Colorado, Attention: Code 284, and one duplicate copy of all laboratory test reports shall be mailed to the Project Manager, Bureau of Reclamation, Huron, South Dakota.

e. Installation. --

(1) General. --The water stop shall be installed with approximately one-half of the width of the material embedded in the concrete on each side of the joint. Care shall be exercised in placing and vibrating the concrete about the water stop to insure complete filling of the concrete forms under and about the water stop and to obtain a continuous bond between the concrete and the water stop at all points around the periphery of the water stop. In the event the water stop is installed in the concrete on one side of a joint more than 1 month prior to the scheduled date of placing the concrete on the other side of the joint, the exposed water stop shall be covered or shaded to protect it from the direct rays of the sun during the exposure.

(2) Field splices. --All splices shall be molded splices. All molded splices shall be made by vulcanizing the splices in a steel mold as follows. The adjoining ends at splices shall be beveled at an angle of 45° or flatter by the use of a saw and miter box so that the ends to be spliced together will be pressed together when the mold is closed. The beveled ends and the sides for at least one-fourth of an inch back from the ends shall be buffed thoroughly to provide clean, rough surfaces. All buffed surfaces shall be given two thin coats of rubber cement and each coat shall be permitted to dry thoroughly. A piece of gum rubber cut to the same dimensions as the beveled face shall then be applied to the end of one strip after removing the cloth backing from the gum rubber. The adjoining strip shall then be placed accurately in position, and all edges shall be stitched thoroughly together with a suitable hand stitcher. The mold shall be heated to a temperature of 290° F before the splice is placed in the mold. The prepared splice shall be placed in the mold with the splice in the center of the mold, and the mold shall be closed tightly to prevent slipping during the vulcanizing process. The splice shall remain in the mold 25 minutes after the mold is closed completely, during which time the mold shall be maintained at a temperature of 290° F.

The contractor shall furnish all materials for molded splices, all field-splicing molds, and electrical energy for heating the molds.

Each finished splice shall withstand a bend test by bending the water stop 180° around a 2-inch-diameter pin without showing any separation at the splice.

f. Measurement and payment. --Measurement, for payment, of rubber water stop will be made of the number of linear feet of water stop in place, measured along the centerline of the water stop. Payment for furnishing and placing rubber water stop will be made at the unit price per linear foot bid therefor in the schedule, which unit price shall include the cost of furnishing all material, making the splices, and installing the water stop.

56. Rubber-covered Dowel Bars

The contractor shall place dowel bars with rubber sleeves in joints as shown on the drawings. The dowel bars and rubber sleeves shall be furnished by the contractor. The dowel bars shall be of the dimensions shown on the drawings, and the rubber sleeve shall be vulcanized to the bars. Steel for the dowel bars shall conform to the requirements for reinforcement bars and the rubber sleeve material shall conform to the requirements of rubber for rubber water stop as provided in Paragraph 55.

Payment for furnishing and placing dowels with rubber sleeves in joints will be made at the unit price per dowel bid therefor in the schedule.

57. Filter

a. General. --An inverted drain filter consisting of graded sand and gravel and clay pipe shall be constructed under the sluiceway and spillway structures and along the downstream wingwall structure for the diversion dam, all as shown on the drawings. All materials shall be furnished by the contractor.

b. Construction. --The trench for the filter shall be constructed to lines, shapes, and dimensions shown on the drawings. The pipe shall be placed in the filter and connected to drain outlets. Disturbing of the compacted foundations will not be permitted, and any material outside of the required lines which is disturbed shall be removed and replaced and compacted at the expense of the contractor. The sand and gravel shall be placed and tamped into place in such a manner that mixing of sand and gravel in the filter with foundation or backfill materials will not occur. The sand and gravel shall be placed and tamped to the dimensions shown. Where joints are used in pipe outlets and are designated to have closed joints, a joint seal of approved mortar shall be used.

c. Materials. --

(1) Zones A and B materials. --Zones A and B materials shall conform to the material requirements of Paragraphs 68 and 69, except that the gradation of the Zones A and B materials shall be as follows:

	Percent (by weight) retained on standard sieve									
	No. 200	No. 100	No. 50	No. 30	No. 16	No. 8	No. 4	3/8	3/4	1 and 1/2
Zone A	-	-	-	-	95-100	75-90	60-80	40-60	20-35	0
Zone B	100	93-97	74-85	38-70	15-45	5-25	0-5	-	-	-

(2) The perforated clay pipe in the filter shall be standard strength, bell-and-spigot, salt-glazed, or unglazed, clay pipe, perforated, conforming to Federal Specification SS-P-359b or ASTM Designation: C 211.

(3) Clay pipe, tees, and bends for outlets shall be standard strength, bell-and-spigot, salt-glazed, or unglazed, sewer pipe conforming to Federal Specification SS-P-361b.

d. Measurement and payment. --Measurement, for payment, of graded sand and gravel in the filter will be of the volume of sand and gravel in the completed filter. Payment for graded sand and gravel for filter will be made at the unit price per cubic yard bid therefor in the schedule, which price shall include the cost of procuring, delivery, handling, placing, and compacting the graded sand and gravel.

Measurement for payment for furnishing and laying 4-inch-diameter clay pipe for drain filters, with and without mortared joints, will be made along the centerline from end to end of the pipe in place including pipe with and without perforations and pipe in tees and bends and no allowance will be made for lap at joints. Payment for furnishing and laying 4-inch-diameter clay pipe for drain filters will be made at the unit price per linear foot bid therefor in the schedule, which unit price shall include the cost of furnishing and laying standard-strength clay drainpipe, either with or without perforations, including pipe in bends and tees for the outlets, mortaring of joints and the cost of strainers.

SLIDE GATE AND METALWORK

58. Right to Operate and Use Unsatisfactory Materials or Equipment

If, after installation, the operation or use of the materials or equipment proves to be unsatisfactory to the contracting officer, the Government shall have the right to operate and use such materials or equipment until they can be taken out of service, without injury to the Government, for correction of defects, errors, or omissions and/or for replacement of unsatisfactory equipment in whole or in part, if correction is unsuccessful or infeasible. Unless otherwise agreed upon in advance, the period of such operation or use, pending correction of defects, will not exceed 1 year.

59. Drawings and Data to be Furnished by the Contractor

a. Approval drawings and data. --Before proceeding with fabrication or procurement of material the contractor shall submit to the Government for approval five sets of drawings and data showing assembly, type, size, lift capacity, and detail dimensions of the cast iron slide gate and lift.

All dimensions shall be in feet and inches, and all wording, signs, symbols, etc., shall be in English.

Any fabrication or procurement performed prior to approval of the drawings and data shall be at the contractor's risk. The Government shall have the right to require the contractor to make any changes in the equipment design which the Government determines necessary to make the equipment conform to the requirements of these specifications without additional cost to the Government. Approval by the Government of the contractor's drawings or data shall not be held to relieve the contractor of any part of the contractor's responsibility to meet all of the requirements of these specifications or of the responsibility for the correctness of the contractor's drawings.

b. Mailing address. --All drawings and data for the cast iron slide gate and lift required under this paragraph shall be forwarded to the Project Manager, U. S. Bureau of Reclamation, Post Office Box 825, Huron, South Dakota, for his approval.

c. Costs. --The costs of preparing drawings, and of submitting drawings, and data, to the Government shall be included in the prices bid in the schedule for the applicable items of equipment.

60. Cast Iron Slide Gate and Lift

a. General. --The 72- by 72-inch cast iron slide gate for the sluiceway complete with frame, flush-bottom seal, seat, slide, stem, stem guides, manually operated lift, stop nut, stem cover, position indicator, and anchor bolts shall be furnished and installed by the contractor, in accordance with the drawings and requirements of these specifications. The slide gate and lift shall be manufactured to the standards of commercial equipment, and the contractor shall assume responsibility for coordinated and adequate design conforming to the best engineering practice for the requirements of the work under these specifications.

The slide gate, lift, stem guides and stem cover shall be painted in accordance with the provisions of Paragraph 63.

b. Cast iron slide gate. --The cast iron slide gate shall be of the spigot-back, flush-bottom type and shall have a cast iron slide (sometimes called disc or leaf), cast iron guide bars and seat with finished bronze contact surfaces and shall be suitable for 10.5-foot face pressure head and zero back pressure. The pressure head shall be the vertical distance from the

center of the gate to the maximum water surface. The gate shall be equipped with adjustable wedges or wedge blocks arranged to force the gate slide against its seat. The flush-bottom type shall be equipped with a neoprene seal, providing a continuous flat surface across the bottom of the gate opening, and without obstructions to the waterflow.

c. Stem and stem guides. --The stem diameter and the number of stem guides for the gate shall be selected so that the unsupported length of stem shall be not greater than 200 times the radius of gyration of the stem, either in the body or threaded section. No portion of a stem shall have a cross-sectional area smaller than the root area of the threaded portion of the stem. The stem guides shall be fully adjustable.

d. Manually operated gate lift. --The gate lift shall be designed to operate with a crank pull of not more than 25 pounds when raising or lowering the gate under applicable face pressure head. All parts of the gate including wedges, stem, and lift shall be capable of withstanding a crank pull of 100 pounds, with the stop nut free, without damage to any parts. The lift shall be equipped with a bronze lifting nut, and provision shall be made for lubrication where ball or roller bearings are used. The enclosed geared gate lift shall be of a type in which the gears are enclosed in a housing. The crank radius shall not be greater than 15 inches. The centerline of the crank shall be at an elevation not less than 2.5 feet and not more than 3.5 feet above the structure on which the gate operator will stand.

e. Installation. --The contractor shall install the gate as shown on the drawings and in such manner as will prevent leakage about the seat. Anchor bolts and other metalwork to be embedded in concrete shall be supported firmly and accurately in position while the concrete is being placed. The lift shall be installed complete with stem, stem guides, stop nut, and anchor bolts. After the gate and lift have been completely installed, the gate shall be tested by the contractor by raising and lowering the gate through its full range of operation. Any required changes or adjustments shall be made until the operation of the gate and lift is approved by the contracting officer. Shop coating on the gate or lift that is damaged, shall be cleaned and coated as provided in Paragraph 63.

f. Payment. --Payment for furnishing and installing one 72- by 72-inch cast iron slide gate and lift will be made at the lump-sum price bid therefor in the schedule.

61. Frame and Insulated Covers

a. General. --The contractor shall furnish and install the frame and insulated covers for the sluiceway as shown on Drawing No. 10 (469-D-76).

b. Fabrication. --Fabrication of the frame and covers shall be in accordance with these specifications and drawing, and shall otherwise conform

to the applicable provisions of the latest "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction.

c. Welding. --Welds shall be made as indicated on the drawings, and are identified thereon by the conventional welding symbols of the American Welding Society as approved by the American Standards Association. Surfaces to be welded shall be prepared, and all welding shall be done either manually, by the shielded-arc method, or automatically by the shielded- or submerged-arc methods in accordance with the applicable requirements of Sections 3, 4, and 5 of the American Welding Society (AWS) Code D1.0-46; and accordingly, procedure qualification tests will be required when welding by automatic machines of any type. "Building Commissioner," referred to in the Code, shall mean the contracting officer.

All welding operators shall be capable of meeting the qualification tests for operators as outlined in Appendix D of the Code. The contracting officer shall have the right to call for the making of test specimens by any welding operator in accordance with the above code appendix. If qualification tests are required, the contractor shall supply all materials, equipment, and labor required for making the qualification tests, and the cost thereof, including transportation costs, shall be included in the price bid in the schedule.

d. Materials. --All material shall be new and shall conform to the applicable requirements of the latest editions or revisions of the standard specifications referred to herein. Any material not specifically referred to a specification shall be of standard commercial quality suitable for the intended use:

(1) Structural steel. --ASTM Designation: A 36.

(2) Floor plate. --Federal Specification QQ-F-461b, Class 1.

(3) Anchors. --All welded anchors shown on the drawing shall be flux-filled stud anchors suitable for end welding with end-welding guns, or may be equivalent headed anchors, manually welded.

e. Installation. --The metalwork shall be installed in accordance with these specifications and drawing. Metalwork to be embedded in concrete shall be supported firmly and accurately in position while the concrete is being placed. After installation, all exposed surfaces of metalwork shall be cleaned and painted in accordance with the provisions of Paragraph 63.

f. Payment. --Payment for furnishing and installing frame and insulated covers will be made at the lump-sum price bid therefor in the schedule.

62. Miscellaneous Metalwork

a. General. --The contractor shall furnish and install the following items of metalwork as miscellaneous metalwork:

- (1) Welded pipe handrail.
- (2) Steel ladder.
- (3) Steel liners for stoplog grooves.
- (4) Four-inch-diameter vent pipe.
- (5) All bolts, nuts, and washers for the above metalwork.

b. Materials. --All materials shall conform to the following requirements:

- (1) Structural steel. --Steel shapes, plates, bars, rods, and straps shall conform to Federal Specification QQ-S-741b, Grade A.
- (2) Standard steel pipe. --Standard steel pipe shall conform to Federal Specification WW-P-406b, Weight A, Class 1, except where pipe is designated to be galvanized, the pipe shall be Class 2.
- (3) Miscellaneous. --Materials for miscellaneous metalwork not specifically covered by detailed specifications shall be of good commercial quality approved by the contracting officer.

c. Installation. --Unless installation by use of grouting recesses or use of expansion anchors is approved, anchor bolts and metalwork to be embedded in concrete shall be installed before the concrete is placed and shall be supported firmly and accurately in position while the concrete is being placed. Handrails shall be set in place when concrete is placed or shall be completely assembled and recesses shall be formed in the concrete and the posts grouted into the recesses. Cleaning and painting of metalwork shall conform to the requirements of Paragraph 63. Welding shall conform to the requirements of Subparagraph 61c.

d. Payment. --Payment for furnishing and installing miscellaneous metalwork will be made at the unit price per pound bid therefor in the schedule. The cost of furnishing and installing other minor miscellaneous items of metalwork for which specific unit prices are not provided in the schedule shall be included in the unit prices bid for the work to which they are appurtenant.

63. Cleaning and Painting Metalwork

a. General. --The contractor shall clean surfaces and apply paint and protective coatings as hereinafter provided, and shall furnish all materials. Surfaces not required to be painted or coated but which are adjacent to surfaces to be cleaned and painted shall be protected against contamination and damage during the cleaning and painting operations. Before proceeding with the painting or coating operations, the contractor shall clean and repair all shop-applied paint which is defective or damaged. Materials which have been painted shall be handled with care and protected as necessary to preserve the coating in good condition. Temporary or permanent welding will not be permitted on areas where the welding will damage paint or other protective coatings unless the areas of coatings which would be damaged thereby are accessible for repairing and inspection. Unless otherwise specified, the contractor will not be required to disassemble machinery, equipment, or other metalwork for the purpose of painting the interiors. Tinting, where required for color contrast, shall be done by using not more than 3 ounces of tinting color per gallon of paint.

b. Costs. --The cost of furnishing, preparing, and applying all materials for the cleaning, painting, or coating operations, including labor, tools, and equipment, shall be included in the applicable prices bid in the schedule for installing the metalwork.

c. Painting tabulation. --

No.	Item	Paint or coating material
1	Metalwork which will be submerged or intermittently submerged and which will be subject to sunlight exposure or to public view: Such metalwork includes stop plant guides, slide gate and gate stem guide metalwork, but not including items otherwise tabulated.	VR-3 vinyl-resin paint. (Colors: alternate coats of white, gray, white, aluminum.) 4 or more coats to produce a minimum dry-film thickness of 6 mils.

No.	Item	Paint or coating material
2	Pedestal lift for slide gate, stem cover, sluiceway frame and insulated covers, handrails, and other metalwork which will be exposed to ordinary atmospheric conditions and to public view, but not including items otherwise tabulated.	1 coat of red-lead priming paint, Type II, for unpainted surfaces and for repaired areas of previously applied paints, followed by 2 coats of regular aluminum paint.
3	Machined surfaces, and finished surfaces which will be in rolling or sliding contact and which are not required to be painted or lubricated.	1 heavy coat of gasoline-soluble rust-preventive compound.
4	Damaged areas of paint or coating on items that are furnished completely painted or coated.	Repair damaged areas to equal and color match undamaged areas.
5	Damaged areas of galvanized surfaces that do not require finish painting.	Clean damaged areas by wiping with clean rags saturated with mineral spirits or xylol, followed by hand wire brushing and recleaning with solvent to remove residue. After cleaning, paint as follows: For surfaces which will be subject to normal atmospheric exposure, apply 2 coats of zinc dust-zinc oxide paint. For surfaces which will be immersed, buried or exposed to damp conditions, apply 2 coats of galvanizing repair compound in accordance with manufacturer's instructions.

No.	Item	Paint or coating material
6	Nonferrous metalwork; and galvanized metalwork.	Painting is not required.
7	Metal surfaces to be encased in concrete and metal surfaces against which concrete is to be placed.	Painting is not required.

d. Preparations of surfaces. --Surfaces shall be cleaned of oil and grease by the use of clean mineral spirits or xylol and clean wiping material. Following the solvent cleaning, the surfaces shall be cleaned of all defective or damaged areas of existing paint and of all loose rust, loose mill scale, dirt, and other foreign substances by sandblasting, gritblasting, power wire brushing, or other effective means: Provided, That surfaces which require vinyl-resin paint shall be blast cleaned to base metal, using hard, sharp, sand or steel grit, to produce a gray etched surface. The blasting material shall pass a No. 16 United States Standard Screen and at least 85 percent shall be retained on a No. 50 United States Standard Screen. In the event that rust forms or the surfaces become otherwise contaminated in the interval between cleaning and painting, or between coats of paint, recleaning will be required.

e. Application. --Materials shall be thoroughly mixed at the time of application. Surfaces shall be clean and free from moisture at the time of application. Effective means shall be provided for removing free oil and moisture from the air supply lines of all spraying equipment. Nozzle pressure consistent with acceptable finish results shall be employed when spray painting. Each coat shall be free from runs, pinholes, and sags. Each coat shall be allowed to dry or to harden before the succeeding coat is applied. Thicknesses specified in mils shall be measured by an approved dry-film thickness gage. Red-lead priming paint, and regular aluminum paint may be thinned if necessary to permit satisfactory application, in which event mineral spirits shall be used and the amount of thinner shall be kept to a minimum and in no event shall it exceed 1 pint per gallon of paint. Thinning of other materials will be permitted only if approved. If necessary to improve application properties, paints may be heated by means of a hot-water bath to temperatures not exceeding 100° F. Paint shall not be applied when the temperature of the item to be painted or of the surrounding air is under 45° F, except that vinyl-resin paints shall not be applied when metal or air temperatures are above 110° or below 40° F.

Application of specific materials shall be as follows:

- (1) Red-lead priming paint shall be applied at a maximum coverage of 500-square-feet-per-gallon per coat. The first coat shall be applied

by brush and subsequent coats shall be applied by either brush or spray. Following the first coat, an additional tinted brush coat shall be applied over all rivets, welds, bolts, seams, sharp corners and edges before subsequent painting. Alternate coats shall be tinted for color contrast using 1B black.

(2) Aluminum paint shall be applied by spraying at a maximum coverage of 500-square-feet-per-gallon per coat. The paint shall be prepared by mixing 2 pounds of aluminum paste per gallon of mixing varnish and only enough paint for each day's use shall be prepared at one time. The first coat shall be tinted for color contrast using 2A blue.

(3) Rust-preventive compound shall be applied by any convenient method to insure complete coverage with a heavy uniform coating.

(4) Vinyl-resin paint VR-3:

Coat*	Application method	Minimum drying time
1	Brush	12 hours
**	Brush	**
2	Spray	12 hours
3	Spray	12 hours if a fourth coat is to be applied or at least 10 days before placing in service if only 3 coats are used.
4	Spray	At least 10 days before placing in service.

*Alternate colors as shown in the painting tabulation.

**Additional coats of vinyl mastic shall be applied to a 14-mil minimum dry-film thickness over all rivets, welds, bolts, seams, sharp corners and edges, and allowed to dry 4 hours minimum between coats and 12 hours minimum after the last mastic coat before application of the second coat.

The paint shall be applied in four or more coats to a minimum acceptable dry-film thickness of 6.0 mils in areas not covered by vinyl mastic and 20 mils in areas where coats of vinyl mastic are applied. In

any instance where additional coats are necessary to obtain the required dry-film thickness, the color of the final coat shall be as specified above.

As a guide, 225-square-feet-per-gallon per coat usually gives a dry-film thickness of about 1.7 mils, but is not required to do so by the materials specifications. Variables such as surface roughness, application technique, amount of overspray, etc., affect the final coverage rates obtained.

Paint applied by brush shall be applied in generous brushfuls and quickly brushed out smooth before significant evaporation of solvents occurs and before brush drag develops.

Conventional pressure-pot equipment shall be used for spray application and the equipment shall be capable of operating at air atomization pressures up to 100 pounds per square inch. Application shall be such as to avoid excessive loss of volatiles before the paint spray strikes the surface. Each stroke of the spray gun shall make a good lap over the previous stroke so that a continuous wet film is obtained on the surface. To prevent sagging and to insure the minimum dry-film thickness, it may be necessary to make repeated passes with the spray gun. Where this is necessary, each additional pass shall be by strokes at right angles to the previous pass. Shop application of only a portion of this paint system is not permitted.

Specific color matches will not be required except that all paint used for the last coat shall be uniform in color.

All vinyl paint materials shall be purchased from the same manufacturer, ready mixed.

Thinning shall be as recommended by the manufacturer and tinting will not be permitted. For application to concrete, the first coat of paint shall be thinned at the rate of two parts paint to one part thinner.

f. Materials. --All pigmented paints and primers shall be purchased in containers not larger than 5 gallons as packaged by the manufacturer. Colors of finish paints shall match color samples furnished by the Government unless color requirements are specifically stated otherwise. Materials shall be in accordance with the following specifications:

(1) Federal Specifications. --

(a) Red-lead priming paint, TT-P-86c, Type II.

(b) Mixing varnish for regular aluminum paint, TT-V-81d, Type II, and aluminum paste TT-P-320a, Type II, Class B.

(c) Pigment-in-oil (tinting colors), TT-P-381c. Colors 1B black and 2A blue.

- (d) Zinc dust-zinc oxide primer, TT-P-641b, Type II.
- (e) Mineral spirits, TT-T-291a, Grade 1.
- (f) Xylol (xylene), TT-X-916b, Grade A or B.

(2) Bureau of Reclamation Specifications. --

- (a) Vinyl-resin paint, VR-3, and thinner.

(3) United States Maritime Administration Specifications. --

- (a) Rust-preventive compound, 52MA-602a, Type B, medium, except that equally effective inhibitors, in suitable quantities, may be used in lieu of the specified percentage of chromates.

(4) Miscellaneous specifications. --

- (a) Galvanizing repair compound shall be Galvanox as manufactured by Subox, Incorporated, Hackensack, New Jersey, or equal.

g. Sampling, testing, and certification of materials. -- Sampling, testing, and certification of all paint and related materials shall be as hereinafter provided and the materials shall not be used until they have been tested or certified in accordance with these specifications. Copies of purchase orders for paint materials which require testing shall be submitted to the Chief Engineer, Bureau of Reclamation, Denver Federal Center, Denver 25, Colorado, Attention: Code 295, who will advise the contractor, with copy to his supplier, on the sampling procedure. The required samples shall be shipped by the contractor, to the Chief Engineer, Attention: Code 295, with all shipping costs prepaid. Copies of purchase orders shall be furnished far enough in advance so that materials to be tested by the Government will be available for sampling and testing at least 30 days prior to use. The contractor will be charged the costs incurred by the Government for additional testing necessitated as a result of rejection of materials.

Samples of the following materials will be required for testing by the Government and the size of each sample shall be as follows, except that quantities of less than 20 gallons of each material will be accepted on certification, which certification shall include detailed test results, unless such test results are specifically waived:

- (1) Vinyl-resin paint (each solution)..... 1 quart
- Aluminum paste for vinyl-resin paint 1 pint

The manufacturer's certificate of compliance with specifications shall be furnished for all paint materials not required to be tested. Detailed test results shall be included in certificates prepared for the following materials, unless such test results are specifically waived:

- (1) Red-lead priming paint, Type II.
- (2) Mixing varnish for regular aluminum paint.
Aluminum paste for regular aluminum paint.

The contractor shall be responsible for the accuracy of all certificates.

The Government reserves the right to test materials accepted on certification when, in the opinion of the Government, such tests are necessary.

CONCRETE

64. Composition

a. General. --Concrete shall be composed of cement, sand, coarse aggregate, water, and admixtures as specified, all well mixed and brought to the proper consistency.

b. Maximum size of aggregate. --The maximum size of coarse aggregate in concrete for any part of the work shall be the largest of the specified sizes, the use of which is practicable from the standpoint of satisfactory consolidation of the concrete by vibration.

c. Mix proportions. --The proportions in which the various ingredients are to be used for different parts of the work shall be as determined from time to time during the progress of the work and as tests are made of samples of the aggregates and the resulting concrete. The mix proportions and appropriate water-cement ratio will be determined on the basis of procuring concrete having suitable workability, density, impermeability, durability, and required strength, without the use of an excessive amount of cement.

The net water-cement ratio of the concrete (exclusive of water, absorbed by the aggregates) shall not exceed 0.47, by weight, for concrete in thin sections of structures which will be exposed to frequent alternations of freezing and thawing, such as the top 2 feet of walls, and walls of structures in the range of fluctuating water levels or subject to spray. The net water-cement ratio shall not exceed 0.53, by weight, for other concrete in structures which will be exposed to freezing and thawing and shall not exceed 0.60, by weight, for concrete in structures that will be covered with fill material or be continually submerged or otherwise protected from freezing and thawing.

Tests of the concrete will be made by the Government, and the mix proportions shall be adjusted whenever necessary for the purpose of securing the required economy, workability, density, impermeability, durability, or strength, and the contractor shall be entitled to no additional compensation because of such adjustments.

d. Consistency. --The amount of water used in the concrete shall be regulated as required to secure concrete of the proper consistency and to adjust for any variation in the moisture content or grading of the aggregates as they enter the mixer. Addition of water to compensate for stiffening of the concrete before placing will not be permitted. Uniformity in concrete consistency from batch to batch will be required.

The slump of the concrete, after the concrete has been deposited but before it has been consolidated, shall not exceed 2 inches for concrete in the tops of walls, and in slabs that are horizontal or nearly horizontal, and 3 inches for concrete in other parts of structures. The Government

reserves the right to require a lesser slump whenever concrete of such lesser slump can be consolidated readily into place by means of the vibration specified in Subparagraph 75c. The use of buckets, chutes, hoppers, or other equipment which will not readily handle and place concrete of such lesser slump will not be permitted.

e. Tests. --The compressive strength of the concrete will be determined by the Government through the medium of tests of 6- by 12-inch cylinders made and tested in accordance with Designations 29 to 33, inclusive, of the Sixth Edition of the Bureau of Reclamation Concrete Manual. Slump tests will be made by the Government in accordance with Designation 22 of the Sixth Edition of the Bureau of Reclamation Concrete Manual. The contractor shall provide such facilities as may be necessary for procuring and handling representative test samples.

65. Cement

a. General. --Cement for concrete, mortar, and grout shall be furnished by the contractor. To prevent undue aging of sacked cement after delivery, the contractor shall use sacked cement in the chronological order in which it was delivered on the job. Each shipment of sacked cement shall be stored so that it may readily be distinguished from other shipments. Bins in which bulk cement is stored shall be weathertight. The bins shall be emptied and cleaned by the contractor when so directed; however, the intervals between required cleanings will normally not be less than 4 months. The cement shall be free from lumps and shall be otherwise undamaged when used in concrete. If the cement is delivered in paper sacks, empty paper sacks shall be burned.

The cement shall be Type V, low alkali or shall be Type II, low alkali: Provided, That if Type II cement is used the tricalcium aluminate ($3\text{CaO} \cdot \text{Al}_2\text{O}_3$) content of the cement shall not be more than 5.0 percent. Regardless of which type of cement used, the cement shall be in accordance with Federal Specification SS-C-192d, and shall meet the false-set limitation specified therein. The contractor shall inform the contracting officer, in writing, at least 30 days before first shipments are required, concerning the mill or mills from which the cement is to be shipped; whether cement will be ordered in bulk or in sacks; and the purchase order number, contract number, or other designation that will identify the cement to be used by the contractor.

b. Inspection. --The cement will be sampled and tested by the Government in accordance with Federal Test Method Standard No. 158a, except that the note at the end of Method 2501.1 concerning variations in initial penetration will be disregarded. Acceptance tests, except for false set, will be made on samples taken as bins of cement are filled and reserved for exclusive Government use. Acceptance tests for false set will be made on samples taken from the cement at the latest time, prior to shipment in cars or trucks, that the cement is still in possession of the

cement company. Cement not meeting test requirements will be rejected. Rejected cement shall be replaced with acceptable cement and the contractor shall be entitled to no adjustments in price or completion time by reason of any delays occasioned thereby.

The contractor will be charged the cost of testing of all Government-tested cement which has been ordered in excess of the amount of cement used for the work under these specifications. The charges to be made for the cost of testing excess cement will be at the rate of 10 cents per barrel, which charge includes the Government overhead, and will be deducted from payments due the contractor.

c. Measurement and payment. --Measurement, for payment, of sacked cement will be on the basis of the number of sacks of cement used at the mixer. Measurement, for payment, of bulk cement will be on the basis of batch weights at the batching plant. Any cement, either bulk or sacked, used for grouting, finishing, or other miscellaneous work will be measured for payment in the most practicable manner. One barrel shall be considered as 4 sacks of sacked cement or 376 pounds of bulk cement.

Payment will be made for cement used in concrete placed within the pay lines for concrete; and for cement used in concrete placed outside the concrete pay lines, unless the requirement for such concrete is determined by the contracting officer to be the result of careless excavation, or excavation intentionally performed by the contractor to facilitate his operations. No payment will be made for cement used as follows: cement used in wasted concrete, mortar, or grout; cement used in the replacement of damaged or defective concrete; cement used in extra concrete required as a result of careless excavation; and cement used in concrete placed by the contractor in excavation intentionally performed by the contractor to facilitate his operations.

Payment for furnishing and handling cement will be made at the unit price per barrel bid therefor in the schedule, which unit price shall include the cost of rail and truck transportation of the cement from the mill to the jobsite and the cost of storing the cement.

66. Admixtures

a. Accelerator. --The use of calcium chloride in concrete will not be permitted.

b. Air-entraining agents. --An air-entraining agent shall be used in all concrete. The agent used shall conform to the requirements of ASTM Designation: C 260-60T, except that the limitation and test on bleeding by concrete containing the agent shall not apply. The agent shall be of uniform consistency and quality within each container and from shipment to shipment. Agents will be accepted on manufacturer's certification of compliance with specifications: Provided, That the Government reserves

the right to require submission of and to perform tests on samples of the agent prior to shipment and use in the work and to sample and test the agent after delivery at the jobsite. The amount of air-entraining agent used in each concrete mix shall be such as will effect the entrainment of the percentage of air shown in the following tabulation in the concrete as discharged from the mixer:

Coarse aggregate maximum size in inches	Total air, percent by volume, of concrete
3/4 inch	6 $\pm$ 1
1 and 1/2 inches	4.5 $\pm$ 1

The agent in solution shall be maintained at uniform strength and shall be added to the batch in a portion of the mixing water. This solution shall be batched by means of a mechanical batcher capable of accurate measurement.

c. General. --Air-entraining agent used shall be furnished by the contractor, and the cost of the materials and all costs incidental to their use shall be included in the price bid in the schedule for concrete in which the materials are used.

67. Water

The water used in concrete, mortar, and grout shall be free from objectionable quantities of silt, organic matter, alkali, salts, and other impurities.

68. Sand

a. General. --The term "sand" is used to designate aggregate in which the maximum size of particles is 3/16 of an inch. Sand for concrete, mortar, and grout shall be furnished by the contractor from any approved source as provided in Subparagraph d. and shall be natural sand, except that crushed sand may be used to make up deficiencies in the natural sand grading.

Bureau of Reclamation tests performed on samples of sand obtained from the following listed locations indicate that the deposits at these locations contain materials of suitable quality that can be processed to meet the requirements of these specifications for sand:

- (1) SW1/4 SW1/4 Sec 30, T 117 N, R 52 W, 5th P.M.
- (2) SW1/4 Sec 10, T 117 N, R 53 W, 5th P.M.
- (3) Sec 26, T 117 N, R 52 W, 5th P.M.
- (4) NW1/4 Sec 25, T 117 N, R 52 W, 5th P.M.

- (5) N1/2 Sec 15, T 116 N, R 52 W, 5th P. M.
- (6) N1/2 SW1/4 Sec 13, T 117 N, R 52 W, 5th P. M.
- (7) Sec 9, T 116 N, R 53 W, 5th P. M.
- (8) SE1/4 Sec 32, T 111 N, R 67 W, 5th P. M.

Any royalties or other charges required to be paid for materials taken from deposits not owned by the Government and controlled by the Bureau of Reclamation, shall be paid by the contractor.

Sand, as delivered to the batching plant, shall have a uniform and stable moisture content.

b. Quality. --The sand shall consist of clean, hard, dense, durable, uncoated rock fragments. The maximum percentages of deleterious substances in the sand, as delivered to the mixer, shall not exceed the following values:

	<u>Percent, by weight</u>
Material passing No. 200 screen	
(Designation 16)	3
Lightweight material (Designation 17)...	2
Clay lumps (Designation 13)	1
Total of other deleterious substances	
(such as alkali, mica, coated grains,	
soft flaky particles, and loam)	2

The sum of the percentages of all deleterious substances shall not exceed 5 percent, by weight. Sand producing a color darker than the standard in the colorimetric test for organic impurities (Designation 14) may be rejected. Sand having a specific gravity (Designation 9, saturated surface-dry basis) of less than 2.60 may be rejected. The sand may be rejected if the portion retained on a No. 50 screen, when subjected to 5 cycles of the sodium-sulfate test for soundness (Designation 19), shows a weighted average loss of more than 8 percent, by weight. The designations in parentheses refer to methods of tests described in the Sixth Edition of the Bureau of Reclamation Concrete Manual.

c. Grading. --The sand as batched shall be well graded, and when tested by means of standard screens (Designation 4), shall conform to the following limits:

<u>Screen No.</u>	<u>Individual percent, by weight retained on screen</u>
4	0 to 5
8	5 to 15(1)
16	10 to 25(1)
30	10 to 30
50	15 to 35
100	12 to 20
Pan	3 to 7

(1) If the individual percent retained on the No. 16 screen is 20 percent or less, the maximum limit for the individual percent retained on the No. 8 screen may be increased to 20 percent.

d. Test and approval. -- If sand is to be obtained from a deposit not previously tested and approved by the Government, the contractor shall submit representative samples for preconstruction test and approval at least 30 days before the sand is required for use. The samples shall consist of approximately 200 pounds of sand.

The approval of deposits by the contracting officer shall not be construed as constituting the approval of all or any specific materials taken from the deposits, and the contractor will be held responsible for the specified quality of all such materials used in the work.

In addition to preconstruction test and approval of the deposit, the Government will test the sand during the progress of the work and the contractor shall provide such facilities as may be necessary for procuring representative samples.

69. Coarse Aggregate

a. General. -- The term "coarse aggregate," for the purpose of these specifications, designates aggregate of sizes within the range of 3/16 of an inch to 1 and 1/2 inches or any size or range of sizes within such limits. The coarse aggregate shall be reasonably well graded within the nominal size ranges hereinafter specified. Coarse aggregate for concrete shall be furnished by the contractor from any approved source as provided in Subparagraph d. and shall consist of natural gravel or crushed rock or a mixture of natural gravel and crushed rock.

Bureau of Reclamation tests performed on samples of coarse aggregate obtained from deposits located in SW1/4 Sec 10, T 117 N, R 53 W; N1/2 Sec 15, T 116 N, R 52 W; N1/2 SW1/4 Sec 13, T 117 N, R 52 W; and Sec 9, T 116 N, R 53 W; locations with respect to fifth principal meridian, indicate that these deposits contain materials of suitable quality that can be processed to meet the requirements of these specifications for coarse aggregate.

Any royalties or other charges required to be paid for materials taken from deposits not owned by the Government and controlled by the Bureau of Reclamation shall be paid by the contractor.

Coarse aggregate, as delivered to the batching plant, shall have a uniform and stable moisture content.

b. Quality. --The coarse aggregate shall consist of clean, hard, dense, durable, uncoated rock fragments. The percentages of deleterious substances in any size of coarse aggregate, as delivered to the mixer, shall not exceed the following values:

	<u>Percent, by weight</u>
Material passing No. 200 screen	
(Designation 16).....	1/2
Lightweight material (Designation 18)...	2
Clay Lumps (Designation 13)	1/2
Other deleterious substances	1

The sum of the percentages of all deleterious substances in any size, as delivered to the mixer, shall not exceed 3 percent, by weight. Coarse aggregate may be rejected if it fails to meet the following test requirements:

- (1) Los Angeles rattler test (Designation 21). --If the loss, using Grading A, exceeds 10 percent, by weight, at 100 revolutions or 40 percent, by weight, at 500 revolutions.
- (2) Sodium-sulfate test for soundness (Designation 19). --If the weighted average loss after 5 cycles, is more than 11 percent, by weight.
- (3) Specific gravity (Designation 10). --If the specific gravity (saturated surface-dry basis), is less than 2.60.

The designations in parentheses refer to methods of test described in the Sixth Edition of the Bureau of Reclamation Concrete Manual.

c. Separation. --The coarse aggregate shall be separated into nominal sizes and shall be graded as follows:

<u>Designation of size</u>	<u>Nominal size range</u>	<u>Minimum percent retained on screens indicated</u>
3/4 inch	3/16 to 3/4 inch	50 percent on 3/8 inch
1 and 1/2 inches	3/4 inch to 1 and 1/2 inches	25 percent on 1 and 1/4 inches

Coarse aggregate shall be screened at the batching bins over vibrating screens having openings 3/16 of an inch in the narrow dimension: Provided, That the contractor may use stationary sloping screens having slotted openings 3/16 of an inch in the narrow dimension if the crushed and broken portion of the total coarse aggregate, as determined by the contracting officer, is less than 30 percent, by weight. Material passing the 3/16-inch screens shall be wasted as directed. The method and rate of feed shall be such that the screens will not be overloaded and will operate properly in a manner that will result in a finished product which consistently meets the grading requirements of these specifications. The vibrating screens shall be mounted on the batching plant, or at the option of the contractor, the screens may be mounted on the ground adjacent to the batching plant. The vibrating screens shall be so mounted that the vibration of the screens will not be transmitted to or affect the accuracy of the batching scales. The finished products shall pass directly to the individual batching plant bins. Stationary slotted sloping screens, where permitted, shall meet the following requirements:

- (1) The screens shall be at least 6 feet in length and shall be not less than 4 feet wide. The flow of the material shall be perpendicular to the narrow dimension of the slots.
- (2) The slots shall be not more than 4 inches long.
- (3) The slope of the screens shall be not less than 30° and not more than 50° from the horizontal, and shall be readily adjustable within that range.

Separation of the coarse aggregate into the specified sizes shall be such that, when the aggregate, as batched, is tested by screening on the screens designated in the following tabulation, the material passing the undersize test screen (significant undersize) shall not exceed 3 percent, by weight, and all material shall pass the oversize test screen:

<u>Size</u>	<u>Size of square opening in screen</u>	
	<u>For undersize test</u>	<u>For oversize test</u>
3/4-inch aggregate	No. 5-mesh (U.S. Standard screen)	7/8 inch
1 and 1/2-inch aggregate	5/8 inch	1 and 3/4 inches

Screens used in making the tests for undersize and oversize will conform to ASTM Designation: E 11, with respect to permissible variations in average openings.

d. Test and approval. --If coarse aggregate is to be obtained from a deposit not previously tested and approved by the Government, the contractor shall submit representative samples for preconstruction test and approval at least 30 days before the coarse aggregate is required for use.

The samples shall consist of approximately 200 pounds of the 3/16- to 3/4-inch size of coarse aggregate, and 100 pounds of the 3/4- to 1 and 1/2-inch coarse aggregate.

The approval of deposits by the contracting officer shall not be construed as constituting the approval of all or any specific materials taken from the deposits, and the contractor will be held responsible for the specified quality of all such materials used in the work.

In addition to preconstruction test and approval of the deposit, the Government will test the coarse aggregate during the progress of the work and the contractor shall provide such facilities as may be necessary for procuring representative samples.

70. Batching

a. General. --The contractor shall provide equipment and shall maintain and operate the equipment as required to accurately determine and control the amount of each separate ingredient entering the concrete. The amounts of bulk cement, sand, and each size of coarse aggregate entering each batch of concrete shall be determined by weighing, and the amount of water shall be determined by weighing or volumetric measurement. Where sacked cement is used, the concrete shall be proportioned on the basis of integral sacks of cement unless the cement is weighed.

When bulk cement and aggregates are hauled from a central batching plant to the mixers, the cement for each batch shall either be placed in an individual compartment which, during transit, will prevent the cement from intermingling with the aggregates and will prevent loss of cement, or be completely enfolded in and covered by the aggregates by loading the cement and aggregates for each batch simultaneously into the batch compartment. Each batch compartment shall be of sufficient capacity to prevent loss in transit and to prevent spilling and intermingling of batches as compartments are being emptied. If the cement is enfolded in aggregates containing moisture, and delays occur between filling and emptying the compartments; the contractor shall, at his own expense, add extra cement to each batch in accordance with the following schedule:

<u>Hours of contact between cement and wet aggregate</u>	<u>Additional cement required</u>
0 to 2	0 percent
2 to 3	5 percent
3 to 4	10 percent
4 to 5	15 percent
5 to 6	20 percent
Over 6	Batch will be rejected

b. Equipment. --The weighing equipment shall conform to the applicable requirements of Federal Specification AAA-S-121b for such equipment, except that accuracy to within 0.4 percent of the net load being weighed will be satisfactory, and the equipment shall be capable of ready adjustment for compensating for the varying weight of any moisture contained in the aggregates and for effecting changes in concrete mix proportions. Batching equipment shall be constructed and operated so that the combined inaccuracies in feeding and measuring the materials will not exceed 1 and 1/2 percent for water or weighed cement and 2 percent for each size of aggregate. Bulk cement shall be weighed in an individual hopper and shall be kept separate from the aggregates until the batch ingredients are discharged from the batching hopper. The cement hopper may be attached to a separate scale for individual weighing or may be attached to the aggregate scale for cumulative weighing. If materials are weighed cumulatively by dial scales, the cement shall be weighed before the other ingredients. If the materials are weighed cumulatively by beam scales, a separate beam shall be provided for weighing each material. Weighing equipment and the water-measuring device shall be in full view of the operator.

The contractor shall provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring device and shall make periodic tests over the ranges of measurements involved in the batching operations. The tests shall be made in the presence of a Government inspector, and shall be adequate to prove the accuracy of the measuring devices. Unless otherwise directed, tests of equipment in operation shall be made at least once every month. The contractor shall make such adjustments, repairs, or replacements as may be necessary to meet the specified requirements for accuracy of measurement.

The operating mechanism in the water-measuring device shall be such that leakage will not occur when the valves are closed. Water tanks on portable mixers shall be constructed so that the indicating device will register, within the specified limit of accuracy, the quantity of water discharged, regardless of the inclination of the mixer setting.

71. Mixing

The concrete ingredients shall be mixed in a batch mixer for not less than 1 and 1/2 minutes after all the ingredients, except the full amount of water, are in the mixer: Provided, That the mixing time may be reduced to 1 and 1/4 minutes if, when determined in accordance with the provisions of Designation 26 of the Sixth Edition of the Bureau of Reclamation Concrete Manual, the unit weight of air-free mortar in samples taken from the first and last portions of the batch as discharged from the mixer does not vary more than 0.8 percent from the average of the two mortar weights, the average variability for six batches does not exceed 0.5 percent, and the weight of coarse aggregate per cubic foot does not vary more than 5.0 percent from the

Par. 71

average of the two weights of coarse aggregates. The Government reserves the right to increase the mixing time when the charging and mixing operations fail to produce a concrete batch throughout which the ingredients are uniformly distributed and the consistency is uniform. The concrete, as discharged from the mixer, shall be uniform in composition and consistency throughout the mixed batch, and from batch to batch except where changes in composition or consistency are required.

Water shall be added prior to, during, and following the mixer-charging operations. Excessive overmixing requiring addition of water to preserve the required concrete consistency will not be permitted. Truck mixers will be permitted only when the mixers and their operation are such that the concrete throughout the mixed batch and from batch to batch is uniform with respect to consistency and grading. Any concrete retained in truck mixers so long as to require additional water to permit satisfactory placing shall be wasted. Any mixer that at any time produces unsatisfactory results shall be repaired promptly and effectively or shall be replaced. Mixers in centralized batching and mixing plants shall be arranged so that mixing action in the mixers can be observed from a location convenient to the mixing plant operator's station. Mixers shall not be loaded in excess of their rated capacity unless specifically authorized. Each mixer shall be equipped with a mechanically operated timing and signaling device which will indicate and assure the completion of the required mixing period and will count the batches.

72. Temperature of Concrete

The temperature of concrete when it is being placed shall be not more than 90° F, and not less than 40° F in moderate weather or 50° F in weather during which the mean daily temperature drops below 40° F. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified 50° F. Methods of heating concrete ingredients shall be subject to approval.

73. Forms

a. General. --Forms shall be used, wherever necessary, to confine the concrete and shape it to the required lines. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall be maintained rigidly in position. Forms shall be sufficiently tight to prevent loss of mortar from the concrete. Chamfer strips shall be placed in the corners of forms so as to produce beveled edges on permanently exposed concrete surfaces. Interior angles on such surfaces and edges at formed joints will not require beveling unless requirement for beveling is indicated on the drawings.

The cost of all labor and materials for forms and for any necessary treatment or coating of forms shall be included in the unit prices bid in the schedule for the concrete for which the forms were used.

b. Form sheathing and lining. --Wood sheathing or lining shall be of such kind and quality or shall be so treated or coated that there will be no chemical deterioration or discoloration of the formed concrete surfaces. The type and condition of form sheathing and lining, and the fabrication of forms for Finish F2 shall be such that the form surfaces will be even and uniform. The ability of forms to withstand distortion caused by placement and vibration of concrete shall be such that formed surfaces will conform with applicable requirements of these specifications pertaining to finish of formed surfaces.

Where pine is used for form sheathing, the lumber shall be *pinus ponderosa* in accordance with the Standard Grading Rules of the Western Pine Association or shall be other lumber of a grading equivalent to that specified for pine. Plywood used for form sheathing or lining shall be Grade B-B, interior, or better, as described in the commercial standards of the Douglas Fir Plywood Association. Materials used for form sheathing or lining shall conform with the following requirements, or may be other materials producing equivalent results:

Required finish of formed surface	Wood sheathing or lining	Steel sheathing or lining*
F1	Any grade - S2E.	Steel sheathing permitted. Steel lining permitted.
F2	No. 2 common or better, pine shiplap, or plywood sheathing or lining.	Steel sheathing permitted. Steel lining permitted if approved.

*Steel "sheathing" denotes steel sheets not supported by a backing of wood boards. Steel "lining" denotes thin steel sheets supported by a backing of wood boards.

c. Form ties. --Embedded ties for holding forms shall remain embedded and, except where F1 finish is permitted, shall terminate not less than 2 diameters or twice the minimum dimension of the tie in the clear of the formed faces of the concrete. Where F1 finish is permitted, ties may be cut off flush with the formed surfaces. The ties shall be constructed so that removal of the ends or end fasteners can be accomplished without causing appreciable spalling at the faces of the concrete. Recesses resulting from removal of the ends of form ties shall be filled in accordance with the provisions of Paragraph 76.

d. Cleaning and oiling of forms. --At the time the concrete is placed in the forms, the surfaces of the forms shall be free from encrustations of mortar, grout, or other foreign material. Before concrete is placed, the surfaces of the forms shall be oiled with a commercial form oil that will effectively prevent sticking and will not stain the concrete surfaces.

For wood forms, form oil shall consist of straight, refined, pale, paraffin mineral oil. For steel forms, form oil shall consist of refined mineral oil suitably compounded with one or more ingredients which are appropriate for the purpose.

e. Removal of forms. --To facilitate satisfactory progress with the specified curing and enable earliest practicable repair of surface imperfections, forms shall be removed as soon as the concrete has hardened sufficiently to prevent damage by careful form removal. Forms on upper sloping faces of concrete, such as forms on the watersides of warped transitions, shall be removed as soon as the concrete has attained sufficient stiffness to prevent sagging. Any needed repairs or treatment required on such sloping surfaces shall be performed at once and be followed immediately by the specified curing.

Forms for box sections shall not be removed until the strength of the concrete is such that form removal will not result in perceptible cracking, spalling, or breaking of edges or surfaces, or other damage to the concrete. Forms shall be removed with care so as to avoid injury to the concrete and any concrete so damaged shall be repaired in accordance with the provisions of Paragraph 76.

74. Preparations for Placing

a. General. --No concrete shall be placed until all formwork, installation of parts to be embedded, and preparation of surfaces involved in the placing have been approved. No concrete shall be placed in water except with the written permission of the contracting officer, and the method of depositing the concrete shall be subject to his approval. Concrete shall not be placed in running water and shall not be subjected to the action of running water until after the concrete has hardened. All surfaces of forms and embedded materials that have become encrusted with dried mortar or grout from concrete previously placed shall be cleaned of all such mortar or grout before the surrounding or adjacent concrete is placed.

b. Foundation surfaces. --Immediately before placing concrete, all surfaces of foundations upon or against which the concrete is to be placed shall be free from standing water, mud, and debris. Earth foundations shall be free from frost or ice when concrete is placed upon or against them. The surfaces of absorptive foundations against which concrete is to be placed shall be moistened thoroughly so that moisture will not be drawn from the freshly placed concrete.

c. Surfaces of construction and contraction joints. --Concrete surfaces upon or against which concrete is to be placed and to which new concrete is to adhere, that have become so rigid that the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of construction joints shall be clean, rough,

and damp when covered with fresh concrete or mortar. Cleaning shall consist of the removal of all laitance, loose or defective concrete, coatings, sand, sealing compound if used, and other foreign material. All pools of water shall be removed from the surfaces of construction joints before the new concrete is placed. The surfaces of all contraction joints shall be cleaned thoroughly of accretions of concrete or other foreign material by scraping, chipping, or other means approved by the contracting officer.

75. Placing

a. Transporting. --The methods and equipment used for transporting concrete and the time that elapses during transportation shall be such as will not cause appreciable segregation of the coarse aggregate, or slump loss in excess of 1 inch, in the concrete as it is delivered into the work.

b. Placing. --The contractor shall keep the contracting officer advised as to when placing of concrete will be performed. Unless inspection is waived in each specific case, placing of concrete shall be performed only in the presence of a duly authorized Government inspector. After the surfaces have been cleaned and dampened as specified, surfaces of unformed construction joints shall be covered, wherever practicable, with a layer of mortar approximately three-eighths of an inch thick. The mortar shall have the same proportions of water, air-entraining agent, cement, and sand as the regular concrete mixture, unless otherwise directed. The water-cement ratio of the mortar in place shall not exceed that of the concrete to be placed upon it, and the consistency of the mortar shall be suitable for placing and working in the manner hereinafter specified. The mortar shall be spread uniformly and shall be worked thoroughly into all irregularities of the surface. Concrete shall be placed immediately upon the fresh mortar.

Retempering of concrete will not be permitted. Any concrete which has become so stiff that proper placing cannot be assured shall be wasted. Concrete shall be deposited in all cases as nearly as practicable directly in its final position and shall not be caused to flow such that the lateral movement will permit or cause segregation of the coarse aggregate, mortar, or water from the concrete mass. Methods and equipment employed in depositing concrete in forms shall be such as will not result in clusters or groups of coarse aggregate particles being separated from the concrete mass, but if clusters do occur they shall be scattered before the concrete is vibrated. A few scattered individual pieces of coarse aggregate that can be restored into the mass by vibration will not be objectionable.

Except as intercepted by joints, all formed concrete shall be placed in continuous approximately horizontal layers, the depths of which generally shall not exceed 20 inches. The Government reserves the right to require lesser depths of layers where concrete in 20-inch layers cannot be placed in accordance with the requirements of these specifications. All intersections of construction joints with concrete surfaces which will be exposed to view shall be made straight and level or plumb.

In placing unformed concrete on slopes so steep as to make internal vibration of the concrete impracticable without forming, the concrete shall be placed ahead of non-vibrated-slip-form screed extending approximately 2 and 1/2 feet back from its leading edge. Concrete ahead of the slip-form screed shall be consolidated by internal vibrators so as to insure complete filling under the slip-form.

If concrete in top slabs, or other similar parts of structures is placed monolithically with supporting concrete, the following instructions shall be strictly observed:

(1) Placing of concrete shall be delayed from 1 hour to 3 hours at the bottoms of bevels under top slabs, or other similar parts of structures when bevels are specified and at the bottom of such structure members when bevels are not specified; but in no case shall the placing be delayed so long that the vibrating unit will not readily penetrate of its own weight the concrete placed before the delay. When consolidating concrete placed after the delay, the vibrating unit shall penetrate and revibrate the concrete placed before the delay.

(2) The last 2 feet or more of concrete placed immediately before the delay shall be placed with as low a slump as practicable, and special care shall be exercised to effect thorough consolidation of the concrete.

(3) The surfaces of concrete where delays are made shall be clean and free from loose and foreign material when concrete placing is started after the delay.

(4) Concrete placed in top slabs and other similar parts of structures shall be placed with as low a slump as practicable and special care shall be exercised to effect thorough consolidation of the concrete.

The contractor shall be entitled to no additional payment over the unit prices bid in the schedule for concrete by reason of any limitations in the placing of concrete required under the provisions of this paragraph.

c. Consolidation. --Concrete shall be consolidated to the maximum practicable density, so that it is free from pockets of coarse aggregate and entrapped air, and closes snugly against all surfaces of forms and embedded materials. Consolidation of concrete in structures shall be by electric- or pneumatic-drive, immersion-type vibrators. Concrete vibrators shall be operated at speeds of at least 7,000 rpm when immersed in the concrete.

In consolidating each layer of concrete the vibrator shall be operated in a near vertical position and the vibrating head shall be allowed to penetrate and revibrate the concrete in the upper portion of the underlying layer. Layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Care shall be exercised to avoid contact of the vibrating head with surfaces of the forms.

76. Repair of Concrete

Repair of concrete shall be performed by skilled workmen. The contractor shall keep the contracting officer advised as to when repair of concrete will

be performed. Unless inspection is waived in each specific case, repair of concrete shall be performed only in the presence of a Government inspector. The contractor shall correct all imperfections on the concrete surfaces as necessary to produce surfaces that conform to the requirements specified in Paragraph 77. Unless otherwise approved, repair of imperfections in formed concrete shall be completed within 24 hours after removal of forms. Fins and encrustations shall be neatly removed from surfaces for which Finish F2 is specified and encrustations shall be removed from surfaces for which Finish U2 is specified. Concrete that is damaged from any cause and concrete that is honeycombed, fractured, or otherwise defective, and concrete which, because of excessive surface depressions, must be excavated and built up to bring the surface to the prescribed lines, shall be removed and replaced with dry pack, mortar, or concrete, as hereinafter specified. If removal of the ends of form ties results in recesses larger than one-fourth of an inch in diameter or in the minimum dimension, the recesses shall be filled with dry pack: Provided, That filling of recesses in surfaces designated to receive Finish F1 will be required only where the recesses are deeper than 1 inch in walls less than 12 inches thick. Where bulges and abrupt irregularities protrude outside the limits specified in Paragraph 77 on formed surfaces for which Finish F2 is required, the protrusions shall be reduced by bushhammering and grinding so that the surfaces are within the specified limits. Dry pack shall be used for filling holes having at least one surface dimension little, if any, greater than the hole depth; for narrow slots cut for repair of cracks; for grout pipe recesses; and for tie-rod fastener recesses as specified. Dry pack shall not be used for filling behind reinforcement or for filling holes that extend completely through a concrete section. Mortar filling, placed under impact by use of a mortar gun, may be used for repairing defects on surfaces designated to receive F1 and F2 finishes where the defects are too wide for dry-pack filling and too shallow for concrete filling and no deeper than the far side of the reinforcement that is nearest the surface. Concrete filling shall be used for holes extending entirely through concrete sections; for holes in which no reinforcement is encountered and which are greater in area than 1 square foot and deeper than 4 inches; and for holes in reinforced concrete which are greater in area than one-half of 1 square foot and which extend beyond reinforcement.

All materials used in the repair of concrete shall conform to the requirements of these specifications and the repairs shall be made in accordance with the procedures of Chapter VII of the Sixth Edition of the Bureau of Reclamation Concrete Manual. All fillings shall be bonded tightly to the surfaces of the holes and shall be sound and free from shrinkage cracks and drummy areas after the fillings have been cured and have dried. The costs of all materials, labor, and equipment required in the repair of concrete shall be borne by the contractor.

77. Finishes and Finishing

a. General. -- Allowable deviations from plumb or level and from the alinement, profile grades, and dimensions shown on the drawings are specified in Paragraph 81, are defined as "tolerances" and are to be distinguished from irregularities in finish as described herein. The classes of finish and the requirements for finishing of concrete surfaces shall be as specified in this paragraph or as indicated on the drawings. The contractor shall keep the contracting officer advised as to when finishing of concrete will be performed. Unless inspection is waived in each specific case, finishing of concrete shall be performed only in the presence of a Government inspector. Concrete surfaces will be tested by the Government where necessary to determine whether surface irregularities are within the limits hereinafter specified.

Surface irregularities are classified as "abrupt" or "gradual." Offsets caused by displaced or misplaced form sheathing or lining or form sections, or by loose knots in forms or otherwise defective form lumber will be considered as abrupt irregularities, and will be tested by direct measurements. All other irregularities will be considered as gradual irregularities, and will be tested by use of a template, consisting of a straight-edge or the equivalent thereof for curved surfaces. The length of the template will be 5 feet for testing of formed surfaces and 10 feet for testing of unformed surfaces.

b. Formed surfaces. -- The classes of finish for formed concrete surfaces are designated by use of Symbols F1 and F2. No sack rubbing or sandblasting will be required on formed surfaces. No grinding will be required on formed surfaces, other than that necessary for repair of surface imperfections. Unless otherwise specified or indicated on the drawings, the classes of finish shall apply as follows:

F1. -- Finish F1 applies to formed surfaces upon or against which fill material or concrete is to be placed. The surfaces require no treatment after form removal except for repair of defective concrete and filling of holes left by the removal of fasteners from the ends of tie rods as required in Paragraph 76, and the specified curing. Correction of surface irregularities will be required for depressions only, and only for those which, when measured as described in Subparagraph a., exceed 1 inch.

F2. -- Finish F2 applied to all formed surfaces not permanently concealed by fill material or concrete, including inside surfaces of sluiceway box sections. Surface irregularities, measured as described in Subparagraph a. shall not exceed one-fourth of an inch for abrupt irregularities and one-half of an inch for gradual irregularities.

c. Unformed surfaces. -- The classes of finish for unformed concrete surfaces are designated by the Symbols U1 and U2. Interior surfaces shall be sloped for drainage where shown on the drawings or directed.

Surfaces which will be exposed to the weather and which would normally be level, shall be sloped for drainage. Unless the use of other slopes or level surfaces is indicated on the drawings or directed, narrow surfaces, such as tops of walls shall be sloped approximately three-eighths of an inch per foot of width; broader surfaces, such as platforms, and decks shall be sloped approximately one-fourth of an inch per foot. Unless otherwise specified or indicated on the drawings, these classes of finish shall apply as follows:

U1. --Finish U1 (screeded finish) applies to unformed surfaces that will be covered by fill material or by concrete. Finish U1 is also used as the first stage of Finish U2. Finishing operations shall consist of sufficient leveling and screeding to produce even uniform surfaces. Surface irregularities, measured as described in Subparagraph a. shall not exceed three-eighths of an inch.

U2. --Finish U2 (floated finish) applies to unformed surfaces not permanently concealed by fill material or concrete, including the floors of the sluiceways, and tops of walls. Floating may be performed by use of hand- or power-driven equipment. Floating shall be started as soon as the screeded surface has stiffened sufficiently and shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Surface irregularities measured as described in Subparagraph a., shall not exceed one-fourth of an inch. Joints and edges shall be tooled where shown on the drawings or directed.

78. Protection

The contractor shall protect all concrete against injury until final acceptance by the Government. Immediately following the first frost in the fall, the contractor shall be prepared to protect all concrete against freezing. After the first frost, and until the mean daily temperature in the vicinity of the work-site falls below 40° F for more than 1 day, the concrete shall be protected against freezing temperatures for not less than 48 hours after it is placed. After the mean daily temperature in the vicinity of the worksite falls below 40° F for more than 1 day, the concrete shall be maintained at a temperature not lower than 50° F for at least 72 hours after it is placed.

Concrete cured by membrane curing will require no additional protection from freezing if the protection at 50° F for 72 hours is obtained by means of approved insulation in contact with the forms or concrete surfaces; otherwise, the concrete shall be protected against freezing temperatures for 72 hours immediately following 72 hours protection at 50° F. Concrete cured by water curing shall be protected against freezing temperatures for 3 days immediately following the 72 hours of protection at 50° F.

Discontinuance of protection against freezing temperatures shall be such that the drop in temperature of any portion of the concrete will be gradual and will not exceed 40° F in 24 hours. After March 15, when the mean daily temperature rises above 40° F for more than 3 successive days, the specified 72-hour protection at a temperature not lower than 50° F may be discontinued for as long as the mean daily temperature remains above 40° F: Provided, That the concrete shall be protected against freezing temperatures for not less than 48 hours after placement.

Where artificial heat is employed, special care shall be taken to prevent the concrete from drying. Use of unvented heaters will be permitted only when unformed surfaces of concrete adjacent to the heaters are protected for the first 24 hours from an excessive carbon-dioxide atmosphere by application of sealing compound.

79. Curing

a. General. --Concrete shall be cured either by water curing in accordance with Subparagraph b. or by membrane curing in accordance with Subparagraph c. except as otherwise hereinafter provided. The unformed top surfaces of walls and piers shall be moistened by covering with water-saturated material or by other effective means as soon as the concrete has hardened sufficiently to prevent damage by water. These surfaces and steeply sloping and vertical formed surfaces shall be kept completely and continually moist, prior to and during form removal, by water applied on the unformed top surfaces and allowed to pass down between the forms and the formed concrete faces. This procedure shall be followed by the specified water curing or membrane curing.

b. Water curing. --Concrete cured with water shall be kept wet for at least 14 days immediately following placement of the concrete or until covered with fresh concrete: Provided, That water curing of concrete may be reduced to 6 days during periods when the mean daily temperature in the vicinity of the worksite is less than 40° F: Provided further, That during the prescribed period of water curing, when temperatures are such that concrete surfaces may freeze, water curing shall be temporarily discontinued. The concrete shall be kept wet by covering with water-saturated material or by a system of perforated pipes, mechanical sprinklers, or porous hose, or by any other approved method which will keep all surfaces to be cured continuously (not periodically) wet. Water used for curing shall meet the requirements of these specifications for water used for mixing concrete.

c. Membrane curing. --Membrane curing shall be by application of a sealing compound which forms a water-retaining membrane on the surfaces of the concrete. The sealing compound shall be white pigmented and shall conform to Bureau of Reclamation "Specifications for Sealing Compound for Curing Concrete," effective June 1, 1961. The compound shall be of uniform consistency and quality within each container and from shipment to shipment.

Sealing compound shall be applied to the concrete surfaces by spraying in one coat to provide a continuous, uniform membrane over all areas. Coverage shall not exceed 150 square feet per gallon and on rough surfaces coverage shall be decreased as necessary to obtain the required continuous membrane. The repair of surface imperfections shall not be made until after application of sealing compound. When sealing compound is used on unformed concrete surfaces, application of the compound shall commence immediately after finishing operations are completed. When sealing compound is to be used on formed concrete surfaces, the surfaces shall be moistened with a light spray of water immediately after the forms are removed and shall be kept wet until the surfaces will not absorb more moisture. As soon as the surface film of moisture disappears but while the surface still has a damp appearance, the sealing compound shall be applied. Special care shall be taken to insure ample coverage with the compound at edges, corners, and rough spots of formed surfaces. After application of the sealing compound has been completed and the coating is dry to touch, any required repair of concrete surfaces shall be performed. Each repair, after being finished, shall be moistened and coated with sealing compound in accordance with the foregoing requirements.

Equipment for applying sealing compound and the method of application shall be in accordance with the provisions of Chapter VI of the Sixth Edition of the Bureau of Reclamation Concrete Manual. Traffic and other operations by the contractor shall be such as to avoid damage to coatings of sealing compound for a period of not less than 28 days. Where it is impossible because of construction operations to avoid traffic over surfaces coated with sealing compound, the membrane shall be protected by a covering of sand or earth not less than 1 inch in thickness or by other effective means. The protective covering shall not be placed until the sealing membrane is completely dry. Before final acceptance of the work, the contractor shall remove all sand or earth covering in an approved manner. Any sealing membrane that is damaged or that peels from concrete surfaces within 28 days after application, shall be repaired without delay and in an approved manner. Sealing compound will be accepted on manufacturer's certification of compliance with specifications: Provided, That the Government reserves the right to require submission of and to perform tests on samples of the compound prior to shipment and use in the work and to sample and test the compound after delivery at the job-site. The contractor shall provide, without charge to the Government, such facilities and assistance as may be necessary for procurement of test samples. Sampling will be in accordance with Designation 38 of the Sixth Edition of the Bureau of Reclamation Concrete Manual.

d. Costs.--The costs of furnishing and applying all materials used for curing concrete shall be included in the price bid in the schedule for the concrete on which the curing materials are used.

80. Reinforcement Bars

a. Furnishing reinforcement bars. --The contractor shall furnish all the reinforcement bars required for completion of the work. Reinforcement bars shall conform to Federal Specification QQ-S-632, Type II, Grades C through G: Provided, That all bars in structures required to be bent to a radius of bend of 50 diameters or less shall be intermediate-grade billet steel (Grade C).

Intermediate-grade billet bars shall be stockpiled separately, and the contractor shall use proper precautions to prevent the use of the wrong grade of reinforcement in any part of the work.

b. Placing reinforcement bars. --Reinforcement bars shall be placed in the concrete where shown on the drawings or where directed. Unless otherwise prescribed, measurements made in placing the bars shall be to the centerlines of the bars.

The Government will not furnish supplemental bar-placing diagrams, bar lists and bar-bending diagrams. Any such additional drawings of this type which the contractor may require to facilitate the fabrication and placement of reinforcement shall be provided by the contractor. The contractor shall submit to the Construction Engineer, Post Office Box 825, Huron, South Dakota, for informational and record purposes, three prints of each drawing prepared by him to facilitate fabrication and placement of reinforcement. The cost of preparing such additional drawings and bar lists, if provided, shall be included in the unit price per pound bid in the schedule for furnishing and placing reinforcement bars.

Reinforcement will be inspected for compliance with requirements as to size, shape, length, splicing, position, and amount after it has been placed. Reinforcement drawings and bar lists prepared by the contractor shall conform to the following requirements:

- (1) Laps. --Bars shall be lapped 24-bar diameters at splices unless otherwise shown on the drawings.
- (2) Bends. --All reinforcement requiring bending shall be bent around a pin having a diameter of 1 inch less than eight times the nominal thickness of the bar, except that bars 1 inch or larger shall be bent around a pin having a diameter of eight times the nominal thickness of the bar to the nearest inch.
- (3) Hooks. --Hooks shall have 180° bend and extensions of 4-bar diameters parallel to the main leg of the bar.

Before the reinforcement is placed, the surfaces of the bars and the surfaces of any metal bar supports shall be cleaned of heavy flaky rust, loose

mill scale, dirt, grease, or other foreign substances which, in the opinion of the contracting officer, are objectionable. Heavy flaky rust that can be removed by firm rubbing with burlap or equivalent treatment is considered objectionable. After being placed, the reinforcement bars shall be maintained in a clean condition until they are completely embedded in the concrete.

Reinforcement bars shall be accurately placed and secured in position so that they will not be displaced during the placing of the concrete, and special care shall be exercised to prevent any disturbance of the reinforcement in concrete that has already been placed. Metal chairs, metal hangers, metal spacers, or other satisfactory metal supports may be used by the contractor for supporting reinforcement bars. The reinforcement in structures shall be so placed that there will be a clear distance of at least 1 inch between the reinforcement and any anchor bolts or other embedded metalwork.

c. Measurement and payment. -- Measurement, for payment, of reinforcement bars will be made only of the weight of the bars placed in the concrete, in accordance with the drawings or as directed. Payment for furnishing and placing reinforcement bars will be made at the unit price per pound bid therefor in the schedule, which unit price shall include the cost of furnishing and attaching wire ties and metal supports, if used, and of cutting, bending, cleaning, and securing all reinforcement bars.

81. Tolerances for Concrete Construction

a. General. -- Permissible surface irregularities for the various classes of concrete surface finish as specified in Paragraph 77, are defined as "finishes," and are to be distinguished from tolerances as described herein. The intent of this paragraph is to establish tolerances that are consistent with modern construction practice, yet governed by the effect that permissible deviations will have upon the structural action or operational function of the structure. Deviations from the established lines, grades, and dimensions will be permitted to the extent set forth herein: Provided, That the Government reserves the right to diminish the tolerances set forth herein if such tolerances impair the structural action or operational function of a structure. When tolerances are not stated in the specifications or drawings for any individual structure or feature thereof, permissible deviations will be interpreted conformably to the provisions of this paragraph. Notations on the drawings, included in these specifications, of specific maximum or minimum tolerances in connection with any dimension shall be considered as supplemental to the tolerances specified herein. The contractor shall be responsible for setting and maintaining concrete forms sufficiently within the tolerance limits so as to insure completed work within the tolerances specified herein. Concrete work that exceeds the tolerance limits specified herein shall be remedied or removed and replaced at the expense of and by the contractor.

b. Tolerances for concrete. --

(1) Dam structure:	
(a) Departure from established alinement	 1 inch
(b) Departure from established grades	 1 inch
(c) Variation from the plumb or the specified batter in the lines and surfaces of columns, piers, walls and in arrises	Exposed in 10 feet 1/2 inch Backfilled, in 10 feet 1 inch
(d) Variation from the level or from the grades indicated on the drawings in slabs, beams, horizontal grooves, and railing offsets	Exposed, in 10 feet 1/2 inch Backfilled, in 10 feet 1 inch
(2) Variation in cross-sectional dimensions of columns, piers, slabs, walls, beams, and similar parts of the structures in Section (1) above	Minus 1/4 inch Plus 1/2 inch
(3) Variation in thickness of deck slabs	Minus 1/8 inch Plus 1/4 inch
(4) Footings:	
(a) Variation of dimensions in plan	Minus 1/2 inch Plus 2 inches
(b) Misplacement of eccentricity	2 percent of the footing width in the direction of misplacement but not more than 2 inches
(c) Reduction in thickness	 5 percent of specified thickness
(5) Variation in the sizes and locations of slab and wall openings	 1/2 inch
(6) Watertight joints:	
(a) Variation from the plumb or level	 not greater than a rate of 1/8 inch in 10 feet

c. Tolerances for placing reinforcement steel. --

(1) (a) Variation of protection covering	With 1 and 1/2- and 2-inch cover 1/4 inch With 3-inch cover 1/2 inch
(b) Variation from indicated spacing	 1 inch

82. Measurement of Concrete

Measurement, for payment, of concrete required to be placed directly upon or against surfaces of excavation will be made to the lines for which payment for excavation is made. Measurement, for payment, of all other concrete will be made to the neatlines of the structures, unless otherwise specifically shown on the drawings or prescribed in these specifications. In measuring concrete for payment, the volume of all openings, recesses, ducts, embedded pipes, woodwork, and metalwork, each of which is larger than 100 square inches in cross section will be deducted.

83. Payment

Payment for concrete in the various parts of the work will be made at the unit prices per cubic yard bid therefor in the schedule, which unit prices shall include the cost of all labor and materials required in the construction, except that payment for furnishing and handling cement, and payment for furnishing and placing reinforcement bars will be made at the unit prices bid therefor in the schedule.

DRAWINGS

84. Drawings

a. List of drawings. --The following drawings are made a part of these specifications:

James Diversion Dam

1. 469-D-51 --Location Map.
2. 469-D-52 --Vicinity Map.
3. 469-D-53 --Access Road.
4. 469-D-69 --Auxiliary Spillway.
5. 469-D-70 --General Plan And Sections.
6. 469-D-71 --Upstream Apron And Wingwalls.
7. 469-D-72 --Spillway And Right Abutment Wall.
8. 469-D-73 --Sluiceway (sheet 1 of 2).
9. 469-D-74 --Sluiceway (sheet 2 of 2).
10. 469-D-76 --Sluiceway--Frame And Insulated Cover.
11. 469-D-75 --Downstream Wingwalls.
12. 469-D-60 --Rubber Waterstop Intersections.
13. 469-D-61 --Hydrographs Of James River.

Logs of exploration:

14. 469-D-62 --(sheet 1 of 4).
15. 469-D-63 --(sheet 2 of 4).
16. 469-D-64 --(sheet 3 of 4).
17. 469-D-65 --(sheet 4 of 4).

Standard Drawings

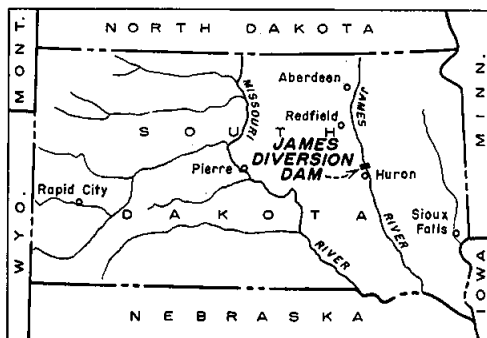
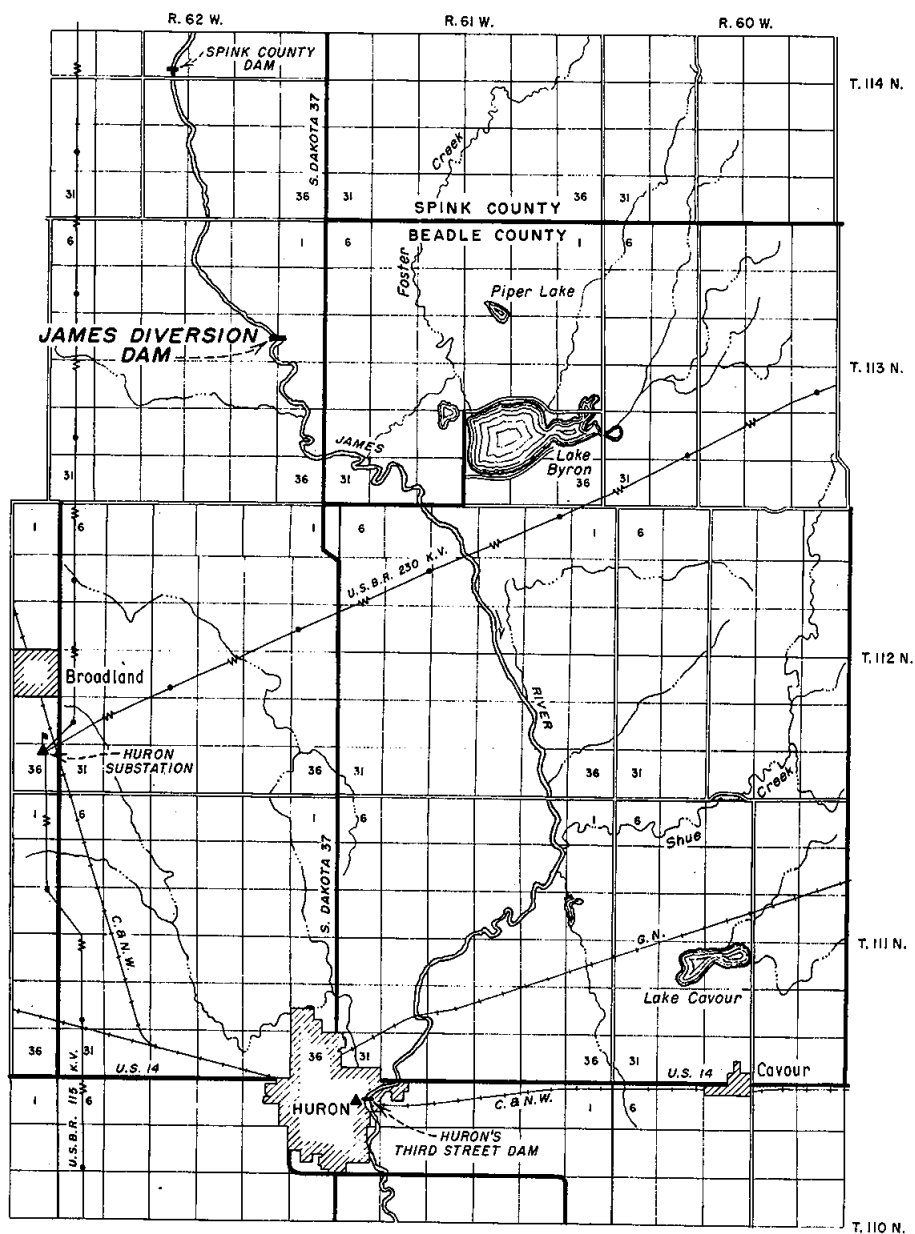
18. 40-D-3103--Ladder Rungs.
19. 40-D-5148--Handrailing--Post Recess.
20. 40-D-4315--Handrail Details.
21. 40-D-5295--Structural Steel Liners.
22. 40-D-2867--Rubber Waterstops.

b. General. --Except as otherwise provided in these specifications for drawings to be furnished by the contractor, additional detail drawings will be furnished to the contractor for construction purposes, where necessary, as determined by the contracting officer. The contractor shall check all drawings carefully and shall advise the contracting officer of any errors or omissions discovered. The contractor will be furnished such additional copies of the specifications and drawings as may be required for carrying out the work. Contact prints of the original drawings

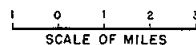
Par. 84

from which the attached reproductions were made will be furnished to the contractor for construction purposes upon request.

All drawings and data submitted by the contractor for which a specific mailing address is not given in these specifications shall be submitted to Construction Engineer, Post Office Box 825, Huron, South Dakota.

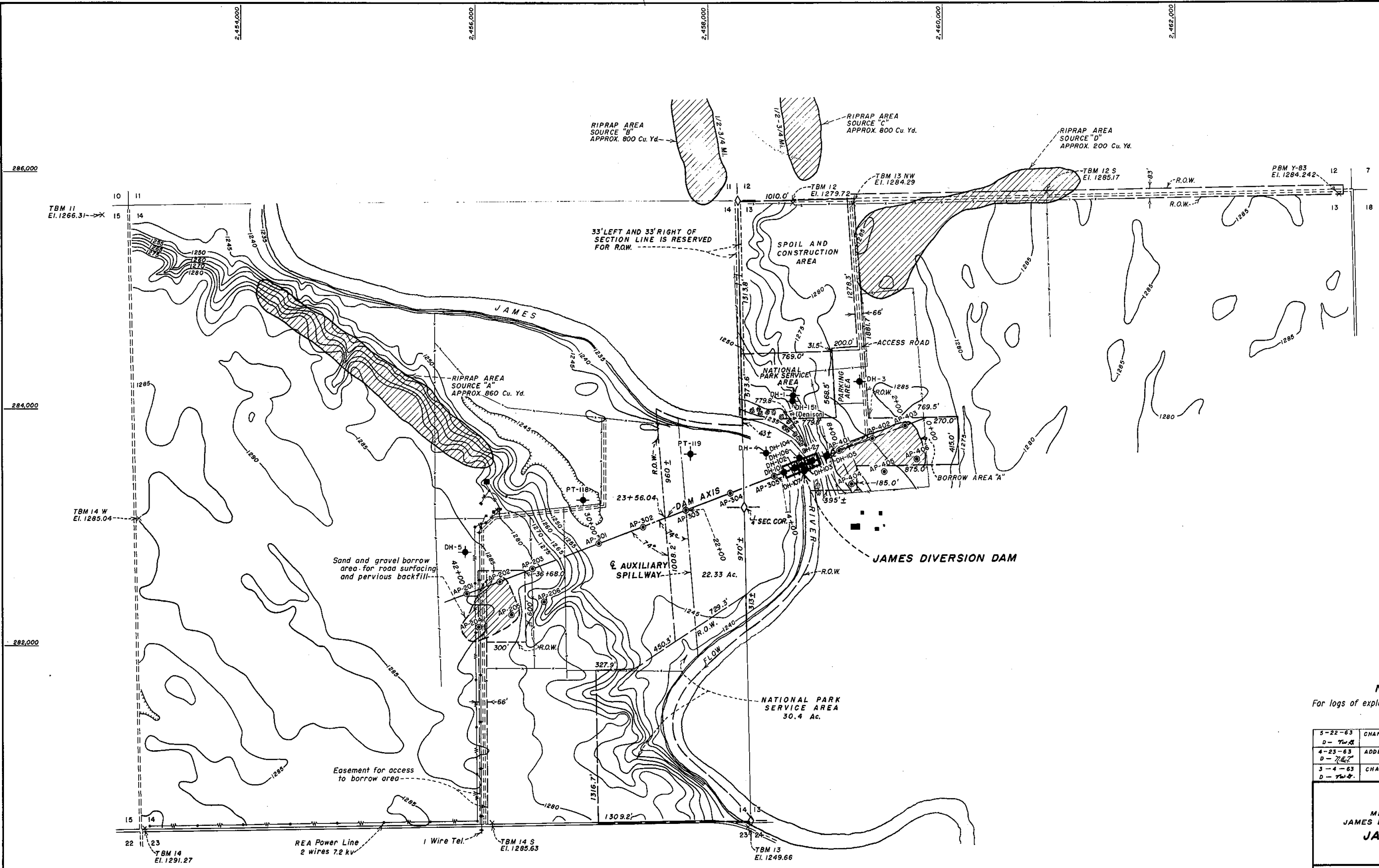


KEY MAP



- EXPLANATION**
- STREAM GAGING STATION
 - SUBSTATIONS
 - TRANSMISSION LINE
 - HARD SURFACED HIGHWAYS
 - SECONDARY ROADS

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION		
MISSOURI RIVER BASIN PROJECT JAMES DIVISION-OAHE UNIT-SOUTH DAKOTA		
JAMES DIVERSION DAM LOCATION MAP		
DRAWN	M.A.N.	SUBMITTED <i>C. H. Terrell</i>
TRACED	W.W.G.	RECOMMENDED <i>John C. Carruthers</i>
CHECKED <i>W. H. H. H.</i>	APPROVED <i>W. H. H. H.</i>	ASST. COMM. AND CHIEF ENGINEER
DENVER, COLORADO NOVEMBER 29, 1962		469-D-51



NOTE
For logs of exploration see 469-D-62 through 65.

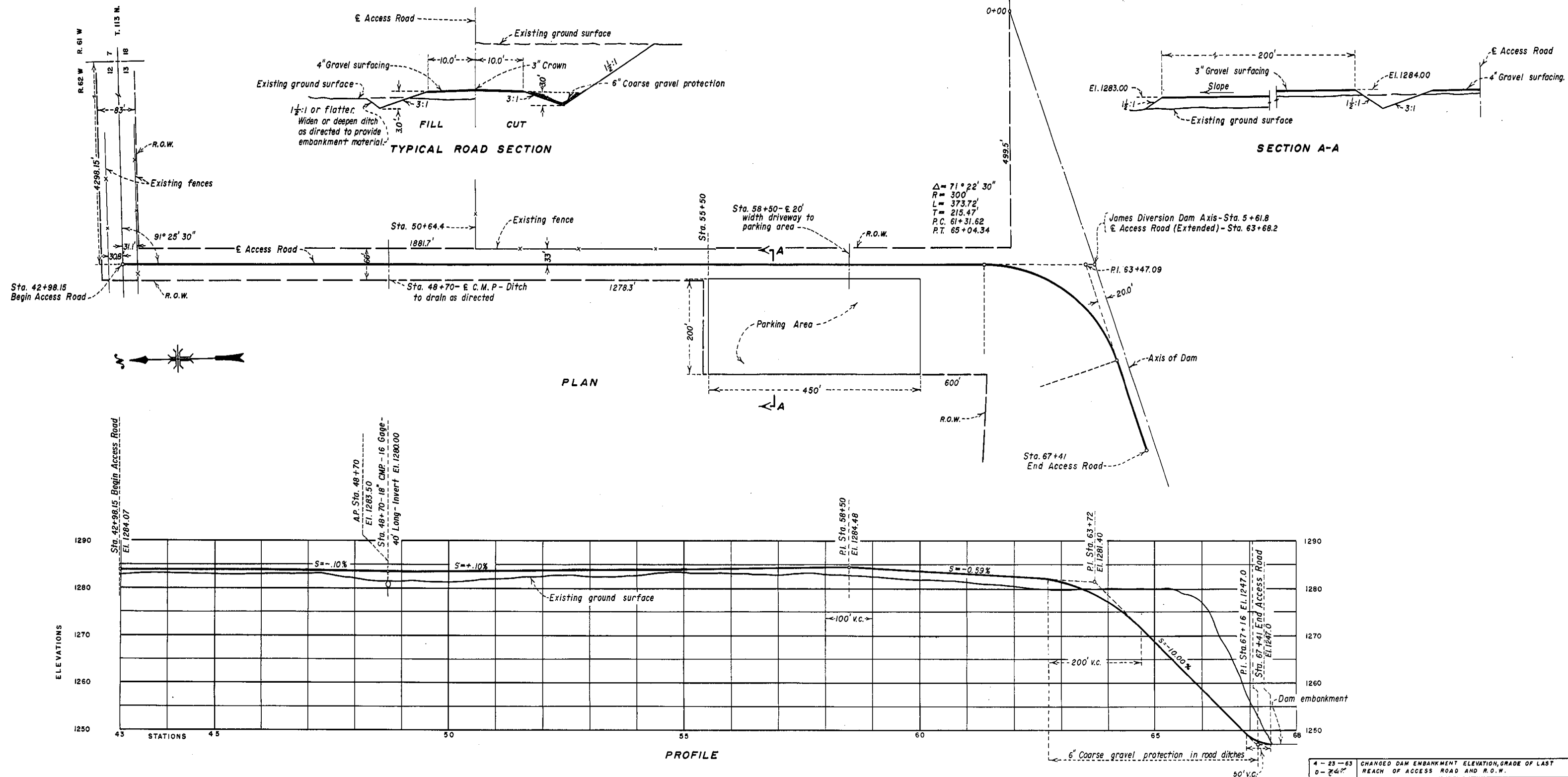
5-22-63 D - T.W.S.	CHANGED R.O.W. AS PER FIELD LETTER DATED 5-17-63
4-23-63 D - T.W.S.	ADDED E AUXILIARY SPILLWAY
3-4-63 D - T.W.S.	CHANGED R.O.W. AS PER FIELD LETTER DATED 2-27-63

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 MISSOURI RIVER BASIN PROJECT
 JAMES DIVISION-OAHE UNIT-SOUTH DAKOTA
JAMES DIVERSION DAM
 VICINITY MAP

DRAWN... J.W.S.
 TRACED... R.T.I.
 CHECKED... J.W.S.
 DENVER, COLORADO NOVEMBER 26, 1962

SUBMITTED... B.H. Twiss
 RECOMMENDED... John Parmakian
 APPROVED... J.W.S.
 DIST. COMM. AND CHIEF ENGINEER

469-D-52

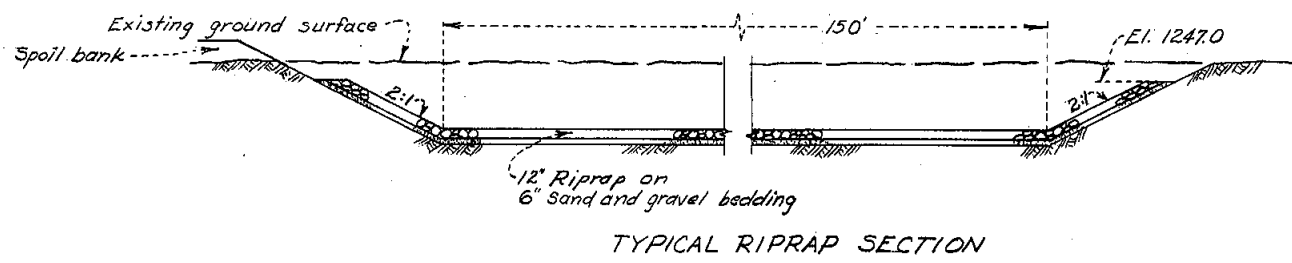
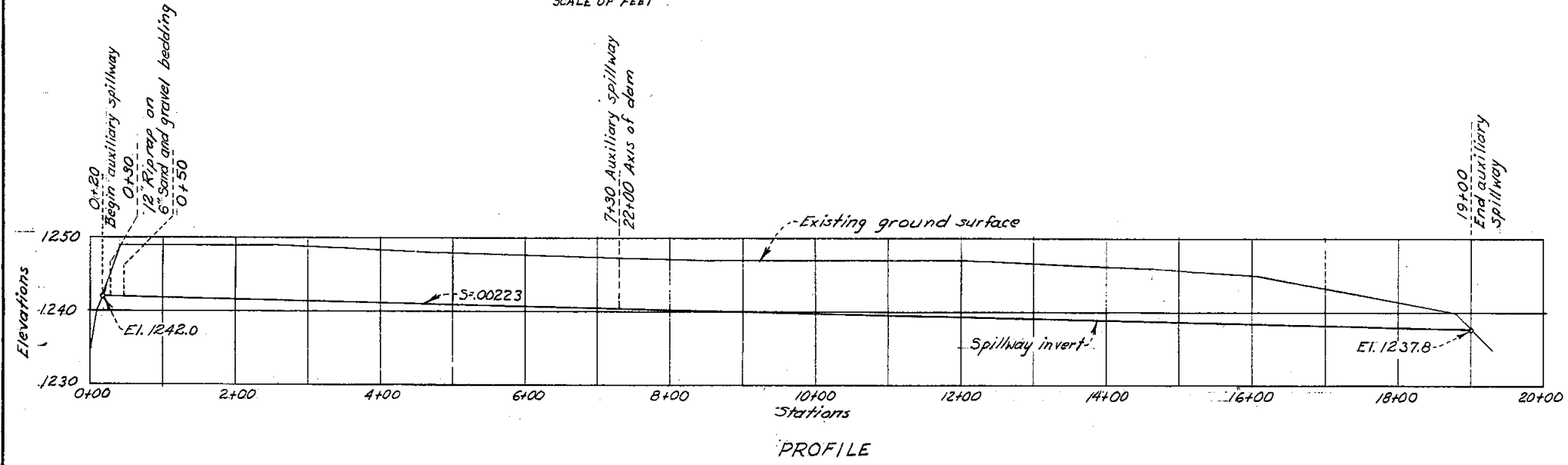
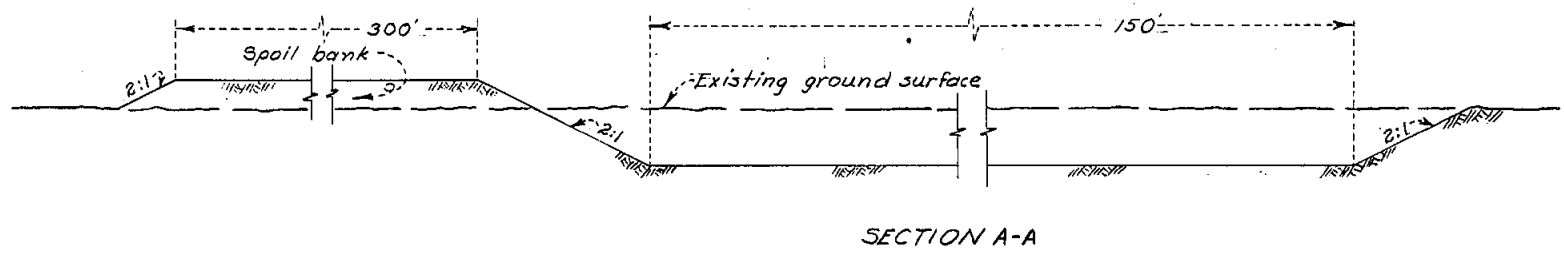
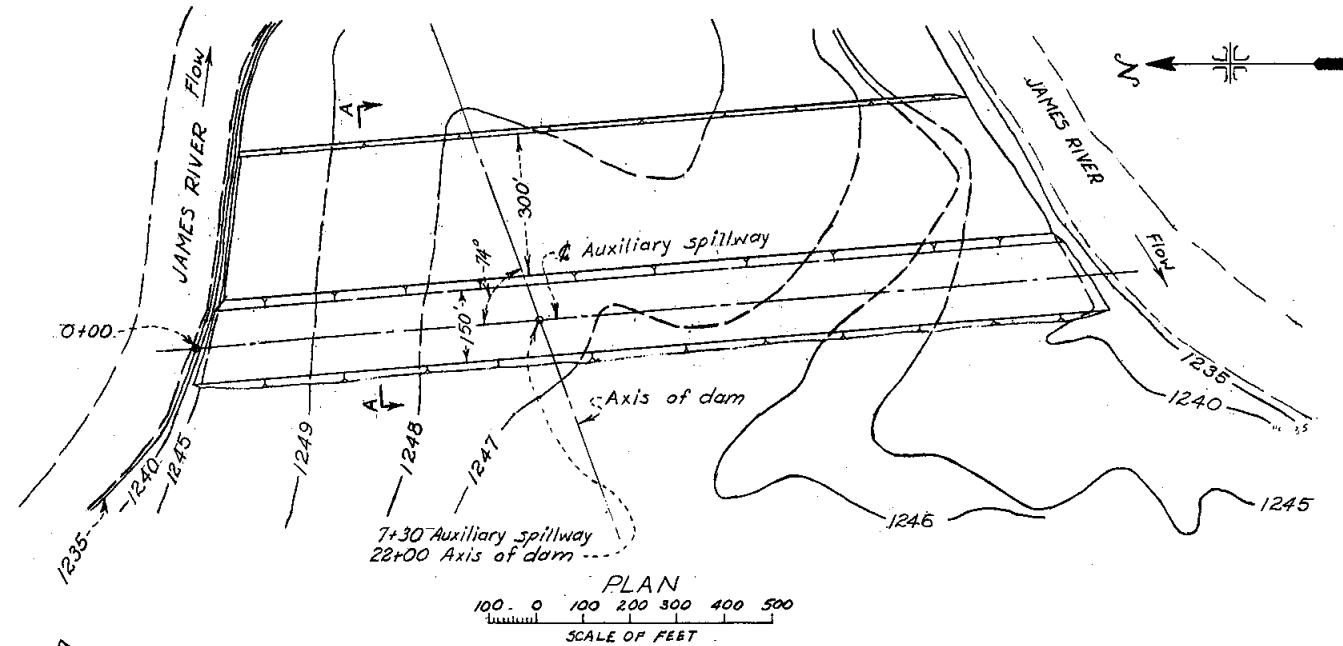


4-23-63 CHANGED DAM EMBANKMENT ELEVATION, GRADE OF LAST
0-24-63 REACH OF ACCESS ROAD AND R.O.W.

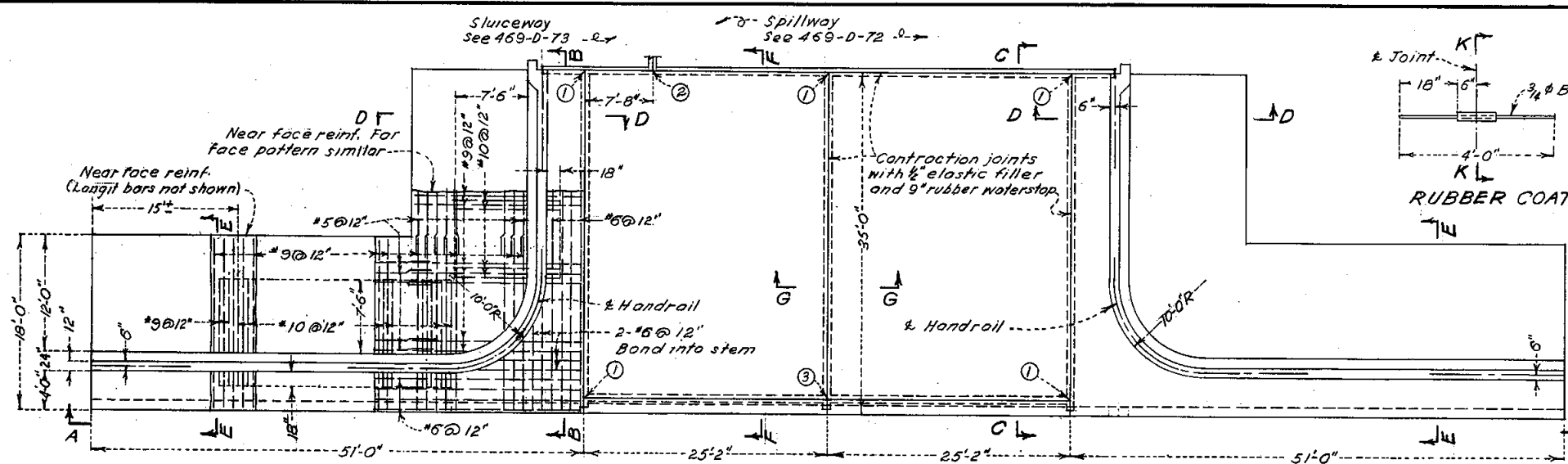
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MISSOURI RIVER BASIN PROJECT
JAMES DIVISION - OAHU UNIT - SOUTH DAKOTA
**JAMES DIVERSION DAM
ACCESS ROAD**

DRAWN - I.W.G. SUBMITTED - J.A. Shaffer
TRACED - L.F.K. RECOMMENDED - J.A. Shaffer
CHECKED - P.H. Traylor APPROVED - P.H. Traylor
DENVER, COLORADO, NOV. 27, 1962

469-D-53

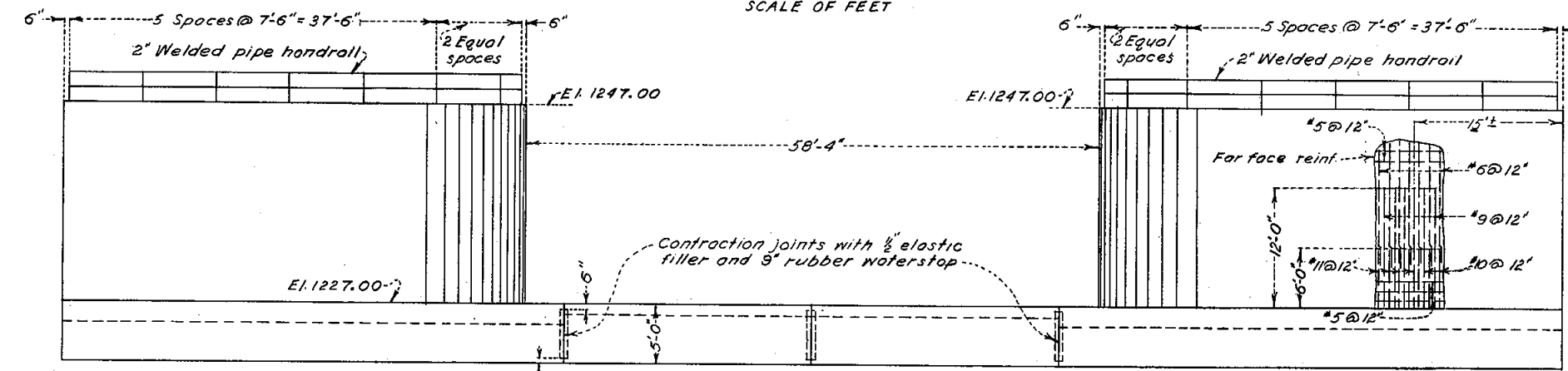


ALWAYS THINK SAFETY	
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION MISSOURI RIVER BASIN PROJECT JAMES DIVISION-CANE UNIT-SOUTH DAKOTA	
JAMES DIVERSION DAM AUXILIARY SPILLWAY	
DRAWN, N.E.T.	SUBMITTED, J. A. H. H.
TRACED, J. A. H.	RECOMMENDED, J. A. H.
CHECKED, J. A. H.	APPROVED, J. A. H.
DENVER, COLORADO APRIL 23, 1963 469-D-69	

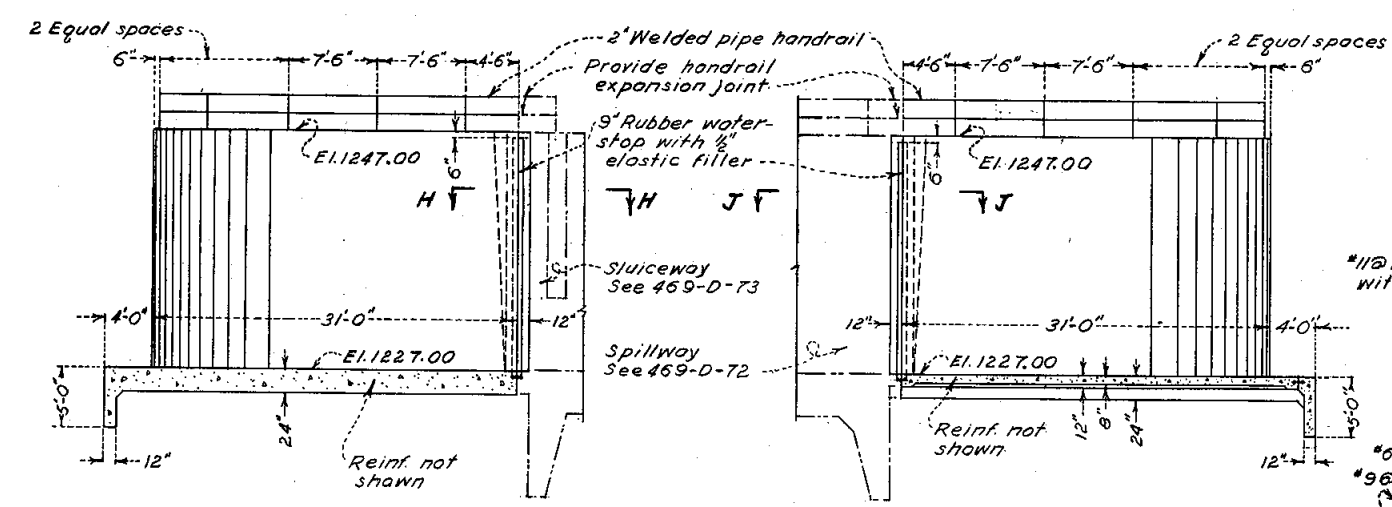


PLAN

SCALE OF FEET
0 5 10 15 20

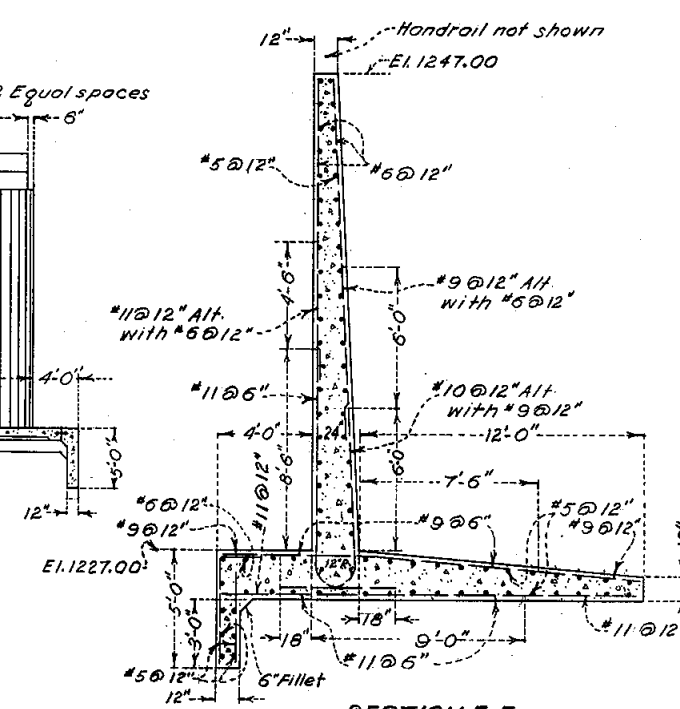


ELEVATION A-A

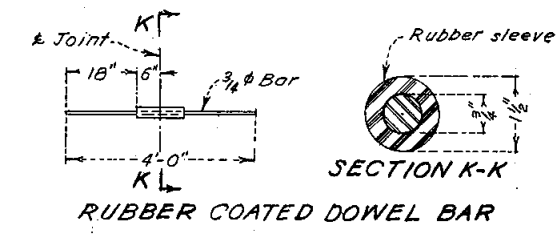


SECTION B-B

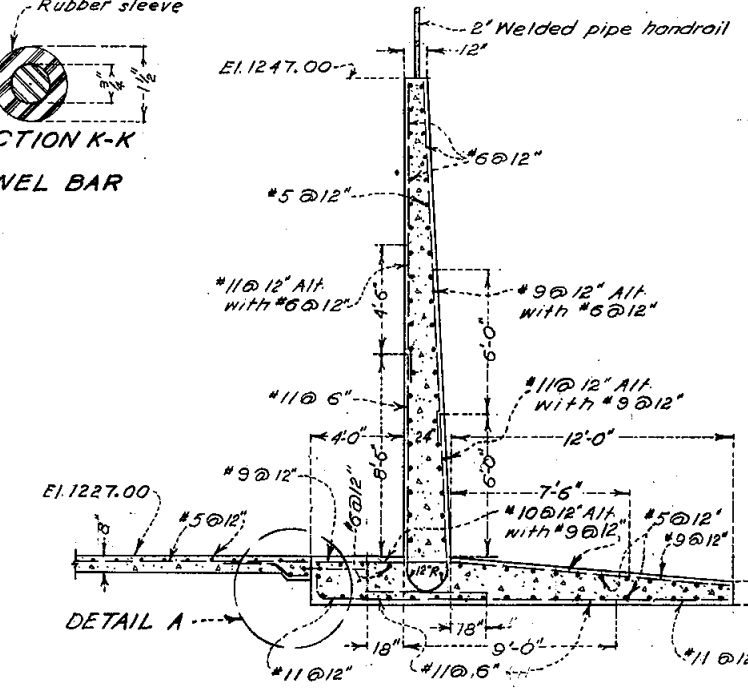
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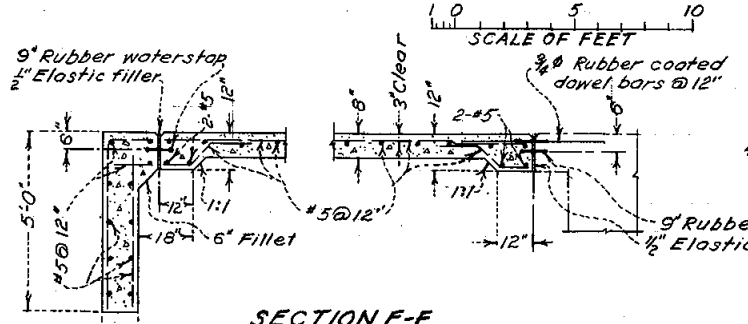
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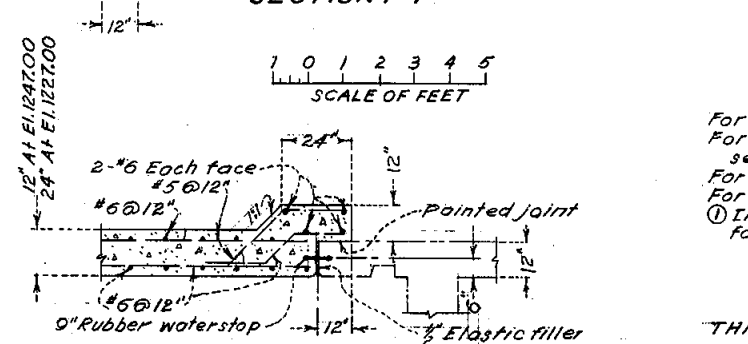
SECTION K-K
RUBBER COATED DOWEL BAR



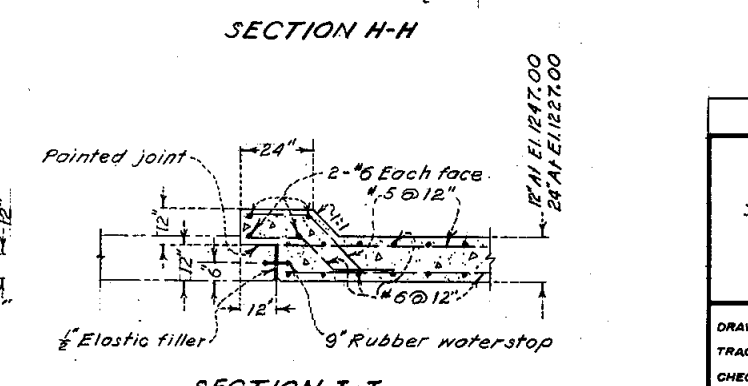
DETAIL A



SECTION D-D

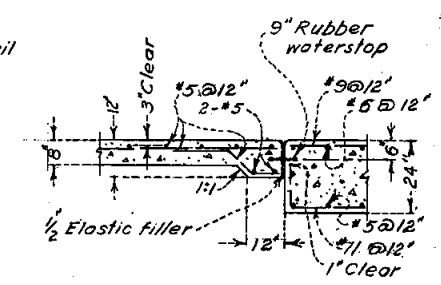


SECTION F-F



SECTION H-H

SECTION J-J

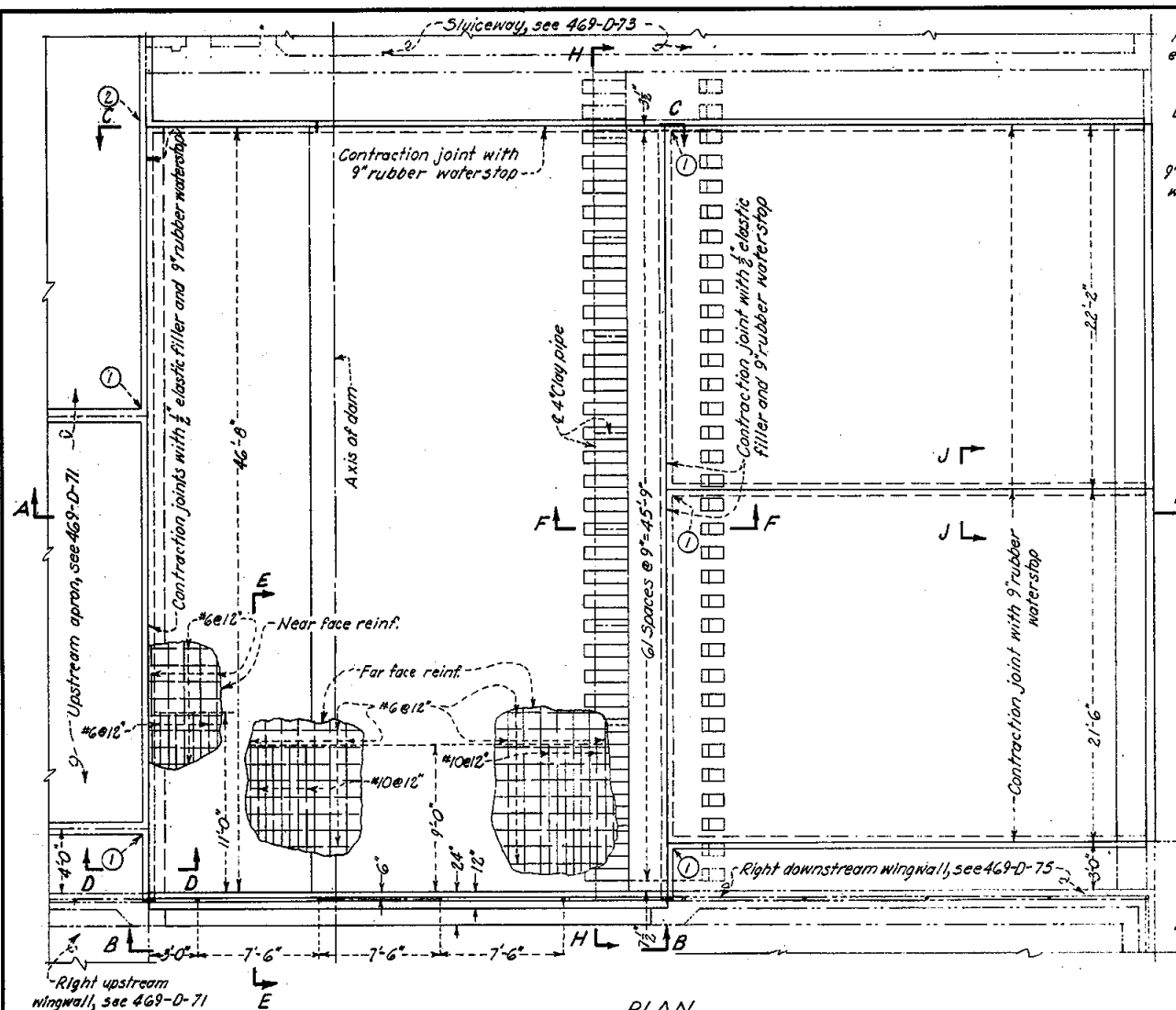


DETAIL A

NOTES
For general notes, see 469-D-73
For details of handrail and expansion joint, see 40-D-4315
For details of handrail post recess, see 40-D-5148
For details of 9" rubber waterstop, see 40-D-2867
① Indicates type of waterstop intersection, for details, see 469-D-60.

THIS DRAWING SUPERSEDES 469-D-55

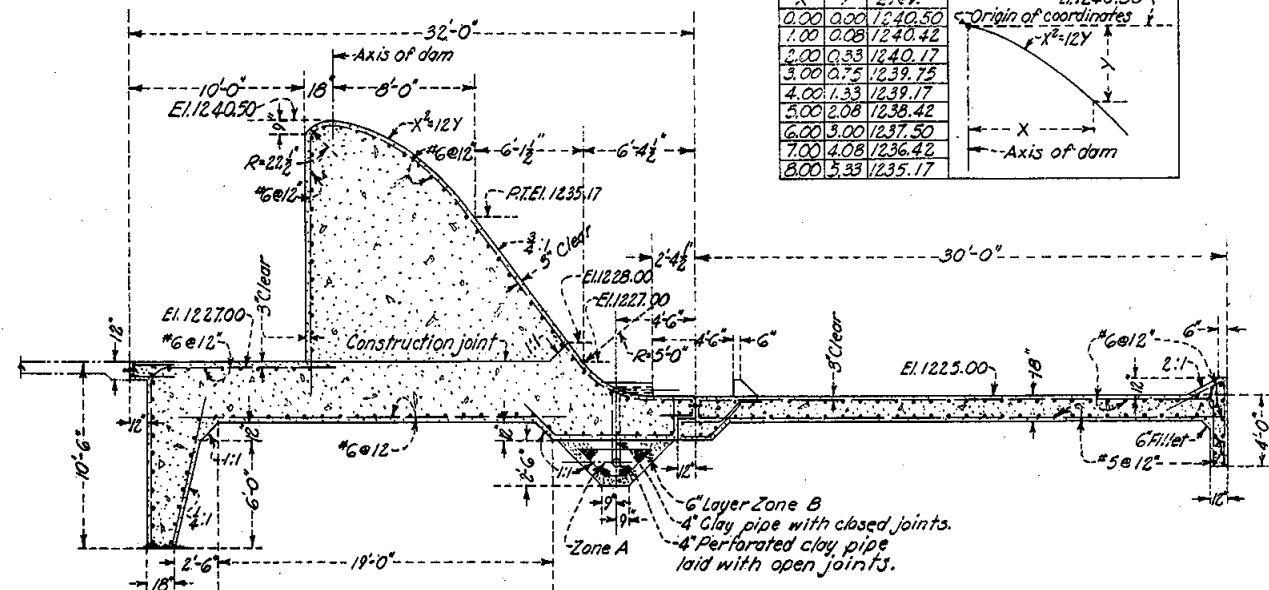
ALWAYS THINK SAFETY	
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION MISSOURI RIVER BASIN PROJECT JAMES DIVISION-OAHE UNIT-SOUTH DAKOTA JAMES DIVERSION DAM UPSTREAM APRON AND WINGWALLS	
DRAWN: J.M.R.	SUBMITTED: H. J. ...
TRACED: J.M.R.	RECOMMENDED: H. J. ...
CHECKED: J.M.R.	APPROVED: H. J. ...
DENVER, COLORADO APRIL 19, 1962 469-D-71	



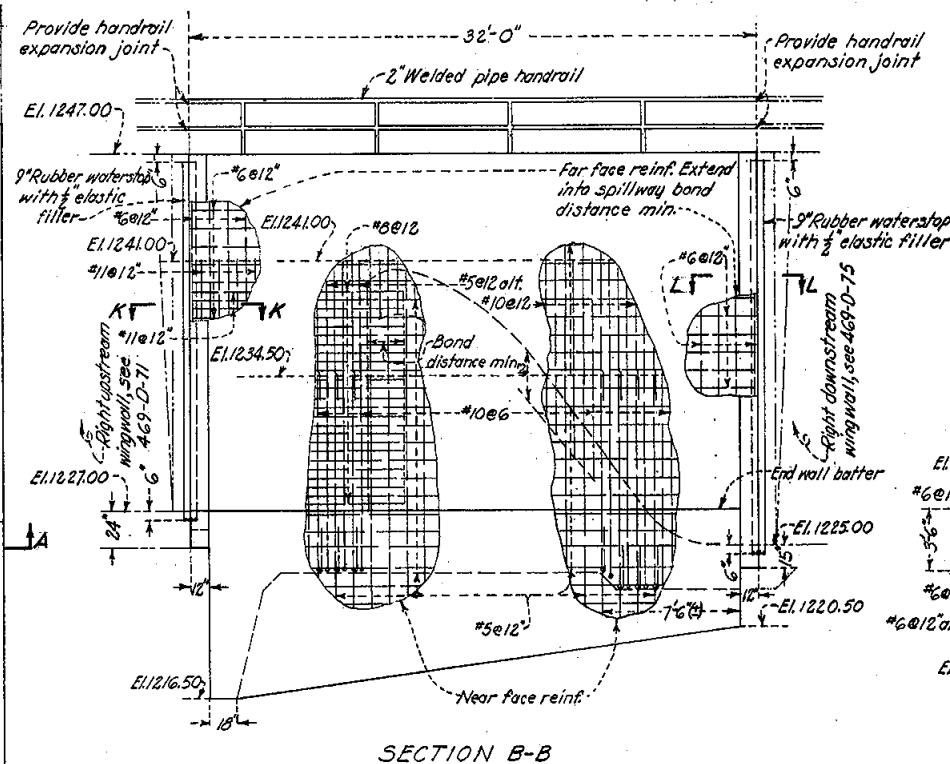
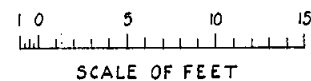
PLAN

X	Y	Elev.
0.00	0.00	1240.50
1.00	0.08	1240.42
2.00	0.33	1240.17
3.00	0.75	1239.75
4.00	1.33	1239.17
5.00	2.08	1238.42
6.00	3.00	1237.50
7.00	4.08	1236.42
8.00	5.33	1235.17

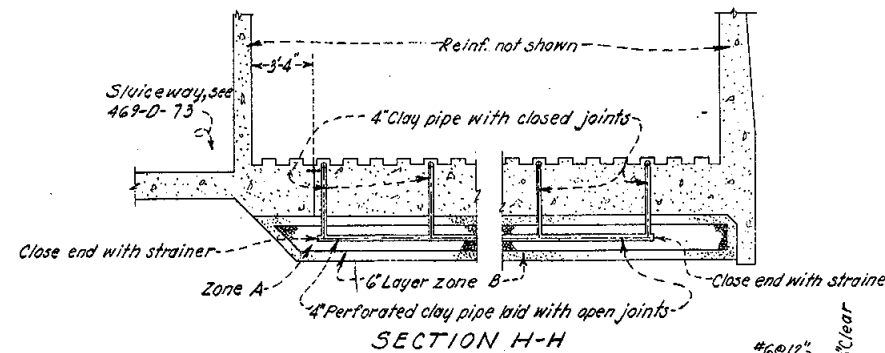
Origin of coordinates at X=12Y



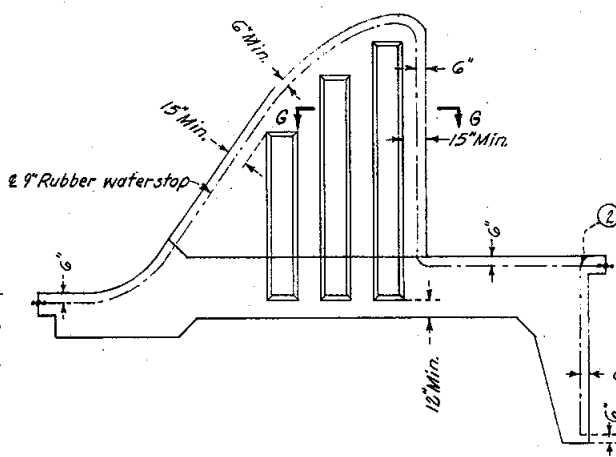
SECTION A-A



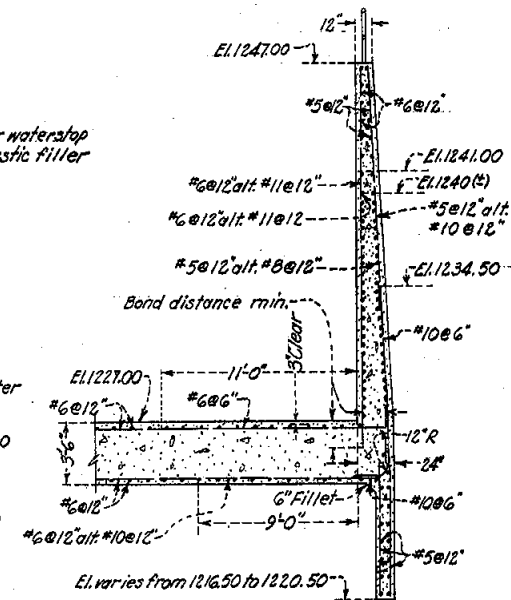
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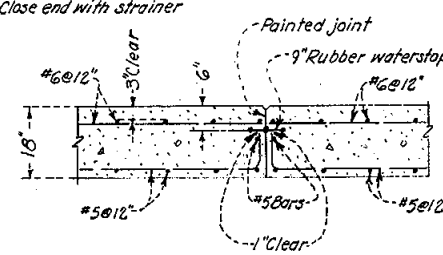
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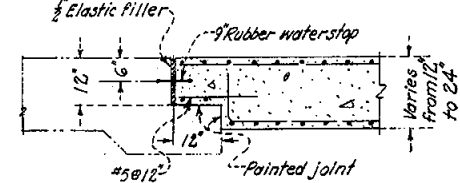
SECTION C-C



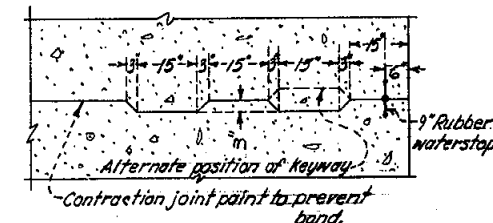
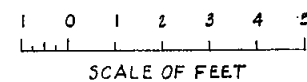
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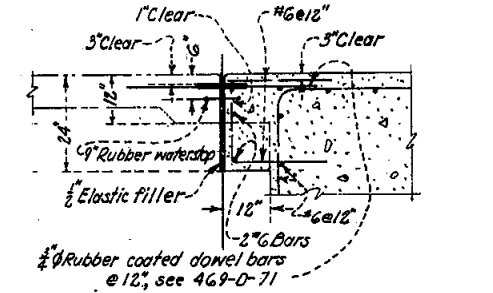
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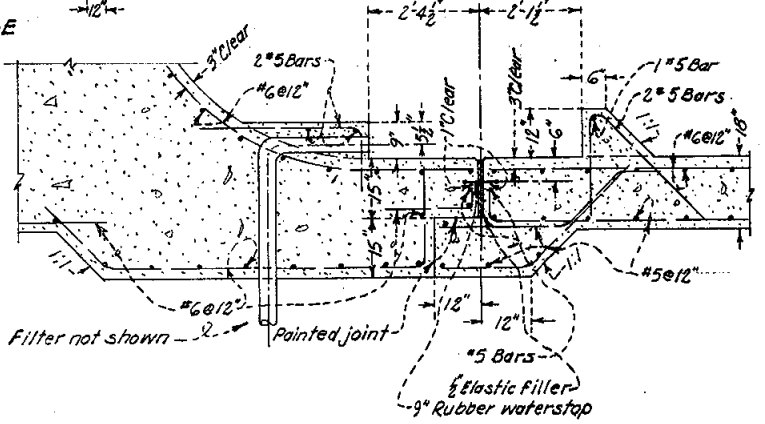
SECTION K-K
(SECTION L-L SIMILAR)



SECTION G-G



SECTION D-D

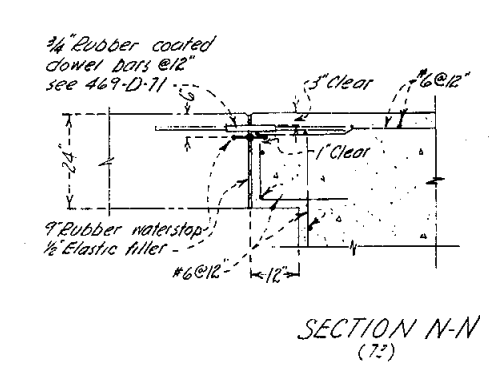
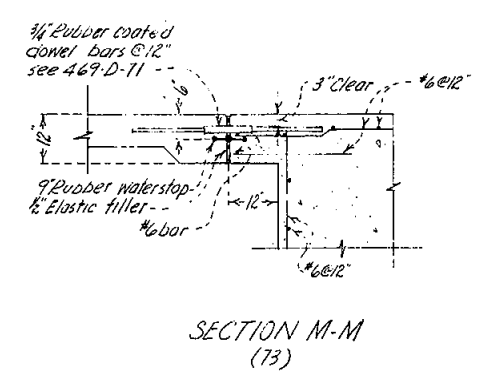
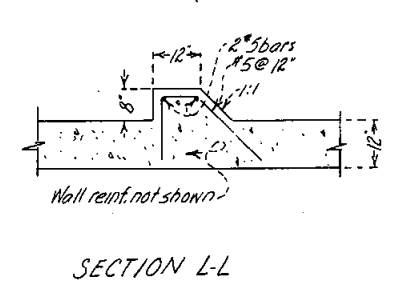
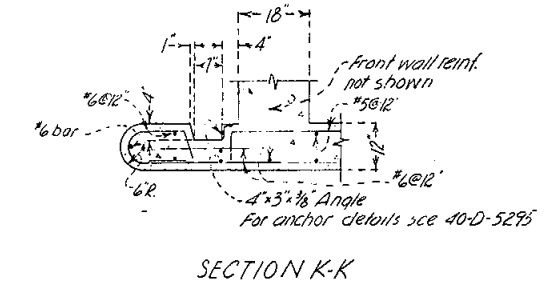
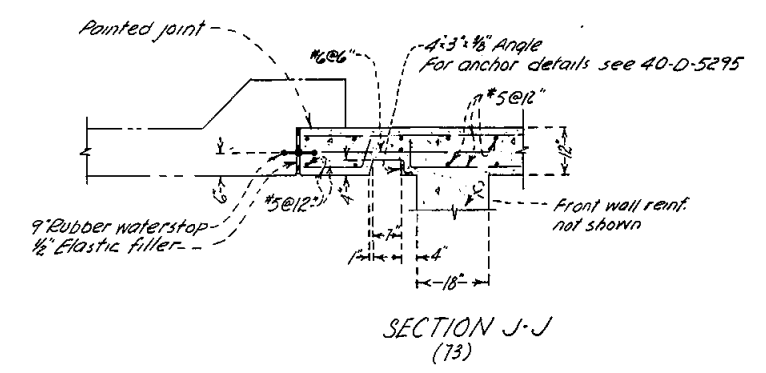
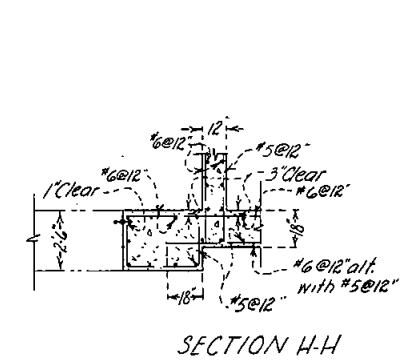
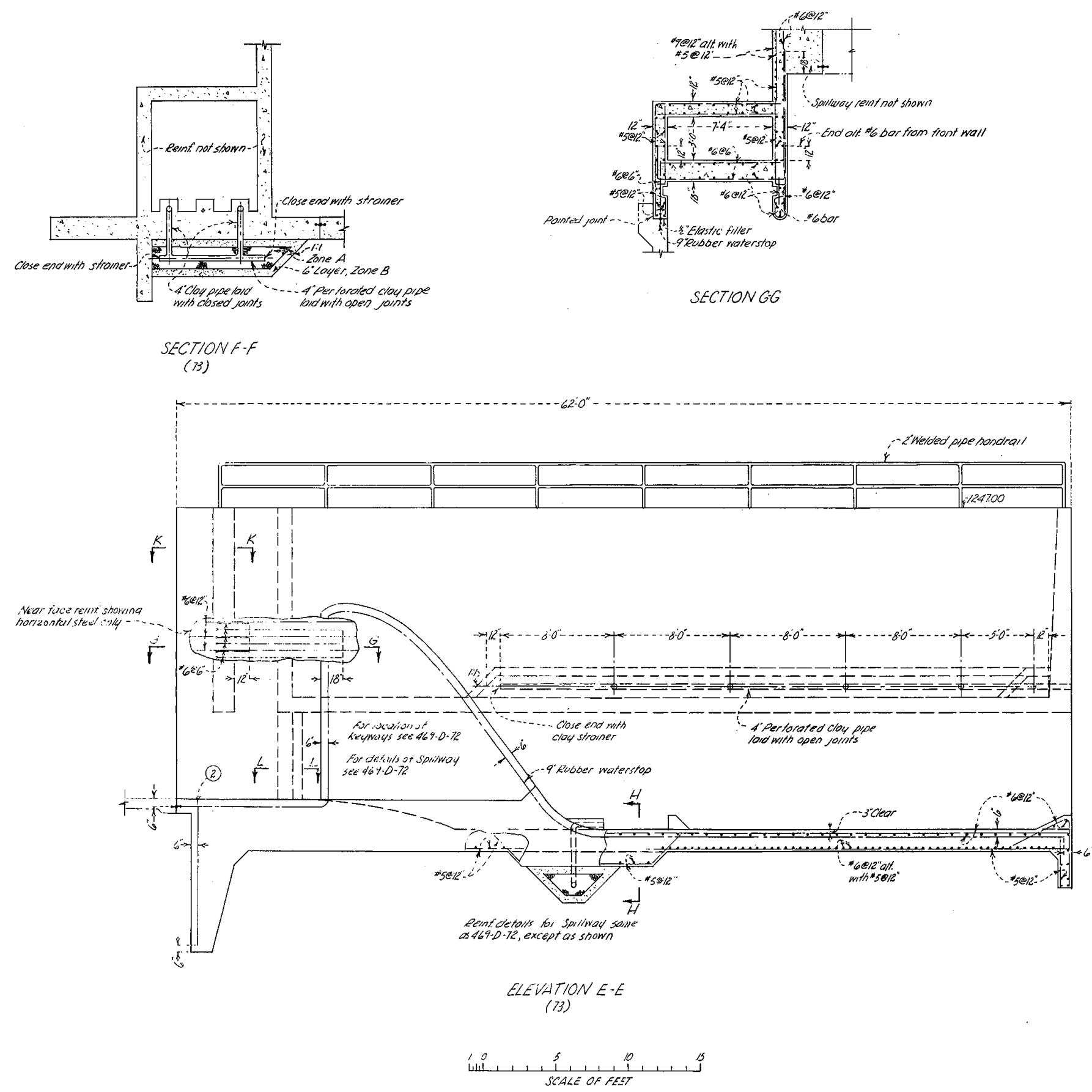


SECTION F-F

NOTES
 For general notes, see 469-D-73
 For details of handrail and expansion joint, see 40-D-4315
 For details of handrail post recess, see 40-D-5148
 For details of 9" rubber waterstop, see 40-D-2867
 ① Indicates type of waterstop intersection, for details, see 469-D-60
 For description of zone A and B, see specifications paragraphs.

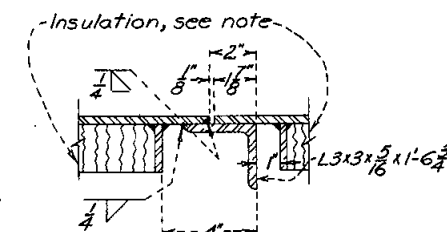
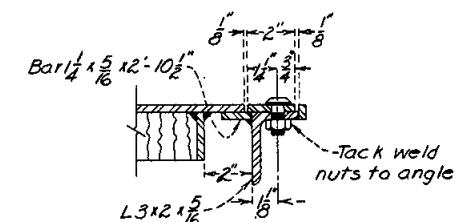
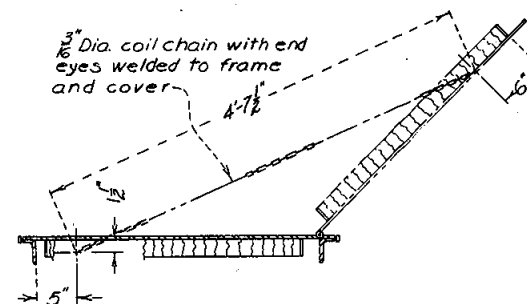
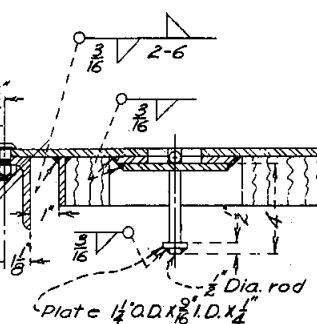
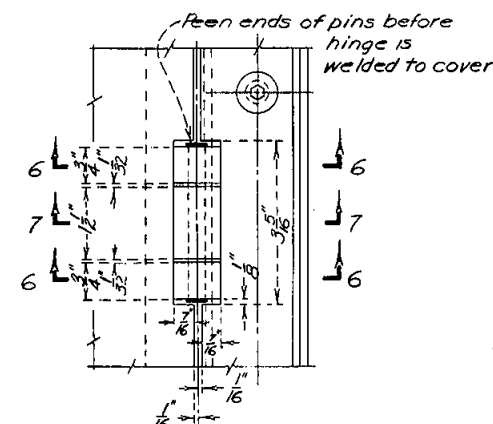
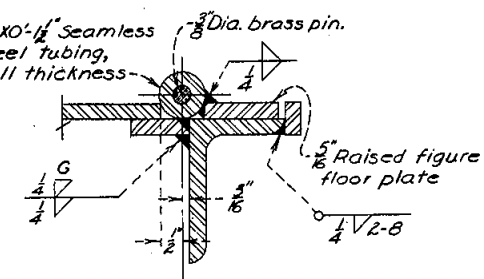
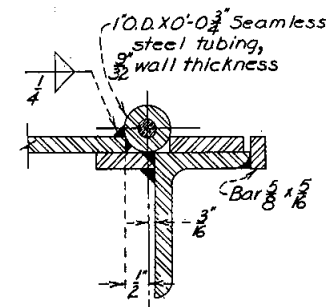
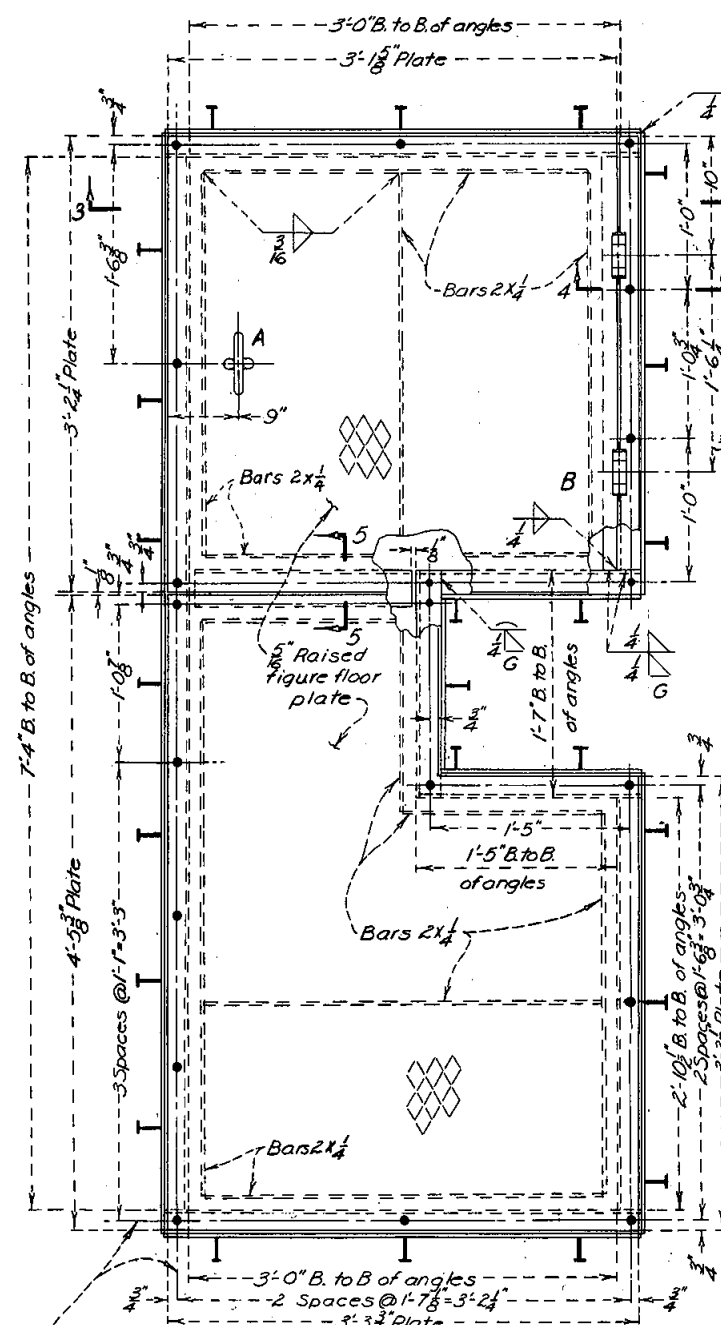
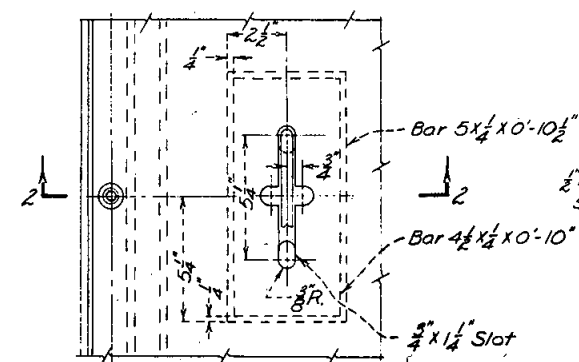
THIS DRAWING SUPERSEDES 469-D-56

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION	
MISSOURI RIVER BASIN PROJECT JAMES DIVISION-DAHE UNIT- SOUTH DAKOTA JAMES DIVERSION DAM SPILLWAY AND RIGHT ABUTMENT WALL	
DRAWN BY: <i>RD</i>	SUBMITTED: <i>Heckler</i>
TRACED: <i>RD</i>	RECOMMENDED: <i>RD</i>
CHECKED: <i>RD</i>	APPROVED: <i>RD</i>
DENVER, COLORADO APRIL 22, 1963 469-D-72	



THIS DRAWING SUPERSEDES 469-D-58

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION MISSOURI RIVER BASIN PROJECT JAMES DIVISION - JAME UNIT - SOUTH DAKOTA	
JAMES DIVERSION DAM SLUICWAY	
DRAWN: A.H.F.	SUBMITTED: J.H. Smith
TRACED: J.H. Smith	RECOMMENDED: J.H. Smith
CHECKED: J.H. Smith	APPROVED: J.H. Smith
DENVER COLORADO	APRIL 26, 1963
SHEET 2012 469-D-74	



NOTES

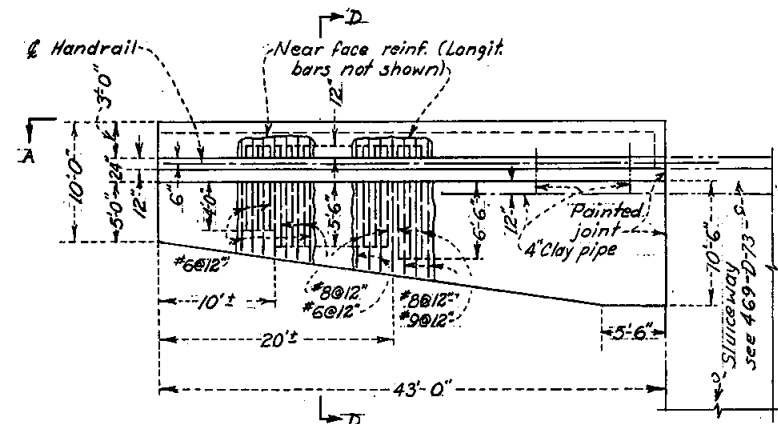
Welding symbols apply to joints of all members of similar identification.
Frame and insulated covers shall be installed assembled.
Insulation shall be rigid glass fiber 2" thick and shall be covered with $\frac{1}{2}$ " No. 16 expanded metal tuck welded to stiffeners at approx. 6" centers. The raised figure on floor plate shall be removed under all bolt heads.
The raised figure floor plate used on the covers shall have identical pattern and shall be matched with the figure extending in the same direction.

Estimated weight _____ 525 lbs.

REFERENCE DRAWING
SLUICeway - - - - - 469-D-73

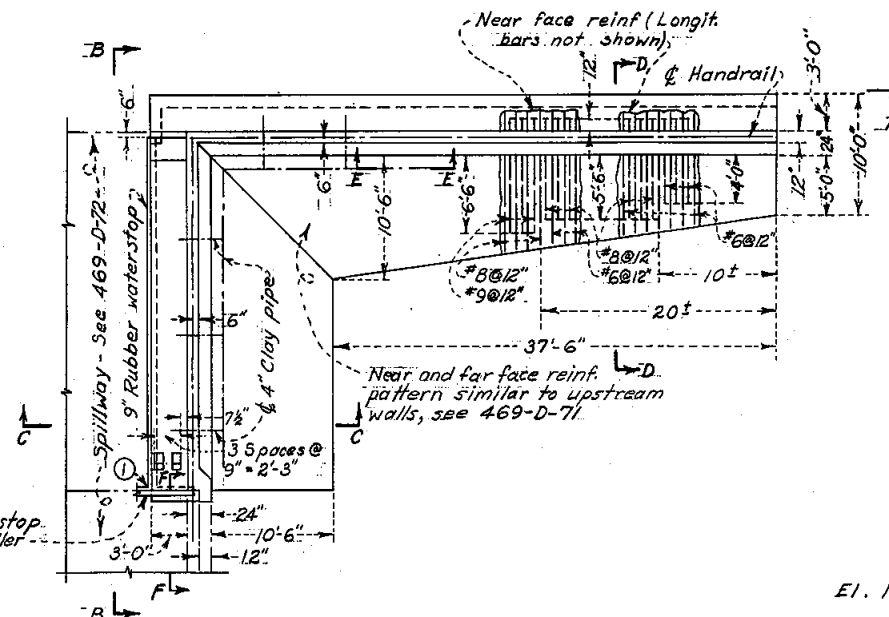
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MISSOURI RIVER BASIN PROJECT
JAMES DIVISION-OAHE UNIT-SOUTH DAKOTA
JAMES DIVERSION DAM
SLUICeway
FRAME AND INSULATED COVERS

DRAWN D.L.MS. SUBMITTED M. J. B...
 TRACED _____ RECOMMENDED H. B...
 CHECKED all APPROVED H.E. B...
 CHIEF RECOMMENDED FRANK
 DENVER, COLORADO MAY. 12, 1963 469-D-76



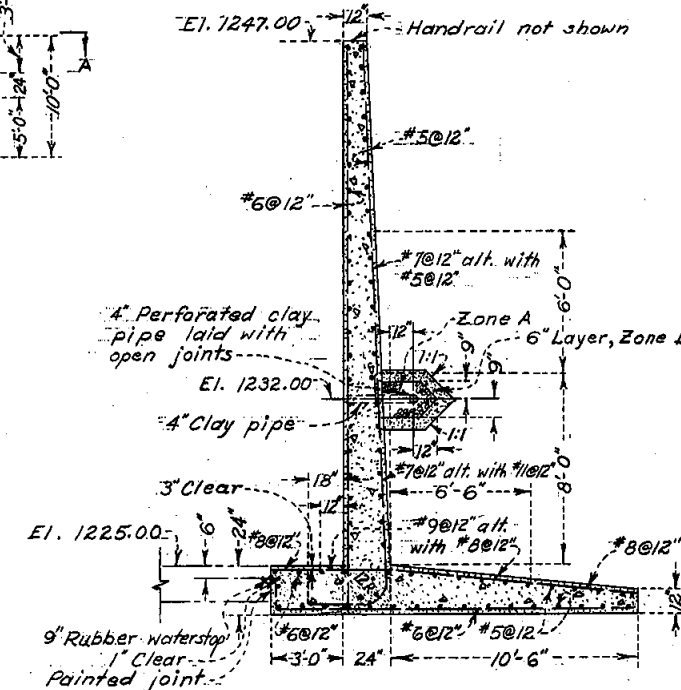
9" Rubber waterstop with 1/2" elastic filler

PLAN

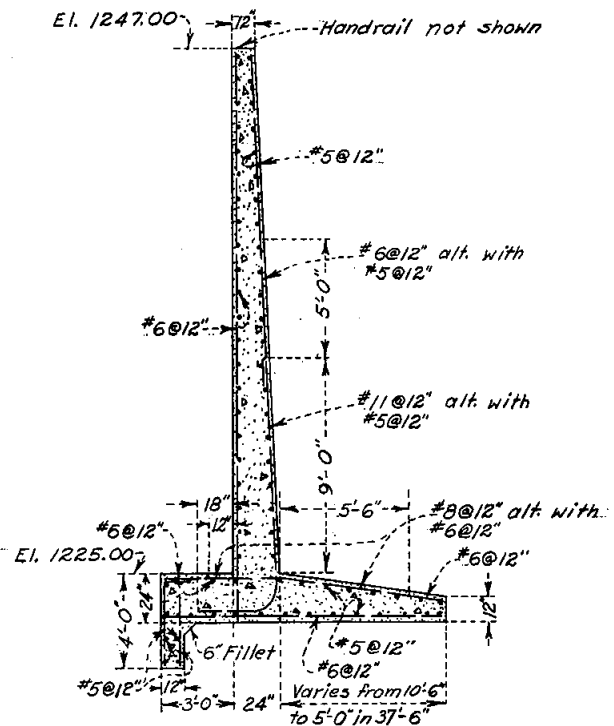


9" Rubber waterstop with 1/2" elastic filler

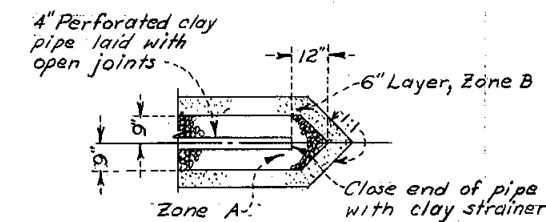
PLAN



SECTION C-C



SECTION D-D



SECTION E-E

(Typical at end of clay pipe.)

NOTES

For general notes, see 469-D-73.

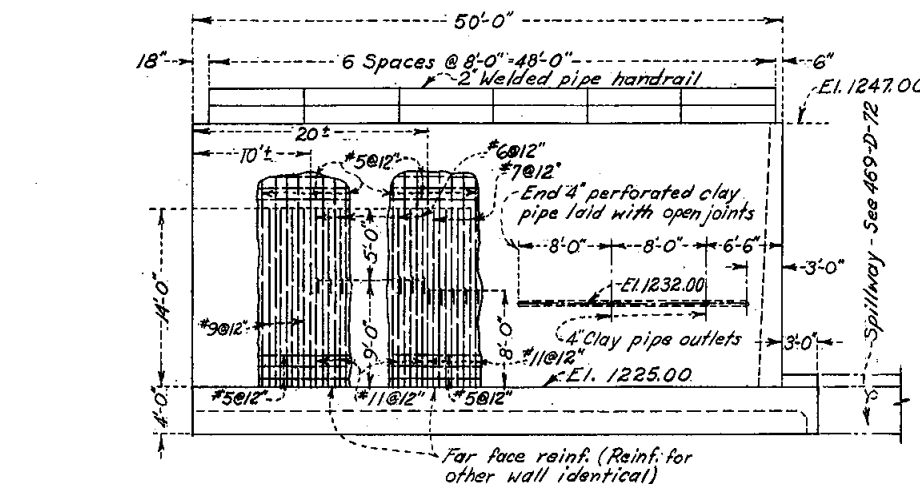
For details of handrail and expansion joint, see 40-D-4315.

For details of handrail post recess, see 40-D-5148.

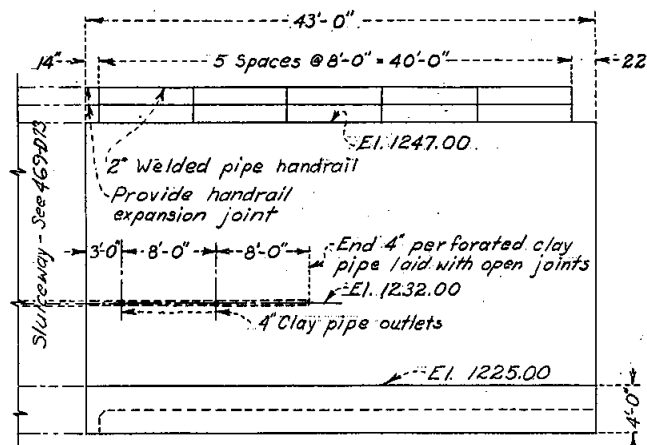
For details of 9" rubber waterstop, see 40-D-2867.

Indicates type of waterstop intersection, for details, see 469-D-60.

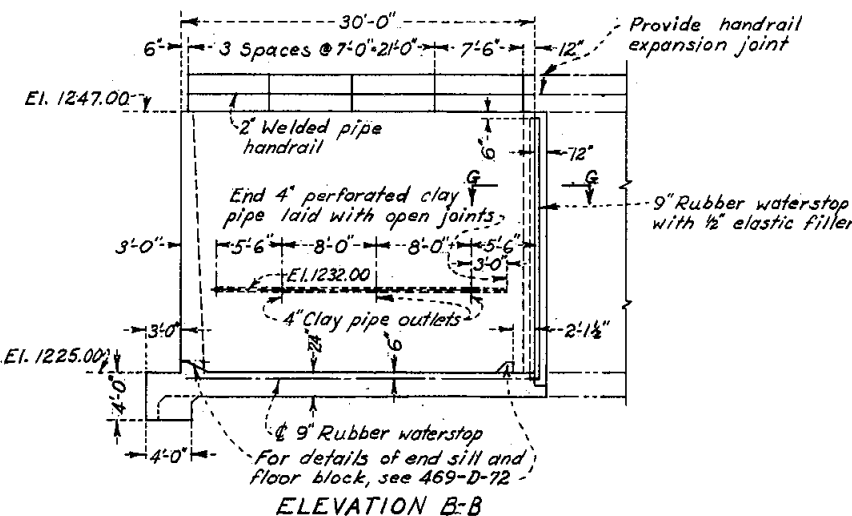
For description of zones A and B, see specification paragraphs.



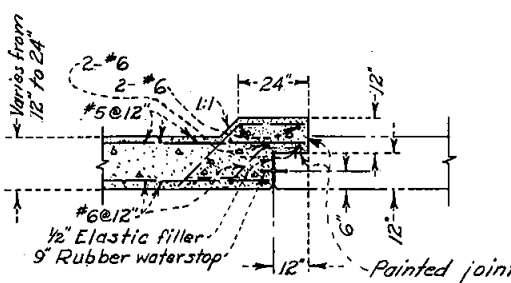
ELEVATION A-A



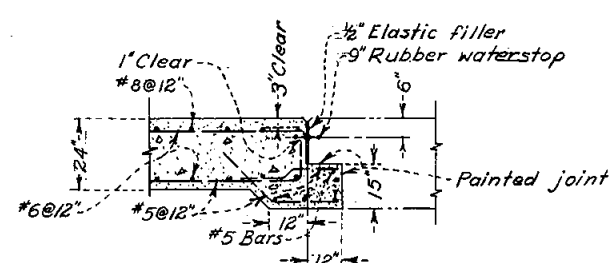
ELEVATION A-A



ELEVATION B-B



SECTION G-G



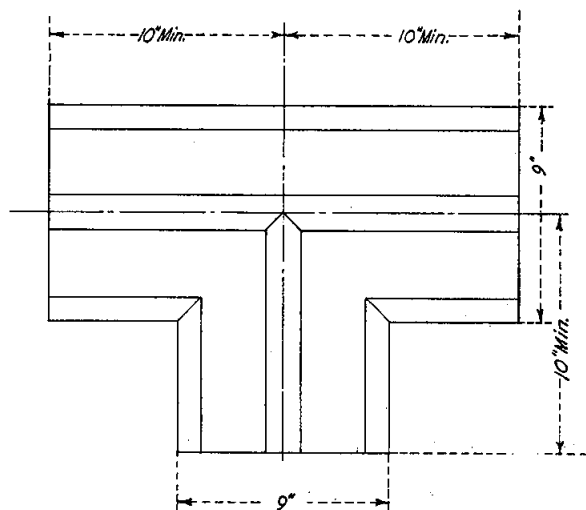
SECTION F-F

THIS DRAWING SUPERSEDES 469-D-59

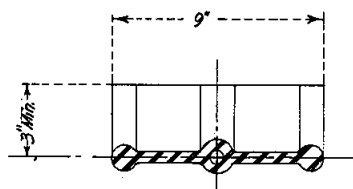
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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MISSOURI RIVER BASIN PROJECT
JAMES DIVISION-OAHE UNIT-SOUTH DAKOTA
JAMES DIVERSION DAM
DOWNSTREAM WINGWALLS

DRAWN BY: SUBMITTED: 11/1/63
TRACED: RECOMMENDED: 11/1/63
CHECKED: 11/1/63 APPROVED: 11/1/63
DENVER, COLORADO APRIL 22, 1963 469-D-75



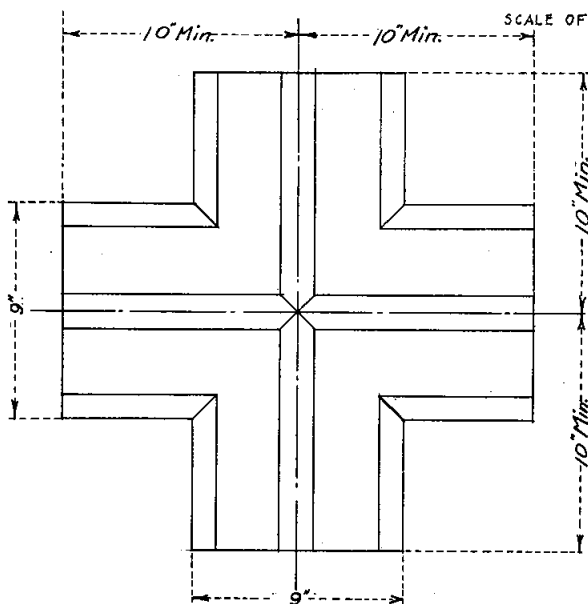
TYPE 1 INTERSECTION
8 REQUIRED



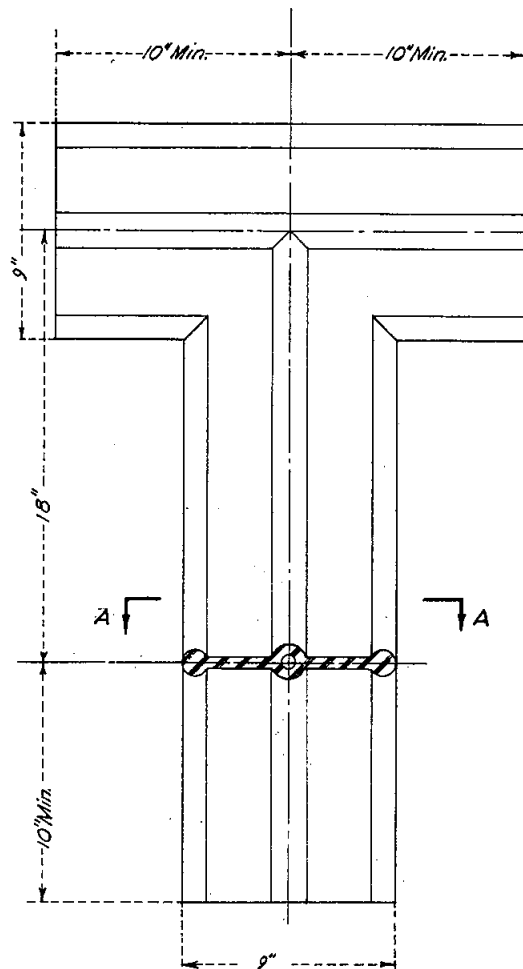
SECTION A-A

0 3 6 9 12

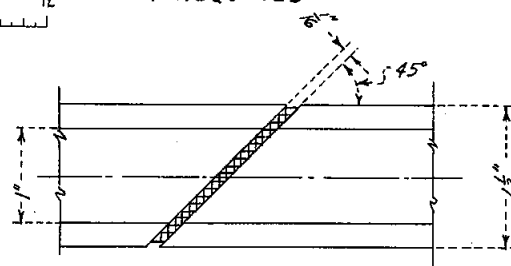
SCALE OF INCHES



TYPE 3 INTERSECTION
1 REQUIRED



TYPE 2 INTERSECTION
1 REQUIRED



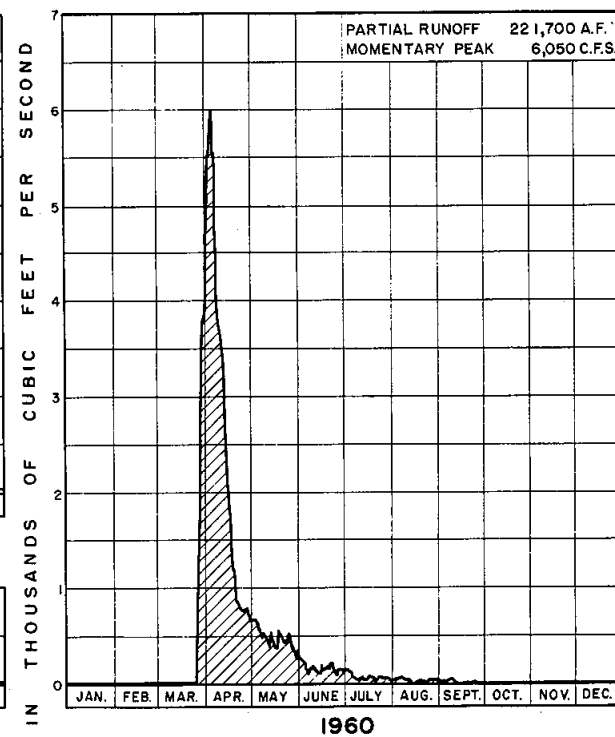
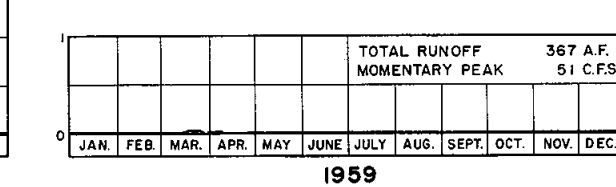
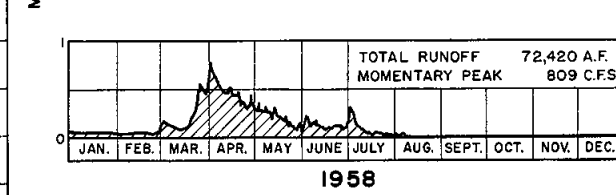
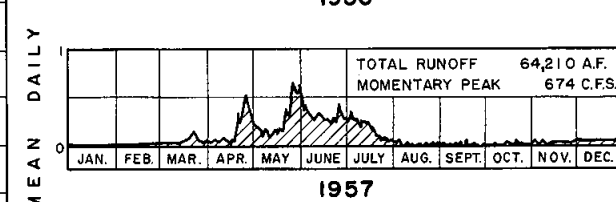
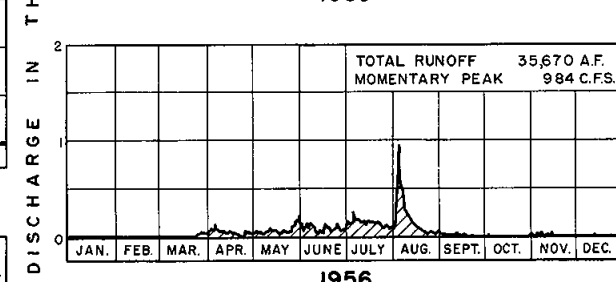
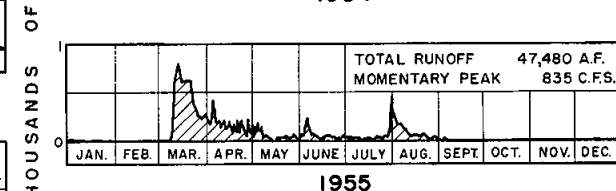
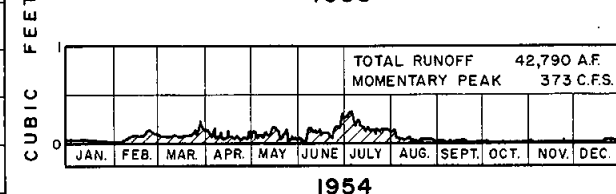
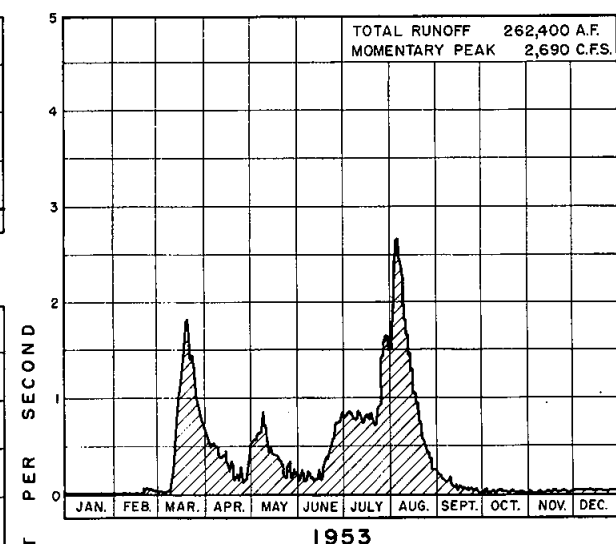
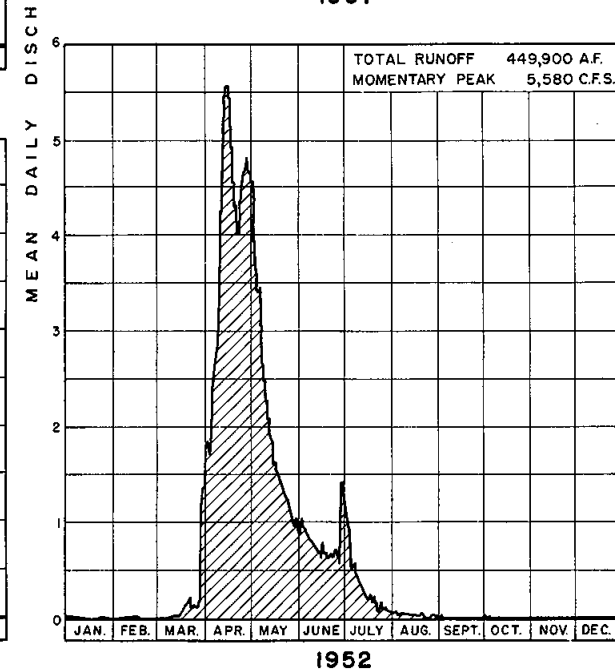
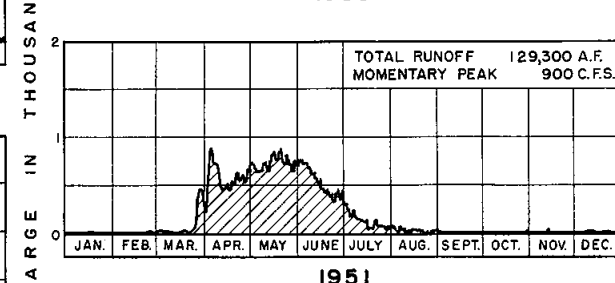
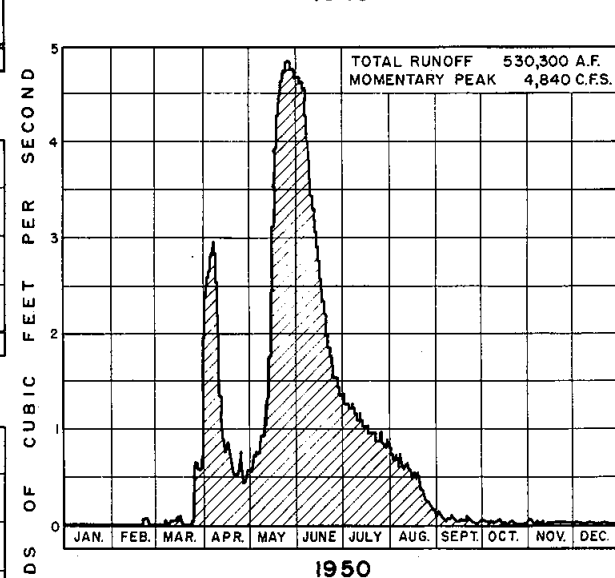
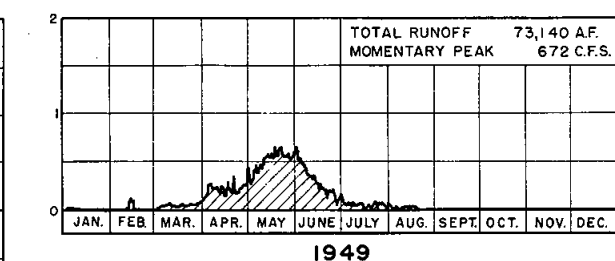
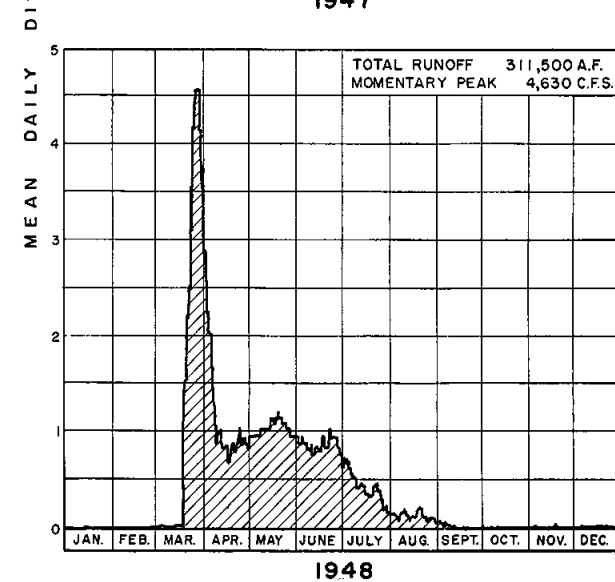
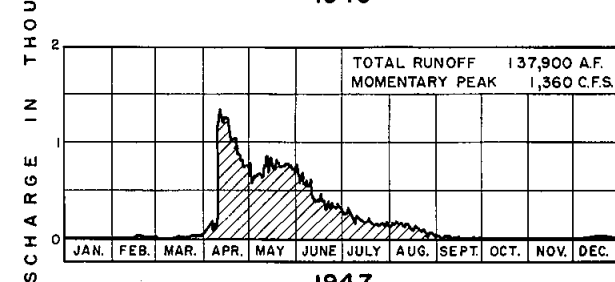
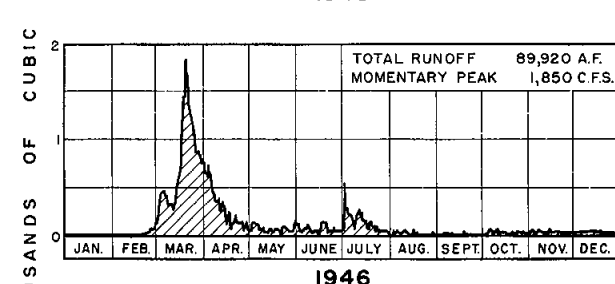
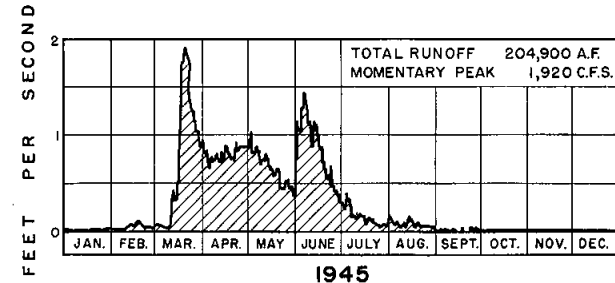
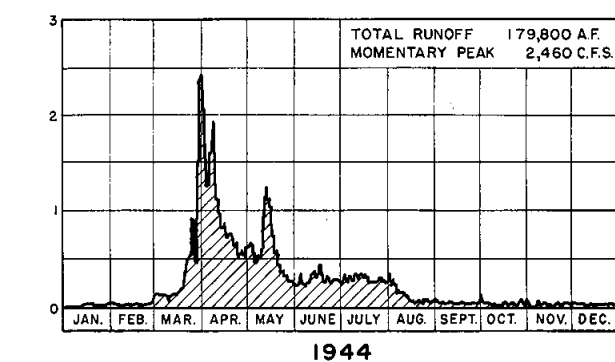
TYPICAL VULCANIZED FIELD SPLICE

NOTE

For details of type A rubber waterstop, see 40-D-2867

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MISSOURI RIVER BASIN PROJECT
JAMES DIVISION-OAHE UNIT-SOUTH DAKOTA
JAMES DIVERSION DAM
RUBBER WATERSTOP INTERSECTIONS

DRAWN BY.....SUBMITTED.....
TRACED.....RECOMMENDED.....
CHECKED BY.....APPROVED.....
DENVER, COLORADO NOV 28, 1962 469-D-60



NOTES

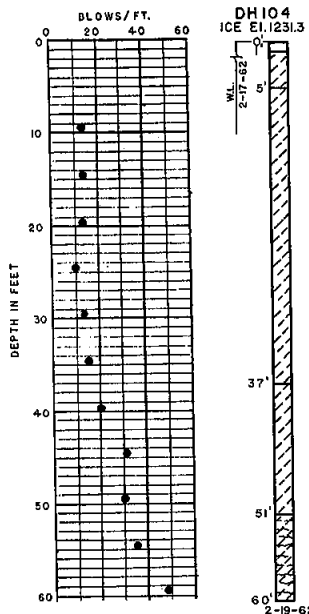
The gaging station, James River at Huron, South Dakota, is located 15 feet upstream from the city dam at Huron, 135 feet downstream from the Chicago and North Western Railway Company bridge, 165 feet upstream from the bridge on U.S. Highway 14, and approximately 29 miles downstream from the James River Diversion damsite.

The gross drainage area at the gaging station is approximately 16,800 square miles, and the net contributing area is approximately 13,700 square miles. The net contributing area at the damsite is approximately 12,400 square miles.

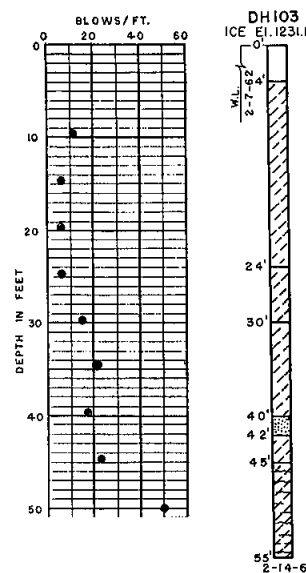
APPROVED: *H. S. Rischel*
CHIEF, HYDROLOGY BRANCH

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MISSOURI RIVER BASIN PROJECT
JAMES DIVISION-OAHE UNIT-SOUTH DAKOTA
JAMES DIVERSION DAM
HYDROGRAPHS OF JAMES RIVER

DRAWN: *P. S. N. R.* SUBMITTED: *J. A. Sheppard*
TRACED: *P. S. N. R.* RECOMMENDED: *H. S. Rischel*
CHECKED: *P. S. N. R.* APPROVED: *P. M. Tordella*
DENVER, COLORADO NOVEMBER 27, 1958
469-D-61



0-1' Ice, numerous boulders along shore of James River.
 1'-5' CLAY, gray, with rocks and boulders, no drive sample recovered because of rock. (Glacial Till?) (CL)
 5'-37' CLAY, gray, wet, soft, plastic, few fine gravel 5'-5.5', thin lenses or fingers of sandy clay till intercalated from 34'-37'. (Lake Deposit) (CH)
 37'-51' CLAY, sandy, gray, stiff, moist, estimated 30-40% medium to fine sand, occasional fine gravel, moderately plastic, moderate reaction to acid. (Glacial Till) (SC-CL)
 51'-60' CLAY SHALE, dark gray, moist, stiff to firm plastic clay, nonindurated, with occasional light gray to tan partially disintegrated claystone concretions up to 2" in size, occasional gravel imbedded in drive core of shale.
 NOTE: NX continuous drive samples with penetration tests at 5' intervals using standard split type spoon from 0-60'. Waxed hand samples of NX continuous drive core from: 10'-10.3', 20'-20.3', 30'-30.3'.



0-4' Ice and water.
 4'-24' CLAY, dark gray, wet, soft, silty, plastic, slight acid reaction, gravel noted in drive sample at 8'-10'. (Lake Deposit) (CH)
 24'-30' CLAY, dark gray, wet, soft to stiff, silty, plastic with lenses of very fine uniform sand, slight acid reaction in plastic clay zones with moderate to active reaction in sandy zones. (CH)
 30'-40' CLAY, gray, wet, stiff, silty, approximately 30% medium to fine sand, estimate 2% fine gravel, moderate acid reaction. (Glacial Till) (CL)
 40'-42' SAND, gray, wet, fairly well graded, approximately 25% fine gravel with occasional medium gravel silty, contains clay zones. (SM-SC)
 42'-45' CLAY, gray, hard, same as gray till from 30'-40'. (Glacial Till) (CL)
 45'-55' CLAY SHALE, dark gray, plastic, nonindurated, stiff, firm, 4" bentonitic clay zone at 54', streaks of bentonite from 53'-54' are in a vertical plane.
 NOTE: NX continuous drive samples with penetration tests at 5' intervals using standard split type spoon from 0-55'. NXCS to 44'. Waxed hand samples of NX continuous drive core from: 20'-20.3', 30'-30.3', 40'-40.3', 50'-50.3'.

EXPLANATION

DH Drill hole, Nx size and/or standard penetration test.

AP Power auger hole, 12" diameter.

PT Penetration test (NX barrel alternating with standard penetration spoon.)
 Results of standard penetration resistance test expressed as number of blows required to drive a 2" O.D. penetration spoon 12" with an 140lb. hammer dropping 30".
 ● Actual number of blows
 ○ Extrapolated number of blows.

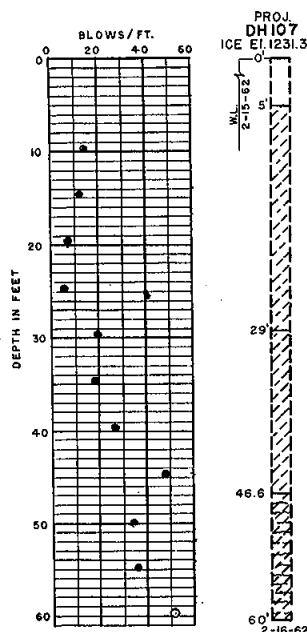
□ Date exploration completed.

□ Water level and date measured. Where not indicated, no water encountered, except as otherwise noted in log description.

Letter symbols in parentheses, following the soil descriptions in the logs, are group symbols of the Unified Soil Classification System based on field identification. Copies of Dwg. No. 103-D-347, Unified Soil Classification, may be obtained on request to Assistant Commissioner and Chief Engineer, Bureau of Reclamation, Denver 25, Colorado

NOTE

For location of exploration see Dwg. 469-D-54 and also 52.

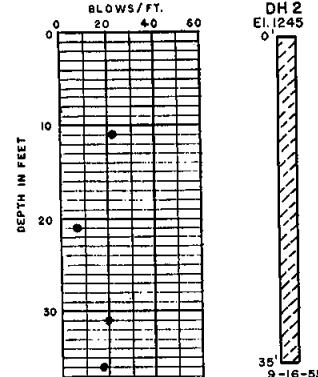
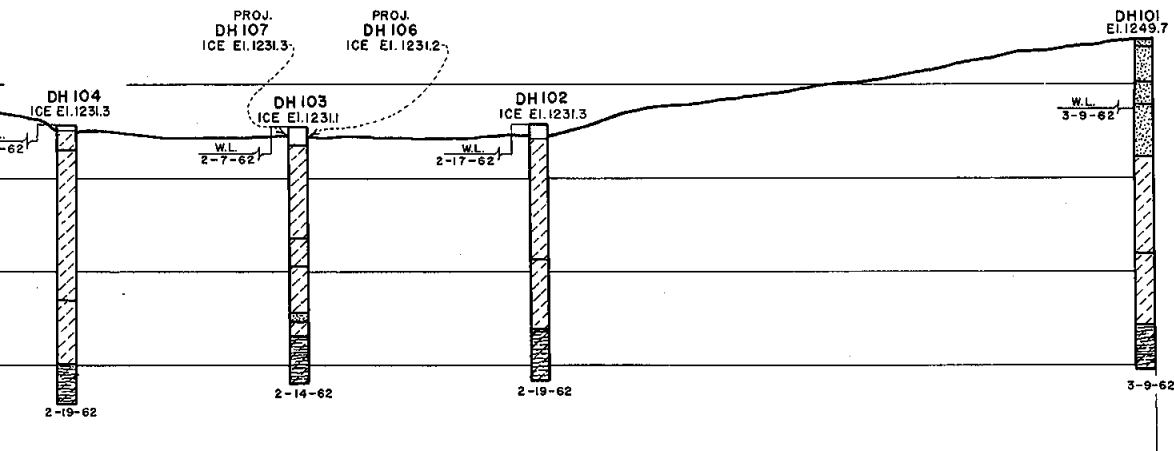


0-5' Ice and water.
 5'-29' CLAY, gray, wet, soft, silty, plastic, slight acid reaction. (Lake Deposit) (CH)
 29'-46.6' CLAY, sandy, gray, moist, stiff, estimated sand content 30-40%, medium to fine, occasional gravel, silty fine sand lenses 30'-34', moderate to active acid reaction, moderate plasticity. (Glacial Till) (SC-CL)
 46.6'-60' CLAY SHALE, dark gray, stiff to firm, plastic, bentonite seam noted at 50', occasional pyrite concretions and partially disintegrated claystone concretion at 56.5'.
 NOTE: NX continuous drive samples with penetration tests at 5' intervals using standard split type spoon from 0-60'. NXCS to 40'. Waxed hand samples of NX continuous drive core from: 50'-50.3', 60'-60.3'.

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UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 MISSOURI RIVER BASIN PROJECT
 JAMES DIVISION-OAHE UNIT-SOUTH DAKOTA
JAMES DIVERSION DAM
LOGS OF EXPLORATION

DRAWN W.C.H. - H.S.P. SUBMITTED M. J. L...

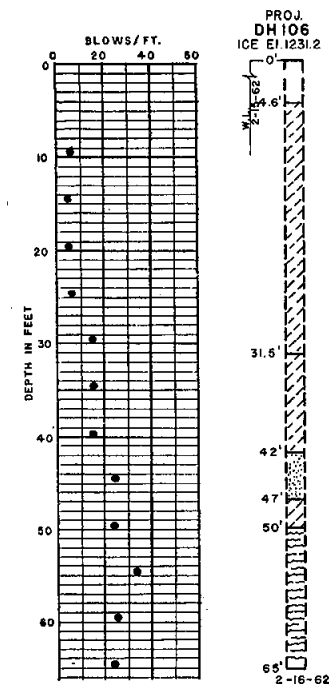
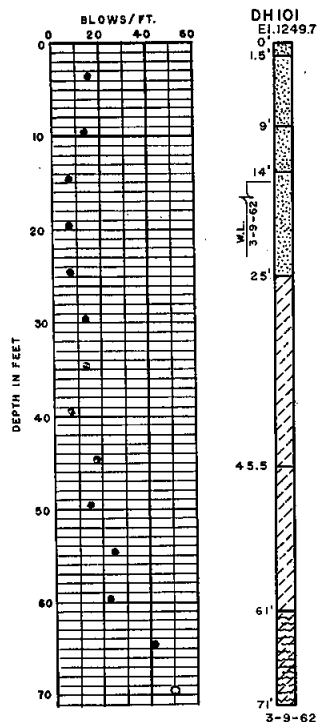


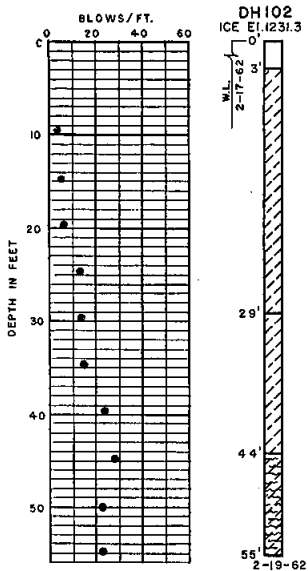
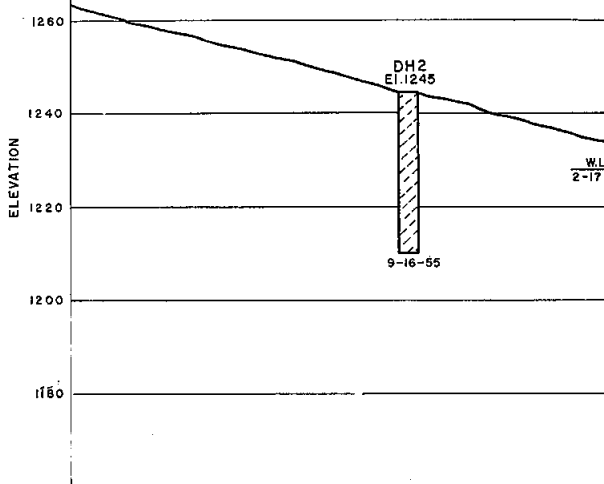
soft, contains sand, snail
occasional gravel 3'-4', plas-
contains lenses of very fine
Deposit) (CH)

ft to stiff, silty, sand content
ately 30% medium to fine, occasion-
medium plasticity. (Glacial Till)

ay, plastic, nonindurated, soft
fact apparent in PR sample 44'-45',
tan partially disintegrated clay-
onal gravel noted in drive core
as contamination from till above,
oted 53.7'.

samples with penetration tests at
ard split type spoon from 0-55',
axed hand samples of NX continuous
core from: 10'-10.2', 20'-20.2', 30'-30.2', 40'-





0-3' Ice and water.
 3'-29' CLAY, dark gray, wet, and small clam shells with silty, slight acid reaction silty sand 27'-29'. (Lak
 29'-44' CLAY, gray, wet, silty, estimated to be approximately 2% gravel estimated 2%, m (SC-CL)
 44'-55' CLAY SHALE, dark gray to stiff, till shale containing occasional light gray to stone concretions, occasional of shale are interpreted thin zone of bentonite no
 NOTE: NX continuous drive 5' intervals using standard Drove 8.5' NX casing. We drive core from: 10'-10.40.3', 50'-50.3'.

AP 201
El. 1286.7

0-1' Topsoil, dry, clayey.
1'-13' CLAY, silty, sandy, brown, moist, moderately plastic, occasional fine gravel, moderate to active acid reaction, (Glacial Till). (CL)
NOTE: Boulders at 13'. Made three unsuccessful attempts to penetrate boulder bed.

1-29-62

AP 202
El. 1284.4

0-1' Topsoil, dry, sandy.
1'-3' SAND, brown, moist, medium to fine, approximately 20% plus No. 4, maximum size 3/4", approximately 5-10% clayey fines. (SP-SC)
3'-12' CLAY, silty, approximately 30% well graded sand, occasional fine gravel, moderately plastic, strong acid reaction, brown, moist, boulder at 12' (Glacial Till). (CL)
12'-14' COBBLES and BOULDERS.
14'-19' SAND, poorly graded, medium to fine, strong acid reaction, occasional fine gravel, brown, trace of moisture. (SP)
19'-25' CLAY, silty, trace of fine sand, medium plasticity, no gravel, slight acid reaction, glacial fluvial material, gray. (CL)
1-25-62 NOTE: Unable to auger through boulder at 12'. Second hole was offset slightly and continued to 25'.

AP 203
El. 1282.0

0-11' CLAY, silty, approximately 30% medium to fine sand, occasional fine gravel, strong acid reaction, moderate plasticity, brown, tan when dry, dry 1'-6', becoming moist 6'-11' (Glacial Till). (CL)
11'-16' SAND, fine, uniform, clean, #50-#100 sieve size, occasional clay till ball from above, active acid reaction, brown, trace of moisture. (SP)
16'-25' CLAY, very silty, moderately plastic to plastic, medium acid reaction, gray. (Glacial Fluvial). (CL-CH)

1-28-62

AP 204
El. 1283.8

0-1' Topsoil, dry, sandy.
1'-4' SAND and GRAVEL, fairly well graded sand, approximately 30% fine gravel, maximum size 1/2", trace of fines, slight acid reaction, brown, moist, (Glacial Outwash). (SW)
4'-7' CLAY, silty, approximately 30% fairly well graded sand, approximately 2-5% fine gravel, moderately plastic, active acid reaction, brown, (Glacial Till). (CL)
NOTE: Boulders at 7'. Two unsuccessful attempts were made to penetrate boulder bed.

AP 205
El. 1281.8

0-1' Topsoil, dry, sandy.
1'-4' SAND and GRAVEL, fairly well graded sand, approximately 30% fine gravel, maximum size 3/4", approximately 5-10% silt, trace of clay, brown, moist. (SW-SM)
4'-15' CLAY, silty, approximately 30% medium to fine sand, approximately 2-5% fine gravel, moderately plastic, active acid reaction, brown, moist, (Glacial Till). (CL)
15'-17' SAND, medium to fine, approximately 30% fine gravel, approximately 5-10% silt, active acid reaction, brown, moist. (Outwash) (SP-SM)
17'-27' CLAY, silty, moderately plastic to plastic, slight acid reaction, gray, moist. (Glacial Fluvial) (CL-CH)

1-29-62

AP 206
El. 1266.5

0-2' Topsoil, clayey, organic, black, dry.
2'-5' CLAY, silty, approximately 30% fairly well graded sand, approximately 2-5% fine gravel, moderately plastic, active acid reaction, brown, dry. (Glacial Till). (CL)
5'-7' SAND, medium to fine, occasional fine gravel, trace organic material, approximately 5-10% silty fines, dark brown, moist. (SP)
7'-14' CLAY, silty, lenses of silty fine uniform sand, medium plastic to plastic, slight to medium acid reaction, mottled tan and gray with occasional brown iron stains, oxidized, moist. (Glacial Fluvial) (CL-CH)
14'-25' CLAY, silty, moderately plastic to plastic, gray, moist. (Glacial Fluvial) (CL-CH)

1-29-62

AP 401
El. 1280.0

0'-9' CLAY, very silty, very active acid reaction, trace very fine sand, very smooth when wet, light brown to tan, dry. (Loess?) (CL)
9'-15' CLAY, silty, approximately 30% fairly well graded sand, approximately 2% gravel, active acid reaction, brown, moist. (Glacial Till) (CL)
15'-21' SAND, medium to fine, occasional coarse sand particles, few fine gravel, cohesionless, loose, caved at 17', contains some organic material, grayish brown. (Outwash) (SP)

1-28-62

AP 402
El. 1279.6

0-1' Topsoil, lean, dry.
1'-14' CLAY, lean (Glacial Till) (CL)
1'-7' About 20% medium to fine sand, about 1% gravel, max. 1/2", fines provide strong acid reaction, brown, medium to strong thread.
7'-14' About 30% medium to fine sand, about 5% subangular gravel, max. 1/2".
14'-21' SAND, silty to clayey, medium to fine, about 5% subangular gravel, maximum size 1/2", fines produce medium acid reaction, dark brown to black. (Glacial Outwash) (SM-SC)
21'-25' CLAY, little or no sand, highly plastic, strong acid reaction, occasional rust particles, brown. (CL-CH)
NOTE: Water level not recorded.

1-25-62

AP 403
El. 1284.3

0-1' Topsoil, dry.
1'-12' CLAY, sandy, brown, #40 material produces medium thread, strong acid reaction, about 30% sand in total sample, 5% gravel, maximum size 1/2". (Glacial Till) (CL)
12'-20' SAND, poorly graded, harsh, medium to fine, nonplastic, strong acid reaction, brown. (Glacial Outwash) (SP)
12'-17' About 5% gravel, maximum size 1/2".
17'-20' About 30% gravel, subangular, maximum size 3/4".
20'-28' SAND, clayey, poorly graded, about 30% gravel, subangular, maximum size about 3/4", strong acid reaction, tan or dark brown mottled, moist. (Glacial Till) (SC)
NOTE: Rocks at 23'. Water level not recorded.

1-24-62

AP 404
El. 1275.2

0-1' Topsoil.
1'-7' CLAY, silty, no sand, no gravel, feels floury in dry state, low breaking strength, slight dilatancy, strong acid reaction, tan. (Loess?) (ML-CL)
7'-10' CLAY, sandy, brown, about 30% medium to fine harsh sand, about 20% gravel maximum size 1 1/2", strong acid reaction, medium to strong thread. (Glacial Till) (CL)
10'-14' SAND, clean, harsh, gray, about #30-#100 size, slight acid reaction, no gravel. (Glacial Outwash) (SP)
14'-20' SAND, well graded, #40 material, nonplastic, little or no fines, about 30% well graded gravel, maximum size 3/4", strong acid reaction from #4 material, dark brown, iron. (Glacial Outwash) (SW)
20'-25' CLAY, silty, blue gray, little or no sand, strong acid reaction, earthy odor. (Alluvium?) (ML-CL)
NOTE: Water level not recorded.

1-24-62

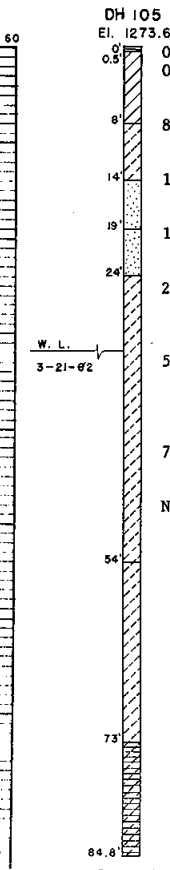
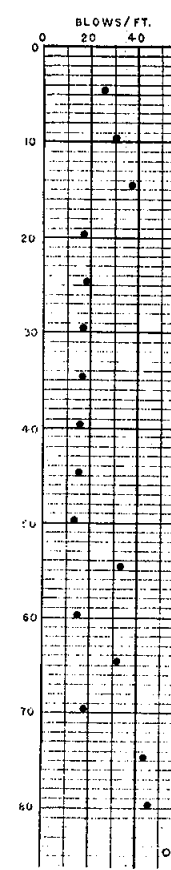
AP 405
El. 1278.6

0-1' Topsoil, dry.
1'-7' CLAY, sandy, brown, about 30% medium to fine sand, about 5% gravel, maximum size 1/2", strong acid reaction, strong earthy odor. (Glacial Till) (CL)
7'-12' SAND, silty, tan, low breaking strength, an occasional pebble about 1/2" in size, strong acid reaction. (Glacial Outwash?) (SM)
12'-15' SAND, dark brown, harsh, #40 material, nonplastic, about 5% subangular gravel, maximum size 3/8", sand mainly #30-#100 size, strong acid reaction. (SP)
NOTE: Hole caved at 12'. Water level not recorded.

AP 406
El. 1282.1

0-1' Topsoil.
1'-10' CLAY, brown, about 30% fine sand, strong acid reaction, strong thread, medium to high breaking strength, no gravel except an occasional pebble about 1/2" in size. (Glacial Till) (CL)
10'-16' SAND, clean, light gray, #50-#100 size, no gravel, nonplastic, slight acid reaction. (Glacial Outwash?) (SP)
NOTE: Hole caved at 12'. Water level not recorded.

1-24-62



DH 105
El. 1273.6

0-0.5' Topsoil, dark brown, organic.
0.5'-8' SILT, light gray and tan with brown iron stains, active HCL reaction, moist, trace very fine sand to 4', becoming clayey 4'-8'. (Loess) (ML)
8'-14' CLAY, brown, moist, tough, high sand content 8'-10', becoming moderately plastic 10'-14', moderate to active HCL reaction. (Glacial Till) (CL)
14'-19' SAND, brown, moist, fine to medium, few gravel
18.5'-19', clean, cohesionless, silty, clayey till finger
15'-17', moderate acid reaction. (Glacial Outwash) (SP)
19'-24' SAND, clayey, brown, moist, fairly well graded, fairly clean in upper portion becoming clayey 21.5'-24', moderate acid reaction. (Outwash) (SW-SC)
24'-54' CLAY, gray, moist to wet, stiff to soft, gravel contamination 25'-26', iron staining at 28', silty, plastic, moderate acid reaction, light gray laminations of silt 52'-54'. (CH)
54'-73' CLAY, sandy, gray, moist to wet, stiff to soft in zones, occasional fine gravel, numerous silty fine sand lenses, moderate to active acid reaction, low to medium plasticity, oxidized zone 69'-70.3'. (Glacial Till) (SC-CL)
73'-84.8' CLAY SHALE, dark gray, very stiff to firm, non-indurated, plastic, occasional pyrite nodules, broken claystone concretion at 81.5', fossil fragments at 83'.
NOTE: Waxed hand samples of NX continuous drive core from: (lengths vary from 0.2' to 0.4')
10' 50'
20' 60'
30' 70'
40' 80'

3-21-62

NOTE

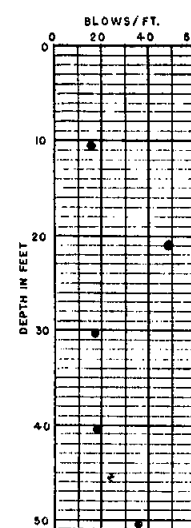
For location of exploration see Dwg. 469-D-52
For explanation see Dwg. 469-D-62

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MISSOURI RIVER BASIN PROJECT
JAMES DIVISION-CAHE UNIT - SOUTH DAKOTA
JAMES DIVERSION DAM
LOGS OF EXPLORATION

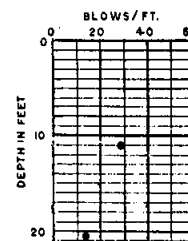
DRAWN BY W.D.H. SUBMITTED BY *W.D.H.*
TRACED BY *W.D.H.* RECOMMENDED BY *William H. Dumm*
CHECKED BY *John P. Barman* APPROVED BY *John P. Barman*
DENVER, COLORADO, DEC. 12, 1962
SHEET 2 OF 4
469-D-63

BORROW AREA HOLES



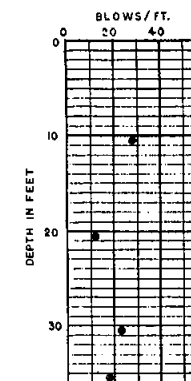
DH 1
El. 1260
9-16-55

0-4.5' SAND, gravelly, slightly silty, easily friable, non-plastic, occasional boulders, well graded, angular to subrounded, medium brown. (Terrace deposit) (SW)
0-0.5' Silty, some humus and clay, topsoil.
4.5'-20' CLAY, silty, calcareous, poorly bedded, moderately to highly plastic, medium yellowish brown, several 1"-3" sand stringers, unoxidized below 10', bluish gray, oxidized streak at 19.9', reworked and wet. (Glacial Till) (CL-CH)
20'-38' SAND, silty, well graded, nonplastic, thinly bedded, angular to subrounded, medium brown, thin silty clay stringers, mostly 1/8"-1/4" thick, silty clay at 28'-29'. (Glacial Outwash) (SW-SM)
38'-49.9' CLAY, silty, calcareous, shale fragments, organic material, some fine pebbles, moderately to highly plastic, dark bluish gray, reworked, wet, many thin sand stringers. (Glacial Till) (CH-CL)
49.9'-51' CLAY, noncalcareous, shaly cleavage, highly plastic, nearly black, reworked, wet. (CH)
NOTE: Last foot from penetration test. NX core drill with hard faced bit to 15', BX core drill 15'-50'. Standard penetration test with 1 3/8" spoon. Water level at 25', hole at 40'.



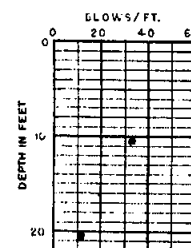
DH 3
El. 1284
10-4-55

0-20' CLAY, very silty, very sandy, gravelly, calcareous, massive, moderately to highly plastic, medium yellowish brown, reworked, wet, many thin stringers of clean silty sand 1/8"-1" thick, some shale fragments. (Glacial Till) (CL-CH)
NOTE: Considerable caving and water loss below 3'. Water level not recorded.



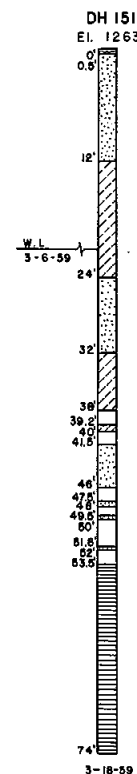
DH 4
El. 1250
10-6-55

0-25' SILT, sandy, slightly clayey, thinly bedded, calcareous, nonplastic to slightly plastic, medium brown, reworked, wet, partially humified to 5', grayish brown, fine sand stringers, unoxidized below 21' with thin beds of fine sand, more clay, dark bluish gray. Fresh water clamshell at 23'. (Recent Alluvium) (ML-CL)
25'-30' SAND, some gravel, some silt and clay, cross-bedded, nonplastic, wood fragments (lignite), gray to yellowish brown. (Recent Alluvium) (SW-SP)
30'-35' CLAY, slightly silty, thin silty interbeds, calcareous, highly plastic, dark bluish gray, reworked, wet. (Glacial Till) (CH)
NOTE: Water level not recorded.



DH 5
El. 1287
10-5-55

0-15' CLAY, silty, sandy, gravelly, massive, calcareous, moderately to highly plastic, medium yellowish brown, reworked, wet.
0-0.5' Humified, noncalcareous, dark brown, 3" cemented zone at 5', many lime streaks and limonite stains, no core 10'-15', driller says clay and rocks. (Glacial Till) (CL-CH)
15'-20' SAND, fine to very fine, silty, slightly clayey, massive, calcareous, medium brown, becomes "quick" when saturated, sandy till in penetration test from 20'-21'. (Glacial Outwash) (SM)
NOTE: NX hard faced bit and core barrel, 0-20'. Hit rock 12'. Hole caving badly from 15'-20', poor recovery. Water level not recorded.

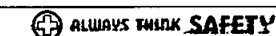


DH 151
El. 1263
3-6-59
3-18-59

0-0.5' Topsoil
0.5'-12' SAND, poorly graded, light brown when dry, dark brown when wet, nonplastic, fast shaking reaction, 95% retained on the #200 screen, predominantly #30-#100 size, maximum size 1" subangular, strong acid reaction. (Alluvial Material) (SP)
0-8' About 20% #4 material.
8'-12' No #4 material, clean.
12'-24' CLAY, highly plastic, light brown when dry, brown and very slippery when wet, dry core breaks with difficulty when hammered, strong thread, no shaking reaction, medium to strong acid reaction, about 98% passing #200 screen, no #4 material. (Alluvial material) (CH)
24'-32' SAND, with clay binder, tan when dry, brown when wet, rusty streaks throughout material, low breaking strength when dry, sufficient clay to be molded between fingers, about 95% retained on the #200 screen, predominantly #30-#100 size, no #4 material, strong acid reaction, small pieces of lignite present. (Alluvial material) (SC)
32'-38' CLAY, lean, gray when dry, dark gray when wet, low breaking strength, slippery when wet, medium thread, washes easily through #200 screen, varved, about 10% #30-#100 sizes, no #4 material, strong acid reaction, small pieces of lignite. (Alluvial material) (CL)
Drillers report the following:
39.2'-40' CLAY, sandy, bluish color.
41.5'-46' SAND, with small amount of clay binder.
47.5'-48' SAND, silty, dark blue color.
49.5'-50' SAND, with small amount of clay binder.
51.8'-52' SAND, GRAVEL, and SILT mixture.
53.5'-74' SHALE
NOTE: NX drill rod and barrel to 38' depth. Denison core barrel from 38'-74' depth. Used 9 7/8" rock bit to ream hole from 38'-54'. Hole filled with water 3-13-59. Water 21' below ground surface 3-16-59.

NOTE

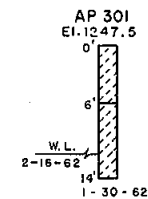
For location of exploration see Dwg. 469-D-52
For explanation see Dwg. 469-D-62



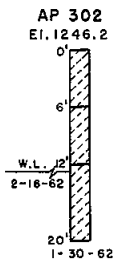
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MISSOURI RIVER BASIN PROJECT
JAMES DIVISION-OAHE UNIT-SOUTH DAKOTA
JAMES DIVERSION DAM
LOGS OF EXPLORATION

DRAWN W.D.H.-H.S.P. SUBMITTED *W.D.H.*
TRACED A.D.S. RECOMMENDED *William H. Brown*
CHECKED *John Barona* APPROVED *John Barona*
DENVER, COLORADO, DEC. 12, 1962
SHEET 3 OF 4
469-D-64

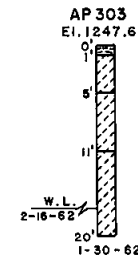
MISCELLANEOUS HOLES



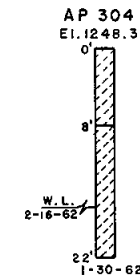
0-6' CLAY, black, organic, dry to a trace of moisture, approximately 20% medium to fine sand with occasional coarse sand particles, no gravel, moderately plastic, active acid reaction. (Alluvium) (Topsoil) (CL)
6'-14' CLAY, grayish brown, moist to wet at 11', silty, moderately plastic to plastic, medium acid reaction. (Alluvium) (CL-CH)



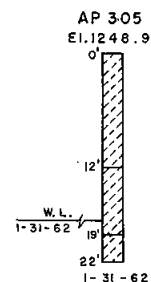
0-6' CLAY, black, dry to moist, organic, silty, trace of fine sand, slight acid reaction, moderately plastic to plastic. (Alluvium) (CL-CH)
6'-12' CLAY, grayish brown, moist, silty, moderately plastic to plastic, medium acid reaction. (Alluvium) (CL-CH)
12'-20' CLAY, sandy, grayish brown, wet, soft, silty, approximately 30-40% fine uniform sand, medium plasticity. (Alluvium) (SC-CL)



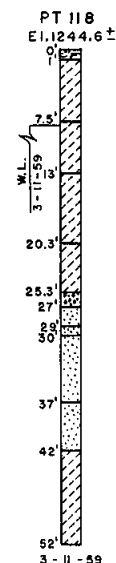
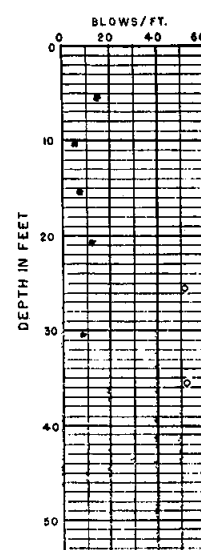
0-1' Topsoil, dry, clayey.
1'-5' CLAY, grayish brown, dry to moist, organic material, silty, trace of fine sand, moderately plastic to plastic, slight acid reaction. (Alluvium) (CL-CH)
5'-11' CLAY, silty, brown, moist, trace fine sand to sandy, medium plasticity, active reaction to acid. (Alluvium) (CL)
11'-20' CLAY, sandy, brown, wet, soft, silty, approximately 30% very fine uniform sand, slightly plastic, moderate acid reaction. (SC-CL)



0-8' CLAY, silty, dark brown, dry to trace of moisture, contains organic material, trace of very fine sand, slight acid reaction, moderately plastic. (Alluvium) (CL)
8'-22' CLAY, silty, brown becoming gray at 19', moist becoming wet at 10', very silty, approximately 15% very fine uniform sand, slight acid reaction, low to medium plasticity. (Alluvium) (CL)
NOTE: Hole caved at 18'.

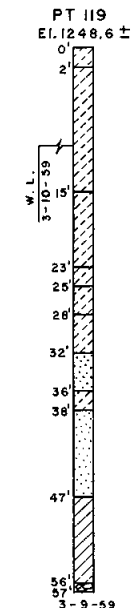
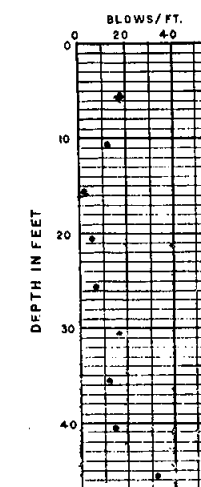


0-12' CLAY, very silty, dark brown, dry to moist, trace very fine sand to sandy, contains organic material, slight acid reaction, low plasticity. (Alluvium) (CL)
12'-19' CLAY, sandy, brown, moist, becoming wet at 18', silty, approximately 30-40% fine uniform sand, contains organic material, slight acid reaction, low plasticity, contains clay balls. (Alluvium) (SC-CL)
19'-22' CLAY, silty, grayish brown, wet, soft, very silty, trace fine sand to sandy, contains organic material, slight acid reaction, moderate plasticity. (Alluvium) (CL)
NOTE: Hole caved at 18'.



0-1' Topsoil (swamp) organic matter.
1'-7.5' CLAY, highly plastic, brownish gray when wet, strong thread, slippery and slimy, little or no acid reaction, alluvial material no gravel, dry, uncemented. (CH)
7.5'-13' CLAY, medium to highly plastic, about 25% fine sand, strong thread, slightly silty, grayish tan, no acid reaction, occasional organic streak, alluvial material, no gravel, wet, soft. (CL-CH)
13'-20.3' CLAY, medium plasticity, light brown to tan when wet, about 20% silt, 45% fine sand, no shaking reaction, medium to weak thread, no acid reaction, spongy, alluvial material, no gravel, material deforms and smears easily, highly saturated, uncemented, soft. (CL)
20.3'-25.3' CLAY, same as above except color is blue-gray, and slightly more clay, rocks at 23'. (CL)
25.3'-27' GRAVEL, well graded, about 70% #4 maximum size 3/4", subangular, about 30% sand, no fines, dense, uncemented, clean. (Alluvial material) (GW)
27'-29' SAND, poorly graded harsh #16-#50 size, no fines, clean. (SP)
29'-30' Same as 27'-29' except #50-#200, no binder, occasional piece of shell.
30'-37' SAND, fine, harsh, clay binder, blue-gray increasing to black with depth, lignite from 34'-37' increasing in density with depth, saturated, enough clay to make fair binder, about 5% #4 3/8" maximum size, subangular, uncemented. (Alluvial material) (SC)
37'-42' SAND, poorly graded, fine (#100-#200 size), harsh, blue gray, unoxidized, slightly dirty, uncemented, hard, dense in place, no acid reaction, alluvial material, occasional piece of lignite between 41.5' and 42', sand separates freely when washed. (SP)
42'-52' CLAY, highly plastic, blue-gray, no sand, no silt, dense, material cuts like cold butter, blocky structure, slight acid reaction. (CH)

NOTE: NX core barrel alternating with a standard split spoon. Swampy, water on surface of ground. Core barrel sheared off at 23' by rocks. Moved rig back 4' and started a new hole. Used rock bit in new hole to depth at 26'. Used BX core barrel in 2nd position. Started using NX casing at 30' depth to 44.5'.



0-2' CLAY, lean (topsoil), (corn stalks) slightly organic at surface, dark brown to tan with depth, slightly silty medium thread, slight acid reaction, alluvial material, no gravel. (CL)
2'-15' CLAY, lean, slightly silty, medium thread, wet, mottled, medium acid reaction, no gravel, 10'-15' slightly more sand, slight acid reaction. (Alluvial material) (CL)
15'-23' CLAY, lean, considerably more silt than at 10'-15', tan when wet, weak thread. (Alluvial material) (CL)
23'-25' CLAY, lean, grayish brown, with alternating laminations of gray harsh sand #50-#100 size, clay increasing in plasticity with depth, about 6" layer of sand at 24.5'-25'. (Alluvial material) (CL)
25'-28' CLAY, highly plastic, blue-gray, little or no sand, strong thread, no oxidation. (Alluvial material) (CH)
28'-32' CLAY, medium plasticity, silty, blue gray, medium thread, about 1' thick layers alternating with #30-#50 size sand layers 3"-6" in thickness, silty material is thinly laminated, occasional oxidized laminations. (Alluvial material) (CL)
32'-36' SAND with CLAY binder, blue-gray, #100-#200 sand particles separate quickly with use of water, clay content decreasing and sand sizes increasing with depth with (SB) at 35'-36', about 30% #4 maximum size 3/4" at 35'-36' depth. (SC)
36'-38' CLAY, lean to highly plastic, about 1' in thickness alternating with about 4" fine sand layers with clay binder, binder is poor, blue-gray color, no #4 material. (CL-CH)
38'-47' SAND, poorly graded, fine, about 15% #4 material, maximum size 3/4", subangular. (SP)
47'-56' SILT, blue-gray, spongy. (ML)
56'-57' Rock (boulders?).
NOTE: NX core barrel alternating with standard split spoon. Slight showing of water at 16' depth. Used 4 1/4" rock bit at 56' depth to penetrate boulder (?).

NOTE
For location of exploration see Dwg. 469-D-52
For explanation see Dwg. 469-D-62

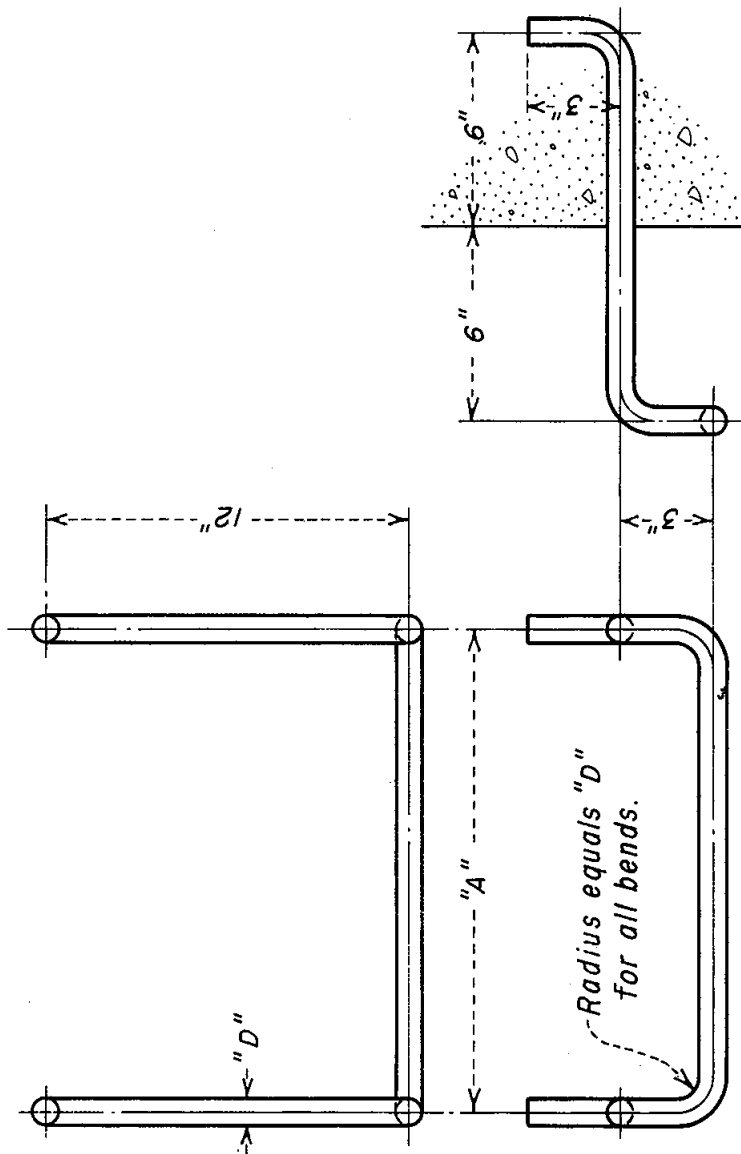
MISCELLANEOUS HOLES

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MISSOURI RIVER BASIN PROJECT
JAMES DIVISION - OAAE UNIT - SOUTH DAKOTA

JAMES DIVERSION DAM LOGS OF EXPLORATION

DRAWN: W.D.H. - H.S.P. SUBMITTED: M. J. Logan
TRACED: H.S.P. - RECOMMENDED: William H. Logan
CHECKED: E.M. - APPROVED: John Carmakian
ACTING CHIEF DESIGNING ENGINEER
DENVER, COLORADO, DEC. 12, 1962
SHEET 4 OF 4
469-D-65



$D = \frac{7}{8}$ for $A = 18$ "
 $D = \frac{3}{4}$ for $A = 15$ "

LADDER RUNG

STEEL

Bend hot. Galvanize after forming if specified.

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 STANDARD DESIGNS
LADDER RUNG

DRAWN W.D. SUBMITTED L.N. McClellan
 TRACED F.R.M. RECOMMENDED J.L. Savage
 CHECKED R.D.H. APPROVED R.F. Walter

REV. 3-5-42
 RETR. 6-3-53
 E.M.W.

DENVER, COLO., DEC. 27, 1939

40-D-3103

2 or 3 Rails as required

for 1½" and 2" pipe

for 2½" pipe

6"

9"

1"

1"

Ø Pipe and curb

Grout

4" Min. for 1½" pipe

A - Dia.

Width of curb
as required

DIM.	NOM. PIPE SIZE		
	1½	2	2½
A	3½ ±	4 ±	4½ ±

11 - 28 - 61

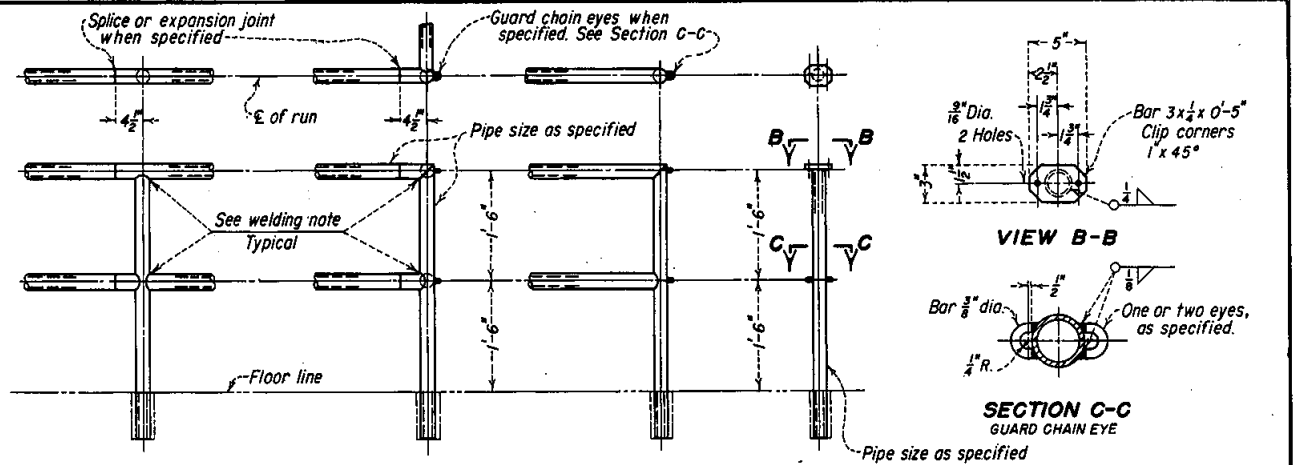
REV. 2-5-53
REV. 12-11-53

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
STANDARD DESIGNS
HANDRAILING
POST RECESS

DRAWN O.K.W. SUBMITTED *D. G. G. G.*
TRACED J.N. RECOMMENDED *O. E. Rice*
CHECKED H.P. APPROVED *W. E. Blomquist*
ACT. CHIEF ENGINEER

DENVER, COLO. 10 - 1 - 51

40-D-5148



INTERMEDIATE POST

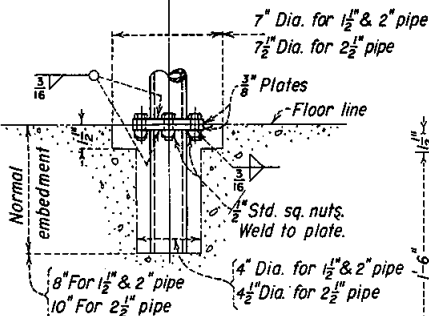
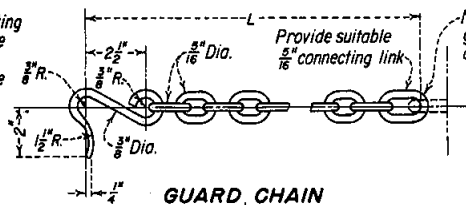
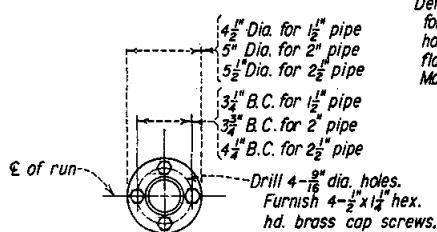
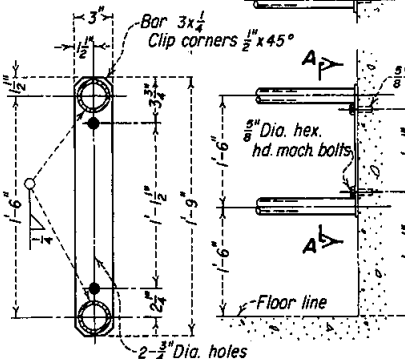
CORNER POST

END POST

GUARD CHAIN POST

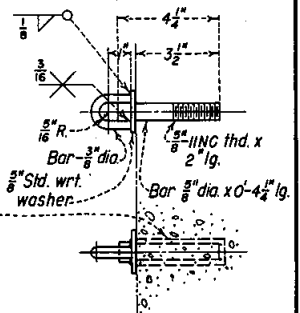
NOTE:

Details for posts show mounting for fixed handrail. Removable handrail is similar, but uses flange mounting. (See Flange Mounting.)

FLANGE MOUNTING
FOR REMOVABLE HANDRAIL

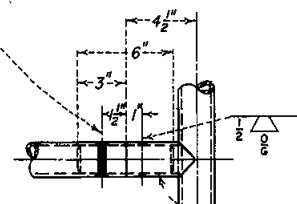
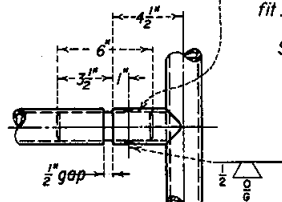
SECTION A-A

WALL MOUNTING



WALL ANCHOR

Shop drill 7/16" dia. and csk. pipe 1/8" deep both sides. Furnish adequate length of 3/8" dia. rod, suitable for field riveting

SPLICE
FOR FIXED HANDRAIL

EXPANSION JOINT

SPLICE
FOR REMOVABLE HANDRAIL

NOTES

All handrails fixed (not removable) unless otherwise specified.

For pipe sizes, tabulated dimensions, and requirements, see installation drawing.

All pipe to be standard weight black, of size specified.

Corners and edges of all plates, and bars to be dressed smooth.

WELDING NOTE:

Weld all pipe joints with continuous bead, size equal to pipe wall thickness and dress smooth.

5-23-62 D. J.B.	RETRACTED.
10-28-54 D. O.E.W.	RETRACTED - EXPANSION JOINT ADDED.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

STANDARD DESIGNS

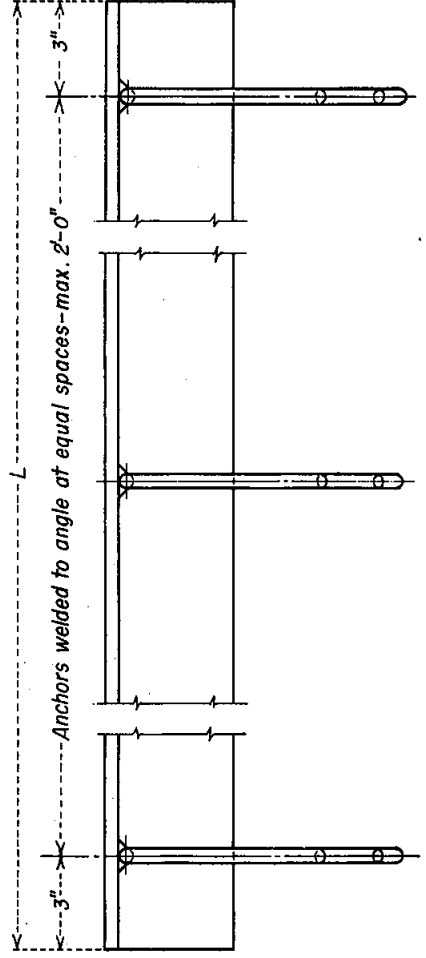
HANDRAIL DETAILS

DRAWN: J.R.B. SUBMITTED: J.K. Richardson

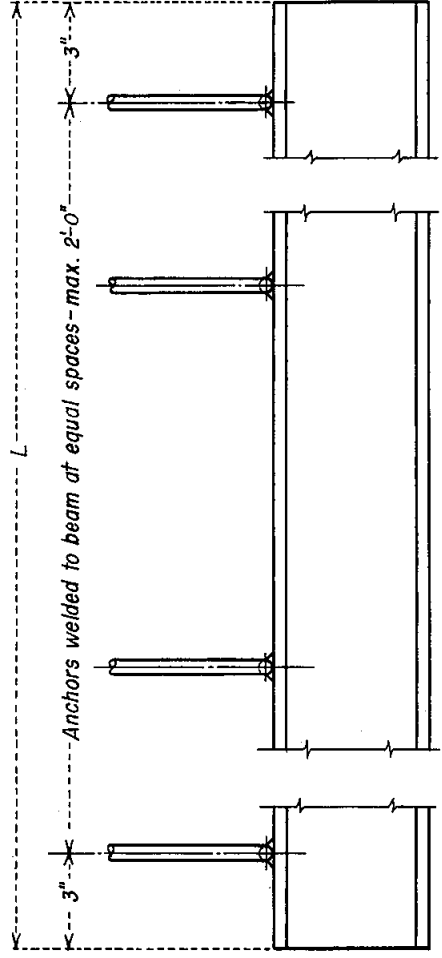
TRACED: A.T.B. RECOMMENDED: S.B. Foster

CHECKED: E.W.B.-C.W.B. APPROVED: L.N. McClellan

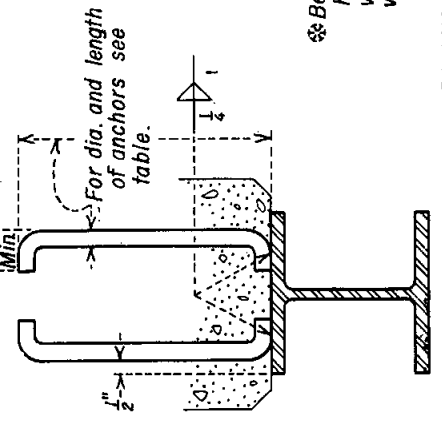
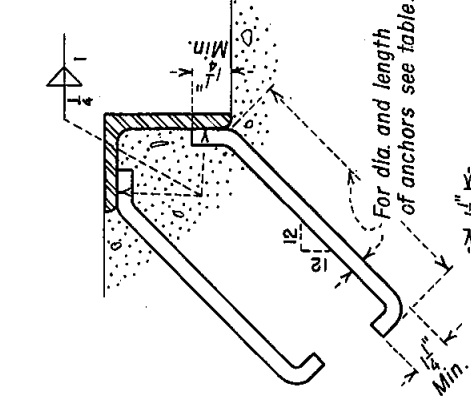
DENVER, COLORADO, MAR. 31, 1947 40-D-4315



ANGLE LINER



BEAM LINER



ANGLE LINER	ANCHORS
2 1/2 x 2 x 1/4	3/8" Dia. x 6"
2 1/2 x 2 1/2 x 1/4	3/8" Dia. x 6"
3 x 2 1/2 x 5/16	1/2" Dia. x 6"
3 x 3 x 5/16	1/2" Dia. x 6"
3 1/2 x 3 1/2 x 5/16	1/2" Dia. x 6"
4 x 3 x 3/8	1/2" Dia. x 8"
4 x 4 x 3/8	1/2" Dia. x 8"
5 x 3 x 3/8	5/8" Dia. x 8"
5 x 3 1/2 x 3/8	5/8" Dia. x 8"
5 x 5 x 3/8	5/8" Dia. x 8"
6 x 4 x 3/8	5/8" Dia. x 8"
6 x 6 x 3/8	5/8" Dia. x 8"

BEAM LINER	ANCHORS
4WF 13.0	1" Dia. x 8"
5WF 18.5	5/8" Dia. x 8"
6WF 25.0	5/8" Dia. x 8"
8WF 31.0	3/4" Dia. x 8"
10WF 49	3/4" Dia. x 10"

* Beams of the same nominal size and having equal or slightly greater weight may be substituted for the wide flange beams shown in the table.

THIS DRAWING SUPERSEDES DWG. 40-D-2897

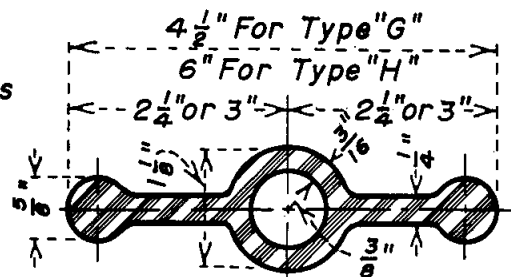
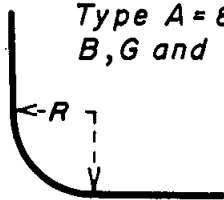
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
STANDARD DESIGNS

STRUCTURAL STEEL LINERS

NOTE
Dimensions "L" and sizes of liners given in the purchase order or specifications.

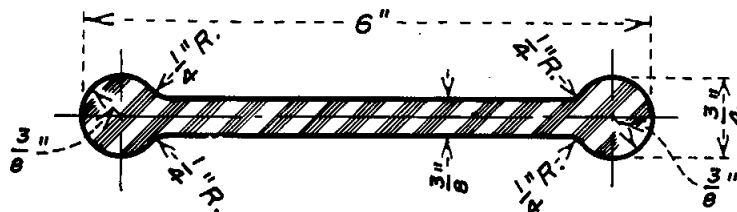
DRAWN: J. J. S. SUBMITTED: H. J. S.
TRACED: W. V. G. RECOMMENDED: J. J. S.
CHECKED: C. E. W. H. E. L. APPROVED: A. J. M. G. L. L.
CHIEF ENGINEER
DENVER, COLORADO, JULY 31, 1935 40-D-5295

Min. Radius R .
Type A = 8 inches
B, G and H = 4 inches

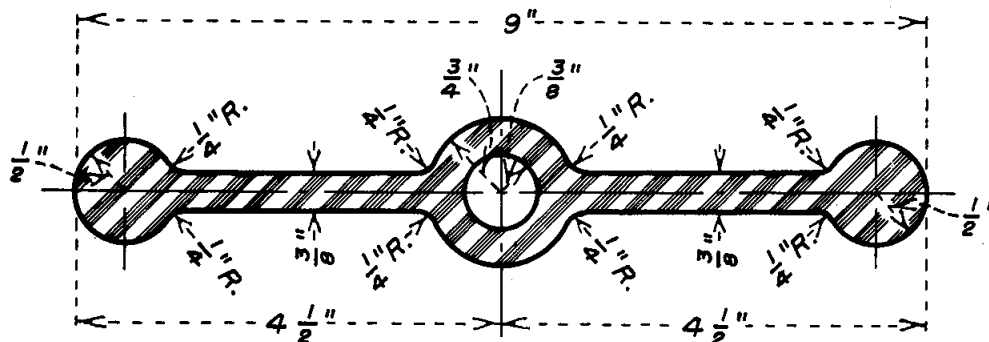


FOR FIELD INSTALLATION

TYPES "G" AND "H"



TYPE "B"



TYPE "A"

TOLERANCES

- $\pm \frac{1}{4}$ " Width, Type A.
- $\pm \frac{1}{8}$ " Width, Type B, G, and H.
- $+\frac{1}{16}$ " - $-\frac{1}{32}$ " Web thickness, end bulb diameter, and wall thickness on center bulb, all types.
- $\pm \frac{1}{8}$ " Diameter of center bulb, both I.D. and O.D., Types A, G, and H.

12-18-59 REVISED AND RETRACED.
D

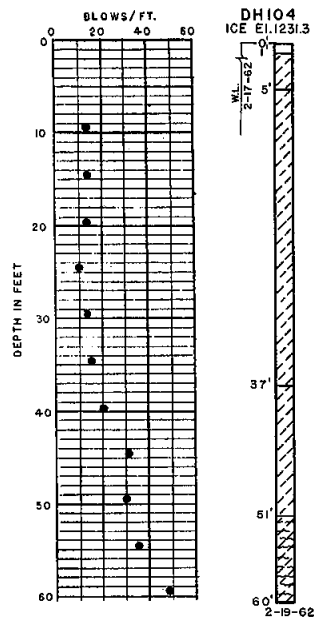
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

STANDARD DESIGNS RUBBER WATERSTOPS TYPES "A", "B", "G", AND "H"

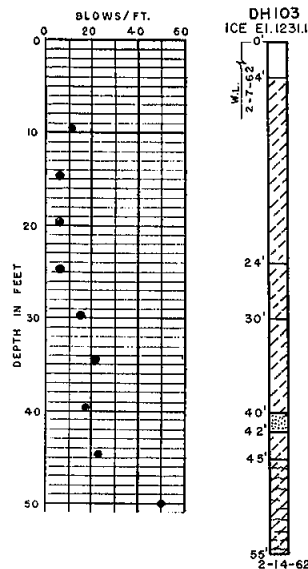
DRAWN H.C.C. SUBMITTED H.R. McBirney
TRACED E.V.C. RECOMMENDED K.B. Keener
CHECKED P.W.T. APPROVED Walker R. Young

DENVER, COLO. 5-7-41

40-D-2867



0-1' Ice, numerous boulders along shore of James River.
 1'-5' CLAY, gray, with rocks and boulders, no drive sample recovered because of rock. (Glacial Till?) (CL)
 5'-37' CLAY, gray, wet, soft, plastic, few fine gravel 5'-5.5', thin lenses or fingers of sandy clay till intercalated from 34'-37'. (Lake Deposit) (CH)
 37'-51' CLAY, sandy, gray, stiff, moist, estimated 30-40% medium to fine sand, occasional fine gravel, moderately plastic, moderate reaction to acid. (Glacial Till) (SC-CL)
 51'-60' CLAY SHALE, dark gray, moist, stiff to firm plastic clay, nonindurated, with occasional light gray to tan partially disintegrated claystone concretions up to 2" in size, occasional gravel imbedded in drive core of shale.
 NOTE: NX continuous drive samples with penetration tests at 5' intervals using standard split type spoon from 0-60'. Waxed hand samples of NX continuous drive core from: 10'-10.3', 20'-20.3', 30'-30.3'.



0-4' Ice and water.
 4'-24' CLAY, dark gray, wet, soft, silty, plastic, slight acid reaction, gravel noted in drive sample at 8'-10'. (Lake Deposit) (CH)
 24'-30' CLAY, dark gray, wet, soft to stiff, silty, plastic with lenses of very fine uniform sand, slight acid reaction in plastic clay zones with moderate to active reaction in sandy zones. (CH)
 30'-40' CLAY, gray, wet, stiff, silty, approximately 30% medium to fine sand, estimate 2% fine gravel, moderate acid reaction. (Glacial Till) (CL)
 40'-42' SAND, gray, wet, fairly well graded, approximately 25% fine gravel with occasional medium gravel silty, contains clay zones. (SM-SC)
 42'-45' CLAY, gray, hard, same as gray till from 30'-40'. (Glacial Till) (CL)
 45'-55' CLAY SHALE, dark gray, plastic, nonindurated, stiff, firm, 4" bentonitic clay zone at 54', streaks of bentonite from 53'-54' are in a vertical plane.
 NOTE: NX continuous drive samples with penetration tests at 5' intervals using standard split type spoon from 0-55'. NXCS to 44'. Waxed hand samples of NX continuous drive core from: 20'-20.3', 30'-30.3', 40'-40.3', 50'-50.3'.

EXPLANATION

DH Drill hole, Nx size and/or standard penetration test.

AP Power auger hole, 12" diameter.

PT Penetration test (NX barrel alternating with standard penetration spoon.)
 Results of standard penetration resistance test expressed as number of blows required to drive a 2" O.D. penetration spoon 12" with an 140lb. hammer dropping 30".
 ● Actual number of blows
 ○ Extrapolated number of blows.

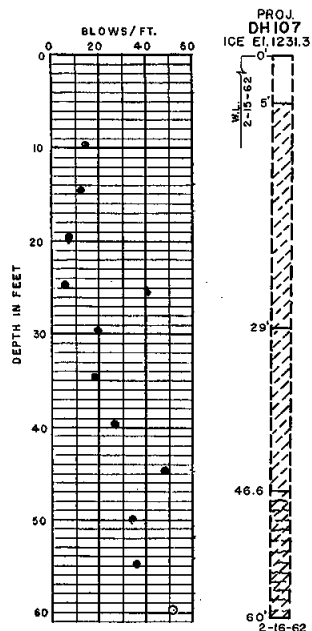
2-14-62 Date exploration completed.

2-17-62 Water level and date measured. Where not indicated, no water encountered, except as otherwise noted in log description.

Letter symbols in parentheses, following the soil descriptions in the logs, are group symbols of the Unified Soil Classification System based on field identification. Copies of Dwg. No. 103-D-347, Unified Soil Classification, may be obtained on request to Assistant Commissioner and Chief Engineer, Bureau of Reclamation, Denver 25, Colorado

NOTE

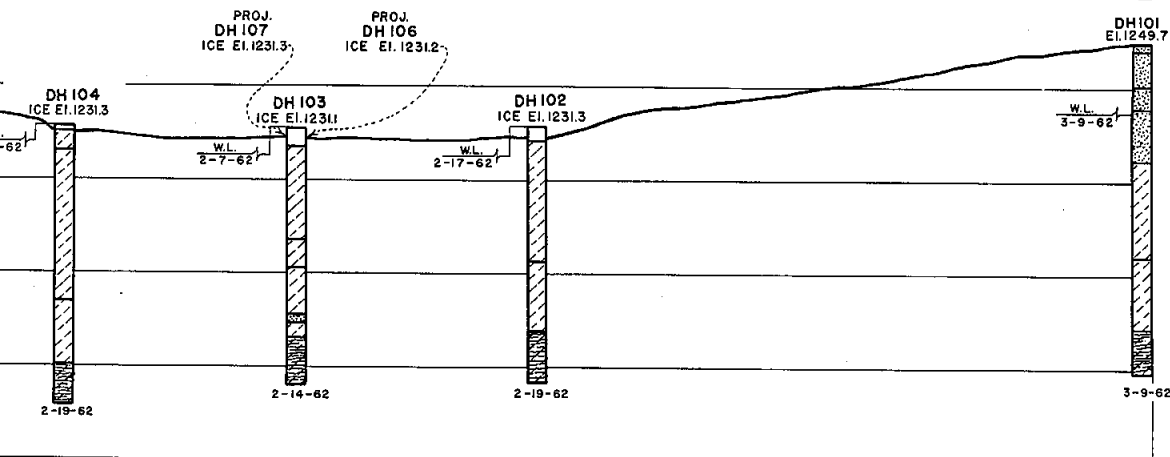
For location of exploration see Dwg. 469-D-54 and also 52.



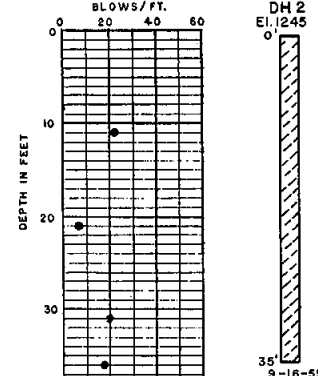
0-5' Ice and water.
 5'-29' CLAY, gray, wet, soft, silty, plastic, slight acid reaction. (Lake Deposit) (CH)
 29'-46.6' CLAY, sandy, gray, moist, stiff, estimated sand content 30-40%, medium to fine, occasional gravel, silty fine sand lenses 30'-34', moderate to active acid reaction, moderate plasticity. (Glacial Till) (SC-CL)
 46.6'-60' CLAY SHALE, dark gray, stiff to firm, plastic, bentonite seam noted at 50', occasional pyrite concretions and partially disintegrated claystone concretion at 56.5'.
 NOTE: NX continuous drive samples with penetration tests at 5' intervals using standard split type spoon from 0-60'. NXCS to 40'. Waxed hand samples of NX continuous drive core from: 50'-50.3', 60'-60.3'.

ALWAYS THINK SAFETY

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 MISSOURI RIVER BASIN PROJECT
 JAMES DIVISION-OAHE UNIT-SOUTH DAKOTA
JAMES DIVERSION DAM
LOGS OF EXPLORATION



SECTION II
SCALE OF FEET
20 0 20 40



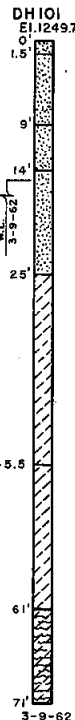
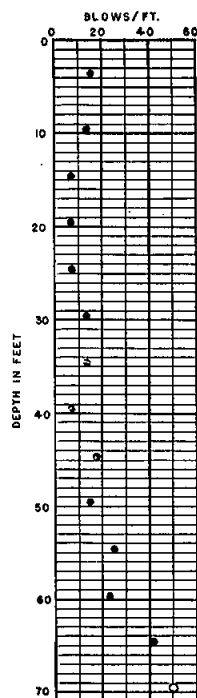
0-35' CLAY, very silty, sandy, calcareous, partially bedded, moderately plastic, reworked, wet, medium yellowish brown (Glacial Till and Outwash) (CL-CH)
3'-5' Very clayey, partially oxidized 15'-18', unoxidized below 18', dark-blueish gray. (CH)
20'-35' Very sandy with occasional small pebbles.

Note: Water level not recorded.

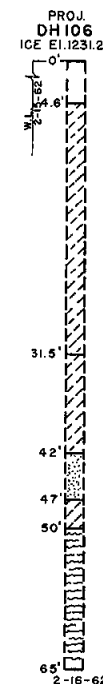
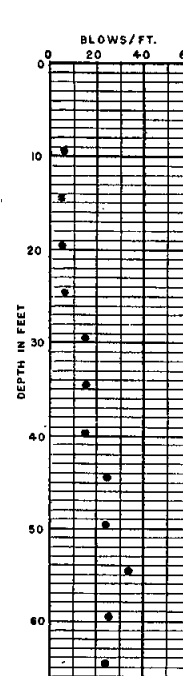
soft, contains sand, small occasional gravel 3'-4', plastic, contains lenses of very fine sand (Deposit) (CH)
stiff to stiff, silty, sand content approximately 30% medium to fine, occasional medium plasticity. (Glacial Till)

plastic, nonindurated, soft, no apparent in PR sample 44'-45', can partially disintegrated clay-onal gravel noted in drive core is contamination from till above, dated 33.7'.

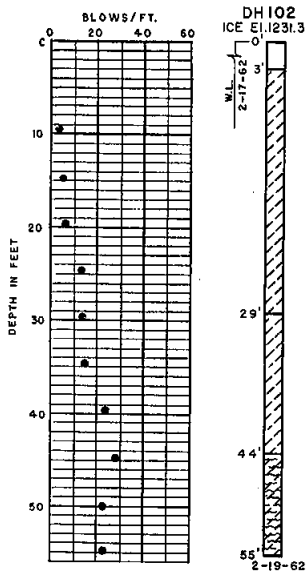
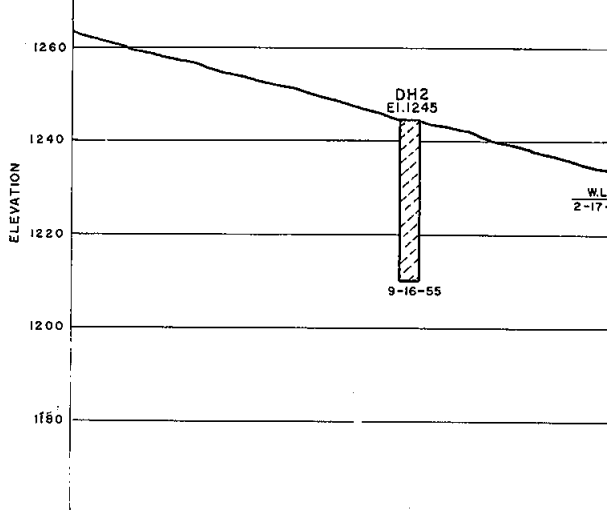
samples with penetration tests at 5' intervals using standard split type spoon from 0-55'. Waxed hand samples of NX continuous drive core from: 10'-10.3', 20'-20.2', 30'-30.2', 40'-



0-1.5' SAND, clayey, dark brown, organic, no sample 0-3' ground frozen, rock bit used to 3'. (Topsoil)
1.5'-9' SAND, silty, brown, moist, very fine trace of clay, organic, moderate acid reaction. (Alluvium) (SM)
9'-14' SAND, clayey, brown, moist, soft, fine, uniform, silty, moderate acid reaction, slight plasticity. (Alluvium) (SC)
14'-25' CLAY, silty, dark brown, moist, soft, trace fine sand, occasional silty sand lens, dark gray organic zone at 21.5', clean, cohesionless, fine sand lens at 22', medium plasticity. (Alluvium) (CL)
25'-45.5' CLAY, gray, soft to stiff, moist, plastic, laminations of light gray silt 41'-44', slight acid reaction. (CH)
45.5'-61' CLAY, gray, moist, stiff, silty, occasional fine gravel, occasional lenses of light gray silt, zone of very fine sandy silt 47'-49', moderate acid reaction, moderately plastic. (Glacial Till) (CL)
61'-71' CLAY SHALE, dark gray, very stiff to firm, non-indurated, moist to plastic, bentonite at 61.5', broken, tan, claystone concretion at 63.5', fossil fragments at 69'.
NOTE: NX continuous drive samples with penetration tests at 5' intervals using standard split type spoon from 0-70', NXCS to 30'. Waxed hand samples of NX continuous drive core from: 10'-10.3', 20'-20.2', 30'-30.2', 40'-40.2', 50'-50.2', 60'-60.2', 70'-70.2'.



0-4.6' Ice and water.
4.6'-31.5' CLAY, gray, wet to 22', becoming silty, plastic, gravel at 4.6', thin lens of sand and silt noted at 23.5' and 27'-28' from 27.5'-31.5', slight acid reaction laminated zone. (Lake Deposit) (CH)
31.5'-42' CLAY, sandy, gray, moist, stiff, graded, sand content estimated 30-40%, gravel estimated 2%, lenses of silty clay moderate to active acid reaction, medium plasticity. (Glacial Till) (SC-CL)
42'-47' SAND, brown, fairly well graded, less in upper portion, approximately 25% becoming silty and clayey 44'-47'. (SU)
47'-50' CLAY, sandy, same as 31.5'-42'.
50'-65' SHALE, clay, dark gray, stiff to plastic, bentonite zone at 57', occasional concretion which reacts actively to acid.
NOTE: NX continuous drive samples with penetration tests at 5' intervals using standard split type spoon from 0-70', NXCS to 30'. Waxed hand samples of NX continuous drive core from: 10'-10.3', 20'-20.3', 30'-30.3', 50'-50.3', 60'-60.3'.



0-3' Ice and water.
 3'-29' CLAY, dark gray, wet,
 and small clam shells with
 tic, slight acid reaction,
 silty sand 27'-29'. (Lake
 29'-44' CLAY, gray, wet, soft
 estimated to be approximately
 al gravel estimated 2%, me
 (SC-CL)
 44'-55' CLAY SHALE, dark gray
 to stiff, till shale contains
 occasional light gray to tan
 stone concretions, occasional
 of shale are interpreted as
 thin zone of bentonite not
 NOTE: NX continuous drive
 5' intervals using standard
 Drove 8.5' NX casing. Wax
 drive core from: 10'-10.2
 40.3', 50'-50.3'.