

1

12-6-67

TO

→ Bill Moothart, Ft Dodge

SUBJECT

Beaver Watershed Specs
and Drawings

FROM

Volney Smith

MESSAGE (WRITE CONCISE MESSAGE, SIGN AND FORWARD PARTS 1 AND 2 TO ADDRESSEE, RETAIN PART 3)

Dewey was wondering if you still have
any ^{extra} sets of Contract drawings and specifications
for Beaver Watershed. We will soon be drawing
up the contract papers for Deer Creek Watershed
and it will be similar in a lot of ways
to Beaver. If you still have these, we'd
appreciate receiving a set to use as a guide.
Thanks.

SIGNATURE

Volney Smith

REPLY (USE THIS SPACE FOR REPLY, SIGN AND DATE, RETURN PART 2 TO SENDER, RETAIN PART 1)

Copy of Contract drawings and specifications
are enclosed as requested above.

SIGNATURE

Bill Moothart

DATE

12-7-67

Recd 2-5-65

C. A. Reese, Design Engineer, E & WP Unit, SCS,
Lincoln, Nebraska

Des Moines, Iowa
February 3, 1965

Dewey T. Bondurant, Head, Engineering Design Unit

DTB

ENGINEERING - WP - Beaver Watershed

Under separate cover, we are sending you the tracings as noted on the attached Cartographic Requisition.

The plans have been revised due to the comments from your office and from the field.

We have revised tile strengths and trench widths so that the loadings associated with various trench depths are not exceeded. A tabulation of the allowable trench depths for the various sizes of tile is attached. Blue-line prints of the profiles with the allowable trench depths shown are also included with the tracings. You will note that the trench widths for the larger sizes of tile are set up to coincide with standard back-hoe bucket widths. The trench widths, when other than the standard widths established in the specifications, are shown on the drawings.

You will note that a new class of 1500 D is established in the specifications and asked for on the drawings. At least two concrete products companies in North Central Iowa produce this class of tile.

The note on Sheet 3 of the plans states that "All tile shall be laid with the closest possible fit". We do not wish to alter the specification, as we may use it for other projects on which a joint gap is needed between tile.

We have examined the need for an additional junction box on the lower reaches of the main. We do not think that one is needed, since the watershed is rather narrow below the junction of Lateral 1 and the topography does not indicate that large capacity laterals which might unbalance the flow exist or might be installed in this reach.

Enclosed is the following material:

Tech. Specification 382-1a. DRAINAGE-DRAIN TILE (2-2-65)
Index to Technical Specifications
Bid Schedule
Cartographic Requisition

Please send us 27 copies of the specifications with the exception of the special amendments to Technical Specifications 200 and 210, which we will reproduce at this office.

After the plans have been approved, please transmit the tracings to Cartographic for printing.

We appreciate your rapid action on the check prints and hope that you will be able to clear these final plans in similar fashion. The local organization is very anxious to set dates for the necessary hearings and need the plans as soon as possible.

CC:

Dilman Moothart, Fort Dodge
Bill Ludwig, Des Moines

Encl:

BEAVER WATERSHED

(WEBSTER COUNTY, IOWA, D. D. #47)

BID SCHEDULE

SECTION 1

LOWER MAIN RELIEF

<u>ITEM</u>	<u>WORK OR MATERIAL</u>	<u>QUANTITY</u>	<u>UNIT</u>
1	Corrugated Iron or Steel Pipe, Class I, Shape 1, Type A Coating, 42" Diam., 12 gage	52	Lin. Ft.
2	Extra-Quality Drain Tile, 36" Diam.	3,948	Lin. Ft.
3	Extra-Quality Drain Tile, 34" Diam.	1,552	Lin. Ft.
4	1500 D Drain Tile, 34" Diam.	300	Lin. Ft.
5	Junction Box Equalizer No. 10	Sum	Job
6	Junction Box Equalizer No. 11	Sum	Job
7	Surface Inlet No. 1	Sum	Job
8	Surface Inlet No. 2	Sum	Job
9	Small Animal Guard	Sum	Job

SECTION 2

UPPER MAIN RELIEF

1	Extra-Quality Drain Tile, 32" Diam.	1,100	Lin. Ft.
2	1500 D Drain Tile, 32" Diam.	800	Lin. Ft.
3	Extra-Quality Drain Tile, 22" Diam.	2,860	Lin. Ft.
4	1500 D Drain Tile, 22" Diam.	1,948	Lin. Ft.
5	Extra-Quality Drain Tile, 18" Diam.	1,900	Lin. Ft.
6	Extra-Quality Drain Tile, 12" Diam.	180	Lin. Ft.
7	Reinforced Concrete Culvert Pipe, Class III, 36" Diam.	100	Lin. Ft.
8.	Reinforced Concrete Culvert Pipe, Class III, 24" Diam.	92	Lin. Ft.

<u>ITEM</u>	<u>WORK OR MATERIAL</u>	<u>QUANTITY</u>	<u>UNIT</u>
TILELINE EQUALIZER NO. 1			
9	Reinforced Concrete Culvert Pipe, ⁷ Class III, 24" Diam.	60	Lin. Ft.
TILELINE EQUALIZER NO. 2			
10	Reinforced Concrete Culvert Pipe, Class III, 12" Diam.	68	Lin. Ft.
TILELINE EQUALIZER NO. 3			
11	Extra-Quality Drain Tile, 8" Diam.	34	Lin. Ft.
12	Junction Box Equalizer No. 12	Sum	Job
13	Surface Inlet No. 3	Sum	Job
14	Surface Inlet No. 4	Sum	Job
15	Surface Inlet No. 5	Sum	Job
16	Surface Inlet No. 6	Sum	Job
17	Surface Inlet No. 7	Sum	Job
18	Surface Inlet No. 8	Sum	Job
19	Surface Inlet No. 9	Sum	Job
20	Surface Inlet No. 10	Sum	Job
21	Surface Inlet No. 11	Sum	Job
22	Surface Inlet No. 12	Sum	Job
23	Surface Inlet No. 13	Sum	Job
SECTION 3			
LATERAL 1 RELIEF			
1	Extra-Quality Drain Tile, 26" Diam.	752	Lin. Ft.
2	1500 D Drain Tile, 26" Diam.	1,500	Lin. Ft.
3	Extra-Quality Drain Tile, 24" Diam.	700	Lin. Ft.
4	1500 D Drain Tile, 24" Diam.	600	Lin. Ft.
5	Extra-Quality Drain Tile, 18" Diam.	1,400	Lin. Ft.

<u>ITEM</u>	<u>WORK OR MATERIAL</u>	<u>QUANTITY</u>	<u>UNIT</u>
6	Reinforced Concrete Culvert Pipe, Class III, 30" Diam.	48	Lin. Ft.
	TILELINE EQUALIZER NO. 4		
7	Extra-Quality Drain Tile, 8" Diam.	40	Lin. Ft.
	TILELINE EQUALIZER NO. 5		
8	Extra-Quality Drain Tile, 8" Diam.	102	Lin. Ft.
9	Surface Inlet No. 14	Sum	Job
10	Surface Inlet No. 15	Sum	Job
11	Surface Inlet No. 16	Sum	Job
12	Surface Inlet No. 17	Sum	Job
	LATERAL 1-A		
13	Extra-Quality Drain Tile, 6" Diam.	60	Lin. Ft.
	LATERAL 1-B		
14	Extra-Quality Drain Tile, 8" Diam.	60	Lin. Ft.
	LATERAL 1-C		
15	Extra-Quality Drain Tile, 12" Diam.	400	Lin. Ft.
16	Extra-Quality Drain Tile, 10" Diam.	400	Lin. Ft.
17	Extra-Quality Drain Tile, 8" Diam.	1,486	Lin. Ft.
18	Reinforced Concrete Culvert Pipe, Class III, 12" Diam.	48	Lin. Ft.
19	Surface Inlet No. 18	Sum	Job
20	Surface Inlet No. 19	Sum	Job
21	Surface Inlet No. 20	Sum	Job

SECTION 4
LATERAL A

<u>ITEM</u>	<u>WORK OR MATERIAL</u>	<u>QUANTITY</u>	<u>UNIT</u>
1	Extra-Quality Drain Tile, 16" Diam.	1,248	Lin. Ft.
2	Extra-Quality Drain Tile, 14" Diam.	662	Lin. Ft.
3	Reinforced Concrete Culvert Pipe, Class III, 18" Diam.	52	Lin. Ft.
4	Surface Inlet No. 21	Sum	Job
5	Surface Inlet No. 22	Sum	Job
6	Surface Inlet No. 23	Sum	Job

SECTION 5
LATERAL 2 RELIEF

1	Extra-Quality Drain Tile, 18"	122	Lin. Ft.
2	Extra-Quality Drain Tile, 16"	4,400	Lin. Ft.
3	Extra-Quality Drain Tile, 12"	948	Lin. Ft.
4	Reinforced Concrete Culvert Pipe, Class III, 18" Diam.	52	Lin. Ft.
5	Reinforced Concrete Culvert Pipe, Class III, 12" Diam.	48	Lin. Ft.

TILELINE EQUALIZER NO. 6

6	Extra-Quality Drain Tile, 10" Diam.	200	Lin. Ft.
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TILELINE EQUALIZER NO. 7

7	Extra-Quality Drain Tile, 8" Diam.	44	Lin. Ft.
8	Junction Box Equalizer No. 13	Sum	Job
9	Surface Inlet No. 24	Sum	Job
10	Surface Inlet No. 25	Sum	Job
11	Surface Inlet No. 26	Sum	Job
12	Surface Inlet No. 27	Sum	Job

<u>ITEM</u>	<u>WORK OR MATERIAL</u>	<u>QUANTITY</u>	<u>UNIT</u>
SECTION 6			
LATERAL 3 RELIEF			
1	Extra-Quality Drain Tile, 24" Diam.	1,200	Lin. Ft.
2	Extra-Quality Drain Tile, 20" Diam.	2,550	Lin. Ft.
3	Extra-Quality Drain Tile, 18" Diam.	550	Lin. Ft.
4	1500 D Drain Tile, 18" Diam.	400	Lin. Ft.
5	Extra-Quality Drain Tile, 14" Diam.	1,060	Lin. Ft.
6	Extra-Quality Drain Tile, 8" Diam.	456	Lin. Ft.
7	Reinforced Concrete Culvert Pipe, Class III, 15" Diam.	40	Lin. Ft.
TILELINE EQUALIZER NO. 8			
8	Extra-Quality Drain Tile, 8" Diam.	20	Lin. Ft.
TILELINE EQUALIZER NO. 9			
9	Extra-Quality Drain Tile, 8" Diam.	72	Lin. Ft.
10	Junction Box Equalizer No. 14	Sum	Job
11	Surface Inlet No. 28	Sum	Job
12	Surface Inlet No. 29	Sum	Job

STATE Iowa PROJECT Lower Watershed (Webster Co. Iowa DO#47)
BY D.T. Boudarant DATE 2-2-64 CHECKED BY _____ DATE _____ JOB NO. _____
SUBJECT _____

Allowable trench depths

SHEET 1 OF 1

Assumptions:

Ordinary Bedding (Class C), Load Factor - 1.5

Safety Factor - 1.5

Backfill - Saturated topsoil, $W = 110 \text{ #/ft}^3$

Using Minnie's chart nomograph, which includes S.F. of 1.5,

Allowable Bearing = 3-Edge Bearing $\times 1.5$

Tile	3-Edge Bearing #/ft	Allowable Bearing #/ft	B _c		B _o		H/B _o	H ft	Allowable Trench Depth ft
			in.	ft	in.	ft			
36" Ex. Qual	2400	3600	42	3.50	48	4.0	1.75	7.0	10.5
36" 1500D	4500	6750	"	"	"	"	4.90	19.6	23.1
34" Ex. Qual	2270	3400	39 3/4	3.31	48	4.0	1.64	6.6	9.9
34" 1500D	4250	6375	"	"	"	"	4.30	17.2	20.5
32" Ex. Qual	2130	3195	37 1/4	3.27	48	4.0	1.52	6.1	9.2
32" 1500D	4000	6000	"	"	"	"	3.85	15.4	18.7
26" Ex. Qual	1730	2595	30 1/4	2.52	42	3.5	1.62	5.7	8.2
26" 1500D	3250	4875	"	"	"	"	4.30	15.0	17.5
24" Ex. Qual	1600	2400	28	2.33	36	3.0	2.16	6.5	8.8
24" 1500D	3000	4500	"	"	"	"	7.80	23.4	25.7
22" Ex. Qual	1470	2205	25 3/4	2.15	36	3.0	1.91	5.7	7.9
22" 1500D	2750	4125	"	"	"	"	5.70	17.1	19.3
20" Ex. Qual	1300	1950	23 1/4	1.94	30	2.5	2.77	6.2	8.8
20" 1500D	2500	3750	"	"	"	"	∞	∞	∞
18" Ex. Qual	1200	1800	21	1.75	30	2.5	2.45	6.1	7.9
18" 1500D	2250	3375	"	"	"	"	∞	∞	∞
16" Ex. Qual	1100	1650	18 3/4	1.56	24	2.0	4.50	9.0	10.6
16" 1500D	2000	3000	"	"	"	"	∞	∞	∞

TECHNICAL SPECIFICATION 382-1a *

DRAINAGE - DRAIN TILE

382.1 SCOPE

The work covered by this specification consists of furnishing all labor, equipment and materials and performing all operations in connection with the necessary earth excavation, installation of all drain tile, other conduits used as drain tile, fittings, breathers, junction boxes, surface inlets, cradles, and any other appurtenances related to the tile drain, and placing the necessary backfill as shown on the drawings or herein specified.

The materials, equipment and labor required for the construction of concrete work is covered in separate technical specifications for concrete and steel reinforcement.

382.2 MATERIALS

382.2.1 Clay Drain Tile

Clay drain tile and all fittings shall conform to the applicable requirements of ASTM Designation: C4. Tile shall be of the diameter and class shown on the drawings.

382.2.2 Concrete Drain Tile

Concrete drain tile and all fittings shall conform to the applicable requirements of ASTM Designation: C 412, except that Table II, Physical Test Requirements for Extra-Quality Concrete Drain Tile, is altered by making the following additions:

Extra-Quality Concrete Drain Tile					
Nominal Inside Diameter, In.	Nominal Shell Thickness, In.	Three-Edge Bearing Crushing Strength		Absorption, Boiled 5 hr.	
		Minimum Average, Lb. Per Lin. Ft.	Minimum for Individual Tile, Lb. Per Lin. Ft.	Maximum Average, Per Cent	Maximum for Individual Tile, Per Cent
22	1 7/8	1,470	1,320	9	10
26	2 1/8	1,730	1,560	9	10
28	2 3/8	1,870	1,680	9	10
30	2 1/2	2,000	1,800	9	10
32	2 5/8	2,130	1,920	9	10
34	2 7/8	2,270	2,040	9	10
36	3	2,400	2,160	9	10

The requirements of ASTM Designation: C 412 are also amended to provide another class of drain tile. This class shall be known as 1500 D Drain Tile. The physical test requirements for 1500 D Drain Tile are shown in the following table:

1500 D DRAIN TILE				
Nominal Inside Diameter In.	Three-Edge Bearing Crushing Strength		Absorption Boiled 5 hours	
	Min. Ave. Lb Per Lin Ft	Min. for Individual Tile, Lb Per Lin Ft	Max. Av. Per Cent	Max. for Individual Tile, Per Cent
12 ["]	1500	1350	9	10
14 ["]	1750	1580	9	10
16 ["]	2000	1800	9	10
18 ["]	2250	2030	9	10
20 ["]	2500	2250	9	10
22 ["]	2750	2480	9	10
24 ["]	3000	2700	9	10
26 ["]	3250	2930	9	10
28 ["]	3500	3150	9	10
30 ["]	3750	3380	9	10
32 ["]	4000	3600	9	10
34 ["]	4250	3830	9	10
36 ["]	4500	4050	9	10

The higher strength required for the 1500 D Drain Tile may be secured by using designs involving the increase of wall thickness, the use of higher strength concrete, or the addition of reinforcing steel. The design of 1500 D Drain Tile shall be submitted to the Engineer for approval prior to furnishing the tile.

The permissible variations in minimum internal diameter and in minimum shell thickness for drain tile larger than 24" in diameter shall be the same as that listed in ASTM Designation: C 412, Section 15, for 24" diameter drain tile.

The nominal length of drain tile larger than 24" in diameter shall not be less than the diameters. The tile shall be of the diameter and class or strength as shown on the drawings.

382.2.3 Reinforced Concrete Culvert Pipe

Reinforced concrete culvert pipe, when used as drain tile, shall conform to ASTM Designation: C 76. The reinforced concrete culvert pipe shall be of the diameter and class or strength shown on the drawings.

382.2.4 Corrugated Iron or Steel Pipe and Corrugated Aluminum Pipe

Corrugated iron or steel or corrugated aluminum pipe, when used as drain tile, shall conform to the requirements of Federal Specification WW-P-00405 or Federal Specification WW-P-00402 respectively. Such pipe shall be of the diameter, gage, shape, class, and type of coating as shown on the drawings.

382.2.5 Standard Strength Clay Sewer Pipe

Standard strength clay sewer pipe, when used as drain tile or in fittings, shall conform to ASTM Designation: C 13. Such pipe shall be of the diameter and length shown on the drawings.

382.2.6 Extra Strength Clay Pipe

Extra Strength Clay Pipe, when used as drain tile or in fittings shall conform to ASTM Designation: C 200. Such pipe shall be of the diameter and length shown on the drawings.

382.2.7 General

The pipe materials shall be furnished in standard lengths, or otherwise as shown on the drawings.

When Extra-Quality Drain Tile is specified on the drawings, either Extra-Quality Drain Tile (Clay) or Extra-Quality Concrete Drain Tile may be furnished.

Gravel used for bedding or backfill shall conform to the applicable requirements for coarse aggregate contained in ASTM Designations: C 33 and C 136.

Timber or lumber used for cradle construction shall be approved by the Engineer prior to installation.

382.3 INSTALLATION

382.3.1 General

All tile and other materials shall be installed to the line and grade shown on the drawings.

Installation of all lines shall begin at the outlet and progress upstream.

All tile shall be kept clean while laying. All earth in the tile shall be removed before laying the next tile. At the end of each day's work and when laying is temporarily suspended, the inlet end shall be blocked so that earth or other material will not enter the tile.

382.3.2 Excavation

The trench or excavation for the tile shall be constructed to the depth and cross-section shown on the drawings or as otherwise specified herein.

Unless otherwise shown on the drawings, the maximum trench width shall be the outside diameter of the tile plus twelve inches and the minimum trench width shall be the outside diameter of the tile plus six inches. The trench width will be measured at the top of the tile. Above the top of the tile, the trench width may be increased.

The tile shall be bedded by shaping the bottom of the tile trench so that the lower 60° of the outside circumference of the tile will bear against solid undisturbed ground for its entire length, permitting no rocking or tipping.

Drain tile shall not be laid on rock foundation. In the event that boulders, rocks, or ledge rock is encountered at the required grade, the trench shall be excavated to a depth of at least six inches below grade and backfilled to grade with gravel.

Such shoring and bracing that may be necessary to safeguard the work and workmen and to prevent damage to the existing improvements shall be furnished, placed, and subsequently removed by the contractor.

382.3.3 Joints

The tile shall be laid and turned so that the minimum widths of opening is obtained at the top. Where joints between tile are open more than one-eighth inch in ordinary loam soils, and more than one-fourth inch in clay soils, the joints shall be covered with broken pieces of tile (tile bats), fiber glass mat, or building or tar paper.

On sandy soils, the tile shall be laid with the tightest possible fit.

When shown on the drawings, tile in mains or laterals used as conduits only and not intended for direct underdrainage shall be laid with the closest possible fit.

Where the gap between tile on the outer edge of a curved tile line exceeds the recommended gap for the type of soil encountered, it shall be covered with tile bats, fiber glass mat, building or tar paper. The tile may be chipped and fitted to secure the required joint opening.

382.3.4 Connections

Connections shall be made with manufactured junctions, if available. When such connections are not available, the junction shall be carefully chipped and fitted and the cracks sealed with concrete mortar around the entire circumference of the fitted junction.

Where existing tile lines not shown on the drawings are crossed, they shall be bridged across the new trench using corrugated metal pipe 2" larger in diameter than the tile, or they shall be connected into the new tile line, as directed by the Engineer. The corrugated metal pipe shall be of the material, size, gage, shape, class, length and type of coating as directed by the Engineer. Where the existing line is connected into the new line, the connection shall be made no lower than center to center of the respective lines, if possible.

382.3.5 Blinding

As soon as the tile are placed, they shall be blinded by covering with loose mellow topsoil to a depth of at least 6". Material used for blinding shall not be frozen and shall contain no stones larger than one inch in diameter. Sand shall not be used for blinding unless the joints are covered. The blinding material shall be shovel placed and shovel tamped to completely fill and spaces under and adjacent to the tile. All tile shall be blinded at the end of the day's work.

382.3.6 Backfilling

The backfilling of the trench shall be completed as rapidly as is consistent with the progress of the work or as specified by the Engineer. Automatic backfilling machines may be used only when approved by the Engineer. The excavated material used in backfilling shall be well rounded over the trench and left in such a condition that it can be farmed over.

Where drain tile is laid under roads and at other locations shown on the drawings, the backfill shall be placed in successive layers of not more than six inches and each layer shall be carefully tamped before the next layer is placed.

382.3.7 Installation in Sandy Soils

Where tile is laid in water bearing or fine sand, the tightest possible fit shall be obtained at the joints, and the upper two-thirds of the circumference of the tile at the joints shall be covered with asphalt treated felt, fiber glass mat, or other materials as shown on the drawings.

If the bottom of the trench does not provide a sufficiently stable or firm foundation for the drain tile, cradles for the tile shall be constructed of timber or fabricated lumber of a cleat-and-rail type construction, as shown on the drawings or as directed by the Engineer.

Where the tile are liable to creep or be displaced vertically by uplift, the contractor shall take every precaution and provide such means as approved by the Engineer to prevent vertical displacement and progressive creeping of drain tile during the process of laying, blinding, and backfilling.

382.3.8 Appurtenances

All appurtenances such as junction boxes, relief wells, and surface intakes shall be constructed as shown on the drawings.

Small animal guards on outlet pipes shall be constructed as shown on the drawings.

382.4 MEASUREMENT AND PAYMENT

The unit of measurement for payment shall be linear feet of drain tile or other conduit in place, measured along the centerline of the drain tile or other conduit to the nearest foot for each material, type, and size.

The unit of measurement for junction boxes, surface inlets, relief wells, and such other appurtenances shall be the number of such appurtenances installed as shown on the drawings and listed in the bid schedule.

Payment for drain tile will be made at the contract unit price per linear foot for the material, size, and class or strength as shown on the drawings and listed in the bid schedule.

Payment for other types of conduits used as drain tile will be made at the contract unit price per linear foot for the corresponding material, type, and size as shown on the drawings and listed in the bid schedule.

Payment for appurtenances such as junction boxes, surface inlets, and relief wells will be made at the contract unit price per appurtenance as shown on the drawings and listed on the bid schedule.

Such payment shall be full compensation for all labor, equipment, materials, and incidentals required to install the drain tile or other conduit used as drain tile and all appurtenances.

No payment will be made for connections shown on the drawings. The cost of such connections will be considered subsidiary to other items of the contract.

The connection or bridging of existing tile lines not shown on the drawings will be considered as changes in the drawings and the contract will be modified accordingly in order to connect them into or bridge them over the new tile line.

BEAVER WATERSHED

(WEBSTER COUNTY, IOWA, DRAINAGE DISTRICT NO. 47)

INDEX TO TECHNICAL SPECIFICATIONS

<u>NO.</u>	<u>TITLE</u>
200	CONCRETE (Rev. 5-10-63) with Amendment No. 1 (Beaver Watershed 1-14-65)
210	FURNISHING AND PLACING STEEL REINFORCEMENT (Rev. 12-1-58) with Amendment No. 1 (Beaver Watershed 1-14-65)
382-1a.	DRAINAGE-DRAIN TILE (1-14-65) (2-2-65)

TECHNICAL SPECIFICATION - 210

FURNISHING AND PLACING STEEL REINFORCEMENT

The provisions of this amendment modify and supersede the designated provisions of Technical Specification 210.

210.9 PAYMENT

--After the last paragraph, add the following:

Excluded from payment under this specification is the steel bar reinforcement used in the junction box equalizers shown on the drawings. Payment for such steel bar reinforcement will be included in the payment for "Junction Box Equalizers".

* Applicable to Beaver Watershed (Webster County, Iowa, D. D. #47)

1-14-65

TECHNICAL SPECIFICATION - 200CONCRETE

The provisions contained in this amendment modify and supersede the designated provisions of Technical Specification 200.

200.3 CLASSIFICATION

--Add Table I.

TABLE I

<u>CLASS</u>	<u>28-DAY COMPRESSIVE STRENGTH</u>	<u>MAXIMUM WATER PER SACK OF CEMENT</u>
A	3750 lbs. per sq. in.	6 gallons
B	3000 lbs. per sq. in.	6½ gallons
C	2500 lbs. per sq. in.	7 gallons
D	2000 lbs. per sq. in.	8 gallons
E (Concrete Bedding)	No minimum limit	No maximum limit

200.5 AGGREGATES200.5.1 Fine and Coarse Aggregates.

--Delete entire paragraph and replace with the following:

(a) Fine Aggregate - Grading.--The fine aggregate shall conform to the following gradation as delivered to the mixer or as incorporated in the mixed concrete:

<u>Sieve Designation</u>	<u>Percent Passing</u>
3/8 inch	100
No. 4	95-100
No. 8	75-100
No. 200	0-1.5

When fine aggregate is sieved through the following numbered sieves: 4, 8, 16, 30, 50, and 100, not more than 40 percent shall pass one sieve and be retained on the sieve with the next higher number.

(b) Coarse Aggregate - Grading.--The coarse aggregate shall be well graded from coarse to fine, and the gradation shall conform to one of the following three requirements as delivered to the mixers, or as incorporated in mixed concrete.

* Applicable to Beaver Watershed (Webster County, Iowa, D. D. #47)

1-14-65

(200) 1-3

1-14-65

The quantities of material per cubic yard of concrete are based on the following assumptions:

Specific gravity of cement = 3.14; specific gravity of aggregate = 2.65; air voids = 0.06; water-cement ratio = 0.51 (5.75 gallons per bag); one bag of cement = 94 lbs.; one gal. of water = 8.33 lbs.

When transit-mix concrete is used, the Contractor shall submit with each mixer load a certified delivery ticket giving the measurement of cement, coarse aggregate, fine aggregate and water contained in the mix.

(b) Measurement.--All materials entering into the concrete shall be mechanically batched and measured by weight.

(c) Adjustment of Proportions.--If the aggregate material to be furnished shows a specific gravity other than 2.65, the proportions by weight will be adjusted by the ratio which the actual specific gravity bears to the foregoing value as determined by the Engineer. The estimated quantities of cement per cubic yard of concrete are based on average conditions. If the combination of materials is such that the quantity of cement per cubic yard of concrete placed is 2 percent, more or less, of the estimated quantity, the proportion may be adjusted accordingly, as directed by the Engineer.

200.9.1 Determination of Total Aggregate in Job Mix.

--This section shall be deleted in its entirety.

200.9.2 Determination of Fine Aggregate in Job Mix.

--This section shall be deleted in its entirety.

200.9.3 Determination of Coarse Aggregate in Job Mix.

--This section shall be deleted in its entirety.

200.9.4 Correction for Specific Gravity.

--This section, including Table I, shall be deleted in its entirety.

200.22 MEASUREMENT AND PAYMENT

--After last sentence in last paragraph, add the following:

Also excluded from payment under this specification is the concrete in the junction box equalizers shown on the drawings. Payment for such concrete will be included in the payment for "Junction Box Equalizers".

R. L. Phillips, Acting State Conservation
Engineer, SCS, Des Moines, Iowa
Attn: Dewey T. Bondurant, Design Engineer

January 25, 1965

C. A. Reese, Design Engineer, R&WP Unit
SCS, Lincoln, Nebraska

ENGINEERING - WP - Beaver Watershed

Mr. Guy B. Fasken, our Drainage Engineer, has reviewed your plans and specification for this project and offers the following comments:

"I have checked the tile sizes on the plan and they are adequate in line with the criteria approved.

"Except for three minor errors in the tile grade the elevations are correct. The elevations of the tile junctions check with sufficient accuracy for a field connection. The differences were usually less than .1 foot and some adjustment of the connections will be made during construction.

"I think the probable trench widths should be marked on the plan. For the trench depths, I have shown on the plans, the portion marked with red line has greater depths than should be laid for the class of tile and bedding proposed. Changing the type of bedding for the tile at these locations would probably be sufficient to take care of the depth. The above depths were selected for earth weight of 110 pounds from the monograph shown in chapter 5 of the National Drainage Handbook.

"On page 4 of the specifications, first paragraph--this is confusing; why not say, "When shown on the drawings, tile in mains or laterals used as conduits only shall be laid with the closest possible fit." I don't think the drawings have this indicated.

"I would like to suggest that another junction box be installed between station 0 and 39+10, perhaps near 15+25. My only reason is to provide additional insurance that the water will divide and equalize. The equalizers in the upper part of the plan are rather close together and I think they should be closer at the lower end. This is only a suggestion which I would like to have considered."

We have checked over your plans for inlets and junction box equalizers and found everything satisfactory. We are returning one copy of the prints.

Enclosure

cc:
Frank Mendell, State Conservationist
SCS, Des Moines, Iowa

Dewey T. Bondurant, Head Engineering
Design Unit

Fort Dodge, Iowa
Sept. 15, 1965

Dilman L. Moothart, Area Engineer

Engineering - WP Beaver Watershed

I have checked through the reference specifications for Beaver Watershed and find that I do not have the following:

ASTM Specifications

C-4-62	C-200-59T
C-13-57T	C-233-63T
C-31-62T	C-309-58
C-33-64	C-478-63T
C-39-64	A-15-58T
C-42-64	
C-76-63T	
C-94-64	
C-136-63	
C-138-63	
C-150-64	
C-172-54	
C-175-64	

I have some of the above ASTM Specifications but they are older; that is of an earlier date. We have checked with Gerald Hollander at Spencer and he does not have the above listed specifications either. Therefore, we would like to have two copies of each specification listed for use in Area 2.

DLMoothart:vmk

Dewey T. Bondurant, Head,
Engineering Design Unit

Fort Dodge, Iowa
Jan. 5, 1965

Dilman L. Moothart, Area Engineer

Engineering - WP - Beaver Watershed

We have completed running levels from known sea level datum and checked our levels with elevations on old tile lines. We find that adding 1100.00 to elevations shown on the plan will equal sea level datum; in other words an elevation of 50.42 on the plan becomes 1150.42.

We have established two bench marks which you may want to show on the plan:

BM#1 - 60 D Nail in Telephone Pole North West Corner of intersection
Sec. 19, 20, 29 & 30 TWP 86N R28W Elev. 1163.51.

BM # 2 - 60 D Nail in Corner Post North West Corner of intersection
Sec. 29, 30, 31 & 32, TWP 86N R28W Elev. 1160.43.

DLMoothart:vmk

Mr. Leonard J. Larson, Work Plan Party
Leader

Fort Dodge, Iowa
Jan. 22, 1964

D. L. Moothart, Area Engineer

Beaver Creek Watershed - DD # 47 Webster County

Attached is a map Russell Knutson left with me on which I have shown old mutual drains on the property of Charles Hutchins, H. G. Carlson, Oscar Swanson and Mabel Sayers in Sec. 20. Information was obtained on the Hutchins and Carlson farms from maps we have in the local Work Unit Office. Information on the Swanson and Sayers farms was obtained by talking with Mr. Swanson and by field observation.

I have also shown new planned legal drains which are on our plan IA-37-47 which you have a copy of but were not shown on the attached map. This was done as Knutson had a question of an outlet being provided for the Anna Anderson, Strand and Thulin properties.

DLMoothart:vmk

UNITED STATES GOVERNMENT

Memorandum

TO : Dilman L. Moothart, Area Engineer, SCS, Fort Dodge, Iowa

DATE: Des Moines, Iowa
October 14, 1964

FROM : Dewey T. Bondurant, Head, Engineering Design Unit

SUBJECT: ENGINEERING - WP - Beaver Watershed

Dewey T. Bondurant

Attached are the original tracings for the subject watershed. We have made blueines for our own use.

I will contact you in the near future about partially redrafting these plans.

Encl:



Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

Dewey T. Bondurant, Head, Engineering
Design Unit

Fort Dodge, Iowa

DEC. 16, 1964

Dilman L. Moothart, Area Engineer

Engineering - WP - Beaver Watershed

I have checked the plans (six sheets) you left with me on Beaver Watershed and made notations and corrections in green pencil. I have also completed the following:

1. Rough draft of the five large Junction Box Equalizers ready for your final drafting.
2. "Tile Design Data" tabulation sheet showing present tile capacities, required design acres and relief tile capacities for entire project along with design coefficients used for various sections.
3. Engineers Report "Character, Location and Design Basis of Contemplated Improvements".

There was one change in design, involving a change in tile size, discovered when working out the Tile Design Data tabulation sheet which I want to call your attention to. This change is on the upper section of Lateral 3 Relief from Station 47+00 to 58+00. The 884 ft. of 10" tile was changed to 14"; the 40 ft. of 12" R/C Culvert Pipe to 15" Culvert Pipe and the 176 ft. of 10" to 14". This was due to an error in the drainage area originally recorded above Station 47+00. It was recorded as 69 acres and should have been 169 acres. This change is shown in green pencil on the profile of Lateral 3 Relief.

The Tile Line Equalizers (nine of them) showed the elevations of the grade line of the main tile lines. These were changed to show the elevations of the grade line of the equalizers.

Some of the stations on the plan map did not agree with those on the profiles. These changes have been made in green pencil also.

Plans (prints - 6 sheets) along with rough draft of Equalizers are being mailed to you ~~in~~ separately in a mailing tube.

Attachments-

C. A. Reese, Design Engineer, E & WP Unit, SCS,
Lincoln, Nebraska

Des Moines, Iowa
January 15, 1965

Dewey T. Bondurant, Head, Engineering Design Unit

ENGINEERING - WP - Beaver Watershed

We are sending you the attached Form SCS-328 and the material as noted thereon.

This project has the highest priority as far as we are concerned. The local organizations, who are cost-sharing in excess of 50% of the construction cost, are anxious to advertise for this work as soon as possible. We would appreciate immediate review of the drawings and specifications by your office.

You will note that we have written an entirely new specification for "DRAINAGE-DRAIN TILE" to be applicable to this job. The existing Technical Specification 380 is inadequate for this size of tile project, and would have had to been amended extensively. The amendment would have been longer than the original specification. For this reason, an entirely new specification was written. The new specification does not follow the format of the new Standard Specifications. We investigated trying to use the new specifications and found that would need at least nine material specifications and eight construction specifications. We considered this to be too voluminous and therefore confusing to prospective bidders who are accustomed to bidding on similar projects under some very simple specifications.

You will also note that we have added notes on the drawings to the effect that the precise locations, depths, etc. are not guaranteed. This project was originally investigated, surveyed, and designed in 1946. To prepare these plans, we have made no resurvey, although the design was altered somewhat. It is probable that minor adjustments in alignment, stationing, etc. will be made during field layout. The drainage coefficients used in the present design were agreed to by Paul Jacobson and John Sutton.

Included in the design information submitted is a narrative report, tile design information, and structural design notes for the junction box components.

DTB

S. A. Mason, Design Engineer, E & WF Unit, GCS,
 [illegible] comments and those from the field are

Bill Ludwig, Des Moines

Dilman Moothart, Fort Dodge

We are sending you the attached Form SCS-328 and the material as noted thereon.

PS TO MOOTHART:
Please return comments, if any, on these drawings. If necessary, the drawings may be returned. I am also returning copy of your narrative report. It appears satisfactory to me.

You will note that we have written an entirely new specification for "DRAINAGE-DRAIN TILE" to be applicable to this job. The existing Technical Specification 380 is inadequate for this size of tile project, and would have had to been amended extensively. The amendment would have been longer than the original specification. For this reason, an entirely new specification was written. The new specification does not follow the format of the new Standard Specifications. We investigated trying to use the new specifications and found that would need at least nine material specifications and eight construction specifications. We considered this to be too voluminous and therefore confusing to prospective bidders who are accustomed to bidding on similar projects under some very simple specifications.

You will also note that we have added notes on the drawings to the effect that the precise locations, depths, etc. are not guaranteed. This project was originally investigated, surveyed, and designed in 1944. In preparing these plans, we have made no resurvey, although the design was altered somewhat. It is probable that minor adjustments in alignment, stationing, etc. will be made during field layout. The drainage coefficients used in the present design were agreed to by Paul Jacobson and John Sutton.

Included in the design information submitted is a narrative report, the design information, and structural design notes for the junction box components.

DTB