IOWA DEPARTMENT OF NATURAL RESOURCES

# **CONSTRUCTION DOCUMENTS** FOR **KLUM LAKE ACCESS ROAD MAINTENANCE**

# LOUISA COUNTY, IOWA

## DOT PROJECT #SP-00SP(2)--7C-00 DNR PROJECT #20-06-58-01



bruce.flippin@dnr.iowa.gov

EMAIL

	HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED UNDER MY SUPERVISION AND THAT ENGINEERING DECISIONS WITH REGARD TO THE DESIGN WERE MADE BY ME UNDER THE LAWS OF THE STATE OF IOWA.
annonun munnth	SIGNATURE DATE  BRUCE L. FLIPPIN PRINTED OR TYPED NAME  MY LICENCE RENEWAL DATE IS DECEMBER 31, 20 20 PAGES COVERED BY THIS SEAL:

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## **PROJECT DESCRIPTION**

This project consists of granular roadway maintenance - blading/ shaping, ditch cleaning, removal and replacement of RCP culverts, flapper, and spreading new rock.



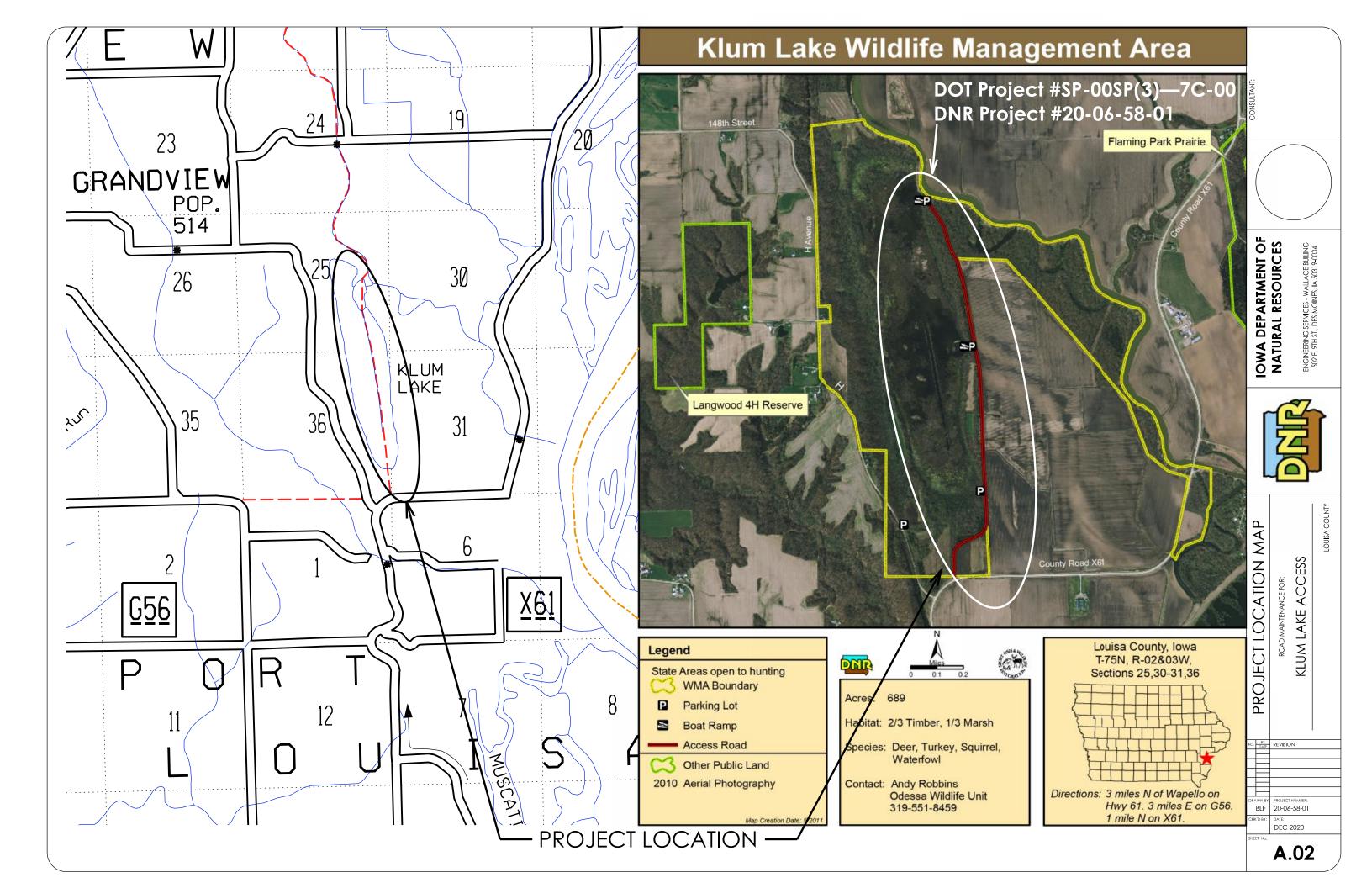
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AUTHORIZATION - PARKS   WILDLIFE   FISHERIES   LAW	ENFORCEMENT   FORESTRY DATE
ENGINEERING BUREAU CHIEF	1/19/21 DATE

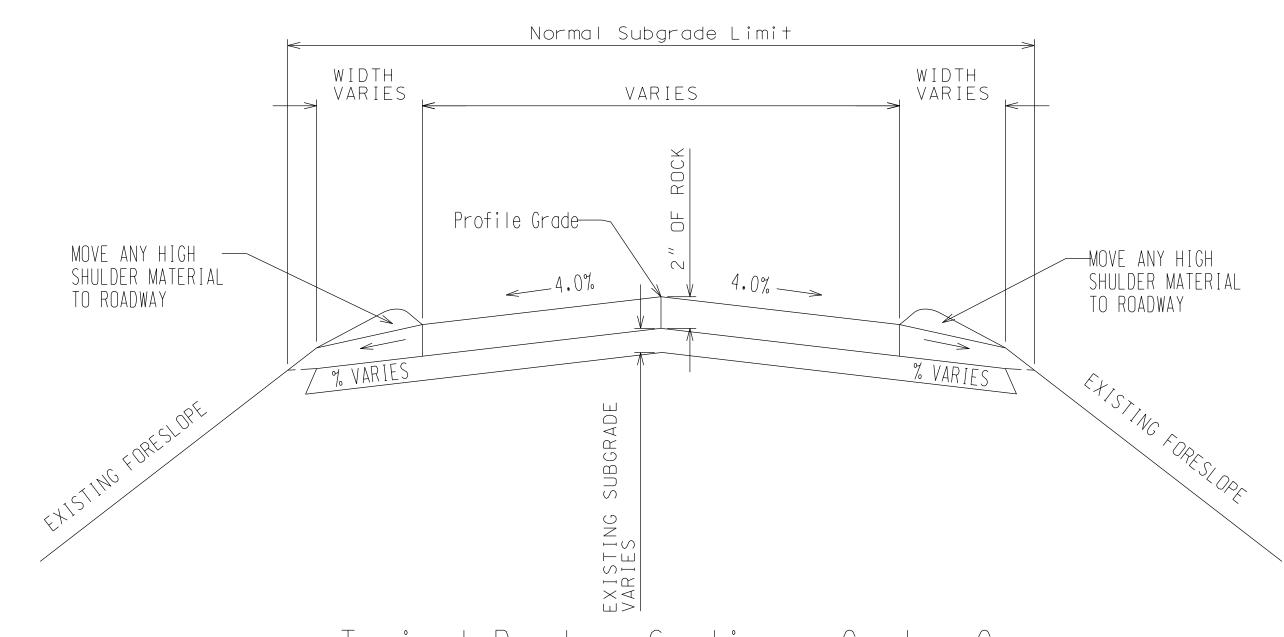
DIRECTORY						
PROJECT	MANAGER	CONSTRUCTION INSPECTOR				
COMPANY	IOWA DEPARTMENT OF NATURAL RESOURCES	COMPANY	IOWA DEPARTMENT OF NATURAL RESOURCES			
ADDRESS	502 EAST 9TH STREET	ADDRESS				
CITY,STATE,ZIP	DES MOINES, IA, 50319	CITY,STATE,ZIP				
CONTACT	BRUCE L. FLIPPIN	CONTACT	MIKE DUFOE			
TELEPHONE	515-689-8009	TELEPHONE	515-985-9196			
FAX	515-281-8685	FAX				

EMAIL

michael.dufoe@dnr.iowa.gov

	SHEET INDEX			
A.01				
A.02	LOCATION MAP			
B.01	TYPICAL CROSS SECTIONS AND DETAILS	<u></u>		
B.02	TYPICAL CROSS SECTIONS AND DETAILS	TAN		
B.03	TYPICAL CROSS SECTIONS AND DETAILS	CONSULTANT:		
B.04	TYPICAL CROSS SECTIONS AND DETAILS	NO		
B.05	TYPICAL CROSS SECTIONS AND DETAILS	10		
B.06	TYPICAL CROSS SECTIONS AND DETAILS			
B.07	TYPICAL CROSS SECTIONS AND DETAILS			
B.08	TYPICAL CROSS SECTIONS AND DETAILS			$\setminus$
C.01 D.01	QUANTITIES AND GENERAL INFORMATION SITE PLAN			
D.01	SITE PLAN			
0.02				
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		COVER SHEET	ROAD MAINTENANCE FOR: CLUM LAKE ACCESS	
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		BLF CHK'D BY:	20-06-58-01 DATE:	
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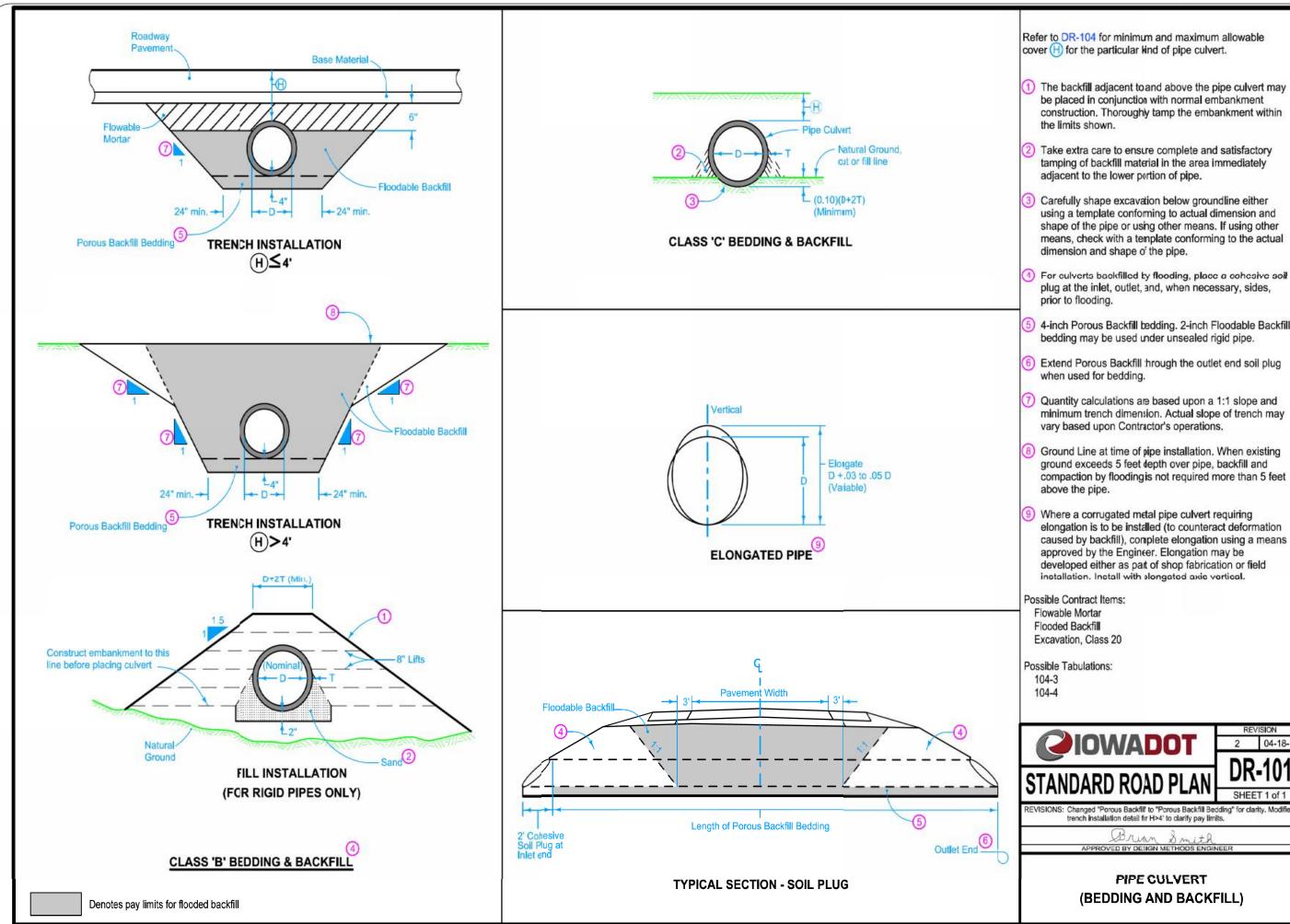
Typical Roadway Section - Center Crown

## Note:

Normal sections shown may be appropriately modified for areas specifically designated by the Engineer.

STATION	TO	STATION	LOCATION	WIDTH
0+00		85+63	HEADING NORTH	16′

CONSULTANT:			
IOWA DEPARTMENT OF	NATURAL RESOURCES	ENGINEERING SERVICES - WALLACE BUILING	502 E. 9TH ST., DES MOINES, IA 50319-0034
TYPICAL CROSS SECTIONS AND DETAILS	ROAD MAINTENANCE FOR:	KLUM LAKE ACCESS	LOUISA COUNTY
NO. BY DATE	REVISIO	DN	
DRAWN BY: BLF CHK'D BY:		5-58-01 2020	
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(1) The backfill adjacent to and above the pipe culvert may be placed in conjunction with normal embankment construction. Thoroughly tamp the embankment within

tamping of backfill material in the area immediately

Carefully shape excavation below groundline either using a template conforming to actual dimension and shape of the pipe or using other means. If using other means, check with a tenplate conforming to the actual

 For culverts backfilled by flooding, place a cohesive soil plug at the inlet, outlet, and, when necessary, sides,

4-inch Porous Backfill bedding. 2-inch Floodable Backfill

Extend Porous Backfill hrough the outlet end soil plug

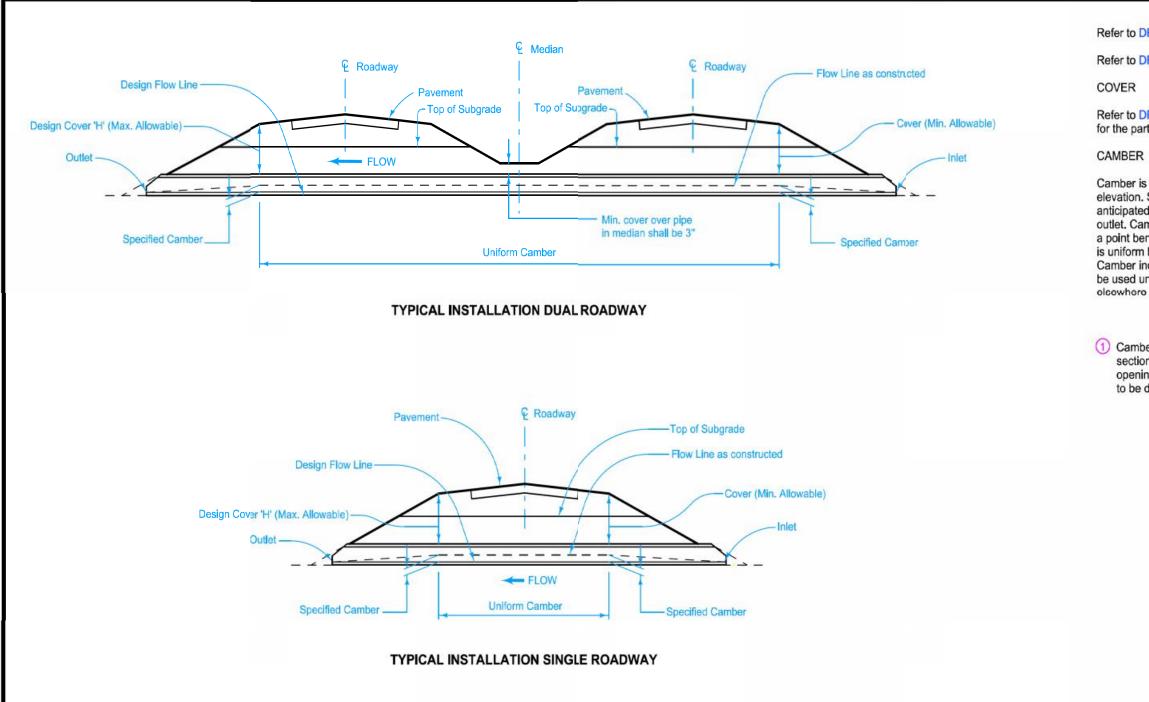
minimum trench dimension. Actual slope of trench may

Ground Line at time of pipe installation. When existing ground exceeds 5 feet depth over pipe, backfill and compaction by flooding is not required more than 5 feet

elongation is to be installed (to counteract deformation caused by backfill), complete elongation using a means developed either as pat of shop fabrication or field

CONSULTANT:			
IOWA DEPARTMENT OF	NATURAL RESOURCES	ENGINEERING SERVICES - WALLACE BUILING	502 E. YH ST., DES MOINES, IA 50319-0034
[			
TYPICAL CROSS SECTIONS AND DETAILS	ROAD MAINTENANCE FOR:	KLUM LAKE ACCESS	LOUISA COUNTY
NO. BY DATE	REV <b>I</b> SIC	DN	
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**B.02** 





Pipe Size 'D'	Maximum Camber (feet)
24"	1.1
30"	1.2
36"	1.3
42"	1.4
48"	1.5
60"	1.6
84"	1.7

## ALLOWABLE CAMBER TABLES

APPROVE

Refer to DR-121 for p

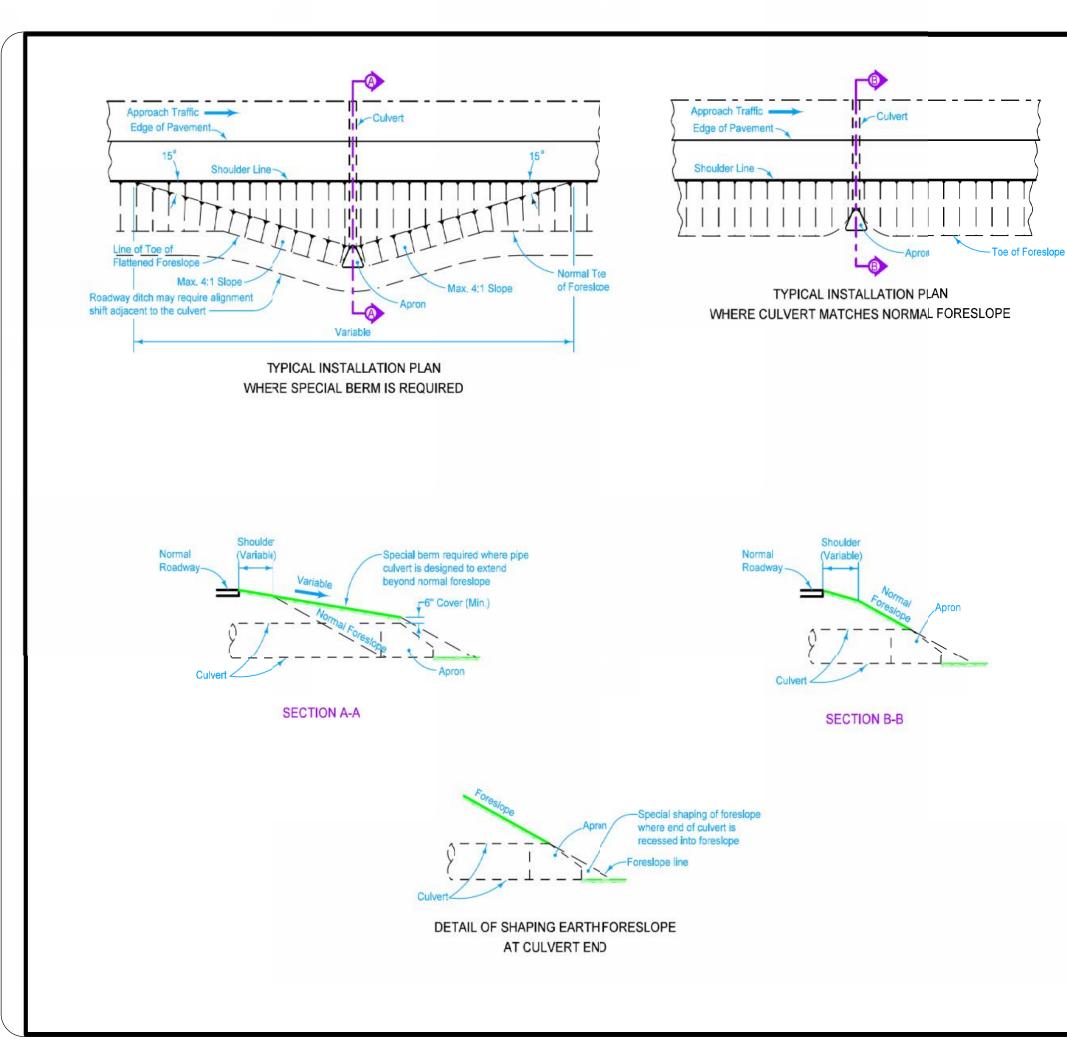
Refer to DR-101 for c

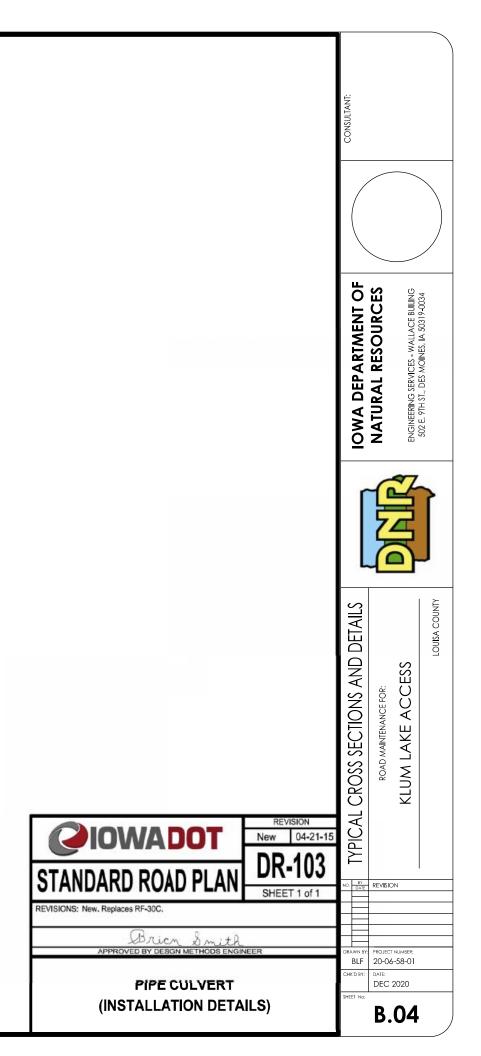
Refer to DR-104 for m for the particular kind

Camber is the dimens elevation. Some settle anticipated, resulting outlet. Camber is deve a point beneath the ou is uniform between the Camber indicated in t be used unless specif olcowhoro in the plan

1 Camber for concr sections tight at th opening at top of to be done as dire

21 for pipe joirt connection an	d wrapping.				
1 for culvert ledding and bac	Ξ̈́́				
	CONSULTANT:				
4 for minimum and maximum	allowable cover	8			
ar kind of culvert.					
dimension line between inlet a	and outlet				
e settlement of the structure i sulting in the cesign flow line t	s usually				
is developed uniformly from in the outside shoulder lines of	nlet and outlet to				
veen those ponts, as indicated ted in the "Allowable Camber	Tables" should	Ь	ŝ	UIING	0034
s specific camber values are in to plane.	ndicated	VEN1	URC	LACE BL	A 50319-
		<b>RTV</b>	RESC	ES WAI	OINES, I
r concrete pipe is created by p ght at the bottom of the joint w		OWA DEPARTMENT OF	ALF	ENGINEERING SERVICES - WALLACE BUILING	I., UES M
top of joint. Camber for corru as directed by the Engineer.		A I	<b>LTUR</b>	NEERING	E. 91H S
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		<b>TYPICAL CROSS SECTIONS AND DE</b>			rouis
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DWADOT	REVISION New 04-21-15	CAL			
	DR-102	TΥΡ			
ARD ROAD PLAN	SHEET 1 of 1	NO. BY DATE	Revisio	٧	
Replaces RF-30B.					
Brian Smith	NEER	DRAWN BY:	PROJECT		
PIPE CULVERT		BLF CHK'D BY:	20-06- DATE: DEC 2		
(COVER AND CAMBER)				03	
11					





For all sizes and installations of polyethylene pipe: IOWA DEPARTMENT OF NATURAL RESOURCES minimum cover = 2 feet SOZ E. 9TH ST., DES MOINES, IA 50319-0034 maximum cover = 24 feet for 12 to 24 inch pipes 20 feet for 30 to 48 inch pipes 1. Bedding Class 2. Pipe Strength (including special design pipe) 3. Type of backfill or cover material 4. Compaction requirements for backfill or cover material 5. Controlled trench width applicable. Necessary modifications of normal requirements will not ordinarily be paid for seperately but will be included in the price bid for culvert pipe. **CROSS SECTIONS AND DETAILS** LOUISA COUI ESS KLUM LAKE ACC ÖR: ANCE ROAD **TYPICAL** REVISION 04-19-1 **DR-104** STANDARD ROAD PLAN BY REVISION SHEET 1 of 3 REVISIONS: Added general note regarling maximum cover on concrete arch pipes. Brian Smith 20-06-58-01 BLF **DEPTH OF COVER TABLES** DEC 2020 FOR CONCRETE AND CORRUGATED PIPE **B.05** 

When unclassified pipe is specified, furnish and install a class of pipe meeting the requirements on the chart. For Steel Round Pipe, the Contractor may choose the type of corrugated pipe and installation to furnish as long as the selection conforms to the limits indicated for the type specified. When furnishing Steel Arch Fipe, furnish pipe with corrugations as specified in plans. Minimum allowable cover for concrete and metal pipe is 2 feet for roadway culverts ard 1 foot for entrance culverts. Maximum cover for all sizes and installations of concrete arch pipe is 12 feet. Where a pipe size not listed in the table is required, the 'H' indicated for the next smallersize will apply. Special installations may be designed to exceed indicated maximumallowable cover by specific modification of one or more of the following conditions: Where site conditions favor such modifications, significant economy may result from special design installations and these should be considered. Special designs will specify particular modification of construction requirements or design criteria as

DESIGN CRITERIA FOR CONCRETE PIPE

The height of cover tables have been prepared from data in the "Concrete Pipe Design Manual" published by the American Concrete Pipe Association using the values listed below.

### FOR EMBANKMENT CONDITIONS

Fill Material Density	= w = 120 lbs. per cu. f.
Settlement Ratio	= rsd = +0.5
*	= ku = 0.13
Projection Ratio	= p = 0.9 (Class "C" bedding)
	= p = 0.7 (Class "B" bedding)
Factor of Safety	= F.S. = 1.33 on Ultimate Strength

0.37 (saturated yellow clay) and a coefficient of internal friction (u) of 0.34.

The values shown for concrete pipe were calculated br concrete pipe placed under embankment conditions. These values do not apply to to design and installation of sanitary sewer except where sanitary sewer would be placed under embankment conditions.

CONCRETE CULVERT PIPE CLASS "C" BEDDING						
DIAMETER	(H) MAX		VABLE COVER	R IN FEET		
OF PIPE 'D' Incnes	1500D (Class II)	2000D (Class III)	3000D (Class IV)	3750D (Class V)		
18	9	12	18	22		
24	10	13	19	23		
36	11	14	20	24		
48	11	15	21	25		
60	12	15	21	26		
72	12	16	22	26		
84	13	16	22	27		
96	13	16	23	27		
108	13	17	23	28		

CONCRETE CULVERT PIPE

CLASS "B" BEDDING

2000D

(Class III)

13

14

16

16

17

17

17

18

18

DIAMETER

OF PIPE 'D'

Inches

18

24

36

48

60

72

84

96

108

1500D

(Class II)

11

12

13

14

14

14

15

15

15

(H) MAXIMUM ALLOWABLE COVER IN FEET

3000D

(Class IV)

20

21

23

24

24

24

25

25

26

3750D

(Class V)

25

26

28

29

29

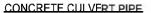
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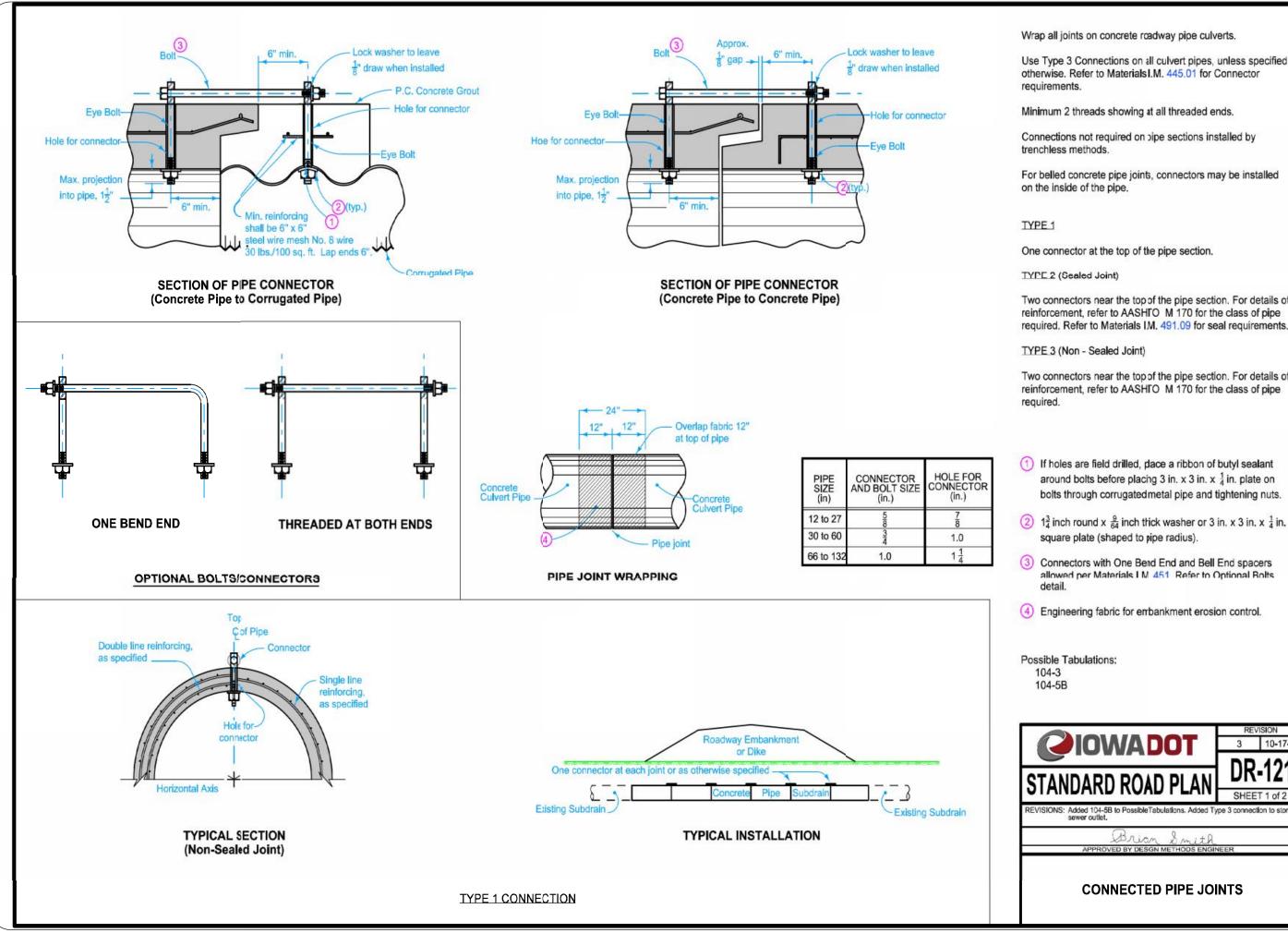
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31

32

Fill Material Density	= w = 120 lbs. per cu. f.
Settlement Ratio	= rsd = +0.5
•	= ku = 0.13
Projection Ratio	= p = 0.9 (Class "C" bedding)
	= p = 0.7 (Class "B" bedding)
Factor of Safety	= F.S. = 1.33 on Ultimate Strength
* Using a ratio of late	eral to vertical earth pressure (k) of





Use Type 3 Connections on all culvert pipes, unless specified otherwise. Refer to Materials I.M. 445.01 for Connector

Two connectors near the top of the pipe section. For details of reinforcement, refer to AASHIO M 170 for the class of pipe required. Refer to Materials I.M. 491.09 for seal requirements.

Two connectors near the top of the pipe section. For details of reinforcement, refer to AASHIO M 170 for the class of pipe

(1) If holes are field drilled, dace a ribbon of butyl sealant around bolts before placing 3 in. x 3 in. x  $\frac{1}{4}$  in. plate on bolts through corrugated metal pipe and tightening nuts.

(3) Connectors with One Bend End and Bell End spacers allowed per Materials I M 451 Refer to Optional Bolts

REVISIONS: Added 104-5B to PossibleTabulations. Added Type 3 connection to stor sewer outlet.

REVISION

3 10-17

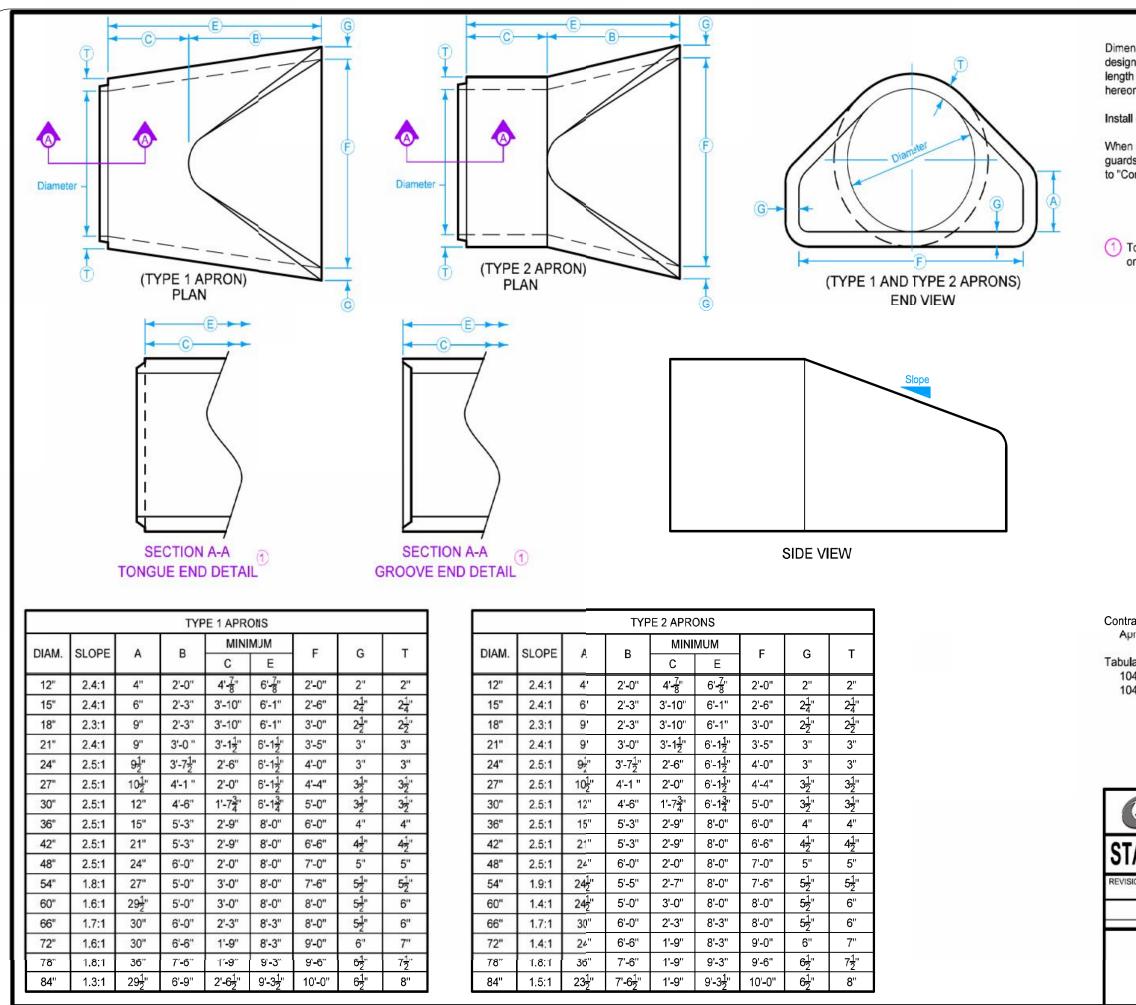
**DR-12** 

SHEET 1 of 2

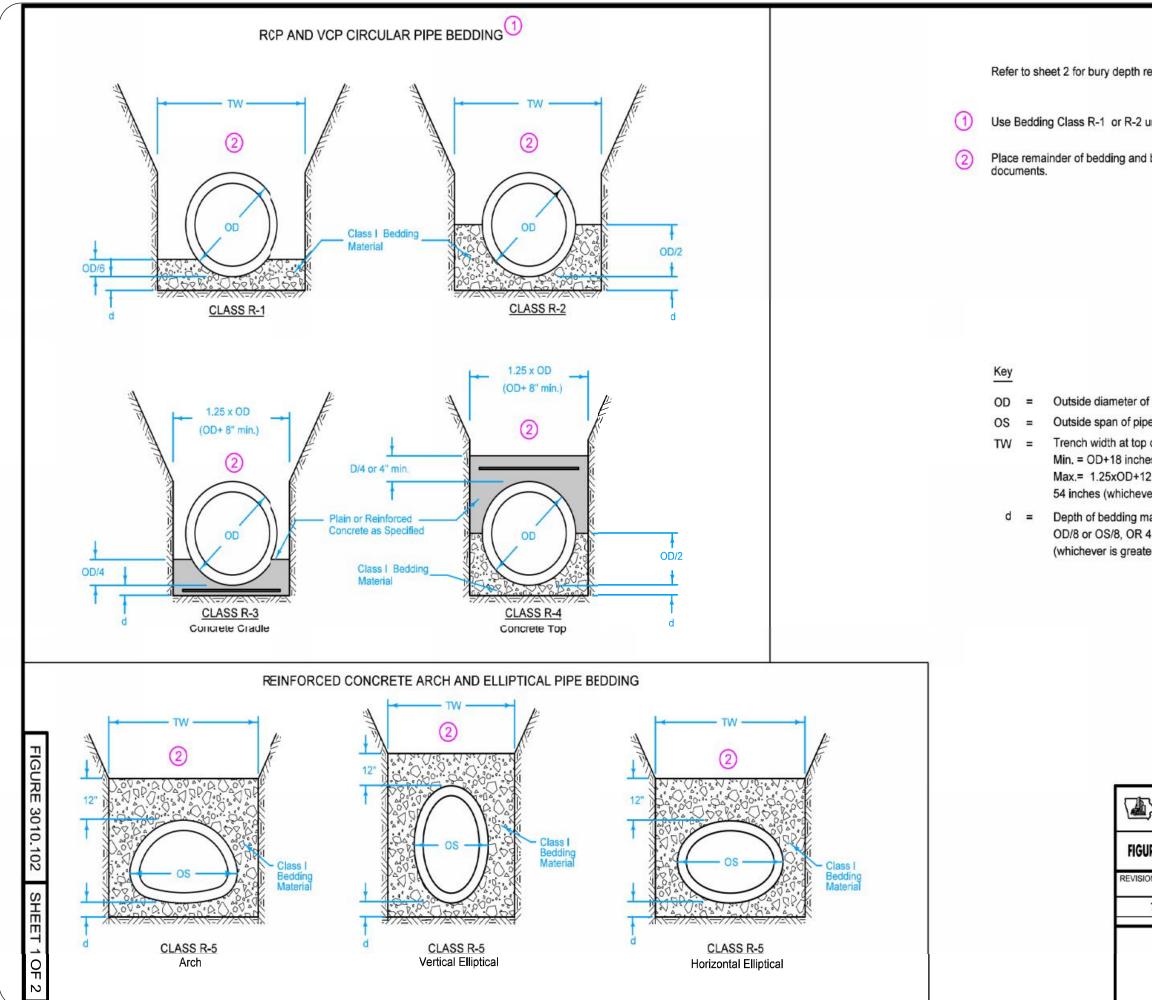
## **CONNECTED PIPE JOINTS**

	CONSULTANT:				
		IOWA DEPARTMENT OF	NATURAL RESOURCES	ENGINEERING SERVICES - WALLACE BUILING	502 E. YIH SI., LES MOINES, IA 50317-0034
					JUNIY
17			ROAD MAINTENANCE FOR:	KLUM LAKE ACCESS	
17			ROAD MAINTENANCE FOR:		
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	ŕ	BY			
17		BY	PROJEC		

**B.06** 



Insion 'E' shown is the minimum and is considered the in length. Adjust for any difference between the actual h of concrete apron installed and the length indicated on within the length of concrete culvert pipe furnished. Il connected pipe joints as shown on DR-121. In specified in the contract documents, install pipe apron ds as shown on DR-213. Pipe apron guards are incidental oncrete Aprons".	CONSULTANT:		
Fongue end used on inlet end section. Groove end used on outlet end section.	IOWA DEPARTMENT OF	NATURAL RESOURCES	ENGINEERING SERVICES - WALLACE BUILING 502 E. 9TH ST., DES MOINES, IA 50319-0034
ract Item: bron, Concrete lations: )4-3 )4-5C	<b>FYPICAL CROSS SECTIONS AND DETAILS</b>	ROAD MAINTENANCE FOR:	KLUM LAKE ACCESS
COWADOT 2 4-21-20 CANDARD ROAD PLAN SHEET 1 of 1 SIONS: Added Designer Info button.		REVISION	
APPROVED BY DESGN METHODS ENGINEER	DRAWN BY BLF CHK'D BY: SHEET NO:	20-06-58 DATE: DEC 202	3-01 20



restrictions. 2 unless specifiend backfill mate	ed otherwise. orials as specified in the o	contract	CONSULTANT:	
of pipe ipe			IOWA DEPARTMENT OF	NATURAL RESOURCES ENGINEERING SERVICES - WALLACE BUILING 502 E. 9TH ST., DES MOINES, IA 50319-0034
p of pipe: hes 12 inches OR ever is greater) material below & 4 inches ater)	pipe:			
		REVISION	<b>TYPICAL CROSS SECTIONS AND DETAILS</b>	ROAD MAINTENANCE FOR: KLUM LAKE ACCESS LOUISA COUNTY
	<b>OIOMADOT</b>	3 04-16-19	TYPIC/	
SURE 3010.102	STAND/RD ROAD PLAN	SHEET 1 of 2	NO. BY DATE	REVISION
D	ss 1 to ClassI in CLASS R-5 Vertica			
	IGID GRAVITY PIP		DRAWN BY: BLF CHK'D BY: SHEET NO:	PROJECT NUMBER: 20-06-58-01 DATE: DEC 2020 <b>B.08</b>

## ESTIMATED PROJECT QUANTITIES

	ESTIMATED PROJECT QUANTITIES		
ITEM N	О. ІТЕМ	UNIT	TOTAL
1	2125 - RESHAPING DITCHES	STA	7.7
2	2127 - RECONSTRUCTION OF ROADBED - BLADING/SHAPING	STA	85.7
3	2312 - GRANULAR SURFACING ON ROAD, CLASS A CRUSHED STONE - 1 - 1.5-INCH	TON	1599
4	2416 - APRON, CONC, 18"	EACH	4
5	2416 - APRON, CONC, 36"	EACH	1
6	2410 - AF NON, CONC, 30 2416 - 36" FLAPPER, HEAVY DUTY	EACH	1
	2416 - CULV, CONC RDWY PIPE, 18"	LF	66
8	2416 - CULV, CONC RDWY PIPE, 36"	LF	36
9	2507 - ENGINEERING FABRIC	SY	45
10	2507 - REVETMENT, CLASS D or E	TON	10
11	2507 - EROSION STONE	TON	10
12	2528 - TRAFFIC CONTROL	LS	1
13	2533 - MOBILIZATION	LS	1
IO.	DESCRIPTION		
1A.	lse for RCP bedding.		
2	<ul> <li>A. Repair all potholes by scarifying surrounding area to depth of pothole and recompacting.</li> <li>B. Re-establish roadway crown - 4% positive drainage each way from centerline; 4% across the width in bc</li> <li>C. Remove any high shoulder areas, before spreading new rock - dispose of excess material off site.</li> </ul>	inked sections.	
3	<ul><li>A. A final leveling of the aggregate after being dumped, is required.</li><li>B. From DOT approved source.</li></ul>		
	C. Approximate 2-inch depth		
4-8	A. Use type 3 connections.		
	B. Pin and wrap all joint.		
	C. Remove existing culverts and dispose of off project site.		
	<ul> <li>D. DOT approved source.</li> </ul>		
	E. Use Class II material for bedding.		
	F. Bed pipe halfway up to springline with bedding material.		
	G. Mechanically/manually compact bedding and backfill material.		
9,10	A. For 36-inch RCP outlet.		
	B. DOT approved source.		
11	A. For 18-inch RCP.		
	B. DOT approved source.		

### GENERAL NOTES

Verify actual locations and elevations with DNR Engineer.

All work shall conform to and be performed in accordance with all ordinances.

The contractor shall visit the site and inspect the project area and t themselves with the actual job conditions prior to bidding and the visit the project site shall not relieve the contractor from performin to the plans, specification, special provisions and contract.

The contractor shall verify, at the site, all dimensions and condition shall notify the DNR Engineer of any discrepancies, omissions, and, proceeding with the work.

It shall be the contractor's responsibility to provide waste areas or material (excavated material or broken concrete) which is not desi into the work involved on this project. No payment for overhaul w hauled to these sites. No material shall be placed within the rightstated in the plans or approved by the DNR Engineer.

The contractor shall not disturb desirable grass areas and desirable construction limits. The contractor will not be permitted to park o equipment or use these areas for storage of materials. Storage, pawill be subject to the approval of the DNR Engineer.

Where utilities and fixtures are shown as Existing on the plans or er construction area, it shall be the responsibility of the contractor to of those utilities prior to the beginning of any construction. The co access to these facilities for necessary modification of services. Un structures and utilities have been plotted from available surveys an their locations must be considered approximate only. It is possible existence of which is presently not known or shown. It is the contra determine their existence and exact location and to avoid damage additional compensation will be allowed to the contractor for any i caused by such work.

The contractor shall shape graded area to maintain surface drainage finish grade.

The contractor is expected to have materials, equipment, and labo to install and maintain erosion control features on the project. The fence, rock ditch checks, silt basins or silt dike.

	TANT:
ll applicable codes and	CONSULTANT
applicable codes and	
l thoroughly familiarize e start of work. Failure to	
ing the work in accordance	
ons shown on the plans and d/or conflicts prior to	
	SZ OF
r disposal sites for excess sirable to be incorporated	IRCI IRCI 3319-001
will be allowed for material t-of-way, unless specifically	S. IA 50
	OWA DEPARTMENT OF NATURAL RESOURCES ENGINERING SERVICES - WALLACE BUILING 502 E. 71H ST., DES MOINES, IA 50319-2034
le trees outside the or service vehicles and	<b>DEF</b> <b>RAL</b>
barking and service areas	ATU ATU 31NEERIN 2 E. 9TH
	<b>ÖZ</b> <sup>M</sup>
encountered within the o notify the DNR Engineer	-97
contractor shall be afforded Inderground facilities,	
and records and therefore le there may be others, the	72
tractor's responsibility to e thereto. No claims for	
/ interference or delay	
age. All elevations are to	
or available on a daily basis	
nis may involve seeding, silt	
	CCC SEFOR
	ND GENERAL I Road maintenance for: IM LAKE ACC
	S AND GENERAL INFO ROAD MAINTENANCE FOR: KLUM LAKE ACCESS
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	DRAWN BY PROJECT NUMBER: BLF 20-06-58-01
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	<b>C.01</b>

KLUM LAKE WMA

1000

FEET

**PROJECT OVERVIEW** 

COLUMBUS

JUNCTION

12 MILES

## MUSCATINE 15 MILES

5+00

0+00

5+00

0+00

+00

5+00

5+00

X61 HAVE



D 1 1	Ditt		
	ng Ditches	36 Inch Flapper	
18+50	20+50	30+00	
2 STA		1 EACH	
29+00	31+00		
23	STA	Engineering Fabric	
37+50	38+50	30+00	
15	5TA	45 SY	
Blading	/Shaping		
0+00	50+00	Revetment, Class E	
50	STA	30+00	
		10 TON	
Class A Rock		1967 IZA 2021	
0+00	50+00	Erosion Stone	
933 Ton		19+50	
		5 TON	
18 Inch	RCP FES	37+50	
19+50		5 TON	
2 EACH			
37+50			
2 EACH			
36 Inch RCP FES			
30+00			
1 E	ACH		
	N		

50+00

45+00

40+00

35+00

30+00

25+00

20+00

5+00

10+00

65+00 60+00 50+00

