

Steven L. Beshear Governor Frankfort, Kentucky 40622 www.transportation.ky.gov/

Michael W. Hancock, P.E. Secretary

September 15, 2011

CALL NO. 104

CONTRACT ID NO. 111329

ADDENDUM # 1

Subject: Pendleton County, BRO 5218 (004)

Letting September 23, 2011

(1) Revised - Plan Sheets - R2C & R2F

(2) Revised - Front Page

(3) Added - Utility Specifications - Pages 24(a)-24(oooooo) of 154

(4) Revised - Bid Items - Pages 148-154 of 154

Proposal revisions are available at <a href="http://transportation.ky.gov/contract/">http://transportation.ky.gov/contract/</a>.
Plan revisions are available at <a href="http://www.lynnimaging.com/kytransportation/">http://www.lynnimaging.com/kytransportation/</a>.

If you have any questions, please contact us at 502-564-3500.

Sincerely,

Ryan Griffith

Director

Division of Construction Procurement

RG:ks

**Enclosures** 



**USER:** USER: dplincks **DATE:** 9/13/2011 11: 54: 34 AM

FILE NAME: J:\1054.02\CAD\Plans\R0020CSU.dgn

E-SHEET NAME:

PREPARED BY \_\_\_\_\_ DATE \_

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# TON

**GENERAL** 

SUMMARY

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- APPROX. 14.5 ACRES

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- TOTAL QUANTITY COMES FROM PIPE DRAINAGE SUMMARY FOR PIPE TRENCH BACKFILL
- TOTAL INCLUDES PIPE SUMMARY
- 97 TONS

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TOTAL INCLUDES 24 TONS PIPE SUMMARY SHEET FROM

 $\bigcirc$ 

- FROM

PENDLETON

6-1048.00

R2C

9F

ITEM NO.

SHEET NO.

GENERAL SUMMARY \* CONTRARY TO THE 2008 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 204, OVERHAUL SHALL NOT BE CONSIDERED FOR ANY UNDERCUT, SPECIAL EXCAVATIONS, OR AUTHORIZED ROADWAY EXCAVATION ADJUSTMENTS FOR THIS PROJECT.

ESTIMATE FOR EARTHWORK CALCULATION IS FOR DESIGN ONLY. THE CONTRACTOR IS ADVISED THAT THE EARTHWORK CALCULATIONS SHOWN ARE FOR INFORMATION ONLY. ASSUMPTIONS FOR SHRINKAGE AND SWELL FACTORS ARE THE CONTRACTOR'S RESPONSIBILITY.

TOTAL

ROADWAY EMBANKMENT

35,890

ROADWAY EMBANKMENT = 34,419 EMBANKMENT BENCHING = 961 GRANULAR EMBANKMENT = 510

.... ....

TOTAL ROADWAY EXCAVATION =

8,953

C. Y.

EARTHWORK TOTALS\*

ROADWAY EXCAVATION = 6,196

EMBANKMENT BENCHING = 961

DITCH EXCAVATION = 1796

.... ....

TOTAL INCLUDES 619 S.Y. PIPE DRAINAGE SUMMARY

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AS

DIRECTED

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THE COST ASSOCIATED WITH LABOR AND INSTALLATION INTO THE DROP BOXES AND CURB BOXES SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE PERFORATED PIPE

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FOR CONTROLLING DUST CAUSED MAINTAINING TRAFFIC ONLY

ВҮ

6

INCLUDES 961 CUBIC YARDS EMBANKMENT BENCHING

FOR

(5)

FOR REMOVAL OF THE KY LICKING RIVER

22 BRIDGE OVER

**USER:** USER: dplincks **DATE:** 9/13/2011 11: 54: 34 AM

FILE NAME: J:\1054.02\CAD\Plans\R0020CSU.dq

**E-SHEET NAME:** 

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The state of the	)ATE )ATE )ATE	ITEM	DESCRIPTION	UNIT	PROJEC	
Part		0078	AGGREGATE, SIZE NO.	TON	_	
1000   1000						
		1000	77 4	· LIN FT		+
		1015	RTIFY EDGE DRAIN	LP. SUM		
10   10   10   10   10   10   10   10		1028	ATED PIPE HDWLS. TY. 3 - 4	1 1 1		
Color   Colo	Y - - -	1310	PIPE	LIN. FT.		
March   Marc	ED B`	1810		LIN. FT.		
	PARE CKED	2014	BARRICADE TYPE III	EACH	\	
2223   BANALAN ENBANNENT NETE   BEAM - NN.E FACE   BANALAN ENBANNENT NETE   BEAM - NN.E FACE   BANALAN   B. F. K. C. N. C. N	PRE CHE	2159	TEMPORARY DITCH			
2230 BESANKEY IN PLACE	) BY	2223		I		
M. GA. S.   2242   MATER   C)	OVED	2230		CU. YD.		
256 CLANDAL LONG ENDER DIVER DE LANGE PAGE  2567 CAMARIAL DON TO REDIDE DE TYPE D  2578 CLANDAR LONG ENDER DE TYPE D  2578 CLANDAR CLASS II ②  2578 CLANDAR CLASS II ③  2578 CLANDAR CLASS II 30	APPR	2242		M GALS.	7	
2557   OJANORALI END TREATMENT ITY   EACH		2360	TERMINAL SECTION NO 1	EACH	1001	
2338   SJARDRALL CON TO BRICKE BYO TYPE D   CINN FL   Z27		2367	END	EACH	_	
2429 RIGH-TOF-WAY MONUMENT TYPE IA EACH 2420 RIGH-TOF-WAY MONUMENT TYPE IA EACH 2430 R		2378	CON TO BRIDGE END TYPE	EACH		
2430 RIDHT-OF-MAY MONUMENT TYPE IA  2432 MINNESS BOS  2432 MINNESS BOS  2433 CHANNEL LINING - CLASS II ② TON 90  2434 CHANNEL LINING - CLASS III ③ TON 90  2545 CHANNEL LINING - CLASS III ③ TON 90  2546 CHANNEL LINING - CLASS III ③ TON 90  2548 CHANNEL CHANNE 90  2549 FABRIC CECINEXILLE "YPE II 90, YO. 188  2540 FABRIC CECINEXILLE "YPE II 90, YO. 188  2550 MAINTAIN 8 CONTROL TRAFFIC 90  2650 MAINTAIN 8 CONTROL TRAFFIC 90  2703 SILT TRAF TYPE A EACH 12  2703 CLEAN SILT TRAF TYPE B EACH 27  2704 CLEAN SILT TRAF TYPE B EACH 27  2705 CLEAN SILT TRAF TYPE B EACH 27  2706 CLEAN SILT TRAF TYPE B EACH 27  2707 CLEAN SILT TRAF TYPE B EACH 27  2708 CLEAN SILT TRAF TYPE B EACH 27  2708 CLEAN SILT TRAF TYPE B EACH 27  2709 CLEAN SILT TRAF TYPE B EACH 27  2709 CLEAN SILT TRAF TYPE B EACH 27  2709 CLEAN SILT TRAF TYPE B EACH 27  2700 CL		2429	MONUMENT TYPE	EACH		
2432 MINESS POSI  2483 CHANNEL LINING - CLASS II ② TON 95  22845 CHANNEL LINING - CLASS III ③ TON 95  22845 CHANNEL LINING - CLASS III ③ TON 95  22845 CHANNEL LINING - CLASS III ③ TON 95  22845 CHANNEL LINING - CLASS III ③ TON 95  22845 CHANNEL LINING - CLASS III ③ TON 95  22845 CHANNEL LINING - CLASS III ③ TON 95  22845 CHANNEL LINING - CLASS III ③ TON 95  22845 CHANNEL LINING - CLASS III ③ TON 95  22845 CHANNEL LINING - CLASS III ③ TON 95  22846 CHANNEL LINING - CLASS III ③ TON 95  22846 CHANNEL LINING - CLASS III 3		2430	MONUMENT TYPE	EACH	2	
2483   CHANNEL LINING - CLASS   1		2432	POST	EACH	6	
2562   SIONS   2568   MOBILIZATION   1.P. SIM   2568   MOBILIZATION   2.P. SIM   2.P.		2483	LINING - CLASS II	TON	908	
2562   SIONS   SO, FI.   3		2545	& GRUBBING (1)			
2568 MOBILIZATION LP. SUM 2569 PROCENTY   170 PROCESSING FRANCIC CETON TARE   1		2562	SIGNS	SQ. FT.	391	
2585   200E REP		2568	MOBILIZATION	LP. SUM		
2586   EBBE REY		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	\ \ \	
2596 FABRIC-GEOTEXTILE TYPE I S.O. YD. 2690 FABRIC GEOTEXTILE TYPE IV FOR PIPE (4) S.O. YD. 2690 FABRIC GEOTEXTILE TYPE IV FOR PIPE (4) S.O. YD. 2690 FABRIC GEOTEXTILE TYPE IV FOR PIPE (4) S.O. YD. 2690 FABRIC GEOTEXTILE TYPE IV FOR PIPE (4) S.O. YD. 2690 FABRIC GEOTEXTILE TYPE IV FOR PIPE (4) S.O. YD. 2690 FABRIC GEOTEXTILE TYPE IV FOR PIPE (4) S.O. YD. 2701 TEMPORARY SILT TRAP TYPE A SILT TRAP TYPE A SILT TRAP TYPE B SILT TRAP TYPE B SILT TRAP TYPE B SACH 2703 SILT TRAP TYPE B SACH 2704 CLEAN SILT TRAP TYPE B SACH 2709 CLEAN SILT TRAP TYPE B SACH 2709 CLEAN SILT TRAP TYPE (5) STAKING STAKING STAKING STAKING STAKING SIDEWALK - 4 INCH CONCRETE (5) SIDEWALK - 4 INCH CONCRETE (5) SIDEWALK - 4 INCH CONCRETE (5) SIDEWALK RAMP TYPE (1) SO. YD. 3290 SIDEWALK RAMP TYPE (1) SO. YD. 35950 EROSION CONTROL BLANKET (5) SO. YD. 35950 TEMPORARY SEEDING & PROTECTION SO. YD. 3500		2585	KEY COLON		1	
2600   FANTLE CHILLY   SOLVED   SOLVED		NF 00 00 00 00 00 00 00 00 00 00 00 00 00	GEOTEXTILE TYPE			
2650 MAINTAIN & CONTROL TRAFFIC LP, SUM 2701 TEMPORARY SILT FENCE LIN, FT. 2703 SILT TRAP TYPE A 2704 SILT TRAP TYPE B 2705 SILT TRAP TYPE C 2706 CLEAN SILT TRAP TYPE B 2707 CLEAN SILT TRAP TYPE B 2708 CLEAN SILT TRAP TYPE C 2708 CLEAN SILT TRAP TYPE C 2709 CLEAN SILT TRAP TYPE C 2709 CLEAN TEMPORARY SILT FENCE 2710 SIDEWALK - 4 INCH CONCRETE 2720 SIDEWALK - 4 INCH CONCRETE 2731 REMOVE STRUCTURE S 2731 REMOVE STRUCTURE S 2731 REMOVE STRUCTURE S 2732 SIDEWALK RAMP TYPE 1 3290 SIDEWALK RAMP TYPE 1 3290 SIDEWALK RAMP TYPE 1 5952 TEMPORARY MULCH 5953 TEMPORARY SEEDING & PROTECTION 5953 TEMPORARY SEEDING & PROTECTION 5964 SQ. YD. 30 5970 SQ. YD. 31		2600	-GEOTEXTILE TYPE IV FOR PIPE			+
2701   TEMPORARY SILT FENCE   LIN. FT.     2703   SILT TRAP TYPE A   EACH     2704   SILT TRAP TYPE B   EACH     2705   SILT TRAP TYPE C   EACH     2706   CLEAN SILT TRAP TYPE B   EACH     2707   CLEAN SILT TRAP TYPE C   EACH     2708   CLEAN SILT TRAP TYPE C   EACH     2709   EACH   EACH     2700   EACH     27		2650	IN & CONTROL TRAFFIC	l .		
2703   SILT TRAP TYPE B		2701	PORARY SILT			+
2705   SILT TRAP TYPE C   EACH   2706   CLEAN SILT TRAP TYPE B   EACH   2707   CLEAN SILT TRAP TYPE C   2708   CLEAN SILT TRAP TYPE C   2709   CLEAN SILT TRAP TYPE C   2720   SIDEWALK - 4 INCH CONCRETE   S0. YD.   2726   STAKING   LP. SUM   LP. SUM   2731   REMOVE STRUCTURE (S)   LP. SUM   LP. SUM   23287   SIDEWALK RAMP TYPE I   3290   SIDEWALK RAMP TYPE I   5950   EROSION CONTROL BLANKET (S)   S952   TEMPORARY MULCH   S0. YD.   39552   TEMPORARY SEEDING & PROTECTION   S0. YD.   35966   TOPDRESSING FERTILIZER   S0. YD.   3300   SO. YD.   3300   S0. YD.   330		2704	T TRAP TYPE	EACH	24	
2706 CLEAN SILT TRAP TYPE A  2707 CLEAN SILT TRAP TYPE B  2708 CLEAN SILT TRAP TYPE C  2709 CLEAN SILT TRAP TYPE C  2720 SIDEWALK - 4 INCH CONCRETE  2720 SIDEWALK - 4 INCH CONCRETE  2721 REMOVE STRUCTURE (\$)  2731 REMOVE STRUCTURE (\$)  2731 SIDEWALK RAMP TYPE I  3290 SIDEWALK RAMP TYPE I  3290 SIDEWALK RAMP TYPE 4  5950 EROSION CONTROL BLANKET (\$)  5952 TEMPORARY MULCH  5953 TEMPORARY SEEDING & PROTECTION  5966 TOPDRESSING FERTILIZER  EACH  EACH  EACH  EACH  SQ. YD.  30. YD.		2705	RAP TYPE C	EACH	18	
2708   CLEAN SILT TRAP TYPE C   EACH   2709   CLEAN SILT TRAP TYPE C   EACH   EACH   2709   CLEAN SILT TRAP TYPE C   SIDEWALK - 4 INCH CONCRETE   S0. YD.   2726   STAKING   LP. SUM   EACH   2731   REMOVE STRUCTURE (\$)   LP. SUM   27387   SIDEWALK RAMP TYPE 1   EACH   3290   SIDEWALK RAMP TYPE 4   EACH   5950   EROSION CONTROL BLANKET (\$)   S0. YD.   3955   TEMPORARY MULCH   S955   TEMPORARY SEEDING & PROTECTION   S0. YD.   3956   TOPDRESSING FERTILIZER   TON   3957		2706	SILT TRAP TYPE	EACH	96	-
2709   CLEAN TEMPORARY SILT FENCE   LIN. FT.   2720   SIDEWALK - 4 INCH CONCRETE   SQ. YD.   2726   STAKING   LP. SUM   LP. SUM   2731   REMOVE STRUCTURE (\$)   LP. SUM   LP. SUM   EACH   3287   SIDEWALK RAMP TYPE 1   EACH   EACH   5950   EROSION CONTROL BLANKET (\$)   S952   TEMPORARY MULCH   S953   TEMPORARY SEEDING & PROTECTION   SQ. YD. 344.0254   S966   TOPDRESSING FERTILIZER   TON   TON   TON   SO. YD. 34554   S966   TOPDRESSING FERTILIZER   TON   SO. YD. 34555   S966   TOPDRESSING FERTILIZER   TON   SO. YD. 34555   TEMPORARY SEEDING & PROTECTION   SQ. YD. 34555   S966   TOPDRESSING FERTILIZER   TON   SO. YD. 34555   S966   TOPDRESSING FERTILIZER   TON   S966		2708	SILT TRAP TYPE	EACH	54	
2720   SIDEWALK - 4 INCH CONCRETE   S0. YD.     2726   STAKING   LP. SUM     2731   REMOVE STRUCTURE (\$)   LP. SUM     3287   SIDEWALK RAMP TYPE     3290   SIDEWALK RAMP TYPE 4   EACH     5950   EROSION CONTROL BLANKET (\$)   S0. YD.     5952   TEMPORARY MULCH   S0. YD.     5953   TEMPORARY SEEDING & PROTECTION   S0. YD.     5966   TOPDRESSING FERTILIZER   TON     700   TON     701   TON     702   TON     703   TON     704   TON     705   TON     706   TON     707   TON     707   TON     708   TON     709   TON     700   TON	Ign	2709	TEMPORARY SILT	1 1		
2731 REMOVE STRUCTURE (S)  3287 SIDEWALK RAMP TYPE 1  3290 SIDEWALK RAMP TYPE 4  5950 EROSION CONTROL BLANKET (3)  5952 TEMPORARY MULCH  5953 TEMPORARY SEEDING & PROTECTION  5966 TOPDRESSING FERTILIZER  700  100  100  100  100  100  100  10	SU.c	2720	- 4 INCH	SQ. YD.		
3287 SIDEWALK RAMP TYPE 1  3290 SIDEWALK RAMP TYPE 4  5950 EROSION CONTROL BLANKET ③ 5952 TEMPORARY MULCH 5966 TOPDRESSING FERTILIZER  TON 5964	020(	2731	STRUCTURE	LP. SUM		
SIDEWALK RAMP TYPE 4  5950  EROSION CONTROL BLANKET (3)  S952  TEMPORARY MULCH  S0. YD. 30  S953  TEMPORARY SEEDING & PROTECTION  S0. YD. 30  TOPDRESSING FERTILIZER  TON	\R0	3287	RAMP TYPE 1	EACH	9	
5952 TEMPORARY MULCH  5953 TEMPORARY SEEDING & PROTECTION  5966 TOPDRESSING FERTILIZER  TON	'lans	3290	RAMP TYPE 4	EACH	2721	
5953 TEMPORARY SEEDING & PROTECTION  5966 TOPDRESSING FERTILIZER  TON	4D\F	5952	RY MULCH		3(	
5966 TOPDRESSING FERTILIZER TON		5953	EMPORARY SEEDING & PROTE			
		5966	OPDRESSING	TON	U	

# NOTES:

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APPROX.

14.5

ACRES

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TOTAL INCLUDES 24 TONS PIPE SUMMARY SHEET

FROM

\* CONTRARY TO THE 2008 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 204, OVERHAUL SHALL NOT BE CONSIDERED FOR ANY UNDERCUT, SPECIAL EXCAVATIONS, OR AUTHORIZED ROADWAY EXCAVATION ADJUSTMENTS FOR THIS PROJECT.

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TOTAL

ROADWAY

EMBANKMENT

35,890

C. Y.

ROADWAY EMBANKMENT = 34,419 EMBANKMENT BENCHING = 961 GRANULAR EMBANKMENT = 510

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TOTAL ROADWAY EXCAVATION =

8,953

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EARTHWORK TOTALS\*

ROADWAY EXCAVATION = 6,196

EMBANKMENT BENCHING = 961

DITCH EXCAVATION = 1796

.... ....

TOTAL INCLUDES 619 S.Y. PIPE DRAINAGE SUMMARY

FROM

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AS

DIRECTED

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ENGINEER

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THE COST ASSOCIATED WITH LABOR AND INSTALLATION INTO THE DROP BOXES AND CURB BOXES SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE PERFORATED PIPE

 $\bigcirc$ 

FOR CONTROLLING DUST CAUSED MAINTAINING TRAFFIC ONLY

ВҮ

6

INCLUDES 961 CUBIC YARDS EMBANKMENT BENCHING

FOR

(5)

FOR REMOVAL OF LICKING RIVER

THE KY

22 BRIDGE

OVER

4

TOTAL QUANTITY COMES FROM PIPE DRAINAGE SUMMARY FOR PIPE TRENCH BACKFILL

 $\bigcirc$ 

TOTAL INCLUDES PIPE SUMMARY

97

TONS

FROM

GENER,  $\vdash \\$ SUMMARY

**REVISED 09-13-2011** 

PENDLETON 9F 6-1048.00 ITEM N 0. SHEET R2C NO.

**GENERAL** 

**SUMMARY** 

**USER:** USER: dplincks **DATE:** 9/13/2011 11:56:29 AM

FILE NAME: J:\1054.02\CAD\Plans\R0020FSU.dgn

E-SHEET NAME:

PREPARED BY	DATE
CHECKED BY	DATE
APPROVED BY	DATE

# **PAVING AREAS**

	<b>,</b>		_		_							
ITEM	KY 22	MAIN STREET	APPROACH RIGHT 114+05	APPROACH LEFT 118+60	APPROACH LEFT 100+90	APPROACH RIGHT 100+90	ENTRANCES	KY 22 DETOUR	KY 159 DETOUR			TOTAL
	S	Q	U	A	R	E		Υ	Α	R	D	S
1.25" CL2 ASPH SURF 0.38D PG64-22	5,222	51	1,035	323	212	356	674	2,067	534			10,474
3.00" CL2 ASPH BASE 1.00D PG64-22					217	359	686	2,085	583			3,930
3.25" CL2 ASPH BASE 1.00D PG64-22	5,245	51	1,038	325								6,659
3.50" CL2 ASPH BASE 1.00D PG64-22 (TWO COURSES)	9,313	136	2,185	665								12,299
4.00" DGA BASE					217	359	759	2,085	583			4,003
4.50" DGA BASE	4,936	85	1,141	335								6,497
FULL DEPTH DGA BASE (CU. YDS.) 2	735		73	52	57	35	101	173	45			1,271
CEM CONC ENT PAVEMENT-8 INCH							51					51

# **PAVING SUMMARY**

EST]	ALL	
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ED A	AL T	
	$MI \times$	

ALL ASHALT MIXTURES SHALL BE ESTIMATED AT 110 LBS. PER SQ. YD. PER INCH OF DEPTH, UNLESS NOTED OTHERWISE.

FOR MAINTENANCE OF TRAFFIC

PAVING

AREAS

SUMMARY

ESTIMATED AT 2.07 TONS/CY

ESTIMATED AT 115 LBS. PER SQ. YD. PER INCH OF DEPTH.

	ITEM CODE	ITEM	UNIT	KY 22	APPROACHES	ENTRANCES	DETOURS	TOTAL
	301	CL2 ASPH SURF 0.38D PG64-22	TON	360	139	47	180	726
	212	CL2 ASPH BASE 1.00D PG64-22  DGA BASE 1	TON	2,731 2,799	926 988	114 384	442 1,066	4,213 5,237
S	2101	CEM CONC ENT PAVEMENT-8 INCH	SY		300	51	1,000	51
NOTES	20	TRAFFIC BOUND BASE 3	TON	250				250

PENDLETON 6-1048.00 R2F USER: USER: dplincks **DATE:** 9/13/2011 11: 56: 29 AM

FILE NAME: J:\1054.02\CAD\Plans\R0020FSU.dgn

E-SHEET NAME:

PAVING

AREAS

SUMMARY

PREPARED BY \_\_\_\_\_ DATE \_\_\_\_ CHECKED BY \_\_\_\_\_ DATE \_\_\_\_ APPROVED BY \_\_\_\_\_ DATE \_\_\_\_

# **PAVING AREAS**

ITEM	KY 22	MAIN STREET	APPROACH RIGHT 114+05	APPROACH LEFT 118+60	APPROACH LEFT 100+90	APPROACH RIGHT 100+90	ENTRANCES	KY 22 DETOUR	KY 159 DETOUR			TOTAL
	S	Q	U	Α	R	E	1	Υ	Α	R	D	S
1.25" CL2 ASPH SURF 0.38D PG64-22	5,222	51	1,035	323	212	356	674	2,067	534			10,474
3.00" CL2 ASPH BASE 1.00D PG64-22					217	359	686	2,085	583			3,930
3.25" CL2 ASPH BASE 1.00D PG64-22	5,245	51	1,038	325								6,659
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4.00" DGA BASE					217	359	759	2,085	583			4,003
4.50" DGA BASE	4,936	85	1,141	335								6,497
FULL DEPTH DGA BASE (CU. YDS.) 2	735		73	52	57	35	101	173	45			1,271
CEM CONC ENT PAVEMENT-8 INCH							51					51

## DAVING CHMMARY

		PAVIN	G SUMMARY					
	ITEM CODE	ITEM	UNIT	KY 22	APPROACHES	ENTRANCES	DETOURS	TOTAL
ALL ASHALT MIXTURES SHALL I ESTIMATED AT 110 LBS. PER SO OTHERWISE.  (1) ESTIMATED AT 115 LBS. PER PER INCH OF DEPTH.  (2) ESTIMATED AT 2.07 TONS/C	301	CL2 ASPH SURF 0.38D PG64-22 CL2 ASPH BASE 1.00D PG64-22	TON	360	139	47	180	726
L ASHALT N TIMATED AT R INCH OF HERWISE. ESTIMATED PER INCH O	212	CL2 ASPH BASE 1.00D PG64-22  DGA BASE 1	TON TON	2,731 2,799	926 988	114 384	442 1,066	4,213 5,237
NOTE  T MIXT  AT 11C  OF DEP  H OF D  H OF D	2101	CEM CONC ENT PAVEMENT-8 INCH	SY TON	250		51	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	51 250
NOTES  T MIXTUR AT 110 L )F DEPTH, ED AT 11 H OF DEP ED AT 2.	20	TRAFFIC BOUND BASE 3	TON	230				230
TES  XTURES SHA 110 LBS. PEI PTH, UNLES  T 115 LBS. DEPTH. T 2.07 TON								
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**REVISED 09-13-2011** PENDLETON COUNTY OF 6-1048.00 ITEM NO. SHEET NO.

R2F

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## Specifications (Water and Sewer Relocation)

THESE SPECIFICATIONS ARE FOR THE RELOCATION OF WATER AND SEWER FACILITIES OWNED BY THE CITY OF FALMOUTH ONLY **KY 22 Over Licking River** 

Water and Sewer Utility Relocation

City of Falmouth, KY

GRW Project No. 3950

September, 2011

**Bid Documents** 

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# DIVISION 1 GENERAL REQUIREMENTS

#### SECTION 01110 - SUMMARY OF WORK

#### PART 1 - GENERAL

#### 1.01 SCOPE OF WORK PERFORMED UNDER THIS CONTRACT

Construction of the KY 22 Over Licking River Water and Sewer Utility Relocation consisting of the replacement and/or relocation of various sizes and types of existing utilities including approximately: 535 L.F. of 4-inch, 6-inch and 8-inch DI water main, 710 L.F. of 8-inch PVC and 16-inch and 18-inch DI gravity sewer and 140 L.F. of 12-inch DI sewer force main; together with all related work as specified and shown on the Drawings.

#### 1.02 ENUMERATION OF DRAWINGS & SPECIFICATIONS

Following are the Drawings and Specifications which form the Water and Sewer Relocation:

<u>Drawings</u>	Sheet Number
Quantities Sheet Summary	1
Water and Sewer Plan – KY 22 – Sta. 100+15 – Sta. 110+00	2
Water and Sewer Plan - KY 22 - Sta. 110+00 - Sta. 123+25	3
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Specifications

See Table of Contents

#### PART 2 - PRODUCTS (Not Applicable)

#### PART 3 - EXECUTION (Not Applicable)

#### SECTION 01125 - SPECIAL PROVISIONS

#### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF REQUIREMENTS

- A. The Contractor shall be advised that where the word "Engineer" appears in the specifications and/or drawings, it shall be understood the "Engineer" is the Kentucky Transportation Cabinet Section Engineer. The Section Engineer, Utility Owner and Utility Owner Engineer, or their designated representatives, shall work cooperatively to inspect and accomplish the work. All decisions made during construction shall be agreeable to all parties. It shall be understood that the Kentucky Transportation Cabinet, through its Section Engineer, has ultimate authority in all decisions.
- B. The Contractor shall coordinate the project schedule such that the Water and Sanitary Sewer utility relocation portion of this project is completed prior to beginning any Highway work.
- C. The Contractor shall perform the utility relocation (Water and Sanitary Sewer) work in a continuous 120 calendar day time frame. If the Contractor fails to complete the work in the given time frame, he will be responsible for the Residents Inspector's time and expenses.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

#### SECTION 01271 - BASIS OF MEASUREMENT AND PAYMENT

#### PART 1 - GENERAL

#### 1.01 SCOPE OF WORK

- A. The Contractor shall furnish all necessary labor, machinery, tools, apparatus, equipment, materials, service and other necessary supplies and perform all work shown on the Drawings and/or described in the specifications and Contract documents at the unit prices for items in the following paragraphs.
- B. The Bidder declares that he has examined the site of the work and informed himself fully in regard to all conditions pertaining to the place where the work is to be done; that he has examined the plans, specification and Contract documents for the work, and has read all special provisions furnished prior to the opening of bids; and that he has further satisfied himself relative to the work to be performed. The Bidder further declares that he understands that unit quantities shown in the Proposal are approximately only, are subject to increase or decrease, and that, should the quantities of any of the items be decreased, the Bidder will make no claim for the anticipated profits. In addition, the Owner also reserves the right to adjust quantities, either by addition or deletion and as-BID unit price shall remain in effect for these quantity adjustments.
- C. All excavation required of the work shall be done as part of the total price for the complete project. All excavation shall be unclassified.

#### 1.02 GRAVITY SEWERS

- A. Payment for the gravity sewer lines of the different types and sizes will be made at the Contract Unit Price per linear foot in place, which price will include compensation for furnishing pipe, fittings, gaskets, polyethylene encasement (where required), all trenching (including rock excavation), bedding, laying, jointing, testing, backfilling (including flowable fill where required), filter fabric and crushed stone (where required), temporary surface restoration (all permanent surface restoration to be performed as part of the road work), connections to new manholes, and all temporary bypass pumping including all necessary materials and equipment. The quantity of sewer to be paid for shall be the length of pipe measured along the centerline of the completed pipeline without deducting the length of branches, fittings and manhole inverts. Backfill material shall be in accordance with the appropriate method shown on the drawings and in the detailed specifications. This pay item shall also include flowable fill backfill for the portion of 18-inch gravity sewer within the road construction disturbance limits, as noted on the drawings.
- B. Connections of existing sewers to new sewers will be additional and not included under the scope of this pay item.
- C. Pay depth measurements shall be taken from the contract profile drawings. If a change in alignment or depth is approved in the field, pay depths may then be measured in the field.
- D. The Contractor shall note that all excavation is unclassified. No separate payment will be made for rock excavation.

E. Installation and maintenance of any and all temporary erosion and sedimentation control devices and methods as described in the Contract Documents and as required by Local, State and Federal requirements are included under this pay item.

#### 1.03 FORCE MAIN

- A. Payment for force main will be made at the Contract Unit Price per linear foot in place, which price will include compensation for furnishing pipe, polyethylene encasement (where required), all trenching (including rock excavation), bedding, laying, jointing, testing, backfilling, geotextile fabric (where required), and temporary surface restoration (all final surface restoration to be performed as part of the road work). This pay item shall include flowable fill backfill for the entire portion of force main to be replaced within the road construction disturbance limits, as noted on the drawings.
- B. Installation and maintenance of any and all temporary erosion and sedimentation control devices and methods as described in the Contract Documents and as required by Local, State and Federal requirements are included under this pay item.
- C. The quantity of sewer to be paid for shall be the length of pipe measured along the centerline of the completed pipeline without deducting the length of branches, fittings and etc.

#### 1.04 STEEL ENCASEMENT PIPE - FORCE MAIN

A. The steel encasement pipe required to be installed in an open cut under the proposed bridge extents as noted in the drawings will be measured from end to end of the completed cover pipe in place, and will be paid for at the Contract Unit Price per linear foot, complete in place, which price will include the cover pipe, the carrier pipe laid therein, material and work for end seals and supporting and bracing the carrier pipe, excavation, bedding and backfilling, temporary surface restoration and all other items necessary for its construction as shown on the drawings and/or described in the detailed specifications. This pay item shall include flowable fill backfill for the entire portion of force main to be replaced within the road construction disturbance limits, as noted on the drawings.

#### 1.05 DUCTILE IRON FITTINGS – FORCE MAIN

A. Payment for furnishing and placing ductile iron fittings will be made at the Contract Unit Price per pound, complete in place, according to the fitting weight table given in the specifications. Price shall include all jointing material and where required, restraint systems (including concrete thrust and anchor blocks).

#### 1.06 MANHOLES

A. Payment for shallow and standard will be made at the Contract Unit Price each, complete in place, which price will include the manhole, complete with footing, precast concrete riser sections and cone (or flat slab top), cast iron frame and cover, inverts, steps, stub outs, excavation (including rock), backfilling (including flowable fill where required), temporary surface restoration and testing in accordance with the drawings and detailed specifications.

#### 1.07 MANHOLE BARREL EXTENSION

A. For manholes greater than six (6) feet in depth, the additional manhole barrel measured as defined in the detailed specifications will be paid for at the Contract Unit Price per vertical linear foot of additional depth, which price will include the precast concrete barrel sections, water proof seals, excavation (including rock) and backfilling (including flowable fill where required). No separate payment will be made for additional steps that are required. Depth of manhole shall be measured vertically from the top of cast iron frame to the downstream invert.

#### 1.08 MANHOLE DROP CONNECTION

A. Payment for manhole drop connection will be made at the Contract Unit Price for each drop constructed, regardless of size, which price includes excavation, bedding, concrete, furnishing all pipe, fittings, saddles, gaskets, compression couplings and stainless steel straps, backfilling (including flowable fill where required), geotextile fabric material (where required), temporary surface restoration and testing in accordance with the drawings and detailed specifications.

#### 1.09 CONNECTION TO EXISTING FORCE MAIN (Dry Tap)

A. Payment for connection to existing force main will be made at the Contract Unit Price each, complete in place, which price shall include compensation for removing existing caps or fittings, coordinating connection to existing main with pump station schedule, furnishing and installing new force main to the existing force main, hauling, excavating (including rock), backfilling (including flowable fill where required), geotextile fabric (where required), and all other installation requirements for connection to existing mains in association with the drawings and detailed specifications. Backfill material shall be in accordance with the appropriate method given on the drawings and in the detailed specifications.

#### 1.10 CUT & PLUG EXISTING FORCE MAIN

A. Payment for cutting and plugging existing force main shown on the drawings will be made at the Contract Unit Price each, complete in place, which price shall include compensation for furnishing and installing all pipe, fittings, hauling, excavation, cutting, placement of ductile iron plug, backfilling (including flowable fill where required), geotextile fabric (where required), temporary surface restoration and all other work and material required for abandoning existing water mains in association with the drawings and detailed specifications. Backfill material shall be in accordance with the appropriate method given on the drawings and in the detailed specifications.

#### 1.11 CONNECT EXISTING GRAVITY SEWER TO NEW MANHOLE

A. Payment for the installation of existing gravity sewer to a new manhole shall be made at the Contract Unit Price each complete in place. This cost will include all labor, material, excavation (including rock), and equipment to install the existing gravity sewer through the wall of the new manhole in accordance with the drawings and detailed specifications. All necessary concrete, pipe, plugs, fittings, adaptors, sealant, backfill (including flowable fill where required), geotextile fabric material (where required), temporary

surface restoration, etc. shall be considered a part of this pay item.

#### 1.12 CUSTOMER SERVICE CONNECTION – SEWER SERVICE

A. Payment for reconnections of existing sewer line of the various sizes and configurations will be made at the Contract Unit Price each, complete in place, which price shall include compensation for all labor, materials, excavation (including rock), installing the wye fitting, service piping to connect to existing service piping, couplings, fittings, etc. required to make the new connection, plugging/abandoning service line, backfill (including flowable fill where required), geotextile fabric material (where required), temporary surface restoration, materials and labor necessary to complete the work in accordance with the drawings and detailed specifications.

#### 1.13 WATER MAIN

- A. Payment for furnishing and installing the water main of different types and sizes will be made at the Contract Unit Price per linear foot, complete in place, which price shall include compensation for furnishing, hauling, polyethylene encasement (where required), excavation (including rock), bedding, laying, installation of pipe location tape, jointing, testing, backfilling (including flowable fill where required), geotextile fabric materials (where required), temporary surface restoration (all final surface restoration to be performed as part of the road work), disinfection and cleanup. The quantity of water line to be paid for shall be the length of the complete water main measured along the centerline without any deduction for lengths of fittings, valves or other appurtenances. Backfill material shall be in accordance with the appropriate method shown on the drawings and in the detailed specifications.
- B. Installation and maintenance of any and all temporary erosion and sedimentation control devices and methods as described in the Contract Documents and as required by Local, State and Federal requirements are included under this pay item.

#### 1.14 STEEL ENCASEMENT PIPE - WATER MAIN

A. The steel encasement pipe required to be installed in an open cut of the size indicated in the drawings will be measured from end to end of the completed cover pipe in place, and will be paid for at the Contract Unit Price per linear foot, complete in place, which price will include the cover pipe, the carrier pipe laid therein, material and work for end seals and supporting and bracing the carrier pipe, excavation, bedding and backfilling (including flowable fill where required), geotextile fabric material (where required), temporary surface restoration and all other items necessary for its construction as shown on the drawings and/or described in the detailed specifications. Backfill material shall be in accordance with the appropriate method shown on the drawings and in the detailed specifications.

#### 1.15 DUCTILE IRON FITTINGS – WATER MAIN

A. Payment for furnishing and placing ductile iron fittings will be made at the Contract Unit Price per pound, complete in place, according to the fitting weight table given in the specifications. Price shall include all jointing material and where required, restraint systems (including concrete thrust and anchor blocks).

#### 1.16 CONNECTION TO EXISTING WATER MAINS (Dry Tap)

A. Payment for connection to existing water mains will be made at the Contract Unit Price each, complete in place, which price shall include compensation for removing existing caps or fittings, closing valves to isolate connection, furnishing and installing new water main to the existing water main, hauling, excavating (including rock), backfilling (including flowable fill where required), geotextile fabric (where required), and all other installation requirements for connection to existing mains in association with the drawings and detailed specifications. Backfill material shall be in accordance with the appropriate method given on the drawings and in the detailed specifications.

#### 1.17 CUT & PLUG EXISTING WATER MAINS

B. Payment for cutting and plugging existing water mains of all sizes and types shown on the drawings will be made at the Contract Unit Price each, complete in place, which price shall include compensation for furnishing and installing all pipe, fittings, hauling, excavation, cutting, placement of duetile iron plug, backfilling (including flowable fill where required), geotextile fabric (where required), temporary surface restoration and all other work and material required for abandoning existing water mains in association with the drawings and detailed specifications. Backfill material shall be in accordance with the appropriate method given on the drawings and in the detailed specifications.

#### 1.18 CUSTOMER SERVICE CONNECTION – WATER SERVICE:

- A. Payment for customer service connections of the various sizes and configurations will be made at the Contract Unit Price each, complete in place, which shall include compensation for tapping the water main and furnishing and installing service connector or corporation stop, steel casing pipe, furnishing and setting meter box, furnishing the meter and cover, and all coupling, fittings, etc. to reconnect to the existing yard line. This pay item also includes service piping necessary to make the connection from the new main line to the meter box and from the meter to the existing yard line, together with all related appurtenances in association with the drawings and detailed specifications necessary to provide customer connections.
- B. Backfilling (including flowable fill where required), temporary surface restoration (all final surface restoration to be performed as part of the road work) and geotextile fabric material (where required) are included under the scope of this pay item. Backfill material shall be in accordance with the appropriate method shown on the drawings and in the detailed specifications.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

#### SECTION 01310 - PROJECT COORDINATION

#### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF REQUIREMENTS

Minimum administrative and supervisory requirements necessary for coordination of work on the project include but are not necessarily limited to the following:

- Coordination and meetings.
- B. Limitations for use of site.
- C. Coordination of crafts, trades and subcontractors.
- D. General installation provisions.
- E. Cleaning and protection.
- F. Conservation and salvage.

#### 1.02 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

#### 1.03 COORDINATION AND MEETINGS

A. Monthly general project coordination meetings will be held at regularly scheduled times convenient for all parties involved. These meetings are in addition to specific meetings held for other purposes, such as regular project meetings and special pre-installation meetings. Representation at each meeting by every party currently involved in coordination or planning for the work of the entire project is requested. Meetings shall be conducted in a manner which will resolve coordination problems. Results of the meeting shall be recorded and copies distributed to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

#### 1.04 LIMITATIONS ON USE OF THE SITE

A. Limitations on site usage as well as specific requirements that impact site utilization are indicated on the drawings and by other contract documents. In addition to these limitations and requirements, allocation of available space shall be administered equitably among entities needing both access and space so as to produce the best overall efficiency in performance of the total work of the project. Schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.

#### 1.05 COORDINATION OF CRAFTS, TRADES AND SUBCONTRACTORS

- A. The Contractor shall coordinate the work of all the crafts, trades and subcontractors engaged on the work, and he shall have final responsibility as regards the schedule, workmanship and completeness of each and all parts of the work.
- B. All crafts, trades and subcontractors shall be made to cooperate with each other and with others as they may be involved in the installation of work which adjoins, incorporates, precedes or follows the work of another. It shall be the Contractor's responsibility to point out areas of cooperation prior to the execution of subcontractor agreements and the assignment of the parts of the work. Each craft, trade and subcontractor shall be made responsible to the Owner, for furnishing embedded items and giving directions, for doing all cutting and fitting and making all provisions for accommodating the work, and for protecting, patching, repairing and cleaning as required to satisfactorily perform the work.
- C. The Contractor shall be responsible for all cutting, digging and other action of his subcontractors and workmen. Where such action impairs the safety or function of any structure or component of the project, the Contractor shall make such repairs, alterations and additions as will, in the opinion of the Engineer, bring said structure or component back to its original design condition at no additional cost to the Owner.
- D. Each subcontractor is expected to be familiar with the General Requirements and all sections of the detailed Specifications for all other trades and to study all Drawings applicable to his work including Architectural and Structural Drawings, to the end that complete coordination between trades will be effected. Consult with the Engineer if conflicts exist on the Drawings.
- E. Special attention shall be given to points where ducts or piping must cross other ducts or piping, where lighting fixtures must be recessed in ceilings and where ducts, piping and conduits must fit into walls and columns. It shall be the responsibility of such subcontractor to leave the necessary room for other trades.
- F. No extra compensation will be allowed to cover the cost of removing piping, conduit, ducts, etc., or equipment found encroaching on space required by others.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

#### SECTION 01320 - PROGRESS SCHEDULES

#### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF REQUIREMENTS

#### A. Scheduling Responsibilities:

- 1. In order to provide a definitive basis for determining job progress, a construction schedule of a type approved by the Owner will be used to monitor the project.
- The Contractor shall be responsible for preparing the schedule and updating on a
  monthly basis. It shall at all times remain the Contractor's responsibility to
  schedule and direct his forces in a manner that will allow for the completion of
  the work within the contractual period.

#### B. Construction Hours:

- 1. No work shall be done between 6:00 p.m. and 7:00 a.m. nor on Saturdays, Sundays or legal holidays without the prior written permission of the Owner. However, emergency work may be done without prior written permission.
- 2. If the Contractor, for his convenience and at his own expense, should desire to carry on his work at night or outside the regular hours, he shall submit a written request to the Engineer and shall allow nine (9) days for satisfactory arrangements to be made for inspecting the work in progress. If permission is granted, the Contractor shall light the different parts of the project as required to comply with all applicable federal, state, and local regulations. The Contractor shall also revise his schedule as appropriate at the next monthly schedule update meeting to reflect the changes in working hours.

#### C. Progress of the Work:

- 1. The work shall be started within ten (10) days following the Notice to Proceed and shall be executed with such progress as may be required to prevent delay to other Contractors or to the general completion of the project. The work shall be executed at such times and in or on such parts of the project, and with such forces, material and equipment, to assure completion of the work in the time established by the Contract.
- 2. The Contractor agrees that whenever it becomes apparent from the current monthly schedule update that delays have resulted and, hence, that the Contract completion date will not be met or when so directed by the Owner, he will take some or all of the following actions at no additional cost to the Owner:
  - a. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of work.
  - b. Increase the number of working hours per shift, shifts per working day or days per week, the amount of construction equipment, or any combination of the foregoing to substantially eliminate the backlog of work.

- Reschedule activities to achieve maximum practical concurrency of accomplishment of activities, and comply with the revised schedule.
- d. The Contractor shall submit to the Owner or the Owner's representative for review a written statement of the steps he intends to take to remove or arrest the delay to the critical path in the accepted schedule. If the Contractor should fail to submit a written statement of the steps he intends to take or should fail to take such steps as required by the Contract, the Owner may direct the level of effort in manpower (trades), equipment, and work schedule (overtime, weekend and holiday work, etc.), to be employed by the Contractor in order to remove or arrest the delay to the critical path in the accepted schedule, and Contractor shall promptly provide such level of effort at no additional cost to the Owner.

#### 1.02 CONSTRUCTION SCHEDULE

A. Within ten (10) calendar days of the Notice to Proceed, the Contractor shall submit to the Engineer five (5) copies of his proposed schedule. The schedule will be the subject of a schedule review meeting with the Contractor, the Engineer and the Owner or the Owner's representative within one (1) week of its submission. The Contractor will revise and resubmit the schedule until it is acceptable and accepted by the Owner or the Owner's representative.

#### 1.03 SUBMITTAL SCHEDULE

- A. In addition to the above scheduling requirements, the Contractor will be required to submit a complete and detailed listing of anticipated submittals during the course of the Contract. The Contractor will coordinate his submittals with those of his Subcontractors and Suppliers and will identify each submittal by Contract drawing number and specification number. The anticipated submission date for each submittal must be indicated along with the date on which its return is anticipated. For planning purposes, the Engineer will usually return shop drawings thirty (30) days after receipt. However, longer durations for review will not be considered a basis for a claim.
- B. The Submittal Schedule must be submitted within twenty (20) working days of the Notice to Proceed and will be the subject of a special meeting with the Engineer and the Owner or the Owner's representative within one (1) week of the schedule's submission. At that meeting, the Submittal Schedule will be reviewed for comprehensiveness and feasibility. The Engineer will adjust the projected return dates based on the need for more or less time for each submittal's review. The Submittal Schedule will then be accepted or revised as required.

#### 1.04 SCHEDULE UPDATES

#### A. Monthly Meetings:

A monthly Schedule Update Meeting will be held in conjunction with the applicable progress meeting at the construction site to review and update the Schedule. The Schedule Update Meetings will be chaired by the Owner or the Owner's representative and attended by the Contractor and the Engineer. Actual progress of the previous month will be recorded and future activities will be reviewed. The duration of activities and

their logical connections may be revised as needed. Decisions made at these meetings and agreed to by all parties are binding with the exception that no contractual completion dates will be modified without formal written requests and acceptance as specified herein.

#### B. Revisions to Schedule:

The Schedule shall be formally revised if any of the following conditions are encountered:

- When a delay in completion of any work item or sequence of work items results in an indicated extension of the project completion.
- When delays in submittals or deliveries or work stoppages are encountered which
  make replanning or rescheduling of the work necessary.
- When the schedule does not represent the actual prosecution and progress of the project.

#### 1.05 CONTRACT COMPLETION TIME

#### A. Causes for Extensions:

The Contract completion time will be adjusted only for causes specified in this Contract. In the event the Contractor requests an extension of any Contract completion date, he shall furnish such justification and supporting evidence as the Owner or the Owner's representative may deem necessary for a determination as to whether the Contractor is entitled to an extension of time under the provisions of this Contract. The Owner, with the assistance of the Engineer, will, after receipt of such justification and supporting evidence, make findings of fact and will advise the Contractor in writing thereof.

#### B. Requests for Time Extension:

Each request for change in any Contract completion date shall be initially submitted to the Owner within the time frame stated in the General Conditions. All information known to the Contractor at that time concerning the nature and extent of the delay shall be transmitted to the Owner at that time. Within the time frame stated in the General Conditions but before the date of final payment under this Contract, all information as required above concerning the delay must be submitted to the Owner. No time extension will be granted for requests which are not submitted within the foregoing time limits.

#### PART 2 - PRODUCTS (Not Applicable)

#### PART 3 - EXECUTION (Not Applicable)

#### SECTION 01340 - SHOP DRAWINGS, PRODUCT DATA, SAMPLES AND RFI'S

#### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF REQUIREMENTS

- A. General: This section specifies procedural requirements for non- administrative submittals including shop drawings, product data, samples (when samples are specifically requested) and other miscellaneous work-related submittals. Shop drawings, product data, samples and other work-related submittals are required to amplify, expand and coordinate the information contained in the Contract Documents.
- B. Refer to other Division-1 sections and other Contract Documents for Specifications on administrative, non-work-related submittals. Such submittals include, but are not limited to the following items:
  - 1. Permits.
  - Payment applications.
  - Performance and payment bonds.
  - Insurance certificates.
  - Inspection and test reports.
  - Schedule of values.
  - Progress reports.
  - Listing of subcontractors.
  - 9. Operating and Maintenance Manuals
- C. Paper submittals shall be furnished in at least six (6) copies and shall be checked and reviewed by the Contractor before submission to the Engineer. The review of the submittals by the Engineer shall not be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory. Review of such submittals will not relieve the Contractor of the responsibility for any errors which may exist as the Contractor shall be responsible for the dimensions and design of adequate connections, details, and satisfactory construction of all work.
- D. All Requests for Information (RFI) to Engineer shall be submitted electronically.

#### 1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.
- B. Section 01780 Operating and Maintenance Manuals.

#### 1.03 DEFINITIONS

- A. Shop drawings are technical drawings and data that have been specially prepared for this project, including but not limited to the following items:
  - Fabrication and installation drawings.
  - Setting diagrams.
  - 3. Shopwork manufacturing instructions.
  - 4. Templates.
  - 5. Patterns.
  - 6. Coordination drawings (for use on-site).
  - 7. Schedules.
  - 8. Design mix formulas.
  - 9. Contractor's engineering calculations.

Standard information prepared without specific reference to a project is not considered to be shop drawings.

- B. Product data includes standard printed information on manufactured products that has not been specially-prepared for this project, including but not limited to the following items:
  - 1. Manufacturer's product specifications and installation instructions.
  - Standard color charts.
  - Catalog cuts.
  - Roughing-in diagram and templates.
  - Standard wiring diagrams.
  - Printed performance curves.
  - Operational range diagrams.
  - Mill reports.
  - Standard product operating and maintenance manuals.
- C. Samples, where specifically required, are physical examples of work, including but not limited to the following items:
  - Partial sections of manufactured or fabricated work.

- 2. Small cuts or containers of materials.
- 3. Complete units of repetitively-used materials.
- Swatches showing color, texture and pattern.
- Color range sets.
- 6. Units of work to be used for independent inspection and testing.
- D. Miscellaneous submittals are work-related, non-administrative submittals that do not fit in the three previous categories, including, but not limited to the following:
  - Specially-prepared and standard printed warranties.
  - Maintenance agreements.
  - 3. Workmanship bonds.
  - Survey data and reports.
  - Testing and certification reports.
  - Record drawings.
  - Field measurement data.

#### 1.04 SUBMITTAL PROCEDURES

- A. General: Refer to the General Conditions and Paragraph 1.02A hereinbefore for basic requirements for submittal handling.
- B. Coordination: Coordinate the preparation and processing of submittals with the performance of the work. Coordinate each separate submittal with other submittals and related activities such as testing, purchasing, fabrication, delivery and similar activities that require sequential activity.

It is the Contractor's responsibility to make such field measurements as are needed to base submittals on actual field conditions to assure proper connection, fit, function and performance of all work and equipment in the execution of the contract work.

Coordinate the submittal of different units of interrelated work so that one submittal will not be delayed by the Architect/Engineer's need to review a related submittal. The Architect/Engineer reserves the right to withhold action on any submittal requiring coordination with other submittals until related submittals are forthcoming.

C. Coordination of Submittal Times: Prepare and transmit each submittal to the Architect/Engineer sufficiently in advance of the scheduled performance of related work and other applicable activities. Transmit different kinds of submittals for the same unit of work so that processing will not be delayed by the Architect/Engineer's need to review submittals concurrently for coordination.

- D. Review Time: Allow sufficient time so that the installation will not be delayed as a result of the time required to properly process submittals, including time for resubmittal, if necessary. Advise the Architect/Engineer on each submittal, as to whether processing time is critical to the progress of the work and if the work would be expedited if processing time could be shortened.
  - Allow a longer time period where processing must be delayed for coordination with subsequent submittals. The Architect/Engineer will advise the Contractor promptly when it is determined that a submittal being processed must be delayed for coordination.
  - No extension of time will be authorized because of the Contractor's failure to transmit submittals to the Architect/Engineer sufficiently in advance of the work.
- E. Submittal Preparation: Mark each submittal with a permanent label for identification. Provide the following information on the label for proper processing and recording of action taken.
  - 1. Project name.
  - 2. Date.
  - Name and address of Architect/Engineer.
  - Name and address of Contractor.
  - Name and address of subcontractor.
  - Name and address of supplier.
  - Name of manufacturer.
  - Number and title of appropriate specification section.
  - 9. Drawing number and detail references, as appropriate.
  - Similar definitive information as necessary.
- F. All submittals shall be referenced to the applicable item, section and division of the Specifications, and to the applicable drawing(s) or drawing schedule(s). Include only one item in a submittal.
- G. The Contractor shall review and check submittals, and shall indicate his review by initials and date. Any submittal received without this evidence of review shall be returned to the Contractor without review.

- H. If the submittals deviate from the Contract Drawings and/or Specifications, the Contractor shall advise the Engineer in writing of the deviation and the reasons therefore.
- I. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Architect/Engineer, and to other destinations as indicated, by use of a transmittal form. Submittals received from sources other than the Contractor will be returned to the sender "without action".
- J. Electronic Submittals: If the electronic method of submittals is agreed to by Contractor, Engineer, and Owner, the format and procedures will be determined and implemented prior to any submittals. Submittals will be processed through "Newforma" software. Each item of the submittal documents shall be in .pdf format and shall be oriented so that they are read from upper left corner to lower right corner, with no rotation of said document being required after receiving it. The .pdf file shall be named so that it describes the item being submitted. All other requirements herein are part of the electronic submittal process with the exception of the duplicate copies. Contractor stamp indicating review and any comments or notes must be on the .pdf submittal.

#### 1.05 SPECIFIC SUBMITTAL REQUIREMENTS

A. Shop drawings shall be prepared by a qualified detailer. Details shall be identified by reference to sheet and detail numbers shown on Contract Drawings. Where applicable, show fabrication, layout, setting and erection details.

Shop drawings are defined as original drawings prepared by the Contractor, subcontractors, suppliers, or distributors performing work under this Contract. Shop drawings illustrate some portion of the work and show fabrication, layout, setting or erection details of equipment, materials and components. The Contractor shall, except as otherwise noted, have prepared the number of reviewed copies required for his distribution plus four (4) which will be retained by the Engineer. Shop drawings shall be folded to an approximate size of 8-1/2" x 11" and in such manner that the title block will be located in the lower right-hand corner of the exposed surface.

- B. Project data shall include manufacturer's standard schematic drawings modified to delete information which is not applicable to the project, and shall be supplemented to provide additional information applicable to the project. Each copy of descriptive literature shall be clearly marked to identify pertinent information as it applies to the project.
- C. Where samples are required, they shall be adequate to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged. Provide sufficient size and quantity to clearly illustrate functional characteristics of product and material, with integrally related parts and attachment devices, along with a full range of color samples.
- D. In the event the Engineer does not specifically reject the use of material or equipment at variance to that which is shown on the Drawings or specified, the Contractor shall, at no additional expense to the Owner, and using methods reviewed by the Engineer, make any changes to structures, piping, controls, electrical work, mechanical work, etc., that may be necessary to accommodate this equipment or material. Should equipment other than that on which design drawings are based be accepted by the Engineer, shop drawings shall be submitted detailing all modification work and equipment changes made necessary by the substituted item.

- E. Additional information on particular items, such as special drawings, schedules, calculations, performance curves, and material details, shall be provided when specifically requested in the technical Specifications.
- F. Submittals for all electrically operated items (including instrumentation and controls) shall include complete size, color coding, all terminations and connections, and coordination with related equipment.
- G. Equipment shop drawings shall indicate all factory or shop paint coatings applied by suppliers, manufacturers and fabricators; the Contractor shall be responsible for insuring the compatibility of such coatings with the field-applied paint products and systems.
- H. Fastener specifications of manufacturer shall be indicated on equipment shop drawings.
- I. Where manufacturer's brand names are given in the Specifications for building and construction materials and products, such as grout, bonding compounds, curing compounds, masonry cleaners, waterproofing solutions and similar products, the Contractor shall submit names and descriptive literature of such materials and products he proposes to use in this Contract.
- J. No material shall be fabricated or shipped unless the applicable drawings or submittals have been reviewed by the Engineer and returned to the Contractor.
- K. All bulletins, brochures, instructions, parts lists, and warranties package with and accompanying materials and products delivered to and installed in the project shall be saved and transmitted to the Owner through the Engineer.

#### 1.06 REVIEW STATUS

- A. Submittals will be returned, stamped with the following classifications: "Reviewed",
   "Furnish as Corrected", "Revise and Resubmit", "Rejected", or "Submit Specified Item".
- B. In some instances, corrections to dimensions or clarification notations will be required, in which case the drawings will be marked "Furnish as Corrected." These shop drawings will not be required to be resubmitted for further approval unless the submittal has been marked "Resubmit Record Copy." If the supplier makes additional modifications after receiving a "Furnish as Corrected" disposition, the drawings must then be resubmitted for review.

In the event the submittal is not accepted, two (2) copies will be returned to the General Contractor marked for resubmittal, as follows:

Revise and Resubmit Rejected Submit Specified Item

Upon return of a submittal marked "Revise and Resubmit", the Contractor shall promptly make the revisions indicated and repeat the initial approval procedure. The "Submit Specified Item" notation indicates that the submittal does not meet the specification. The "Rejected" notation is used to indicate materials or equipment that are not acceptable and are not included in the project. Upon return of a drawing so marked, the Contractor shall repeat the initial approval procedure, utilizing acceptable materials or equipment.

#### 1.07 REMINDER OF CONTRACTOR RESPONSIBILITIES

- A. Verify field measurements, field construction criteria, catalog numbers, and similar data.
- B. Coordinate each submittal with requirements of work and of Contract Documents.
- C. Notify Engineer, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.
- D. Begin no work, and have no material or products fabricated or shipped which requires submittals until return of submittals with Engineer's stamp and initials or signature indicating review.
- E. It is emphasized that the review of shop drawings by the Engineer is for general conformance to the Contract Drawings and Specifications, but subject to the detailed requirements of the Contract Drawings and Specifications. Although the Engineer may check submitted data in more or less detail, such checking is an effort to discover errors and omissions in the Contractor's drawings and to assist the Contractor in coordinating and expediting his work, but shall in no way relieve the Contractor of his obligation and responsibility to properly coordinate the work, and to Engineer the details of the work in such a manner, that the purpose and intent of the Contract will be achieved nor shall any such detailed checking by the Engineer be construed as placing on him or on the Owner, any responsibility for the accuracy, proper fit, functioning or performance of any phase of the work included in this Contract. The Contractor is responsible for confirmation and correlation of dimensions at the job site; for information that pertains solely to the fabrication processes or to the techniques of construction; for the coordination of the work of all trades; and for performance of his work in a safe and satisfactory manner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

#### SECTION 01631 - PRODUCTS AND SUBSTITUTIONS

#### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF REQUIREMENTS

- A. General: Substitution of materials and/or equipment is defined in Paragraph 6.7.1 of the General Conditions and more fully hereinafter.
- B. Definitions: Definitions used in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents including such terms as "specialties", "systems", "structure", "finishes", "accessories", "furnishings", "special construction" and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry.
  - "Products" are items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the project or taken from the Contractor's previously purchased stock. The term "product" as used herein includes the terms "material", "equipment", "system" and other terms of similar intent.
  - 2. "Named Products" are products identified by use of the manufacturer's name for a product, including such items as a make or model designation, as recorded in published product literature, of the latest issue as of the date of the Contract Documents.
  - "Materials" are products that must be substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form units of work.
  - 4. "Equipment" is defined as a product with operational parts, regardless of whether motorized or manually operated, and in particular, a product that requires service connections such as wiring or piping.
- C. Substitutions: The Contractor's requests for changes in the products, materials, equipment and methods of construction required by the Contract Documents are considered requests for "substitutions", and are subject to the requirements specified herein. The following are not considered as substitutions:
  - Revisions to the Contract Documents, where requested by the Owner, Engineer are considered as "changes" not substitutions.
  - Substitutions requested during the bidding period, which have been accepted
    prior to the Contract Date, are included in the Contract Documents and are not
    subject to the requirements for substitutions as herein specified.
  - Specified Contractor options on products and construction methods included in the Contract Documents are choices available to the Contractor and are not subject to the requirements for substitutions as herein specified.

- 4. Except as otherwise provided in the Contract Documents, the Contractor's determination of and compliance with governing regulations and orders as issued by governing authorities do not constitute "substitutions" and do not constitute a basis for change orders.
- D. Standards: Refer to Division-1 section "Definitions and Standards" for applicability of industry standards to the products specified for the project, and for acronyms used in the text of the specification sections.

#### 1.02 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to Work of this Section.

#### 1.03 SUBMITTALS

The information required to be furnished for evaluation of product substitution will be as follows:

- A. Performance capabilities, and materials and construction details will be evaluated based upon conformance with the Specifications. Products that do not conform with the Specification shall not be accepted.
- B. Manufacturer's production and service capabilities, and evidence of proven reliability will be acceptable if the following is furnished.
  - 1. Written evidence that the manufacturer has not less than (3) years experience in the design and manufacture of the substitute product.
  - 2. Written evidence of at least one application, of a type and size similar to the proposed substitute product, in successful operation in a wastewater treatment plant for a period of at least one year.
  - 3. In lieu of furnishing evidence of a manufacturer's Experience and successful operation of an application of the product to be substituted, the Contractor has the option of furnishing a cash deposit or bond which will guarantee replacement if the product the furnished does not satisfy the other requirements specified in this section. The amount of each deposit or bond will be subject to the approval.
- C. Specific reference to characteristics either superior or inferior to specified requirements will be evaluated based on their net effect on the project. Products with any characteristics inferior to those specified will not be acceptable unless offset by characteristics that, in the opinion of the Engineer, will cause the overall effect of the product on the project to be at least equal to that of those specified.

#### 1.04 QUALITY ASSURANCE

A. Source Limitations: To the fullest extent possible, provide products of the same generic kind, from a single source, for each unit of work.

- B. Compatibility of Options: Compatibility of products is a basic requirement of product selection. When the Contractor is given the option of selecting between two or more products for use on the project, the product selected must be compatible with other products previously selected, even if the products previously selected were also Contractor options. The complete compatibility between the various choices available to the Contractor is not assured by the various requirements of the Contract Documents, but must be provided by the Contractor.
- C. The detailed estimate of operating and maintenance costs will be evaluated based on comparison with similar data on the specified products. Proposed substitute products which have an operating and maintenance cost that, in the opinion of the Engineer, exceeds that of the specified products will not be considered equal and will not be acceptable.

#### 1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

General: Deliver, store, and handle products in accordance with manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft. Control delivery schedules to minimize long-term storage at the site and to prevent overcrowding of construction spaces. In particular coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily dam aged, or sensitive to deterioration, theft and other sources of loss.

- A. Deliver products to the site in the manufacturer's sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
- B. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
- C. Store heavy materials away from the project structure in a manner that will not endanger the supporting construction.

#### **PART 2 - PRODUCTS**

#### 2.01 GENERAL PRODUCT COMPLIANCE

- A. General: Requirements for individual products are indicated in the Contract Documents; compliance with these requirements is in itself a Contract Requirement. These requirements may be specified in any one of several different specifying methods, or in any combination of these methods. These methods include the following:
  - Proprietary.
  - Descriptive.
  - Performance.
  - Compliance with Reference Standards.

- Compliance with codes, compliance with graphic details, allowances, and similar provisions of the Contract Documents also have a bearing on the selection process.
- B. Procedures for Selecting Products: Contractor's options in selecting products are limited by requirements of the Contract Documents and governing regulations. They are not controlled by industry traditions or procedures experienced by the Contractor on previous construction projects.

#### 2.02 SUBSTITUTIONS

- A. Conditions: Contractor's request for substitution will be received and considered when extensive revisions to the Contract Documents are not required, when the proposed changes are in keeping with the general intent of the Contract Documents, when the request are timely, fully documented and properly submitted, and when one or more of the following conditions is satisfied, all as judged by the Engineer; otherwise the requests will be returned without action except to record non-compliance with these requirements.
  - 1. The Engineer will consider a request for substitution where the request is directly related to an "or equal" clause or similar language in the Contract Documents.
  - 2. The Engineer will consider a request for substitution where the specified product or method cannot be provided within the Contract Time. However, the request will not be considered if the product or method cannot be provided as a result of the Contractor's failure to pursue the work promptly or to coordinate the various activities properly.
  - The Engineer will consider a request for substitution where the specified product or method cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
  - 4. The Engineer will consider a request for a substitution where a substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. These additional responsibilities may include such considerations as additional compensation to the Engineer for redesign and evaluation services, the increased cost of other work by the Owner or separate contractors, and similar considerations.
  - 5. The Engineer will consider a request for substitution when the specified product or method cannot be provided in a manner which is compatible with other materials of the work, and where the Contractor certifies that the substitution will overcome the incompatibility.
  - 6. The Engineer will consider a request for substitution when the specified product or method cannot be properly coordinated with other materials in the work, and where the Contractor certifies that the proposed substitution can be properly coordinated.
  - 7. The Engineer will consider a request for substitution when the specified product or method cannot receive a warranty as required by the Contract Documents and where the Contractor certifies that the proposed substitution receive the required warranty.

- 8. The Contractor shall reimburse the Owner any costs for review by the Engineer of proposed product substitutions which require major design changes, as determined by the Owner, to related of adjacent work made necessary by the proposed substitutions.
- B. Work-Related Submittals: Contractor's submittal of and the Engineer's acceptance of shop drawings, product data or samples which relate to work not complying with requirements of the Contract Documents, does not constitute an acceptable or valid request for a substitution, nor approval thereof.

#### 2.03 GENERAL PRODUCT REQUIREMENTS

- A. General: Provide products that comply with the requirements of the Contract Documents and that are undamaged and, unless otherwise indicated, unused at the time of installation. Provide products that are complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
  - Standard Products: Where they are available, provide standard products of types
    that have been produced and used successfully in similar situations on other
    projects.
  - 2. Continued Availability: Where, because of the nature of its application, the Owner is likely to need replacement parts or additional amounts of a product at a later date, either for maintenance and repair or replacement, provide standard, domestically produced products for which the manufacturer has published assurances that the products and its parts are likely to be available to the Owner at a later date.
- B. Nameplates: Except as otherwise indicated for required labels and operating data, do not permanently attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view either in occupied spaces or on the exterior of the completed project.
  - Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface which, in occupied spaces, is not conspicuous.
  - Equipment Nameplates: Provide permanent nameplate on each item of service-connected or power operated equipment. Locate the nameplate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data.
    - a. Name of manufacturer
    - b. Name of product
    - c. Model number
    - d. Serial number
    - e. Capacity

- f. Speed
- g. Ratings

#### **PART 3 - EXECUTION**

#### 3.01 INSTALLATION OF PRODUCTS

A. General: Except as otherwise indicated in individual sections of these Specifications, comply with the manufacturer's instructions and recommendations for installation of the products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other work. Clean exposed surfaces and protect surfaces as necessary to ensure freedom from damage and deterioration at Time of Acceptance.

#### **SECTION 01731 - CUTTING AND PATCHING**

#### PART 1 - GENERAL

#### 1.01 DESCRIPTION OF REQUIREMENTS

- A. Definition: "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other Work and subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting and patching" is performed for coordination of the work, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes upon written instructions of the Engineer.
- C. Cutting and patching is performed during the manufacture of products, or during the initial fabrication. Erection or installation processes are not considered to be "cutting and patching" under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching".
- D. "Cutting and Patching" includes removal and replacement of Work not conforming to requirements of the Contract Documents, removal and replacement of defective Work, and uncovering Work to provide for installation of ill-timed Work.
- E. No Work shall be endangered by cutting or altering Work or any part of it.

#### 1.02 RELATED DOCUMENTS

A. Drawing and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to Work of this Section.

#### 1.03 SUBMITTALS

- A. Prior to cutting which affects structural safety of Project, submit written notice to the Engineer, requesting consent to proceed with cutting, including:
  - 1. Identification of Project.
  - Description of affected work.
  - Necessity for cutting.
  - Effect on structural integrity of Project.
  - Description of proposed work. Designate:
    - Scope of cutting and patching.
    - Trades to execute work.
    - Products proposed to be used.

- d. Extent of refinishing.
- 6. Alternatives to cutting and patching.
- B. Should conditions of work, or schedule, indicate change of materials or methods, submit written recommendation to the Engineer, including:
  - Conditions indicating change.
  - Recommendations for alternative materials or methods.
  - Submittals as required for Substitutions.
- C. Submit written notice to the Engineer, designating time Work will be uncovered, to provide for observation.

#### 1.04 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural Work in a manner that would result in a reduction of load-carrying capacity or of load-deflection ratio.
- B. Operational and Safety Limitations: Do not cut and patch operational elements or safety related components in a manner that would result in a reduction of their capacity to perform in the manner intended, including energy performance, or that would result in increased maintenance, or decreased operational life or decreased energy.

#### **PART 2 - PRODUCTS**

#### 2.01 MATERIALS

A. For replacement of work removed, comply with Specifications for type of work to be done.

#### PART 3 - EXECUTION

#### 3.01 INSPECTION

A. Before cutting, examine the surfaces to be cut and patched and the conditions under which the Work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the Work.

#### 3.02 PREPARATION

A. Temporary Support: To prevent failure, provide temporary support of Work to be cut. Provide shoring, bracing and support as required to maintain structural integrity of project. B. Protection: Protect other Work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas. Take precautions not to cut existing pipe, conduit or duct serving the building but scheduled to be relocated until provisions have been made to bypass them.

#### 3.03 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching Work. Except as otherwise indicated or as approved by the Engineer, proceed with cutting and patching at the earliest feasible time and complete Work without delay.
- B. Cutting: Cut the Work using methods that are least likely to damage work to be retained or adjoining Work. Where possible, review proposed procedures with the original installer; comply with original installer's recommendations.
  - In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill to insure a neat hole. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.
  - Comply with requirements of applicable sections of Division 2 where cutting and patching requires excavating and backfilling.
  - 3. By-pass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated or abandoned. Cut-off conduit and pipe in wall or partitions to be removed. After by-pass and cutting, cap, valve or plug and seal tight remaining portion of pipe and conduit to prevent entrance of moisture or other foreign matter.
- C. Patching: Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the Work.
  - Where feasible, inspect and test patched areas to demonstrate integrity of work.
  - Restore exposed finishes of patched areas and where necessary, extend finish
    restoration into retained adjoining Work in a manner which will eliminate
    evidence of patching and refinishing.
  - Execute fittings and adjustment of products to provide finished installations to comply with specified tolerances.
  - Restore work which has been cut or removed; install new products to provide completed work in accord with requirements of Contract Documents.
  - Refinish entire surfaces as necessary to provide an even finish.
    - Continuous Surfaces: To nearest intersection.
    - b. Assembly: Entire refinishing.

## 3.04 CLEANING

A. Thoroughly clean areas and spaces where Work is performed or used as access to work. Remove completely point, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

## **SECTION 01740 - CLEANING**

#### PART 1 - GENERAL

## 1.01 DESCRIPTION OF REQUIREMENTS

- Maintain premises free from accumulations of waste, debris, and rubbish.
- B. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all exposed surfaces. Leave project clean and ready for occupancy.

#### 1.02 RELATED DOCUMENTS

- A. Cutting and Patching: Section 01731.
- B. Project Closeout: Section 01770.
- C. Cleaning for Specific Products of Work: Specification Section for that work.

## 1.03 SAFETY REQUIREMENTS

- A. Hazards Control:
  - Store volatile wastes in covered metal containers, and remove from premises daily.
  - Prevent accumulation of wastes which create hazardous conditions.
  - Provide adequate ventilation during use of violative noxious substances.
- B. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
  - 1. Do not burn or bury rubbish and waste materials on project site.
  - Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
  - Do not dispose of wastes into streams or waterways.

## **PART 2 - PRODUCTS**

## 2.01 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

#### **PART 3 - EXECUTION**

## 3.01 DURING CONSTRUCTION

- A. Execute cleaning to ensure that building, grounds, and public properties are maintained free from accumulations of waste materials and rubbish.
- B. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
- C. At reasonable intervals during progress of work, clean site and public properties, and dispose of waste materials, debris and rubbish.
- D. Provide on-site containers for collection of waste materials, debris and rubbish.
- E. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.
- F. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- G. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

## 3.02 FINAL CLEANING

- Employ experienced workmen, or professional cleaners, for final cleaning.
- B. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- C. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from sight-exposed interior or exterior finished surfaces; polish surfaces so designated to shine finish.
- Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
- Broom clean paved surfaces; rake clean other surfaces of grounds.
- F. Maintain cleaning until project, or portion thereof, is occupied by Owner.

#### SECTION 01770 - PROJECT CLOSEOUT

## **PART 1 - GENERAL**

## 1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Liquidated Damages: Supplemental General Conditions
- B. Cleaning: Section 01740.
- C. Project Record Documents: Section 01785.

#### 1.02 SUBSTANTIAL COMPLETION

- A. In order to initiate project closeout procedures, the Contractor shall submit the following:
  - 1. Written certification to Engineer that project is Substantially Complete.
  - 2. List of major items to be completed or corrected.
- B. Engineer will make an inspection within seven (7) days after receipt of certification, together with Owner's Representative.
- C. Should Engineer consider that work is Substantially Complete:
  - 1. Contractor shall prepare, and submit to Engineer, a list of items to be completed or corrected, as determined by the inspection.
  - 2. Engineer will prepare and issue a Certificate of Substantial Completion, containing:
    - a. Date of Substantial Completion.
    - Contractor's list of items to be completed or corrected, verified and amended by Engineer.
    - The time within which Contractor shall complete or correct work of listed items.
    - d. Time and date Owner will assume possession of work or designated portion thereof.
    - Responsibilities of Owner and Contractor for:
      - (1) Insurance
      - (2) Utilities
      - (3) Operation of Mechanical, Electrical, and Other Systems.
      - (4) Maintenance and Cleaning.
      - (5) Security.

- f. Signatures of:
  - (1) Engineer
  - (2) Contractor
  - (3) Owner
- 3. Owner occupancy of Project or Designated Portion of Project:
  - a. Contractor shall:
    - (1) Obtain certificate of occupancy.
    - (2) Perform final cleaning in accordance with Section 01740.
  - Owner will occupy Project, under provisions stated in Certificates of Substantial Completion.
- 4. Contractor: Complete work listed for completion or correction, within designated time.
- D. Should Engineer consider that work is not Substantially Complete:
  - 1. He shall immediately notify Contractor, in writing, stating reasons.
  - 2. Contractor: Complete work, and send second written Engineer, certifying that Project, or designated portion of Project is substantially complete.
  - Engineer will reinspect work.
- E. Should Engineer consider that work is still not finally complete:
  - He shall notify Contractor, in writing, stating reasons.
  - Contractor shall take immediate steps to remedy the stated deficiencies, and send third written notice to the Engineer certifying that the work is complete.
  - Engineer and Owner will reinspect work at Contractor's expense.

## 1.03 FINAL INSPECTION

- A. Contractor shall submit written certification that:
  - Contract Documents have been reviewed.
  - Project has been inspected for compliance with Contract Documents.
  - Work has been completed in accordance with Contract Documents.
  - Equipment and systems have been tested in presence of Owner's Representative and are operational.
  - Project is completed, and ready for final inspection.

- B. Engineer will make final inspection within seven (7) days after receipt of certification.
- C. Should Engineer consider that work is finally complete in accordance with requirements of Contract Documents, he shall request Contractor to make Project Closeout submittals.
- D. Should Engineer consider that work is not finally complete:
  - He shall notify Contractor in writing, stating reasons.
  - Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Engineer certifying that work is complete.
  - Engineer will reinspect work.

## 1.04 CLOSEOUT SUBMITTALS

- A. Project Record Documents: To requirements of Section 01785.
- B. Guarantees, Warranties and Bonds: To requirements of particular technical Specifications and Section 01782.

## 1.05 INSTRUCTION

 Instruct Owner's personnel in operation of all systems, mechanical, electrical, and other equipment.

## 1.06 FINAL APPLICATION FOR PAYMENT

A. Contractor shall submit final applications in accordance with requirements of General Conditions.

## 1.07 FINAL CERTIFICATE FOR PAYMENT

- A. Engineer will issue final certificate in accordance with provisions of general conditions.
- B. Should final completion be materially delayed through no fault of Contractor, Engineer may issue a Semi-Final Certificate for Payment.

## PART 2 - PRODUCTS (Not Applicable)

## PART 3 - EXECUTION (Not Applicable)

#### SECTION 01782 - WARRANTIES AND BONDS

#### PART 1 - GENERAL

## 1.01 DESCRIPTION OF REQUIREMENTS

- Compile specified warranties and bonds.
- B. Compile specified service and maintenance contracts.
- Co-execute submittals when so specified.
- D. Review submittals to verify compliance with Contract Documents.
- E. Submit to Engineer for review and transmittal to Owner.

#### 1.02 RELATED DOCUMENTS

- Bid Bond: Instructions to Bidders.
- B. Performance and Payment Bonds: General Conditions and Supplemental General Conditions.
- C. Guaranty: General Conditions and Supplemental General Conditions.
- D. General Warranty of Construction: General Conditions.
- E. Project Closeout: Section 01770.
- F. Warranties and Bonds required for specific products: As listed in technical specifications in these Contract Documents herein.
- G. Provisions of Warranties and Bonds, Duration: Respective specification sections for particular products.

## 1.03 SUBMITTALS REQUIREMENTS

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers and subcontractors.
- B. Furnish two (2) original signed copies.
- Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
  - Product, equipment or work item.
  - Firm name, address and telephone number.
  - 3. Scope

- 4. Date of beginning of warranty, bond or service and maintenance contract.
- Duration of warranty, bond or service and maintenance contract.
- 6. Provide information for Owner's personnel:
  - Proper procedure in case of failure.
  - Instances which might affect the validity of warranty or bond.
- 7. Contractor name, address and telephone number.

## 1.04 FORM OF SUBMITTALS

- Prepare in duplicate packets.
- B. Format:
  - Size 8-1/2 in. x 11 in., punch sheets for 3-ring binder.
    - Fold larger sheets to fit into binders.
  - Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS." List:
    - a. Title of Project
    - Name of Contractor
- C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

## 1.05 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during progress of construction:
  - 1. Submit documents within 10 days after inspection and acceptance.
- B. Otherwise make submittals within 10 days after date of substantial completion, prior to final request for payment.
- C. For items of work, where acceptance is delayed materially beyond the Date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing the date of acceptance as the start of the warranty period.

## 1.06 SUBMITTALS REQUIRED

A. Submit warranties, bonds, service and maintenance contracts as specified in the respective sections of the Specifications. **PART 2 - PRODUCTS (Not Applicable)** 

**PART 3 - EXECUTION (Not Applicable)** 

## SECTION 01785 - PROJECT RECORD DOCUMENTS

#### **PART 1 - GENERAL**

#### 1.01 MAINTENANCE OF DOCUMENTS

- A. Maintain at job site, one copy of:
  - Contract Drawings
  - 2. Specifications
  - Addenda
  - Reviewed Shop Drawings
  - Change Orders
  - 6. Other Modifications to Contract
- B. Store documents in approved location, apart from documents used for construction.
- C. Provide files and racks for storage of documents.
- Maintain documents in clean, dry, legible condition.
- E. Do not use record documents for construction purposes.
- F. Make documents available at all times for inspection by Engineer and Owner.

## 1.02 AS-BUILT REQUIREMENTS

A. The Contractor shall, on a daily basis, maintain one set of prints of the contract drawings marked to scale indicating the installed size, elevation and location of all equipment, structures, concealed materials including sewer service lines, water service lines, gravity lines, trunk sewer and force mains, water mains, valves, and fire hydrants, as well as other existing utilities affected by the construction or in the trench-width vicinity thereof. All changes made during construction shall be recorded on these prints as they occur. Drawings shall give accurate dimensions to concealed materials from easily discernible permanent points and from right-of-way lines. These marked record prints shall be made readily available at all times to the Owner, the Engineer, and other duly authorized personnel named in these specifications.

## 1.03 RELATED WORK SPECIFIED ELSEWHERE

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

#### 1.04 MARKING DEVICES

Provide colored pencil or felt-tip marking pen for all marking.

## 1.05 RECORDING

- A. Label each document "PROJECT RECORD" in 2-inch high printed letters.
- Keep record documents current.
- Do not permanently conceal any work until required information has been recorded.
- D. Contract Drawings: Legibly mark to record actual construction:
  - Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
  - Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
  - Field changes of dimension and detail.
  - Changes made by Change Order or Field Order.
  - Details not on original Contract Drawings.
- E. Specifications and Addenda: Legibly mark up each section to record:
  - Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
  - Changes made by Change Order or Field Order.
  - 3. Other matters not originally specified.
- F. Shop Drawings: Maintain as record documents; legibly annotate shop drawings to record changes made after review. Coordinate and confirm with Engineer that electronic media versions of all shop drawings have been provided to Engineer.

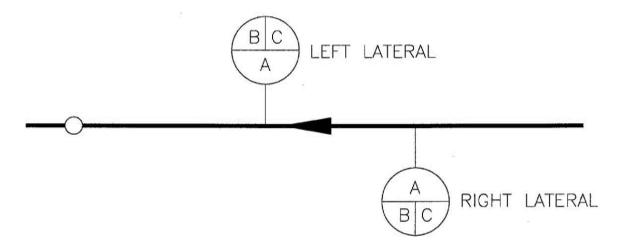
## 1.06 SUBMITTALS

- A. At completion of project, deliver record documents to Engineer.
- B. Accompany submittal with transmittal letter, in duplicate, containing:
  - 1. Date.
  - Project Title and Number.
  - Contractor's Name and Address.
  - Title and Number of each Record Document.
  - Certification that each Document as Submitted is Complete and Accurate.
  - Signature of Contractor, or His Authorized Representative.

# 1.07 STANDARD PROCEDURE FOR AS CONSTRUCTED LOCATION OF LATERAL SERVICE CONNECTIONS

## A. See Exhibit 1:

Exhibit 1 – Standard Procedure for as constructed location of lateral service connections.



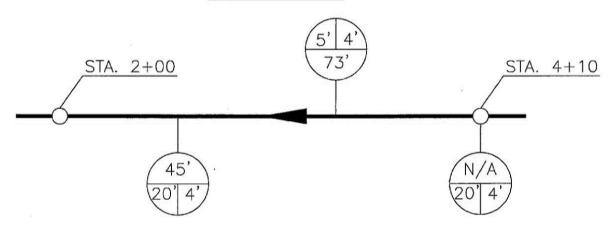
## **EXPLANATION**

A. Laterals for service connections shall be located with reference to the nearest downstream manhole. The distance from the downstream manhole to the tee is measured along the centerline of the main sewer and noted as "A" in the circle diagram.

When the lateral is out of manhole, "A" is noted as "N/A" (not Applicable).

- B. Distance from main sewer to the end of lateral is measured at right angles to the main sewer from centerline of tee to the end of lateral. Distance is shown as "B" in circle diagram. When only one length of pipe is installed, distance is given as 5-feet.
- C. Depth at end of lateral is from top of ground to top of lateral and shown as "C" in circle diagram.

## TYPICAL EXAMPLE



## PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)



#### SECTION 02220 - DEMOLITION & SALVAGE

#### PART 1 - GENERAL

#### 1.01 SCOPE OF WORK

A. Provide all labor, materials, equipment and services required for demolition as shown on the Drawings and specified herein.

## 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 02300

## 1.03 PROCEDURE

- A. The procedures proposed for the accomplishment of salvage and demolition work shall be submitted for review. The procedures shall provide for safe conduct of the work, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, coordination with other work in progress and timely disconnection of utility services. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations.
- B. It is the responsibility of the Contractor to visit the site to familiarize himself with the amount of Work that is included under this Section.

## PART 2 - PRODUCTS (Not Applicable)

#### **PART 3 - EXECUTION**

## 3.01 DUST CONTROL

A. The amount of dust resulting from the demolition shall be controlled to prevent the spread of dust to occupied portions of the plant and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution.

## 3.02 DISCONNECTION OF UTILITY SERVICES

A. Utilities shall be disconnected at the points indicated by the Owner or Engineer and left in a safe condition.

## 3.03 BURNING

A. The use of burning at the project site for the disposal of refuse and debris will not be permitted, unless authorized in writing by the Owner.

## 3.04 PROTECTION OF EXISTING WORK

A. Existing work to remain shall be protected from damage. Work damaged by the Contractor shall be repaired to match existing work.

## 3.05 BACKFILL OF STRUCTURES

- A. The portion of the demolished structures remaining below grade shall be backfilled with concrete, masonry, etc., from the demolition or any backfill material which is acceptable to the Engineer. The top two (2) feet of the backfill shall be made up of topsoil and graded to match the existing ground. It shall be free of any of the demolition material. The entire backfill shall be compacted in such a manner as to prevent settlement.
- B. It is the responsibility of the Contractor to dispose of all excess demolition material from the site as soon as practicable.

#### 3.06 SALVAGE MATERIAL

A. All equipment, pumps, controls, valves, piping, etc., is the property of the Owner and care shall be taken in its removal so not to damage it in any way. Such salvage material shall be removed and delivered to the Owner to a site designated by him. The Owner has the right to refuse any salvage material, and in such cases it is the responsibility of the Contractor to dispose of the unwanted material.

#### **SECTION 02240 - DEWATERING**

#### PART 1 - GENERAL

## 1.01 SCOPE OF WORK

- Furnish all labor and equipment required to dewater all excavations.
- B. Dewatering of all excavations shall be the responsibility of the Contractor, and no additional compensation will be allowed for same unless specifically included as a bid item.

## 1.02 RELATED WORK SPECIFIED ELSEWHERE

- Earthwork is included in Section 02300.
- B. Erosion and sedimentation control is included in Section 02371.

## PART 2 - PRODUCTS (Not Applicable)

#### **PART 3 - EXECUTION**

#### 3.01 GENERAL

- A. Dewatering equipment shall be of adequate size and quantity to assure maintaining proper conditions for installing pipe, concrete, backfill or other material or structure in the excavation.
- B. Dewatering shall include proper removal of any and all liquid, regardless of its source, from the excavation and the use of all practical means available to prevent surface runoff from entering any excavation.
- C. The site shall be kept free of surface water at all times. The Contractor shall install drainage ditches, dikes and shall perform all pumping and other work necessary to divert or remove rainfall and all other accumulations of surface water from the excavations. The diversion and removal of surface water shall be performed in a manner that will prevent flooding and/or damage to other locations within the construction area where it may be detrimental. The Contractor shall provide, install and operate sufficient trenches, sumps, pumps, hose piping, well points, deep wells, etc., necessary to depress and maintain the ground water level at least two (2) feet below the base of the excavation during all stages of construction operations. The ground water table shall be lowered in advance of excavation and maintained a minimum of two (2) feet below the lowest excavation subgrade made until the structure has sufficient strength and weight to withstand horizontal and vertical soil and water pressures from natural ground water.
- D. Dewatering operations should not discharge into the sanitary sewer system, or into any ditch, pipe or other conveyance that leads to a regulated water body, except as authorized by a KPDES permit.

## SECTION 02260 - EXCAVATION SUPPORT AND PROTECTION

## **PART 1 - GENERAL**

#### 1.01 SCOPE OF WORK

- A. This Section includes, but is not limited to, the following:
  - Shoring and bracing necessary to protect existing buildings, streets, walkways, utilities, and other improvements and excavation against loss of ground or caving embankments.
  - Maintenance of shoring and bracing.
  - Removal of shoring and bracing, as required.
- B. Types of shoring and bracing systems include, but are not limited to, the following:
  - Steel H-section (soldier) piles.
  - Timber lagging.
  - Steel sheet piles.
  - Portable Steel Trench Box.
- C. Building excavation is specified in another Division 2 Section.

#### 1.02 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.03 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Section 01340.
- B. Layout drawings for excavation support system and other data prepared by, or under the supervision of, a qualified professional engineer. System design and calculations must be acceptable to local authorities having jurisdiction.

## 1.04 QUALITY ASSURANCE

A. Engineer Qualifications: A professional engineer legally authorized to practice in jurisdiction where Project is located, and experienced in providing successful engineering services for excavation support systems similar in extent required for this Project.

- B. Supervision: Engage and assign supervision of excavation support system to a qualified professional engineer foundation consultant.
- C. Regulations: Comply with codes and ordinances of governing authorities having jurisdiction.

#### 1.05 JOB CONDITIONS

- A. Before starting work, verify governing dimensions and elevations. Verify condition of adjoining properties. Take photographs to record any existing settlement or cracking of structures, pavements, and other improvements. Prepare a list of such damages, verified by dated photographs, and signed by Contractor and others conducting investigation.
- B. Survey adjacent structures and improvements, employing qualified professional engineer, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
- C. During excavation, resurvey benchmarks weekly, maintaining accurate log of surveyed elevations for comparison with original elevations. Promptly notify Engineer if changes in elevations occur or if cracks, sags, or other damage is evident.

#### 1.06 EXISTING UTILITIES

- A. Protect existing active sewer, water, gas, electricity and other utility services and structures.
- B. Notify municipal agencies and service utility companies having jurisdiction. Comply with requirements of governing authorities and agencies for protection, relocation, removal, and discontinuing of services.

## PART 2 - PRODUCTS

## 2.01 MATERIALS

- A. General: Provide adequate shoring and bracing materials which will support loads imposed. Materials need not be new, but should be in serviceable condition.
- B. Structural Steel: ASTM A 36.
- C. Steel Sheet Piles: ASTM A 328.
- D. Timber Lagging: Any species, rough-cut, mixed hardwood, nominal 3 inches thick, unless otherwise indicated.
- Portable Steel Trench Box shall be OSHA approved.

#### PART 3 - EXECUTION

#### 3.01 SHORING

- A. Wherever shoring is required, locate the system to clear permanent construction and to permit forming and finishing of concrete surfaces. Provide shoring system adequately anchored and braced to resist earth and hydrostatic pressures.
- B. Shoring systems retaining earth on which the support or stability of existing structures is dependent must be left in place at completion of work.

#### 3.02 BRACING

- A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing prior to removal of original brace.
- B. Do not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to Engineer.
- C. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
- D. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.
- E. Remove sheeting, shoring, and bracing in stages to avoid disturbance to underlying soils and damage to structures, pavements, facilities, and utilities.
- F. Repair or replace, as acceptable to Engineer, adjacent work damaged or displaced through installation or removal of shoring and bracing work.

#### SECTION 02300 - EARTHWORK

## **PART 1 - GENERAL**

#### 1.01 SCOPE OF WORK

A. Provide all materials, labor, equipment and services necessary to do all clearing and grubbing, excavation, backfilling, providing of additional fill material and topsoil, control of surface drainage and ground water, finished site grading and erosion control required to construct the work as shown.

## 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. State and local code requirements shall control the disposal of trees and shrubs.
- B. All burning shall be controlled by applicable local regulations.
- C. EXCAVATION SUPPORT AND PROTECTION Section 02260
- D. EROSION AND SEDIMENTATION CONTROL Section 02371

## 1.03 JOB CONDITIONS

- A. Weather: Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained on account of rain, snow, ice, drought or other adverse weather conditions.
- B. Existing Utilities: Prior to commencement of work, the Contractor shall locate existing underground utilities in areas of the work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.
- C. Use of Explosives: The Contractor (or any of his Subcontractors) shall not bring explosives onto site or use in work without prior written permission from the Owner. All activities involving explosives shall be in compliance with the rules and regulations of the <u>State Department of Mines</u>, and <u>Minerals</u>, <u>Division of Explosives and Blasting</u>. Contractor is solely responsible for handling, storage, and use of explosive materials when their use is permitted.
- D. Protection of Persons and Property:
  - Barricade open excavations occurring as part of this work and post with warning lights.
    - Operate warning lights as recommended by authorities having jurisdiction.
    - b. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

E. Dust Control: Use all means necessary to control dust on or near the project site where such dust is caused by the Contractor's operations or directly results from conditions left by the Contractor.

#### 1.04 UTILITY LINE ACTIVITIES COVERED UNDER NATIONWIDE PERMIT # 12

All activities involving utility line construction covered under NATIONWIDE PERMIT # 12 shall meet the following conditions:

- A. The general Water Quality Certification is limited to the <u>crossing</u> of intermittent and perennial streams by utility lines.
- B. The construction of permanent or temporary access roads will impact less than 300 linear feet of intermittent and perennial streams and less than one acre of jurisdictional wetlands.
- C. Utility lines shall be located at least 50 feet away from a stream which appears as a blue line on a USGA 7 ½ minute topographic map except where the utility line alignment crosses the stream. Utility lines that cross streams shall be constructed by methods that maintain normal stream flow and allow for a dry excavation. Water pumped from the excavation shall be contained and allowed to settle prior to re-entering the stream. Excavation equipment and vehicles shall operate outside of the flowing portion of the stream. Spoil material from the utility line excavation shall not be allowed to enter the flowing portion of the stream.
- D. The activities shall not result in any permanent changes in preconstruction elevation contours in waters or wetlands or stream dimension, pattern or profile.
- E. Utility line construction projects through jurisdictional wetlands shall not result in conversion of the area to non-wetland status.
- F. Measures shall be taken to prevent or control spills of fuels, lubricants, or other toxic materials used in construction form entering the watercourse.
- G. Removal of riparian vegetation in the utility line right-of-way shall be limited to that necessary for equipment access. Effective erosion and sedimentation control measures must be employed at all times during the project to prevent degradation of waters of the Commonwealth. Site regarding and reseeding will be accomplished with 14 days after disturbance.
- H. To the maximum extent practicable, all in stream work under this certification shall be performed during low flow.
- I. Heavy equipment, e.g. bulldozers, backhoes, draglines, etc., if required for this project, should not be used or operated within the stream channel. In those instances where such in stream work is unavoidable, then it shall be performed in such a manner and duration as to minimize turbidity and disturbance to substrates and bank or riparian vegetation.
- J. Any fill shall be of such composition that it will not adversely affect the biological, chemical, or physical properties of the receiving waters and/or cause violations of water quality standards. If riprap is utilized, it is to be of such weight and size that bank stress or slump conditions will not be created because of its placement.

- K. Removal of existing riparian vegetation should be restricted to the minimum necessary for project construction.
- L. Should evidence of stream pollution or jurisdictional wetland impairment and/or violations of water quality standards occur as a result of this activity (either from a spill or other forms of water pollution), the Kentucky Division of Water shall be notified immediately by calling 800/928-2380.

## **PART 2 - PRODUCTS**

#### 2.01 SOIL MATERIALS

#### A. Definitions:

- 1. Satisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups GW, GP, GM, SM, SW, SP, GC, SC, ML, and CL.
- Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups MH, CH, OL, OH and PT. The Contractor shall notify the Engineer if these soil materials are encountered.
- 3. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand.
- 4. Drainage Fill: Washed, evenly graded mixture of crushed stone, or uncrushed gravel, with 100 percent passing a 1/2 inch sieve and not more than 5 percent passing a No. 4 sieve.
- Backfill and Fill Materials: Satisfactory soil materials free of debris, waste, frozen materials, vegetable, and other deleterious matter.

#### 2.02 DENSE GRADED AGGREGATE D.G.A.

A. Dense graded aggregate shall consist of crushed stone or crushed slag in combination with approved mineral filler needed to meet grading requirements. The D.G.A. shall comply with the applicable requirements of Section 805 of the Kentucky Department of Transportation's Standard Specifications for Road and Bridge Construction, 2000.

#### 2.03 PIPE BEDDING & BACKFILL

- A. <u>Pipe Bedding</u>: Pipe bedding material shall consist of crushed stone and shall conform to grading limits for No. 9 crushed stone as specified in Section 805 of the Kentucky Department of Transportation's Standard Specifications for Road and Bridge Construction, 2000.
- B. <u>Crushed Stone Backfill</u>: Crushed stone for backfilling shall be No. 9 as specified in the Kentucky Department of Transportation's Standard Specifications for Road and Bridge Construction, 2000. If in rock cut or unsuitable backfill may backfill with No. 57 or 67 stone. Backfill shall be compacted in six (6) inch layers or lifts.

- C. <u>Flowable Fill Backfill</u>: Flowable fill shall be used as backfill material in accordance with the standard detail drawings for pipe main lines and services under existing State roadways. Flowable fill shall conform to Subsection 601.03.03B of Kentucky Transportation Cabinet's Standard Specifications for Road and Bridge Construction, 2000 edition.
- D. Geotextile Fabric Material (For Crushed Stone Backfill): Contractor shall use Type IV fabric with a minimum width of 36 inches conforming to Section 843 of Kentucky Transportation Cabinet's Standard Specifications for Road and Bridge Construction, 2000 edition. All pipes within the State's right-of-way (not backfilled with flowable fill as specified herein) should be backfilled as noted and wrapped with geotextile fabric. See item B of this Section 2.03.

#### PART 3 - EXECUTION

## 3.01 CLEARING AND GRUBBING

- A. Work shall consist of cutting and removing designated trees, stumps, brush, logs, removal of fences, or other loose and projecting material. Unless otherwise specified, it shall also include the grubbing of stumps, roots, and other natural obstructions which, in the opinion of the Engineer, must be removed to execute properly the construction work and operate properly the facility upon the completion of construction.
- B. Trees, bushes, and all natural vegetation shall only be removed with the approval of the Engineer. No cleared or grubbed materials shall be used in backfills or embankment fills. All stumps, roots, and other objectionable material shall be grubbed up so that no roots larger than 3 inches in diameter remain less than 18 inches below the ground surface. All holes and depressions left by grubbing operations shall be filled with suitable material and compacted to grade, as recommended in Paragraph 3.06.
- C. Disposal shall be by burning or other methods satisfactory to the Engineer; however, burning will be permitted only when the Contractor has obtained written permission from the local regulatory agency.
- D. The Contractor shall also remove from the site and satisfactorily dispose of all miscellaneous rubbish including, but not limited to, masonry, scrap metal, rock, pavement, etc., that is under the fill or to be removed as shown on the Drawings, specified herein, or directed by the Engineer.
- E. Existing improvements, adjacent property, utility and other facilities, and trees, plants, and brush that are not to be removed shall be protected from injury or damage resulting from the Contractor's operations.
- F. Trees and shrubs, designated to remain or that are beyond the clearing and grubbing limit, which are injured or damaged during construction operations shall be treated or replaced at the Contractor's expense by experienced tree surgery personnel.

## 3.02 EROSION CONTROL

A. Temporary measures shall be applied throughout the construction period to control and to minimize siltation to adjacent properties and waterways. Such measures shall include,

## SECTION 02370 - EROSION AND SEDIMENTATION CONTROL (Areas Less Than One Acre)

#### PART 1 - GENERAL

#### 1.01 SCOPE OF WORK

- A. Furnish all labor, materials, and equipment required for erecting, maintaining and removing temporary erosion and sedimentation controls as shown on the Drawings and as specified herein and as recommended by state and local regulatory agencies.
- B. Temporary erosion controls include, but are not limited to grassing, mulching, seeding, providing erosion control and turf reinforcement mats on all disturbed surfaces including waste area surfaces and stockpile and borrow area surfaces; scheduling work to minimize erosion and providing interceptor ditches at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits.
- C. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, and appurtenances on sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits.
- D. Contractor is responsible for providing and maintaining effective temporary erosion and sediment control measures prior to and during construction or until final controls become effective.
- E. The Contractor shall be responsible for placement of erosion and sedimentation controls. Prior to construction, the Contractor shall develop an erosion control plan and submit to the Engineer for review. Prior to excavation, fill or grade work, the Contractor shall place controls in locations required by the erosion control plan. If during the course of construction, the Engineer determines additional controls are required, the Contractor shall furnish, install and maintain additional mulching, blankets and/or sediment barriers to control erosion and sedimentation to the satisfaction of the Engineer.
- F. The Contractor shall notify the appropriate state agency before beginning construction, and shall implement erosion control measures as may be required by state and federal agencies. If disturbed area is greater than one acre, Contractor shall submit a signed Notice of Intent form to the Division of Water at least 48 hours prior to beginning of construction activity.
- G. The Contractor shall inspect and repair all erosion and sedimentation controls every seven (7) days and after each rainfall of 0.5 inch or greater.
- H. Bare soil areas must be seeded, mulched, or covered after 14 days if no work will be done in the area within the next 7 days.

## 1.02 RELATED WORK

- A. Dewatering is included in this Division, Section 02240.
- B. Final erosion protection measures where required are included in this Section.
- C. Utility Line Stream Crossings Division 2

but not be limited to, the use of berms, silt barriers, gravel or crushed stone, mulch, slope drains and other methods.

- B. These temporary measures shall be applied to erodible material exposed by any activity associated with the construction of this project.
- C. Refer to Section 02371, Erosion and Sedimentation Control for requirements.

## 3.03 EXCAVATION

- A. Excavation of every description and of whatever substances encountered within the grading limits of the project shall be performed to the lines and grades indicated on the Drawings. All excavation shall be performed in the manner and sequence as required for the work.
- B. All excavated materials that meet the requirements for fill, subgrades or backfill shall be stockpiled within the site for use as fill or backfill, or for providing the final site grades. Where practicable, suitable excavated material shall be transported directly to any place in the fill areas within the limits of the work. All excavated materials that are not suitable for fill, and any surplus of excavated material that is not required for fill shall be disposed of by the Contractor.
- C. The site shall be kept free of surface water at all times. The Contractor shall install drainage ditches, dikes and shall perform all pumping and other work necessary to divert or remove rainfall and all other accumulations of surface water from the excavations. The diversion and removal of surface water shall be performed in a manner that will prevent flooding and/or damage to other locations within the construction area where it may be detrimental. The Contractor shall provide, install and operate sufficient trenches, sumps, pumps, hose piping, well points, deep wells, etc., necessary to depress and maintain the ground water level at least two (2) feet below the base of the excavation during all stages of construction operations. The ground water table shall be lowered in advance of excavation and maintained a minimum of two (2) feet below the lowest excavation subgrade made until the excavation is backfilled or the structure has sufficient strength and weight to withstand horizontal and vertical soil and water pressures from natural ground water.
- D. Excavations for concrete structural slabs on grade shall extend two (2) feet below the indicated bottom of slabs. The over-excavation shall be backfilled with 18 inches, compacted thickness, of over lot fill material or suitable material as herein specified. The remaining six (6) inches of over-excavation shall be backfilled with porous fill material. The porous fill layer shall extend beyond the limits of the concrete slab a minimum of two (2) feet on all sides as indicated on the Drawings. The porous fill shall be crushed stone or gravel and shall have the following U.S. Standard Sieve gradation:

Sieve	1-1/2	1	3/4	1/2	3/8
% Passing	Min 100	95+5	58+17	Max 15	Max 5

E. Excavations for the construction shall be carefully made to the depths required. Bottoms for footings and grade beams shall be level, clean and clear of loose material, the lower sections true to size. Bottoms of footings and grade beams, in all locations, shall be at a minimum depth of 30 inches below adjacent exterior finished grade or 30 inches below adjacent existing grade, whichever is lower, whether so indicated or not. Footings and grade beam bottoms shall be inspected by the Engineer before any concrete is placed thereon.

- F. In excavations for structures where, in the opinion of the Engineer, the ground is spongy or otherwise unsuitable for the contemplated foundation, the Contractor shall remove such unsuitable material and replace it with suitable material properly compacted.
- G. Sheeting and shoring shall be provided as necessary for the protection of the work and for the safety of the personnel. The clearances and types of the temporary structures, insofar as they affect the character of the finished work, will be subject to the review of the Engineer, but the Contractor shall be responsible for the adequacy of all sheeting, bracing and cofferdamming. All shoring, bracing and sheeting shall be removed as the excavations are backfilled in a manner such as to prevent injurious caving; or, if so directed by the Engineer, shall be left in place. Sheeting left in place shall be cut off 18 inches below the surface.
- H. Excavation for structures which have been carried below the depths indicated without specific instructions shall be refilled to the proper grade with suitable material properly compacted, except that in excavation for columns, walls or footings, the concrete footings shall extend to this lower depth. All work of this nature shall be at the Contractor's expense.

## 3.04 FILL

- A. All existing fill below structures and paved areas must be stripped. The upper six (6) inches of the natural subgrade below shall be scarified and recompacted at optimum moisture to at least ninety-five percent (95%) of Standard Proctor Density ASTM D 698 (latest revision).
- B. All vegetation, such as roots, brush, heavy sods, heavy growth of grass and all decayed vegetable matter, rubbish and other unsuitable material within the area upon which fill is to be placed shall be stripped or otherwise removed before the fill is started. In no case will such objectionable material be allowed to remain in or under the fill area. Existing fill from excavated areas on site shall be used as fill for open and/or planted areas. Additional fill stockpiled at the site can be used for structural fill if approved by the Engineer. Any additional material necessary for establishing the indicated grades shall be furnished by the Contractor and approved by the Engineer. All fill material shall be free from trash, roots and other organic material. The best material to be used in fills shall be reserved for backfilling pipe lines and for finishing and dressing the surface. Material larger than 3 inches maximum dimension shall not be permitted in the upper 6 inches of the fill area. Fill material shall be placed in successive layers and thoroughly tamped or rolled in a manner approved by the Engineer, each layer being moistened or dried such that the specified degree of compaction shall be obtained. No fill shall be placed or compacted in a frozen condition or on top of frozen material. No fill material shall be placed when free water is standing on the surface of the area where the fill is to be placed and no compaction of fill will be permitted with free water on any point of the surface of the fill to be compacted.
- C. Where concrete slabs are placed on earth, all loam and organic or other unsuitable material shall be removed. Where fill is required to raise the subgrade for concrete slabs to the elevations as indicated on the Drawings or as required by the Engineer, such fill shall consist of suitable material and shall be placed in layers. Each layer shall be moistened or dried such that the specified degree of compaction shall be obtained. All compaction shall be accomplished in a manner and with equipment as approved by the Engineer. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for adjacent fill.

#### 3.05 BACKFILLING

- A. After completion of footings, grade beams and other construction below the elevation of the final grades and prior to backfilling, all forms shall be removed and the excavation shall be cleaned of all trash and debris. Material for backfilling shall be as specified for suitable material, placed and compacted as specified hereinafter. Backfill shall be placed in horizontal layers of the thickness specified and shall have a moisture content such that the required degree of compaction is obtained. Each layer shall be compacted by mechanical tampers or by other suitable equipment approved by the Engineer to the specified density. Special care shall be taken to prevent wedging action or eccentric loading upon or against the structure. Trucks and machinery used for grading shall not be allowed within 45 degrees above the bottom of the footings or grade beams.
- B. The trenches shall be backfilled following visual inspection by the Engineer and prior to pressure testing. The trenches shall be carefully backfilled with the excavated materials approved for backfilling, or other suitable materials, free from large clods of earth or stones. Each layer shall be compacted to a density at least equal to that of the surrounding earth and in such a manner as to permit the rolling and compaction of the filled trench with the adjoining earth to provide the required bearing value, so that paving, if required, can proceed immediately after backfilling is completed.

## 3.06 COMPACTION

A. Suitable material as hereinbefore specified shall be placed in maximum 6" horizontal layers. Compaction shall be performed by rolling with approved tamping rollers, pneumatic-tired rollers, three wheel power rollers or other approved equipment. The degree of compaction required is expressed as a percentage of the maximum dry density obtained by the test procedure presented in ASTM D-698. Laboratory moisture density tests shall be performed on all fill material. Material shall be moistened or aerated as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction. Compaction requirements shall be as specified below:

Fill Utilized For	Required Density (%)	Maximum Permissible Lift Thickness As Compacted, Inches		
Backfill & Utility Trenches Under Foundations & Pavements	95-100	6		
Backfill Around Structures	95-100	6		
Field and Utility Trench Backfill Under Sidewalks and Open Areas	95-100	6		

B. Field density tests shall be performed in sufficient number to insure that the specified density is being obtained. Tests shall be in accordance with ASTM Standards D 1556 or D 2922/D 3017 and shall be performed as authorized by the Engineer. Payment for field density tests shall be by the Contractor. Contractor shall provide suitable notification for coordination of testing. Delays due to the lack of adequate advance notification shall be the responsibility of the Contractor.

D. Earthwork: Se

Section 02300

#### PART 2 - PRODUCTS

#### 2.01 SEED

A. The seed mixture to be sown shall be in the following proportions:

Common Name	Proportion By Weight	% of Purity	% of Germination
Fine Lawn Fescue	40	90	85
Chewings Fescue	25	90	85
Italian Rye Grass	20	90	85
Red Top	10	90	85
White Clover	5	95	90

B. All seed shall be fresh and clean and shall be delivered mixed, in unopened packages, bearing a guaranteed analysis of the seed mixture.

#### 2.02 FERTILIZER

- A. Just prior to the planting of turf, evenly broadcast 15 pounds per thousand square feet of fertilizer, 10-10-10 (nitrogen, phosphorus, potassium). Disc or harrow fertilizer 2 to 4 inches into the soil.
- B. Fertilizer shall be delivered to the site in the original unopened container bearing the manufacturer's guarantee analysis. Any fertilizer that becomes caked or damaged making it unsuitable for use, will not be accepted.

#### 2.03 SOD

- Sod shall be at least 70% Bluegrass, strongly rooted and free of weeds.
- B. It shall be moved to a height not to exceed 3" before lifting, and shall be of uniform thickness with not over 1-1/2" of soil.

#### 2.04 MULCH

- A. Mulch for seeded areas shall be Conwed Hydro Mulch, Silva-Fiber, or equal. It shall be suitable for use in a water slurry or for application with hydraulic equipment.
- B. Clean straw is acceptable as mulch. It shall be spread at the rate of one (1) bale per 1,000 feet (approximately 2" loose depth).
- C. Mulch on slopes greater than 4:1 shall be held in place with erosion control netting.
- D. Mulch on areas subject to surface water run-off or in drainage ditches shall be held in place with erosion control netting.

#### 2.05 EROSION CONTROL BLANKETS

- A. Erosion Control Blanket shall be made up of biodegradable and/or photodegradable products such as jute, wood fiber, coconut fiber, straw and degradable plastic netting. They shall degrade at a rate of approximately 6 months to 24 months.
- B. Erosion Control Blanket shall be installed on slopes greater than 4:1 and in all ditches and drainage channels, and where otherwise indicated on the Contract Drawings or directed by regulatory agencies.

#### 2.06 TURF REINFORCEMENT MAT

- A. Where indicated on the Contract Drawings or as described in the Specifications, Turf Reinforcement Mat shall be installed for permanent erosion control.
- B. Turf Reinforcement Mat shall consist of top and bottom heavy weight netting and biodegradable matrix such as coconut fiber or aspen curled wood excelsior.
- C. Where slope and hydraulic conditions are severe, a synthetic matrix may be used, based on manufacturer's recommendations.

#### 2.07 SILT FENCE

- A. Temporary Silt Fence shall consist of woven geotextile fabric attached to 2" X 2" X 48" tall hardwood stakes.
  - 1. Fabric shall be 48" tall, with top being even with top of stakes. Bottom 12" shall be buried in trench as shown on the Detail Drawings.
  - Stakes shall be at 6' centers unless stated otherwise on Contract Documents.

## B. Temporary Reinforced Silt Fence

- For areas of steep slopes and high flows, where indicated on the Contract Drawings, or as directed by state or local regulations, Reinforced Silt Fence shall be installed.
- Fabric shall be woven monofilament geotextile attached to 11 gauge steel fencing of 2" X 4" grid.
- Stakes shall be 5" tall steel and shall be installed on 4' centers.
- Fabric and fencing shall be buried in trench as shown on the Detail Drawings.
- C. Spacing of Silt Fences on slopes shall be according to the following table, or as directed by state or local regulatory agencies:

		Soil Type		
Slope Angle	Silty	Clays	Sandy	
Very Steep (1:1)	50 ft.	75 ft.	100 ft.	
Steep (2:1)	75 ft.	100 ft.	125 ft.	
Moderate (4:1)	100 ft.	125 ft.	150 ft.	
Slight (10:1)	125 ft.	150 ft.	200 ft.	

D. If runoff flows along the uphill side of the silt fence, Contractor shall install "J-hooks" every 40 to 80 feet. These are curved sections of silt fence above the continuous fence that serve as small dams to stop and hold the flow to allow sediment to settle.

#### 2.08 FIBER ROLLS

- A. On long slopes less than 10:1, and where indicated on the Contract Drawings or recommended by the regulatory agency, Fiber Rolls shall be installed.
- B. Fiber Rolls shall be made of wood shavings, coconut fiber or other similar material encased in heavy duty netting.
- C. Wooden stakes at 4'-0" on center shall be used to anchor the Fiber Rolls along the contours of the slope.

## 2.09 AGGREGATE SILT CHECKS

- A. Where needed to slow flow velocity, to cause ponding or to protect storm water inlet structures, Aggregate Silt Checks shall be installed.
- B. Aggregate Silt Checks shall consist of rock of various sizes ranging from 2" to 6" contained in or placed on geotextile filter fabric. Pea-stone or gravel-filled bags are acceptable for temporary silt checks in low-flow conditions.

#### 2.10 RIP RAP

- A. Rip Rap shall be installed at the outlets of storm drains and on channel banks as noted on the Contract Drawings and/or recommended by state and local regulatory agencies.
- B. Rip Rap shall have no less than 80%, by volume, of individual stones that range in size from 0.0247 to 1.483 cubic feet.

## 2.11 CONSTRUCTION ENTRANCE PAD

- Contractor shall construct entrance pads at all locations where vehicles will enter or exit the site.
- B. Pad shall be a minimum of 20 feet wide, 50 feet long and 6" thick, and consist of No. 2 stone laid on top of filter fabric.

#### PART 3 - EXECUTION

## 3.01 GENERAL

A. Erosion and sediment control practices shall be consistent with the requirements of the state and local regulatory agencies and in any case shall be adequate to prevent erosion of disturbed and/or regraded areas.

- B. Contractor is responsible for notifying the state regulatory agency concerning inclusion under the NPDES General Permit for Storm Water Discharges From Construction Activities.
- C. Gravity sewer lines and force mains that cross steams shall be constructed by methods that maintain normal stream flow and allow for a dry exaction. Water pumped from the excavation shall be contained and allowed to settle prior to reentering the stream. Excavation equipment and vehicles shall operate outside of the flowing portion of the stream. Spoil material from the sewer line excavation shall not be allowed to enter the flowing portion of the stream. The provisions of this condition shall apply to all types of utility line stream crossings.

Removal of riparian vegetation in the utility line right-of-way shall be limited to that necessary for equipment access. Effective erosion and sedimentation control measures must be employed at all times during the project to prevent degradation of waters of the Commonwealth. Site regrading and reseeding will be accomplished with 14 days after disturbance.

#### 3.02 SEEDING

- A. The areas to be seeded shall be thoroughly tilled to a depth of at least 4" by discing, harrowing, or other approved methods until the condition of the soil is acceptable to the Engineer. After harrowing or discing, the seed bed shall be dragged and/or hand raked to finish grade.
- B. The incorporation of the fertilizer and the agricultural lime may be a part of the tillage operation and shall be applied no less than 24 hours nor more than 48 hours before the seed is to be sown.
- C. Seed shall be broadcast either by hand or approved sowing equipment at the rate of ninety (90) pounds per acre (two pounds per 1,000 square feet), uniformly distributed over the area. Broadcasting seeding during high winds will not be permitted. The seed shall be drilled or raked into a depth of approximately 2 inch and the seeded areas shall be lightly raked to cover the seed and rolled. Drilling seeding shall be done with approved equipment with drills not more than 3 inches apart. All ridges shall be smoothed out, and all furrows and wheel tracks likely to develop into washes, shall be removed.
- D. After the seed has been sown, the areas so seeded shall be mulched with clean straw at the rate of one (1) bale per 1,000 feet (approximately 2 inch loose depth). Mulch on slopes and in all ditches and drainage channels shall be held in place with erosion control blankets.
- E. Areas seeded shall be watered and protected until a uniform stand develops, and then inspected periodically and maintained appropriately. Displaced mulch shall be replaced or any damage to the seeded area shall be repaired promptly, both in a manner to cause minimum disturbance to the existing stand of grass. If necessary to obtain a uniform stand, the Contractor shall refertilize, reseed and remulch as needed. Scattered bare spots up to one (1) square yard in size will be allowed up to a maximum of 10 percent of any area.
- F. Payment for seeding and mulching shall be included in the Contractor's bid.

#### 3.03 SOD

- A. To install, bring soil to final grade and clear of trash, wood, rock, and other debris. Apply topsoil, fertilizer at approximately 1000 lbs per acre.
- B. Use sod within 36 hours of cutting. Lay sod in straight lines. Butt joints tightly, but do not overlap joints or stretch sod. Stagger joints in adjacent rows in a brickwork type pattern. Use torn or uneven pieces on the end of the row.
- C. Notch into existing grass. Anchor sod with pins or stakes if placed on slopes greater than 3:1. Roll or tamp sod after installation and water immediately. Soak to a depth of 4 to 6 inches. Replace sod that grows poorly. Do not cut or lay sod in extremely wet or cold weather. Do not mow regularly until sod is well established.

## 3.04 INSTALLATION OF EROSION AND SEDIMENT CONTROL DEVICES

- A. All erosion and sediment control products and materials shall be installed per manufacturer's recommendations and in accordance with the Kentucky Erosion Prevention and Sediment Control Field Guide.
- B. Contractor shall pay special attention to the trenching-in of the bottoms of silt fence, the staking of sediment barriers, and the stapling of erosion control blankets.

#### 3.05 MAINTENANCE OF EROSION AND SEDIMENT CONTROL DEVICES

- A. Erosion and sedimentation controls shall be inspected weekly and after rain events of 0.5 inch or greater. Replace silt fencing as needed, filter stone which is dislodged, erosion control blanket which is damaged, and make other necessary repairs.
- B. Remove sediment from fences and barriers when it accumulates to half the height of the barrier, or more often as needed.

## 3.06 CLEAN UP

A. Upon completion of the project and/or establishment of satisfactory turf, vegetation or permanent erosion control structures, Contractor shall remove all temporary devices and properly dispose of such.

#### SECTION 02510 - WATER DISTRIBUTION PIPING

#### PART 1 - GENERAL

## 1.01 SCOPE OF WORK

A. Provide all labor, materials, equipment and services required for furnishing and installing all piping and appurtenances specified herein.

## 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Valves - Utility Services:

Section 02515

#### 1.03 SUBMITTALS

- A. A notarized certification shall be furnished for all pipe and fittings that verifies compliance with all applicable specifications.
- B. The requirement for this certification does not eliminate the need for shop drawings submittals in compliance with Section 01340.
- C. In accordance with the requirements of the General and Special Conditions and this Section, the following table includes, but is not limited to, the items required to be submitted:

Item Description	Shop Drawings	Product Data	Schedules	Installation Data	Parts Lists	Wiring Diagram	Samples	O & M Manual	Certificates	Warranty	Report	Other
Pipe and Fittings		X							X			
Couplings and Adapters		X										
Detectable UG Tape		X	141.55	X								
Tracer Wire		X		X								
Trench Baffles		X		X		200-200		.507/107-				
PE Tubing		X	3/1/552U									
Corp. Stops and Fittings		X		X								

## 1.04 EXISTING CONDITIONS

A. The existing piping shown on the Contract Drawings is based on the best available information. The Engineer makes no guarantee as to the accuracy of the locations or type

- of piping depicted. All new piping which ties into existing lines must be made compatible with that piping.
- B. So that piping conflicts may be avoided, Contractor shall open up his trench well ahead of the pipe laying operation to confirm exact locations of existing piping before installing any new piping.
- Contractor shall provide all fittings and adapters necessary to complete all connections to existing piping.

## 1.05 UTILITY LINE ACTIVITIES COVERED UNDER NATIONWIDE PERMIT # 12

All activities involving utility line construction covered under NATIONWIDE PERMIT # 12 shall meet the following conditions:

- A. The general Water Quality Certification is limited to the <u>crossing</u> of intermittent and perennial streams by utility lines.
- B. The construction of permanent or temporary access roads will impact less than 300 linear feet of intermittent and perennial streams and less than one acre of jurisdictional wetlands.
- C. Utility lines shall be located at least 50 feet away from a stream which appears as a blue line on a USGA 7 ½ minute topographic map except where the utility line alignment crosses the stream. Utility lines that cross streams shall be constructed by methods that maintain normal stream flow and allow for a dry excavation. Water pumped from the excavation shall be contained and allowed to settle prior to re-entering the stream. Excavation equipment and vehicles shall operate outside of the flowing portion of the stream. Spoil material from the utility line excavation shall not be allowed to enter the flowing portion of the stream.
- D. The activities shall not result in any permanent changes in preconstruction elevation contours in waters or wetlands or stream dimension, pattern or profile.
- E. Utility line construction projects through jurisdictional wetlands shall not result in conversion of the area to non-wetland status.
- F. Measures shall be taken to prevent or control spills of fuels, lubricants, or other toxic materials used in construction form entering the watercourse.
- G. Removal of riparian vegetation in the utility line right-of-way shall be limited to that necessary for equipment access. Effective erosion and sedimentation control measures must be employed at all times during the project to prevent degradation of waters of the Commonwealth. Site regarding and reseeding will be accomplished with 14 days after disturbance.
- H. To the maximum extent practicable, all in stream work under this certification shall be performed during low flow.
- I. Heavy equipment, e.g. bulldozers, backhoes, draglines, etc., if required for this project, should not be used or operated within the stream channel. In those instances where such in stream work is unavoidable, then it shall be performed in such a manner and duration as to minimize turbidity and disturbance to substrates and bank or riparian vegetation.

- J. Any fill shall be of such composition that it will not adversely affect the biological, chemical, or physical properties of the receiving waters and/or cause violations of water quality standards. If riprap is utilized, it is to be of such weight and size that bank stress or slump conditions will not be created because of its placement.
- K. Removal of existing riparian vegetation should be restricted to the minimum necessary for project construction.
- L. Should evidence of stream pollution or jurisdictional wetland impairment and/or violations of water quality standards occur as a result of this activity (either from a spill or other forms of water pollution), the Kentucky Division of Water shall be notified immediately by calling 800/928-2380.

## 1.06 CONSTRUCTION IN A FLOODPLAIN

- A. No material shall be placed in the stream or in the flood plain to form construction pads, coffer dams, access roads, etc. unless prior approval has been obtained from the Environmental and Public Protection Cabinet.
- B. The trench shall be backfilled as closely as possible to the original contour. All excess material from construction of the trench shall be disposed of outside the flood plain unless the applicant has received prior approval from the Cabinet to fill within the flood plain.

# 1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Upon delivery and before unloading, the Contractor must inspect the pipe for any damage occurred in transit; note such damage on the delivery ticket.
- B. The means by which the pipe is unloaded is the decision and responsibility of the Contractor. The Contractor should follow the recommendations of the manufacturer.
- C. The Contractor shall follow manufacturer's recommendations for storage of pipe in order to minimize damage prior to installation.
- D. The Contractor shall adhere to the Standard procedures given by the manufacturer for handling the pipe.

### PART 2 - PRODUCTS

## 2.01 DUCTILE IRON PIPE AND FITTINGS

- A. Ductile iron pipe shall conform to ANSI/AWWA C151/A21.51, latest revision, Pressure Class 350, with push-on joints unless otherwise noted on Drawings.
- B. The interior of the pipe shall be cement-mortar lined with bituminous seal coat in accordance with ANSI/AWWA C104/A21.4, latest revision. Thickness of the lining shall be as set forth in the ANSI/AWWA C104/A21.4 specification unless otherwise directed by the Engineer. The exterior of all pipe, unless otherwise specified, shall receive either coal tar or asphalt base coating a minimum of 1 mil thick.

- C. Each piece of pipe shall bear the manufacturer's name or trademark, the year in which it was produced and the letters "DI" or the word "DUCTILE". Pipe manufacturer shall furnish notarized certificate of compliance to the above AWWA or ANSI specifications.
- D. Fittings shall be Pressure Class 350 ductile iron and have mechanical-joints or push-on joints in accordance with ANSI/AWWA C110/A21.10, latest revision and shall conform to the details and dimensions shown therein. Fittings shall have interior cement-mortar lining as specified hereinbefore for the pipe. Compact ductile iron fittings meeting the requirements of ANSI/AWWA C153/A21.53, latest revision, will also be acceptable.
- E. Joints for ductile iron pipe and fittings, as described hereinbefore, shall be rubber-gasket joints and be in accordance with ANSI/AWWA C111/A21.11, latest revision. Joints shall have the same pressure rating as the pipe or fitting of which they are a part. Joints shall be installed per the manufacturer's recommendations.
- F. Provide ANSI/AWWA C110/A21.10 mechanical joint plugs and locked or restrained pipe joints where indicated on Drawings. Fittings under structures shall be mechanical joint with retainer glands.
- G. Ductile iron fittings shall be paid based on the following weights:

<b>Ductile Iron Fitting</b>	Weight (lbs)
4" 22.5° Bend	26
4" 45° Bend	27
4" 90° Bend	32
6" 22.5° Bend	37
6" 45° Bend	40
6" 90° Bend	48
8" 22.5° Bend	54
8" 45° Bend	59
8" 90° Bend	72
8" x 6" Reducer	47

### 2.02 RESTRAINED JOINT DUCTILE IRON PIPE

- A. Restrained joint ductile iron pipe shall conform to ANSI/AWWA C151/A21.51, latest revision, Pressure Class 350, with restrained push-on joints unless otherwise noted on Drawings.
- B. The interior of the pipe shall be cement-mortar lined with bituminous seal coat in accordance with ANSI/AWWA C104/A21.4, latest revision. Thickness of the lining shall be set forth in the aforementioned specification unless otherwise directed by the Engineer. The exterior of all pipe, unless otherwise specified, shall receive either coal tar or asphalt base coating a minimum of 1 mil thick.
- C. Each piece of pipe shall bear the manufacturer's name or trademark, the year in which it was produced and the letters "DI" or the word "DUCTILE". Pipe manufacturer shall furnish notarized certificate of compliance to the above AWWA or ANSI specifications.

- D. Fittings shall be Pressure Class 350 ductile iron and have restrained push-on joints in accordance with ANSI/AWWA C110/A21.10, latest revision with the exception of the manufacturer's proprietary design dimensions. Fittings shall have interior cement-mortar lining as specified hereinbefore for the pipe.
- E. The use of restrained joints utilizing a friction type connection shall not be accepted.
- F. Joints for ductile iron pipe and fittings, as described hereinbefore, shall be rubber-gasket joints and be in accordance with ANSI/AWWA C111/A21.11, latest revision. Joints shall have the same pressure rating as the pipe of fitting of which they are a part. Joints shall be installed per the manufacturer's recommendations.
- G. All pipe in the vicinity of a series of bends shall have restrained push-on joints, with lengths as recommended by the Engineer or pipe manufacturer. Pipe at ends left for future connections shall also have restrained push-on joints. All other tees, bends, and dead-ends shall have concrete thrust blocking.
- H. Restrained joint pipe and fittings shall be TR FLEX Restrained Joint by U.S. Pipe, SUPER-LOCK Restrained Joint by Clow Water Systems, SNAP-LOCK Restrained Joint by Griffin Pipe, or approved equal.
- Restrained push-on joint pipe and fittings shall be capable of being deflected after assembly.
- J. All restrained joint pipe and fittings shall be fabricated by the same pipe manufacturer.
- K. Where spigot end of restrained joint pipe connect with valves or other items that have mechanical-joint ends, connection shall be made with a restrained mechanical-joint gland. Restrained mechanical-joint connection shall be Mechanical- Joint Coupled-Joint by American Ductile Iron Pipe, MECH-LOK Restrained Joint by Griffin Pipe, or approved equal.
- L. Restrained joint ductile iron fittings shall be paid based on the following weights:

Restrained Joint Ductile Iron Fitting	Weight (lbs)
4" RJ 22.5° Bend	30
4" RJ 45° Bend	30
4" RJ 90° Bend	35
6" RJ 22.5° Bend	55
6" RJ 45° Bend	55
6" RJ 90° Bend	70
8" RJ 22.5° Bend	80
8" RJ 45° Bend	90
8" RJ 90° Bend	125
8" x 8" x 4" RJ Tee	125

## 2.03 POLYETHYLENE ENCASEMENT FOR DUCTILE IRON PIPE (Polywrap)

- A. Polyethylene encasement and materials shall be in accordance with ANSI/AWWA C105/A21.5-88 and shall conform to the details and specifications shown therein.
- B. Polyethylene encasement shall be installed on all ductile iron water main except where water main is indicated to be steel encased.

## C. Installation:

- 1. The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding material.
- All lumps of clay, mud, cinders, etc. on the pipe surface shall be removed prior to
  installation of the polyethylene encasement. During installation, care shall be
  taken so as to prevent soil or embedment material from becoming trapped
  between the pipe and the polyethylene.
- 3. The polyethylene film shall be fitted to the contour of the pipe to effect a snug, but not tight, encasement with minimum space between the polyethylene and the pipe. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to the polyethylene due to backfilling operations. Overlaps and ends shall be secured with adhesive tape, string, or any other material capable of handling the polyethylene encasement in place until backfilling operations are complete.

## D. Methods of Installation

Method A - for use with Polyethylene Tubes:

- 1. Cut polyethylene tube to a length approximately 2 ft. longer than the pipe section.
- Slip the tube around the pipe, centering it to provide a 1 ft. overlap on each
  adjacent pipe section, and bunching it accordion-fashion lengthwise until it clears
  the pipe ends.
- Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at joints to facilitate the installation of the polyethylene tube.
- 4. After assembling the pipe joint, make the overlap of the polyethylene tube. Pull the bunched polyethylene from the preceding length of pipe, slip it over the end of the new length of pipe, and secure it in place. Then slip the end of the polyethylene from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe. Secure the overlap in place. Take up the slack width at the top of the pipe to make a snug, but not tight, fit along the barrel of the pipe, securing the fold at quarter points.
- 5. Any cuts, tears, punctures, or other damage to the polyethylene shall be repaired in accordance with Section 2.23 Sub-section F of these specifications.

## Method B - for use with Polyethylene Tubes:

- 1. Cut polyethylene tube to a length approximately 1 ft. shorter than that of the pipe section. Slip the tube around the pipe, centering it to provide 6 inches of bare pipe at each end. Take up the slack width at the top of the pipe to make a snug, but not tight, fit along the barrel of the pipe, securing the fold at quarter points; secure the ends as described here within under Method A.
- 2. Before making a joint, slip a 3-ft. length of polyethylene tube over the end of the preceding pipe section, bunching it accordion-fashion lengthwise. After completing the joint, pull the 3-ft. length of polyethylene over the joint, overlapping the polyethylene previously installed on each adjacent section of pipe by at least 1 ft.
- 3. Any cuts, tears, punctures, or other damage to the polyethylene shall be repaired in accordance with Section 2.23 Sub-section F of these specifications.

## Method C - For use with Polyethylene Sheets:

- 1. Cut polyethylene sheet to a length approximately 2 ft. longer than that of the pipe section. Center the cut length to provide a 1-ft overlap on each adjacent pipe section, bunching it until it clears the pipe ends. Wrap the polyethylene around the pipe so that it circumferentially overlaps the top quadrant of the pipe. Secure the cut edge of polyethylene sheet at intervals of approximately 3 ft.
- 2. Lower the wrapped pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at joints to facilitate installation of the polyethylene. After completing the joint, make the overlap and secure the ends as described here within under Method A.
- 3. Any cuts, tears, punctures, or other damage to the polyethylene shall be repaired in accordance with Section 2.23 Sub-section F of these specifications.

## E. Appurtenances

### Pipe Shaped Appurtenances:

1. Cover bends, reducers, offsets, and other pipe-shaped appurtenances with polyethylene in the same manner as the pipe.

# Odd-Shaped Appurtenances:

- 1. When it is not practical to wrap valves, tees, crosses and other odd-shaped pieces in a tube, wrap with a flat sheet or split length of polyethylene tube by passing the sheet under the appurtenance and bringing it up around the body. Make seams by bringing the edges together, folding over twice, and taping down.
- 2. Tape polyethylene securely in place at valve stem and other penetrations.
- F. Repair any cuts, tears, punctures, or damage to polyethylene with adhesive tape or with a short length of polyethylene sheet or a tube cut open, wrapped around the pipe to cover the damaged area, and secured in place.

- G. Openings in the encasement shall provide for branches, service taps, blowoffs, air valves, and similar appurtenances by making an X-shaped cut in the polyethylene and temporarily folding back the film. After the appurtenance is installed, tape the slack securely to the appurtenance and repair the cut with tape. Service taps may also be made directly through the polyethylene, with any resulting damaged areas being repaired as described here within.
- H. Where polyethylene -wrapped pipe joins an adjacent pipe that is not wrapped, extend the polyethylene wrap to cover the adjacent pipe for a distance of at least 3 ft. Secure the end with circumferential turns of tape. Service lines of dissimilar metals shall be wrapped with polyethylene or a suitable dielectric tape for a minimum clear distance of 3 ft. away from the ductile iron pipe.
- I. Backfilling for Polyethylene -Wrapped Pipe:
  - Use the same backfill material as that specified for pipe without polyethylene wrap, exercising care to prevent damage to the polyethylene wrapping when placing backfill material.
  - Backfill material shall be free from cinders, refuse, boulders, rocks, stones, or other material that could damage the polyethylene. Backfilling shall be in accordance with AWWA C600.

## 2.04 COUPLING AND ADAPTORS

- A. Flexible couplings shall be of the sleeve type with a middle ring, two wedge shaped resilient gaskets at each end, two follower rings, and a set of steel trackhead bolts. The middle ring shall be flared at each end to receive the wedge portion of the gaskets. The follower rings shall confine the outer ends of the gaskets, and tightening of the bolts shall cause the follower rings to compress the gaskets against the pipe surface, forming a leak-proof seal. Flexible couplings shall be steel with minimum wall thickness of the middle ring or sleeve installed on pipe being 5/16-inch for pipe smaller than 10 inches, 3/8-inch for pipe 10 inches or larger. The minimum length of the middle ring shall be 5-inches for pipe sizes up to 10 inches and 7 inches for pipe 10 inches to 30 inches. The pipe stop shall be removed. Gaskets shall be suitable for 250 psi pressure rating or at rated working pressure of the connecting pipe. Couplings shall be harnessed and be designed for 250 psi.
- B. Flanged adapters shall have one end suitable for bolting to a pipe flange and the other end of flexible coupling similar to that described hereinbefore. All pressure piping with couplings or adapters shall be harnessed with full threaded rods spanning across the couplings or adapters. The adapters shall be furnished with bolts of an approved corrosion resistant steel alloy, extending to the adjacent pipe flanges. Flanges on flanged adapter (unless otherwise indicated or required) shall be faced and drilled ANSI B16.1 Class 125.
- C. Flexible couplings and flanged adapters shall be as manufactured by Dresser, Rockwell, or equal, per the following, unless otherwise specified and/or noted on the Drawings:
- Steel couplings for joining same size, plain-end, steel, cast iron, and PVC plastic pipe -

Dresser	Rockwell
Style 138	411

E. Transition couplings for joining pipe of different outside diameters-

Dresser	Rockwell
Style 162 (4"-12")	413 steel (2"-24")
Style 62 (2"-24")	415 steel (6"-48")
Lineary Programmes appropriate Property 12 to 1 the 1980s	433 cast (2"-16")
	435 cast (2"-12")

F. Flanged adapters for joining plain-end pipe to flanged pipe, fittings, valves and equipment.

Dresser	Rockwell
Style 127 cast (3"-12")	912 cast (3"-12")
Style 128 steel (3"-48" C.I. Pipe)	913 steel (3" and larger)
Style 128 steel (2"-96" steel pipe)	

### 2.05 TRACER WIRE

- A. Tracer wire shall be 12 gauge copper wire with 30-mil polyethylene jacket. Tracer wire shall be installed with all buried piping, "duct" taped to top of pipe.
- B. Split Bolt connectors are required when connecting two (2) pieces of tracer wire. Wire and connector shall be wrapped with electrical tape.
- C. Tracer wire shall be brought up into locator boxes with grounding devices. Locator boxes shall be valve boxes with a polystyrene donut that fits around the box to serve as a termination point for tracer wire. Locator boxes shall be installed at a maximum of 3000 linear feet apart, or where shown on the Drawings.
- D. Payment for tracer wire and boxes shall be included in the linear foot price bid of the appropriate bid item(s) unless it is listed as a separate payment item in the bid schedule

## 2.06 CONCRETE PIPE ANCHORS, THRUST BLOCKS, CRADLE OR ENCASEMENT

- A. Where indicated on the Drawings, required by the Specifications or as directed by the Engineer, concrete pipe anchors, thrust blocks, cradles or encasements shall be installed.
- B. Concrete shall be 3000 psi, and reinforcing bars shall be installed as indicated on the details.

### 2.07 CONNECTION OF NEW WATER MAINS TO EXISTING SYSTEM

A. The Contractor shall connect the new water main to existing water main where shown on the Drawings or directed by the Engineer, and shall furnish all necessary equipment and materials required to complete the connection.

### 2.08 POLYETHYLENE (PE) TUBING

A. Customer service tubing, sizes 3/4-inch and 1-inch, shall be Polyethylene (PE) DR-9 (200 psi) and conform to AWWA C901, ASTM F 741 with a pipe designation of PE 3408 defined per ASTM D 3035 for IPS sizes and ASTM D 2737 for CTS sizes.

### 2.09 CUSTOMER SERVICE RELOCATIONS AND RE-CONNECTIONS

Where water service lines are disturbed, the Contractor shall reconnect the existing service line to the new water main. The Contractor shall furnish and install the necessary piping, couplings, fittings, etc. necessary to complete the service line re-connection.

## A. Service Lines Not Crossing a Road

Unless indicated otherwise on the plans, all service lines shall be of PE tubing.

Water service connections shall be made in accordance with the details shown on the Drawings and/or set forth herein. Locations of the various sizes shall be as directed by the Engineer and as shown on the Drawings.

# B. <u>Service Lines Crossing a County Road or City Streets</u>

Same as subparagraph A, except that in general all pipe may be jacked beneath certain paved or blacktopped city streets or county roads, unless solid rock prevents using this method in which case, the open trench method will be used. Schedule 40 steel pipe shall be used as casing pipe unless otherwise indicated by the plans. The open trench method generally will be used on all unpaved city streets, county roads and private driveways. In general, blacktopped private driveways shall also be jacked under. In all cases where lines are under traffic, a minimum cover of 48 inches shall be provided. All backfill shall be compacted by air tampers in layers no greater than 6-inch depth. Specific instructions as to the type of crossing to be installed will be shown on the plans.

# C. Service Lines Crossing a State Highway

Services shall be jacked or pushed under paving. If solid rock is encountered, trench will be open-cut, pipe placed and backfilled all in accordance with current requirements of the State Highway Department or the crossing will be relocated to permit boring or jacking. Specific details will be shown on the plans. Where required on the plans or by the ENGINEER service pipe shall be encased under highways. Schedule 40 steel pipe shall be used as casing pipe unless otherwise indicated by the plans.

# D. Existing Galvanized Iron Services

All galvanized services are to be replaced in their entirety, including service piping from the main to the meter, corporation stops, water meters, meter setters, meter boxes, and service piping five (5) feet past the meter. Service connections shall be made in accordance with the details shown on the Drawings and/or set forth herein.

### 2.10 CORPORATION STOPS AND FITTINGS FOR HOUSE SERVICE RECONNECTIONS

- A. Corporation stops, of the size required, shall be tapped directly into the water main for Ductile Iron Pipe or by the use of a tapping saddle for PVC pipe.
- B. Corporation stops shall have AWWA C800-66 C.S. threaded inlet. Outlets shall be suitable for the type of service piping furnished and laid, and the Contractor shall verify compatibility with "iron pipe size" or "copper tubing size" service piping as required before ordering stops.
- C. Corporation stops shall be Ford Meter Box Type F1000, F1001, F1002 (as required); Mueller H-15005, H-15006, H-15008, H-15009 (as required); Hayes Series 5200, or equal.
- D. Fittings shall be brass.

### 2.11 CARRIER PIPE

Carrier pipe shall be as specified in Part 2 above.

## 2.12 CASING PIPE

- A. Casing pipe shall be steel, plain end, have a minimum yield point strength of 35,000 psi and conform to ASTM A 252 Grade 2 or ASTM A 139 Grade B without hydrostatic tests. The steel pipe shall have welded joints and be in at least 18 foot lengths. The exterior of the casing pipe shall be coated with a VOC-compliant coal tar epoxy.
- B. The diameter of the casing pipe shall be as follows:

\$14	ar John		\ C	arrie	r Pip	e No	mina	l Dia	mete	r (In	ches				
4	6	8	10	12	14	15	16	18	20	21	24	27	30	33	36
100	) N	14	C	asing	g Pip	e No	mina	l Dia	mete	r (In	ches)	1. 14	<b>M</b> :	<b>(</b> }	1197
10	12	16	18	20	24	24	30	30	30	36	36	42	48	50	50

For carrier pipe sizes greater than 36-inches nominal diameter, the casing pipe diameter size shall be determined by the Engineer or as shown on the Contract Drawings.

C. The wall thickness of the casing pipe shall be as follows:

7. 1	Cas	ing Pipe	Nomina	l Diame	eter (Inc	ches)	42	
Under 20	20 & 22	24	30	36	38	42	48	50
S. S. W. W.	Casi	ng Pipe	Nomina	l Thickr	iess (In	ches)		WW.
.250	.281	.312	.406	.469	.500	.562	.625	.656

However, should casing pipe thickness be specified or required on Highway or Railroad permit approval sheets, said permit thickness requirement shall govern. Permit approval sheets will be made available to the Contractor.

### 2.13 CASING SPACERS

A. Stainless Steel Casing Spacers: Stainless steel casing spacers shall be bolt-on style with a shell made in two (2) sections of heavy T-304 stainless steel. Connecting flanges shall be ribbed for extra strength. The shell shall be lined with a PVC liner .090" thick with 85-90 durometer. All nuts and bolts are to be 18-8 stainless steel. Runners shall be made of ultra high molecular weight polymer with inherent high abrasion resistance and a low coefficient of friction. Runners shall be supported by risers made of heavy T-304 stainless steel. The supports shall be mig welded to the shell and all welds shall be fully passivated. Stainless steel casing spacers shall be made by Cascade Waterworks Mfg. Co., or equal.

## 2.14 CASING END SEALS

- A. Wrap-around end seals Wrap-around end seals shall be made of a waterproof flexible coal tar membrane reinforced with fiberglass, or synthetic rubber. The two exposed edges of the wrap-around seal shall be adhesively bonded forming a watertight seal. The ends of the wrap shall be sealed on the casing and carrier pipe by stainless steel bands. Wrap-around end seals shall be made by Calpico Inc., Advance Products & Systems, Inc., or equal.
- B. Upon approval the by Engineer, in lieu of wrap-around end seals, each end of the casing pipe and the carrier pipe shall be wrapped with two (2) layers of roofing felt.

### **PART 3 - EXECUTION**

## 3.01 EXCAVATION FOR PIPELINE TRENCHES

- A. Unless otherwise directed by the Engineer, trenches in which pipes are to be laid shall be excavated in open cut to the depths required by field conditions or as specified by the Engineer. In general this shall be interpreted to mean that machine excavation in earth shall not extend below an elevation permitting the pipe to be properly bedded. Installation shall be in accordance with ANSI/AWWA C600 for ductile iron and Cast Iron O.D. (AWWA) PVC pipe or ASTM F-645 for Iron Pipe O.D. (ASTM) PVC pipe except as modified herein.
- B. If the foundation is good firm earth and the machine excavation has been accomplished as set out hereinbefore, the remainder of the material shall be excavated by hand, then the earth pared or molded to give full support to the lower quadrant of the barrel of each pipe. Where bell and spigot is involved, bell holes shall be excavated during this latter operation to prevent the bells from being supported on undisturbed earth. If for any reason the machine excavation in earth is carried below an excavation that will permit the type of bedding specified above, then a layer of granular material shall be placed so that the lower quadrant of the pipe will be securely bedded in compact granular fill.

- C. Excavation may be undercut to a depth below the required invert elevation that will permit laying the pipe in a bed of granular material to provide continuous support for the bottom quadrant of the pipe. When this method is used, the bedding shall be as set out in Paragraph 3.02 hereinafter.
- D. Trenches shall be of sufficient width to provide free working space on each side of the pipe and to permit proper backfilling around the pipe, but unless specifically authorized by the Engineer, trenches shall in no case be excavated or permitted to become wider then 2'-0" plus the nominal diameter of the pipe at the level of or below the top of the pipe. If the trench does become wider than 2'-0" at the level of or below the top of the pipe, special precaution may be necessary, such as providing compacted, granular fill up to top of the pipe or providing pipe with additional crushing strength as determined by the Engineer after taking into account the actual trench loads that may result and the strength of the pipe being used. The Contractor shall bear the cost of such special precautions as are necessary.
- E. All excavated materials shall be placed a minimum of two feet (2') back from the edge of the trench.
- F. Before laying the pipe, the trench shall be opened far enough ahead to reveal obstructions that may necessitate changing the line or grade of the pipeline.
- G. The trench shall be straight and uniform so as to permit laying pipe to lines and grades given by the Engineer. It shall be kept free of water during the laying of the pipe and until the pipeline has been backfilled. Removal of trench water shall be at the Contractor's expense. Dry conditions shall be maintained in the excavations until the backfill has been placed. During the excavation, the grade shall be maintained so that it will freely drain and prevent surface water from entering the excavation at all times. When directed by Owner, temporary drainage ditches shall be installed to intercept or direct surface water which may affect work. All water shall be pumped or drained from the excavation and disposed of in a suitable manner without damage to adjacent property or to other work.
- H. Minimum cover of 36" shall be provided for all pipelines, except those located under a State Highway. Those shall have a minimum cover of 48".

## 3.02 PIPE BEDDING

- A. All pipe shall be supported on a bed of granular material, unless the trench has been prepared in accordance with Paragraph 3.01B. In no case shall pipe be supported directly on rock. Bedding shall not be a separate pay item unless otherwise set out in the Detailed Specifications. Bedding shall be provided in earth bottom trenches, as well as rock bottom trenches. Bedding material shall be free from large rock, foreign material, frozen earth, and shall be acceptable to the Engineer. Bedding shall be a minimum of 6" below pipe barrel.
- B. In all cases the foundation for pipes shall be prepared so that the entire load of the backfill on top of the pipe will be carried on the barrel of the pipe so that none of the load will be carried on the bells.
- C. The bedding shall be placed up to at least the spring line (horizontal center line) of the pipe. The bedding material and procedures shall conform to ASTM D 2321 and any Technical Specifications set out hereinafter. If conditions warrant, the Engineer may require the bedding to be placed above the springline of the pipe. Granular bedding shall

be Department of Transportation crushed limestone Size #9 crushed stone and is not a separate pay item.

- D. Where undercutting and granular bedding is involved it shall be of such depth that the bottom of the bells of the pipe will be at least three inches above the bottom of the trench as excavated. Undercutting is not a separate pay item.
- E. In wet, yielding mucky locations where pipe is in danger of sinking below grade or floating out of line or grade, or where backfill materials are of such a fluid nature that such movements of the pipe might take place during the placing of the backfill, the pipe must be weighted or secured permanently in place by such means as will prove effective. When ordered by the Engineer, yielding and mucky materials in subgrades shall be removed below ordinary trench depth in order to prepare a proper bed for the pipe. Crushed stone or other such granular material, if necessary, as determined by the Engineer to replace poor subgrade material, shall be a separate pay item and classified as "Special Granular Fill". Removal of poor material is not a separate pay item.
- F. Installation shall be in accordance with ASTM D 2321 except as modified hereinafter.

## 3.03 SPECIAL GRANULAR FILL

A. As noted in Paragraph 3.02E, granular material for "Special Granular Fill" when directed by the Engineer shall be Department of Transportation crushed limestone, Size #57. Payment for "Special Granular Fill" must have approval from the Engineer prior to installation.

#### 3.04 LAYING PIPE

- A. The laying of pipe in finished trenches shall be commenced at the lowest point so the spigot ends point in the direction of flow.
- B. All pipes shall be laid with ends abutting and true to line and grade as given by the Engineer. Supporting of pipes shall be as set out hereinbefore under "Pipe Bedding" and in no case shall the supporting of pipes on blocks be permitted.
- C. Before each piece of pipe is lowered into the trench, it shall be thoroughly inspected to insure that it is clean. Each piece of pipe shall be lowered separately unless special permission is given otherwise by the Engineer. No piece of pipe or fitting which is known to be defective shall be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipe is laid, it shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe.
- D. Pipe shall not be laid on solid rock. A pad of granular material as specified in Paragraph 3.02 "Pipe Bedding" shall be used as a pipe bedding. Pipe bedding is not a separate pay item. Irregularities in subgrade in an earth trench shall be corrected by use of granular material.
- E. When ordered by the Engineer, unsuitable materials in subgrades shall be removed below ordinary trench depth in order to prepare a proper bed for the pipe.

- F. When laying of pipe is stopped for any reason, the exposed end of such pipe shall be closed with a plywood or fabricated plug fitted into the pipe bell, so as to exclude earth or other material, and precautions taken to prevent flotation of pipe by runoff into trench.
- G. No backfilling (except for securing pipe in place) over pipe will be allowed until the Engineer has had an opportunity to make an inspection of the joints, alignment and grade, in the section laid.

## 3.05 BACKFILLING PIPELINE TRENCHES

A. Backfilling of pipeline trenches shall be accomplished with the requirements set forth in ASTM D 2321, in accordance with the details as shown on the Drawings, as described hereinafter and the requirements given in Section 02300 "Earthwork". Before final acceptance, the Contractor will be required to level off all trenches or to bring the trench up to grade. The Contractor shall also remove from roadways, rights-of-way and/or private property all excess earth or other materials resulting from construction. In the event that pavement is not placed immediately following trench backfilling in paved areas, the Contractor shall be responsible for maintaining the trench surface in a level condition at proper pavement grade at all times.

# B. Method "1" - Backfilling in Open Terrain:

Backfilling of pipeline trenches in open terrain, beyond five (5) feet from the edge of pavement, shall be accomplished in the following manner:

- 1. The lower portion of the trench, from the pipe bedding to a point 12" above the top of the pipe, shall be backfilled with No. 9 crushed stone. This material shall be placed in a manner approved by the Engineer, and shall be carefully compacted to avoid displacement of the pipe. Compaction shall be accomplished by hand-tamping or by approved mechanical methods.
- 2. The upper portion of the trench above the crushed stone portion shall be backfilled with earthen material which is free from large rock. Incorporation of rock having a volume exceeding one-half cubic foot is prohibited. This material shall be placed in a manner approved by the Engineer, and shall be carefully compacted to avoid displacement of the pipe. Compaction shall be accomplished by hand-tamping or by approved mechanical methods. This portion of the trench shall be wrapped with geotextile fabric per Section 02300 and the Standard Detail Drawings.
- C. Method "2" Backfilling Under Streets, Roads, and Paved Driveways:

Backfilling of pipeline trenches under existing and proposed paved areas, and five (5) feet beyond the edge of pavement, shall be accomplished in the following manner:

1. The lower portion of the trench, from the pipe bedding to a point 12 inches above the top of the pipe, shall be backfilled with No. 9 crushed stone. This material shall be placed in a manner to avoid displacement of the pipe. This material shall be placed in a manner approved by the Engineer, and shall be carefully compacted to avoid displacement of the pipe. Compaction shall be accomplished by hand-tamping or by approved mechanical methods.

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- 2. The middle portion of the trench, from a point 12" above the top of the pipe to a point even with the bottom of the base course for paving shall be backfilled with flowable fill per Section 02300 and the Standard Detail Drawings.
- D. All backfilling methods are shown on the Detail Drawings. When directed by the Engineer, the Contractor shall wet backfill material to assure maximum compaction.
- E. Before final acceptance, the Contractor will be required to level off all trenches or to bring the trench up to grade. The Contractor shall also remove from roadways, rights-of-ways and/or private property all excess earth or other materials resulting from construction.
- F. In the event that pavement is not placed immediately following trench backfilling in streets and highways, the Contractor shall be responsible for maintaining the trench surface in a level condition at proper pavement grade at all times. All temporary paving materials and their method of placement shall be approved by the KYTC Section Engineer or his representative prior to use.

### 3.06 SETTLEMENT OF TRENCHES

A. Whenever lines are in, or cross, driveways and streets, the Contractor shall be responsible for any trench settlement which occurs within these rights-of-way within one (1) year from the time of final acceptance of the work. If paving shall require replacement because of trench settlement within this time, it shall be replaced by the Contractor at no extra cost to the Owner. Repair of settlement damage shall meet the approval of the Owner.

# 3.07 CONCRETE THRUST BLOCKS, CRADLE, ANCHORS OR ENCASEMENT

- A. Concrete thrust blocks, cradle, anchors or encasement shall be placed where shown on the Drawings, required by the Specifications, or as directed by the Engineer.
- B. For cradle and encasement, concrete shall be 3000 psi and shall be mixed sufficiently wet to permit it to flow under the pipe to form a continuous bed.
- C. For thrust blocks and anchors, concrete shall be 3000 psi, and shall be formed or be sufficiently stiff to maintain the forms indicated on the Details.
- D. In tamping concrete, care shall be taken not to disturb the grade or line of the pipe or injure the joints. Concrete placed outside the specified limits or without authorization from the Engineer will not be subject to payment.
- E. Water mains shall have concrete thrust or "kicker" blocks at all pipe intersections and changes of direction to resist forces acting on the pipeline. All reducers (increasers) shall be anchored.

# 3.08 REPLACEMENT OF EXISTING MAIL BOXES, CULVERTS, CLOTHES LINE POSTS, FENCES AND OTHER SUCH FACILITIES

A. Existing mail boxes, drainage culverts, clothes line posts, fences and the like shall not be damaged or disturbed unless necessary, in which case, they shall be replaced in as good condition as found as quickly as possible. Existing materials shall be reused in replacing WATER DISTRIBUTION PIPING 02510-16

such facilities when materials have not been damaged by the Contractor's operations. Existing facilities damaged by Contractor's operation shall be replaced with new materials of the same type at the Contractor's expense. Work in this category is not a pay item.

B. Replacement of paved drainage ditches within highway right-of-way shall be accomplished in accordance with Department of Transportation specifications.

### 3.09 TESTING

- A. All pressure piping (lines not laid to grade) shall be given a hydrostatic test of at least 1.5 times the normal operating pressure of the pipe (at its lowest elevation), but not to exceed the rated working pressure of the pipe or valves. Note: Engineer shall verify test pressure. Loss of pressure during the test shall not exceed 0 psi in a 4 hour period and 5 psi in a 24 hour period. Any test results that do not meet either of these requirements shall constitute a failure of the pressure test.
- B. Leakage in pipelines, when tested under the hydrostatic test described above, shall not exceed 10 gallons per 24 hours per inch of diameter per mile of pipe.
- C. Contractor shall furnish a recording gauge and water meter for measuring water used during leakage test and recording pressure charts during duration of test. Recording pressure charts shall be turned over to the Engineer at conclusion of tests. The pressure recording device shall be suitable for outside service, with a range from 0-200 psig, 24-hour spring wound clock, designed for 9-inch charts, and shall be approved by the Engineer.
- D. Pipelines shall be tested before backfilling at joints except where otherwise required by necessity or convenience.
- E. Duration of test shall be not less than four (4) hours where joints are exposed and not less than 24 hours where joints are covered.
- F. Where leaks are visible at exposed joints, evident on the surface where joints are covered, and/or identified by isolating a section of pipe, the joints shall be repaired and leakage must be minimized, regardless of total leakage as shown by test.
- G. All pipe, fittings, valves, and other materials found to be defective under test shall be removed and replaced at no additional expense to the Owner.
- H. Lines which fail to meet tests shall be repaired and retested as necessary until test requirements are complied with.
- Where nonmetallic joint compounds are used, pipelines should be held under normal operating pressure for at least three days before testing.
- J. The Owner will provide initial water for testing the pressure piping. Should the first test fail to pass, all additional water required for subsequent tests shall be furnished at the Contractor's expense.
- K. The cost of testing of pressure piping is incidental and is to be included in the Contractor's unit Contract Price.

### 3.10 CLEAN UP

A. Upon completion of installation of the piping and appurtenances, the Contractor shall remove all debris and surplus construction materials resulting from the Work. The Contractor shall grade the ground along each side of pipe trenches in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line.

### 3.11 DISINFECTION OF POTABLE WATER LINES

- A. The new potable waterlines shall not be placed in service--either temporarily or permanently--until they have been thoroughly disinfected in accordance with AWWA Standard C651-05, 2005 and to the satisfaction of the Engineer.
- B. After testing, a solution of hypochlorite using HTH or equal shall be introduced into the section of the line being disinfected sufficient to insure a chlorine dosage of at least 50 ppm in the main. While the solution is being applied, the water should be allowed to escape at the ends of the line until tests indicate that a dosage of at least 50 ppm has been obtained throughout the pipe. Open and close all valves and cocks while chlorinating agent is in the piping system. The chlorinated water shall be allowed to remain in the pipe for 24 hours, after which a residual of at least 25 ppm shall be obtained. The disinfection shall be repeated until 25 ppm is obtained after which time the main shall be thoroughly flushed until the residual chlorine content is not greater than 1.0 ppm, and then may be connected to the system. Also, no additional payment will be allowed for providing taps for chlorine injection and/or flushing, if necessary. The Contractor is responsible for the disposal of highly chlorinated water flushed from the main.
- C. The new water line shall not be put into service until bacteriological samples taken at the points specified herein are examined and shown to be negative after disinfection, following the requirements of "Standard Methods for Examination of Water and Wastewater". Two consecutive sets of acceptable samples, taken at least 24 hours apart shall be collected from the new line. Samples are to be taken and tested at every 1200 feet of new water line, at each branch and at each dead end.
- D. If trench water has entered the pipe, or excessive quantities of dirt or debris have entered the pipe, samples shall be taken at intervals of approximately 200 feet and the locations identified. Samples shall be taken of water that has stood in the new line for at least 16 hours after flushing is completed.
- E. If the initial disinfection does not produce satisfactory bacteriological results, the new line shall be reflushed and resampled. If samples fail, the line shall be rechlorinated by the continuous-feed or slug method until satisfactory results are obtained.
- F. All testing documentation shall be submitted to the Owner.

END OF SECTION

### SECTION 02515 - VALVES

### PART 1 - GENERAL

### 1.01 SCOPE OF WORK

A. Provide all labor, materials, equipment and services required to furnish and install all valves shown on the Drawings and/or specified herein.

## 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.
- B. Piping is specified in Division 2 Specification sections.

## 1.03 SUBMITTALS

- A. Descriptive literature, catalog cuts, and dimensional prints clearly indicating all dimensions and materials of construction, shall be submitted on all items specified herein to the Engineer for review before ordering. Comply with provisions of Section 01340.
- B. At the time of submission, the Contractor shall, in writing, call Engineer's attention to any deviations that the submittals may have from the requirements of the Engineer's Contract Drawings and Specifications.
- C. In accordance with the requirements of the General and Special Conditions and this Section, the following table includes, but is not limited to, the items required to be submitted:

Item Description	Shop Drawings	Product Data	Schedules	Installation Data	Parts Lists	Wiring Diagram	Samples	O & M Manual	Certificates	Warranty	Report	Other
Valves	X	X			X				10.7			
Valve Boxes		X	e <u>eeelii e</u> k						Til.			
Access Manhole	X	X							T I			
Yard Hydrant	X	X			X							48   THE WILLIAM CONTROL   12 TO   12
Tapping Sleeve, Valve	X	X		X	X							

### PART 2 - PRODUCTS

### 2.01 GATE VALVES

- A. Gate valves shall conform with AWWA C-509 or AWWA C-515 standard, and shall be of the resilient seat type, iron body, fully bronze mounted, non-rising stem and have a design working pressure of 200 psi. All assembly bolts shall be stainless steel. Valves shall be of standard manufacturer and of the highest quality both as to materials and workmanship.
- B. All gate valves shall be furnished with mechanical joint connections, unless otherwise shown on the Drawings or specified hereinafter.
- C. An epoxy coating conforming to AWWA C-550 shall be applied to the interior and exterior ferrous surfaces of the valve except for finished or seating surfaces.
- D. All gate valves shall have the name or monogram of the manufacturer, the year the valve casting was made, the size of the valve, and the working water pressure cast on the body of the valve.
- E. Each gate valve shall be installed in a vertical position with a roadway type valve box. Gate valves set with valve boxes shall be provided with a 2-inch square operating nut and shall be opened by turning to the left (counter-clockwise). There shall be a maximum 48" depth of valve operating nut. Contractor must use extension stems, if necessary, to raise operator nut within 48" of final grade.

## 2.02 GATE VALVES - BURIED

A. Gate valves shall conform to the Specifications of Section 02515, Paragraph 2.01, except be designed for buried service, have mechanical joint ends, have all exterior surfaces shop painted with two coats of Fed. Spec. TT-V-51F Asphalt Varnish, with 2-inch square nut operator in a vertical position for use in a valve box.

# 2.03 VALVE BOXES - BURIED VALVES (EXCEPT AIR RELEASE AND SEWAGE COMBINATION VALVES)

- A. Valve boxes shall be of 5-1/4 inch standard cast iron, two-piece, screw type valve box with drop cover marked "WATER", "SEWER", "DRAIN", as applicable. Valve boxes for gate valves larger than 8 inches shall be three-piece. Valve boxes shall be accurately centered over valve operating nut, and backfill thoroughly tamped about them. Valve boxes shall not rest on the valves but shall be supported on crushed stone fill. They shall be set vertically and properly cut and/or adjusted so that the tops of boxes will be grade in any paving, walk or road surface, and 2 to 3 inches above finish grade in grass plots, fields, woods or other open terrain. In grass areas, provide concrete pad around valve box; slightly crown in all directions to shed water. Valve boxes and covers shall be as manufactured by Tyler Corporation, Opelika Foundry or equal.
- B. Contractor shall furnish two (2) 6-foot T-handle operating wrenches for underground valves. Nut operator extensions for all valves buried deeper than 3 feet shall be provided with stem extensions sufficient to raise operator nut to within 3 feet of finished grade.

- C. Circular hi-density polyethylene boxes shall be as manufactured by Mid-States Company, Lexington, Kentucky; Tallman Conduit Company, Louisiana, Missouri; or equal, size as indicated on Drawings. Covers shall be solid one-piece flat lids, sized to fit box, as manufactured by Charlotte Pipe and Foundry, or equal.
- D. Valve boxes inside a paving, walk, or road surface shall not be set on the valves but shall be supported on crushed stone fill.
- E. Wherever valve boxes fall outside of the roadway pavement, the top of the box shall be set in a cast-in-place concrete slab 18" x 18" x 4" thick with the top of the slab and box flush with the top of the ground. This provision shall apply to all new and all existing valve boxes which fall within the limits of the contract, unless otherwise stated on the plans or ordered by the Engineer.

## **PART 3 - EXECUTION**

# 3.01 INSTALLATION

- A. All valves shall be installed in accordance with details on the Contract Drawings and with the manufacturer's recommendations.
- All valves shall be anchored in accordance with the details on the Contract Drawings.

END OF SECTION

### SECTION 02530 - GRAVITY SEWER PIPING

### PART 1 - GENERAL

# 1.01 SCOPE OF WORK

A. Provide all labor, materials, equipment and services required for furnishing and installing all piping and appurtenances as shown on the Drawings and specified herein.

## 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork:

Section 02300

B. Sanitary Sewer Manholes, Frames and Covers:

Section 02532

C. Excavation Support and Protection:

Section 02260

# 1.03 SUBMITTALS

- Submit manufacturer's data as specified herein. Comply with all requirements of Section 01340.
- B. In accordance with the requirements of the General and Special Conditions and this Section, the following table includes, but is not limited to, the items required to be submitted:

Item Description	Shop Drawings	Product Data	Schedules	Installation Data	Parts Lists	Wiring Diagram	Samples	O & M Manual	Certificates	Warranty	Report	Other	
Pipe & Fittings		X							X				
Couplings		X						6					
Trench Baffles		X											3 - 4 -
													11 - 11 - 11 - 11 - 11 - 11 - 11 - 11

## 1.04 INTERNAL PIPE DIAMETER

A. All sewer pipe provided shall have a minimum actual internal diameter which is equal to or greater than the diameter indicated on the Contract Drawings.

# 1.05 UTILITY LINE ACTIVITIES COVERED UNDER NATIONWIDE PERMIT # 12

All activities involving utility line construction covered under NATIONWIDE PERMIT # 12 shall meet the following conditions:

- A. The general Water Quality Certification is limited to the <u>crossing</u> of intermittent and perennial streams by utility lines.
- B. The construction of permanent or temporary access roads will impact less than 300 linear feet of intermittent and perennial streams and less than one acre of jurisdictional wetlands.
- C. Sewer lines shall be located at least 50 feet away from a stream which appears as a blue line on a USGS 7 ½ minute topographic map except where the sewer alignment crosses the stream. Utility lines that cross streams shall be constructed by methods that maintain normal stream flow and allow for a dry excavation. Water pumped from the excavation shall be contained and allowed to settle prior to re-entering the stream. Excavation equipment and vehicles shall operate outside of the flowing portion of the stream. Spoil material from the sewer line excavation shall not be allowed to enter the flowing portion of the stream.
- D. The activities shall not result in any permanent changes in preconstruction elevation contours in waters or wetlands or stream dimension, pattern or profile.
- E. Utility line construction projects through jurisdictional wetlands shall not result in conversion of the area to non-wetland status.
- F. Measures shall be taken to prevent or control spills of fuels, lubricants, or other toxic materials used in construction form entering the watercourse.
- G. Removal of riparian vegetation in the utility line right-of-way shall be limited to that necessary for equipment access. Effective erosion and sedimentation control measures must be employed at all times during the project to prevent degradation of waters of the Commonwealth. Site regarding and reseeding will be accomplished with 14 days after disturbance.
- H. To the maximum extent practicable, all in stream work under this certification shall be performed during low flow.
- I. Heavy equipment, e.g. bulldozers, backhoes, draglines, etc., if required for this project, should not be used or operated within the stream channel. In those instances where such in stream work is unavoidable, then it shall be performed in such a manner and duration as to minimize turbidity and disturbance to substrates and bank or riparian vegetation.
- J. Any fill shall be of such composition that it will not adversely affect the biological, chemical, or physical properties of the receiving waters and/or cause violations of water quality standards. If riprap is utilized, it is to be of such weight and size that bank stress or slump conditions will not be created because of its placement.
- K. Removal of existing riparian vegetation should be restricted to the minimum necessary for project construction.
- L. Should evidence of stream pollution or jurisdictional wetland impairment and/or violations of water quality standards occur as a result of this activity (either from a spill

or other forms of water pollution), the Kentucky Division of Water shall be notified immediately by calling 800/928-2380.

# 1.06 CONSTRUCTION IN A FLOODPLAIN

- A. No material shall be placed in the stream or in the flood plain to form construction pads, coffer dams, access roads, etc. unless prior approval has been obtained from the Environmental and Public Protection Cabinet.
- B. The trench shall be backfilled as closely as possible to the original contour. All excess material from construction of the trench shall be disposed of outside the flood plain unless the applicant has received prior approval from the Cabinet to fill within the flood plain.

### PART 2 - PRODUCTS

#### 2.01 GRAVITY SEWER PIPE

- Ductile Iron Pipe
  - 1. Ductile Iron Pipe shall be installed where indicated on the Contract Drawings.
  - Ductile iron pipe shall conform to the current requirements of AWWA C151, Pressure Class 350, with push-on joints unless otherwise noted on drawings.
  - 3. The interior of the pipe and fittings shall be coated with 40 mils of Protecto 401 Ceramic Epoxy as manufactured by Induron Coatings, Birmingham, AL, Polybond as manufactured by American Cast Iron Pipe Co., Birmingham, AL, or approved equal. The flexible lining used shall meet the requirements of the lining manufacturer's own specifications and shall be applied in accordance with the manufacturer's specifications and requirements.
  - 4. The exterior of all pipe, unless otherwise specified, shall receive either coal tar or asphalt base coating a minimum of 1 mil thick.
  - 5. Each piece of pipe shall bear the manufacturer's name or trademark, the year in which it was produced and the letters "DI" or the word "DUCTILE". Pipe manufacturer shall furnish notarized certificate of compliance to the above AWWA or ANSI specifications.
  - 6. Joints for ductile iron pipe and fittings, as described hereinbefore, shall be rubber-gasket joints and be in accordance with ANSI/AWWA C111/A21.11, latest revision. Joints shall have the same pressure rating as the pipe or fitting of which they are a part. Joints shall be installed per the manufacturer's recommendations.
  - 7. The cleaning and assembly of pipe and fitting joints shall be in accordance with the manufacturer's recommendations.
  - 8. Pipe and fittings lined with flexible lining must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning, or laying. The pipe shall not be GRAVITY SEWER PIPING 02530-3

dropped or unloaded by rolling. Care should be taken not to let the pipe strike sharp objects while swinging or being off loaded. Ductile iron pipe should never be placed on grade by use of hydraulic pressure from an excavator bucket or by banging with heavy hammers.

# B. Restrained Joint Ductile Iron Pipe

- Restrained Joint Ductile Iron Pipe shall be installed where indicated on the Contract Drawings.
- Restrained joint ductile iron pipe shall conform to ANSI/AWWA C151/A21.51, latest revision, Pressure Class 350, with restrained push-on joints unless otherwise noted on Drawings.
- 3. The interior of the pipe and fittings shall be coated with 40 mils of Protecto 401 Ceramic Epoxy as manufactured by Induron Coatings, Birmingham, AL, Polybond as manufactured by American Cast Iron Pipe Co., Birmingham, AL, or approved equal. The flexible lining used shall meet the requirements of the lining manufacturer's own specifications and shall be applied in accordance with the manufacturer's specifications and requirements.
- 4. The exterior of all pipe, unless otherwise specified, shall receive either coal tar or asphalt base coating a minimum of 1 mil thick.
- 5. Each piece of pipe shall bear the manufacturer's name or trademark, the year in which it was produced and the letters "DI" or the word "DUCTILE". Pipe manufacturer shall furnish notarized certificate of compliance to the above AWWA or ANSI specifications.
- The use of restrained joints utilizing a friction type connection shall not be accepted.
- 7. Joints for ductile iron pipe and fittings, as described hereinbefore, shall be rubber-gasket joints and be in accordance with ANSI/AWWA C111/A21.11, latest revision. Joints shall have the same pressure rating as the pipe of fitting of which they are a part. Joints shall be installed per the manufacturer's recommendations.
- Restrained joint pipe and fittings shall be FLEX-RING Restrained Joint by American Ductile Iron Pipe, TR FLEX Restrained Joint by U.S. Pipe, SUPER-LOCK Restrained Joint by Clow Water Systems, SNAP-LOCK Restrained Joint by Griffin Pipe, or approved equal.
- Restrained push-on joint pipe and fittings shall be capable of being deflected after assembly.
- 10. All restrained joint pipe and fittings shall be fabricated by the same pipe manufacturer.
- 11. Where spigot end of restrained joint pipe connect with valves or other items that have mechanical-joint ends, connection shall be made with a restrained mechanical-joint gland. Restrained mechanical-joint connection shall be Mechanical- Joint Coupled-Joint by American Ductile Iron Pipe, MECH-LOK Restrained Joint by Griffin Pipe, or approved equal.

- 12. The cleaning and assembly of pipe and fitting joints shall be in accordance with the manufacturer's recommendations.
- 13. Pipe and fittings lined with flexible lining must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning, or laying. The pipe shall not be dropped or unloaded by rolling. Care should be taken not to let the pipe strike sharp objects while swinging or being off loaded. Ductile iron pipe should never be placed on grade by use of hydraulic pressure from an excavator bucket or by banging with heavy hammers.

# Polyvinyl Chloride (PVC) Pipe and Fittings

PVC Pipe shall be installed where indicated on the Contract Drawings. PVC pipe shall not be used in locations where the depth of cut is greater than 16 feet.

Pipe must be delivered to job site by means which will adequately support it, and not subject it to undue stresses. In particular, the load shall be so supported that the bottom rows of pipe are not damaged by crushing. Pipe shall be unloaded carefully and strung or stored as close to the final point of placement as is practical. Pipe shall not be stored outside where subject to sunlight.

Jointing of PVC pipe shall be by a natural rubber ring inserted into the belled end of the pipe or double hub joints. Solvent weld joints are not acceptable.

The PVC pipe manufacturer shall provide special fittings, acceptable to the Engineer to make watertight connections to manholes.

Pipe manufacturer shall furnish notarized certificate of compliance with applicable specifications.

- 1. Gravity Sewer Application (15" and Smaller):
  - a. PVC pipe used for gravity sewer applications shall meet all requirements of ASTM Specification D-3034, latest revision. Pipe and fittings shall meet the extra strength minimum of SDR-35 of that Specification.
  - b. All pipe and fittings shall be inspected at the factory and on the job site. Testing of PVC pipe and fittings shall be accomplished in conformance with the latest revision of ASTM D3034, ASTM D2444, ASTM D2412, and ASTM D2152. The manufacturer shall submit five (5) copies of certification of test for each lot of material represented by shipment to the job site.
  - c. The pipe shall be homogeneous throughout and free from cracks, holes, foreign inclusions or other defects. The pipe shall be as uniform in color as commercially practical. PVC pipe shall have a ring painted around spigot ends in such a manner as to allow field checking of setting depth of pipe in the socket.
- PVC Gravity Lateral Service Connection Piping (4").

PVC gravity lateral service connection pipe (4") shall be ASTM-3034, SDR 35 solid wall PVC pipe.

For deep sewer house connection laterals (deeper than 10 feet) and for near vertical (within 30 degrees of vertical) lateral risers, install a vertical riser adapter with flange (Plastic Treads Model No. G-986 or equal) between the bottom fitting and the vertical riser section to prevent settlement of the lateral riser and to prevent possible damage to the bottom fitting joint. See detail on Sheet 7 for deep sewer house connection laterals.

# 2.02 POLYETHYLENE ENCASEMENT FOR DUCTILE IRON PIPE (Polywrap)

- A. Polyethylene encasement and materials shall be in accordance with ANSI/AWWA C105/A21.5-88 and shall conform to the details and specifications shown therein.
- B. Polyethylene encasement shall be installed on all ductile iron gravity sewer pipe.

## C. Installation:

- 1. The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding material.
- 2. All lumps of clay, mud, cinders, etc. on the pipe surface shall be removed prior to installation of the polyethylene encasement. During installation, care shall be taken so as to prevent soil or embedment material from becoming trapped between the pipe and the polyethylene.
- 3. The polyethylene film shall be fitted to the contour of the pipe to effect a snug, but not tight, encasement with minimum space between the polyethylene and the pipe. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to the polyethylene due to backfilling operations. Overlaps and ends shall be secured with adhesive tape, string, or any other material capable of handling the polyethylene encasement in place until backfilling operations are complete.

## D. Methods of Installation

Method A - for use with Polyethylene Tubes:

- Cut polyethylene tube to a length approximately 2 ft. longer than the pipe section.
- Slip the tube around the pipe, centering it to provide a 1 ft. overlap on each
  adjacent pipe section, and bunching it accordion-fashion lengthwise until it clears
  the pipe ends.
- Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at joints to facilitate the installation of the polyethylene tube.
- 4. After assembling the pipe joint, make the overlap of the polyethylene tube. Pull the bunched polyethylene from the preceding length of pipe, slip it over the end of the new length of pipe, and secure it in place. Then slip the end of the polyethylene from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe. Secure the overlap

in place. Take up the slack width at the top of the pipe to make a snug, but not tight, fit along the barrel of the pipe, securing the fold at quarter points.

5. Any cuts, tears, punctures, or other damage to the polyethylene shall be repaired in accordance with Section 2.23 Sub-section F of these specifications.

# Method B - for use with Polyethylene Tubes:

- 1. Cut polyethylene tube to a length approximately 1 ft. shorter than that of the pipe section. Slip the tube around the pipe, centering it to provide 6 inches of bare pipe at each end. Take up the slack width at the top of the pipe to make a snug, but not tight, fit along the barrel of the pipe, securing the fold at quarter points; secure the ends as described here within under Method A.
- 2. Before making a joint, slip a 3-ft. length of polyethylene tube over the end of the preceding pipe section, bunching it accordion-fashion lengthwise. After completing the joint, pull the 3-ft. length of polyethylene over the joint, overlapping the polyethylene previously installed on each adjacent section of pipe by at least 1 ft.
- 3. Any cuts, tears, punctures, or other damage to the polyethylene shall be repaired in accordance with Section 2.23 Sub-section F of these specifications.

# Method C - For use with Polyethylene Sheets:

- 1. Cut polyethylene sheet to a length approximately 2 ft. longer than that of the pipe section. Center the cut length to provide a 1-ft overlap on each adjacent pipe section, bunching it until it clears the pipe ends. Wrap the polyethylene around the pipe so that it circumferentially overlaps the top quadrant of the pipe. Secure the cut edge of polyethylene sheet at intervals of approximately 3 ft.
- 2. Lower the wrapped pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at joints to facilitate installation of the polyethylene. After completing the joint, make the overlap and secure the ends as described here within under Method A.
- 3. Any cuts, tears, punctures, or other damage to the polyethylene shall be repaired in accordance with Section 2.23 Sub-section F of these specifications.

# E. Appurtenances

### Pipe Shaped Appurtenances:

1. Cover bends, reducers, offsets, and other pipe-shaped appurtenances with polyethylene in the same manner as the pipe.

# Odd-Shaped Appurtenances:

- When it is not practical to wrap valves, tees, crosses and other odd-shaped pieces
  in a tube, wrap with a flat sheet or split length of polyethylene tube by passing
  the sheet under the appurtenance and bringing it up around the body. Make
  seams by bringing the edges together, folding over twice, and taping down.
- Tape polyethylene securely in place at valve stem and other penetrations.

- F. Repair any cuts, tears, punctures, or damage to polyethylene with adhesive tape or with a short length of polyethylene sheet or a tube cut open, wrapped around the pipe to cover the damaged area, and secured in place.
- G. Openings in the encasement shall provide for branches, service taps, blowoffs, air valves, and similar appurtenances by making an X-shaped cut in the polyethylene and temporarily folding back the film. After the appurtenance is installed, tape the slack securely to the appurtenance and repair the cut with tape. Service taps may also be made directly through the polyethylene, with any resulting damaged areas being repaired as described here within.
- H. Where polyethylene -wrapped pipe joins an adjacent pipe that is not wrapped, extend the polyethylene wrap to cover the adjacent pipe for a distance of at least 3 ft. Secure the end with circumferential turns of tape. Service lines of dissimilar metals shall be wrapped with polyethylene or a suitable dielectric tape for a minimum clear distance of 3 ft. away from the ductile iron pipe.
- I. Backfilling for Polyethylene -Wrapped Pipe:
  - Use the same backfill material as that specified for pipe without polyethylene wrap, exercising care to prevent damage to the polyethylene wrapping when placing backfill material.
  - Backfill material shall be free from cinders, refuse, boulders, rocks, stones, or other material that could damage the polyethylene. Backfilling shall be in accordance with AWWA C600.

# 2.03 PIPE EMBEDMENT & BACKFILL MATERIALS (Per ASTM D2321)

- A. Classes of Embedment and Backfill Materials are defined in ASTM D2321. Embedment Materials are those used for bedding, haunching and initial backfill.
- No. 9 crushed stone is acceptable for Pipe Embedment.
- Final Backfill must be compacted to 95% Standard Proctor Density

No rocks larger than 3" shall be incorporated into the Final Backfill materials.

- D. Class 1A Manufactured Aggregates: Open graded clean, angular, crushed stone or rock. These materials compact with little or no mechanical effort.
  - Class 1B Manufactured, Processed Aggregate: Dense graded clean, angular crushed stone. Compact to 85% Standard Proctor Density with hand tampers or vibratory compaction.
  - Class 2: Clean, coarse-grained materials, such as gravel, coarse sands, and gravel/sand mixtures (1" maximum size). The materials are classified by the Unified Soil Classification System as GW, GP, SW, SP, and GW-GC or SP-SM. Hand tamping or mechanical vibration is required to provide the necessary 85% Standard Proctor Density.
  - Class 3: Coarse-grained materials with fines including silty or clayey gravels or sands. Gravel or sand must comprise more than 50% of Class 3 materials (1" maximum size). Soils classified as GM, GC, SM or SC meets these requirements. Hand tamping or mechanical vibration is required to provide the necessary 90% Standard Proctor Density.

Class 4: Fine-grained materials, such as fine sands and soils, containing 50% or more clay or silt. Soils classified as Class 4A (ML or CL) have medium to low plasticity. Soils classified as Class 4B (MH or CH) have high plasticity and are NOT allowed as embedment or backfill materials.

## 2.04 COMPRESSION COUPLINGS

- A. When joining different types of pipe together or new pipe to existing pipe, the Contractor shall use Fernco Compression Couplings, or equal, that are resistant to corrosion by soil and sewage and that will provide a permanent watertight joint.
- B. The compression coupling shall meet the physical test and joint-leak requirements specified in ASTM C425. The bands for attaching pipes shall be stainless steel conforming to ASTM C425. Each coupling shall bear the manufacturer's name and an indication of its size.

### **PART 3 - EXECUTION**

## 3.01 EXCAVATION FOR PIPELINE TRENCHES

- A. Unless otherwise directed by the Engineer, trenches in which pipes are to be laid shall be excavated in open cut to the depths required by field conditions or as specified by the Engineer. In general this shall be interpreted to mean that machine excavation in earth shall not extend below an elevation permitting the pipe to be properly bedded. Installation shall be in accordance with ASTM-D-2321 except as modified herein.
- B. Excavation may be undercut to a depth below the required invert elevation that will permit laying the pipe in a bed of granular material to provide continuous support for the bottom quadrant of the pipe. When this method is used, the bedding shall be as set out in Paragraph 3.02 hereinafter.
- C. Trenches shall be of sufficient width to provide free working space on each side of the pipe and to permit proper backfilling around the pipe, but unless specifically authorized by the Engineer, trenches shall in no case be excavated or permitted to become wider then 2'-0" plus the nominal diameter of the pipe at the level of or below the top of the pipe. If the trench does become wider than 2'-0" at the level of or below the top of the pipe, special precaution may be necessary, such as providing compacted, granular fill up to top of the pipe or providing pipe with additional crushing strength as determined by the Engineer after taking into account the actual trench loads that may result and the strength of the pipe being used. The Contractor shall bear the cost of such special precautions as are necessary.
- D. All excavated materials shall be placed a minimum of two feet (2') back from the edge of the trench.
- E. Before laying the pipe, the trench shall be opened far enough ahead to reveal obstructions that may necessitate changing the line or grade of the pipeline.
- F. The trench shall be straight and uniform so as to permit laying pipe to lines and grades given by the Engineer. It shall be kept free of water during the laying of the pipe and until the pipeline has been backfilled. Removal of trench water shall be at the Contractor's expense. Dry conditions shall be maintained in the excavations until the

backfill has been placed. During the excavation, the grade shall be maintained so that it will freely drain and prevent surface water from entering the excavation at all times. When directed by Engineer, temporary drainage ditches shall be installed to intercept or direct surface water which may affect work. All water shall be pumped or drained from the excavation and disposed of in a suitable manner without damage to adjacent property or to other work.

G. Minimum cover of 36" shall be provided for all pipelines, except those located under a State Highway. Those shall have a minimum cover of 48".

## 3.02 PIPE BEDDING

- A. All sewer pipe shall be supported on a bed of granular material. In no case shall pipe be supported directly on rock. Bedding shall not be a separate pay item unless otherwise set out in the Detailed Specifications. Bedding shall be provided in earth bottom trenches, as well as rock bottom trenches. Bedding material shall be free from rock, foreign material, frozen earth, and be acceptable to the Engineer. Bedding shall be a minimum of 6" below pipe barrel.
- B. In all cases the foundation for pipes shall be prepared so that the entire load of the backfill on top of the pipe will be carried on the barrel of the pipe and insofar as possible where bell and spigot pipe is involved so that none of the load will be carried on the bells.
- C. Where flexible pipe is used, the granular bedding shall be placed up to at least the spring line (horizontal center line) of the pipe. The bedding material and procedures shall conform to ASTM D 2321 and any Technical Specifications set out hereinafter. If conditions warrant, the Engineer may require the bedding to be placed above the springline of the pipe. Granular bedding shall be Department of Transportation crushed limestone Size #9 crushed stone and is not a separate pay item. Refer to Paragraph 2.02 for materials specification for pipe bedding.
- D. Where undercutting and granular bedding are involved the undercutting shall be of such depth that the bottom of the bells of the pipe will be at least three inches above the bottom of the trench as excavated. Undercutting is not a separate pay item.
- E. In wet, yielding mucky locations where pipe is in danger of sinking below grade or floating out of line or grade, or where backfill materials are of such a fluid nature that such movements of the pipe might take place during the placing of the backfill, the pipe must be weighted or secured permanently in place by such means as will prove effective. When ordered by the Engineer, yielding and mucky materials in subgrades shall be removed below ordinary trench depth in order to prepare a proper bed for the pipe. Crushed stone or other such granular material, if necessary, as determined by the Engineer to replace poor subgrade material, shall be a separate pay item and classified as "Special Granular Fill". Removal of poor material is not a separate pay item.
- F. Installation shall be in accordance with ASTM D 2321 except as modified hereinafter.

# 3.03 SPECIAL GRANULAR FILL

A. As noted in Paragraph 3.02E, granular material for "Special Granular Fill" when directed by the Engineer shall be Department of Transportation crushed limestone, Size #57. Payment for "Special Granular Fill" must have approval from the Engineer prior to installation.

## 3.04 LAYING PIPE

- A. The laying of pipe in finished trenches shall be commenced at the lowest point so the spigot ends point in the direction of flow.
- B. All pipes shall be laid with ends abutting and true to line and grade as given by the Engineer. Supporting of pipes shall be as set out hereinbefore under "Pipe Bedding" and in no case shall the supporting of pipes on blocks be permitted.
- C. Before each piece of pipe is lowered into the trench, it shall be thoroughly inspected to insure its being clean. Each piece of pipe shall be lowered separately unless special permission is given otherwise by the Engineer. No piece of pipe or fitting which is known to be defective shall be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipe is laid, they shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe.
- D. Pipe shall not be laid on solid rock. A pad of granular material as specified in Paragraph 3.02 "Pipe Bedding", shall be used as a pipe bedding. Pipe bedding is not a separate pay item. Irregularities in subgrade in an earth trench shall be corrected by use of granular material.
- E. When ordered by the Engineer, unsuitable materials in subgrades shall be removed below ordinary trench depth in order to prepare a proper bed for the pipe.
- F. When laying of pipe is stopped for any reason, the exposed end of such pipe shall be closed with a plywood or fabricated plug fitted into the pipe bell, so as to exclude earth or other material, and precautions taken to prevent flotation of pipe by runoff into trench.
- G. No backfilling (except for securing pipe in place) over pipe will be allowed until the Engineer has had an opportunity to make an inspection of the joints, alignment and grade, in the section laid.

### 3.05 BACKFILLING PIPELINE TRENCHES

- A. Backfilling of pipeline trenches shall be accomplished with the requirements set forth in ASTM D 2321, in accordance with the details as shown on the Drawings, as described hereinafter and the requirements given in Section 02300 "Earthwork". Before final acceptance, the Contractor will be required to level off all trenches or to bring the trench up to grade. The Contractor shall also remove from roadways, rights-of-way and/or private property all excess earth or other materials resulting from construction. In the event that pavement is not placed immediately following trench backfilling in paved areas, the Contractor shall be responsible for maintaining the trench surface in a level condition at proper pavement grade at all times.
- B. Method "1" Backfilling in Open Terrain:

Backfilling of pipeline trenches in open terrain, beyond five (5) feet from the edge of pavement, shall be accomplished in the following manner:

- 1. The lower portion of the trench, from the pipe bedding to a point 12" above the top of the pipe, shall be backfilled with No. 9 crushed stone. This material shall be placed in a manner approved by the Engineer, and shall be carefully compacted to avoid displacement of the pipe. Compaction shall be accomplished by hand-tamping or by approved mechanical methods.
- 2. The upper portion of the trench above the crushed stone portion shall be backfilled with earthen material which is free from large rock. Incorporation of rock having a volume exceeding one-half cubic foot is prohibited. This material shall be placed in a manner approved by the Engineer, and shall be carefully compacted to avoid displacement of the pipe. Compaction shall be accomplished by hand-tamping or by approved mechanical methods. This portion of the trench shall be wrapped with geotextile fabric per Section 02300 and the Standard Detail Drawings.
- C. Method "2" Backfilling Under Streets, Roads, and Paved Driveways:

Backfilling of pipeline trenches under existing and proposed paved areas, and five (5) feet beyond the edge of pavement, shall be accomplished in the following manner:

- 1. The lower portion of the trench, from the pipe bedding to a point 12 inches above the top of the pipe, shall be backfilled with No. 9 crushed stone. This material shall be placed in a manner to avoid displacement of the pipe. This material shall be placed in a manner approved by the Engineer, and shall be carefully compacted to avoid displacement of the pipe. Compaction shall be accomplished by hand-tamping or by approved mechanical methods.
- 2. The middle portion of the trench, from a point 12" above the top of the pipe to a point even with the bottom of the base course for paving shall be backfilled with flowable fill per Section 02300 and the Standard Detail Drawings.
- D. All backfilling methods are shown on the Detail Drawings. When directed by the Engineer, the Contractor shall wet backfill material to assure maximum compaction.
- E. Before final acceptance, the Contractor will be required to level off all trenches or to bring the trench up to grade. The Contractor shall also remove from roadways, rights-ofways and/or private property all excess earth or other materials resulting from construction.
- F. In the event that pavement is not placed immediately following trench backfilling in streets and highways, the Contractor shall be responsible for maintaining the trench surface in a level condition at proper pavement grade at all times. All temporary paving materials and their method of placement shall be approved by the KYTC Section Engineer or his representative prior to use.

# 3.06 SETTLEMENT OF TRENCHES

A. Whenever lines are in, or cross, driveways and streets, the Contractor shall be responsible for any trench settlement that occurs within these rights-of-way within one year from the time of final acceptance of the work. If paving shall require replacement because of trench settlement within this time, it shall be replaced by the Contractor at no extra cost to the Owner. Repair of settlement damage shall meet the approval of the Owner and/or the State Department of Transportation.

# 3.07 REPLACEMENT OF EXISTING MAIL BOXES, CULVERTS, CLOTHES LINE POSTS, FENCES AND OTHER SUCH FACILITIES

- A. Existing mail boxes, drainage culverts, clothes line posts, fences and the like shall not be damaged or disturbed unless necessary, in which case, they shall be replaced in as good condition as found as quickly as possible. Existing materials shall be reused in replacing such facilities when materials have not been damaged by the Contractor's operations. Existing facilities damaged by Contractor's operation shall be replaced with new materials of the same type at the Contractor's expense. Work in this category is not a pay item.
- B. Replacement of paved drainage ditches within highway right-of-way shall be accomplished in accordance with Department of Transportation specifications.

### 3.08 PORTLAND CEMENT CONCRETE DRIVEWAY REPLACEMENT

- A. Wherever Portland cement concrete driveways are removed, they shall be reconstructed to the original lines and grades and in such manner as to leave all such surfaces in fully as good or better condition than existed prior to the operation.
- B. The existing concrete paving shall be sawed or cut to straight edges 12-inches outside the edges of the trench or broken out to an existing joint, as directed by the Engineer. The concrete pavement shall be equal to the existing pavement thickness but not less than 6-inches in thickness for driveways.
- C. Pavement shall be reinforced with 6 x 6 #10-10 wire mesh and shall be constructed with 3000 psi concrete.

# 3.09 TESTING

On all projects involving installation of sanitary sewer lines, the finished work shall comply with the provisions listed below or similar requirements which will insure equal or better results:

- A. Rod Out: After the collecting and/or outfall lines or system have been brought to completion, and prior to final inspection, the Contractor shall rod out the entire system by pushing through each individual line in the system, from manhole to manhole, appropriate tools for the removal from the lines of any and all dirt, debris and trash.
- B. Inspect Lines: During the final inspection, the Engineer will inspect each individual line, from manhole to manhole, either by use of lights or other means at his disposal to determine whether the completed lines are true to line and grade as laid out or as shown on the plans.
- C. Deflection tests shall be performed on a flexible pipe. The test shall be conducted after the final backfill has been in place at least 30 days to permit stabilization of the soil-pipe system. No pipe shall exceed a deflection of 5 percent. If deflection exceeds 5 percent, pipe shall be replaced or corrected. The rigid ball cylinder or mandrel used for the deflection test shall have a diameter not less than 95 percent of the base inside diameter or average inside diameter of the pipe depending on which is specified in the ASTM Specification, including the appendix, to which the pipe is manufactured. The pipe shall be measured in compliance with ASTM D2122 Standard Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings. The test shall be performed without mechanical pull devices.

- D. Replace Defective Lines: All lines or sections of lines that are found to be laid improperly with respect to line or grade, that are found to contain broken or leaking sections of pipe, or are obstructed in such a manner that they cannot be satisfactorily corrected otherwise, shall be removed and replaced at the Contractor's expense.
- E. I & I Limits: The Contractor shall lay sewer lines, including house connections so that the access of ground water or loss of water from the sewer system or other gravity flow piping which does not normally flow full will be limited to 10 gallons per inch diameter per mile per day. This limitation is inclusive of manholes, sewers, house connections, and appurtenances. This requirement may be applied to a portion of the contract work, such as the sewers in a separate drainage area or to a single section of the line between two manholes.
- F. Low Pressure Air Test: To test for leaks, the Engineer will require that all completed piping as specified herein after back filling be tested by low-pressure air test, exfiltration, or infiltration test. Should the low pressure air test results be inconclusive, or at the request of the Engineer, an exfiltration or infiltration test will be required on the low pressure air tested segments. Labor, equipment and supplies required for all tests shall be furnished by the Contractor.

The low pressure air test shall consist of meeting a required holding time during a measured pressure drop. The initial test pressure shall be 4.0 psi, with the allowable pressure loss being 1.0 psi during the calculated holding time. Holding time shall be as indicated in the following table:

l Pipe Dia. (in)	2 Minimu m Time (min:sec)	3 Length for Minimum Time (ft)	4 Time for Longer Length (sec)	Specified Minimum for Length (L) Shown (min:sec)									
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 fi		
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46		
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24		
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:2		
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48		
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38		
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04		
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:4		
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:3		
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:3		
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:4		
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:1		
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:5		
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:4		
42	39:48	57	41.883 L	69:48	104:42	139:37	174:30	209:24	244:19	279:13	314:0		
48	45:34	50	54.705 L	91:10	136:45	182.21	227:55	273:31	319:06	364:42	410:1		
54	51:02	44	69.236 L	115:24	173:05	230:47	288:29	346:11	403:53	461:34	519:1		
60	65:40	40	85.476 L	142:28	213:41	284:55	356:09	427:23	498:37	569:50	641:0		

<sup>\*</sup> If there is no leakage (0 psi drop) after one hour of testing, the tested section shall be accepted.

G. Exfiltration Test: In order to test for infiltration the Engineer may also require exfiltration tests on each section of pipe between manholes after it has been laid but prior to back filling of joints. Exfiltration tests shall be conducted by plugging the lower end of the section of sewer to be tested and filling the sewer with water to a point approximately five feet above the invert at the lower end and at least one foot above the pipe at the upper end, observing for leakage at all joints and measuring the amount of leakage for a given interval of time. Exfiltration shall not exceed 110 percent times the

infiltration limits set out hereinbefore. All observed leaks shall be corrected even though exfiltration is within the allowable limits.

- H. Infiltration Test: To test for infiltration, the Engineer may also require that the Contractor plug the open ends of all lines at the manhole so that measurements may be made at each section of the sewer line. Infiltration tests shall consist of weir measurement to determine quantities of any infiltration. Measurements shall be taken at line locations directed by the Engineer. This infiltration test will not be made until the sewer line is completed, and the Contractor will be required to correct all conditions that are conductive to excessive infiltration and may be required to relay such sections of the line that may not be corrected even though infiltration is within allowable limits.
- I. Smoke testing may be used only to locate leaks and in no case shall be considered conclusive. In all cases the smoke test shall be accompanied by an air test, exfiltration test or infiltration test. Smoke testing may only be performed where ground water is low and smoke is blown into a conduit that is properly sealed. All such leaks or breaks discovered by the smoke tests shall be repaired and/or corrected by the Contractor at his own expense. Equipment and supplies required from smoke tests shall be furnished by the Contractor. The Contractor may also be required to smoke test the first section (manhole-to-manhole) of each size of pipe and type of joint on each construction contract prior to backfilling to establish and check laying and jointing procedures. Other supplementary smoke tests prior to backfilling may be performed by the Contractor at his option; however, any such tests shall not supplant the final tests of the completed work unless such final tests are waived by the Engineer.

### 3.10 CLEAN UP

A. Upon completion of installation of the piping and appurtenances, the Contractor shall remove all debris and surplus construction materials resulting from the Work. The Contractor shall grade the ground along each side of pipe trenches in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line.

END OF SECTION

#### SECTION 02531 - SEWAGE FORCE MAINS

### PART 1 - GENERAL

## 1.01 SCOPE OF WORK

A. Provide all labor, materials, equipment and services required for furnishing and installing all piping and appurtenances specified herein.

## 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 02300

## 1.03 SUBMITTALS

- A. Submit manufacturer's data and shop drawings for all materials and as specified herein. Comply with all requirements of Section 01340.
- B. A notarized certification shall be furnished for all pipe and fittings that verifies compliance with all applicable specifications. The requirement for this certification does not eliminate the need for shop drawings submittals in compliance with Section 01340.
- C. In accordance with the requirements of the General and Special Conditions and this Section, the following table includes, but is not limited to, the items required to be submitted:

Shop Drawings	Product Data	Schedules	Installation Data	Parts Lists	Wiring Diagram	Samples	O & M Manual	Certificates	Warranty	Report	Other	
	X							X				
er a serie	X											er was a series
	X		X	2110.0.0								
	X		X	awatta sa	1.104						0,3250034	
	Shop Drawings	X X X Prod	X Shop	Shop Drawi X X Product Da Schedules X Installation	Shop Drawi X X Product Da Schedules X Installation Parts Lists	Shop Drawi X X Product Da Schedules X Installation Parts Lists	Shop Drawi X X Product Da Schedules X Installation Parts Lists Wiring Dia	Shop Drawi X X Product Da Schedules X Installation Parts Lists Wiring Dia Samples O & M Mau	Shop Drawi X X Product Da Schedules X Installation Parts Lists Wiring Dia Samples O & M Mau	Shop Drawi X X Product Da Schedules X Installation Parts Lists Wiring Dia Samples O & M Mau X Certificates	Shop Drawi X X Product Da Schedules X Installation Parts Lists Wiring Diay Wiring Diay Warranty Report	Shop Drawi X X Product Da Schedules Schedules Wiring Dia Wiring Dia X Certificates Warranty Report Other

# 1.04 UTILITY LINE ACTIVITIES COVERED UNDER NATIONWIDE PERMIT # 12

All activities involving utility line construction covered under NATIONWIDE PERMIT # 12 shall meet the following conditions:

- A. The general Water Quality Certification is limited to the <u>crossing</u> of intermittent and perennial streams by utility lines.
- B. The construction of permanent or temporary access roads will impact less than 300 linear feet of intermittent and perennial streams and less than one acre of jurisdictional wetlands.
- C. Utility lines shall be located at least 50 feet away from a stream which appears as a blue line on a USGA 7 ½ minute topographic map except where the utility line alignment crosses the stream. Utility lines that cross streams shall be constructed by methods that maintain normal stream flow and allow for a dry excavation. Water pumped from the excavation shall be contained and allowed to settle prior to re-entering the stream. Excavation equipment and vehicles shall operate outside of the flowing portion of the stream. Spoil material from the utility line excavation shall not be allowed to enter the flowing portion of the stream.
- D. The activities shall not result in any permanent changes in preconstruction elevation contours in waters or wetlands or stream dimension, pattern or profile.
- E. Utility line construction projects through jurisdictional wetlands shall not result in conversion of the area to non-wetland status.
- F. Measures shall be taken to prevent or control spills of fuels, lubricants, or other toxic materials used in construction form entering the watercourse.
- G. Removal of riparian vegetation in the utility line right-of-way shall be limited to that necessary for equipment access. Effective erosion and sedimentation control measures must be employed at all times during the project to prevent degradation of waters of the Commonwealth. Site regarding and reseeding will be accomplished with 14 days after disturbance.
- H. To the maximum extent practicable, all in stream work under this certification shall be performed during low flow.
- I. Heavy equipment, e.g. bulldozers, backhoes, draglines, etc., if required for this project, should not be used or operated within the stream channel. In those instances where such in stream work is unavoidable, then it shall be performed in such a manner and duration as to minimize turbidity and disturbance to substrates and bank or riparian vegetation.
- J. Any fill shall be of such composition that it will not adversely affect the biological, chemical, or physical properties of the receiving waters and/or cause violations of water quality standards. If riprap is utilized, it is to be of such weight and size that bank stress or slump conditions will not be created because of its placement.
- K. Removal of existing riparian vegetation should be restricted to the minimum necessary for project construction.
- L. Should evidence of stream pollution or jurisdictional wetland impairment and/or violations of water quality standards occur as a result of this activity (either from a spill or other forms of water pollution), the Kentucky Division of Water shall be notified immediately by calling 800/928-2380.

#### 1.05 CONSTRUCTION IN A FLOODPLAIN

- A. No material shall be placed in the stream or in the flood plain to form construction pads, coffer dams, access roads, etc. unless prior approval has been obtained from the Environmental and Public Protection Cabinet.
- B. The trench shall be backfilled as closely as possible to the original contour. All excess material from construction of the trench shall be disposed of outside the flood plain unless the applicant has received prior approval from the Cabinet to fill within the flood plain.

## **PART 2 - PRODUCTS**

## 2.01 RESTRAINED JOINT DUCTILE IRON PIPE

- A. Restrained joint ductile iron pipe shall conform to ANSI/AWWA C151/A21.51, latest revision, Pressure Class 350, with restrained push-on joints unless otherwise noted on Drawings.
- B. The interior of the pipe and fittings shall be coated with 40 mils of Protecto 401 Ceramic Epoxy as manufactured by Induron Coatings, Birmingham, AL, Polybond as manufactured by American Cast Iron Pipe Co., Birmingham, AL, or approved equal. The flexible lining used shall meet the requirements of the lining manufacturer's own specifications and shall be applied in accordance with the manufacturer's specifications and requirements
- C. The exterior of all pipe, unless otherwise specified, shall receive either coal tar or asphalt base coating a minimum of 1 mil thick.
- D. Each piece of pipe shall bear the manufacturer's name or trademark, the year in which it was produced and the letters "DI" or the word "DUCTILE". Pipe manufacturer shall furnish notarized certificate of compliance to the above AWWA or ANSI specifications.
- E. Fittings shall be Pressure Class 350 ductile iron and have restrained push-on joints in accordance with ANSI/AWWA C110/A21.10, latest revision with the exception of the manufacturer's proprietary design dimensions. Fittings shall have interior cement-mortar lining as specified hereinbefore for the pipe.
- F. The use of restrained joints utilizing a friction type connection shall **not** be accepted.
- G. Joints for ductile iron pipe and fittings, as described hereinbefore, shall be rubber-gasket joints and be in accordance with ANSI/AWWA C111/A21.11, latest revision. Joints shall have the same pressure rating as the pipe of fitting of which they are a part. Joints shall be installed per the manufacturer's recommendations.
- H. All pipe in the vicinity of a series of bends shall have restrained push-on joints, with lengths as recommended by the Engineer or pipe manufacturer. Pipe at ends left for future connections shall also have restrained push-on joints. All other tees, bends, and dead-ends shall have concrete thrust blocking.
- Restrained joint pipe and fittings shall be FLEX-RING Restrained Joint by American Ductile Iron Pipe, TR FLEX Restrained Joint by U.S. Pipe, SUPER-LOCK Restrained

Joint by Clow Water Systems, SNAP-LOCK Restrained Joint by Griffin Pipe, or approved equal.

- J. Restrained push-on joint pipe and fittings shall be capable of being deflected after assembly.
- K. All restrained joint pipe and fittings shall be fabricated by the same pipe manufacturer.
- L. Where spigot end of restrained joint pipe connect with valves or other items that have mechanical-joint ends, connection shall be made with a restrained mechanical-joint gland. Restrained mechanical-joint connection shall be Mechanical- Joint Coupled-Joint by American Ductile Iron Pipe, MECH-LOK Restrained Joint by Griffin Pipe, or approved equal.
- M. Pipe and fittings lined with flexible lining must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning, or laying. The pipe shall not be dropped or unloaded by rolling. Care should be taken not to let the pipe strike sharp objects while swinging or being off loaded. Ductile iron pipe should never be placed on grade by use of hydraulic pressure from an excavator bucket or by banging with heavy hammers.
- N. Restrained joint ductile iron fittings shall be paid based on the following weights:

Restrained Joint Ductile Iron Fitting	Weight (lbs)
12" RJ 22.5° Bend	155
12" RJ 45° Bend	170
12" RJ 90° Bend	255

# 2.02 POLYETHYLENE ENCASEMENT FOR DUCTILE IRON PIPE (Polywrap)

- A. Polyethylene encasement and materials shall be in accordance with ANSI/AWWA C105/A21.5-88 and shall conform to the details and specifications shown therein.
- B. Polyethylene encasement shall be installed on all ductile iron force main pipe except where force main pipe is indicated to be steel encased.

# C. Installation:

- 1. The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding material.
- All lumps of clay, mud, cinders, etc. on the pipe surface shall be removed prior to
  installation of the polyethylene encasement. During installation, care shall be
  taken so as to prevent soil or embedment material from becoming trapped
  between the pipe and the polyethylene.
- 3. The polyethylene film shall be fitted to the contour of the pipe to effect a snug, but not tight, encasement with minimum space between the polyethylene and the pipe. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to the polyethylene due to backfilling operations. Overlaps and ends shall be secured with adhesive tape,

string, or any other material capable of handling the polyethylene encasement in place until backfilling operations are complete.

#### D. Methods of Installation

# Method A - for use with Polyethylene Tubes:

- 1. Cut polyethylene tube to a length approximately 2 ft. longer than the pipe section.
- 2. Slip the tube around the pipe, centering it to provide a 1 ft. overlap on each adjacent pipe section, and bunching it accordion-fashion lengthwise until it clears the pipe ends.
- Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at joints to facilitate the installation of the polyethylene tube.
- 4. After assembling the pipe joint, make the overlap of the polyethylene tube. Pull the bunched polyethylene from the preceding length of pipe, slip it over the end of the new length of pipe, and secure it in place. Then slip the end of the polyethylene from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe. Secure the overlap in place. Take up the slack width at the top of the pipe to make a snug, but not tight, fit along the barrel of the pipe, securing the fold at quarter points.
- 5. Any cuts, tears, punctures, or other damage to the polyethylene shall be repaired in accordance with Section 2.23 Sub-section F of these specifications.

# Method B - for use with Polyethylene Tubes:

- 1. Cut polyethylene tube to a length approximately 1 ft. shorter than that of the pipe section. Slip the tube around the pipe, centering it to provide 6 inches of bare pipe at each end. Take up the slack width at the top of the pipe to make a snug, but not tight, fit along the barrel of the pipe, securing the fold at quarter points; secure the ends as described here within under Method A.
- 2. Before making a joint, slip a 3-ft. length of polyethylene tube over the end of the preceding pipe section, bunching it accordion-fashion lengthwise. After completing the joint, pull the 3-ft. length of polyethylene over the joint, overlapping the polyethylene previously installed on each adjacent section of pipe by at least 1 ft.
- 3. Any cuts, tears, punctures, or other damage to the polyethylene shall be repaired in accordance with Section 2.23 Sub-section F of these specifications.

# Method C - For use with Polyethylene Sheets:

1. Cut polyethylene sheet to a length approximately 2 ft. longer than that of the pipe section. Center the cut length to provide a 1-ft overlap on each adjacent pipe section, bunching it until it clears the pipe ends. Wrap the polyethylene around the pipe so that it circumferentially overlaps the top quadrant of the pipe. Secure the cut edge of polyethylene sheet at intervals of approximately 3 ft.

- 2. Lower the wrapped pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at joints to facilitate installation of the polyethylene. After completing the joint, make the overlap and secure the ends as described here within under Method A.
- 3. Any cuts, tears, punctures, or other damage to the polyethylene shall be repaired in accordance with Section 2.23 Sub-section F of these specifications.

# E. Appurtenances

## Pipe Shaped Appurtenances:

1. Cover bends, reducers, offsets, and other pipe-shaped appurtenances with polyethylene in the same manner as the pipe.

#### Odd-Shaped Appurtenances:

- 1. When it is not practical to wrap valves, tees, crosses and other odd-shaped pieces in a tube, wrap with a flat sheet or split length of polyethylene tube by passing the sheet under the appurtenance and bringing it up around the body. Make seams by bringing the edges together, folding over twice, and taping down.
- 2. Tape polyethylene securely in place at valve stem and other penetrations.
- F. Repair any cuts, tears, punctures, or damage to polyethylene with adhesive tape or with a short length of polyethylene sheet or a tube cut open, wrapped around the pipe to cover the damaged area, and secured in place.
- G. Openings in the encasement shall provide for branches, service taps, blowoffs, air valves, and similar appurtenances by making an X-shaped cut in the polyethylene and temporarily folding back the film. After the appurtenance is installed, tape the slack securely to the appurtenance and repair the cut with tape. Service taps may also be made directly through the polyethylene, with any resulting damaged areas being repaired as described here within.
- H. Where polyethylene -wrapped pipe joins an adjacent pipe that is not wrapped, extend the polyethylene wrap to cover the adjacent pipe for a distance of at least 3 ft. Secure the end with circumferential turns of tape. Service lines of dissimilar metals shall be wrapped with polyethylene or a suitable dielectric tape for a minimum clear distance of 3 ft. away from the ductile iron pipe.
- I. Backfilling for Polyethylene -Wrapped Pipe:
  - Use the same backfill material as that specified for pipe without polyethylene wrap, exercising care to prevent damage to the polyethylene wrapping when placing backfill material.
  - Backfill material shall be free from cinders, refuse, boulders, rocks, stones, or other material that could damage the polyethylene. Backfilling shall be in accordance with AWWA C600.

# 2.03 COUPLING AND ADAPTORS

- A. Flexible couplings shall be of the sleeve type with a middle ring, two wedge shaped resilient gaskets at each end, two follower rings, and a set of steel trackhead bolts. The middle ring shall be flared at each end to receive the wedge portion of the gaskets. The follower rings shall confine the outer ends of the gaskets, and tightening of the bolts shall cause the follower rings to compress the gaskets against the pipe surface, forming a leak-proof seal. Flexible couplings shall be steel with minimum wall thickness of the middle ring or sleeve installed on pipe being 5/16-inch for pipe smaller than 10 inches, 3/8-inch for pipe 10 inches or larger. The minimum length of the middle ring shall be 5-inches for pipe sizes up to 10 inches and 7 inches for pipe 10 inches to 30 inches. The pipe stop shall be removed. Gaskets shall be suitable for 250 psi pressure rating or at rated working pressure of the connecting pipe. Couplings shall be harnessed and be designed for 250 psi.
- B. Flanged adapters shall have one end suitable for bolting to a pipe flange and the other end of flexible coupling similar to that described hereinbefore. All pressure piping with couplings or adapters shall be harnessed with full threaded rods spanning across the couplings or adapters. The adapters shall be furnished with bolts of an approved corrosion resistant steel alloy, extending to the adjacent pipe flanges. Flanges on flanged adapter (unless otherwise indicated or required) shall be faced and drilled ANSI B16.1 Class 125.
- C. Flexible couplings and flanged adapters shall be as manufactured by Dresser, Rockwell, or equal, per the following, unless otherwise specified and/or noted on the Drawings:
- D. Steel couplings for joining same size, plain-end, steel, cast iron, and PVC plastic pipe -

Dresser	Rockwell
Style 138	411

E. Transition couplings for joining pipe of different outside diameters-

Dresser	Rockwell
Style 162 (4"-12")	413 steel (2"-24")
Style 62 (2"-24")	415 steel (6"-48")
	433 cast (2"-16")
	435 cast (2"-12")

F. Flanged adapters for joining plain-end pipe to flanged pipe, fittings, valves and equipment.

Dresser	Rockwell
Style 127 cast (3"-12")	912 cast (3"-12")
Style 128 steel (3"-48" C.I. Pipe)	913 steel (3" and larger)
Style 128 steel (2"-96" steel pipe)	of the control of the

# 2.04 DETECTABLE UNDERGROUND UTILITY WARNING TAPES

A. Detectable underground utility warning tapes which can be located from the surface by a pipe detector shall be installed directly above nonmetallic (PVC, polyethylene, concrete) pipe.

- B. The tape shall consist of a minimum thickness 0.35 mils solid aluminum foil encased in a protective inert plastic jacket that is impervious to all know alkalis, acids, chemical reagents and solvents found in the soil.
- C. The minimum overall thickness of the tape shall be 5.5 mils and the width shall not be less than 2" with a minimum unit weight of 2-1/2 pounds/1" x 1,000'. The tape shall be color coded and imprinted with the message as follows:

Type of Utility	Color Code	Legends
Sewer	Safety Green	Caution Buried Sewer Line Below

- D. Detectable underground tape shall be "Detect Tape" as manufactured by Allen Systems, or equal.
- E. Installation of detectable tapes shall be per manufacturer's recommendations and shall be as close to the grade as is practical for optimum protection and detectability. Allow a minimum of 18" between the tape and the line.
- F. Payment for detectable tapes shall be included in the linear foot price bid of the appropriate bid item(s) unless it is listed as a separate payment item in the bid schedule.

# 2.05 CONCRETE PIPE ANCHORS, THRUST BLOCKS, CRADLE OR ENCASEMENT

A. Where indicated on the Drawings, required by the specifications or as directed by the Engineer, concrete pipe anchors, thrust blocks, cradles or encasements shall be installed. Concrete shall be 3000 psi, and reinforcing bars shall be as installed as indicated on the details.

# 2.06 CARRIER PIPE

Carrier pipe shall be as specified in Part 2 above.

#### 2.07 CASING PIPE

- A. Casing pipe shall be steel, plain end, have a minimum yield point strength of 35,000 psi and conform to ASTM A 252 Grade 2 or ASTM A 139 Grade B without hydrostatic tests. The steel pipe shall have welded joints and be in at least 18 foot lengths. The exterior of the casing pipe shall be coated with a VOC-compliant coal tar epoxy.
- B. The diameter of the casing pipe shall be as follows:

d n			C	arrie	r Pip	e No	mina	l Dia	mete	r (In	ches)	W. C.	推納	14/12	
4	6	8	10	12	14	15	16	18	20	21	24	27	30	33	36
Krist i		1440	C	asing	g Pip	e No	mina	Dia	mete	r (In	ches)		70. 93	23477	
10	12	16	18	20	24	24	30	30	30	36	36	42	48	50	50

For carrier pipe sizes greater than 36-inches nominal diameter, the casing pipe diameter size shall be determined by the Engineer or as shown on the Contract Drawings.

C. The wall thickness of the casing pipe shall be as follows:

*	Cas	ing Pipe	Nomina	l Diame	ter (Inc	ches)	file:	le an
Under 20	20 & 22	24	30	36	38	42	48	50
沙夏东	Casi	ing Pipe	Nomina	Thicki	iess (In	ches)		441
.250	.281	.312	.406	.469	.500	.562	.625	.656

However, should casing pipe thickness be specified or required on Highway or Railroad permit approval sheets, said permit thickness requirement shall govern. Permit approval sheets will be made available to the Contractor.

# 2.08 CASING SPACERS

A. Stainless Steel Casing Spacers: Stainless steel casing spacers shall be bolt-on style with a shell made in two (2) sections of heavy T-304 stainless steel. Connecting flanges shall be ribbed for extra strength. The shell shall be lined with a PVC liner .090" thick with 85-90 durometer. All nuts and bolts are to be 18-8 stainless steel. Runners shall be made of ultra high molecular weight polymer with inherent high abrasion resistance and a low coefficient of friction. Runners shall be supported by risers made of heavy T-304 stainless steel. The supports shall be mig welded to the shell and all welds shall be fully passivated. Stainless steel casing spacers shall be made by Cascade Waterworks Mfg. Co., or equal.

# 2.09 CASING END SEALS

- A. Wrap-around end seals Wrap-around end seals shall be made of a waterproof flexible coal tar membrane reinforced with fiberglass, or synthetic rubber. The two exposed edges of the wrap-around seal shall be adhesively bonded forming a watertight seal. The ends of the wrap shall be sealed on the casing and carrier pipe by stainless steel bands. Wrap-around end seals shall be made by Calpico Inc., Advance Products & Systems, Inc., or equal.
- B. Upon approval the by Engineer, in lieu of wrap-around end seals, each end of the casing pipe and the carrier pipe shall be wrapped with two (2) layers of roofing felt.

# **PART 3 - EXECUTION**

#### 3.01 EXCAVATION FOR PIPELINE TRENCHES

A. Unless otherwise directed by the Engineer, trenches in which pipes are to be laid shall be excavated in open cut to the depths required by field conditions or as specified by the Engineer. In general this shall be interpreted to mean that machine excavation in earth shall not extend below an elevation permitting the pipe to be properly bedded. Installation shall be in accordance with ASTM-D-2321 except as modified herein.

- B. If the foundation is good firm earth and the machine excavation has been accomplished as set out hereinbefore, the remainder of the material shall be excavated by hand, then the earth pared or molded to give full support to the lower quadrant of the barrel of each pipe. Where bell and spigot is involved, bell holes shall be excavated during this latter operation to prevent the bells from being supported on undisturbed earth. If for any reason the machine excavation in earth is carried below an excavation that will permit the type of bedding specified above, then a layer of granular material shall be placed so that the lower quadrant of the pipe will be securely bedded in compact granular fill.
- C. Excavation may be undercut to a depth below the required invert elevation that will permit laying the pipe in a bed of granular material to provide continuous support for the bottom quadrant of the pipe. When this method is used, the bedding shall be as set out in Paragraph 3.02 hereinafter.
- D. Trenches shall be of sufficient width to provide free working space on each side of the pipe and to permit proper backfilling around the pipe, but unless specifically authorized by the Engineer, trenches shall in no case be excavated or permitted to become wider then 2'-0" plus the nominal diameter of the pipe at the level of or below the top of the pipe. If the trench does become wider than 2'-0" at the level of or below the top of the pipe, special precaution may be necessary, such as providing compacted, granular fill up to top of the pipe or providing pipe with additional crushing strength as determined by the Engineer after taking into account the actual trench loads that may result and the strength of the pipe being used. The Contractor shall bear the cost of such special precautions as are necessary.
- E. All excavated materials shall be placed a minimum of two feet (2') back from the edge of the trench.
- F. Before laying the pipe, the trench shall be opened far enough ahead to reveal obstructions that may necessitate changing the line or grade of the pipeline.
- G. The trench shall be straight and uniform so as to permit laying pipe to lines and grades given by the Engineer. It shall be kept free of water during the laying of the pipe and until the pipeline has been backfilled. Removal of trench water shall be at the Contractor's expense. Dry conditions shall be maintained in the excavations until the backfill has been placed. During the excavation, the grade shall be maintained so that it will freely drain and prevent surface water from entering the excavation at all times. When directed by Owner, temporary drainage ditches shall be installed to intercept or direct surface water which may affect work. All water shall be pumped or drained from the excavation and disposed of in a suitable manner without damage to adjacent property or to other work.
- H. Minimum cover of 36" shall be provided for all pipelines, except those located under a State Highway. Those shall have a minimum cover of 48".

# 3.02 PIPE BEDDING

A. All sewer pipe shall be supported on a bed of granular material unless the trench has been prepared in accordance with Paragraph 3.01B. In no case shall pipe be supported directly on rock. Bedding shall not be a separate pay item unless otherwise set out in the Detailed Specifications. Bedding shall be provided in earth bottom trenches, as well as rock bottom trenches. Bedding material shall be free from large rock, foreign material, frozen earth, and shall be acceptable to the Engineer. Bedding shall be a minimum of 6" below pipe barrel.

- B. In all cases the foundation for pipes shall be prepared so that the entire load of the backfill on top of the pipe will be carried on the barrel of the pipe so that none of the load will be carried on the bells.
- C. Where flexible pipe is used, the bedding shall be placed up to at least the spring line (horizontal center line) of the pipe. The bedding material and procedures shall conform to ASTM D 2321 and any Technical Specifications set out hereinafter. If conditions warrant, the Engineer may require the bedding to be placed above the springline of the pipe. Granular bedding shall be Department of Transportation crushed limestone Size #9 crushed stone and is not a separate pay item.
- D. Where undercutting and granular bedding is involved it shall be of such depth that the bottom of the bells of the pipe will be at least three inches above the bottom of the trench as excavated. Undercutting is not a separate pay item.
- E. In wet, yielding mucky locations where pipe is in danger of sinking below grade or floating out of line or grade, or where backfill materials are of such a fluid nature that such movements of the pipe might take place during the placing of the backfill, the pipe must be weighted or secured permanently in place by such means as will prove effective. When ordered by the Engineer, yielding and mucky materials in subgrades shall be removed below ordinary trench depth in order to prepare a proper bed for the pipe. Crushed stone or other such granular material, if necessary, as determined by the Engineer to replace poor subgrade material, shall be a separate pay item and classified as "Special Granular Fill". Removal of poor material is not a separate pay item.
- F. Installation shall be in accordance with ASTM D 2321 except as modified hereinafter.

# 3.03 SPECIAL GRANULAR FILL

A. As noted in Paragraph 3.02E, granular material for "Special Granular Fill" when directed by the Engineer shall be Department of Transportation crushed limestone, Size #57. Payment for "Special Granular Fill" must have approval from the Engineer prior to installation.

# 3.04 LAYING PIPE

- A. The laying of pipe in finished trenches shall be commenced at the lowest point so the spigot ends point in the direction of flow.
- B. All pipes shall be laid with ends abutting and true to line and grade as given by the Engineer. Supporting of pipes shall be as set out hereinbefore under "Pipe Bedding" and in no case shall the supporting of pipes on blocks be permitted.
- C. Before each piece of pipe is lowered into the trench, it shall be thoroughly inspected to insure its being cleaned. Each piece of pipe shall be lowered separately unless special permission is given otherwise by the Engineer. No piece of pipe or fitting which is known to be defective shall be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipe is laid, they shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe.

- D. Pipe shall not be laid on solid rock. A pad of granular material as specified in Paragraph 3.02 "Pipe Bedding", shall be used as a pipe bedding. Pipe bedding is not a separate pay item. Irregularities in subgrade in an earth trench shall be corrected by use of granular material.
- E. When ordered by the Engineer, unsuitable materials in subgrades shall be removed below ordinary trench depth in order to prepare a proper bed for the pipe.
- F. When laying of pipe is stopped for any reason, the exposed end of such pipe shall be closed with a plywood or fabricated plug fitted into the pipe bell, so as to exclude earth or other material, and precautions taken to prevent flotation of pipe by runoff into trench.
- G. No backfilling (except for securing pipe in place) over pipe will be allowed until the Engineer has had an opportunity to make an inspection of the joints, alignment and grade, in the section laid.

# 3.05 BACKFILLING PIPELINE TRENCHES

- A. Backfilling of pipeline trenches shall be accomplished with the requirements set forth in ASTM D 2321, in accordance with the details as shown on the Drawings, as described hereinafter and the requirements given in Section 02300 "Earthwork". Before final acceptance, the Contractor will be required to level off all trenches or to bring the trench up to grade. The Contractor shall also remove from roadways, rights-of-way and/or private property all excess earth or other materials resulting from construction. In the event that pavement is not placed immediately following trench backfilling in paved areas, the Contractor shall be responsible for maintaining the trench surface in a level condition at proper pavement grade at all times.
- B. Method "1" Backfilling in Open Terrain:

Backfilling of pipeline trenches in open terrain, beyond five (5) feet from the edge of pavement, shall be accomplished in the following manner:

- 1. The lower portion of the trench, from the pipe bedding to a point 12" above the top of the pipe, shall be backfilled with No. 9 crushed stone. This material shall be placed in a manner approved by the Engineer, and shall be carefully compacted to avoid displacement of the pipe. Compaction shall be accomplished by hand-tamping or by approved mechanical methods.
- 2. The upper portion of the trench above the crushed stone portion shall be backfilled with earthen material which is free from large rock. Incorporation of rock having a volume exceeding one-half cubic foot is prohibited. This material shall be placed in a manner approved by the Engineer, and shall be carefully compacted to avoid displacement of the pipe. Compaction shall be accomplished by hand-tamping or by approved mechanical methods. This portion of the trench shall be wrapped with geotextile fabric per Section 02300 and the Standard Detail Drawings.
- C. Method "2" Backfilling Under Streets, Roads, and Paved Driveways:

Backfilling of pipeline trenches under existing and proposed paved areas, and five (5) feet beyond the edge of pavement, shall be accomplished in the following manner:

- 1. The lower portion of the trench, from the pipe bedding to a point 12 inches above the top of the pipe, shall be backfilled with No. 9 crushed stone. This material shall be placed in a manner to avoid displacement of the pipe. This material shall be placed in a manner approved by the Engineer, and shall be carefully compacted to avoid displacement of the pipe. Compaction shall be accomplished by hand-tamping or by approved mechanical methods.
- 2. The middle portion of the trench, from a point 12" above the top of the pipe to a point even with the bottom of the base course for paving shall be backfilled with flowable fill per Section 02300 and the Standard Detail Drawings.
- D. All backfilling methods are shown on the Detail Drawings. When directed by the Engineer, the Contractor shall wet backfill material to assure maximum compaction.
- E. Before final acceptance, the Contractor will be required to level off all trenches or to bring the trench up to grade. The Contractor shall also remove from roadways, rights-ofways and/or private property all excess earth or other materials resulting from construction.
- F. In the event that pavement is not placed immediately following trench backfilling in streets and highways, the Contractor shall be responsible for maintaining the trench surface in a level condition at proper pavement grade at all times. All temporary paving materials and their method of placement shall be approved by the KYTC Section Engineer or his representative prior to use.

# 3.06 SETTLEMENT OF TRENCHES

A. Whenever lines are in, or cross, driveways and streets, the Contractor shall be responsible for any trench settlement which occurs within these rights-of-way within one year from the time of final acceptance of the work. If paving shall require replacement because of trench settlement within this time, it shall be replaced by the Contractor at no extra cost to the Owner. Repair of settlement damage shall meet the approval of the Owner and/or the State Department of Transportation.

# 3.07 CONCRETE THRUST BLOCKS, CRADLE, ANCHORS OR ENCASEMENT

- A. Concrete thrust blocks, cradle, anchors or encasement shall be placed where shown on the Drawings, required by the specifications, or as directed by the Engineer.
- B. For cradle and encasement, concrete shall be 3000 psi and shall be mixed sufficiently wet to permit it to flow under the pipe to form a continuous bed.
- C. For thrust blocks and anchors, concrete shall be 3000 psi, and shall be formed or be sufficiently stiff to maintain the forms indicated on the Details.
- D. When tamping concrete, care shall be taken not to disturb the grade or line of the pipe or injure the joints. Concrete placed outside the specified limits or without authorization from the Engineer will not be subject to payment.
- E. Force mains shall have concrete thrust or "kicker" blocks at all pipe changes of direction to resist forces acting on the pipeline.

# 3.10 REPLACEMENT OF EXISTING MAIL BOXES, CULVERTS, CLOTHES LINE POSTS, FENCES AND OTHER SUCH FACILITIES

- A. Existing mail boxes, drainage culverts, clothes line posts, fences and the like shall not be damaged or disturbed unless necessary, in which case, they shall be replaced in as good condition as found as quickly as possible. Existing materials shall be reused in replacing such facilities when materials have not been damaged by the Contractor's operations. Existing facilities damaged by Contractor's operation shall be replaced with new materials of the same type at the Contractor's expense. Work in this category is not a pay item.
- B. Replacement of paved drainage ditches within highway right-of-way shall be accomplished in accordance with Department of Transportation specifications.

#### 3.12 RIP-RAP STREAM BANK SLOPE PROTECTION

A. The Contractor shall install rip-rap stream bank slope protection at locations directed by the Engineer. Rip-rap slope protection shall be 12-inches thick and shall meet State D.O.T. Standard Specifications.

#### 3.13 TESTING

- A. All pressure piping (lines not laid to grade) shall be given a hydrostatic test of at least 1.5 times the normal operating pressure of the pipe (at its lowest elevation), but not to exceed the rated working pressure of the pipe or valves. Note: Engineer shall verify test pressure. Loss of pressure during the test shall not exceed 0 psi in a 4 hour period and 5 psi in a 24 hour period. Any test results that do not meet either of these requirements shall constitute a failure of the pressure test.
- B. Leakage in pipelines, when tested under the hydrostatic test described above, shall not exceed 10 gallons per 24 hours per inch of diameter per mile of pipe.
- C. Contractor shall furnish a recording gauge and water meter for measuring water used during leakage test and recording pressure charts during duration of test. Recording pressure charts shall be turned over to the Engineer at conclusion of tests. The pressure recording device shall be suitable for outside service, with a range from 0-200 psig, 24-hour spring wound clock, designed for 9-inch charts, and shall be approved by the Engineer.
- D. Pipelines shall be tested before backfilling at joints except where otherwise required by necessity or convenience.
- E. Duration of test shall be not less than four (4) hours where joints are exposed and not less than 24 hours where joints are covered.
- F. Where leaks are visible at exposed joints, evident on the surface where joints are covered, and/or identified by isolating a section of pipe, the joints shall be repaired and leakage must be minimized, regardless of total leakage as shown by test.
- G. All pipe, fittings, valves, and other materials found to be defective under test shall be removed and replaced at no additional expense to the Owner.

- H. Lines which fail to meet tests shall be repaired and retested as necessary until test requirements are complied with.
- Where nonmetallic joint compounds are used, pipelines should be held under normal operating pressure for at least three days before testing.
- J. The Owner will provide initial water for testing the pressure piping. Should the first test fail to pass, all additional water required for subsequent tests shall be furnished at the Contractor's expense.
- K. The cost of testing of pressure piping is incidental and is to be included in the Contractor's unit Contract Price.

# 3.14 CLEAN UP

A. Upon completion of installation of the piping and appurtenances, the Contractor shall remove all debris and surplus construction materials resulting from the Work. The Contractor shall grade the ground along each side of pipe trenches in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line.

END OF SECTION

# SECTION 02532 - SANITARY SEWER MANHOLES, FRAMES, AND COVERS

#### PART 1 - GENERAL

#### 1.01 SCOPE OF WORK

A. Provide all labor, materials, equipment and services required for furnishing and installing all manholes and appurtenances specified herein and shown on the Drawings.

# 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 02300

B. Gravity Sewer Lines: Section 02530

# 1.03 SUBMITTALS

- A. Submit manufacturer's data and shop drawings for the materials specified herein. Comply with all requirements of Section 01340.
- B. Descriptive literature, catalog cuts, and dimensional prints clearly indicating all dimensions and materials of construction, shall be submitted on all items specified herein to the Engineer for review before ordering.
- C. At the time of submission, the Contractor shall, in writing, call the Engineer's attention to any deviations that the submittals may have from the requirements of the Engineer's Contract Drawings and Specifications.
- D. In accordance with the requirements of the General and Special Conditions and this Section, the following table includes, but is not limited to, the items required to be submitted:

Item Description	Shop Drawings	Product Data	Schedules	Installation Data	Parts Lists	Wiring Diagram	Samples	O & M Manual	Certificates	Warranty	Report	Other	
Manholes	X	X			Х								
Manhole Apppurtenances	х	х		х				1859				1000	

# **PART 2 - PRODUCTS**

#### 2.01 MANHOLES

- A. Manholes of the form and dimensions shown on the Drawings shall be constructed of ASTM C 478 precast reinforced concrete manhole sections erected on 3,000 psi concrete foundation.
- B. Precast concrete manhole bottom sections may be substituted for "cast-in-place" foundations subject to the Owner's review.
- C. The excavation shall be kept free of water while the manhole is being constructed and the manhole shall not be backfilled until inspected by the Engineer.

#### D. Standard Manholes:

- 1. The standard manhole shall be 4'-0" in diameter and not greater than six (6) feet in depth, measured from the top of the cover frame to the invert of the outlet and shall be cone type- top construction as shown on the Drawings.
- Manholes greater than six (6) feet in depth, measured as above, shall be paid for as a standard six foot manhole, plus the additional vertical depth at the Contract unit price.

# E. Shallow Manholes:

The shallow manholes shall be five (5) feet or less in depth, measured from the top of the cover frame to the invert of the outlet and shall be of flat top construction as shown on the Drawings.

# F. Concrete Manhole Sections:

Precast concrete manhole sections (risers and grade rings) shall conform to ASTM C 478.

# G. Precast Concrete Eccentric Cones:

Precast concrete eccentric cones shall be of the size and shape shown on the Drawings and shall conform to ASTM C 478.

#### H. Precast Manhole Section Joints:

Precast manhole section joints shall be jointed with one of the following products:

ASTM C 443 rubber gaskets
AASHTO M-198-75 preformed flexible butyl type joint sealant
Hamilton-Kent "Kent-Seal No. 2"
K.T. Snyder Co. "Rub'r-Nek"
Press Seal Gasket "E-Z stik"
Concrete Sealants, Inc. "Conseal"

or equal, or joined with bituminous mastic joint sealing compound. When making joints with mastic compound prime and seal all joints with primer supplied with the joint compound. Manhole section joints shall be watertight. These requirements apply to all joints, including manhole risers, cones, and grade rings.

#### I. Manhole Inverts:

Manhole inverts shall be formed with 3,000 psi concrete. Inverts shall be constructed as shown on the Contract Drawings and shall form a smooth finish. Inverts may be shop fabricated or constructed on site.

# J. Manhole Steps:

Plastic manhole steps shall be PS1-PF (Press Fit) polypropylene plastic as manufactured by MA Industries, Peachtree City, Georgia or equal. Steps shall be driven into specially sized holes cast into the manhole section. Holes shall be formed in the manhole section using an insert plug that is removed upon curing.

Steps shall be aligned vertically above the outlet, in line with the flow through. Step spacing shall be 15".

#### K. Manhole Frames and Covers:

Manhole castings shall consist of cast iron frames with a minimum clear opening of twenty-two (22) inches. Casting shall have a minimum of four (4) bolt holes for the purpose of anchoring the casting to the manhole cone or grade ring.

Manhole covers must set neatly in the rings, with contact edges machined for even bearing and tops flush with ring edge. They shall have sufficient corrugations to prevent slipperiness and be marked in large letters, "SANITARY SEWER". The covers shall have two concealed pick holes. Covers on sanitary sewer manholes shall not be perforated.

Acceptable manufacturers are J.R. Hoe & Sons, Middlesboro, KY; John Bouchard & Sons Co., Nashville, TN; and Neenah Foundry Company, Neenah, WI., or equal.

- Where indicated on the Drawings or in the Specifications, Traffic Weight Manhole frames and covers shall be provided. These shall weigh a minimum of 325 pounds.
- Non-Traffic Weight: Manhole frame and cover weight to be minimum of 250 pounds.

# L. Watertight Manhole Covers:

Watertight manhole covers shall consist of cast iron frames with machined bearing surfaces, continuous gasket seal preinstalled into slots with dovetail design and shall be of the self-sealing type as manufactured by Neenah Foundry Company or equal. Watertight manhole covers shall have sufficient corrugations to prevent slipperiness and be marked in large letters "SANITARY SEWER". Weight of manhole covers shall be as specified in Paragraph 2.01.K of this specification.

# M. Pipe Connections Into Manholes:

Sewer pipe shall be sealed in the manhole section pipe openings with a resilient connector meeting the requirements of ASTM C923. Resilient connector shall be A-Lok by A-Lok Products, Inc. or equal.

Resilient connector shall be cast integrally into the wall of the manhole section at time of manufacture. There shall be no mortar placed around the connector on the outside of the manhole and no mortar shall be placed around the top half of the connector on the inside of the manhole when completing the invert work.

Resilient connectors requiring compression clamps or take up clamps will not be approved.

Wherever plastic sewer pipe is to be field grouted into manhole openings, pipe-tomanhole connector seal shall be Fernco Concrete Manhole Adapters manufactured by Fernco, Inc., Division, Michigan, or equal. Adapter shall be mounted on pipe and shall be positioned about the center of the manhole wall.

## N. Precast Concrete Manhole Base Sections:

Precast concrete manhole base sections, if provided in lieu of cast-in-place foundations, shall be "monolithic", consisting of base slab, and base riser section. Upon review and approval by the Owner and Engineer, precast base sections may include floor invert channel and apron. All precast base sections with pipe openings shall be furnished with ASTM C 923 pipe-to-manhole connector gaskets, as specified hereinbefore. Precast base sections shall be furnished with an integral anti-flotation footing, thickness as specified hereinafter, with 6-inch projection, as shown in the Details. Precast base sections shall be set on a 6-inch deep pad (compacted thickness) of dense graded aggregate, placed to proper elevation and leveled. The Engineer reserves the right to inspect precast manhole base sections at the construction site and to reject the use of such sections if the Engineer determines the products unsuitable for the Owner's installation.

Precast concrete manhole base slab thickness shall comply with the following schedule:

0' - 10'	Vertical Height - 6" Slab
10.1' - 15'	Vertical Height - 8" Slab
15.1' - 20'	Vertical Height - 10" Slab
20.1' - 25'	Vertical Height - 12" Slab
25.1' - 30'	Vertical Height - 14" Slab

# O. Drop Connections into Manholes

Where indicated on the Drawings, drop connections into manholes shall be installed. Drop connections shall be cast-in-place or precast, and shall conform to the requirements shown on the Details.

# 2.02 COMPRESSION COUPLINGS

A. When joining different types of pipe together or new pipe to existing pipe, the Contractor shall use Fernco Compression Couplings, or equal, that are resistant to corrosion by soil and sewage and that will provide a permanent watertight joint. The compression coupling shall meet the physical test and joint-leak requirements specified in ASTM C-594. The bands for attaching pipes shall be stainless steel conforming to ASTM C-594. Each coupling shall bear the manufacturer's name and an indication of its size.

# **PART 3 - EXECUTION**

#### 3.01 EXCAVATION FOR MANHOLE INSTALLATION

- A. Unless otherwise directed by the Engineer, excavation in which manholes are to be installed shall be excavated in open cut to the depths required by field conditions or as specified by the Engineer. In general this shall be interpreted to mean that machine excavation in earth shall not extend below an elevation permitting the manhole to be properly bedded.
- B. Excavation may be undercut to a depth below the required invert elevation that will permit installing the manhole on a bed of granular material to provide continuous support for the manhole base. When this method is used, the bedding shall be as set out in Paragraph 3.02 hereinafter.
- C. Excavations shall be of sufficient dimensions to provide free working space on all sides of the manhole and to permit proper backfilling around the manhole. All excavated materials shall be placed a minimum of two feet (2') back from the edge of the excavation.
- D. The excavation shall be straight and uniform so as to permit installation of the manhole to lines and grades given by the Engineer. It shall be kept free of water during the installation of the manhole and until the manhole has been backfilled. Removal of water shall be at the Contractor's expense. Dry conditions shall be maintained in the excavations until the backfill has been placed. During the excavation, the grade shall be maintained so that it will freely drain and prevent surface water from entering the excavation at all times. When directed by the Owner or the Engineer, temporary drainage ditches shall be installed to intercept or direct surface water which may affect work. All water shall be pumped or drained from the excavation and disposed of in a suitable manner without damage to adjacent property or to other work.

# 3.02 MANHOLE BEDDING

- A. All manholes shall be supported on a bed of granular material. In no case shall manhole be supported directly on rock. Bedding shall not be a separate pay item unless otherwise set out in the Detailed Specifications. Bedding shall be provided in earth bottom excavations, as well as rock bottom excavations. Bedding material shall be free from rock, foreign material, frozen earth, and be acceptable to the Engineer. Bedding shall be a minimum of 6" below manhole base.
- B. Granular bedding shall be Size #9-m or ASTM C 33, Size #7 crushed stone, fine gravel, or sand, and is not a separate pay item.
- C. Where undercutting and granular bedding is involved it shall be of such depth that the bottom of the manhole will be at least six inches above the bottom of the excavation. Undercutting is not a separate pay item.
- D. In wet, yielding, mucky locations where the manhole is in danger of sinking below grade or floating out of line or grade, or where backfill materials are of such a fluid nature that such movements of the pipe and/or manhole might take place during the placing of the backfill, the pipe and/or manhole must be weighted or secured permanently in place by such means as will prove effective. When ordered by the Engineer, yielding and mucky materials in subgrades shall be removed below ordinary excavation depth in order to

prepare a proper bed for the manhole. Crushed stone or other such granular material, if necessary, as determined by the Engineer to replace poor subgrade material, shall be a separate pay item and classified as "Special Granular Fill". Removal of poor material is not a separate pay item.

#### 3.03 SPECIAL GRANULAR FILL

A. As noted in Paragraph 3.02D, granular material for "Special Granular Fill" when directed by the Engineer shall be Department of Transportation crushed limestone, Size #9. Payment for "Special Granular Fill" must have approval from the Engineer prior to installation.

# 3.04 REPLACEMENT OF EXISTING MAIL BOXES, CULVERTS, CLOTHES LINE POSTS, FENCES AND OTHER SUCH FACILITIES

- A. Existing mail boxes, drainage culverts, clothes line posts, fences and the like shall not be molested or disturbed unless necessary, in which case, they shall be replaced in as good condition as found as quickly as possible. Existing materials shall be reused in replacing such facilities when materials have not been damaged by the Contractor's operations. Existing facilities damaged by Contractor's operation shall be replaced with new materials of the same type at the Contractor's expense. Work in this category is not a pay item.
- B. Replacement of paved drainage ditches within highway right-of-way shall be accomplished in accordance with Department of Transportation specifications.

# 3.05 MANHOLE FRAME INSTALLATION

- A. The manhole frame casting shall be centered over the opening in the cone or grade ring of the manhole, with a bituminous mastic joint sealing compound applied between the concrete and the casting.
- B. The frame shall be bolted to the cone or grade ring with wedge anchors.

#### 3.06 TESTING PRIOR TO BACKFILLING

This specification shall govern the vacuum testing of sanitary sewer manholes and structures and shall be used as a method of determining acceptability by the Owner, in accepting maintenance of a sanitary sewer manhole or structure on behalf of the public. This test shall be performed in accordance with ASTM C 1244 prior to backfilling. Other forms of testing of some manholes may be required, as deemed necessary by the Owner.

- Manholes shall be tested after installation with all connections in place.
  - Lift holes, if any, shall be plugged with an approved, non-shrinkable grout prior to testing.
  - Drop connections shall be installed prior to testing.

The vacuum test shall include testing of the seal between the cast iron frame and the concrete cone, slab or grade rings.

## B. Test Procedure:

- 1. Temporarily plug, with the plugs being braced to prevent the plugs or pipes from being drawn into the manhole, all pipes entering the manhole at least eight inches into the sewer pipe(s). The plug must be inflated at a location past the manhole/pipe gasket.
- 2. The test head shall be placed inside the frame at the top of the manhole and inflated, in accordance with the manufacturer's recommendations.
- 3. A vacuum of 10" of mercury shall be drawn on the manhole. Shut the valve on the vacuum line to the manhole and disconnect the vacuum line.
- 4. The pressure gauge shall be liquid filled, having a 3.5 inch diameter face with a reading from zero to thirty inches of mercury.
- 5. The manhole shall be considered to pass the vacuum test if it holds at least 9 inches of mercury for the following time durations:

		Time (Second	ls)
Manhole Depth	4' Diameter	5' Diameter	6' Diameter
20 Feet or Less	50	65	81
20.1 to 30 Feet	74	98	121

- 6. If a manhole fails the vacuum test, the manhole shall be repaired with a non-shrinkable grout or other suitable material based on the material of which the manhole is constructed and retested, as stated above.
- All temporary plugs and braces shall be removed after each test.

Manholes will be accepted as having passed the vacuum test requirements if they meet the criteria stated above.

## 3.07 TESTING AFTER BACKFILLING

This specification shall govern the vacuum testing of sanitary sewer manholes and structures and shall be used as a method of determining acceptability by the Owner, in accepting maintenance of a sanitary sewer manhole or structure on behalf of the public. This test shall be performed AFTER backfilling. Other forms of testing of some manholes may be required, as deemed necessary by the Owner.

- A. Manholes shall be tested after installation with all connections in place.
  - Lift holes, if any, shall be plugged with an approved, non-shrinkable grout prior to testing.
  - Drop connections shall be installed prior to testing.
  - The vacuum test shall include testing of the seal between the cast iron frame and the concrete cone, slab or grade rings.

- Manhole shall be backfilled to final grade.
- B. Test Procedure for Manholes 0 to 12 feet deep:
  - 1. Temporarily plug, with the plugs being braced to prevent the plugs or pipes from being drawn into the manhole, all pipes entering the manhole at least eight inches into the sewer pipe(s). The plug must be inflated at a location past the manhole/pipe gasket.
  - 2. The test head shall be placed inside the frame at the top of the manhole and inflated, in accordance with the manufacturer's recommendations.
  - 3. A vacuum of 10" of mercury shall be drawn on the manhole. Shut the valve on the vacuum line to the manhole and disconnect the vacuum line.
  - 4. The pressure gauge shall be liquid filled, having a 3.5 inch diameter face with a reading from zero to thirty inches of mercury.
  - 5. The manhole shall be considered to pass the vacuum test if it holds at least 9 inches of mercury for the following time durations:

	V201000	Time (Second	ls)
Manhole Depth	4' Diameter	5' Diameter	6' Diameter
20 Feet or Less	50	65	81
20.1 to 30 Feet	74	98	121

- 6. If a manhole fails the vacuum test, the manhole shall be repaired with a non-shrinkable grout or other suitable material based on the material of which the manhole is constructed and retested, as stated above.
- All temporary plugs and braces shall be removed after each test.
- C. Test Procedure for Manholes 12.1 to 22 feet deep:

Follow the procedures listed in Paragraph B. above, except the vacuum pressure shall be dependent on the depth of the manhole in accordance with the following table:

Depth (ft)	12	13	14	15	16	17	18	19	20	21
Vacuum	10	9	8	7	6	5	4	3	2	1

Manholes deeper than 22 feet shall not be tested after backfilling. The allowable drop in vacuum pressure is 1 Hg.

Manholes will be accepted as having passed the vacuum test requirements if they meet the criteria stated above.

# 3.08 CLEAN UP

A. Upon completion of installation of the manholes and appurtenances, the Contractor shall remove all debris and surplus construction materials resulting from the Work. The Contractor shall grade the ground around and adjacent to the construction area in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line.

END OF SECTION



#### SECTION 03300 - CAST-IN-PLACE CONCRETE

# PART 1 - GENERAL

# 1.01 SCOPE OF WORK

- A. Provide all labor, materials, equipment and services required to furnish and install all cast-in-place concrete as indicated on the Drawings and specified herein.
- B. All concrete construction shall conform to all applicable requirements of ACI 301 (latest), Specifications for Structural Concrete for Buildings, except as modified by the supplemental requirements specified herein.

# 1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork: Section 02300

#### 1.03 SUBMITTALS

The Contractor shall submit the following data for Engineer's review in accordance with Section 01340.

- A. Concrete mixture proportions, test results and curves plotted to establish water-cementitious materials ratio if ACI 301-05 Section 4.2.3.4.b is followed.
- B. Proposed mix designs and all necessary substantiating data used to establish the proposed mix designs if ACI 301-05 Section 4.2.3.1 is followed.
- C. Mix designs shall be submitted for all mixes proposed or required to be used, including all mixes containing admixtures.
- D. A certified copy of the control records of the proposed production facility establishing the standard deviation as defined in Paragraph 4.2.3.2. of ACI 301.
- E. Submit shop drawings as specified in ACI 301. Submit shop drawing showing the location of proposed construction and control joints separate from the steel reinforcement shop drawings.
  - Construction Joints
  - Control Joints
  - Steel Reinforcement

# 1.04 QUALITY ASSURANCE

The Contractor shall obtain and have available in the field office at all times, the following references:

A. ACI 301 Specifications for Structural Concrete for Buildings ACI 301 (latest Revision).

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B. SP-15 (05) Field Reference Manual: Specifications for Structural Concrete for Buildings with selected ACI references.

Available from:

The American Concrete Institute
Publications Department
P.O. Box 9094
Farmington Hills, Michigan 48333-9094

- C. Manual of Standard Practice CRSI. (Latest Edition).
- D. Placing Reinforcing Bars CRSI (Latest Edition).

Available from:

Concrete Reinforcing Steel Institute 933 North Plum Grove Road Schaumburg, Illinois 60173-4758

- E. ACI 318-08 Building Code Requirements for Structural Concrete and Commentary.
- F. ACI 347 Guide to Form Work for Concrete.

#### **PART 2 - PRODUCTS**

# 2.01 CLASSES OF CONCRETE AND USAGE

- A. Structural concrete of the various classes required shall be proportioned by either Method 1 or Method 2 of ACI 301 to produce the following 28-day compressive strengths:
  - 1. Selection of Proportions for Class B Concrete:
    - 3,000 psi compressive strength at 28 days.
    - Type I cement plus supplementary cementitious materials.
    - Max. water-cementitious materials ratio = 0.45.
    - d. Min. cement content = 470 lbs. (5.0 bags)/cu. yd. concrete.
    - e. Nominal max. size coarse aggregate = No. 67 (3/4" max.) or No. 57 (1" max). Walls with architectural treatment shall use No. 67 (3/4" max.).
    - f. Air content = 6% plus or minus 1% by volume.
    - g. Slump = 3" 4" when tested in accordance with ASTM C 143/C 143M. Slump shall not exceed 8 inches when high-range water-reducers are used.

- B. Concrete shall be used as follows:
  - Class B concrete for fill concrete, thrust and anchor blocks and topping over hollow-core slabs, and where indicated on the Drawings.
- C. Type II cement conforming to ASTM C 150 shall be used in all structural concrete. Cement for exposed to view concrete shall have a uniform color classification.
- D. Coarse aggregate for concrete shall be size No. 57, as specified in ASTM C 33 unless a smaller size aggregate is required to conform to provisions of Section 4.2.2.3 of ACI 301. Coarse aggregate shall conform to all requirements of ASTM C 33.
- Manufactured sand shall not be used as fine aggregate in concrete.

#### 2.02 ADMIXTURES

- A. An air entraining admixture shall be used on all concrete exposed to freezing and thawing cycles. Product shall be MB-AE 90, MB-VR or Micro Air by BASF Construction Chemicals or approved equal. Certification attesting to the percent of effective solids and compliance of the material with ASTM C 260 shall be furnished, if requested.
- B. Water-Reducing Admixture shall conform to ASTM C 494/C 494M Type A. Product shall be "Pozzolith" Series or "PolyHeed" Series by BASF Construction Chemicals or approved equal.
- C. High-Range Water-Reducing Admixture shall conform to ASTM C 494/C 494M Type F. Product shall be Rheobuild 1000, "Glenium" Series or PS 1466 by BASF Construction Chemicals or approved equal.
- D. Accelerating Admixture shall conform to ASTM C 494/C 494M Type C or E. Products shall be Pozzolith NC 534 or Pozzutec 20+ by BASF Construction Chemicals or approved equal.
- E. Retarding Admixture shall conform to ASTM C 494/C 494M Type B or D. Product shall be "Pozzolith" Series or "DELVO" Series by BASF Construction Chemicals.
- F. A water-reducing, set controlling admixture (nonlignin type) shall be used in all concrete. The admixture shall be a combination of polyhydroxylated polymers including catalysts and components to produce the required setting time based on job site conditions, specified early strength development, finishing characteristics required, and surface texture, as determined by the Engineer.
- G. Certification shall be furnished attesting that the admixture exceeds the physical requirements of ASTM C 494, Type A, water-reducing and normal setting admixture, and when required, for ASTM C 494, Type D, water-reducing and retarding admixture when used with local materials with which the subject concrete is composed.
- H. The admixture manufacturer, when requested, shall provide a qualified concrete technician employed by the manufacturer to assist in proportioning concrete for optimum use. He shall also be available when requested to advise on proper addition of the admixture to the concrete and on adjustment of the concrete mix proportions to meet changing job conditions.

- I. The use of admixtures to retard setting of the concrete during hot weather, to accelerate setting during cold weather, and to reduce water content without impairing workability will be permitted if the following conditions are met:
- J. The admixture shall conform to ASTM C494, except that the durability factor for concrete containing the admixture shall be at least 100 percent of control, the water content a maximum of 90 percent of control and length change shall not be greater than control, as defined in ASTM C 494.
- K. Where the Contractor finds it impractical to employ fully the recommended procedures for hot weather concreting, the Engineer may at his discretion, require the use of a set retarding admixture for mass concrete 2.5 feet or more thick for all concrete whenever the temperature at the time concrete is cast exceeds 80°F. The admixture shall be selected by the Contractor subject to the review of the Engineer. The admixture and concrete containing the admixture shall meet all the requirements of these Specifications. Preliminary tests of this concrete shall be required at the Contractor's expense.
- L. When more than one (1) admixture is used, all admixtures shall be compatible. They should preferably be by the same manufacturer.
- Calcium chloride will not be permitted as an admixture in any concrete.

# 2.03 REINFORCEMENT

- A. The minimum yield strength of the reinforcement shall be 60,000 pounds per square inch. Bar reinforcement shall conform to the requirements of ASTM A 615/A 615M. All bar reinforcement shall be deformed.
- B. Wire-mesh reinforcement shall be continuous between expansion joints. Laps shall be at least one full mesh plus 2 inches, staggered to avoid continuous lap in either direction, and securely wired or clipped with standard clips.
- C. Smooth dowels shall be plain steel bars conforming to ASTM A 615/A615M, Grade 60, or steel pipe conforming to ASTM A 120, Schedule 80. Pipe, if used, shall be closed flush at each end with mortar or metal or plastic cap. Dowels shall be installed at right angles to construction joints and expansion joints. Dowels shall be accurately aligned parallel to the finished surface, and shall be rigidly held in place and supported during placing of the concrete. One end of dowels shall be oiled or greased or dowels shall be coated with high density polyethylene with a minimum thickness of 14 mils.
- D. Reinforcement supports and other accessories in contact with the forms for members which will be exposed to view in the finished work shall be of stainless steel or shall have approved high-density polyethylene tips so that the metal portion shall be at least one-quarter of an inch from the form or surface. Supports for reinforcement, when in contact with the ground or stone fill, shall be precast stone concrete blocks. Particular attention is directed to the requirement of Paragraph 3.3.2.4 of ACI Standard 301. These requirements apply to all reinforcement, whether in walls or other vertical elements, inclined elements or flatwork.
- E. Particular care shall be taken to bend tie wire ends away from exposed faces of beams, slabs and columns. In no case shall ends of tie wires project toward or touch formwork.

#### 2.04 OTHER MATERIALS

- A. Anchorage items shall be of standard manufacture and of type required to engage with the anchors to be installed therein under other sections of the Specifications and shall be subject to approval by the Engineer.
  - Slots shall be galvanized dovetail-type as specified in Section "Masonry Work".
  - Inserts shall be malleable iron or steel, and of sturdy design adequate strength for the load to be carried. All inserts shall be galvanized. Adjustable wedge inserts shall have an integral loop or strap at the back, or shall be slotted to receive a special-headed bolt not smaller than 5/8-inch in diameter and of the required length and fitted with hexagonal nut. Other inserts shall be either threaded or slotted as required by their usage. Threaded inserts shall have integral lugs to prevent running.
  - 3. Concrete anchors shall be an approved expansion type conforming to Federal Specification FF-S-325, Groups I, II, III, or VIII and shall be installed in strict accordance with the manufacturer's recommendations. Material for anchors shall be as specified in Section 05500 "Miscellaneous Metals". Anchors shall develop ultimate shear and pull out loads of not less than the following values in Class A concrete:

Bolt Diameter (Inches)	Min. Shear (Pounds)	Min. Pull-Out Load (Pounds)
2	4,500	4,600
5/8	6,900	7,700
3/4	10,500	9,900

B. Epoxy bonding adhesive used to bond fresh plastic concrete to sound, hardened concrete shall meet the following Specification. Contractor shall furnish a notarized certification by the manufacturer that the proposed material meets the Specification.

# 1. Material:

The epoxy material shall consist of a 2-component system whose components conform to the following requirements:

- a. Component A Component A shall be a modified epoxy resin of the epichlorohydrin bisphenol A condensation type, containing suitable viscosity control agents and having an epoxide equivalent of 180-200.
- b. Component B The B component shall be primarily a reaction product of one mole of an aliphatic polyamine and two moles of mono-functional epoxide containing compounds modified with 2, 4, 6 tri (dimethylaminomethyl) phenol.
- The component ratio of B to A by volume shall be as specified by the manufacturer.

2. Properties of Mixed Components:

a.	Solids Content	100% by weight
b.	Pot Life	25-35 min. @ 73°F.
c.	Tack-Free Time	4-5-1/2 hrs @
	(Thin Film)	73°F.
d.	Final Cure ASTM D 695 (75% ultimate strength)	3 days at 73°F.
e.	Initial Viscosity (A+B)	2,000 cps. min at 73°F.
f.	Color Mixed	Straw

3. Properties of Cured Material (Neat Material):

a.	Tensile Strength	3,000 psi min. @
	ASTM D 638	14 days 73°F. cure
b.	Tensile Elongation	2 - 2% at 14
	ASTM D 638	modified days 73°F. cure
c.	Compressive Strength	12,500 psi min. at
	ASTM D 695	73° F. cure
d.	Compressive Modules	470,000 psi min. @
	ASTM D 695	28 days, 73°F cure
e.	Compressive Strength	5,500 psi min. @
	ASTM D 695	24 days 73°F cure
f.	Water Pick-up	1.5 max.
	ASTM D 570	

- C. Flashing reglets shall be as specified in Section 07530. Reglets shall be correctly placed into forms prior to placing concrete in formwork.
- D. Premolded expansion-joint filler strips shall conform to ASTM D 1752 and shall be 3/8-inch thick unless otherwise shown.
- E. Joint sealants shall conform to ANSI A 116.1. The following joint sealants are acceptable:
  - Colma by Sika Chemical Corporation
  - 2. Hornflex by A.C. Horn, Inc.
  - Sonolastic by BASF Construction Chemicals.
- F. Nonshrink grout shall be Embeco 885 grout by BASF Construction Chemicals, Euco Firmix grout by the Euclid Chemical Company, or approved equal. The approved product shall be delivered to the site of the Work in the original sealed

containers, each bearing the trade name of the material and the name of the manufacturer.

- G. Hardeners and dustproofers shall be colorless, aqueous solution of zinc or magnesium fluosilicate. Each gallon of solution used for the first application shall contain not less than one pound of crystals. Each gallon of solution used for subsequent application shall contain not less than two pounds of crystals. Materials shall be reviewed by the Engineer. Product shall be Lapidolith by BASF Construction Chemicals or approved equal.
- H. Porous fill shall be crushed rock or gravel of such size that all will pass a 1-1/2 inch screen and not more than 5 percent will pass a No. 4 screen, free from earth clay or other foreign substances.
- I. Waterstops: Waterstops shall be polyvinyl chloride, flat dumbbell shape (no center bulb), of size shown on Drawings, complete with fittings as required such as unions, vertical tees, vertical ells, flat crosses, flat ells, flat tees, etc. Waterstops shall be securely wired into place to maintain proper position during placement of fresh concrete, as shown on the Drawings. Care shall be taken in the installation of the waterstop and the placing of the concrete to avoid "folding" while concrete is being placed, and to prevent voids in the concrete surrounding the waterstop.
- J. Form Liners: Form liners for construction of fluted wall treatment shall be prefabricated plastic liners as manufactured by Greenstreak Plastic Products, Interform Company, or Symons Corporation.

Liners shall be fiberglass or ABS (acrylonitrile - butadiene - styrene) of such configuration as to obtain the fluted pattern shown or indicated on the Drawings.

For purposes of designating type and quality of material required, form liners shall be pattern 361 trapezoidal liners as manufactured by Greenstreak Plastic Products.

Preparation of forming materials, sealing of joints to prevent grout leakage and form release treatment (if required) shall be in strict compliance with the manufacturer's printed instructions and recommendations.

#### PART 3 - EXECUTION

#### 3.01 FINISHES

- A. Exposed to Public View Concrete Surfaces:
  - 1. All concrete exposed to view in the completed structure shall be produced using materials and workmanship to such quality that only nominal finishing will be required. The provisions of paragraphs 6.2.2.1 and 6.3.6 of ACI 301 shall apply to all exterior exposed to public view concrete surfaces, including the outside surfaces of tanks.
  - 2. Forms for exposed concrete surfaces shall be exterior grade, high-density overlay plywood, steel, or wood forms with smooth tempered hard-board form-liners.

- Forms shall be coated with an approved release agent before initial pour and between subsequent pours, in accordance with the manufacturer's printed instructions. Form boards shall not be wet prior to placing concrete.
- Recessed joints in concrete shall be formed using lacquer-coated wood battens or forms, milled to indicated profiles. Battens and corner strips shall be carefully inspected before concrete is placed and damaged pieces replaced.
- Chamfer strips shall be one (1) inch radius with leg, polyvinyl chloride strips by Gateway Building Products, Saf-T-Grip Specialties Corp., Vinylex Corp., or equal.
- 6. Form panels shall be provided in the maximum sized practicable in order to minimize form joints. Wherever practicable, form joints shall occur at recessed joints. All form joints in exterior exposed to view surfaces shall be carefully caulked with an approved nonstaining caulking compound. Joints shall not be taped. Form oil or other material which will impart a stain to the concrete shall not be allowed to contact concrete surfaces.
- 7. Care shall be taken to prevent chipping of corners or other damage to concrete when forms are removed. Exposed corners and other surfaces which may be damaged by ensuing operations shall be protected from damage by boxing, corner boards or other approved means until construction is completed.
- 8. Form ties shall remain in the walls and shall be equipped with a waterseal to prevent passage of water through the walls. Minimum set back of form ties shall be 1-1/2 inches from faces of wall. The hole left by removal of tie ends shall be sealed and grouted in accordance with the procedure described hereinafter in Par. 3.01.F. Form ties will be permitted to fall within as-cast areas of architecturally treated wall surfaces; this does not apply to walls receiving decorative waterproof masonry coating.
- 9. All formed exposed to view concrete surfaces shall have a "smooth rubbed finish". Exterior vertical surfaces shall be rubbed to one foot below grade. Interior exposed to public view vertical surfaces of liquid containers shall be rubbed to one (1) foot below the minimum liquid level that will occur during normal operations.
- B. All vertical surfaces in liquid containing structures shall have a "smooth form" finish.
  - All "smooth form" concrete vertical surfaces shall be a true plane within 1/4 inch in ten (10) feet as determined by a ten (10) foot straightedge placed anywhere on the surface in any direction. Abrupt irregularities shall not exceed 1/8 inch.
- C. Basin, flume, conduit and tank floors shall have a "troweled" finish unless shown otherwise on Drawings.
- D. Weirs and overflow surfaces shall be given a "troweled" finish.
- E. Exterior platforms, steps and landings, shall be given a "broom" finish. "Broom" finish shall be applied to surfaces which have been steel-troweled to an even, smooth finish. The troweled surface shall then be broomed with a fiber-bristle brush in the direction transverse to that of the main traffic.

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- F. Patching of holes due to removal of tie ends and other repairable defective areas, shall be as follows: Entire contact area of hole shall be coated with two-part moisture insensitive epoxy bonding compound as specified in Par. 2.04.B. in accordance with manufacturer's specifications, and prior to placing of freshly mixed patching mortar. Parching mortar shall be mixed and placed in general accordance with ACI 301, Par. 5.3.7.5.
- G. For floors and slabs in which drains occur, special care shall be exercised to slope the floors uniformly to the drains. All floors with drains shall be sloped not less than 1/8 inch per foot unless otherwise shown. In all areas where quarry tile or other materials requiring more than 1/4 inch drop are to be overlaid, the concrete base slab shall be depressed to provide a finished floor at the same elevation as surrounding areas.

#### 3.02 TESTING

- A. All testing shall be in accordance with provisions of ACI 301. Testing services listed in ACI Sections 1.6.4 shall be performed by a testing agency acceptable to the Engineer and Owner.
- B. The testing services of ACI sections 1.6.4.2 and 1.6.4.3 shall be performed at the Contractor's expense. The Contractor shall be responsible for making concrete test cylinders, storing and protecting concrete cylinders and delivering cylinders to the Owner-approved testing laboratory.
- C. Testing services of ACI Section 1.6.4.4 shall be paid for by the Contractor. Test shall be made for each 50 cubic yards of concrete and/or each day concrete is placed.

# 3.03 ADDITIONAL REQUIREMENTS

- A. Unless otherwise directed by the Engineer, the vertical surfaces of footings shall be formed. Excavations and reinforcement for all footings shall have been inspected by the Engineer before any concrete is placed.
- B. The installation of underground and embedded items shall be inspected before slabs are placed. Pipes and conduits shall be installed below the concrete unless otherwise indicated. Fill required to raise the subgrade shall be placed as specified in Section 02300 "Earthwork". Porous fill not less than 6 inches in compacted thickness shall be installed under all slabs, tank bottoms, and foundations. The fill shall be leveled and uniformly compacted to a reasonably true and even surface. The surfaces shall be clean, free from frost, ice, mud and water. Waterproof paper, polyethylene sheeting of nominal 4-mil minimum thickness, or polyethylene-coated burlap shall be laid over all surfaces receiving concrete.
- C. Concrete shall be placed in layers not over 18 inches deep and each layer shall be compacted by mechanical internal-vibrating equipment supplemented by hand spading, rodding and tamping as directed. Vibrators shall not be inserted into lower courses that have begun to set.

# D. Concrete Mixing

 Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M and furnish batch ticket information.

- a. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and deliver time to 60 minutes.
- Project site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C 94M. Mix concrete materials in appropriate drumtype batch machine mixer.
  - a. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at lease 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
  - b. For mixer capacity larger than 1 cu. Yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd.
  - c. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.
- E. If concrete is placed by pumping, no aluminum shall be used in any parts of the pumping system which contact or might contaminate the concrete. Aluminum chutes and conveyors shall not be used.
- F. All concrete surfaces shall be moist cured by the application of absorptive mats or double thicknesses of fabric kept continuously wet. Forms shall be kept continuously wet. Use of other curing methods will not be permitted unless written authorization is received from the Engineer.
- G. The unit of operation shall not exceed 30 feet for tank walls and walls exposed to weather, and 45 feet for other work in any horizontal direction and not less than 48 hours shall elapse between casting of adjoining units unless these requirements are waived by the Engineer. Provision shall be made for jointing successive units as indicated or required to be made at spacing of approximately 25 feet. Additional construction joints required to satisfy the 25 foot spacing shall be located by the Contractor subject to the review of the Engineer. The Contractor shall submit for review drawings separate from the steel reinforcing drawings, showing the location of all proposed construction joints. All construction joints shall be prepared for bonding by roughening the surface of the concrete in an acceptable manner which will expose the aggregate uniformly and will not leave laitance, loosened particles of aggregate or damaged concrete at the surface. Joints in walls and columns shall be maintained level. Concrete shall be placed in layers not over 18 inches deep and each layer shall be compacted by mechanical internal-vibrating equipment supplemented by hand spading, rodding and tamping as directed. Vibrators shall not be inserted into lower courses that have begun to set.
- H. Formwork for beam soffits and slabs and other parts that support the weight of concrete, shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified or permitted.
- I. Concrete Walks and Curbs:
  - 1. Subgrade shall be true and well compacted at the required grades. Spongy and otherwise unsuitable material shall have been removed and replaced with approved material. Concrete walks shall be placed upon porous fill covered with

waterproof paper, polyethylene sheeting of nominal 4-mil minimum thickness or polyethylene-coated burlap.

- 2. Concrete walks shall be not less than 4 inches in thickness. Walks shall have contraction joints every 5 linear feet in each groove in the top surface of the slab to a depth of at least one-fourth the slab thickness with a jointing tool. Transverse expansion joints shall be installed at all returns, driveways, and opposite expansion joints in adjacent curbs. Where curbs are not adjacent, transverse expansion joints shall be installed at intervals of approximately forty (40) feet. Sidewalks shall receive a "broomed" finish. Scoring shall be in a transverse direction. Edges of the sidewalks and joints shall be edged with a tool having a radius not greater than 1/6 inch. Sidewalks adjacent to curbs shall have a slope of 1/4 inch per foot toward the curb. Sidewalks not adjacent to curbs shall have a slope of 1/4 inch per foot. The surface of the concrete shall show no variation in cross section in excess of 1/4 inch in 5 feet. Concrete walks shall be reinforced with 6 x 6-W1.4xW1.4 welded wire reinforcement.
- 3. Concrete curbs shall be constructed to the section indicated on the Standard Detail, and all horizontal and vertical curves shall be incorporated as indicated or required. Forms shall be steel as approved by the Engineer. At the option of the Contractor, the curbs may be precast or cast-in-place. Cast-in-place curbs shall be divided into sections 8 to 10 feet in length using steel divider plates. The divider plates shall extend completely through the concrete and shall be removed. Precast curbs shall be cast in lengths of 4 to 5 feet. All exposed surfaces of concrete shall be finished smooth. All sharp edges and the edges of joints and divisions shall be tooled to 1/4 inch radius. Steel reinforcement shall be installed where the curb crosses pipe trenches or other insecure foundations. Such reinforcement shall consist of two (2) No. 4 deformed bars near the bottom of the curb and shall extend at least 24 inches beyond the insecure area. Transverse expansion joints shall be installed at all curb returns and at intervals of approximately 40 feet.
- J. Column base plates, bearing plates for beams and similar structural members, machinery and equipment bases shall, after being plumbed and properly positioned, be provided with full bearing with nonshrink grout. Concrete surfaces shall be rough, clean, free of oil, grease, and laitance and shall be moistened thoroughly immediately before grout is placed. Metal surfaces shall be clean and free of oil, grease and rust. Mixing and placing shall be in conformance with the material manufacturer's printed instructions. After the grout has set, exposed surfaces shall be cut back one (1) inch and covered with a parge coat of mortar consisting of one (1) part Portland cement, two (2) parts sand and sufficient water to make the mixture placeable. Parge coat shall have a smooth dense finish. Exposed surfaces of grout and parge coat shall be water cured with wet burlap for seven (7) days.
- K. Grout fill which is formed in place by using rotating equipment as a screen, such as clarifiers and similar types of equipment, shall be mixed in proportions and consistencies as required by the manufacturer or supplier of the equipment.

# L. Watertightness:

The structures which are intended to contain liquids and/or will be subjected to
exterior hydrostatic pressures shall be so constructed that, when completed and
tested, there shall be no loss of water and no wet spots shall show.

- 2. As soon as practicable, after the completion of the structures, the Contractor shall fill them with water and if leakages develop or wet spots show, the Contractor shall empty such structures and correct the leakage in an approved manner. Any cracks which appear in the concrete shall be dug out and suitably repaired. Temporary bulkheads over pipe openings in walls shall be provided as required for the testing.
- After repairs, if any are required, the structures shall be tested again and further repaired if necessary until satisfactory results are obtained. All work in connection with these tests and repairs shall be at the expense of the Contractor.
- 4. Waterstops shall be placed in other locations as indicated on the Drawings and as may be required to assure the watertightness of all containers of liquids. Special shop fabricated ells, tees and crosses shall be provided at junctions. Waterstops shall be extended at least 6 inches beyond end of placement in order to provide splice length for subsequent placement. In slabs and tank bottoms, water stops shall be turned up to be made continuous with waterstops at bottom of walls or in walls.
- 5. Joints between pipe (except cast iron wall pipe) and cast-in-place concrete walls shall be sealed by means of a groove cast completely around the pipe; the groove shall be filled with a quick setting hydraulic compound similar and equal to Waterplug as made by BASF Construction Chemicals mixed and applied in accordance with the manufacturer's instructions.
- M. Unless otherwise shown or directed, all pumps, other equipment, and items such as lockers, motor control centers and the like, shall be installed on concrete bases. The bases shall be constructed to the dimensions shown on the plans or as required to meet plan elevations. Where no specific plan elevations are required, the bases shall be 6 inches thick and shall extend 3 inches outside the metal equipment base. In general, the concrete bases shall be placed up to 2 inches below the metal base. The equipment shall then be properly shimmied to grade and the 2- inch void filled with nonshrink grout.
- N. Concrete which, in the opinion of the Architect-Engineer, has excessive honeycomb, aggregate pockets or depressions will be rejected and the Contractor shall, at his own expense, remove the entire section containing such defects and replace it with acceptable concrete.
- O. Manhole or access steps shall be plastic, constructed of copolymer polypropylene meeting the requirements of ASTM D 2146 for Type II, Grade 16906 material. Step shall be reinforced with ASTM A 615, Grade 60, #4 deformed steel reinforcing bar, be 9" deep, 14" wide, provided with notched tread ridge, foot retainer lugs on each side of tread and penetration stops for press fit installation. Plastic steps shall be PS2-PF as manufactured by M.A. industries, Inc., Peachtree City, Georgia. Steps shall be installed by drilling 1" diameter holes, minimum 3-3/4 inches deep into the wall, and then driving steps into hole to the penetration stop, resulting in a press fit condition.
- P. Tank pressure relief valves shall be 6" diameter Neenah Foundry Company R-5001-1, American Valve & Hydrant B315.1, or equal, floor type, with outside hooks or inside self-contained lock; quantity and spacing as shown on structural drawings. No part of pressure relief valves shall project above the neat line of the tank floor to prevent fouling of scraper mechanisms where used.

Q. All existing contact surfaces with new patch shall be coated with moisture insensitive epoxy bonding adhesive, Sikadur Hi-Mod, Concresive LPL Liquid by BASF Construction Chemicals, or approved equal. Patch shall consist of base pour of 4,000 psi structural concrete, then a topping of non-shrink natural aggregate grout, Masterflow 713, Sonogrout by BASF Construction Chemicals, or approved equal, mixed and placed in accordance with manufacturer's instructions, to the thicknesses shown on Drawings. Coat base pour with epoxy bonding adhesive prior to placing grout course.

END OF SECTION

# THESE SPECIFICATIONS ARE TO BE USED FOR THE RELOCATION OF WATER FACILITIES OWNED BY EAST PENDLETON WATER DISTRICT ONLY

TECHNICAL SPECIFICATIONS
FOR
KY 22 WATER LINE RELOCATION
EAST PENDLETON WATER DISTRICT
PENDLETON COUNTY, KENTUCKY

**AUGUST 2011** 



3 HMB Circle, US 460 Frankfort, KY 40601 (502) 695-9800

# SECTION 01000 General Information

# PART 1 GENERAL

# 1.1 "ENGINEER"

Where the word "Engineer" appears in the specifications and drawings, it shall be understood the "Engineer" is the Kentucky Transportation Cabinet Section Engineer. The Section Engineer, Utility Owner and Utility Owner Engineer, or their designated representatives, shall work cooperatively to inspect and accomplish the work. All decisions made during construction shall be agreeable to all parties. It shall be understood that the Kentucky Transportation Cabinet, through its Section Engineer, has ultimate authority in all decisions.

#### 1.2 COMMUNICATIONS

All communications from the Contractor need to be through the KYTC Section Engineer. All communications involving the water line relocation for the East Pendleton Water District shall be copied to HMB Professional Engineers, Inc., attention: Jeff Reynolds, P.E. This shall include but not limited to such items as shop drawings, product data samples, etc.

END OF SECTION

# SECTION 01150 Measurement and Payment

# PART 1 GENERAL

- 1.1 The CONTRACTOR shall provide all necessary labor, materials, tools, equipment, insurances, and permits, etc., and perform all other related work, as may be required for the work in accordance with the applicable terms of these Specifications and other pertinent documents, etc.
- 1.2 The cost associated with the preparation of submittal and the preparation for and attendance at all project meetings shall be incidental to the work.
- 1.3 Items shown in the plan but not expressly described herein shall be considered incidental to the work.
- 1.4 Lump sum items shall be paid upon completion and acceptance of all work covered by the item. However, CONTRACTOR may submit an application for partial payment of lump sum items. Such application shall be in writing and shall define and provide justification for desired break down of the lump sum items. The application will be reviewed by the ENGINEER in a timely manner and any concerns will be discussed with the CONTRACTOR prior to issuing written agreement with the partial payment scheme. It is recommended that Partial Payment Applications be submitted and approval sought prior to the submission of the first invoice for the project.
- 1.5 The quantities shown are estimated. Only the actual quantities required, furnished, and installed and/or removed, will be eligible for payment. No minimum(s) is/are guaranteed.
- 1.6 The CONTRACTOR will <u>NOT</u> be paid for any items herein in excess of the estimated quantities or for any items not contained in the proposal(s) unless the CONTRACTOR has obtained <u>WRITTEN</u> authorization from the ENGINEER before proceeding with the work.
- 1.7 The various phases of contractual work that are required to complete the subject project must be performed in a most expeditious manner and to the satisfaction of the ENGINEER

#### PART 2 PAY ITEMS

#### 2.1 WATER LINES

- A. <u>Measurement</u> Measurement for the length of pipe to be included for payment at the unit prices bid shall be the actual length laid in the trench measured along the centerline of the
  - pipe and including the lengths of and fittings in the line. Measurement shall begin at the ends of existing pipes, valves or fittings to which the new pipe is connected or such other point as may be designated on the plans.
- B. Payment Payment for installing only water pipe lines complete will be made at the contract unit price bid per linear foot for water pipe of the various sizes and classifications. No pay item has been established for fittings or restraint joints. These

# Measurement and Payment

are considered incidental and shall be included in the unit price bid per linear foot for water pipe. Payment for installing water pipe shall constitute full compensation for trenching, installation of pipe, restraint joints and tracer wire, backfill (including flowable fill concrete where required), disinfecting and testing for the water line, together with other incidental and related work necessary for the completion of the water main installation except that valves, valve boxes, pavement replacement and such other items shall be paid for separately, if included as a pay item on the bid proposal.

# 2.2 WATER LINES INSTALLED IN CASING PIPE

- A. <u>Measurement</u> Measurement for the length of pipe installed in casing pipe to be included for payment at the unit prices bid shall be the actual length installed in the casing pipe. Measurement shall be from end of casing to end of casing.
- B. Payment Payment for installing water pipe line in casing pipe complete will be made at the contract unit price bid per linear foot for water pipe of the various sizes and classifications. No pay item has been established for fittings or restraint joints. These are considered incidental and shall be included in the unit price bid per linear foot. Payment for installing water pipe in casing pipe shall constitute full compensation for trenching, installation of pipe, restraint joints and tracer wire, disinfecting and testing for the water line, together with other incidental and related work necessary for the completion.

#### 2.3 VALVES

- A. <u>Measurement</u> Valves will be measured by actual count on each size and type of valve installed in the completed system.
- B. <u>Payment</u> Payment for installing only valves of the various sizes and classifications, accessories, adapters, extension stems, valve boxes with lids, concrete collar or other required appurtenances, shall be made on the basis of the contract unit prices bid. Such payment shall constitute full compensation for installing the valves complete in full accordance with the Plans and Specifications.

#### 2.4 ROCK EXCAVATION

Excavation is unclassified, therefore, separate measurement or payment will not be made.

# 2.5 CONNECTION TO EXISTING LINE (DRY TAP)

- A. <u>Measurement</u>—Dry tap connections to existing lines shall be sized as shown on plans and include fittings or transition couplings, as required. This item will be measured by an actual count of dry taps installed, tested, sterilized and accepted.
- B. <u>Payment</u> Dry tap connections to existing lines, installed and accepted will be paid for on the basis of the unit price per each and payment shall constitute full compensation for fittings, transition couplings, testing and sterilizing, for excavation, preparation of bed and backfilling, and for the furnishing of all equipment, tools and incidentals necessary

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Measurement and Payment

to complete the item.

#### 2.6 BLOWOFF CONNECTION

- A. <u>Measurement</u> Measurement of blowoff connection for payment shall be made by actual count in the completed installation.
- B. <u>Payment</u> Payment for blowoff connection complete shall be based on the contract unit prices bid. Such payment shall constitute compensation in full for tapping water line, saddle, corp stop, quick disconnect, etc. complete in place.

# 2.7 OPEN CUT WITH STEEL CASING OR PLASTIC CASING

- A. Measurement Measurement of casing pipe installed by open cut shall be by the linear foot and shall be by the linear foot and shall be in the casing installed and accepted
- B. <u>Payment</u> Payment shall be made on the basis of the contract unit price bid for the various diameters. The price shall constitute payment for furnishing and installing casing pipe by open cut and spacers, end seals, flowable fill concrete; including all labor, tools, and equipment. Payment for the water line to be installed in the casing shall be paid for at applicable unit price bid.

#### SECTION 01340

# **Shop Drawings, Product Data and Samples**

#### PART 1 GENERAL

#### 1.1 SCOPE

- A. The work under this Section includes submittal to the ENGINEER of shop drawings, product data and samples required by the various sections of these Specifications.
- B. Submittal Contents: The submittal contents required are specified in each section.
- C. The following forms shall be used for all major components of the work:
  - 1. Typical Maintenance Summary Form
  - 2. Notice of Start of Manufacturing
  - 3. Notice of Shipment of Equipment
  - 4. Notice of Schedule Impact

The forms are included at the back of this section.

- D. Definitions: Submittals are categorized as follows:
  - 1. Shop Drawings
    - a. Shop drawings shall include technical data, drawings, diagrams, procedure and methodology, performance curves, schedules, templates, patterns, test reports, calculations, instructions, measurements and similar information as applicable to the specific item for which the shop drawing is prepared.
    - b. Provide newly-prepared information, on reproducible sheets, with graphic information at accurate scale (except as otherwise indicated) or appropriate number of prints hereof, with name or preparer (firm name) indicated. The Contract Drawings shall not be traced or reproduced by any method for use as or in lieu of detail shop drawings. Show dimensions and note which are based on field measurement. Identify materials and products in the work shown. Indicate compliance with standards and special coordination requirements. Do not allow shop drawing copies without appropriate final "Action" markings by the ENGINEER to be used in connection with the Work.
    - c. Drawings shall be presented in a clear and thorough manner. Details shall be identified by reference to sheet and detail, specification section, schedule or room numbers shown on the Contract Drawings.

- Minimum assembly drawings sheet size shall be 24 x 36-inches.
- e. Minimum detail sheet size shall be 8-1/2 x 11-inches.
- f. Minimum Scale:
  - (1) Assembly Drawings Sheet, Scale: 1-inch = 30 feet.
  - (2) Detail Sheet, Scale: 1/4-inch = 1 foot.

# Product Data

- a. Product data includes standard printed information on materials, products and systems, not specially prepared for this Project, other than the designation of selections from among available choices printed therein.
- b. Collect required data into one submittal for each unit of work or system, and mark each copy to show which choices and options are applicable to the Project. Include manufacturer's standard printed recommendations for application and use, compliance with standards, application of labels and seals, notation of field measurements which have been checked and special coordination requirements.

# 3. Samples

- a. Samples include both fabricated and un-fabricated physical examples of materials, products and units of work, both as complete units and as smaller portions of units of work, either for limited visual inspection or, where indicated, for more detailed testing and analysis.
- b. Provide units identical with final condition of proposed materials or products for the work. Include "range" samples, not less than three units, where unavoidable variations must be expected, and describe or identify variations between units of each set. Provide full set of optional samples where the ENGINEER'S selection is required. Prepare samples to match the ENGINEER'S sample where indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations and compliance with standards. Samples are submitted for review and confirmation of color, pattern, texture and "kind" by the ENGINEER. ENGINEER will note "test" samples, except as otherwise indicated, for other requirements, which are the exclusive responsibility of the CONTRACTOR.
- 4. Miscellaneous submittals related directly to the Work (non-administrative) include warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical work records, statements of applicability, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance

materials, overrun stock, security/protection/safety keys and similar information, devices and materials applicable to the Work but not processed as shop drawings, product data or samples.

# 1.2 SPECIFIC CATEGORY REQUIREMENTS

- A. General: Except as otherwise indicated in the individual work sections, comply with general requirements specified herein for each indicated category of submittal. Submittals shall contain:
  - 1. The date of submittal and the dates of any previous submittals.
  - The Project title.
  - 3. Numerical submittal numbers, starting with 1.0, 2.0, etc. Revisions to be numbered 1.1, 1.2, etc.
  - 4. The Names of:
    - a. Contractor
    - b. Supplier
    - c. Manufacturer
  - 5. Identification of the product, with the Specification section number, permanent equipment tag numbers and applicable Drawing No.
  - Field dimensions, clearly identified as such.
  - Relation to adjacent or critical features of the Work or materials.
  - 8. Applicable standards, such as ASTM or Federal Specification numbers.
  - 9. Notification to the ENGINEER in writing, at time of submissions, of any deviations on the submittals from requirements of the Contract Documents.
  - Identification of revisions on resubmittals.
  - 11. An 8 x 3-inch blank space for CONTRACTOR and ENGINEER stamps.
  - 12. CONTRACTOR'S stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria and coordination of the information within the submittal with requirements of the Work and of Contract Documents.
  - 13. Submittal sheets or drawings showing more than the particular item under consideration shall have all but the pertinent description of the item for which

review is requested crossed out.

# 1.3 ROUTING OF SUBMITTALS

- A. Submittals and routine correspondence shall be routed as follows:
  - 1. Supplier to CONTRACTOR (through representative if applicable)
  - 2. CONTRACTOR to ENGINEER
  - 3. ENGINEER to CONTRACTOR and OWNER
  - CONTRACTOR to Supplier

# 1.4 ADDRESS FOR COMMUNICATIONS

Engineer:

Jeff Reynolds, P.E.

HMB Professional Engineers, Inc.

3 HMB Circle Frankfort, KY 40601 OFFICE (502) 695-9800 FAX (502) 695-9810

FAX (502) 695-9810

# PART 2 PRODUCTS

#### 2.1 SHOP DRAWINGS

- A. Unless otherwise specifically directed by the ENGINEER, make all shop drawings accurately to a scale sufficiently large to show all pertinent features of the item and its method of connection to the Work.
- B. Submit all shop assembly drawings, larger than 11 x 17-inches, in the form of one reproducible transparency with two opaque prints or bluelines.
- C. Submit all shop drawings, 11 x 17-inches and smaller, in the form of six opaque prints or bluelines.
- D. One reproducible for all submittals larger than 11 x 17-inches and no more than three prints of other submittals will be returned to the CONTRACTOR.

#### 2.2 MANUFACTURER'S LITERATURE

- A. Where content of submitted literature from manufacturers includes data not pertinent to this submittal, clearly indicate which portion of the contents is being submitted for the ENGINEER'S review.
- B. Submit the number of copies which are required to be returned (not to exceed three)

plus three copies which will be retained by the ENGINEER.

#### 2.3 SAMPLES

- A. Samples shall illustrate materials, equipment or workmanship and established standards by which completed work is judged.
- B. Unless otherwise specifically directed by the ENGINEER, all samples shall be of the precise article proposed to be furnished.
- C. Submit all samples in the quantity which is required to be returned plus one sample which will be retained by the ENGINEER.

#### 2.4 COLORS

- A. Unless the precise color and pattern is specifically described in the Contract Documents, wherever a choice of color or pattern is available in a specified product, submit accurate color charts and pattern charts to the ENGINEER for review and selection.
- B. Unless all available colors and patterns have identical costs and identical wearing capabilities, and are identically suited to the installation, completely describe the relative costs and capabilities of each.

#### PART 3 EXECUTION

#### 3.1 CONTRACTOR'S COORDINATION OF SUBMITTALS

- A. Prior to submittal for the ENGINEER'S review, the CONTRACTOR shall use all means necessary to fully coordinate all material, including the following procedures:
  - Determine and verify all field dimensions and conditions, catalog numbers and similar data.
  - 2. Coordinate as required with all trades and all public agencies involved.
  - Submit a written statement of review and compliance with the requirements of all applicable technical Specifications as well as the requirements of this Section.
  - 4. Clearly indicate in a letter or memorandum on the manufacturer's or fabricator's letterhead, all deviations from the Contract Documents.
- B. Each and every copy of the shop drawings and data shall bear the CONTRACTOR'S stamp showing that they have been so checked. Shop drawings submitted to the ENGINEER without the CONTRACTOR'S stamp will be returned to the

CONTRACTOR for conformance with this requirement.

C. The Owner may backcharge the CONTRACTOR for costs associated with having to review a particular shop drawing, product data or sample more than two times to receive a "No Exceptions Taken" mark.

# D. Grouping of Submittals

- Unless otherwise specifically permitted by the ENGINEER, make all submittals in groups containing all associated items.
- 2. No review will be given to partial submittals of shop drawings for items which interconnect and/or are interdependent. It is the CONTRACTOR'S responsibility to assemble the shop drawings for all such interconnecting and/or interdependent items, check them and then make one submittal to the ENGINEER along with CONTRACTOR'S comments as to compliance, non-compliance or features requiring special attention.
- E. Schedule of Submittals: Within 30 days of Contract award and prior to any shop drawing submittal, the CONTRACTOR shall submit a schedule showing the estimated date of submittal and the desired approval date for each shop drawing anticipated. A reasonable period shall be scheduled for review and comments. Time lost due to unacceptable submittals shall be the CONTRACTOR'S responsibility and some time allowance for resubmittal shall be provided. The schedule shall provide for submittal of items which relate to one another to be submitted concurrently.

# 3.2 TIMING OF SUBMITTALS

- A. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery.
- B. In scheduling, allow sufficient time for the ENGINEER'S review following the receipt of the submittal.

#### 3.3 REVIEWED SHOP DRAWINGS

# A. ENGINEER Review

Allow a minimum of 14 days for the ENGINEER'S initial processing of each submittal requiring review and response, except allow longer periods where processing must be delayed for coordination with subsequent submittals. The ENGINEER will advise the CONTRACTOR promptly when it is determined that a submittal being processed must be delayed for coordination. Allow a minimum of two weeks for reprocessing each submittal. Advise the ENGINEER on each submittal as to whether processing time is critical to progress of the Work, and therefore the Work would be expedited if processing time could be foreshortened.

- Acceptable submittals will be marked "No Exceptions Taken". A minimum of three copies will be retained by the ENGINEER for ENGINEER'S and the OWNER'S use and the remaining copies will be returned to the CONTRACTOR.
- 3. Submittals requiring minor corrections before the product is acceptable will be marked "Make Corrections Noted". The CONTRACTOR may order, fabricate and ship the items included in the submittals, provided the indicated corrections are made. Drawings must be resubmitted for review and marked "No Exceptions Taken" prior to installation or use of products.
- 4. Submittals marked "Amend and Resubmit" must be revised to reflect required changes and the initial review procedure repeated.
- The "Rejected See Remarks" notation is used to indicate products which are
  not acceptable. Upon return of a submittal so marked, the CONTRACTOR
  shall repeat the initial review procedure utilizing acceptable products.
- 6. Only two copies of items marked "Amend and Resubmit" and "Rejected See Remarks" will be reviewed and marked. One copy will be retained by the ENGINEER and the other copy with all remaining unmarked copies will be returned to the CONTRACTOR for resubmittal.
- B. No work or products shall be installed without a drawing or submittal bearing the "No Exceptions Taken" notation. The CONTRACTOR shall maintain at the job site a complete set of shop drawings bearing the ENGINEER'S stamp.
- C. Substitutions: In the event the CONTRACTOR obtains the ENGINEER'S approval for the use of products other than those which are listed first in the Contract Documents, the CONTRACTOR shall, at the CONTRACTOR'S own expense and using methods approved by the ENGINEER, make any changes to structures, piping and electrical work that may be necessary to accommodate these products.
- D. Use of the "No Exceptions Taken" notation on shop drawings or other submittals is general and shall not relieve the CONTRACTOR of the responsibility of furnishing products of the proper dimension, size, quality, quantity, materials and all performance characteristics, to efficiently perform the requirements and intent of the Contract Documents. The ENGINEER'S review shall not relieve the CONTRACTOR of responsibility for errors of any kind on the shop drawings. Review is intended only to assure conformance with the design concept of the Project and compliance with the information given in the Contract Documents. The CONTRACTOR is responsible for dimensions to be confirmed and correlated at the job site. The CONTRACTOR is also responsible for information that pertains solely to the fabrication processes or to the technique of construction and for the coordination of the work of all trades.

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Shop Drawings, Product Data and Samples

# 3.4 RESUBMISSION REQUIREMENTS

# A. Shop Drawings

- 1. Revise initial drawings as required and resubmit as specified for initial submittal, with the resubmittal number shown.
- 2. Indicate on drawings all changes which have been made other than those requested by the ENGINEER.
- B. Project Data and Samples: Resubmit new data and samples as specified for initial submittal, with the resubmittal number shown.

**END OF SECTION** 

#### SECTION 02665

# Water Mains and Accessories

# PART 1 GENERAL

# 1.01 SCOPE

- A. This Section describes products to be incorporated into the water mains and requirements for the installation and use of these items. Furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.
- B. General: Supply all products and perform all work in accordance with applicable American Society for Testing and Material (ASTM), American Water Works Association (AWWA), American National Standards Institute (ANSI), or other recognized standards. Latest revisions of all standards are applicable.

# 1.02 QUALIFICATIONS

If requested by the ENGINEER, submit evidence that manufacturers have consistently produced products of satisfactory quality and performance for a period of at least two years.

#### 1.03 SUBMITTALS

Complete shop drawings and engineering data for all products shall be submitted to the ENGINEER in accordance with the requirements of Section 01340 of these Specifications.

# PART 2 PRODUCTS

# 2.01 PIPING MATERIALS AND ACCESSORIES

# A. Ductile Iron Pipe (DIP)

1. Ductile iron pipe shall be manufactured in accordance with AWWA C151 (latest edition). All pipe, except specials, shall be furnished in nominal lengths of 18 to 20 feet. Sizes will be as shown on the Drawings. All pipe shall have a minimum pressure rating as indicated in the following table, and corresponding minimum wall thickness, unless otherwise specified or shown on the Drawings:

Pipe Sizes (inches)	Pressure Class (psi)
4 - 12	350
14 - 18	250
20	250
24	200
30 - 54	250
60 - 64	200

- 2. Flanged pipe minimum wall thickness shall be equal to Special Class 53. Flanges shall be furnished by the pipe manufacturer.
- Pipe and fittings shall be cement lined in accordance with AWWA C104 (latest edition). Pipe and fittings shall be furnished with a bituminous outside coating.
- 4. Fittings shall be ductile iron and shall conform to AWWA C110 or AWWA C153 (latest edition) with a minimum rated working pressure of 250 psi or as indicated on plans.

#### Joints

- a. Unless shown or specified otherwise, joints shall be push-on or restrained joint type for pipe and standard mechanical, push-on or restrained joints for fittings. Push-on and mechanical joints shall conform to AWWA C111 (latest edition). Restrained joints for pipe and fittings shall be American "FLEX-RING" or "LOK-RING", Clow "SUPER-LOCK", or U.S. Pipe "TR FLEX". No field welding of restrained joint pipe will be permitted. No mega lug type restraints are allowed on 24" and 30" water line.
- b. Restrained joint pipe (RJP) on supports shall have bolted joints and shall be specifically designed for clear spans of at least 36 feet.
- c. Flanged joints shall meet the requirements of ANSI B16.1, Class 125.
- Provide the appropriate gaskets for mechanical and flange joints. Gaskets for flange joints shall be made of 1/8-inch thick, cloth reinforced rubber; gaskets may be ring type or full face type.

- 7. Provide the necessary bolts for mechanical, restrained and flange connections. Bolts for flange connections shall be steel with American Regular unfinished square or hexagon heads. Nuts shall be steel with American Standard Regular hexagonal dimensions, all as specified in ANSI B17.2. All bolts and all nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A and 2B fit. Mechanical joint glands shall be ductile iron.
- Acceptance will be on the basis of the ENGINEER'S inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards.

# B. Polyvinyl Chloride Pipe (PVC)

- All PVC pipe shall have belled ends for push-on type jointing and shall conform to ASTM D 2241. The pipe shall have a Standard Dimension Ratio as indicated on the plans. Pipe shall be supplied in minimum lengths of 20 feet.
  - 2. All fittings shall be of cast or ductile iron meeting the requirements of AWWA C110 or AWWA C153 (latest edition) with a minimum rated working pressure of 250 psi. Fittings shall be cement lined in accordance with AWWA C104. Fittings shall be furnished with a bituminous outside coating. Special adapters shall be provided as recommended by the manufacturer to adapt the PVC pipe to mechanical jointing with cast or ductile iron pipe, fittings, or valves.
- Detection tape shall be provided over all PVC water mains.
- 4. Acceptance will be on the basis of the ENGINEER'S or OWNER'S inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards, including the National Sanitation Foundation. Additionally, each piece of pipe shall be stamped "NSF Approved".

# C. Polyvinyl Chloride Pipe (PVC) - (C-900)

 All PVC pipe shall have belled ends for push-on type jointing and shall conform to AWWA C900, ductile iron pipe equivalent outside diameters. The pipe shall have a Dimension Ratio (DR) of 14 and shall be capable of withstanding a working pressure of 200 psi. Pipe shall be supplied in minimum lengths of 20 feet.

- 2. All fittings shall be of cast or ductile iron meeting the requirements of AWWA C110 or AWWA C153 with a minimum rated working pressure of 250 psi. Fittings shall be cement lined in accordance with AWWA C104. Fittings shall be furnished with a bituminous outside coating. Special adapters shall be provided, as recommended by the manufacturer, to adapt the PVC pipe to mechanical jointing with cast or ductile iron pipe, fittings or valves.
- 3. Detection tape shall be provided over all PVC water mains.
- 4. Acceptance will be on the basis of the ENGINEER'S inspection and the manufacturer's written certification that the pipe was manufactured and tested in accordance with the applicable standards, including the National Sanitation Foundation. Additionally, each piece of pipe shall be stamped "NSF Approved".

#### 2.02 VALVES

# A. Gate Valves (GV)

- 3-Inches in Diameter and Smaller: Gate valves shall be bronze, heavy duty, rising stem, wedge type with screwed or union bonnet. Valve ends shall be threaded or solder type as appropriate. Valves shall have a minimum 200 psi working pressure for water (125 psi working pressure for steam). Valves shall be made in the U.S.A. Gate valves shall be equal to Crane No. 428 (threaded) or Crane No. 1334 (solder end).
- 4-Inches Through 12-Inches in Diameter: Gate valves 4-inches through 12-inches shall be resilient wedge type conforming to the requirements of AWWA C509 rated for 200 psi working pressure.
  - a. Valves shall be provided with two O-ring stem seals with one O-ring located above and one O-ring below the stem collar. The area between the O-rings shall be filled with lubricant to provide lubrication to the thrust collar bearing surfaces each time the valve is operated. At least one anti-friction washer shall be utilized to further minimize operating torque. All seals between valve parts, such as body and bonnet, bonnet and bonnet cover, shall be flat gaskets or O-rings.
  - b. The valve gate shall be made of cast iron having a vulcanized, synthetic rubber coating, or a seat ring attached to the disc with retaining screws. Sliding of the rubber on the seating surfaces to compress the rubber will not be allowed. The design shall be such that compression-set of the rubber shall not affect the ability of the valve to seal when pressure is

applied to either side of the gate. The sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.

- c. All internal ferrous surfaces shall be coated with epoxy to a minimum thickness of 4 mils. The epoxy shall be non-toxic, impart no taste to the water and shall conform to AWWA C550, latest revision.
- Gate valves 4 through 12-inches shall be manufactured by American-Darling, Mueller or M & H Valve.

# 2.03 FIRE HYDRANTS (FH) (NOT USED)

# 2.04 VALVE BOXES (VB) AND EXTENSION STEMS

- A. All valves shall be equipped with valve boxes. The valve boxes shall be cast iron two-piece screw type with drop covers. Valve boxes shall have a 5.25-inch inside diameter. Valve box covers shall weigh a minimum of 13 pounds. The valve boxes shall be adjustable to 6-inches up or down from the nominal required cover over the pipe. Valve boxes shall be of sufficient length that bottom flange of the lower belled portion of the box is below the valve operating nut. Ductile or cast iron extensions shall be provided as necessary. Covers shall have "WATER VALVE" or "WATER" cast into them. Valve boxes shall be manufactured in the United States.
- B. All valves shall be furnished with extension stems, as necessary, to bring the operating nut to within 30-inches of the top of the valve box. Connection to the valve shall be with a wrench nut coupling and a set screw to secure the coupling to the valve's operating nut. The coupling and square wrench nut shall be welded to the extension stem. Extension stems shall be equal to Mueller A-26441 or M & H Valve Style 3801.
- C. All Valve Boxes shall be installed with Concrete Collars as Indicated on the Detail Sheet.

### 2.05 TAPPING SADDLES

Tapping saddles shall be ductile iron body type with O-ring gasket and alloy steel straps. Connection shall be flanged or mechanical joint as detailed on the Drawings. Tapping saddles shall be equal to ACIPCO A-10920.

#### 2.06 CORPORATION COCKS AND CURB STOPS

02665-6

Water Mains and Accessories

Corporation cocks and curb stops shall be ground key type, shall be made of bronze conforming to ASTM B 61 or B 62, and shall be suitable for the working pressure of the system. Ends shall be suitable for flared tube compression type joint. Threaded ends for inlet and outlet of corporation cocks shall conform to AWWA C800; coupling nut for connection to flared copper tubing shall conform to ANSI B16.26. Corporation cocks and curb stops shall be manufactured by Mueller or Ford or approved equal.

# 2.07 CONCRETE

Concrete shall have a compressive strength of not less than 3000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5-inches. For job mixed concrete, submit the concrete mix design for approval by the Engineer. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

# PART 3 EXECUTION

# 3.01 EXISTING UTILITIES AND OBSTRUCTIONS

- A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available to the OWNER. The CONTRACTOR shall call the agencies or departments that own and/or operate utilities in the vicinity of the construction work site at least 72 hours (three business days) prior to construction to verify the location of the existing utilities.
- B. Existing Utility Location: The following steps shall be exercised to avoid interruption of existing utility service.
  - 1. Provide the required notice to the utility owners and allow them to locate their facilities. Field utility locations are valid for only 10 days after original notice. The CONTRACTOR shall ensure, at the time of any excavation, that a valid utility location exists at the point of excavation.
    - Expose the facility, for a distance of at least 200 feet in advance of pipeline
      construction, to verify its true location and grade. Repair, or have repaired,
      any damage to utilities resulting from locating or exposing their true location.
    - Avoid utility damage and interruption by protection with means or methods recommended by the utility owner.

4. Maintain a log identifying when phone calls were made, who was called, area for which utility relocation was requested and work order number issued, if any. The CONTRACTOR shall provide the ENGINEER an updated copy of the log bi-weekly, or more frequently if required.

# C. Conflict with Existing Utilities

- 1. Horizontal Conflict: Horizontal conflict shall be defined as when the actual horizontal separation between a utility, main, or service and the proposed water main does not permit safe installation of the water main by the use of sheeting, shoring, tieing-back, supporting, or temporarily suspending service of the parallel or crossing facility. The CONTRACTOR may change the proposed alignment of the water main to avoid horizontal conflicts if the new alignment remains within the available right-of-way or easement, complies with regulatory agency requirements and after a written request to and subsequent approval by the EENGINEER or OWNER. Where such relocation of the water main is denied by the ENGINEER or OWNER, the CONTRACTOR shall arrange to have the utility, main, or service relocated.
- Vertical Conflict: Vertical conflict shall be defined as when the actual vertical separation between a utility, main, or service and the proposed water main does not permit the crossing without immediate or potential future damage to the utility, main, service, or the water main. The CONTRACTOR may change the proposed grade of the water main to avoid vertical conflicts if the changed grade maintains adequate cover and complies with regulatory agencies requirements after written request to and subsequent approval by the ENGINEER or OWNER. Where such relocation of the water main is denied by the ENGINEER or OWNER, the CONTRACTOR shall arrange to have the utility, main, or service relocated.
- D. Electronic Locator: Have available at all times an electronic pipe locator and a magnetic locator, in good working order, to aid in locating existing pipe lines or other obstructions.

#### E. Water and Sewer Separation

1. Water mains should maintain a minimum 10 foot edge-to-edge separation from sewer lines, whether gravity or pressure. If the main cannot be installed in the prescribed easement or right-of-way and provide the 10 foot separation, the separation may be reduced, provided the bottom of the water main is a minimum of 18-inches above the top of the sewer. Should neither

of these two separation criteria be possible, the water main shall be installed below the sewer with a minimum vertical separation of 18-inches.

- 2. The water main, when installed below the sewer, shall be encased in concrete with a minimum 6-inch concrete depth to the first joint in each direction. Where water mains cross the sewer, the pipe joint adjacent to the pipe crossing the sewer shall be cut to provide maximum separation of the pipe joints from the sewer.
- No water main shall pass through, or come in contact with, any part of a sanitary sewer manhole.

# 3.02 CONSTRUCTION ALONG HIGHWAYS, STREETS AND ROADWAYS

A. Install pipe lines and appurtenances along highways, streets and roadways in accordance with the applicable regulations of, and permits issued by, the Department of Transportation, with reference to construction operations, safety, traffic control, road maintenance and repair.

#### B. Traffic Control

- The CONTRACTOR shall provide, erect and maintain all necessary barricades, suitable and sufficient lights and other traffic control devices; provide qualified flagmen where necessary to direct traffic; take all necessary precautions for the protection of the work and the safety of the public.
  - Construction traffic control devices and their installation shall be in accordance with the current <u>Manual On Uniform Traffic Control Devices for Streets and Highways</u> and the Department of Highways Specifications, latest edition.
  - Placement and removal of construction traffic control devices shall be coordinated with the Department of Transportation, a minimum of 48 hours in advance of the activity.
  - 4. Placement of construction traffic control devices shall be scheduled ahead of associated construction activities. Construction time in street right-of-way shall be conducted to minimize the length of time traffic is disrupted. Construction traffic control devices shall be removed immediately following their useful purpose. Traffic control devices used intermittently, such as "Flagmen Ahead", shall be removed and replaced when needed.
  - 5. Existing traffic control devices within the construction work zone shall be protected from damage. Traffic control devices requiring temporary

relocation shall be located as near as possible to their original vertical and horizontal locations. Original locations shall be measured from reference points and recorded in a log prior to relocation. Temporary locations shall provide the same visibility to affected traffic as the original location. Relocated traffic control devices shall be reinstalled in their original locations as soon as practical following construction.

- Construction traffic control devices shall be maintained in good repair and shall be clean and visible to affected traffic for daytime and nighttime operation. Traffic control devices affected by the construction work zone shall be inspected daily.
- 7. Construction warning signs shall be black legend on an orange background. Regulatory signs shall be black legend on a white background. Construction sign panels shall meet the minimum reflective requirements of the Department of Transportation. Sign panels shall be of durable materials capable of maintaining their color, reflective character and legibility during the period of construction.
- 8. Channelization devices shall be positioned preceding an obstruction at a taper length as required by the current <u>Manual On Uniform Traffic Control Devices for Streets and Highways</u>, as appropriate for the speed limit at that location. Channelization devices shall be patrolled to insure that they are maintained in the proper position throughout their period of use.

# C. Construction Operations

- 1. Perform all work along highways, streets and roadways to minimize interference with traffic.
  - 2. Stripping: Where the pipe line is laid along road right-of-way, strip and stockpile all sod, topsoil and other material suitable for right-of-way restoration.
  - 3. Trenching, Laying and Backfilling: Do not open the trench any further ahead of pipe laying operations than is necessary. Backfill and remove excess material immediately behind laying operations. Complete excavation and backfill for any portion of the trench in the same day.
  - Shaping: Reshape damaged slopes, side ditches, and ditch lines immediately
    after completing backfilling operations. Replace topsoil, sod and any other
    materials removed from shoulders.

- Construction operations shall be limited to 400 feet along areas within KYDOT jurisdiction, including clean-up and utility exploration.
- D. Excavated Materials: Do not place excavated material along highways, streets and roadways in a manner which obstructs traffic. Sweep all scattered excavated material off of the pavement in a timely manner.
- E. Drainage Structures: Keep all side ditches, culverts, cross drains, and other drainage structures clear of excavated material. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
  - 1. The CONTRACTOR shall make provisions for handling all flows in existing creeks, ditches, sewers and trenches by pipes, flumes or other approved methods at all times when his operations would, in any way, interfere with the natural functioning of said creeks, ditches, sewers and drains. The CONTRACTOR shall at all times during construction provide and maintain sufficient equipment for the disposal of all water which enters the excavation, both in open cut trenches and in tunnels, to render such excavation firm and dry, until the structures to be built thereon are completed.
- F. Landscaping Features: Landscaping features shall include, but are not necessarily limited to: fences; property corners; cultivated trees and shrubbery; manmade improvements; subdivision and other signs within the right-of-way and easement. The CONTRACTOR shall take extreme care in moving landscape features and promptly re-establishing these features.
- G. Maintaining Highways, Streets, Roadways and Driveways
  - Maintain streets, highways, roadways and driveways in suitable condition for movement of traffic until completion and final acceptance of the Work. All excavation shall be conducted in a manner to the last interruption to traffic.
  - 2. During the time period between pavement removal and completing permanent pavement replacement, maintain highways, streets and roadways by the use of steel running plates. Running plate edges shall have asphalt placed around their periphery to minimize vehicular impact. The backfill above the pipe shall be compacted as specified elsewhere up to the existing pavement surface to provide support for the steel running plates.
  - 3. Furnish a road grader or front-end loader for maintaining highways, streets, and roadways. The grader or front-end loader shall be available at all times.

- 4. Immediately repair all driveways that are cut or damaged. Maintain them in a suitable condition for use until completion and final acceptance of the Work. Driveways and other private and public access routes shall not be kept blocked or closed by the CONTRACTOR for more than a reasonable period of time without prior written approval from the property owner or controlling authority.
- Maintenance of all traffic shall be in accordance with any requirements of the local road department(s) and/or the Kentucky Department of Transportation. It is the responsibility of the CONTRACTOR to coordinate all work with and notify the above-named agencies, and to provide all necessary signs, barricades, lights, flagmen, and other items for maintenance of traffic.

Public travel shall be maintained, unrestricted, wherever and whenever possible. Detours shall be provided when so directed by the appropriate agency. Adequate precautions shall be taken to provide for the safety of both vehicular and pedestrian traffic. Emergency vehicles shall be provided access to construction area at all times.

Unless specifically directed otherwise by the ENGINEER, not more than five hundred (500') feet of trench shall be opened ahead of the pipe laying, and not more than five hundred (500') feet of open ditch shall be left behind the pipe laying. All barricades, lanterns, watchmen, and other such signs and signals as may be necessary to warn the public of the dangers in connection with open trenches, excavations and other obstructions, shall be provided by and at the expense of the CONTRACTOR.

When so required, or when directed by the ENGINEER, only one-half (1/2) of the street crossing and road crossings shall be excavated before placing temporary bridges over the side excavated for the convenience of the traveling public.

All backfilled ditches shall be maintained in such manner that they will offer no hazard to the traveling public and the property owners abutting the improvements shall be taken into consideration. All public or private drives shall be promptly backfilled or bridges at the direction of the ENGINEER. Excavated materials shall be disposed of so as to cause the least interference, and in every case the deposition of excavated materials shall be satisfactory to the ENGINEER.

# H. Property Protection

- Extreme care shall be taken to protect trees, fences, poles, crops and all other
  property from damage unless their removal is authorized by the ENGINEER.
  Any damaged property shall be restored to as good or better than original
  condition and shall meet with the approval of the ENGINEER and OWNER.
- 2. The CONTRACTOR has the right to fully utilize the easement unless specifically stated otherwise on the plans or by the ENGINEER. If any irreplaceable trees, fences, poles or crops, such as tobacco, corn, soy beans and such (excluding pasture land), occur on the easement the CONTRACTOR shall obtain the ENGINEER's and OWNER's approval prior to removing or otherwise causing damage to any of these items.
- Beyond the limits of the easement the CONTRACTOR shall be responsible for any damage caused by his operations and/or his personnel.

#### 3.03 PIPE DISTRIBUTION

- A. Pipe shall be distributed and placed in such a manner that will not interfere with traffic.
- B. No pipe shall be strung further along the route than 1000 feet beyond the area in which the CONTRACTOR is actually working without written permission from the OWNER.
- C. No street or roadway may be closed for unloading of pipe without first obtaining permission from the proper authorities. The CONTRACTOR shall furnish and maintain proper warning signs and obstruction lights for the protection of traffic along highways, streets and roadways upon which pipe is distributed.
- D. No distributed pipe shall be placed inside drainage ditches.
- E. Distributed pipe shall be placed as far as possible from the roadway pavement, but no closer than five feet from the roadway pavement, as measured edge-to-edge.

#### 3.04 LAYING AND JOINTING PIPE AND ACCESSORIES

- A. Lay all pipe and fittings to accurately conform to the lines and grades established by the ENGINEER.
- B. Pipe Installation

- Proper implements, tools and facilities shall be provided for the safe performance of the Work. All pipe, fittings, valves and hydrants shall be lowered carefully into the trench by means of slings, ropes or other suitable tools or equipment in such a manner as to prevent damage to water main materials and protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench.
- 2. All pipe, fittings, valves, hydrants and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the ENGINEER, who may prescribe corrective repairs or reject the materials.
- 3. All lumps, blisters and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and free from dirt, sand, grit or any foreign materials before the pipe is laid. No pipe containing dirt shall be laid.
- 4. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. No debris, tools, clothing or other materials shall be placed in the pipe at any time.
- 5. As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.
- It is not mandatory to lay pipe with the bells facing the direction in which work is progressing.
- Applying pressure to the top of the pipe, such as with a backhoe bucket, to lower the pipe to the proper elevation or grade, shall not be permitted.
- 8. Detection tape shall be buried 4 to 10-inches deep. Should detection tape need to be installed deeper, the CONTRACTOR shall provide 3-inch wide tape. In no case shall detection tape be buried greater than 20-inches from the finish grade surface.
- 9. All areas beyond 5 feet from the edge of existing and proposed pavement shall be backfilled with earth backfill and compacted to 95% optimum density. Backfill from the trench bottom to 12" above the pipe shall be free on any rock. Backfill under and within 5 feet of the edge of existing and proposed roadway shall be flowable fill concrete. Flowable fill concrete shall be from the top of bedding to top of trench or pavement subgrade, which ever is lowest.

# C. Alignment and Gradient

- Lay pipe straight in alignment and gradient or follow true curves as nearly as practicable. Do not deflect any joint more than the maximum deflection recommended by the manufacturer.
- 2. Maintain a transit, level and accessories on the job to lay out angles and ensure that deflection allowances are not exceeded.
- D. Expediting of Work: Excavate, lay the pipe, and backfill as closely together as possible. Do not leave unjointed pipe in the trench overnight. Backfill and compact the trench as soon as possible after laying and jointing is completed. Cover the exposed end of the installed pipe each day at the close of work and at all other times when work is not in progress. If necessary to backfill over the end of an uncompleted pipe or accessory, close the end with a suitable plug, either pushon, mechanical joint, restrained joint or as approved by the ENGINEER.

# E. Joint Assembly

- Push-on, mechanical, flange and restrained type joints shall be assembled in accordance with the manufacturer's recommendations.
- The CONTRACTOR shall inspect each pipe joint within 200 feet on either side of main line valves to insure 100 percent seating of the pipe spigot, except as noted otherwise.
- 3. Each restrained joint shall be inspected by the CONTRACTOR to ensure that it has been "homed" 100 percent.
- The CONTRACTOR shall internally inspect each pipe joint to insure proper assembly for pipe 24-inches in diameter and larger after the pipe has been brought to final alignment.
- F. Cutting Pipe: Cut ductile iron pipe using an abrasive wheel saw. Cut PVC pipe using a suitable saw; remove all burrs and smooth the end before jointing. The CCONTRACTOR shall cut the pipe and bevel the end, as necessary, to provide the correct length of pipe necessary for installing the fittings, valves, accessories and closure pieces in the correct location. Only push-on or mechanical joint pipe shall be cut.
- G. Polyethylene Encasement: Installation shall be in accordance with AWWA C105 and the manufacturer's instructions. All ends shall be securely closed with tape

and all damaged areas shall be completely repaired to the satisfaction of the Engineer.

# H. Valve and Fitting Installation

- Prior to installation, valves shall be inspected for direction of opening, number of turns to open, freedom of operation, tightness of pressurecontaining bolting and test plugs, cleanliness of valve ports and especially seating surfaces, handling damage and cracks. Defective valves shall be corrected or held for inspection by the ENGINEER. Valves shall be closed before being installed.
- 2. Valves, fittings, plugs and caps shall be set and joined to the pipe in the manner specified in this Section for cleaning, laying and joining pipe, except that 12-inch and larger valves shall be provided with special support, such as treated timbers, crushed stone, concrete pads or a sufficiently tamped trench bottom so that the pipe will not be required to support the weight of the valve. Valves shall be installed in the closed position.
- 3. A valve box shall be provided on each underground valve. They shall be carefully set, centered exactly over the operating nut and truly plumbed. The valve box shall not transmit shock or stress to the valve. The bottom flange of the lower belled portion of the box shall be placed below the valve operating nut. This flange shall be set on brick, so arranged that the weight of the valve box and superimposed loads will bear on the base and not on the valve or pipe. Extension stems shall be installed where depth of bury places the operating nut in excess of 30-inches beneath finished grade so as to set the top of the operating nut 30-inches below finished grade. The valve box cover shall be flush with the surface of the finished area or such other level as directed by the ENGINEER.
- In no case shall valves be used to bring misaligned pipe into alignment during installation. Pipe shall be supported in such a manner as to prevent stress on the valve.
- A valve marker shall be provided for each underground valve. Unless
  otherwise detailed on the Drawings or directed by the ENGINEER, valve
  markers shall be installed 6-inches inside the right-of-way or easement.

#### 3.05 CONNECTIONS TO WATER MAINS

A. Make connections to existing pipe lines with tapping sleeves and valves, unless specifically shown otherwise on the Drawings.

- B. Location: Before laying pipe, locate the points of connection to existing water mains and uncover as necessary for the ENGINEER or OWNER to confirm the nature of the connection to be made.
- C. Interruption of Services: Make connections to existing water mains only when system operations permit. Operate existing valves only with the specific authorization and direct supervision of the Owner.
- D. Tapping Saddles and Tapping Sleeves
  - Holes in the new pipe shall be machine cut, either in the field or at the factory. No torch cutting of holes shall be permitted.
  - 2. Prior to attaching the saddle or sleeve, the pipe shall be thoroughly cleaned, utilizing a brush and rag, as required.
  - 3. Before performing field machine cut, the watertightness of the saddle or sleeve assembly shall be pressure tested. The interior of the assembly shall be filled with water. An air compressor shall be attached, which will induce a test pressure as specified in this Section. No leakage shall be permitted for a period of five minutes.
  - 4. After attaching the saddle or sleeve to an existing main, but prior to making the tap, the interior of the assembly shall be disinfected. All surfaces to be exposed to potable water shall be swabbed or sprayed with a one percent hypochlorite solution.
- E. Connections Using Solid Sleeves: Where connections are shown on the Drawings using solid sleeves, the CONTRACTOR shall furnish materials and labor necessary to make the connection to the existing pipe line.
- F. Connections Using Couplings: Where connections are shown on the Drawings using couplings, the CONTRACTOR shall furnish materials and labor necessary to make the connection to the existing pipe line, including all necessary cutting, plugging and backfill.

#### 3.06 THRUST RESTRAINT

- Provide restraint at all points where hydraulic thrust may develop.
- B. Concrete Blocking

- Provide concrete blocking for all bends, tees, valves, and other points where thrust may develop, except where other exclusive means of thrust restraint are specifically shown on the Drawings.
- Concrete shall be as specified in this Section.
- Form and pour concrete blocking at fittings as shown on the Drawings and as directed by the ENGINEER. Pour blocking against undisturbed earth. Increase dimensions when required by over excavation.

# 3.07 INSPECTION AND TESTING

# A. Pressure and Leakage Test

- All sections of the water main subject to internal pressure shall be pressure tested in accordance with AWWA C600. A section of main will be considered ready for testing after completion of all thrust restraint and backfilling.
- 2. Each segment of water main between main valves shall be tested individually.

# 3. Test Preparation

- a. For water mains less than 24-inches in diameter, flush sections thoroughly at flow velocities, greater than 2.5 feet per second, adequate to remove debris from pipe and valve seats. For water mains 24-inches in diameter and larger, the main shall be carefully swept clean, and mopped if directed by the ENGINEER. Partially open valves to allow the water to flush the valve seat.
- Partially operate valves and hydrants to clean out seats.
- c. Provide temporary blocking, bulkheads, flanges and plugs as necessary, to assure all new pipe, valves and appurtenances will be pressure tested.
- d. Before applying test pressure, air shall be completely expelled from the pipeline and all appurtenances. Insert corporation cocks at highpoints to expel air as main is filled with water as necessary to supplement automatic air valves. Corporation stops shall be constructed as detailed on the Drawings with a meter box.

- e. Fill pipeline slowly with water. Provide a suitable pump with an accurate water meter to pump the line to the specified pressure.
- f. The differential pressure across a valve or hydrant shall equal the maximum possible, but not exceed the rated working pressure. Where necessary, provide temporary backpressure to meet the differential pressure restrictions.
- g. Valves shall not be operated in either the opening or closing direction at differential pressures above the rated pressure.
- 4. Test Pressure: Test the pipeline at 50 psi above the rated working pressure measured at the lowest point for at least two hours. Maintain the test pressure within 5 psi of the specified test pressure for the test duration. Should the pressure drop more than 5 psi at any time during the test period, the pressure shall be restored to the specified test pressure. Provide an accurate pressure gage with graduation not greater than 5 psi.

#### Leakage

- a. Leakage shall be defined as the sum of the quantity of water that must be pumped into the test section, to maintain pressure within 5 psi of the specified test pressure for the test duration plus water required to return line to test pressure at the end of the test. Leakage shall be the total cumulative amount measured on a water meter.
- The OWNER assumes no responsibility for leakage occurring through existing valves.
- 6. Test Results: No test section shall be accepted if the leakage exceeds the limits determined by the following formula:

 $L = \frac{SD (P)^{1/2}}{133,200}$ 

Where:

L = allowable leakage, in gallons per hour

S = length of pipe tested, in feet

D = nominal diameter of the pipe, in inches

P = average test pressure during the leakage test, in pounds per square inch (gauge)

As determined under Section 4 of AWWA C600.

If the water main section being tested contains lengths of various pipe diameters, the allowable leakage shall be the sum of the computed leakage for each diameter. The leakage test shall be repeated until the test section

is accepted. All visible leaks shall be repaired regardless of leakage test results.

7. Completion: After a pipeline section has been accepted, relieve test pressure. Record type, size and location of all outlets on record drawings.

#### 3.08 DISINFECTING PIPELINE

- A. After successfully pressure testing each pipeline section, disinfect in accordance with AWWA C651 for the continuous-feed method and these Specifications.
- B. Specialty Contractor: Disinfection shall be performed by an approved specialty contractor. Before disinfection is performed, the CONTRACTOR shall submit a written procedure for approval before being permitted to proceed with the disinfection. This plan shall also include the steps to be taken for the neutralization of the chlorinated water.

#### C. Chlorination

- Apply chlorine solution to achieve a concentration of at least 50 milligrams
  per liter free chlorine in new line. Retain chlorinated water for 24 hours.
- 2. Chlorine concentration shall be recorded at every outlet along the line at the beginning and end of the 24 hour period.
- After 24 hours, all samples of water shall contain at least 25 milligrams per liter free chlorine. Re-chlorinate if required results are not obtained on all samples.
- D. Disposal of Chlorinated Water: Reduce chlorine residual of disinfection water to less than one milligram per liter if discharged directly to a body of water or to less than two milligrams per liter if discharged onto the ground prior to disposal. Treat water with sulfur dioxide or other reducing chemicals to neutralize chlorine residual. Flush all lines until residual is equal to existing system.
- E. Bacteriological Testing: After final flushing and before the main is placed into service, the CONTRACTOR shall assist the OWNER in collecting samples from the line to have tested for bacteriological quality. Testing shall be performed by the OWNER at a laboratory certified by the State of Kentucky. Re-chlorinate lines until the required results are obtained.

# 3.09 PROTECTION AND RESTORATION OF WORK AREA

- A. General: Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started. All temporary restoration of any kind shall be incidental to water line relocation construction. All temporary paving materials shall be approved by the Section Engineer prior to placement. All permanent restoration shall be performed and paid under contract bid items.
  - The CONTRACTOR shall plan, coordinate, and prosecute the work such that disruption to personal property and business is held to a practical minimum.
  - 2. All construction areas abutting lawns and yards of residential or commercial property shall be restored promptly. Backfilling of underground facilities, ditches, and disturbed areas shall be accomplished on a daily basis as work is completed. Finishing, dressing, and grassing shall be accomplished immediately thereafter, as a continuous operation within each area being constructed and with emphasis placed on completing each individual yard or business frontage. Care shall be taken to provide positive drainage to avoid ponding or concentration of runoff.
  - Handwork, including raking and smoothing, shall be required to ensure that
    the removal of roots, sticks, rocks, and other debris is removed in order to
    provide a neat and pleasing appearance.
  - 4. The Department of Transportation's engineer shall be authorized to stop all work by the CONTRACTOR when restoration and cleanup are unsatisfactory and to require appropriate remedial measures.
- B. Man-Made Improvements: Protect, or remove and replace with the ENGINEER'S approval, all fences, walkways, mail boxes, pipe lines, drain culverts, power and telephone lines and cables, property pins and other improvements that may be encountered in the Work.
- C. Cultivated Growth: Do not disturb cultivated trees or shrubbery unless approved by the ENGINEER. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.
- D. Cutting of Trees: Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced

- nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the CONTRACTOR. No stumps, wood piles, or trash piles will be permitted on the work site.
- E. Disposal of Rubbish: Dispose of all materials cleared and grubbed during the construction of the Project in accordance with the applicable codes and rules of the appropriate county, state and federal regulatory agencies.

END OF SECTION

# KENTUCKY TRANSPORTATION CABINET DEPARTMENT OF HIGHWAYS FRANKFORT, KY 40622

Revised: 9-15-11 Contract ID: 111329 Page 148 of 154

CONTRACT ID: 111329

COUNTY: PENDLETON

PROPOSAL: BRO 5218 (004)

PAGE: 1 LETTING: 09/23/11

CALL NO: 104

NO	ITEM 	DESCRIPTION	APPROXIMATE ( QUANTITY	:	UNIT PRICE	AMOUNT
	SECTION 0001					
0010	00001 	1 DGA BASE		TON		
0020	00020 	TRAFFIC BOUND BASE	250.000	TON		
0030	00212 	CL2 ASPH BASE 1.00D PG64-22	4,213.000	TON		
0040	00301	CL2 ASPH SURF 0.38D PG64-22 (REVISED: 9-15-11)	726.000	TON		
0050	02101 	CEM CONC ENT PAVEMENT-8 IN	51.000	SQYD		
	SECTION 0002	ROADWAY				
0060	00078 	CRUSHED AGGREGATE SIZE NO 2	1.000	TON		
0070	01000 	PERFORATED PIPE-4 IN	59.000	LF		
0080	01010 	NON-PERFORATED PIPE-4 IN	8.000	LF		
0090	01015 	INSPECT & CERTIFY EDGE DRAIN SYSTEM	( 1.00)	LS		
0100	01028 	PERF PIPE HEADWALL TY 3-4 IN	1.000	EACH		
0110	01310 	REMOVE PIPE	62.000	LF		
0120	01810 	STANDARD CURB AND GUTTER	1,516.000	LF		
0130	02014 	BARRICADE-TYPE III	10.000	EACH		
0140	  02091 	REMOVE PAVEMENT	2,426.000	SQYD		
0150	02159 	TEMP DITCH	2,310.000	LF		
0160	02223 	GRANULAR EMBANKMENT	510.000	CUYD		
0170	02230 	EMBANKMENT IN PLACE	35,380.000	CUYD		
0180	  02242 	WATER	4.000	MGAL		
0190	02351 	GUARDRAIL-STEEL W BEAM-S FACE	1,237.500	LF		

# KENTUCKY TRANSPORTATION CABINET DEPARTMENT OF HIGHWAYS FRANKFORT, KY 40622

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COUNTY: PENDLETON

PROPOSAL: BRO 5218 (004)

PAGE: 2 LETTING: 09/23/11 CALL NO: 104

LINE NO	ITEM 	DESCRIPTION	APPROXIMATE   QUANTITY	!	UNIT   PRICE	AMOUNT
0200	02360	GUARDRAIL TERMINAL SECTION NO 1	5.000	EACH		
0210	02367 	GUARDRAIL END TREATMENT TYPE 1	1.000	EACH		
0220	02378 	GUARDRAIL CONNECTOR TO BRIDGE END TY D	4.000	EACH		
0230	02397 	TEMP GUARDRAIL	737.500	LF		
0240	02429 	RIGHT-OF-WAY MONUMENT TYPE 1	35.000	EACH		
0250	02430	RIGHT-OF-WAY MONUMENT TYPE 1A	2.000	EACH		
0260	02432	WITNESS POST	6.000	EACH		
0270	02483	CHANNEL LINING CLASS II	513.000	TON		
0280	02484	CHANNEL LINING CLASS III	908.000	TON		
0290	02545 	CLEARING AND GRUBBING (14.5 ACRES)	( 1.00)	LS		
0300	02562 	SIGNS	391.000	SQFT		
0320	02585 	EDGE KEY	262.000	LF		
0330	02596 	FABRIC-GEOTEXTILE TYPE I	89.000	SQYD		
0340	02599 	FABRIC-GEOTEXTILE TYPE IV	1,389.000	SQYD		
0350	02600 	FABRIC GEOTEXTILE TY IV FOR PIPE	1,820.000	SQYD	2.00	3,640.00
0360	02650 		( 1.00)	LS		
0370	02701 	TEMP SILT FENCE	2,310.000	LF		
0380	02703 	SILT TRAP TYPE A	32.000	EACH		
0390	02704 	SILT TRAP TYPE B	24.000	EACH		
0400	  02705 	SILT TRAP TYPE C	18.000	EACH		
0410	02706 	CLEAN SILT TRAP TYPE A	96.000	EACH		

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COUNTY: PENDLETON

PROPOSAL: BRO 5218 (004)

PAGE: 3 LETTING: 09/23/11 CALL NO: 104

LINE NO	   ITEM 	DESCRIPTION	APPROXIMATE U QUANTITY	NIT	UNIT PRICE	AMOUNT
0420	02707 	CLEAN SILT TRAP TYPE B	72.000	EACH		   
0430	02708 	CLEAN SILT TRAP TYPE C	54.000	EACH		   
0440	02709 	CLEAN TEMP SILT FENCE	2,310.000	LF		   
0450	02720 	SIDEWALK-4 IN CONCRETE	843.000	SQYD		   
0460	02726 	STAKING	( 1.00)	LS		   
0470	02731 	REMOVE STRUCTURE	( 1.00)	LS		   
0480	03287 	SIDEWALK RAMP TYPE 1	9.000	EACH		   
0490	  03290 	SIDEWALK RAMP TYPE 4	2.000	EACH		   
0500	  05950 	EROSION CONTROL BLANKET	2,721.000	SQYD		   
0510	  05952 	TEMP MULCH	36,445.000	SQYD		   
0520	  05953 	TEMP SEEDING AND PROTECTION	36,445.000 	SQYD		   
0530	  05966 	TOPDRESSING FERTILIZER	3.000	TON		   
0540	05985 	SEEDING AND PROTECTION	43,221.000	SQYD		   
0550	  05989 	SPECIAL SEEDING CROWN VETCH	2,977.000	SQYD		   
0560	  05990 	SODDING	758.000	SQYD		   
0570	  06510 	PAVE STRIPING-TEMP PAINT-4 IN	3,272.000	LF		   
0580	  06514 	PAVE STRIPING-PERM PAINT-4 IN	   11,445.000 	LF		   
0590	  06549 	PAVE STRIPING-TEMP REM TAPE-B	300.000	LF		   
0600	  06550 	PAVE STRIPING-TEMP REM TAPE-W	3,900.000	LF		   
0610	  06551 	PAVE STRIPING-TEMP REM TAPE-Y	900.000	LF		   
0620	  06588 	PAVEMENT MARKER TY IVA-BY TEMP	22.000	EACH		   
				<u>-</u> -		

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APPROXIMATE UNIT UNIT AMOUNT QUANTITY PRICE LINE | ITEM DESCRIPTION QUANTITY NO \_\_\_\_\_\_ 0630 | 06591 PAVEMENT MARKER TYPE V-BY 58.000 EACH 0640 | 08019 CYCLOPEAN STONE RIP RAP 95.000 TON 0650 | 08100 CONCRETE-CLASS A 14.930 CUYD 0660 | 08150 STEEL REINFORCEMENT 452.000 LB 0670 | 10020NS FUEL ADJUSTMENT 7,923.000 DOLL 1.00| 7,923.00 0680 |10030NS 8,939.000 DOLL ASPHALT ADJUSTMENT 1.00 8,939.00 0690 |20099ES842 PAVE MARK TEMP PAINT STOP BAR 24.000 LF 0700 | 20205EC PAVE MARK STOP BAR-24 IN PAINT 115.000 LF 0710 |20209EP69 GRANULAR PILE CORE 230.000 CUYD 0720 23158ES505 DETECTABLE WARNINGS 80.000 SQFT 1,250.000 SQYD 0730 23274EN11F TURF REINFORCEMENT MAT 1 0740 | 23542EC ENHANCED SILT TRAP 1.000 EACH \_\_\_\_\_\_ CONTAINER PLANTINGS AND MULCH 1.100 ACRE 0750 | 23892EC 0760 | 23894EC BANK STABILIZATION WITH LIVE STAKING 580.000 SOYD 0770 | 24130EC SPILL CONTAINMENT AREA 2.000 EACH BANK STABILIZATION W/EXIST ROOT MATERIAL SECTION 0003 DRAINAGE -----0790 | 00440 ENTRANCE PIPE-15 IN 45.000 LF 0800 | 00445 ENTRANCE PIPE-30 IN 30,000 LF \_\_\_\_\_ 0810 | 00461 CULVERT PIPE-15 IN 53.000 LF 0820 | 00462 CULVERT PIPE-18 IN 160.000 LF

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PROPOSAL: BRO 5218 (004)

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CALL NO: 104 UNIT AMOUNT APPROXIMATE UNIT LINE | ITEM DESCRIPTION NO QUANTITY \_\_\_\_\_\_ 0830 | 00468 CULVERT PIPE-36 IN 90.000 LF 0840 | 00521 STORM SEWER PIPE-15 IN 26.000 LF STORM SEWER PIPE-18 IN 245.000 LF 0860 | 01456 CURB BOX INLET TYPE A 5.000 EACH 0870 | 01480 CURB BOX INLET TYPE B 2.000 EACH 0880 | 01490 DROP BOX INLET TYPE 1 1.000 EACH 0890 | 01496 DROP BOX INLET TYPE 3 1.000 EACH 0900 | 01577 DROP BOX INLET TYPE 14 1.000 EACH 0910 23131ER701 PIPELINE VIDEO INSPECTION 131.000 LF | SECTION 0004 BRIDGE 604.000 CUYD 0920 | 02231 STRUCTURE GRANULAR BACKFILL 0930 | 02998 MASONRY COATING 1,887.000 SQYD \_\_\_\_\_\_ ARMORED EDGE FOR CONCRETE 0940 | 03299 56.000 LF 0950 | 08001 STRUCTURE EXCAVATION-COMMON 660.000 CUYD 0960 | 08002 STRUCTURE EXCAV-SOLID ROCK 110.000 CUYD 0970 | 08019 240.000 TON CYCLOPEAN STONE RIP RAP 0980 | 08033 TEST PILES 95.000 LF 0990 | 08046 PILES-STEEL HP12X53 1,978.000 LF 1000 | 08094 PILE POINTS-12 IN 72.000 EACH 1010 | 08100 CONCRETE-CLASS A 641.500 CUYD 1020 | 08104 CONCRETE-CLASS AA 1,332.100 CUYD

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COUNTY: PENDLETON

LETTING: 09/23/11 PROPOSAL: BRO 5218 (004) CALL NO: 104

LINE NO	ITEM	DESCRIPTION	APPROXIMATE U	JNIT   	UNIT PRICE	AMOUNT
1030	08150	STEEL REINFORCEMENT	90,374.000	LB		
1040	08151 	STEEL REINFORCEMENT-EPOXY COATED	268,783.000	LB		
1050	08160 	STRUCTURAL STEEL (1,393,862 LBS.)	( 1.00)	LS		
1060	08170 	SHEAR CONNECTORS (9,029 LBS.)	( 1.00)	LS		
1070	08269 	ELECTRICAL CONDUIT	( 1.00)	LS		
1080	08500	APPROACH SLAB	156.000	SQYD		
1090	21342ED	FORM LINER	10,262.000	SQFT		
	SECTION 0005	SEWER				
1100	01052	SEWER PIPE-8 IN	346.000	LF		
1110	01103	DUCTILE IRON PIPE-16 IN	183.000	LF		
1120	03442 	DUCTILE IRON FITTINGS	1,870.000	LB		   
1130	20083NN 	CONNECT TO SERVICE	2.000	EACH		
1140	20708ND 	CUT AND PLUG 12 IN	2.000	EACH		
1150	21918NN 	MANHOLE-4 FT	6.000	EACH		
1160	21921EN 	MANHOLE-4 FT BARREL EXTENSION	36.000	VTFT		
1170	22785NN 	CONNECT TO FORCE MAIN-12 IN	2.000	EACH		
1180	23574EC 	RESTRAINED JOINT DIP,CL50 W/POLYWRP-12IN	90.000	LF		
1190	23716EC 	CONNECT TO NEW MANHOLE	11.000	EACH		
1200	24257EC 	DUCTILE IRON PIPE-RESTRAINED-18 IN	230.000	LF		
1210	24258EC 	DIP 12"-RESTRAINED IN 20" STEEL ENCASE	50.000	LF		   
1220	24259EC 	MANHOLE DROP CONNECTION	2.000	 EACH   		
	SECTION 0006	WATERLINE		<u>-</u>		

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CALL NO: 104

LINE NO	ITEM 	DESCRIPTION		APPROXIMATE UNIT	T   UNIT   PRICE	AMOUNT
1230	01071 	STEEL ENCASEMENT PIPE-14 IN		135.000 LF		
1240	03528 	GATE VALVE-8 IN		1.000 EAG	 Сн   	
1250	22186NN 	FLUSHING DEVICE-2 IN		1.000 EAC	 Сн   	
1260	22447NN 	CONNECT TO 8 IN		2.000 EAG	CH   	
1270	23917EC 	DUCTILE IRON PIPE	-RESTRAINED-8 IN	123.000 LF		
1280	24267EC 	DIP 8"-RESTRAINED	IN 14" STEEL ENCASE	135.000 LF		
	SECTION 0007	MOBILIZATION / DE	MOBILIZATION			
1290	02568 	MOBILIZATION	(NO MORE THAN 5%)	LUMP		
1300	02569 		(AT LEAST 1.5%)	LUMP		
		TOTAL BID				