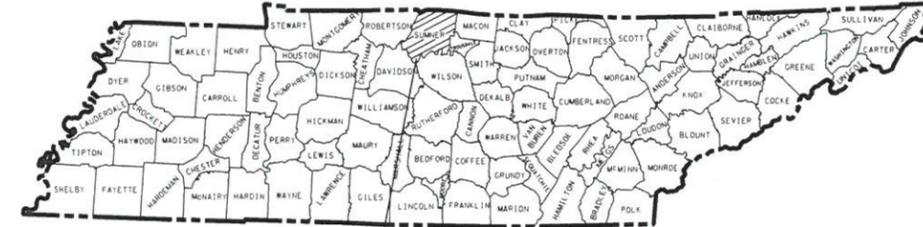


CITY OF GOODLETTSVILLE

INDEX OF SHEETS

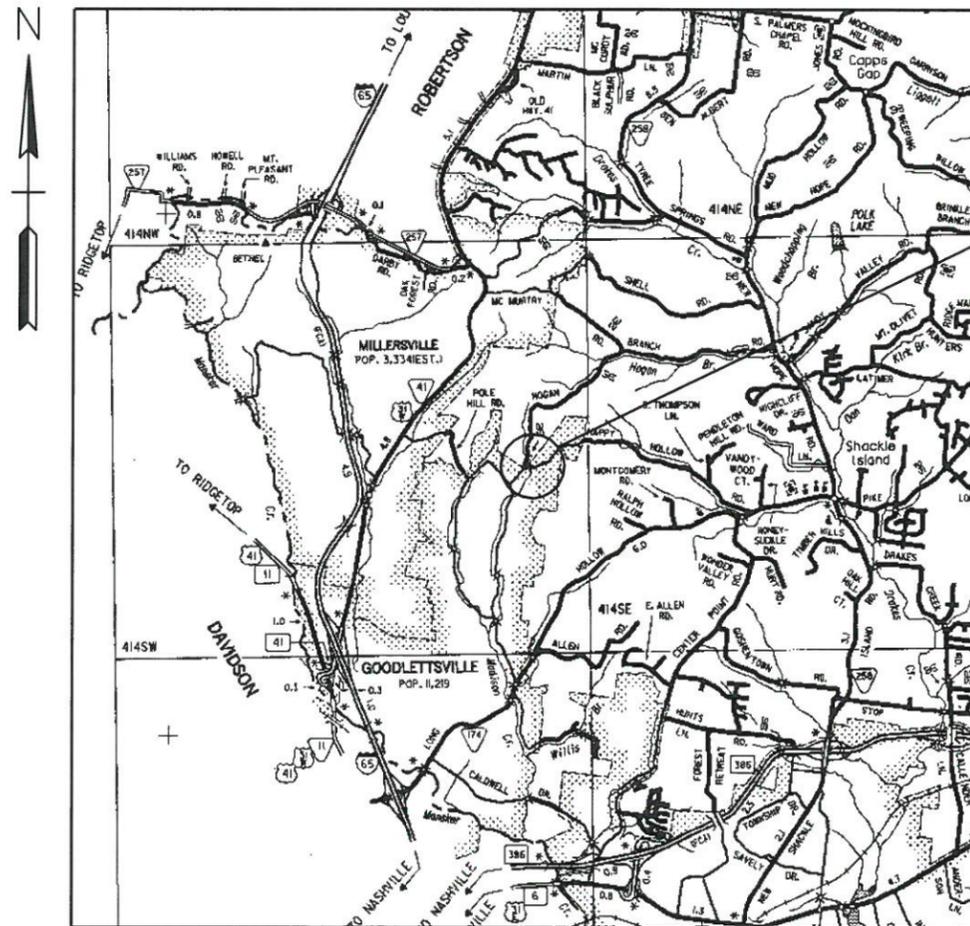
SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	TYPICAL SECTION & QUANTITIES
2A	GENERAL NOTES
2B	EROSION CONTROL SHEET
2C	TRAFFIC CONTROL SHEET
3	PRESENT & PROPOSED LAYOUT
3A	PROPOSED LAYOUT WITH PROFILE
4 TO 10	CULVERT DETAILS

HAPPY HOLLOW ROAD OVER MADISON CREEK SUMNER COUNTY, TENNESSEE



TN DEPT. OF TRANSPORTATION - STANDARD DRAWINGS

DWG. NO.	CURRENT REVISION DATE	TITLE
RD-A-1	12-18-99	STANDARD ABBREVIATIONS
RD-L-1	10-26-94	STANDARD LEGEND
RD-L-5	05-01-08	STANDARD LEGEND FOR EROSION AND SEDIMENT CONTROL
RD-L-6	03-30-10	STANDARD LEGEND FOR EROSION AND SEDIMENT CONTROL
RD01-S-11	04-04-03	DESIGN AND CONSTRUCTION DETAILS FOR ROADSIDE SLOPE DEVELOPMENT
RD01-S-11A	10-15-02	ROADSIDE DITCH DETAILS FOR DESIGN AND CONSTRUCTION
RD01-SE-3	10-15-02	RURAL SUPERELEVATION DETAILS
RD01-TS-1	02-05-16	DESIGN STANDARDS FOR LOCAL ROADS AND STREETS
T-S-9	06-10-14	LAYOUT-GROUND MOUNTED SIGNS
T-S-10	04-04-12	MOUNTING DETAILS-FLAT SHEET SIGNS, ALUMINUM-STEEL DESIGN
T-S-16	07-02-15	GROUND MOUNTED SIGN AND DETAILS
EC-STR-2	08-01-12	SEDIMENT FILTER BAGS
EC-STR-3D	04-01-08	ENHANCED SILT FENCE
EC-STR-3E	04-01-08	SILT FENCE FABRIC JOINING DETAILS
EC-STR-25	08-01-12	TEMPORARY CULVERT CROSSING, CONSTRUCTION EXIT, CONSTRUCTION FORD
EC-STR-31	08-01-12	TEMPORARY DIVERSION CHANNELS
EC-STR-31A	04-01-08	TEMPORARY DIVERSION CHANNELS DESIGN
STD-10-1	04-08-05	MISCELLANEOUS ABUTMENT AND DRAINAGE DETAILS



PROJECT LOCATION

PROJECT LOCATION
SUMNER COUNTY
TENNESSEE

CITY OFFICIALS

JOHN COOMBS.....MAYOR
GREG EDRINGTON.....CITY ENGINEER
TIM ELLIS.....CITY MANAGER

SCALE = 1" = 1 MILE

TRAFFIC DATA

ADT = 450
DESIGN SPEED = 30 MPH

SEE SHEET 4 FOR ALUMINUM BOX CULVERT DRAWINGS

NO.	DATE	BY	DESCRIPTION

CECOLLIER
ENGINEERING CO., INC.
CONSULTING-DESIGN-CONSTRUCTION

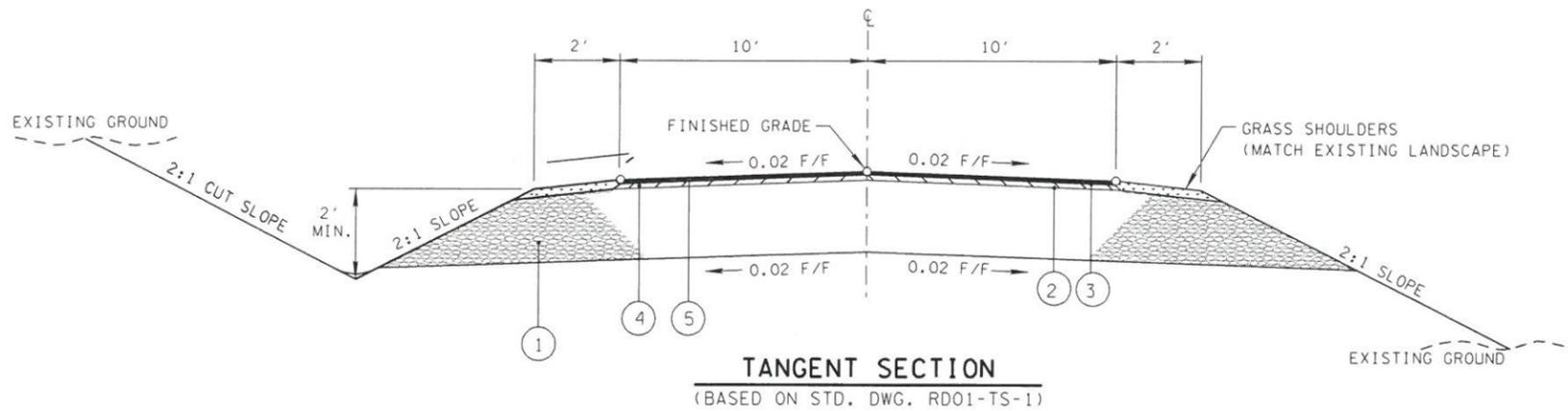
5560 FRANKLIN PIKE CIRCLE
BRENTWOOD, TN 37027
PHONE: (615) 331-1441 FAX: (615) 331-1050

TITLE SHEET
HAPPY HOLLOW ROAD
OVER MADISON CREEK
CITY OF GOODLETTSVILLE



DATE: 02/16/17
DESIGNED BY: JDS
DRAWN BY: ADD
SUPERVISED BY: JDS
CHECKED BY: JDS

DATE: 2017
SHEET NO: 1



TRAFFIC DATA
 ADT = 450
 DESIGN SPEED = 30 MPH

PROPOSED PAVEMENT SCHEDULE	
①	BASE STONE (8"± THICK) ITEM NO. 303-01 MINERAL AGGREGATE, TYPE A BASE, GRADING D
②	PRIME COAT ITEM NO. 402-01 BIT. MAT'L. FOR PRIME COAT (PC) @ 0.03-0.35 GAL./S.Y. ITEM NO. 402-02 AGGREGATE FOR COVER MAT'L. (PC) @ 8-12 LBS./S.Y.
③	TACK COAT ITEM NO. 403-01 BITUMINOUS MATERIAL FOR TACK COAT (TC) @ 0.02 GAL/SY ITEM NO. 403-02 ASPHALT CEMENT FOR TACK COAT (TC) @ 0.05 GAL/SY
④	BINDER (2½" THICK) ITEM NO. 307-01.08 ASPHALT CONCRETE MIX (PG64-22) (BPMB-HM) GRADING B-M2
⑤	SURFACE (1¼" THICK) ITEM NO. 411-01.10 ACS MIX (PG64-22) GRADING D

WORK TO BE PERFORMED BY CONTRACTOR

ESTIMATED ROADWAY QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QUANTITY
①	ROADWAY APPROACHES		
②	PAVING FOR ROADWAY APPROACHES		

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
① INCLUDES:			
201-01	CLEARING & GRUBBING	1	L.S.
203-01	ROAD AND DRAINAGE EXCAVATION (UNCLASSIFIED)	280	C.Y.
203-03	BORROW EXCAVATION (UNCLASSIFIED)	415	C.Y.
203-07	FURNISHING AND SPREADING TOPSOIL	90	C.Y.
303-01	MINERAL AGGREGATE TYPE A BASE, GRADING D	560	TONS
801-01	SEEDING (WITH MULCH)	10	UNITS
② INCLUDES:			
402-01	BITUMINOUS MATERIAL FOR PRIME COAT (PC)	2	TONS
402-02	AGGREGATE FOR COVER MATERIAL (PC)	6	TONS
* 403-01	BITUMINOUS MATERIAL FOR TACK COAT (TC)	1	TONS
* 403-02	ASPHALT CEMENT FOR TACK COAT (TC)	1	TONS
307-01.08	ASPHALT CONCRETE MIX (PG 64-22)	150	TONS
* 411-01.10	ACS MIX, GRADING "D"	70	TONS

NOTE: CITY TO MAINTAIN OWNERSHIP OF ALL SALVAGEABLE MATERIAL INCLUDING THE EXISTING CMP CULVERT.
 * DENOTES TO BE PERFORMED BY CITY OF GOODLETTSVILLE. THESE ARE NOT TO BE BID OR PERFORMED BY CONTRACTOR.

HAPPY HOLLOW ROAD
 OVER
 MADISON CREEK
 48.00 L.F. OF ALBC #8
 10'-2" x 2'-8"
 ALUMINUM BOX CULVERT
 SKEW 60°
 BR. LENGTH 11.74'
 ALONG CENTERLINE
 OF ROAD

WORK TO BE PERFORMED BY CONTRACTOR

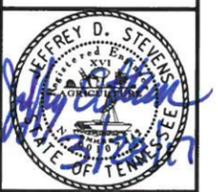
ESTIMATED BRIDGE & ROADWAY QUANTITIES			
ITEM NO.	DESCRIPTION	UNIT	QUANTITY
①	202-04.01 REMOVAL OF STRUCTURES (EXISTING CULVERTS)	L.S.	1
	209-08.03 TEMPORARY SILT FENCE (WITHOUT BACKING)	L.F.	400
	209-09.01 SAND BAGS	BAG	400
	209-09.02 TEMPORARY SEDIMENT FILTER BAG (14'-6" x 2'-0" x 13'-3")	BAG	1
	209-20.04 POLYETHYLENE SHEETING (10 MIL.)	S.Y.	200
②	303-01.02 GRANULAR BACKFILL (BRIDGES)	TON	450
④	604-03.01 CLASS A CONCRETE (BRIDGES)	C.Y.	45
④	604-03.02 STEEL BAR REINFORCEMENT (BRIDGES)	LB.	2,685
⑤	607-40.70 CORRUGATED ALUMINUM BOX CULVERT (ALBC #8)	L.F.	48
	709-05.06 MACHINED RIP-RAP (CLASS A-1)	TON	100
	710-09.01 6" PERF. PIPE W/ VERTICAL DRAIN SYSTEM	L.F.	88
	710-09.02 6" PIPE UNDERDRAIN	L.F.	40
	712-01 TRAFFIC CONTROL	L.S.	1

- ① EXISTING STRUCTURE CONSISTS OF 28.57 L.F. OF 72" CMP.
- ② GRANULAR BACKFILL SHALL BE CLASS "A" GRADING "D" MATERIAL. SEE STANDARD DRAWING STD-10-1.
- ③ GRANULAR BACKFILL TO BE USED AS PRIMARILY FILL MATERIAL AROUND THE ALUMINUM BOX CULVERT, EXCEPT WHERE OTHER MATERIAL IS NEEDED TO MATCH LANDSCAPING SUCH AS "UNCLASSIFIED" DIRT OR TOPSOIL.
- ④ ESTIMATED QUANTITY FOR HEADWALLS, WINGWALLS & FOOTINGS.
- ⑤ CONTECH ALUMINUM BOX CULVERT IS TO BE USED. FABRICATION, DELIVERY, AND INSTALLATION TO BE COORDINATED WITH CONTECH ENGINEERED SOLUTIONS.

NO.	DATE	BY	DESCRIPTION

CE COLLIER
 ENGINEERING CO., INC.
 CONSULTING-DESIGN-CONSTRUCTION
 5560 FRANKLIN PIKE, SUITE 300, BRENTWOOD, TN 37027
 PHONE: (615) 331-1441 FAX: (615) 331-1050

TYPICAL SECTION AND QUANTITIES
 HAPPY HOLLOW ROAD
 OVER MADISON CREEK
 CITY OF GOODLETTSVILLE



DATE: 02/16/17
 DESIGNED BY: JDS
 DRAWN BY: ADD
 SUPERVISED BY: JDS
 CHECKED BY: JDS
 DATE: 2017
 SHEET NO: 2

GENERAL NOTES

SPECIFICATIONS

- (1) ALL WORK SHALL BE IN ACCORDANCE WITH THE STANDARD ROAD AND BRIDGE CONSTRUCTION SPECIFICATIONS OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION (JANUARY 1, 2015 EDITION).

DESIGN SPECIFICATIONS

- (2) "AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS" 7TH EDITION (2014), AND THE 2011 AASHTO GUIDE SPECIFICATIONS FOR LRFD SEISMIC BRIDGE DESIGN, EDITION 2 (WITH INTERIMS).
- (3) CONTECH ENGINEERED SOLUTIONS, STRUCTURAL PLATE DESIGN GUIDE - 6TH EDITION.

UNIT PRICES

- (4) THE UNIT PRICES BID SHALL INCLUDE ALL MATERIALS, LABOR, EQUIPMENT, INSURANCE, OVERHEAD AND PROFIT FOR THE COMPLETE INSTALLATION OF THE ITEM. THE UNIT PRICES WILL NOT BE INCREASED OR DECREASED SHOULD A SIGNIFICANT VARIATION IN QUANTITIES OCCUR.

UTILITIES

- (5) UNLESS OTHERWISE NOTED, ALL UTILITY ADJUSTMENTS WILL BE PERFORMED BY THE UTILITY OR ITS REPRESENTATIVE. THE CONTRACTOR AND UTILITY OWNERS WILL BE REQUIRED TO COOPERATE WITH EACH OTHER IN ORDER TO EXPEDITE THE WORK REQUIRED BY THIS CONTRACT.
- (6) LOCATIONS OF UTILITIES SHOWN ON THESE PLANS ARE APPROXIMATE ONLY AND SOME UTILITIES MAY NOT APPEAR ON THE PLANS. THE CONTRACTOR WILL BE RESPONSIBLE FOR CALLING TENNESSEE ONE CALL SYSTEM AT 1-800-351-1111, THREE DAYS PRIOR TO ANY CONSTRUCTION OR EXCAVATION SO THAT UTILITY COMPANIES CAN LOCATE THEIR UTILITIES IN THE FIELD.

TRAFFIC CONTROL

- (7) THE CONTRACTOR SHALL PROVIDE ADEQUATE SIGNS AND/OR BARRICADES AS REQUIRED TO PROVIDE FOR THE SAFETY OF THE TRAVELING PUBLIC. TRAFFIC CONTROL DEVICES SHALL MEET THE REQUIREMENTS OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD). ALL COSTS TO BE INCLUDED IN THE UNIT PRICE BID ITEM NO. 712-01, TRAFFIC CONTROL.

APPROACH CONSTRUCTION

- (8) APPROACH CONSTRUCTION WILL BE PERFORMED BY THE CONTRACTOR.
- (9) IF ROCK IS USED IN APPROACH FILL CONSTRUCTION, THE ROCK FILL WILL BE CAPPED WITH COMMON EXCAVATION OR COMMON BORROW EXCAVATION A MINIMUM OF FOUR (4) FEET THICK WHERE GUARDRAIL IS TO BE INSTALLED.
- (10) MINERAL AGGREGATE FOR STRUCTURAL BACKFILL SHALL BE FURNISHED AND PLACED BY THE CONTRACTOR IN ACCORDANCE WITH T.D.O.T. STANDARD DRAWING STD-10-1, MISCELLANEOUS ABUTMENT AND DRAINAGE DETAILS.

CONCRETE CONSTRUCTION

- (11) FALSEWORK AND SUPPORTS UNDER CONCRETE IN STRUCTURES MAY BE RELEASED AND REMOVED WHEN REPRESENTATIVE SPECIMENS OF THE CONCRETE CURED BY THE METHODS AND IN THE MANNER IN WHICH THE CONCRETE THE SPECIMENS REPRESENT IS CURED ATTAIN A COMPRESSIVE STRENGTH OF AT LEAST 3000 P.S.I. IN ADDITION TO THE ABOVE REQUIREMENTS, THE CONCRETE SHALL HAVE BEEN PLACED A MINIMUM OF SEVEN DAYS NOT COUNTING THE DAYS OF TWENTY-FOUR (24) HOURS EACH IN WHICH THE TEMPERATURE FALLS BELOW FORTY (40) DEGREES FARENHEIT, OR TWENTY-ONE (21) CALENDAR DAYS, WHICHEVER OCCURS FIRST. AFTER THESE CONDITIONS HAVE BEEN MET, SEE SECTION 604.19 OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION'S "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" FOR ADDITIONAL DETAILS.

CULVERT EXCAVATION

- (12) ALL CULVERT EXCAVATION REQUIRED FOR CONSTRUCTION OF THIS PROJECT WILL BE PERFORMED BY THE CONTRACTOR. THE COST OF CULVERT EXCAVATION IS TO BE INCLUDED IN THE UNIT PRICES BID FOR OTHER ITEMS OF CONSTRUCTION.
- (13) UPON COMPLETION OF THE PROJECT, A VISUAL INSPECTION SHALL REVEAL THAT APPROXIMATELY 50% OF THE SURFACE AREA CONSISTS OF STONES NO SMALLER THAN ONE-HALF (1/2) OF THE MAXIMUM SIZE SPECIFIED.

CONCRETE AND STEEL

- (14) ALL SUBSTRUCTURE CONCRETE TO BE CLASS "A", f'c=3000 P.S.I. REINFORCING STEEL TO BE ASTM A615, (GRADE 60).
- (15) STANDARD CRSI HOOK DETAILS APPLY UNLESS OTHERWISE NOTED ON THE BILL OF STEEL. SPACING DIMENSIONS ARE CENTER TO CENTER AND COVER DIMENSIONS ARE CLEAR DISTANCE UNLESS OTHERWISE NOTED. PLACING TOLERANCES ARE PLUS OR MINUS ONE-HALF (1/2) INCH FOR SPACING AND MINUS ONE-EIGHTH (1/8) INCH OR PLUS THREE-EIGHTHS (3/8) INCH FOR COVER.

FIELD LAYOUT OF CULVERT

- (16) IT SHALL BE THE RESPONSIBILITY OF THE CITY ENGINEER TO ESTABLISH FIELD CONTROL POINTS AND PROVIDE INITIAL CULVERT LAYOUT. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE THE NECESSARY LINES AND GRADES OF THE WORK BASED ON DATA ON THE PLANS AND CONTROL POINTS ESTABLISHED BY THE CITY ENGINEER. SUCH LAYOUT SHALL BE DONE IN A WORKMAN LIKE MANNER AND COPIES OF THE FIELD NOTES FURNISHED TO THE CITY ENGINEER. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN AND PRESERVE ALL STAKES AND OTHER MARKERS ESTABLISHED BY THE CITY ENGINEER UNTIL AUTHORIZED TO REMOVE THEM. IF SUCH MARKERS ARE DESTROYED BY THE CONTRACTOR OR THROUGH ITS NEGLIGENCE, PRIOR TO THEIR AUTHORIZED REMOVAL, THEY SHALL BE REPLACED BY THE CITY ENGINEER AT HIS DISCRETION. THE EXPENSE OF THIS REPLACEMENT WILL BE BILLED TO THE CONTRACTOR AT THE CITY ENGINEER'S NORMAL RATE FOR THIS TYPE WORK. ALL CONSTRUCTION STAKES ESTABLISHED BY THE CONTRACTOR SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE CITY ENGINEER.

CONSTRUCTION INSPECTION

- (17) THE CONTRACTOR SHALL NOTIFY THE CITY ENGINEER AT LEAST FORTY EIGHT (48) HOURS PRIOR TO PLACEMENT OF CONCRETE IN ANY PART OF THE STRUCTURE. THE ENGINEER WILL SECURE PHOTOGRAPHS OF ALL REINFORCING STEEL AND CHECK SPACING AND CLEARANCES PRIOR TO THE PLACING OF CONCRETE.

CLEARING AND GRUBBING

- (18) CLEARING AND GRUBBING TO BE PERFORMED BY THE CONTRACTOR. ALL COSTS TO BE INCLUDED IN THE UNIT PRICE ITEM NO. 201-01, CLEARING & GRUBBING.

RIP-RAP

- (19) MACHINED RIP-RAP (CLASS A-1) SHALL VARY IN SIZE FROM 2" TO 1'- 3".THE STONE SIZES SHALL BE DISTRIBUTED UNIFORMLY THROUGHOUT THE SIZE RANGE WITH NO MORE THAN 20% OF THE MATERIAL (BY WEIGHT) LESS THAN 4". THE THICKNESS OF THE STONE LAYER SHALL BE 1'- 6" (+/- 3").

NO	DATE	BY	DESCRIPTION

CE COLLIER
ENGINEERING CO., INC.
CONSULTING-DESIGN-CONSTRUCTION

5560 FRANKLIN PIKE CIRCLE BRENTWOOD, TN 37027
PHONE: (615) 331-1441 FAX: (615) 331-1050

GENERAL NOTES

HAPPY HOLLOW ROAD
OVER MADISON CREEK
CITY OF GOODLETTSVILLE



DATE: 02/16/17
DESIGNED BY: JDS
DRAWN BY: ADD
SUPERVISED BY: JDS
CHECKED BY: JDS

DATE: 2017
SHEET NO: 2A

POLLUTION CONTROL

THE CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO CONTROL EROSION AND WATER POLLUTION THROUGHOUT THE CONSTRUCTION PERIOD. ALL TEMPORARY EROSION CONTROL DEVICES SHALL BE IN PLACE BEFORE EARTH MOVING OPERATIONS BEGIN. CLEARING AND GRUBBING WILL BE HELD TO THE MINIMUM WIDTH NECESSARY TO ACCOMMODATE ROADWAY SLOPES AND BRIDGE CONSTRUCTION. EMBANKMENTS AND EXCAVATED AREAS WILL BE PROMPTLY STABILIZED TO MINIMIZE EROSION. BALED HAY AND STRAW AND/OR SILT FENCES SHALL BE USED ALONG THE TOE OF FILL SLOPES, IN DITCHES OR AT OTHER LOCATIONS WHERE EROSION IS A PROBLEM AND SILT DUE TO SURFACE WATER RUNOFF COULD BE DEPOSITED IN THE STREAM OR ONTO ADJACENT PROPERTIES.

ANY STOCKPILED TOPSOIL, EMBANKMENT MATERIAL OR CRUSHED STONE WILL BE LOCATED AND TREATED IN SUCH MANNER AS TO PREVENT SILT FROM BEING DEPOSITED IN THE STREAM OR ONTO ADJACENT PROPERTIES. ALL WASTE MATERIAL WILL BE DISPOSED OF ABOVE HIGHWATER AND TREATED IN A LIKE MANNER.

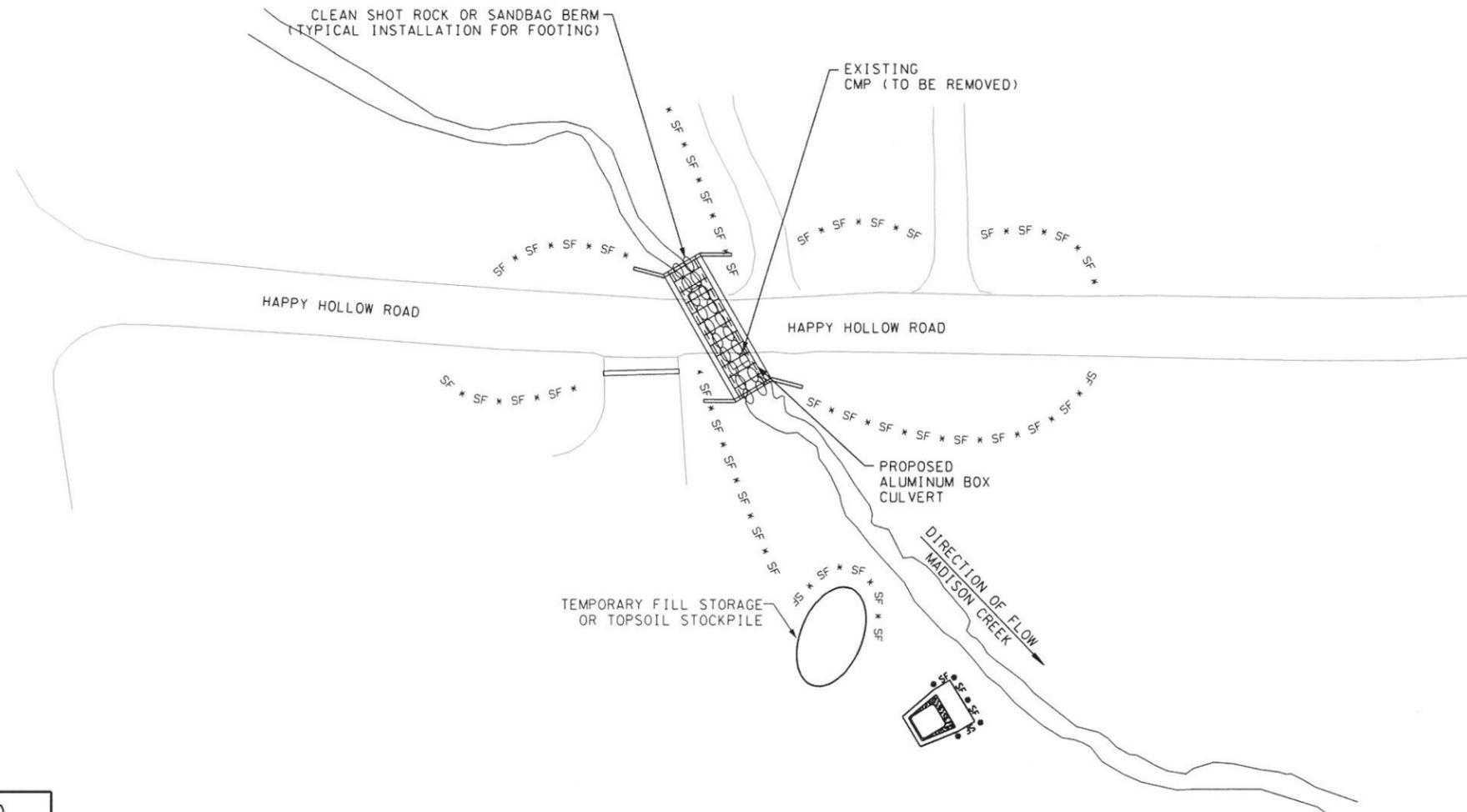
NO EARTH OR OTHER ERODIBLE MATERIAL WILL BE USED TO DIVERT STREAM FLOW OR CONSTRUCT COFFER DAMS. CLEAN SHOT ROCK WITH NO FINES OR PORTABLE CONCRETE MEDIAN BARRIERS WILL BE USED TO DIVERT STREAM FLOW WHEN NECESSARY FOR SUBSTRUCTURE CONSTRUCTION. SHEET PILING WILL BE USED TO CONSTRUCT COFFERDAMS. WATER ISOLATED BY DIVERSION DAMS, COFFER DAMS, OR FOOTINGS WILL NOT BE PUMPED DIRECTLY INTO THE STREAM, BUT SUCH WATER WILL BE PUMPED INTO SEDIMENT BASINS, SEDIMENT FILTER BAGS, OR TEMPORARY DE-WATERING STRUCTURES LOCATED AWAY FROM THE STREAM. SILT WILL BE REMOVED FROM TEMPORARY EROSION CONTROL STRUCTURES AS REQUIRED DURING CONSTRUCTION. UPON COMPLETION OF CONSTRUCTION, ALL TEMPORARY EROSION CONTROL STRUCTURES WILL BE REMOVED AND THE AREAS STABILIZED.

DURING SEDIMENT REMOVAL, THE CONTRACTOR SHALL TAKE CARE TO INSURE THAT STRUCTURAL COMPONENTS OF EROSION CONTROL STRUCTURES ARE NOT DAMAGED AND THUS MADE INEFFECTIVE. IF DAMAGE DOES OCCUR, THE CONTRACTOR SHALL REPAIR THE STRUCTURES AT THE CONTRACTOR'S OWN EXPENSE.

ALL COSTS OF TEMPORARY POLLUTION CONTROL MEASURES SHALL BE INCLUDED IN THE UNIT PRICES BID FOR ITEMS IN THE 209 SERIES.

ANY MONETARY FINES OR PENALTIES INCURRED BY THE CITY FOR LACK OF EROSION CONTROL PLACEMENT AND MAINTENANCE BY THE CONTRACTOR WILL BE DEDUCTED FROM THE CONTRACTOR'S PAYMENT FOR WORK PERFORMED ON THE PROJECT.

ANY WORK WITHIN THE STREAM CHANNEL AREA (E.G. FOR PIER FOOTING, RIP-RAP PLACEMENT, MULTI-BARREL CULVERT/BRIDGE CONSTRUCTION, ETC.) SHALL BE SEPARATED FROM FLOWING WATER OR EXPECTED FLOW PATH AND PERFORMED DURING LOW FLOW CONDITIONS. ALL ITEMS USED WITHIN THE STREAM CHANNEL AREA FOR DIVERSION OF FLOW (OR EXPECTED FLOW), UNLESS SPECIFIED IN THE PLANS, SHALL NOT BE PAID FOR DIRECTLY BUT SHALL BE INCLUDED IN THE COST OF OTHER ITEMS. THIS NOTE EXCLUDES ANY ITEMS SPECIFIED IN THE PLANS FOR THE TEMPORARY DIVERSION CHANNELS, EC-STR-31 AND TEMPORARY DIVERSION CULVERTS, EC-STR-32 FOR SINGLE BARREL CULVERT CONSTRUCTION.



EROSION CONTROL LEGEND		
SYMBOL	ITEM	STD. DWG.
* SF * SF * SF *	TEMPORARY SILT FENCE	EC-STR-3B
	TEMPORARY SEDIMENT FILTER BAG	EC-STR-2

TYPICAL EROSION CONTROL DETAIL

(NOT TO SCALE)

NOTE: SANDBAGS TO BE USED AROUND FOOTING AREA DURING CONSTRUCTION TO DIVERT FLOW AND PROVIDE POLLUTION CONTROL.

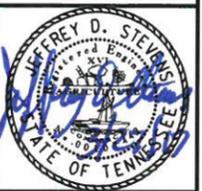
NOTE: SILT FENCE TO BE ADJUSTED TO EXISTING SITE CONDITIONS.

NO.	DATE	BY	DESCRIPTION

CE COLLIER
 ENGINEERING CO., INC.
 CONSULTING-DESIGN-CONSTRUCTION

5560 FRANKLIN PIKE CIRCLE
 BRENTWOOD, TN 37027
 PHONE: (615) 331-1441 FAX: (615) 331-1050

EROSION CONTROL SHEET
 HAPPY HOLLOW ROAD
 OVER MADISON CREEK
 CITY OF GOODLETTSVILLE



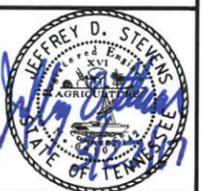
DATE: 02/16/17
 DESIGNED BY: JDS
 DRAWN BY: ADD
 SUPERVISED BY: JDS
 CHECKED BY: JDS

DATE: 2017
 SHEET NO: 2B

NO	DATE	BY	DESCRIPTION

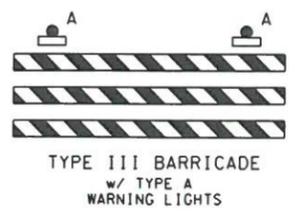
CE COLLIER
ENGINEERING CO., INC.
CONSULTING-DESIGN-CONSTRUCTION
5560 FRANKLIN PIKE CIRCLE BRENTWOOD, TN 37027
PHONE: (615) 331-1441 FAX: (615) 331-1050

TRAFFIC CONTROL SHEET
HAPPY HOLLOW ROAD
OVER MADISON CREEK
CITY OF GOODLETTSVILLE

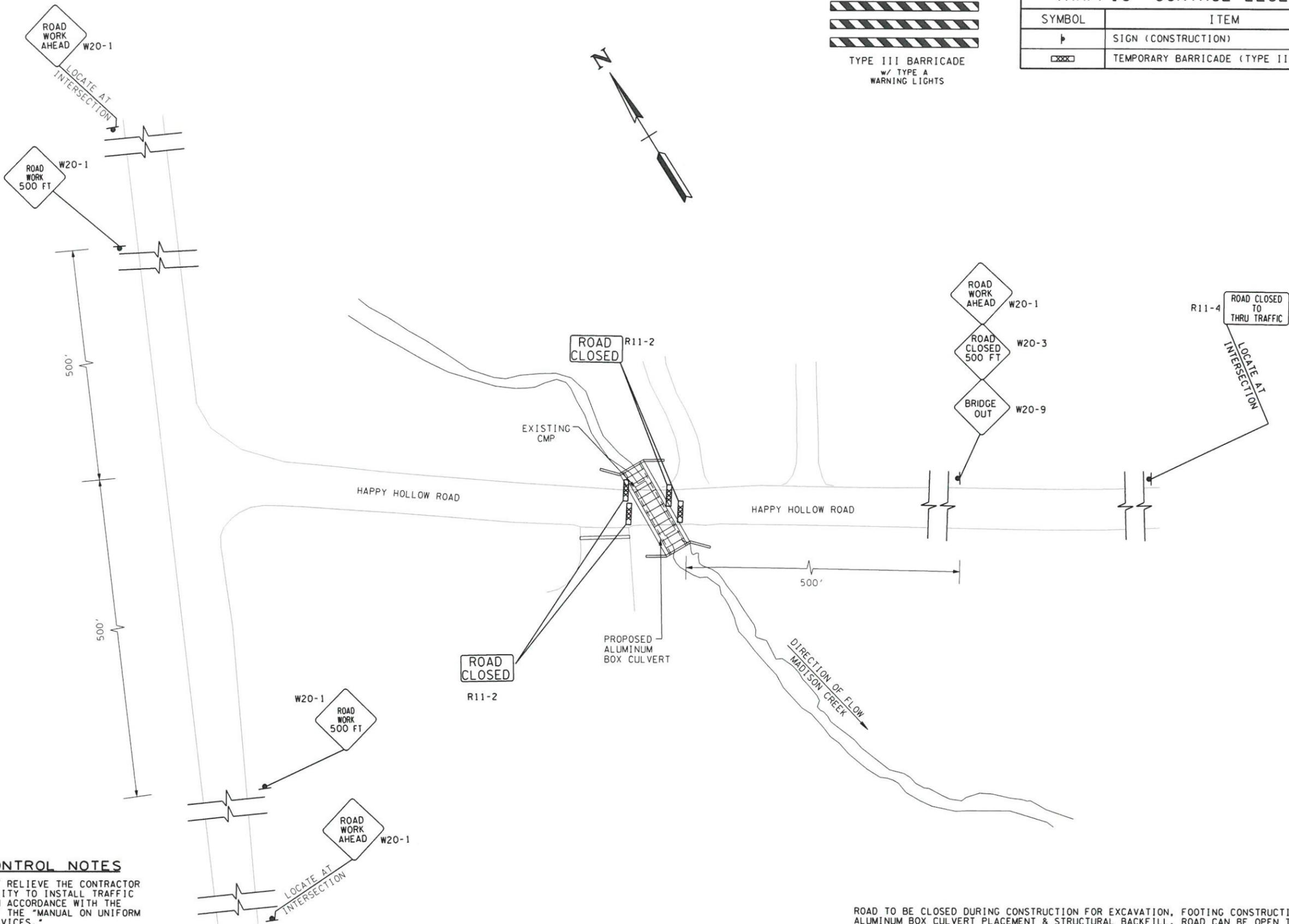


DATE: 02/16/17
DESIGNED BY: JDS
DRAWN BY: ADD
SUPERVISED BY: JDS
CHECKED BY: JDS

DATE: 2017
SHEET NO: 2C



TRAFFIC CONTROL LEGEND	
SYMBOL	ITEM
▶	SIGN (CONSTRUCTION)
⊠	TEMPORARY BARRICADE (TYPE III)



TRAFFIC CONTROL NOTES
THIS PLAN DOES NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY TO INSTALL TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH THE CURRENT EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES."
NO WORK SHALL BEGIN UNTIL ALL SIGNS AND BARRICADES ARE IN PLACE.

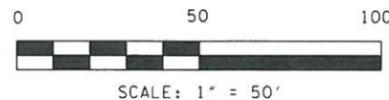
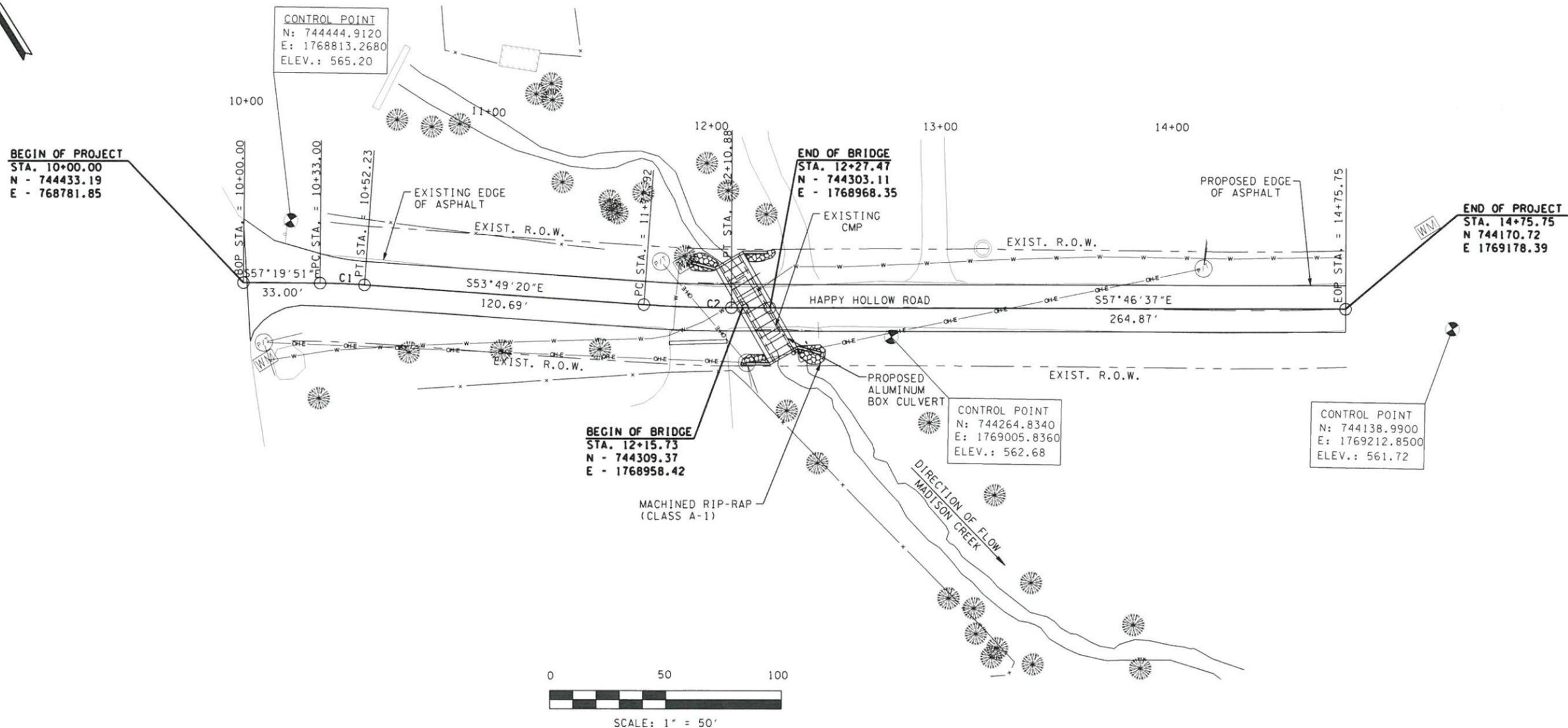
TYPICAL TRAFFIC CONTROL DETAIL
(NOT TO SCALE)

ROAD TO BE CLOSED DURING CONSTRUCTION FOR EXCAVATION, FOOTING CONSTRUCTION, ALUMINUM BOX CULVERT PLACEMENT & STRUCTURAL BACKFILL. ROAD CAN BE OPEN TO TRAFFIC DURING CONSTRUCTION OF HEADWALLS & WINGWALLS.

NOTE: THE CONTRACTOR WILL BE RESPONSIBLE FOR CALLING TENNESSEE ONE CALL SYSTEM AT 1-800-351-1111, THREE DAYS PRIOR TO ANY CONSTRUCTION ACTIVITIES OR EXCAVATION. LOCATIONS OF UTILITIES SHOWN ARE APPROXIMATE ONLY AND SOME UTILITIES MAY NOT BE SHOWN ON THE PLANS.

CURVE NUMBER	1
DELTA ANGLE	03°40'17"
DEGREE OF CURVE - ARC	19°05'55"
DEGREE OF CURVE - CHORD	19°11'17"
CHORD DIRECTION	S55°39'29"E
EXTERNAL TANGENT	9.62
RADIUS	300
CURVE LENGTH	19.22
CHORD LENGTH	19.22
EXTERNAL SECANT	0.15
MID-ORDINATE	0.15

CURVE NUMBER	2
DELTA ANGLE	03°57'17"
DEGREE OF CURVE - ARC	10°25'03"
DEGREE OF CURVE - CHORD	10°25'54"
CHORD DIRECTION	S55°47'59"E
EXTERNAL TANGENT	18.99
RADIUS	550
CURVE LENGTH	37.96
CHORD LENGTH	37.96
EXTERNAL SECANT	0.33
MID-ORDINATE	0.33



DESIGN SPEED = 30 MPH
ADT = 450

EXISTING: 72" CMP CULVERT (58° SKEW)
PROPOSED: ALBC #8 10'-2" X 2'-8" ALUMINUM BOX CULVERT (60° SKEW)

NO.	DATE	DESCRIPTION

CE COLLIER
ENGINEERING CO., INC.
CONSULTING-DESIGN-CONSTRUCTION

5560 FRANKLIN PIKE CIRCLE BRENTWOOD, TN 37027
PHONE: (615) 331-1441 FAX: (615) 331-1050

PRESENT & PROPOSED LAYOUT
HAPPY HOLLOW ROAD
OVER MADISON CREEK
CITY OF GOODLETTSVILLE



DATE: 02/16/17
DESIGNED BY: JDS
DRAWN BY: ADD
SUPERVISED BY: JDS
CHECKED BY: JDS

DATE: 2017
SHEET NO: 3

CURVE NUMBER	1
DELTA ANGLE	03°40'17"
DEGREE OF CURVE - ARC	19°05'55"
DEGREE OF CURVE - CHORD	19°11'17"
CHORD DIRECTION	S55°39'29"E
EXTERNAL TANGENT	9.62
RADIUS	300
CURVE LENGTH	19.22
CHORD LENGTH	19.22
EXTERNAL SECANT	0.15
MID-ORDINATE	0.15

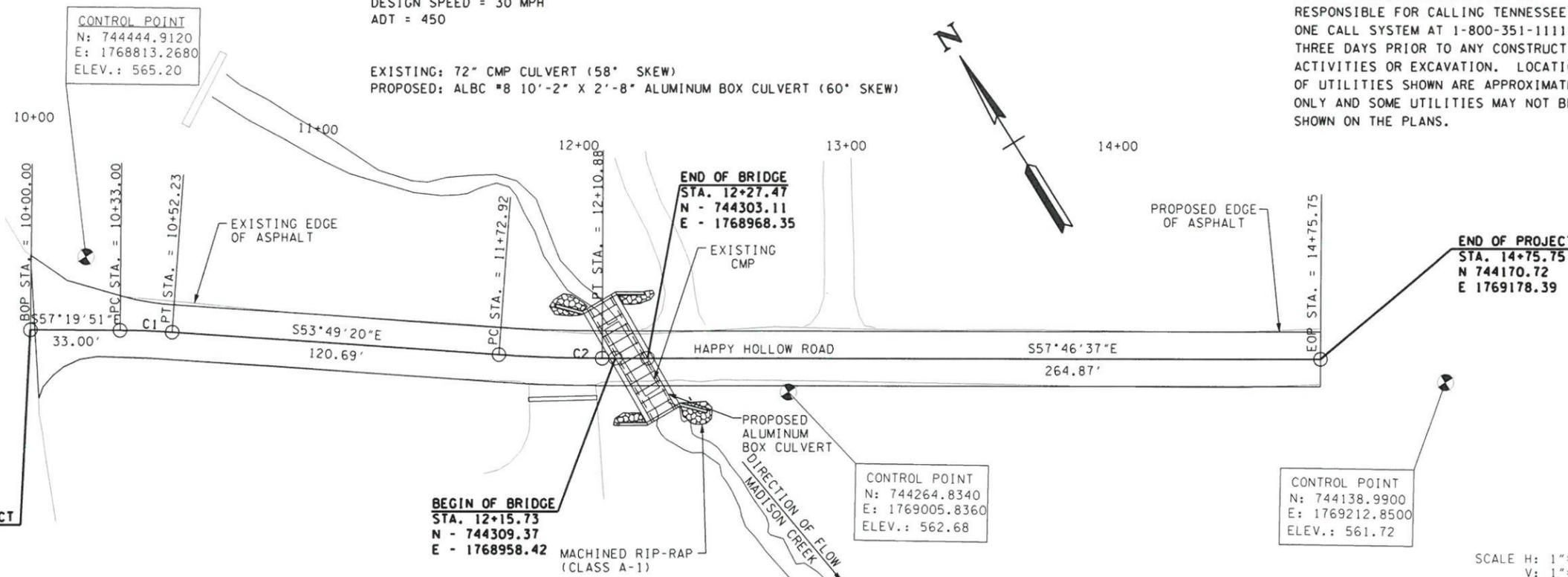
CURVE NUMBER	2
DELTA ANGLE	03°57'17"
DEGREE OF CURVE - ARC	10°25'03"
DEGREE OF CURVE - CHORD	10°25'54"
CHORD DIRECTION	S55°47'59"E
EXTERNAL TANGENT	18.99
RADIUS	550
CURVE LENGTH	37.96
CHORD LENGTH	37.96
EXTERNAL SECANT	0.33
MID-ORDINATE	0.33

BEGIN OF PROJECT
 STA. 10+00.00
 N - 744433.19
 E - 768781.85

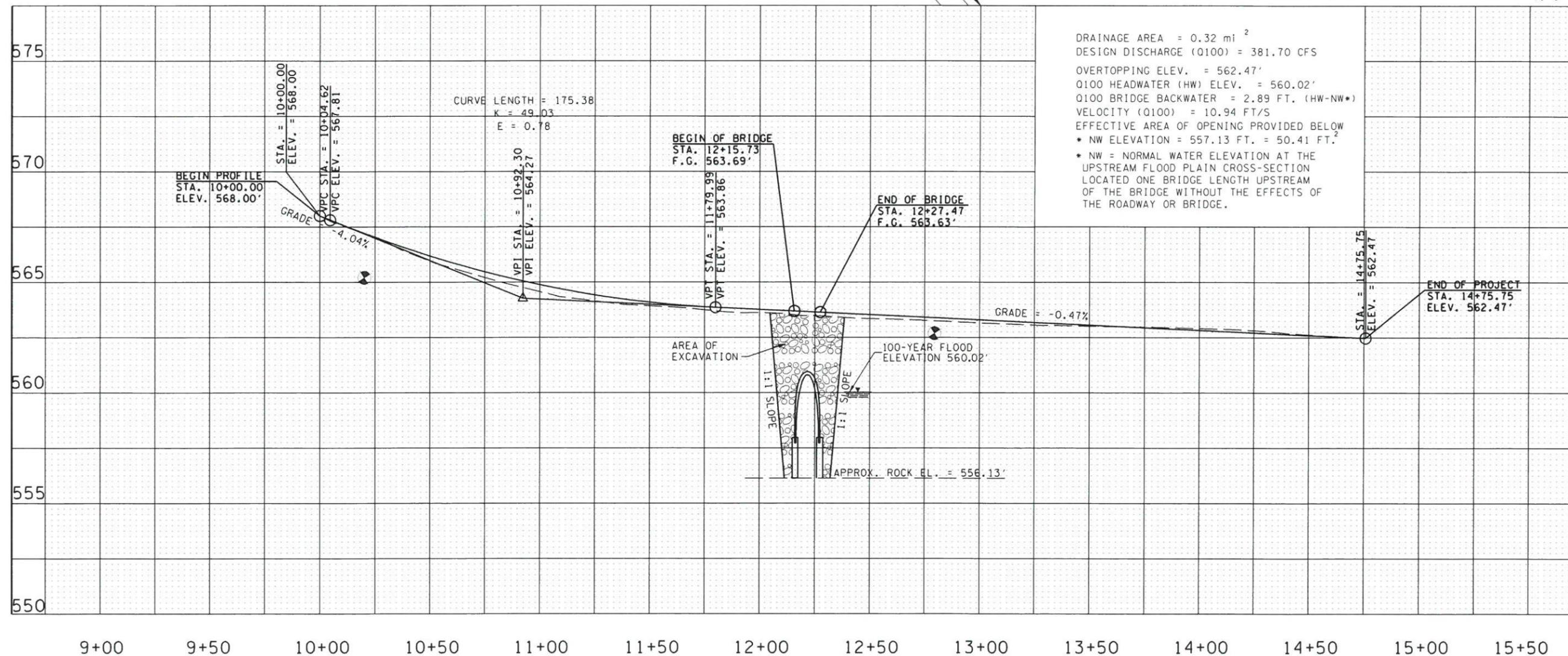
DESIGN SPEED = 30 MPH
 ADT = 450

EXISTING: 72" CMP CULVERT (58° SKEW)
 PROPOSED: ALBC #8 10'-2" X 2'-8" ALUMINUM BOX CULVERT (60° SKEW)

NOTE: THE CONTRACTOR WILL BE RESPONSIBLE FOR CALLING TENNESSEE ONE CALL SYSTEM AT 1-800-351-1111, THREE DAYS PRIOR TO ANY CONSTRUCTION ACTIVITIES OR EXCAVATION. LOCATIONS OF UTILITIES SHOWN ARE APPROXIMATE ONLY AND SOME UTILITIES MAY NOT BE SHOWN ON THE PLANS.



SCALE H: 1"=50'
 V: 1"=5'



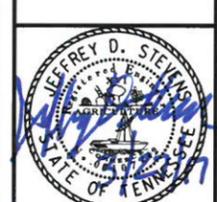
DRAINAGE AREA = 0.32 mi²
 DESIGN DISCHARGE (Q100) = 381.70 CFS
 OVERTOPPING ELEV. = 562.47'
 Q100 HEADWATER (HW) ELEV. = 560.02'
 Q100 BRIDGE BACKWATER = 2.89 FT. (HW-NW*)
 VELOCITY (Q100) = 10.94 FT/S
 EFFECTIVE AREA OF OPENING PROVIDED BELOW
 * NW ELEVATION = 557.13 FT. = 50.41 FT.²
 * NW = NORMAL WATER ELEVATION AT THE UPSTREAM FLOOD PLAIN CROSS-SECTION LOCATED ONE BRIDGE LENGTH UPSTREAM OF THE BRIDGE WITHOUT THE EFFECTS OF THE ROADWAY OR BRIDGE.

NO.	DATE	BY	DESCRIPTION

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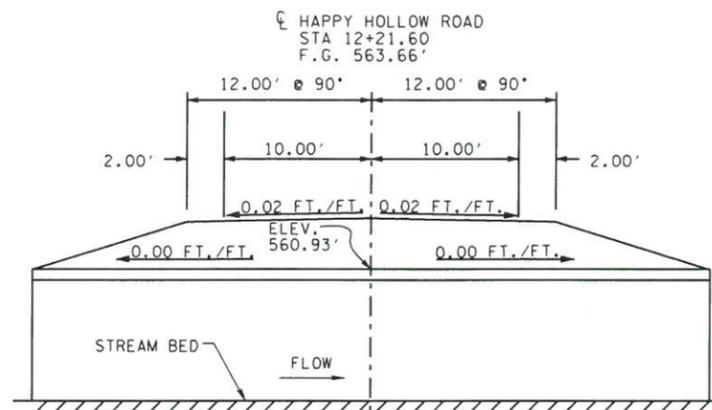
5560 FRANKLIN PIKE CIRCLE BRENTWOOD, TN 37027
 PHONE: (615) 351-1441 FAX: (615) 351-1050

PROPOSED LAYOUT WITH PROFILE
 HAPPY HOLLOW ROAD
 OVER MADISON CREEK
 CITY OF GOODLETTSVILLE



DATE: 02/16/17
 DESIGNED BY: JDS
 DRAWN BY: ADD
 SUPERVISED BY: JDS
 CHECKED BY: JDS

DATE: 2017
 SHEET NO: 3A



STATION 12+21.60
 STRUCTURE 48.00 L.F. OF ALBC #8
 10'-2" X 2'-8"
 ALUMINUM BOX CULVERT
 SKEW 60°

BRIDGE CROSS-SECTION

LOOKING FORWARD ON SURVEY
 (NOT TO SCALE)

INDEX OF STRUCTURAL DRAWINGS

- 4.....ALUMINUM BOX CULVERT DETAILS
- 5.....FOUNDATION DETAILS
- 6.....HEADWALL DETAILS
- 7.....WINGWALL DETAILS
- 8.....WINGWALL DETAILS
- 9.....STRUCTURAL NOTES
- 10.....BILL OF STEEL

**INDEX OF SPECIFICATIONS
 FOR ALUMINUM BOX CULVERT**

CONTECH ENGINEERED SOLUTIONS - DRAWINGS

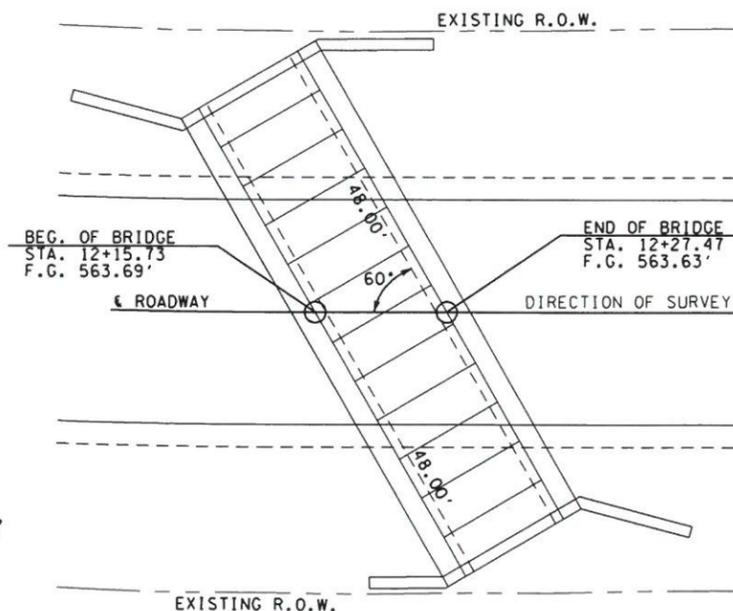
- 1) ALBC #8.....PLAN VIEW (WINGWALLS VARY)
- 2) ALBC #8.....CROSS SECTION A-A
- 8) ALBC #8.....SPECIFICATIONS FOR ALUMINUM BOX CULVERT #1-87
- 9) ALBC #8.....STRUCTURAL BACKFILL NOTES

NOTE: THESE DRAWINGS ARE TO BE PRINTED WITH PLANS

ESTIMATED QUANTITIES

ITEM	CONCRETE (C.Y.)	REINF. STEEL (LBS.)
① FOOTINGS	18	1,165
HEADWALLS	7	530
② WINGWALLS	25	990
TOTAL	45	2,685

- ① INCLUDES BOX CULVERT FOOTER QUANTITIES. DOES NOT INCLUDE WING FOOTERS.
- ② INCLUDES WING FOOTERS



BRIDGE LAYOUT
 (NOT TO SCALE)

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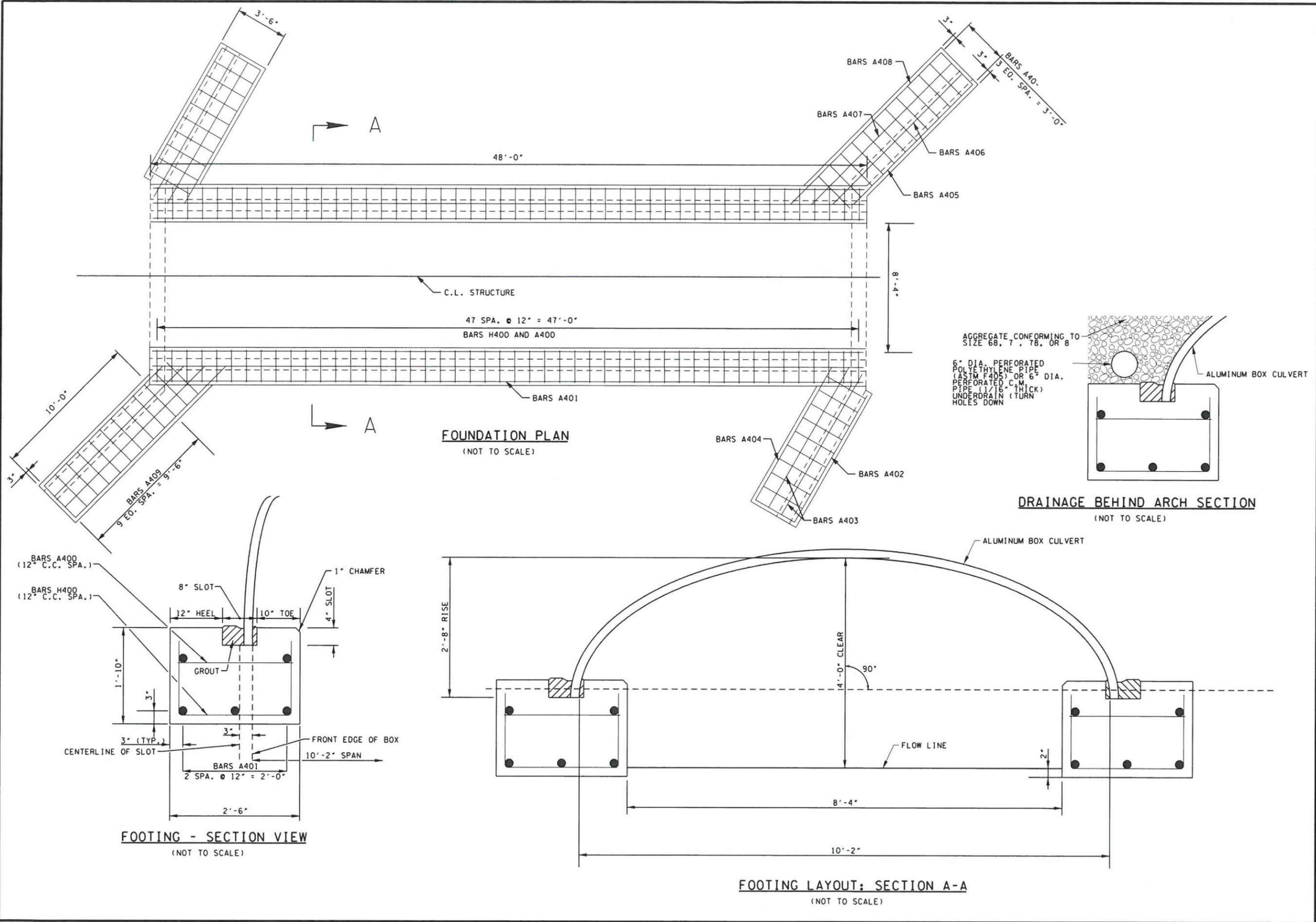
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ALUMINUM BOX CULVERT DETAILS
 HAPPY HOLLOW ROAD
 OVER MADISON CREEK
 CITY OF GOODLETTSVILLE



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DATE: 2017
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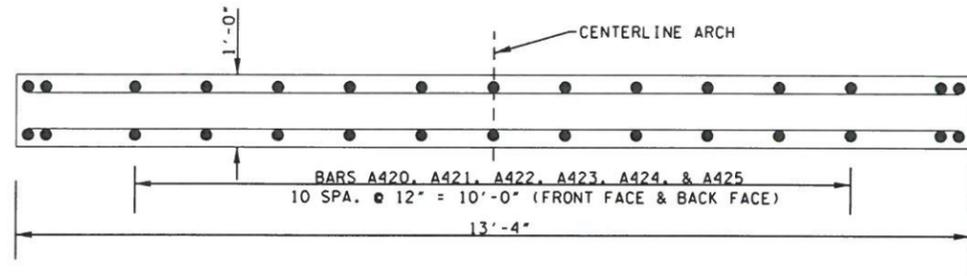
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FOUNDATION DETAILS
HAPPY HOLLOW ROAD
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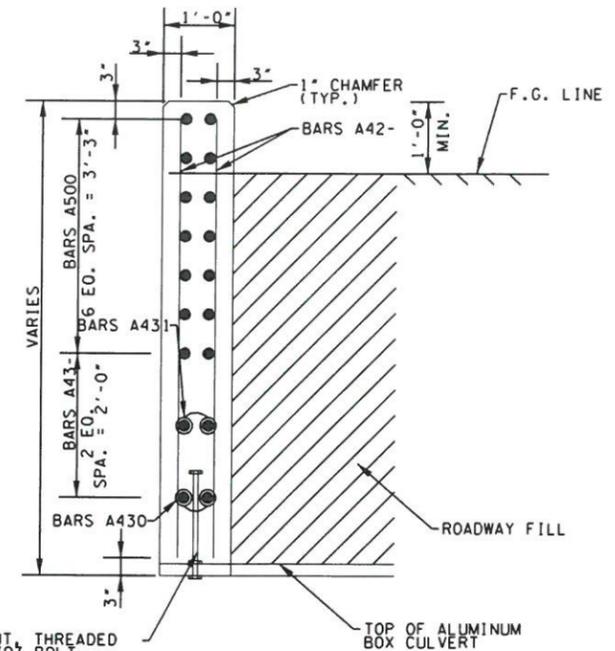


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DATE: 2017
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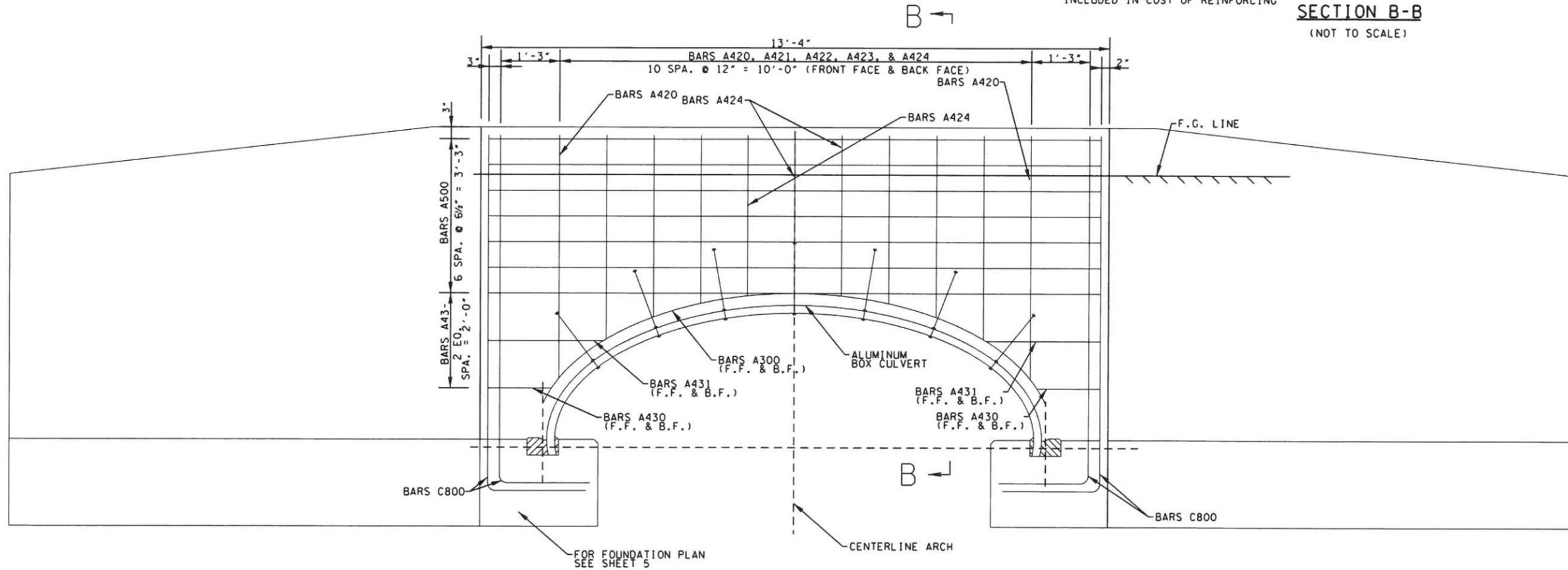


HEADWALL PLAN VIEW
(NOT TO SCALE)



SECTION B-B
(NOT TO SCALE)

3/4" X 18" TRIPLE NUT, THREADED GALVANIZED ASTM A307 BOLT
18" C.C. SPACING ALONG ARCH
(14 TOTAL REQUIRED)
NOTE: COST OF BOLTS TO BE INCLUDED IN COST OF REINFORCING



HEADWALL END ELEVATION
(NOT TO SCALE)

NO.	DATE	BY	DESCRIPTION

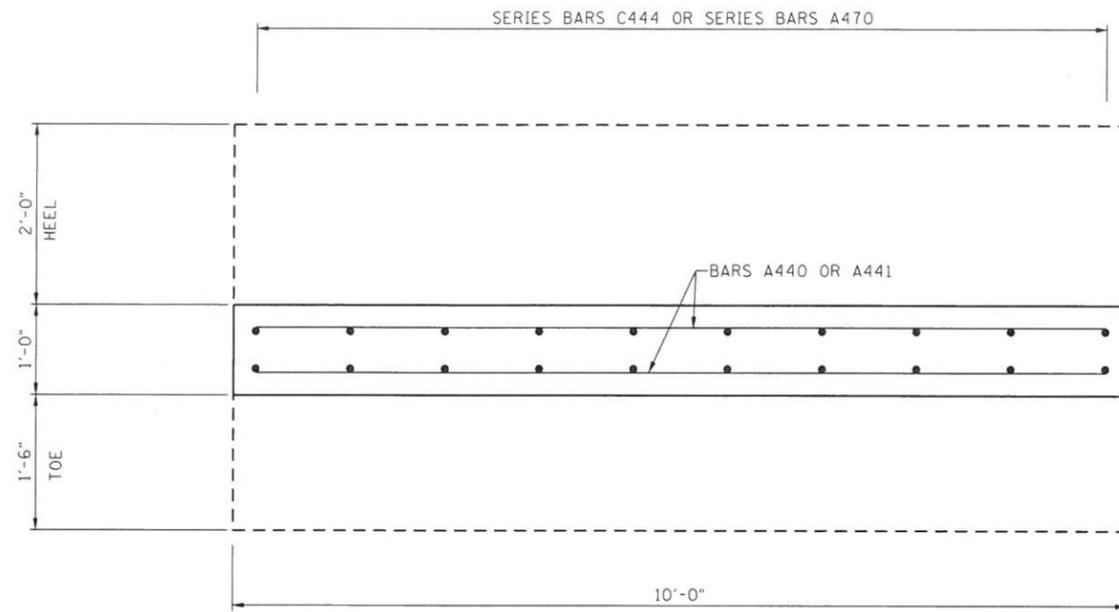
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HEADWALL DETAILS
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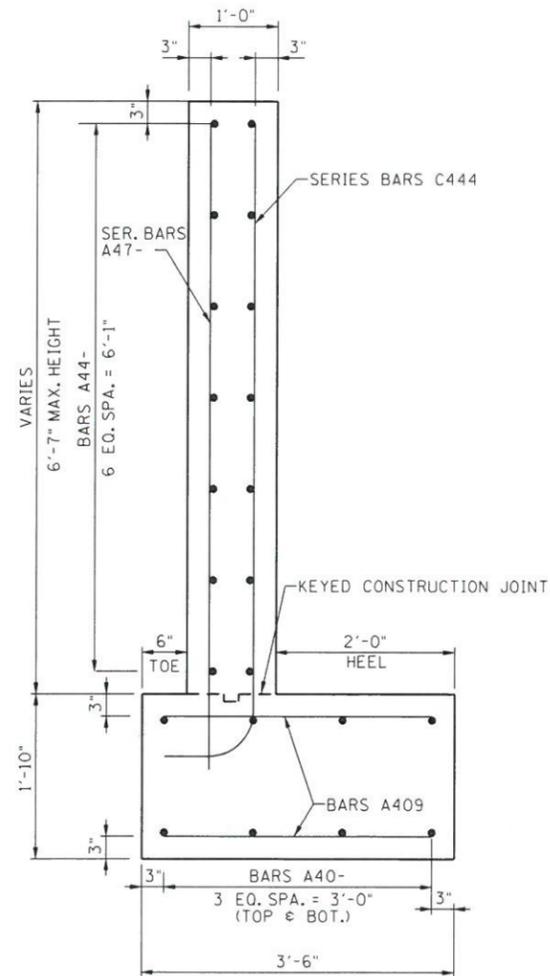


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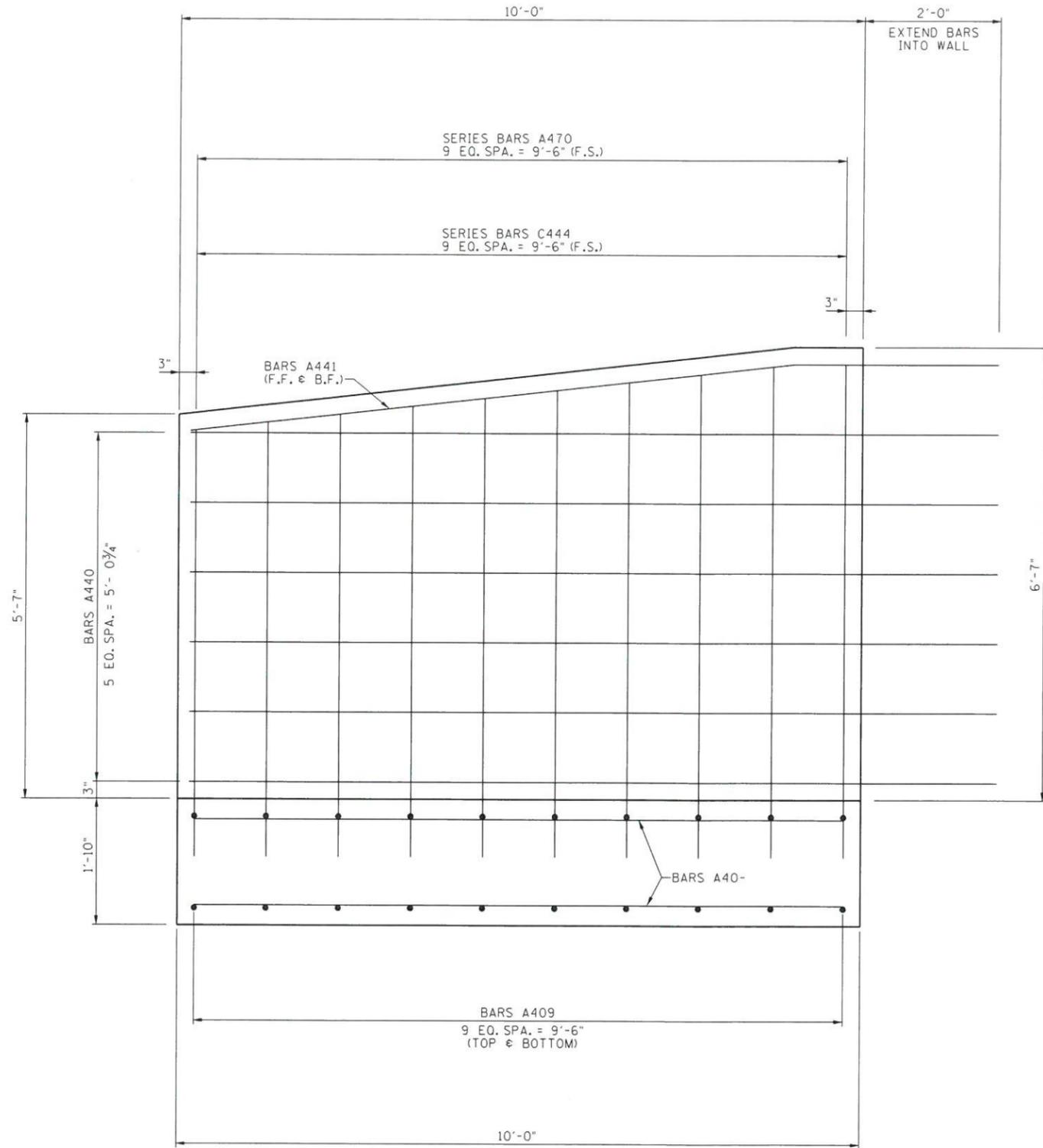
DATE: 2017
SHEET NO: 6



WINGWALL - PLAN VIEW
(NOT TO SCALE)



WINGWALL SECTION VIEW
(NOT TO SCALE)

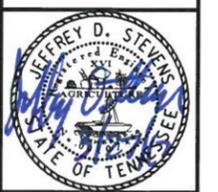


WINGWALL - ELEVATION VIEW
(NOT TO SCALE)

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WINGWALL DETAILS
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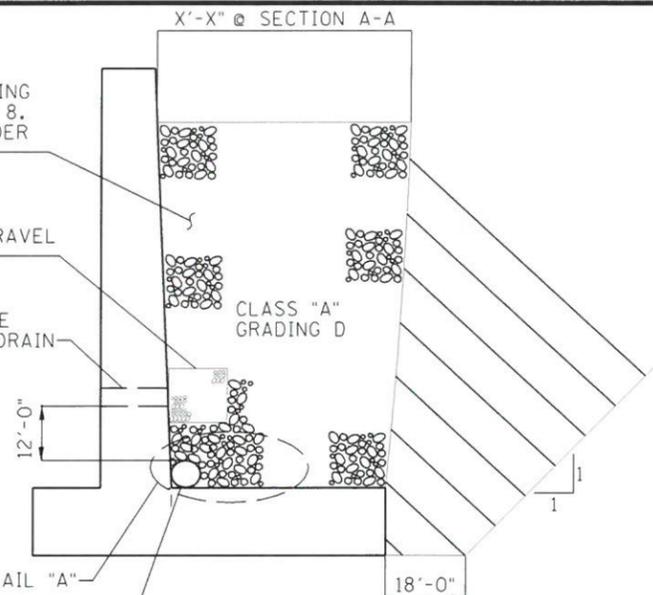
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AGGREGATE CONFORMING TO SIZE 68,7,78, OR 8, TO BE PAID FOR UNDER ITEM NO. 710-09.01

ONE CUBIC FOOT OF BAGGED SCREENED GRAVEL AT EACH WEEP HOLE

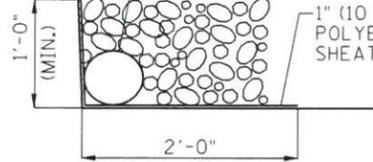
4"Ø WEEP HOLE AT 15'-0" MAX. SPA. SLOPE 1/2" PER FOOT TO DRAIN



6" DIA. PERFORATED POLYETHYLENE PIPE (ASTM F-405) OR 6" DIA. PERFORATED C.M. PIPE (18 GA.) UNDERDRAIN (TURN HOLES DOWN). ITEM NO. 710-09.01

AGGREGATE CONFORMING TO SIZE 68,7,78, OR 8.

1" (10 MIL.) POLYETHYLENE SHEATHING



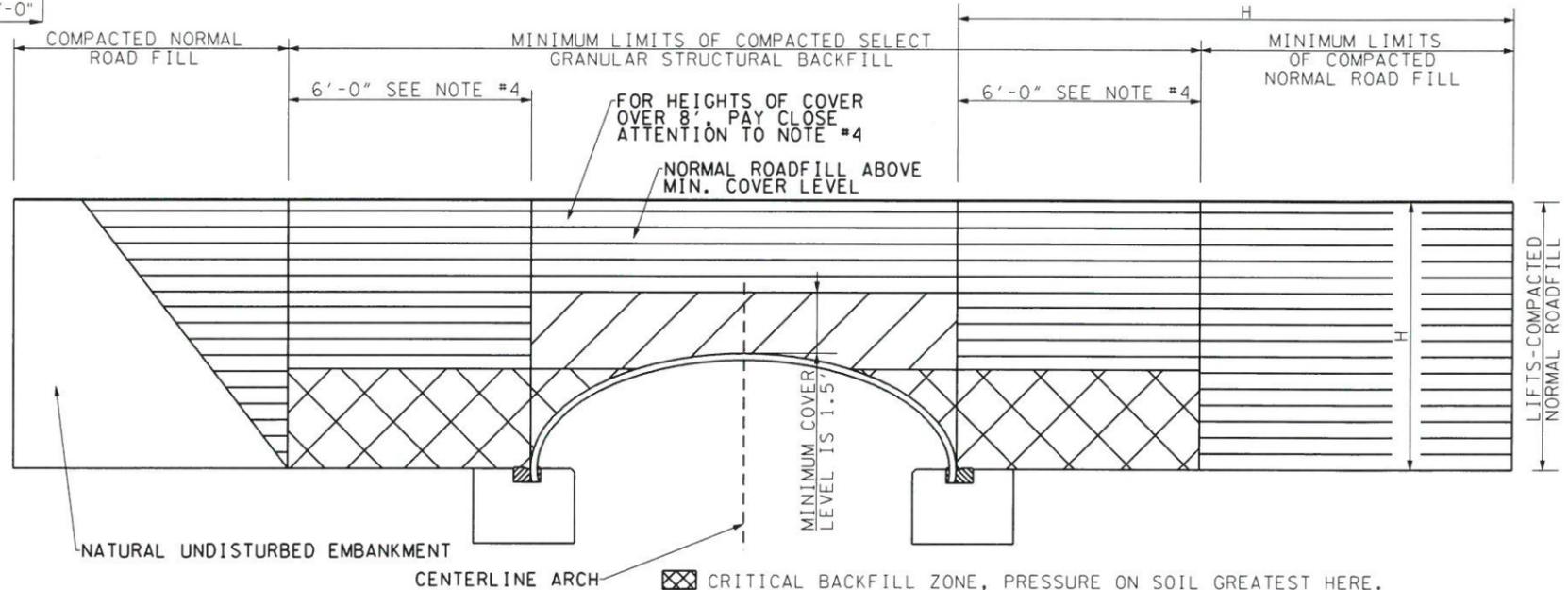
DETAIL "A"
(NOT TO SCALE)

AASHTO M-145 TABLE 2 (MODIFIED)*				
GROUP CLASSIFICATION	A-1		A-2	
	A-1a	A-1-b	A-2-4	A-2-5
SIEVE ANALYSIS PERCENT PASSING				
NO. 10 (2.00 mm)	50 MAX.	-----	-----	-----
NO. 40 (0.425 mm)	30 MAX.	50 MAX.	-----	-----
NO. 100 (0.150 mm)	-----	-----	50 MAX.	50 MAX.
NO. 200 (0.075 mm)	15 MAX.	25 MAX.	20 MAX.	20 MAX.
CHARACTERISTICS OF FRACTION PASSING NO. 40 (0.425 mm)				
LIQUID LIMIT	-----	-----	40 MIN.	41 MIN.
PLASTICITY LIMIT	6 MAX.	6 MAX.	10 MAX.	10 MAX.
USUAL TYPES OF SIGNIFICANT CONSTITUENT MATERIALS	STONE FRAGMENTS, GRAVEL AND SAND		SILTY OR CLAYEY GRAVEL OR SAND	

* MODIFIED TO BE MORE SELECT M-145.

LOCATE PIPE AT LOWEST POINT PRACTICAL FOR PROPER DRAINAGE (TYPICALLY ON TOP OF FOOTING)

DRAINAGE DETAIL
(NOT TO SCALE)



NOTES:

BACKFILLING: UNLESS OTHERWISE SPECIFIED OR DIRECTED, THE CONTRACTOR SHALL BACKFILL BEHIND WINGWALLS AS SOON AS THE FOLLING CONDITIONS ARE MET.

- A. REPRESENTATIVE SPECIMENS OF THE CONCRETE IN THE STRUCTURE, CURED BY THE METHODS AND IN THE MANNER THAT THE CONCRETE WHICH THE TEST SPECIMENS REPRESENT IS CURED, ATTAIN A COMPRESSIVE STRENGTH OF 3000 PSI.
- B. THE CONCRETE SHALL HAVE BEEN PLACED A MINIMUM OF 7 DAYS, NOT COUNTING THE DAYS OF TWENTY-FOUR HOURS EACH IN WHICH THE TEMPERATURE FALLS BELOW 40° F OR 21 CALENDAR DAYS, WHICHEVER OCCURS FIRST.

BACKFILLING OF WINGWALLS SHALL BE PERFORMED IN ACCORDANCE WITH SECTION 204.11 OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS. THE REQUIREMENTS FOR STEPPING OF BOUNDARY SLOPES TO PREVENT WEDGE ACTION, FOR PROPER LAYERING AND COMPACTION OF BACKFILL, AND FOR MAINTAINING (AT ALL TIMES) EQUAL HEIGHTS OF BACKFILL.

LOCATE 6" DIA. PIPE AT LOWEST POINT PRACTICAL FOR PROPER DRAINAGE WITH SLOPE PARALLEL TO WINGWALL (1/8" PER FOOT MINIMUM). INSTALL PIPE AND 1'-0" OF COVER AS SOON AS POSSIBLE AFTER FORMING WALL.

NOTES:

1. ALL SELECT GRANULAR FILL TO BE COMPACTED TO 90 PERCENT PER AASHTO 7-180.
2. COMPLETE AND REGULAR MONITORING OF THE ALUMINUM BOX CULVERT SHAPE IS NECESSARY DURING ALL BACKFIRING OF THE STRUCTURE.
3. PREVENT EXCESSIVE DISTORTION OF SHAPE AS NECESSARY BY VARYING COMPACTION METHODS AND EQUIPMENT.
4. GREATER OR LESSER DISTANCE MAY BE REQUIRED. DISTANCE DEPENDS ON BEARING LOAD FOR ANY GIVEN LOADING, STRUCTURE SHAPE AND BACKFILL MATERIAL. THIS MUST BE EVALUATED BY THE PROJECT ENGINEER FOR EACH SPECIFIC SITUATION.
5. MINIMUM COVERS FOR CONSTRUCTION LOADS AND SIMILAR HEAVY WHEEL LOADS MUST BE ESTABLISHED FOR INDIVIDUAL APPLICATIONS.

ADDITIONAL BACKFILL MATERIAL REQUIREMENTS:

BACKFILL MUST BE DENSE-GRADED MATERIAL. OPEN-GRADED OR GAP-GRADED MATERIALS ARE NOT ALLOWED. FINE BEACH SANDS, WINDBLOWN SANDS, STREAM DEPOSITED SANDS EXHIBITING FINE, ROUNDED PARTICLES AND TYPICALLY CLASSIFIED BY AASHTO M-145 AS A-3 MATERIALS ARE NOT ALLOWED. ON-SITE MIXING OR BLENDING TO ACHIEVE SPECIFIED GRADATION IS NOT ALLOWED.

STRUCTURAL BACKFILL MATERIAL REQUIREMENTS MINIMUM SPECIFICATION:

- A) A GRANULAR TYPE OF MATERIAL SHALL BE USED AROUND AND OVER THE STRUCTURE. THIS SELECT STRUCTURAL BACKFILL MATERIAL SHALL CONFORM TO ONE OF THE FOLLOWING CLASSIFICATIONS OF SOIL FROM AASHTO SPECIFICATION M-145, AS MODIFIED IN THE FOLLOWING TABLE FOR A-1, A-2-4 OR A-2-5.
- B) MAXIMUM PARTICLE SIZE SHALL NOT EXCEED 3 INCHES. FOR A-2 MATERIALS, MOISTURE CONTENT MUST BE BETWEEN -3% TO +2% OF OPTIMUM MOISTURE CONTENT AS DEFINED BY AASHTO T-180. ALL SOIL CLASSIFICATIONS ARE LIMITED IN HEIGHT OF COVER AND STRUCTURE SHAPE APPLICATION AS FOLLOWS:
 - A-1-a AND A-1-b MATERIALS FILL HEIGHTS UP TO A MAXIMUM OF 20'.
 - A-2-4 AND A-2-5 MATERIALS ARE RESTRICTED TO 12' MAXIMUM HEIGHTS OF COVER.

NO.	DATE	BY	DESCRIPTION

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WINGWALL DETAILS
HAPPY HOLLOW ROAD
OVER MADISON CREEK
CITY OF GOODLETTSVILLE



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DEFINITIONS

- (1) OWNER: IN THESE SPECIFICATIONS THE WORD "OWNER" SHALL MEAN THE INDIVIDUAL OR AGENCY LEGALLY RESPONSIBLE FOR DEVELOPMENT OF THE SUBJECT PROPERTY.
- (2) ENGINEER: IN THESE SPECIFICATIONS THE WORD "ENGINEER" SHALL MEAN THE OWNER DESIGNATED ENGINEER.
- (3) DESIGN ENGINEER: IN THESE SPECIFICATIONS THE WORDS "DESIGN ENGINEER" SHALL MEAN COLLIER ENGINEERING CO., INC., BRENTWOOD, TENNESSEE.
- (4) CONTRACTOR: IN THESE SPECIFICATIONS THE WORD "CONTRACTOR" SHALL MEAN THE FIRM OR CORPORATION UNDERTAKING THE EXECUTION OF ANY WORK UNDER THE TERMS OF THESE SPECIFICATIONS.

GENERAL CONDITIONS

- (5) THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIAL, EQUIPMENT, AND PERFORM ALL WORK AND SERVICES EXCEPT THOSE SET OUT AND FURNISHED BY THE OWNER, NECESSARY TO COMPLETE IN A SATISFACTORY MANNER THE SITE PREPARATION, EXCAVATION, CONCRETE CONSTRUCTION, BACKFILLING, COMPACTION, AND GRADING AS SHOWN ON THE PLANS AND AS DESCRIBED THEREIN.
- (6) THE CONTRACTOR SHALL EXAMINE, INVESTIGATE AND INSPECT THE CONSTRUCTION SITE AS TO THE NATURE AND LOCATION OF THE WORK, AND THE GENERAL AND LOCAL CONDITIONS AT THE CONSTRUCTION SITE, INCLUDING, WITHOUT LIMITATION, THE CHARACTER OF SURFACE OR SUBSURFACE CONDITIONS AND OBSTACLES TO BE ENCOUNTERED ON AND AROUND THE CONSTRUCTION SITE. THE CONTRACTOR SHALL MAKE SUCH ADDITIONAL INVESTIGATION AS HE MAY DEEM NECESSARY FOR THE PLANNING AND PROPER EXECUTION OF THE WORK.
- (7) IF CONDITIONS OTHER THAN THOSE INDICATED ARE DISCOVERED BY THE CONTRACTOR, THE OWNER OR HIS DESIGNATED REPRESENTATIVE SHOULD BE NOTIFIED IMMEDIATELY. THE MATERIAL WHICH THE CONTRACTOR BELIEVES TO BE A CHANGED CONDITIONS SHOULD NOT BE DISTURBED SO THAT THE OWNER OR HIS DESIGNATED REPRESENTATIVE CAN INVESTIGATE THE CONDITION.

EXCAVATION

- (8) ALL STRUCTURE EXCAVATION SHALL BE CUT TO THE ELEVATION REQUIRED TO ENCOUNTER COMPETEND SOIL OR ROCK WITH A BEARING CAPACITY EQUAL TO OR GREATER THAN REQUIRED FOR THE PROJECT, OR AS DIRECTED BY THE ENGINEER.
- (9) NO EXCAVATED MATERIALS SHALL BE DEPOSITED OR DISPOSED OF OUTSIDE THE CONSTRUCTION LINES UNLESS DIRECTED BY THE ENGINEER.
- (10) INCLINED SURFACES OF ROCK USED AS FOUNDATION SHALL BE EXCAVATED EITHER LEVEL OR IN STEPS. WHEN NECESSARY, AS DETERMINED BY THE ENGINEER, TO OBTAIN GOOD BOND, THE SURFACE OF ROCK FOUNDATION SHALL BE ROUGHENED OR SUITABLE ANCHORS INSTALLED.
- (11) THE CONTRACTOR SHALL NOTIFY EACH INDIVIDUAL UTILITY OWNER OF HIS PLAN OF OPERATION IN THE AREA OF THE UTILITIES. PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL CONTACT THE UTILITY OWNERS AND REQUEST THEM TO PROPERLY LOCATED THEIR RESPECTIVE UTILITY ON THE GROUND. THIS NOTIFICATION SHALL BE GIVEN AT LEAST THREE (3) BUSINESS DAYS PRIOR TO COMMENCEMENT OF OPERATIONS AROUND THE UTILITY. SOME UTILITIES CAN BE LOCATED BY CALLING THE TENNESSEE ONE CALL SYSTEM, INC. AT 1-800-351-1111.

WEEP HOLES

- (12) DRAINAGE OPENINGS AND WEEP HOLES SHALL BE CONSTRUCTED USING MATERIALS IN THE MANNER, AND AT THE LOCATIONS SHOWN ON THE PLANS OR ESTABLISHED BY THE ENGINEER. PORTS OR VENTS FOR EQUALIZED HYDROSTATIC PRESSURE, WHEN REQUIRED, SHALL BE PLACED AS DIRECTED. WEEP HOLE OPENINGS SHALL BE PROTECTED BY PLACING A WIRE BASKET 1 FOOT BY 1 FOOT BY 1 FOOT, FILLED WITH COARSE AGGREGATE, SIZE 7, 8, 57, 67, 68, OR 78, IMMEDIATELY OVER OR BEHIND THE HOLES OR OPENINGS, AS DIRECTED.

BACKFILL

- (13) ALL BACKFILL THAT BECOMES A PART OF THE ROADWAY PRISMS OR THEIR FOUNDATIONS SHALL BE PLACED IN LAYERS AND COMPACTED TO 95 PERCENT DENSITY.
- (14) ALL AREAS WHICH HAVE BEEN EXCAVATED, THE VOLUME OF WHICH IS NOT OCCUPIED BY THE STRUCTURE, SHALL BE REFILLED WITH ACCEPTABLE EARTH MATERIAL TO THE NORMAL GROUND SURFACE, UNLESS OTHERWISE DIRECTED. THIS BACKFILL SHALL BE ACCOMPLISHED BY BUILDING UP IN LAYERS, NOT MORE THAN 6 INCHES IN LOOSE DEPTH FOR MECHANICAL TAMPS AND 10 INCHES IN LOOSE DEPTH FOR TAMPING ROLLERS, ON BOTH SIDES OF THE STRUCTURE OR AROUND THE STRUCTURE UNIT, MAINTAINING THE LAYERS AT EQUAL ELEVATION AND THOROUGHLY COMPACTING EACH LAYER BY TAMPING WITH SUITABLE RAPID STRIKING POWER-DRIVEN MECHANICAL TAMPERS AND SHEEPSFOOT ROLLERS BEFORE THE SUCCEEDING LAYER IS PLACED.

- (15) BACKFILL SHALL NOT BE PLACED AGAINST A STRUCTURE OR A SECTION OR UNIT THEREOF, UNTIL THE WORK DESCRIBED UNDER REMOVAL OF FORMS AND FINISHING CONCRETE SURFACES HAS BEEN PERFORMED AND REPRESENTATIVE SPECIMENS OF THE CONCRETE IN THE STRUCTURE, SECTION OR UNIT, CURED BY THE METHODS AND IN THE MANNER THE CONCRETE WHICH THE ADDITION TO THE ABOVE REQUIREMENTS THE CONCRETE SHALL HAVE BEEN PLACED A MINIMUM OF 7 DAYS, NOT COUNTING THE DAYS OF TWENTY-FOUR HOURS EACH IN WHICH THE TEMPERATURE FALLS BELOW FORTY DEGREES FAHRENHEIT, OR TWENTY-ONE CALENDAR DAYS, WHICHEVER OCCURS FIRST.

REINFORCING STEEL

- (16) ALL REINFORCEMENT SHALL CONSIST OF DEFORMED STEEL BARS MEETING THE REQUIREMENTS OF ASTM A 615 GRADE 60. STANDARD CRSI HOOK DETAILS SHALL APPLY UNLESS OTHERWISE NOTED. DEFORMED STEEL BARS SHALL HAVE A NET AREA AT ALL SECTIONS EQUIVALENT TO THAT OF PLAIN ROUND OR SQUARE BARS OF THE CORRESPONDING NOMINAL SIZE.
- (17) REINFORCING STEEL SHALL BE STORED ABOVE THE GROUND SURFACE UPON PLATFORMS, SKIDS OR OTHER SUPPORTS LOCATED OUTSIDE THE SCOPE OF THE ACTIVE CONSTRUCTION OPERATIONS. REINFORCING STEEL SHALL BE PROTECTED AT ALL TIMES FROM INJURY AND DAMAGE. ALL BRUSH AND WEEKS SHALL BE REMOVED FROM THE AREA IMMEDIATELY PRIOR TO STORING REINFORCING SKILL THEREON.
- (18) REINFORCING STEEL, WHERE INDICATED, SHALL BE ACCURATELY BENT, WITHOUT HEATING, TO THE FORMS AND DIMENSIONS, INDICATED ON THE PLANS. UNLESS OTHERWISE INDICATED, ALL BENDS SHALL BE IN ONE PLANE. UNCOATED BARS OF THREE-QUARTER INCH DIAMETER OR LESS WHICH HAVE ONLY HOOKS OR A SINGLE BEND MAY BE BENT IN THE FIELD, PROVIDED THE BENDING IS ACCOMPLISHED TRUE TO FORM AND DIMENSIONS WITHOUT DAMAGE TO THE BARS. ALL OTHER BENDING SHALL BE DONE IN THE SHOP BEFORE SHIPMENT.
- (19) SUBSTITUTION OF BARS OF DIFFERENT SIZED FROM THOSE INDICATED ON THE PLANS MAY ONLY BE MADE WITH THE WRITTEN PERMISSION OF THE ENGINEER.
- (20) ALL REINFORCING STEEL BEFORE BEING PLACED SHALL BE THOROUGHLY CLEANED OF MILL SCALE, RUST, DIRT, PAINT, OIL, OR OTHER FOREIGN SUBSTANCES OR COATING OF ANY CHARACTER THAT WILL REDUCE THE BOND.
- (21) REINFORCEMENT SHALL BE ACCURATELY PLACED AND FIRMLY HELD IN POSITION AS INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL BARS SHALL BE SECURELY FASTENED TOGETHER WITH METAL CLIPS OR WIRE AT EACH INTERSECTION, EXCEPT WHERE SPACING IS LESS THAN 1 FOOT IN EACH DIRECTION, THEN ALTERNATE INTERSECTIONS SHALL BE FASTENED. ALL REINFORCING STEEL SHALL BE SECURELY SPACED FROM THE FORMS AND BETWEEN ADJACENT REINFORCEMENT BY MEANS OF APPROVED SPACERS.
- (22) ALL REINFORCING STEEL IN A SECTION OF CONSTRUCTION SHALL BE ACCURATELY AND SECURELY PLACED AND THE PLACEMENT APPROVED BY THE ENGINEER BEFORE ANY CONCRETE IS DEPOSITED IN THE SECTION. CARE SHALL BE TAKEN TO NOT DISTURB THE SPACERS DURING PLACEMENT OF THE CONCRETE.
- (23) IN LAPPED SPLICES, THE BARS SHALL BE PLACED AND WIRED IN SUCH A MANNER AS TO MAINTAIN THE MINIMUM DISTANCE TO THE SURFACE OF THE CONCRETE SHOWN ON THE PLANS.

GROUTED BARS IN DRILLED HOLES

- (24) HORIZONTALLY DRILLED HOLES SHALL BE DRILLED ONE-HALF INCH IN DIAMETER LARGER THAN THE BAR, CLEANED, PACKED WITH NON-SHRINK GROUT AND THE BAR ROTATED (NOT DRIVEN) INTO ITS SEAT.
- (25) VERTICALLY DRILLED HOLES SHALL BE DRILLED ONE-QUARTER INCH IN DIAMETER LARGER THAN THE BAR, CLEANED, PACKED WITH EPOXY GROUT AND BAR DRIVEN TO ITS SEAT.

CONCRETE

- (26) ALL CONCRETE USED IN THE PROJECT DESCRIBED HEREIN SHALL BE $f'c = 3000$ PSI CLASS A CONCRETE IN ACCORDANCE WITH TDOT STANDARD SPECIFICATIONS 2015.
- (27) ALL CONCRETE SHALL BE PROPORTIONED IN ACCORDANCE WITH SUBSECTION 501.03 OF THE TDOT STANDARD SPECIFICATIONS 2015.
- (28) ALL CONCRETE SHALL BE MIXED IN ACCORDANCE WITH SUBSECTIONS 501.10 AND 604.13 OF THE TDOT STANDARD SPECIFICATIONS 2015.

- (29) CONCRETE COMPRESSIVE STRENGTH TESTS AND TEST SPECIMENS SHALL BE TAKEN IN ACCORDANCE WITH SUBSECTION 604.15 OF THE TDOT STANDARD SPECIFICATIONS 2015. NOT LESS THAN TWO TEST SPECIMENS SHALL BE MADE FOR EACH DAY'S POUR EXCEEDING 50 CUBIC YARDS OF CONCRETE. FOR UNITS OR A DAY'S POUR EXCEEDING 50 CUBIC YARDS, AT LEAST TWO ADDITIONAL SPECIMENS SHALL BE MADE.
- (30) PLACEMENT OF CONCRETE SHALL BE IN ACCORDANCE WITH SUBSECTION 604.16 OF THE TDOT STANDARD SPECIFICATIONS 2015.
- (31) UNLESS OTHERWISE DIRECTED, THE CONCRETE SHALL BE COMPACTED WITH SUITABLE MECHANICAL VIBRATORS OPERATING WITHIN THE CONCRETE. WHEN REQUIRED, VIBRATING SHALL BE SUPPLEMENTED BY HAND SPADING WITH SUITABLE TOOLS TO ASSURE PROPER AND ADEQUATE COMPACTION. VIBRATORS SHALL BE SO MANIPULATED AS TO WORK THE CONCRETE THOROUGHLY AROUND THE REINFORCEMENT AND EMBEDDED FIXTURES AND INTO CORNERS AND ANGLES OF THE FORMS. VIBRATORS SHALL NOT BE USED AS A MEANS TO CAUSE CONCRETE TO FLOW OR RUN INTO POSITION IN LIEU OF PLACING. THE VIBRATION AT ANY POINT SHALL NOT BE PROLONGED TO THE POINT WHERE SEGREGATION OCCURS. AT LEAST ONE ADDITIONAL STAND-BY VIBRATING UNIT SHALL BE AVAILABLE FOR ALL INDIVIDUAL POURS IN EXCESS OF 10 CUBIC YARDS.
- (32) THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL A MIX DESIGN FOR ALL CONCRETE USED FOR THIS PROJECT. THE CONTRACTOR MAY NOT PROCEED WITH WORK UNTIL THIS MIX DESIGN IS APPROVED.
- (33) NO CONCRETE SHALL BE DEPOSITED UNDER WATER.
- (34) REMOVAL OF FORMS AND FALSEWORK SHALL BE IN ACCORDANCE WITH SUBSECTION 604.20 OF THE TDOT STANDARD SPECIFICATIONS 2015.
- (35) ANY DEFECTIVE CONCRETE DISCOVERED AFTER THE FORMS HAVE BEEN REMOVED SHALL BE REMOVED IMMEDIATELY AND REPLACED. IF THE SURFACE IS BULGED, UNEVEN, OR SHOWS HONEYCOMBING WHICH CANNOT BE REPAIRED SATISFACTORILY, THE ENTIRE SECTION SHALL BE REMOVED AND REPLACED.
- (36) CONCRETE HAVING A 28 DAY STRENGTH OF LESS THAN THE MINIMUM SPECIFIED SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR, AT HIS EXPENSE, UNLESS SPECIFICALLY AUTHORIZED BY THE ENGINEER, IN WRITING TO REMAIN IN PLACE.
- (37) CURING CONCRETE SHALL BE IN ACCORDANCE WITH SUBSECTION 604.24 OF THE TDOT STANDARD SPECIFICATIONS.
- (38) AFTER THE CONCRETE HAS BEEN PLACED, IF IT IS EXPECTED THAT THE AMBIENT TEMPERATURE WILL DROP BELOW 35 DEGREES FAHRENHEIT, THE CONTRACTOR SHALL PROVIDE SUFFICIENT CANVAS AND FRAMEWORK, OR OTHER TYPES OF HOUSING, TO ENCLOSE AND PROTECT THE STRUCTURE IN SUCH A WAY THAT THE AIR SURROUNDING THE FRESH CONCRETE CAN BE MAINTAINED AT A TEMPERATURE OF NOT LESS THAN 45 DEGREES FAHRENHEIT, AND THE SURFACE TEMPERATURE OF THE CONCRETE SHALL NOT EXCEED 80 DEGREES FAHRENHEIT. THE ABOVE CONDITIONS SHALL BE MAINTAINED FOR A PERIOD OF 120 HOURS AFTER THE CONCRETE IS PLACED. THE CONTRACTOR SHALL FURNISH A MAXIMUM-MINIMUM THERMOMETER TO THE ENGINEER FOR THE PURPOSE OF TEMPERATURE DOCUMENTATION.

SPECIAL NOTES

- (39) CONTRACTOR SHALL USE EXTREME CARE AND TAKE ANY MEASURE NECESSARY TO ENSURE THAT NO DEBRIS IS DROPPED INTO THE STREAM. THIS SHALL BE ACCOMPLISHED BY THE USE OF BASKETS, NETTING, WRAPPING, WORK PLATFORM, OR OTHER SIMILARLY EFFECTIVE MEANS. ANY DEBRIS WHICH IS ALLOWED TO DROP ON THE BANKS BELOW THE BRIDGE SHALL NOT BE ALLOWED TO ENTER THE STREAM AND SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR. ANY CONSTRUCTION WITHIN THE STREAM CHANNEL AREA SHALL BE SEPARATED FROM FLOWING WATER, AND ACCOMPLISHED DURING LOW FLOW CONDITIONS. THIS SHALL BE ACCOMPLISHED BY THE USE OF FLUMES, DIVERSION CHANNEL WITH SANDBAG BERM, DIVERSION PIPE, OR IN SOME CASES COFFERDAMS. ALL CONCRETE USED IN THE PROJECT DESCRIBED HEREIN SHALL BE $f'c = 3000$ PSI CLASS A CONCRETE IN ACCORDANCE WITH TDOT STANDARD SPECIFICATIONS 2015.
- (40) ANY DAMAGE TO EXISTING STRUCTURES TO BE LEFT IN PLACE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
- (41) THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS PRIOR TO ORDERING REINFORCING STEEL.

NO.	DATE	BY	DESCRIPTION

CE COLLIER
ENGINEERING CO., INC.
CONSULTING-DESIGN-CONSTRUCTION

5560 FRANKLIN PIKE CIRCLE BRENTWOOD, TN 37027
PHONE: (615) 331-1441 FAX: (615) 331-1050

STRUCTURAL NOTES
HAPPY HOLLOW ROAD
OVER MADISON CREEK
CITY OF GOODLETTSVILLE



DATE: 02/16/17
DESIGNED BY: JDS
DRAWN BY: ADD
SUPERVISED BY: JDS
CHECKED BY: JDS

DATE: 2017

SHEET NO: 9

1 - GENERAL

1.0 STANDARDS AND DEFINITIONS

1.1 STANDARDS - ALL STANDARDS REFER TO LATEST EDITION UNLESS OTHERWISE NOTED.

1.1.1 ASTM B-864 "STANDARD SPECIFICATION FOR CORRUGATED ALUMINUM BOX CULVERTS" (AASHTO DESIGNATION M-219).

1.1.2 AASHTO STANDARD SPECIFICATION FOR HIGHWAY BRIDGES - SECTION 12 DIVISION I - DESIGN.

1.1.3 AASHTO STANDARD SPECIFICATION FOR HIGHWAY BRIDGES - SECTION 26 DIVISION II - CONSTRUCTION.

1.2 DEFINITIONS

1.2.1 OWNER - IN THESE SPECIFICATIONS THE WORD "OWNER" SHALL MEAN CONTECH Engineered Solutions, LLC.

1.2.2 ENGINEER - IN THESE SPECIFICATIONS THE WORD "ENGINEER" SHALL MEAN THE ENGINEER OF RECORD OR OWNER'S DESIGNATED ENGINEERING REPRESENTATIVE.

1.2.3 MANUFACTURER - IN THESE SPECIFICATIONS THE WORD "MANUFACTURER" SHALL MEAN CONTECH ENGINEERED SOLUTIONS, LLC 800-338-1122 Contech Winchester.

1.2.4 CONTRACTOR - IN THESE SPECIFICATIONS THE WORD "CONTRACTOR" SHALL MEAN THE FIRM OR CORPORATION UNDERTAKING THE EXECUTION OF ANY INSTALLATION WORK UNDER THE TERMS OF THESE SPECIFICATIONS.

1.2.5 APPROVED - IN THESE SPECIFICATIONS THE WORD "APPROVED" SHALL REFER TO THE APPROVAL OF THE ENGINEER OR HIS DESIGNATED REPRESENTATIVE.

1.2.6 AS DIRECTED - IN THESE SPECIFICATIONS THE WORDS "AS DIRECTED" SHALL REFER TO THE DIRECTIONS TO THE CONTRACTOR FROM THE OWNER OR HIS DESIGNATED REPRESENTATIVE.

2.0 GENERAL CONDITIONS

2.1 THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIAL AND EQUIPMENT AND PERFORM ALL WORK AND SERVICES EXCEPT THOSE SET OUT AND FURNISHED BY THE OWNER, NECESSARY TO COMPLETE IN A SATISFACTORY MANNER THE SITE PREPARATION, EXCAVATION, FILLING, COMPACTION, GRADING AS SHOWN ON THE PLANS AND AS DESCRIBED THEREIN. THIS WORK SHALL CONSIST OF ALL MOBILIZATION CLEARING AND GRADING, GRUBBING, STRIPPING, REMOVAL OF EXISTING MATERIAL UNLESS OTHERWISE STATED, PREPARATION OF THE LAND TO BE FILLED, FILLING OF THE LAND, SPREADING AND COMPACTION OF THE FILL, AND ALL SUBSIDIARY WORK NECESSARY TO COMPLETE THE GRADING OF THE CUT AND FILL AREAS TO CONFORM WITH THE LINES, GRADES, SLOPES, AND SPECIFICATIONS. THIS WORK IS TO BE ACCOMPLISHED UNDER THE OBSERVATION OF THE OWNER OR HIS DESIGNATED REPRESENTATIVE.

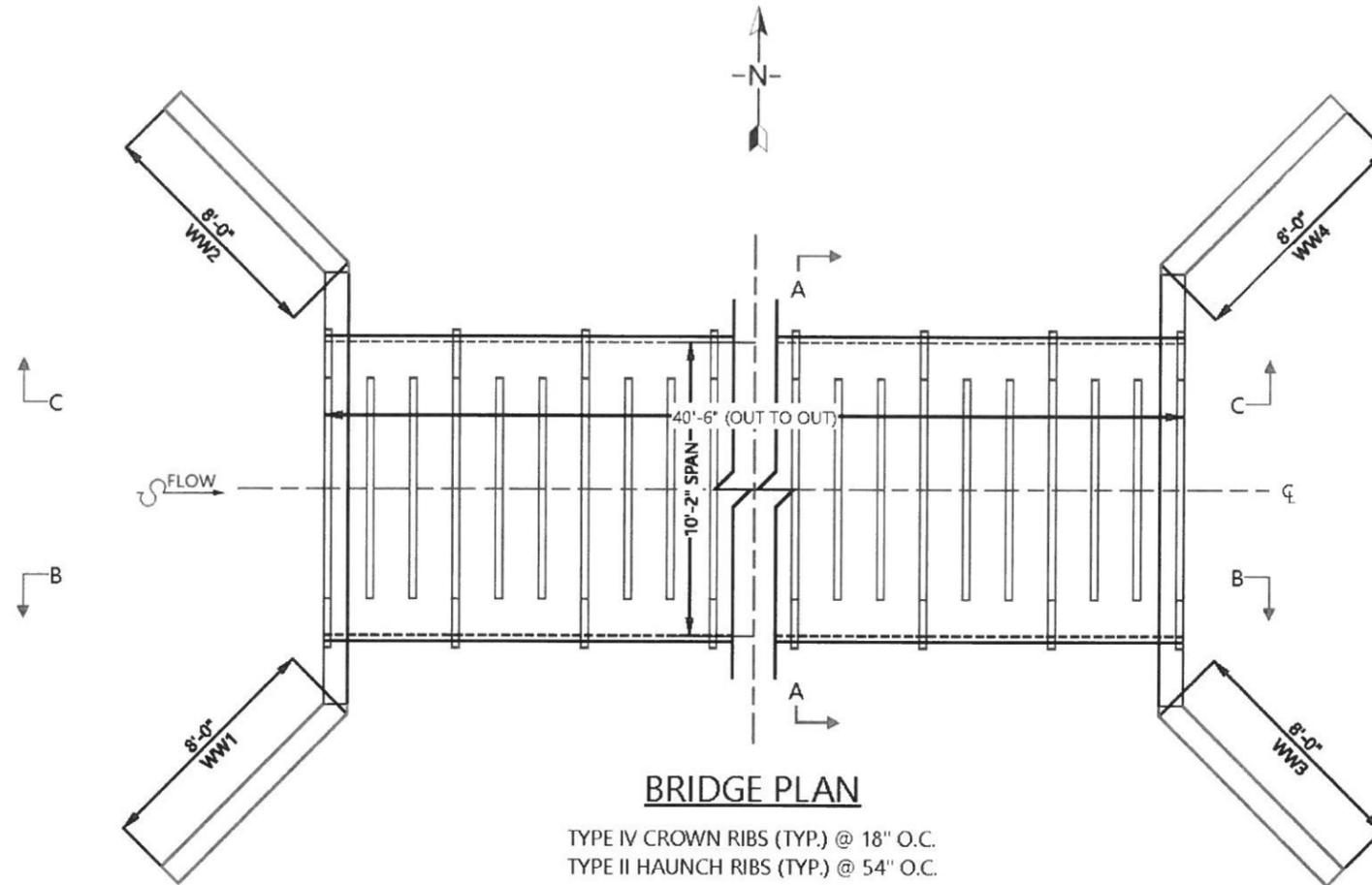
2.2 PRIOR TO BIDDING THE WORK, THE CONTRACTOR SHALL EXAMINE, INVESTIGATE AND INSPECT THE CONSTRUCTION SITE AS TO THE NATURE AND LOCATION OF THE WORK, AND THE GENERAL AND LOCAL CONDITIONS AT THE CONSTRUCTION SITE, INCLUDING WITHOUT LIMITATION, THE CHARACTER OF SURFACE OR SUBSURFACE CONDITIONS AND OBSTACLES TO BE ENCOUNTERED ON AND AROUND THE CONSTRUCTION SITE AND SHALL MAKE SUCH ADDITIONAL INVESTIGATION AS HE MAY DEEM NECESSARY FOR THE PLANNING AND PROPER EXECUTION OF THE WORK.

IF CONDITIONS OTHER THAN THOSE INDICATED ARE DISCOVERED BY THE CONTRACTOR, THE OWNER SHALL BE NOTIFIED IMMEDIATELY. THE MATERIAL WHICH THE CONTRACTOR BELIEVES TO BE A CHANGED CONDITION SHALL NOT BE DISTURBED SO THAT THE OWNER CAN INVESTIGATE THE CONDITION.

2.3 THE CONSTRUCTION SHALL BE PERFORMED UNDER THE DIRECTION OF THE ENGINEER.

2.4 ALL ASPECTS OF THE STRUCTURE DESIGN AND SITE LAYOUT INCLUDING FOUNDATIONS, BACKFILL, END TREATMENTS AND NECESSARY SCOUR CONSIDERATION SHALL BE PERFORMED BY THE ENGINEER.

ANY INSTALLATION GUIDANCE PROVIDED HEREIN SHALL BE ENDORSED BY THE ENGINEER OR SUPERSEDED BY THE ENGINEER'S PLANS AND SPECIFICATIONS.



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CONTECH
ENGINEERED SOLUTIONS

9025 Centre Pointe Dr., Suite 400, West Chester, OH 45061
 800-338-1122 513-645-7000 513-645-7993 FAX

PROPOSAL
DRAWING

ALBC #8 - 10'-2" X 2'-8"
 HAPPY HOLLOW ROAD CULVERT REPLACEMENT
 CITY OF GOODLETTSVILLE
 GOODLETTSVILLE, TN

Project No.: 557375	Seq No.: 010	Date: 2/8/2017
Designed:	Drawn: JMS	
Checked:	Approved:	
Sheet No.: 1 OF 11		

II - ALUMINUM BOX CULVERT

1.0 GENERAL

1.1 Manufacturer shall fabricate the aluminum box culvert as shown on the plans. Fabrication shall conform to the requirements of ASTM B-864 and shall consist of plates, ribs, and appurtenant items.

Plate thickness, rib spacing, end treatment and type of invert and foundation shall be as indicated on the plans. All manufacturing processes including corrugating, punching, curving and required galvanizing shall be performed within the United States of America.

1.2 The contractor shall verify all field dimensions and conditions prior to ordering materials.

2.0 DIMENSIONS

- Designation: ALBC 8-A6
- Span: 10'-2"
- Rise: 2'-8"
- Min. Cover: 1'-6"
- Max. Cover: 3'-0"
- Loading: HL-93

2.1 The proposed structure shall be an ALUMINUM BOX CULVERT with the following dimensions:

2.2 All plan dimensions on the contract drawings are measured in a true horizontal plan unless otherwise noted.

3.0 ASSEMBLY AND INSTALLATION

3.1 Bolts and nuts shall conform to the requirements of ASTM A-307 or ASTM A-449. The box culvert shall be assembled in accordance with the plate layout drawings provided by the manufacturer and per the manufacturer's recommendations.

Bolts shall be tightened using an applied torque of between 100 and 150 ft.-lbs.

3.2 The box culvert shall be installed in accordance with the plans and specifications, the manufacturer's recommendations, and AASHTO Standard Specification for Highway Bridges - Section 26 Division II - Construction.

3.3 Trench excavation shall be made in embankment material that is structurally adequate. The trench width shall be shown on the plans. Poor quality in situ embankment material must be removed and replaced with suitable backfill as directed by the Engineer.

3.4 Bedding preparation is critical to both structure performance and service life. The bed should be constructed to uniform line and grade to avoid distortions that may create undesirable stresses in the structure and/or rapid deterioration of the roadway. The bed should be free of rock formations, protruding stones, frozen lumps, roots, and other foreign matter that may cause unequal settlement.

3.5 Bedding shall provide a minimum of 4,000 psf bearing capacity. Foundation details for bearing capacity less than 4,000 psf shall be approved by the Engineer.

3.6 The structure shall be assembled in accordance with the Manufacturer's instructions. All plates shall be unloaded and handled with reasonable care. Plates shall not be rolled or dragged over gravel rock and shall be prevented from striking rock or other hard objects during placement in trench or on bedding.

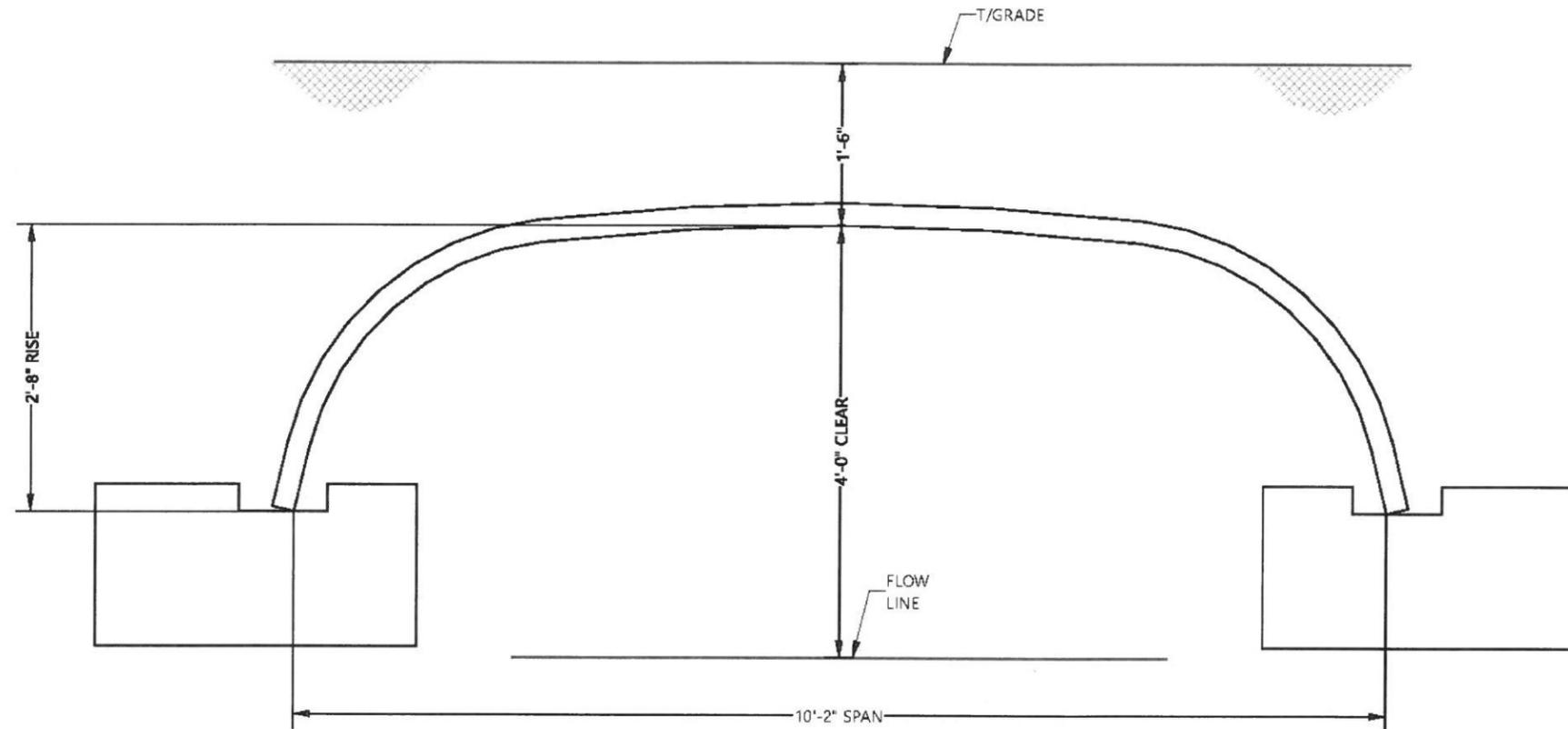
When installed on a full invert or on flexible footing pads, assembly of the invert or footing pads shall start at the downstream end. Circumferential seam laps shall shingle over the top of the downstream plates as assembly progresses upstream. Whether the box culvert is installed on a concrete footing, full metal invert, or flexible footing pad, assembly of the structure shell shall start at the upstream end. Downstream rings of plates shall be assembled outside of the upstream rings. (Circumferential seams are shingled downstream when viewed from the inside of the shell).

3.7 The structure shall be backfilled using clean well graded granular material that meets the requirements for soil classifications A-1, A-2-4, A-2-5 or A-3 modified to be more select than AASHTO M-145. See the information at the right of this sheet.

Backfill must be placed symmetrically on each side of the structure in 6 to 8 inch loose lifts. Each lift shall be compacted to a minimum of 90 percent density per AASHTO T-180

3.8 Construction loads that exceed highway load limits are not allowed to cross the structure without approval from the Engineer.

Normal highway traffic is not allowed to cross the structure until the structure has been backfilled and paved. If the road is unpaved, cover allowance to accommodate rutting shall be as directed by the Engineer.



CROSS SECTION A-A

Approximate Area: 37 sq. ft. used, 23 sq. ft. total

NOTES

- MEASUREMENTS ARE TO THE INSIDE CRESTS OF THE CORRUGATION
- DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES

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CDNTech
ENGINEERED SOLUTIONS

9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

PROPOSAL
DRAWING

ALBC #8 - 10'-2" X 2'-8"
HAPPY HOLLOW ROAD CULVERT REPLACEMENT
CITY OF GOODLETTSVILLE
GOODLETTSVILLE, TN

Project No.: 557375	Seq No.: 010	Date: 2/8/2017
Designed:	Drawn: JMS	
Checked:	Approved:	
Sheet No.: 2 OF 11		

SPECIFICATIONS FOR MANUFACTURE AND INSTALLATION OF CONTECH® ALUMINUM BOX CULVERT #1-87

I - GENERAL

1.0 STANDARDS AND DEFINITIONS

- 1.1 STANDARDS - All standards refer to latest edition unless otherwise noted.
- 1.1.1 ASTM B-864 "Standard Specification for Corrugated Aluminum Box Culverts" (AASHTO Designation M-219).
- 1.1.2 AASHTO Standard Specification for Highway Bridges - Section 12 Division I - Design.
- 1.1.3 AASHTO Standard Specification for Highway Bridges - Section 26 Division II - Construction.
- 1.2 DEFINITIONS
- 1.2.1 Owner - In these specifications the word "Owner" shall mean City of Goodlettsville.
- 1.2.2 Engineer - In these specifications the word "Engineer" shall mean the Engineer of Record or Owner's designated engineering representative.
- 1.2.3 Manufacturer - In these specifications the word "Manufacturer" shall mean CONTECH ENGINEERED SOLUTIONS 800-338-1122 Joe Spain
- 1.2.4 Contractor - In these specifications the word "Contractor" shall mean the firm or corporation undertaking the execution of any installation work under the terms of these specifications.
- 1.2.5 Approved - In these specifications the word "approved" shall refer to the approval of the Engineer or his designated representative.
- 1.2.6 As Directed - In these specifications the words "as directed" shall refer to the directions to the Contractor from the Owner or his designated representative.

2.0 GENERAL CONDITIONS

- 2.1 The Contractor shall furnish all labor, material and equipment and perform all work and services except those set out and furnished by the Owner, necessary to complete in a satisfactory manner the site preparation, excavation, filling, compaction, grading as shown on the plans and as described therein. This work shall consist of all mobilization clearing and grading, grubbing, stripping, removal of existing material unless otherwise stated, preparation of the land to be filled, filling of the land, spreading and compaction of the fill, and all subsidiary work necessary to complete the grading of the cut and fill areas to conform with the lines, grades, slopes, and specifications. This work is to be accomplished under the observation of the Owner or his designated representative.
- 2.2 Prior to bidding the work, the Contractor shall examine, investigate and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site, including without limitation, the character of surface or subsurface conditions and obstacles to be encountered on and around the construction site and shall make such additional investigation as he may deem necessary for the planning and proper execution of the work.
- If conditions other than those indicated are discovered by the Contractor, the Owner shall be notified immediately. The material which the Contractor believes to be a changed condition shall not be disturbed so that the owner can investigate the condition.
- 2.3 The construction shall be performed under the direction of the Engineer.
- 2.4 All aspects of the structure design and site layout including foundations, backfill, end treatments and necessary scour consideration shall be performed by the Engineer.
- Any installation guidance provided herein shall be endorsed by the Engineer or superseded by the Engineer's plans and specifications.

II - ALUMINUM BOX CULVERT

1.0 GENERAL

- 1.1 Manufacturer shall fabricate the aluminum box culvert as shown on the plans. Fabrication shall conform to the requirements of ASTM B-864 and shall consist of plates, ribs, and appurtenant items.
- Plate thickness, rib spacing, end treatment and type of invert and foundation shall be as indicated on the plans. All manufacturing processes including corrugating, punching, curving and required galvanizing shall be performed within the United States of America.
- 1.2 The contractor shall verify all field dimensions and conditions prior to ordering materials.

2.0 DIMENSIONS

- 2.1 The proposed structure shall be an ALUMINUM BOX CULVERT with the following dimensions:
- | | | |
|--------------------------|-------------------------|-------------------|
| Span: 10'-2" | Rise: 2'-8" | Loading: HL-93 |
| Haunch Gage: 0.125 | Crown Gage: 0.125 | Min. Cover: 1'-6" |
| Haunch Rib Type: TYPE II | Crown Rib Type: TYPE IV | Max. Cover: 3'-0" |
| Haunch Rib Spacing: 54" | Crown Rib Spacing: 18" | |
- 2.2 All plan dimensions on the contract drawings are measured in a true horizontal plan unless otherwise noted.

3.0 ASSEMBLY AND INSTALLATION

- 3.1 Bolts and nuts shall conform to the requirements of ASTM A-307 or ASTM A-449. The box culvert shall be assembled in accordance with the plate layout drawings provided by the manufacturer and per the manufacturer's recommendations.
- Bolts shall be tightened using an applied torque of between 100 and 150 ft.-lbs.
- 3.2 The box culvert shall be installed in accordance with the plans and specifications, the manufacturer's recommendations, and AASHTO Standard Specification for Highway Bridges - Section 26 Division II - Construction.
- 3.3 Trench excavation shall be made in embankment material that is structurally adequate. The trench width shall be shown on the plans. Poor quality in situ embankment material must be removed and replaced with suitable backfill as directed by the Engineer.
- 3.4 Bedding preparation is critical to both structure performance and service life. The bed should be constructed to uniform line and grade to avoid distortions that may create undesirable stresses in the structure and/or rapid deterioration of the roadway. The bed should be free of rock formations, protruding stones, frozen lumps, roots, and other foreign matter that may cause unequal settlement.
- 3.5 Bedding shall provide a minimum of 4,000 psf bearing capacity. Foundation details for bearing capacity less than 4,000 psf shall be approved by the Engineer.
- 3.6 The structure shall be assembled in accordance with the Manufacturer's instructions. All plates shall be unloading and handled with reasonable care. Plates shall not be rolled or dragged over gravel rock and shall be prevented from striking rock or other hard objects during placement in trench or on bedding.
- When installed on a full invert or on flexible footing pads, assembly of the invert or footing pads shall start at the downstream end. Circumferential seam laps shall shingle over the top of the downstream plates as assembly progresses upstream. Whether the box culvert is installed on a concrete footing, full metal invert, or flexible footing pad, assembly of the structure shell shall start at the upstream end. Downstream rings of plates shall be assembled outside of the upstream rings. (Circumferential seams are shingled downstream when viewed from the inside of the shell).
- 3.7 The structure shall be backfilled using clean well graded granular material that meets the requirements for soil classifications A-1, A-2-4, A-2-5 or A-3 modified to be more select than AASHTO M-145. See the information at the right of this sheet.
- Backfill must be placed symmetrically on each side of the structure in 6 to 8 inch loose lifts. Each lift shall be compacted to a minimum of 90 percent density per AASHTO T-180
- 3.8 Construction loads that exceed highway load limits are not allowed to cross the structure without approval from the Engineer.
- Normal highway traffic is not allowed to cross the structure until the structure has been backfilled and paved. If the road is unpaved, cover allowance to accommodate rutting shall be as directed by the Engineer.

GROUP CLASSIFICATION	A-1	A-3	A-2-4	A-2-5
Sieve Analysis Percent Passing				
No. 10 (2.000 mm)	---	---	---	---
No. 40 (0.425 mm)	50 max.	51 max.	---	---
No. 100 (0.150 mm)	---	---	50 max.	50 max.
No. 200 (0.075 mm)	25 max.	10 max.	20 max.	20 max.
Atterberg Limits for Fraction Passing No., 40 (0.425 mm)				
Liquid Limits	---	---	40 max.	41 max.
Plasticity Index	6 max.	Non Plastic	10 max.	10 max.
Usual Materials	Stone Fragment, Gravel and Sand	Sand	Silty or Clayey Gravel and Sand	

NOTE: Atterberg Limits are modified to provide material that are primarily granular

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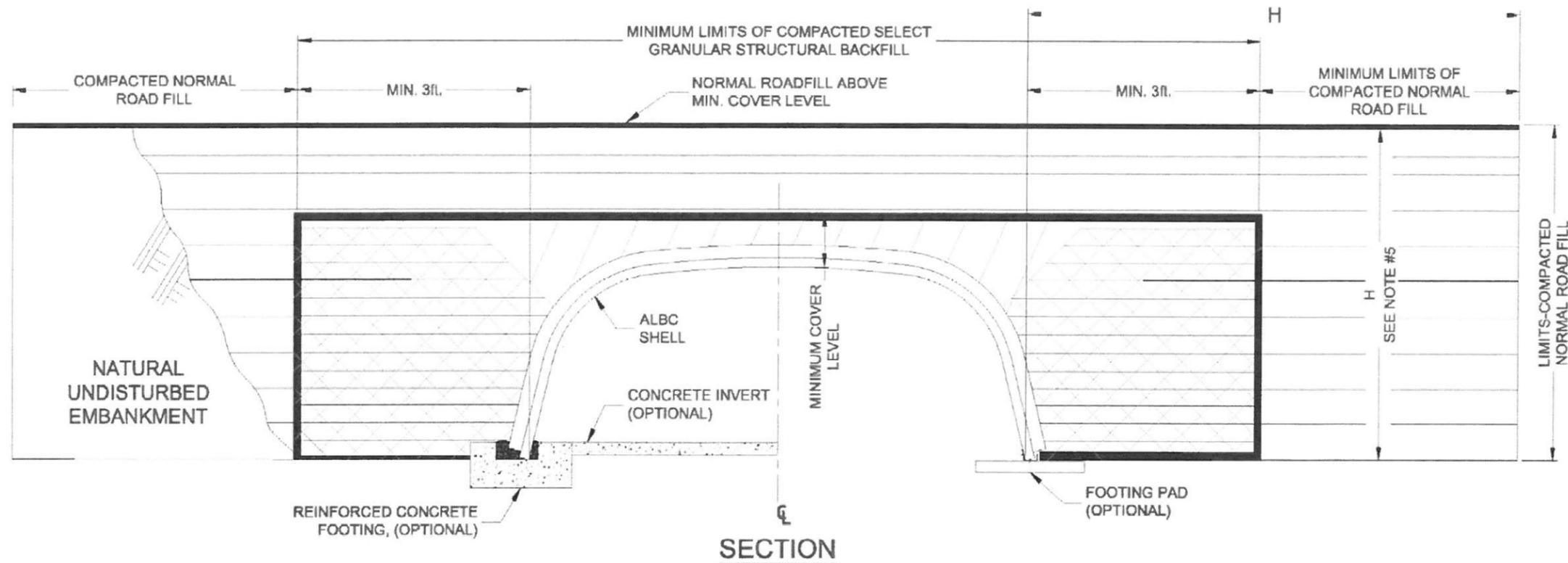


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PROPOSAL
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ALBC #8 - 10'-2" X 2'-8"
 HAPPY HOLLOW ROAD CULVERT REPLACEMENT
 CITY OF GOODLETTSVILLE
 GOODLETTSVILLE, TN

Project No.: 557375	Seq No.: 010	Date: 2/8/2017
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Checked:	Approved:	
Sheet No.: 8	OF 11	



-  CRITICAL BACKFILL ZONE, PRESSURE ON SOIL GREATEST HERE.
-  INITIAL LIFTS OVER CROWN OF STRUCTURE AS INDICATED BY SHADED AREA TO BE COMPACTED TO REQUIRED DENSITY WITH HAND OPERATED EQUIPMENT OR WITH SMALL TRACTOR (D-4 OR SMALLER) DRAWN EQUIPMENT.
-  SELECT GRANULAR STRUCTURAL BACKFILL LIMITS.

- NOTES:**
1. ALL SELECT GRANULAR BACKFILL TO BE PLACED IN A BALANCED FASHION IN THIN LIFTS (6"-8" LOOSE TYPICALLY) AND COMPACTED TO 90 PERCENT DENSITY PER AASHTO T-180.
 2. COMPLETE AND REGULAR MONITORING OF THE ALUMINUM BOX CULVERT SHAPE IS NECESSARY DURING ALL BACKFILLING OF THE STRUCTURE.
 3. PREVENT EXCESSIVE DISTORTION OF SHAPE AS NECESSARY BY VARYING COMPACTION METHODS AND EQUIPMENT.
 4. TRENCH WIDTH OTHER THAN 3ft. SHALL BE BY DIRECTION OF THE ENGINEER OF RECORD.
 5. "H" = STRUCTURE RISE + MAXIMUM ALLOWABLE COVER FOR SHAPE DESIGN SPECIFIED.

ADDITIONAL BACKFILL NOTES:

SATISFACTORY BACKFILL MATERIAL, PROPER PLACEMENT, AND COMPACTION ARE KEY FACTORS IN OBTAINING MAXIMUM STRENGTH AND STABILITY.

THE BACKFILL MATERIAL SHOULD BE FREE OF ROCKS, FROZEN LUMPS, AND FOREIGN MATERIAL THAT COULD CAUSE HARD SPOTS OR DECOMPOSE TO CREATE VOIDS. BACKFILL MATERIAL SHOULD BE WELL GRADED GRANULAR MATERIAL THAT MEETS THE REQUIREMENTS OF AASHTO M-145 FOR SOIL CLASSIFICATIONS A-1, A-2, A-3. BACKFILL MUST BE REPLACED SYMMETRICALLY ON EACH SIDE OF THE STRUCTURE IN 6" LOOSE LIFTS. EACH LIFT IS TO BE COMPACTED TO A MINIMUM OF 90% DENSITY PER AASHTO T-180.

A HIGH PERCENTAGE OF SILT OR FINE SAND IN THE NATIVE SOILS SUGGESTS THE NEED FOR A WELL GRADED GRANULAR BACKFILL MATERIAL TO PREVENT SOIL MIGRATION.

DURING BACKFILL, ONLY SMALL TRACKED VEHICLES (D-4 OR SMALLER) SHOULD BE NEAR THE STRUCTURE AS FILL PROGRESSES ABOVE THE CROWN AND TO THE FINISHED GRADE.

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CITY OF GOODLETTSVILLE
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