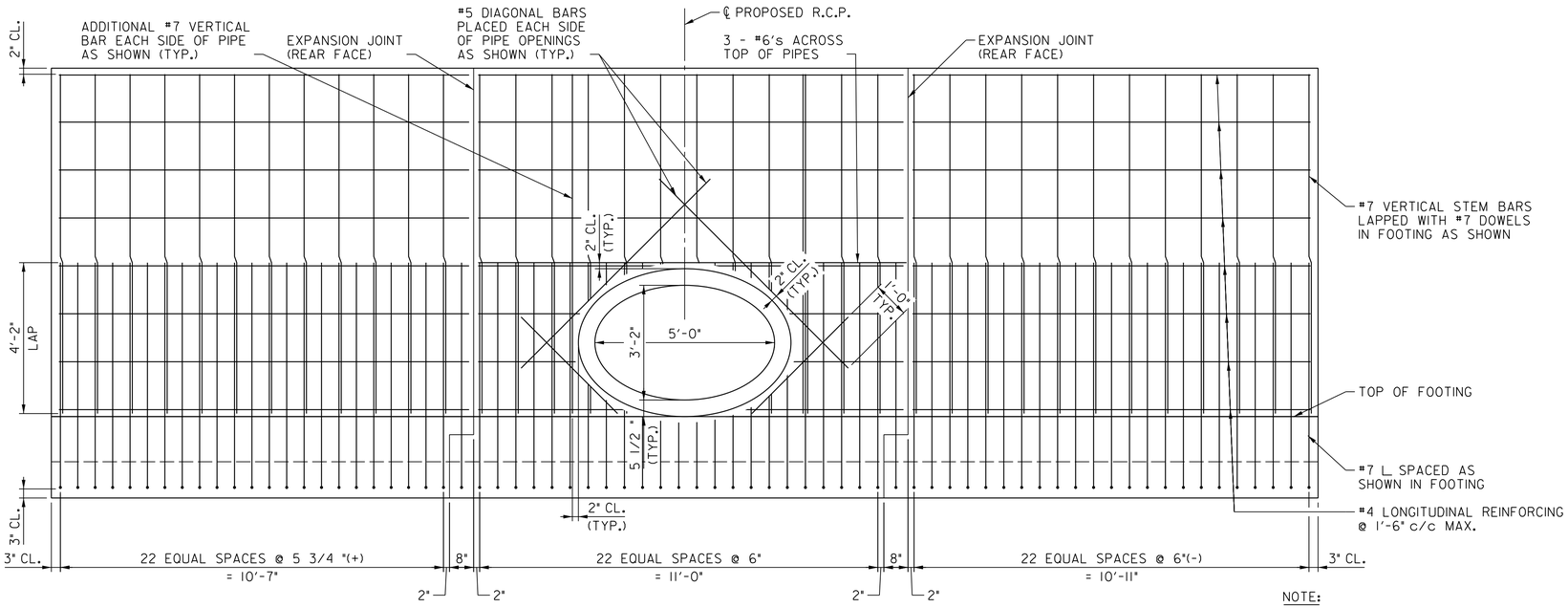
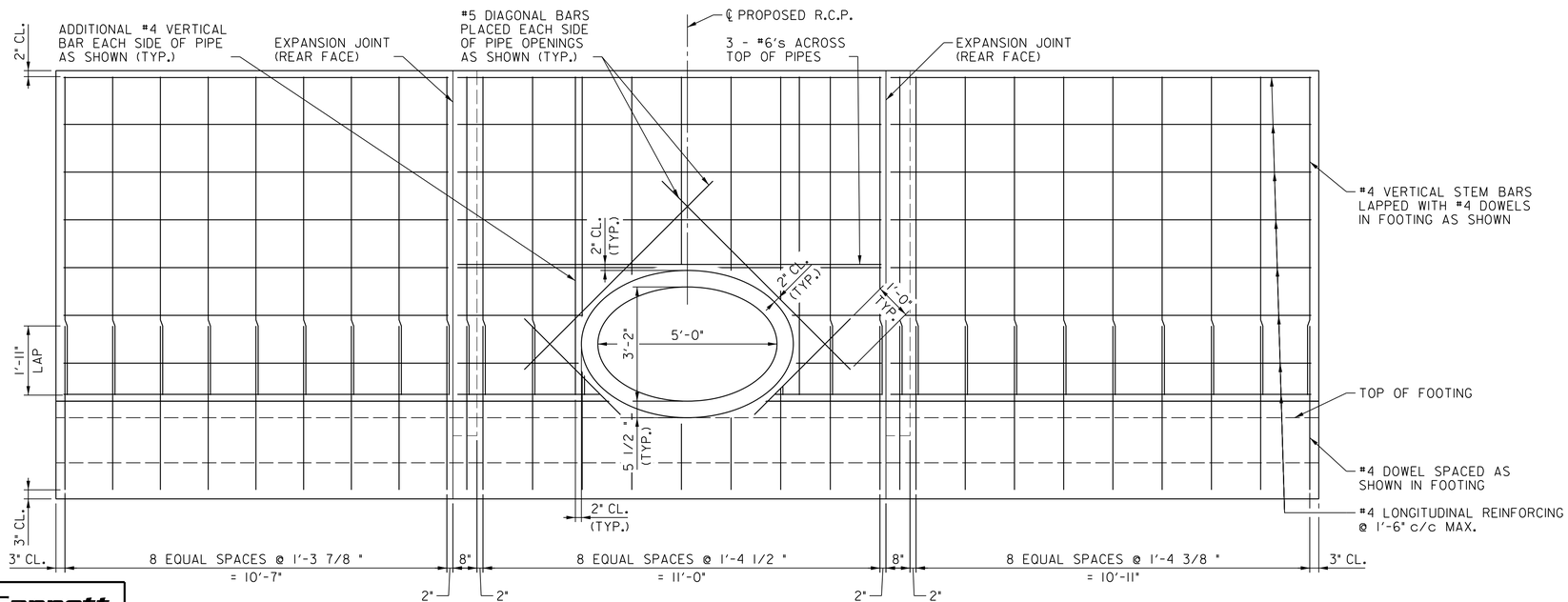


ELEVATION PRECAST DOWNSTREAM HEADWALL – REAR FACE REINFORCING

SCALE: 1/2" = 1'-0"

NOTE:

FOOTING REINFORCING NOT SHOWN.



ELEVATION PRECAST DOWNSTREAM HEADWALL – FRONT FACE REINFORCING

SCALE: 1/2" = 1'-0"

NOTE:

FOOTING REINFORCING NOT SHOWN.

NOTE:

HOLES THROUGH PRECAST HEADWALL SHALL BE ADJUSTED TO ACCOMMODATE THE SKEWED ORIENTATION OF PIPE AS IT PASSES THROUGH THE HEADWALL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND PLACEMENT OF LIFTING DEVICES. IN ADDITION, THE CONTRACTOR AND HIS PRECAST SUPPLIER SHALL VERIFY THAT THE LIFTING POINTS WILL NOT DAMAGE THE HEADWALL OR FOOTING DURING LIFTING.

NOTES:

FOR PLAN AND PROFILE OF PIPE, SEE DRAWING NOS. SI-1 AND SI-3.

FOR ADDITIONAL PIPE DETAILS, SEE DRAWING NO. SI-4.

FOR SECTION DETAIL, SEE DRAWING NO. SI-9.

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03189X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

DOWNSTREAM HEADWALL REINFORCING DETAILS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
This plan is draft and subject to change. It is inter-agency/intra-agency deliberative communication that is not for public disclosure under MD General Provisions Code Annotated Section 4-344 (Maryland Public Information Act)

DRAWING NO. S1-10 OF 18

SHEET NO. 29 OF 57

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

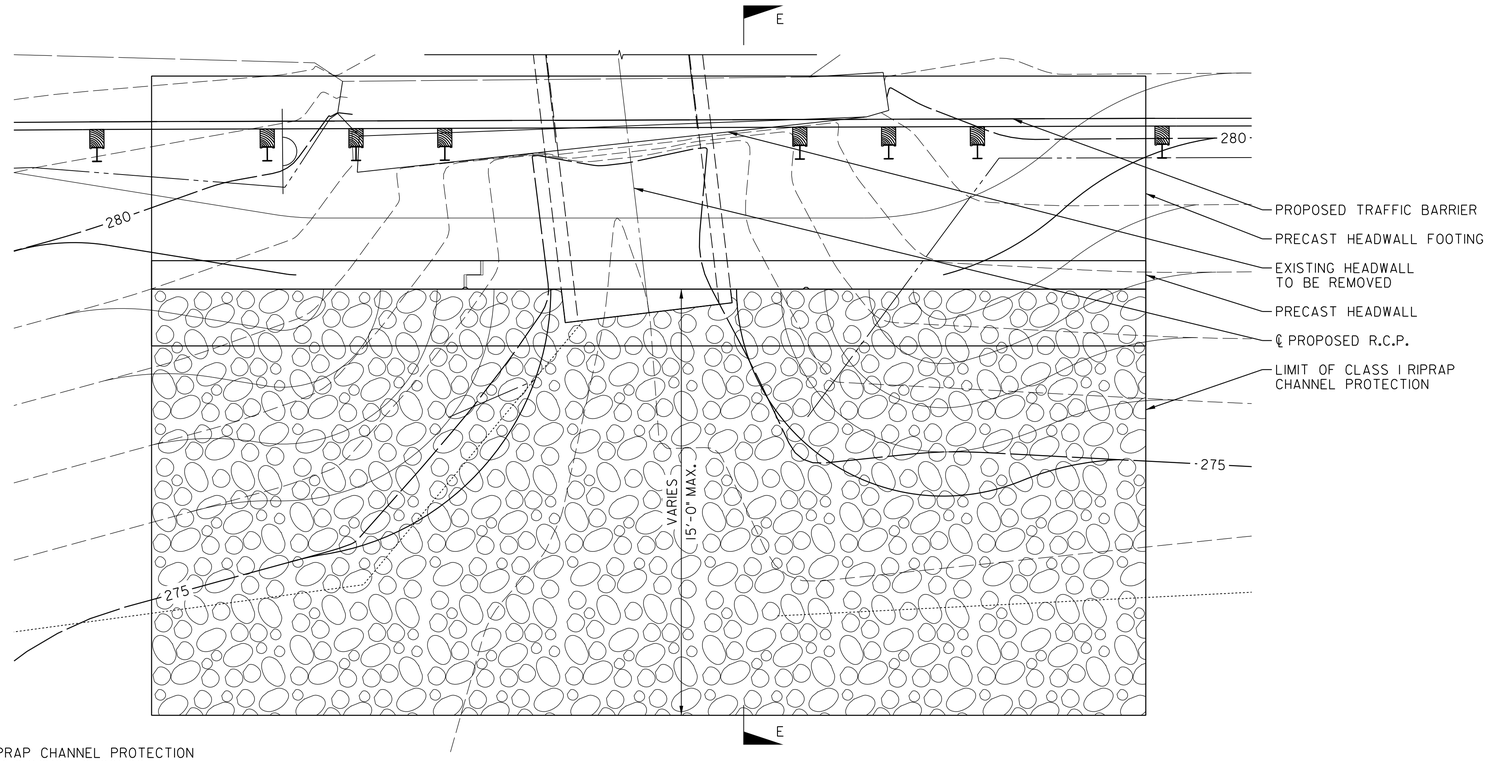
BY: david.clayton –

PLOTTED: 03:55 PM on Friday, May 17, 2019

STRUCTURE INVENTORY NO. 03189XO

SURVEY BOOK NO.

PLOTTED: "03:55 PM on Friday, May 17, 2019"
FILE: M:\2010\23100466.29\Drawings\pBR-DE04_MD_146.dgn



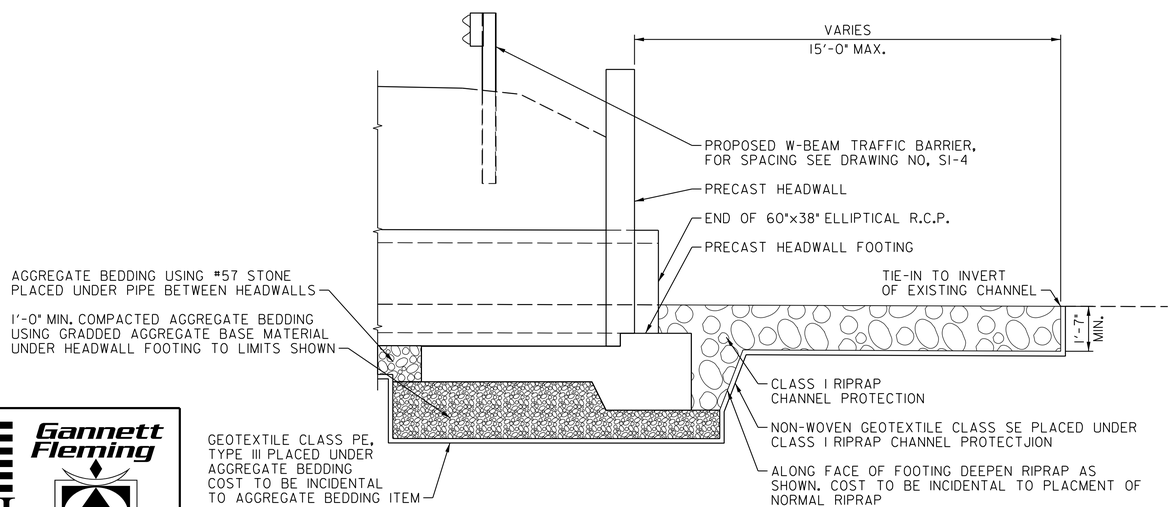
NOTES:

1. ALL MATERIAL FOR RIPRAP CHANNEL PROTECTION SHALL BE CLASS I CONFORMING TO 901.02.

2. REFER TO 312 FOR OTHER REQUIREMENTS AND PAYMENT.

RIPRAP CHANNEL PROTECTION PLAN – DOWNSTREAM END

SCALE: 3⁄8 " = 1'-0"



SECTION E–E
RIPRAP PLACEMENT AT DOWNSTREAM END

SCALE: 3⁄8 " = 1'-0"

DENOTES CLASS I RIPRAP CHANNEL PROTECTION

DENOTES GRADED AGGREGATE BASE MATERIAL PLACED UNDER HEADWALLS

DENOTES AGGREGATE BEDDING USING #57 STONE PLACED UNDER PIPE BETWEEN HEADWALLS

NOTES:

FOR MOT PLAN AND GENERAL NOTES, SEE SHEET NOS. 4 TO 6.
FOR GENERAL PLAN OF PIPE, SEE DRAWING NO. SI-1.
FOR DOWNSTREAM HEADWALL DETAILS, SEE DRAWING NOS. SI-8 TO SI-10.

KCI TECHNOLOGIES
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REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03189X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

DOWNSTREAM RIPRAP CHANNEL PROTECTION

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

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DRAWING NO. SI-11 OF 18

SHEET NO. 30 OF 57

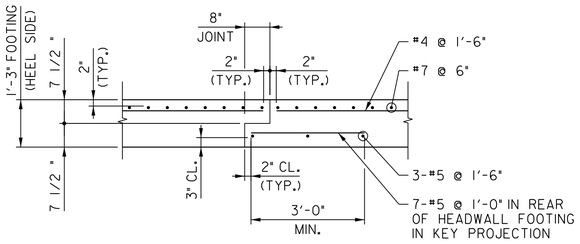
STRUCTURE INVENTORY NO. 03189XO

SURVEY BOOK NO.

PLOTTED: "03:55 PM on Friday, May 17, 2019"
FILE: M:\2010\23100466.29\Drawings\pBR-DR00_MD_146.dgn

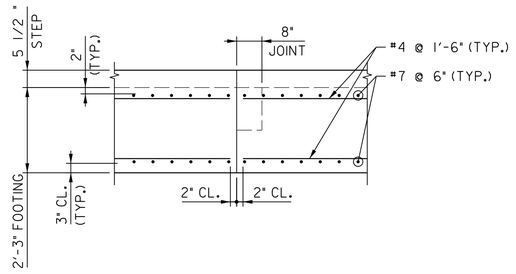
PLOTTED:03:55 PM on Friday, May 17, 2019"

BY: david.clayton –



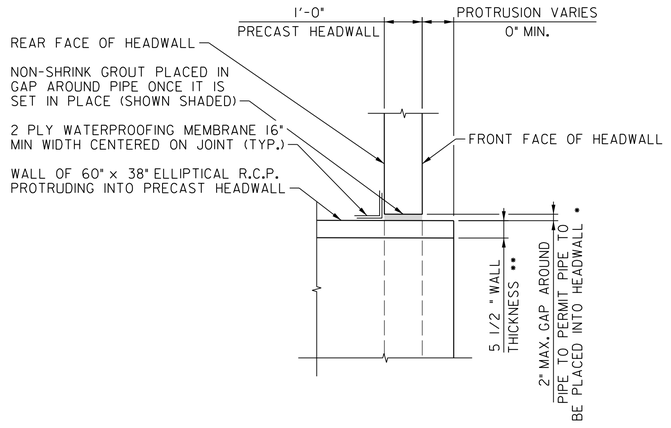
SECTION B–B FOOTING JOINT DETAIL

SCALE: 1/2" = 1'-0"



SECTION C–C FOOTING JOINT DETAIL

SCALE: 1/2" = 1'-0"

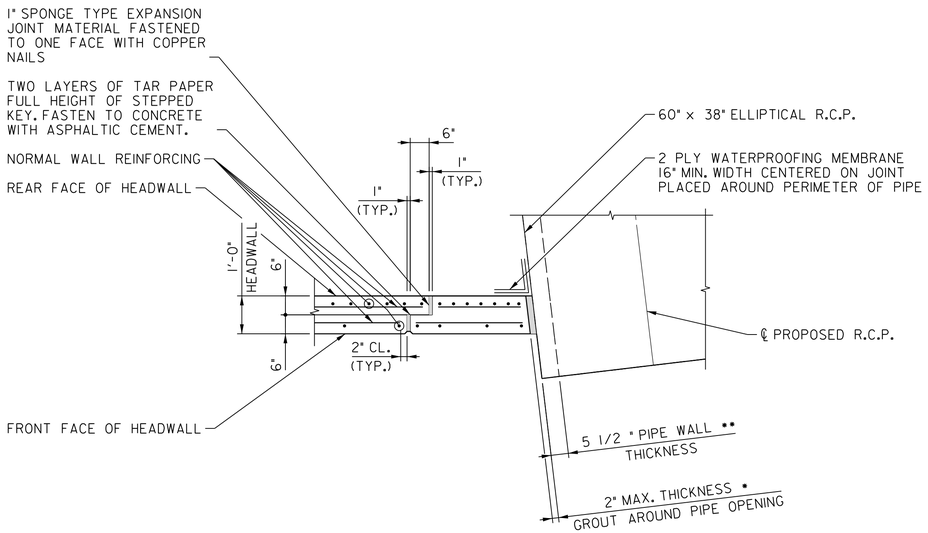


SECTION
PRECAST HEADWALL DETAIL AT PIPE OPENING

SCALE: 1/2" = 1'-0"

- GAP SHALL BE TERMINATED AT BOTTOM OF 60" x 38" ELLIPTICAL R.C.P. TO ALLOW IT TO BEAR FIRMLY ON HEADWALL FOOTING.

•• ASSUMED WALL THICKNESS FOR 60" x 38" ELLIPTICAL R.C.P.



PLAN HEADWALL EXPANSION JOINT LAYOUT

SCALE: 1/2" = 1'-0"

NOTE:

FOR ADDITIONAL HEADWALL DETAILS, SEE DRAWING NOS. SI-5 TO SI-10.

KCI TECHNOLOGIES — Gannett Fleming — *In Joint Venture*

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03189X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

HEADWALL DETAILS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
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DRAWING NO. SI-12 OF 18

SHEET NO. 31 OF 57

BY: david.clayton –

PLOTTED: 03:55 PM on Friday, May 17, 2019

STRUCTURE INVENTORY NO. 03189XO

SURVEY BOOK NO.

PLOTTED: "03:55 PM on Friday, May 17, 2019"
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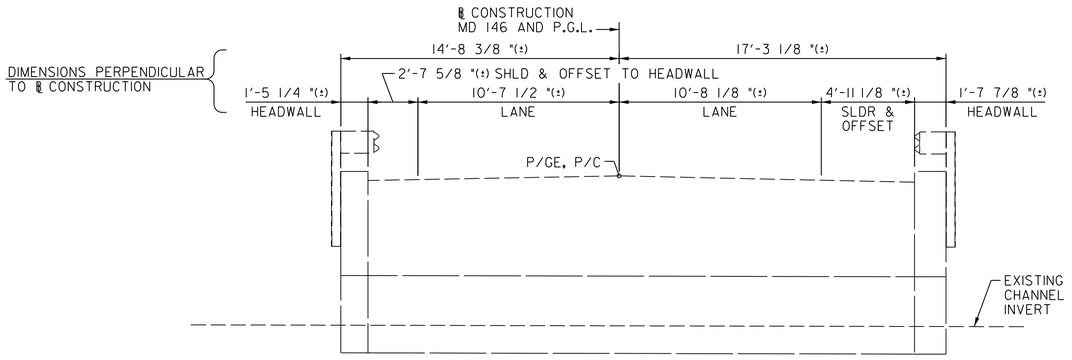
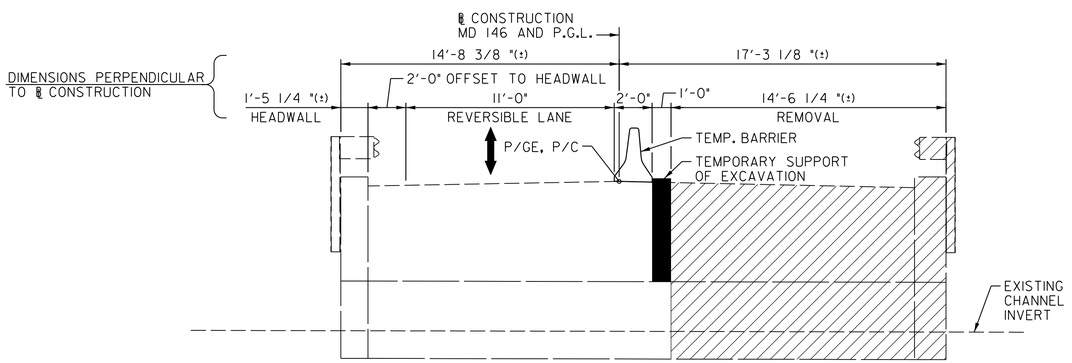


EXISTING TYPICAL SECTION

SCALE: 1/4 " = 1'-0"



SECTION
STAGE I REMOVAL

SCALE: 1/4 " = 1'-0"

STAGE I REMOVAL NOTES:

1. REFER TO MOT PLANS, SHEET NOS. 4 TO 6.
2. SHIFT TRAFFIC AS SHOWN.
3. PLACE TEMPORARY PRECAST CONCRETE TRAFFIC BARRIER AS SHOWN.
4. ONCE THE PRECAST CONCRETE TRAFFIC BARRIER IS IN PLACE THE CONTRACTOR SHALL INSTALL TEMPORARY SUPPORT OF EXCAVATION AND REMOVE RAILING, FILL, HEADWALL AND CULVERT TO THE LIMITS SHOWN HATCHED.

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE
NO. 03189X0 SINGLE 60" x 38" ELLIPTICAL
REINFORCED CONCRETE PIPE ON
MD 146 (DULANEY VALLEY ROAD)
OVER DRAINAGE DITCH

SEQUENCE OF CONSTRUCTION – 1

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

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OFFICE OF STRUCTURES
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DRAWING NO. S1-13 OF 18

SHEET NO. 32 OF 57

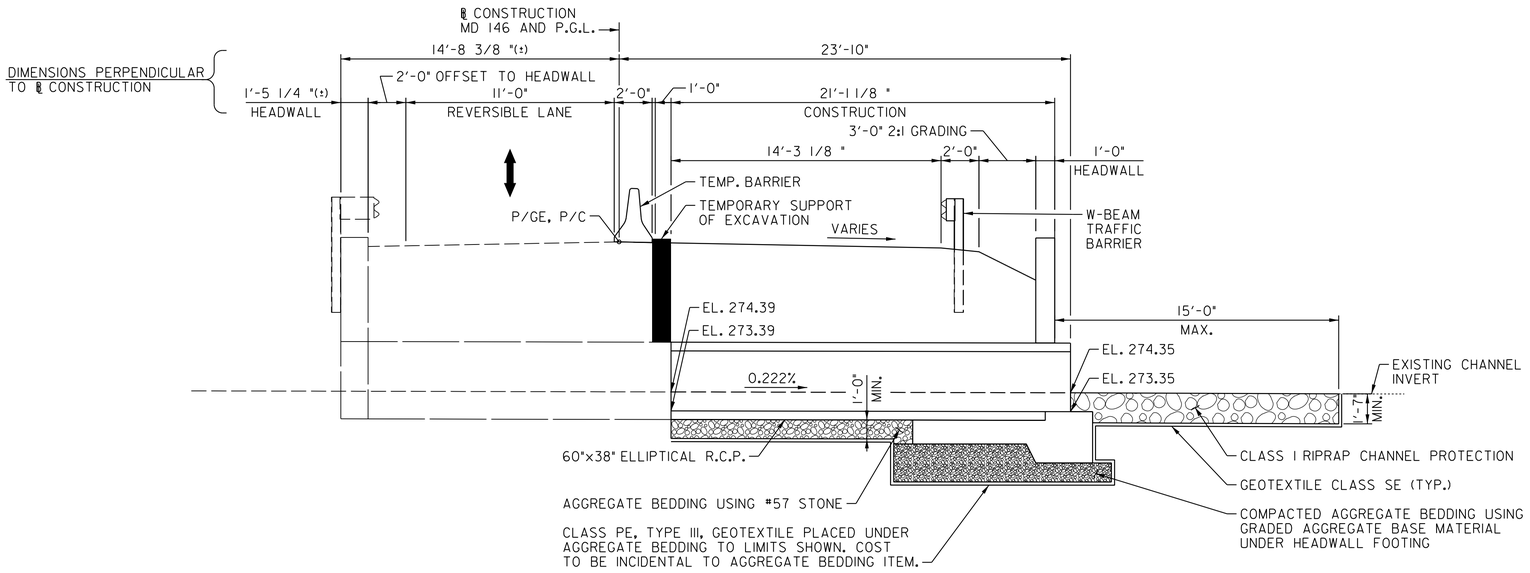
STRUCTURE INVENTORY NO. 03189XO

SURVEY BOOK NO.

BY: david.clayton –

PLOTTED: 03:55 PM on Friday, May 17, 2019
FILE: M:\2010\23100466.29\Drawings\pBR-SC03_MD_146.dgn

PLOTTED: 03:55 PM on Friday, May 17, 2019

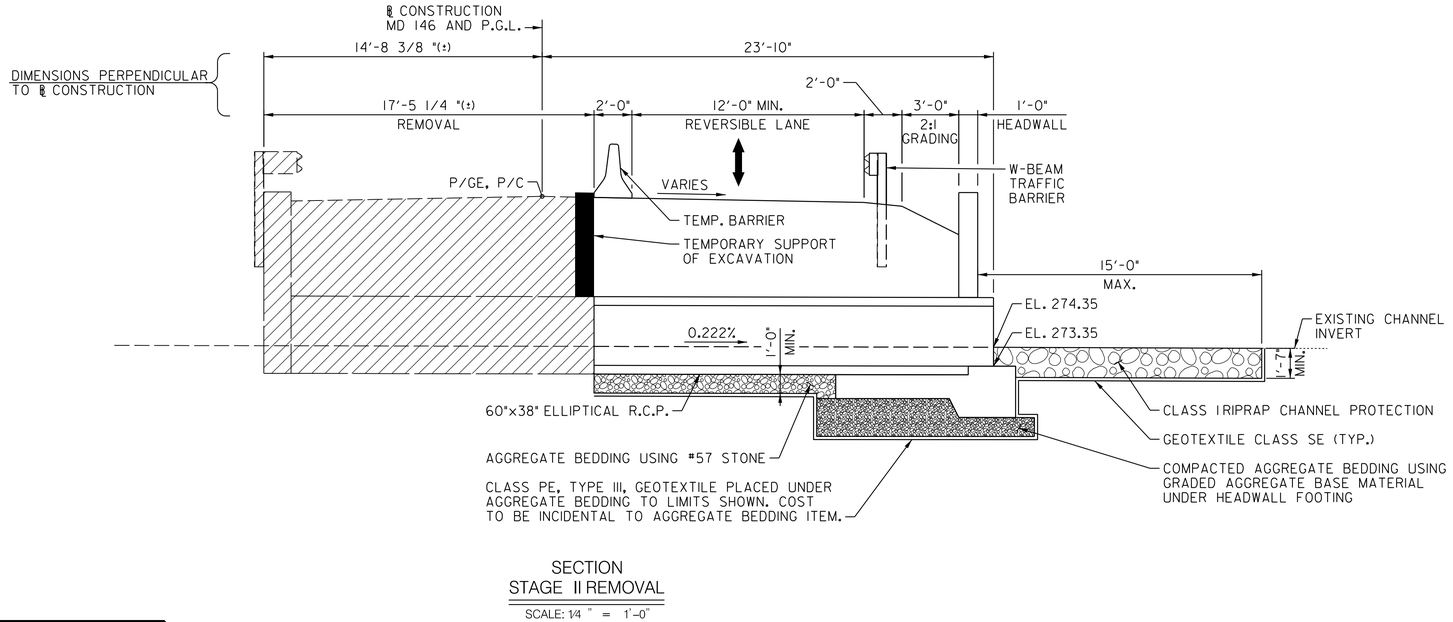


SECTION
STAGE I CONSTRUCTION

SCALE: 1/4 " = 1'-0"

STAGE I CONSTRUCTION NOTES:

1. CONSTRUCT NEW PORTION OF PIPE AND HEADWALL TO THE LIMITS SHOWN.
2. BACKFILL AND INSTALL ROADWAY ASPHALT.
3. INSTALL W-BEAM TRAFFIC BARRIER.
4. REMOVE TEMPORARY PRECAST TRAFFIC BARRIER.
5. RETURN TO TWO LANE TRAFFIC.
6. PLACE CLASS I RIPRAP CHANNEL PROTECTION.



SECTION
STAGE II REMOVAL

SCALE: 1/4 " = 1'-0"

STAGE II REMOVAL NOTES:

1. SHIFT TRAFFIC AS SHOWN.
2. PLACE TEMPORARY PRECAST CONCRETE TRAFFIC BARRIER AS SHOWN.
3. ONCE THE PRECAST CONCRETE TRAFFIC BARRIER IS IN PLACE THE CONTRACTOR SHALL REMOVE RAILING, FILL, HEADWALL AND CULVERT TO THE LIMITS SHOWN HATCHED.

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE
NO. 03189X0 SINGLE 60" x 38" ELLIPTICAL
REINFORCED CONCRETE PIPE ON
MD 146 (DULANEY VALLEY ROAD)
OVER DRAINAGE DITCH

SEQUENCE OF CONSTRUCTION – 2

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
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DRAWING NO. S1-14 OF 18

SHEET NO. 33 OF 57

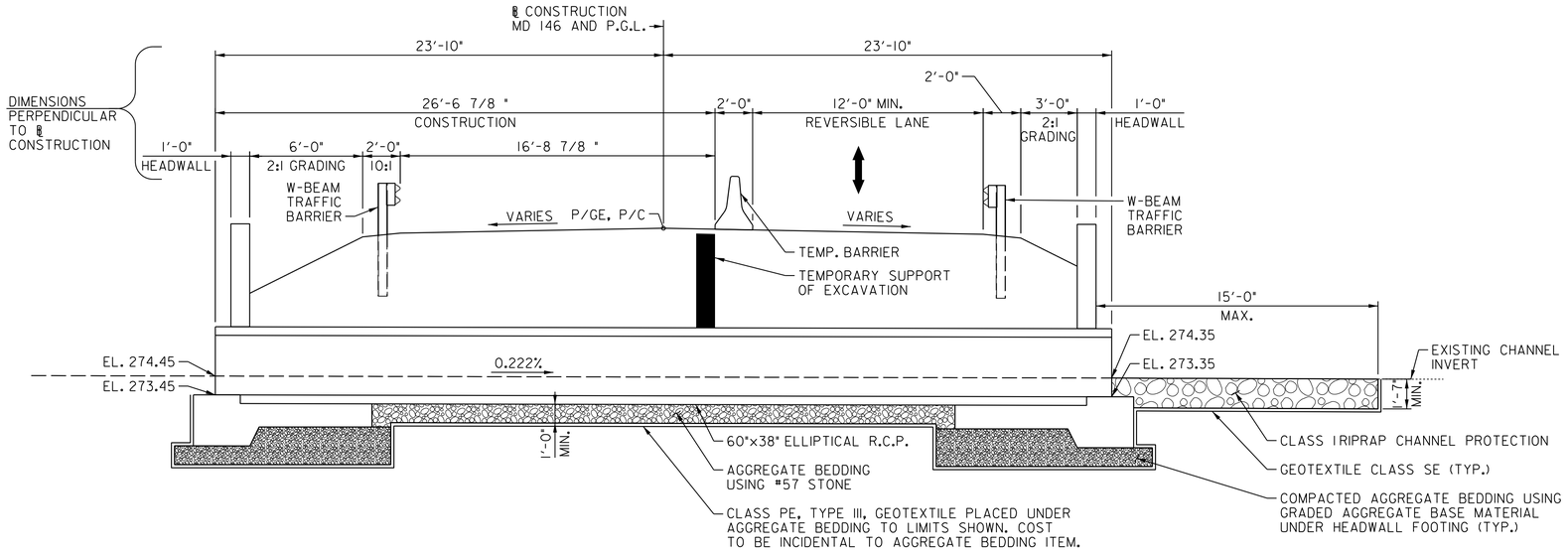
STRUCTURE INVENTORY NO. 03189XO

SURVEY BOOK NO.

PLOTTED: "03:55 PM on Friday, May 17, 2019"
FILE: M:\2010\23100466.29\Drawings\pBR-SC04_MD_146.dgn

BY: david.clayton –

PLOTTED:03:55 PM on Friday, May 17, 2019"

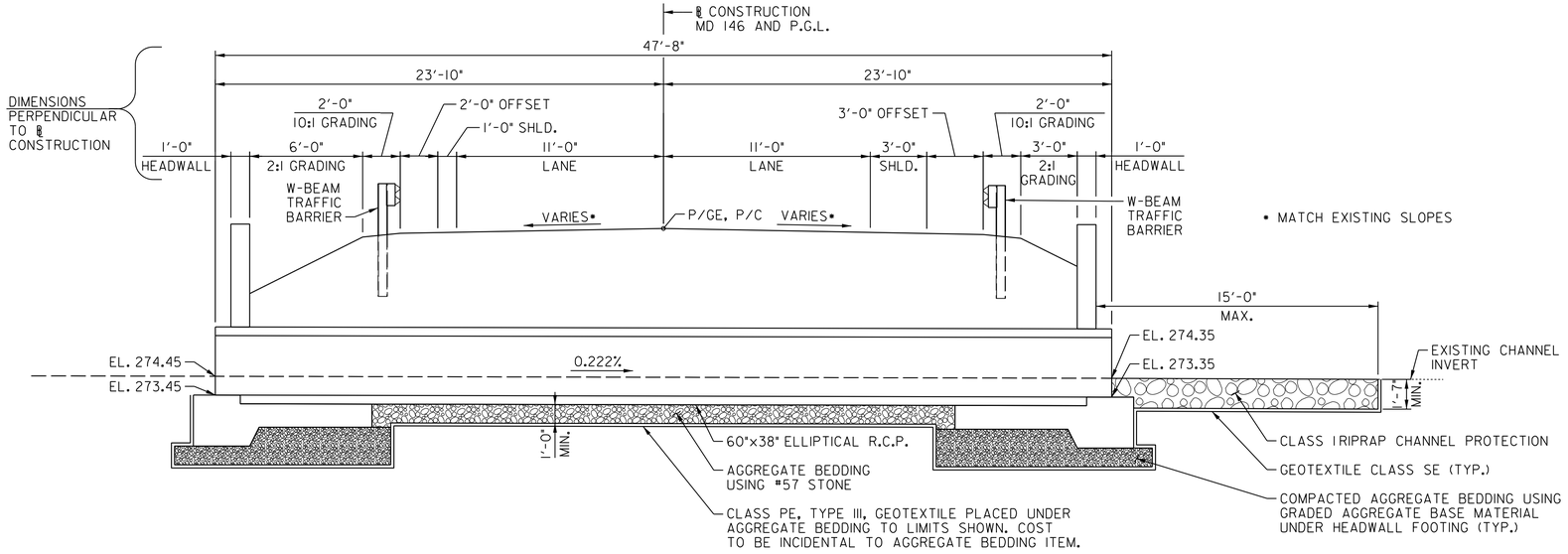


SECTION
STAGE II CONSTRUCTION

SCALE: 1/4 " = 1'-0"

STAGE II CONSTRUCTION NOTES:

1. CONSTRUCT NEW PORTION OF PIPE AND HEADWALL TO THE LIMITS SHOWN.
2. REMOVE PORTION OF TEMPORARY SUPPORT OF EXCAVATION BELOW PROPOSED PAVEMENT SECTION.
3. BACKFILL AND INSTALL ROADWAY ASPHALT.
4. INSTALL W-BEAM TRAFFIC BARRIER.
5. REMOVE TEMPORARY PRECAST CONCRETE TRAFFIC BARRIER.
6. RETURN TRAFFIC TO FINAL PATTERN.



PROPOSED TYPICAL SECTION

SCALE: 1/4 " = 1'-0"

KCI TECHNOLOGIES
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REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03189X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

SEQUENCE OF CONSTRUCTION – 3

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
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DRAWING NO. S1-15 OF 18

SHEET NO. 34 OF 57

BY: david.clayton - PLOTTED: 03:55 PM on Friday, May 17, 2019

STRUCTURE INVENTORY NO. 03189XO

SURVEY BOOK NO.

PLOTTED: 03:55 PM on Friday, May 17, 2019
FILE: M:\2010\23100466.29\Drawings\pBR-SC05_MD_146.dgn

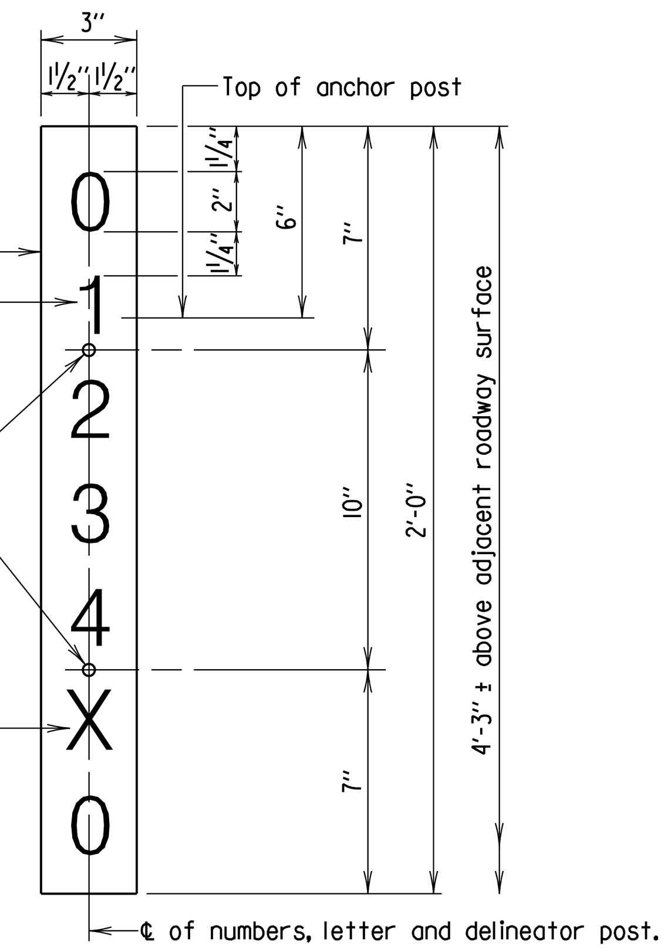
Aluminum sign shall be 3" wide by 2'-0" long by 1/4" thick. Letters shall be 2" green letters with 1 1/4" spacing between letters on white reflective background.

Small structure number

Drill 2 - 3/8" dia. holes spaced as shown for 5/16" dia. stainless steel nuts, bolts and lock washers. Burr threads after installation.

This position may be an X (culvert), R (retaining wall) or N (noise wall)

Note:
Delineator post shall be standard 6' galvanized post.



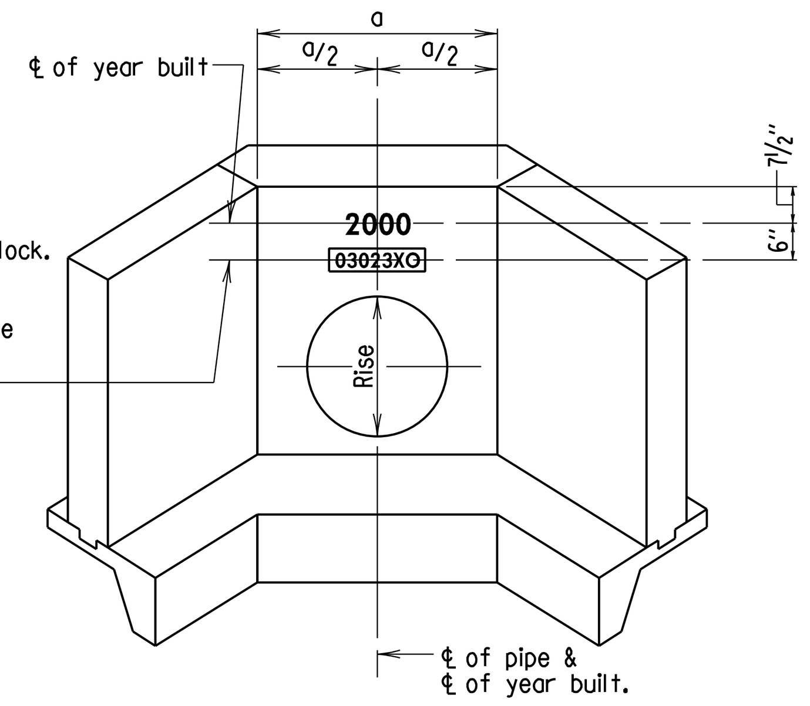
SMALL STRUCTURE SIGN
Scale: None

Placement Notes:

1. The small structure sign shall be placed behind traffic barriers where applicable, (delineator post to be driven within traffic barrier w-beam post). The sign shall be placed at the approach ends of the structure on the right side of the road, at roadway level.
2. Divided highways shall have only one sign placed at each approach end.
3. If traffic barriers are not present, place small structure sign as close to end of structure as possible but sign must be visible from the approach roadway.
4. For noise walls and retaining walls place one small structure sign at each end.
5. For retaining walls that are not visible from the approach roadway, place small structure sign as close to end of structure as possible but sign must be visible from approach roadway. For retaining walls that are visible from the approach roadway, refer to SI-104.
6. Always locate small structure sign so that it will be in the safest position possible relative to highway and pedestrian traffic.

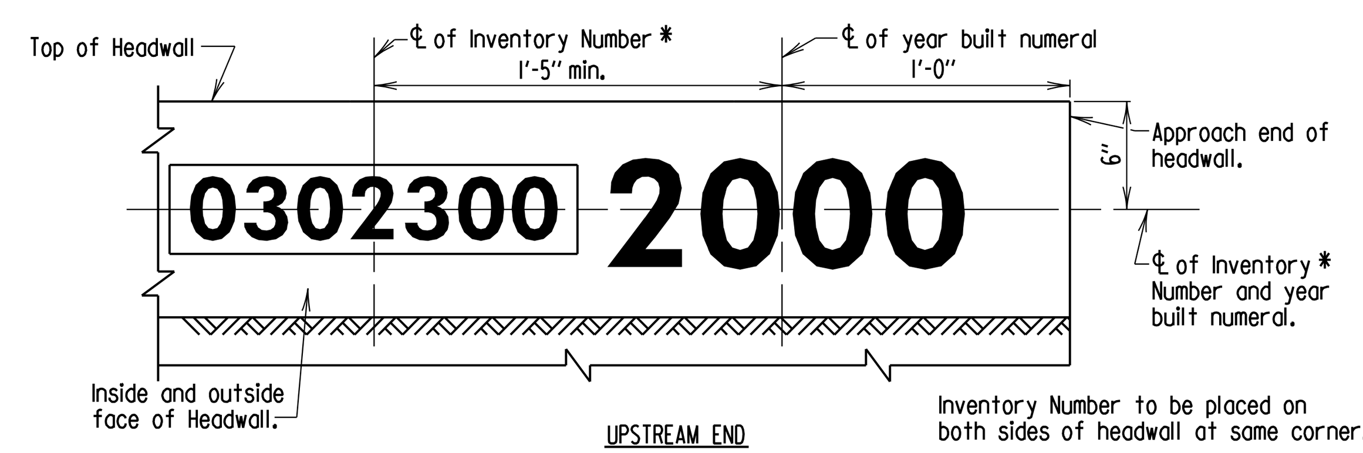
APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR, OFFICE OF STRUCTURES DATE: 09-20-2005	
VERSION	SMALL STRUCTURE SIGN AND PLACEMENT DETAILS
1.0	DETAIL NO. SI-102 SHEET 1 OF 1

Note:
If headwall has a form liner finish, a 14" x 18" smooth block shall be formed for placement of the numbers. See Plans for location of block.



UPSTREAM END

HEADWALLS FOR PIPES AND/OR PIPE ARCHES WITH RISE 3'-0" OR GREATER



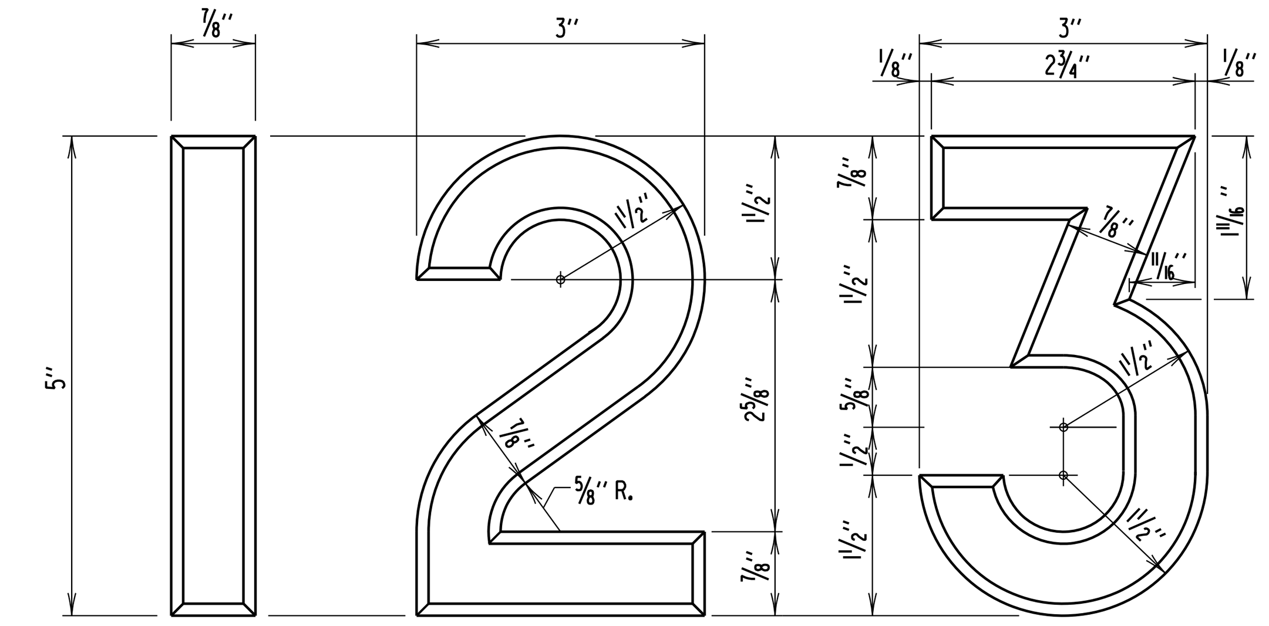
UPSTREAM END

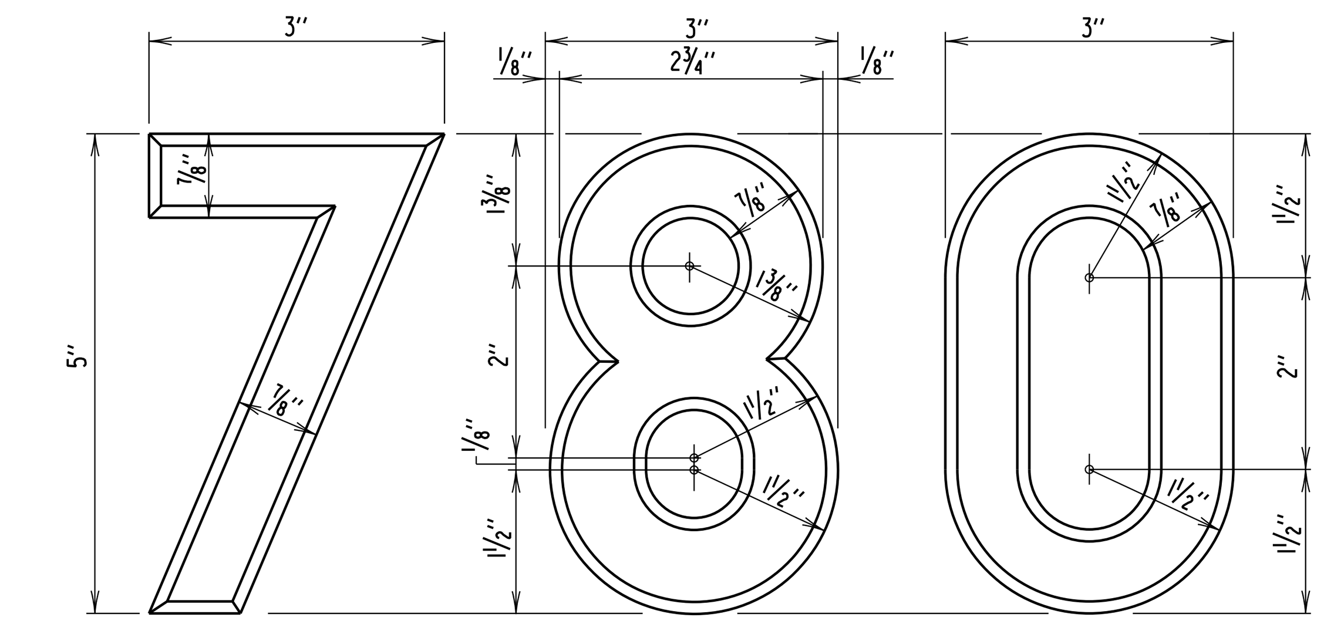
BOX CULVERTS

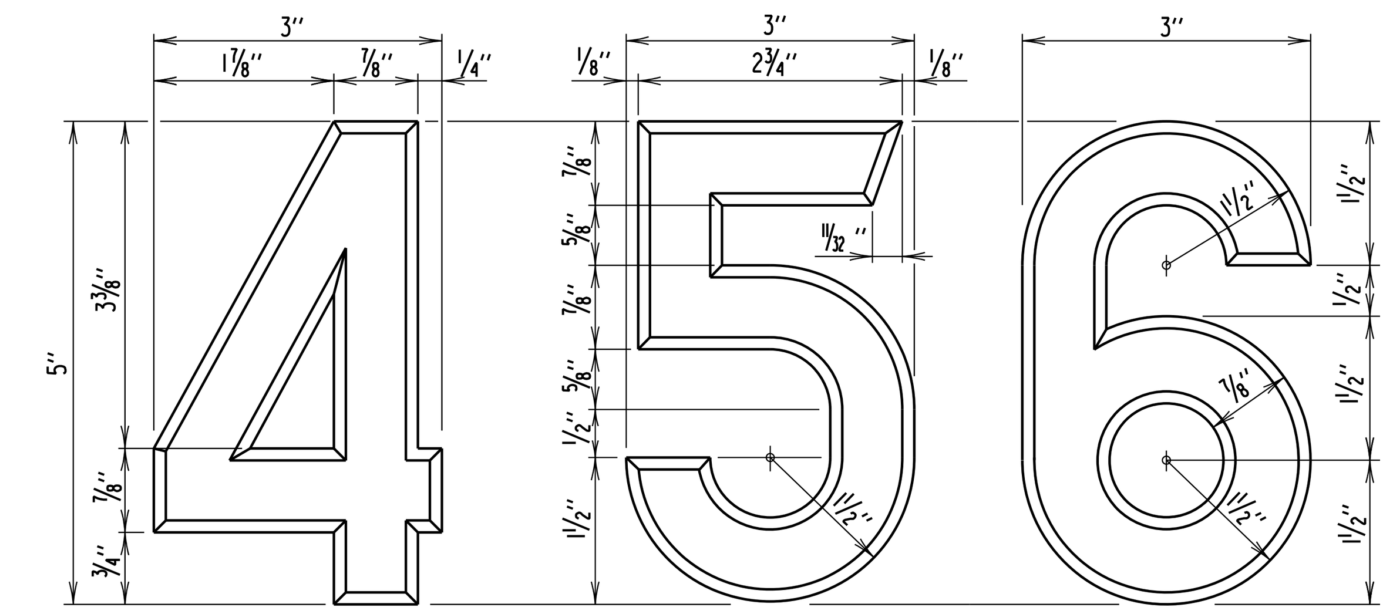
* Black numbers 3" high on a painted white background, (5" x 17").

Notes:
1. For existing structures, where a year built is shown on the structure and structure is to be rehabilitated, the marking should read 1942-2000 (old year first - new year).
2. For existing structures with no year built contact Office of Structures for old year.
3. For Year Built Numerals refer to Standard No. SI-201.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR, OFFICE OF STRUCTURES DATE: 10-17-2013	
VERSION	LOCATION OF YEAR BUILT MARKING AND STRUCTURE INVENTORY NUMBER ON HEADWALLS FOR PIPES AND BOX CULVERTS
1.0	DETAIL NO. SI-103 SHEET 1 OF 1

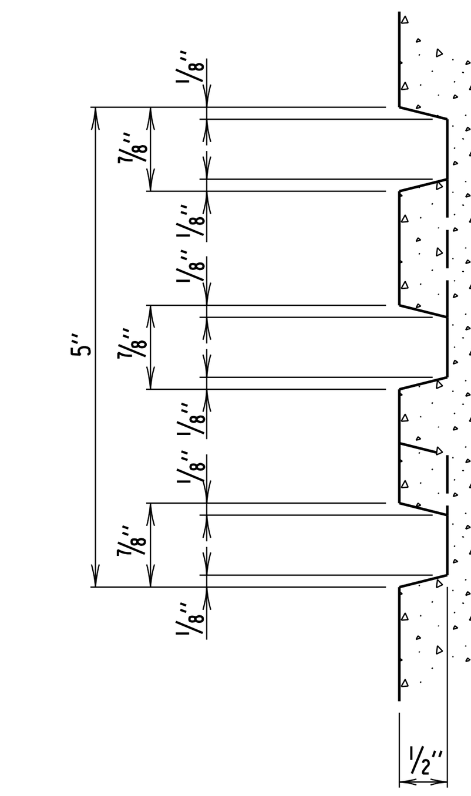




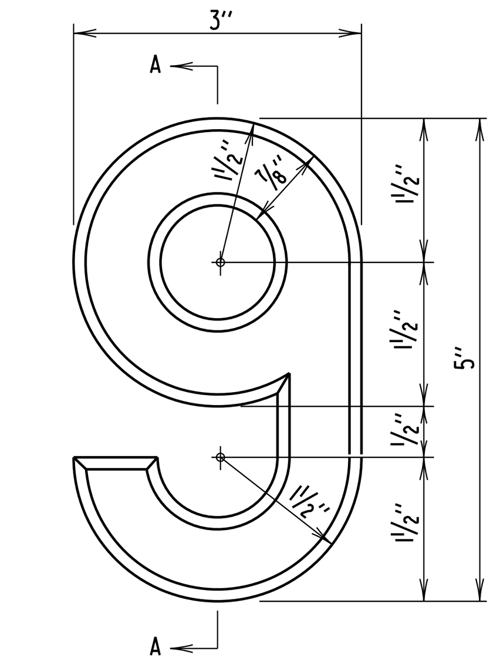


Note:
Year built numerals to be indented into concrete (unpainted) - as indicated on Standard Nos. SI-101, SI-103 and SI-104.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR, OFFICE OF STRUCTURES DATE: 9/14/99	
VERSION	NUMERALS FOR YEAR BUILT MARKING ON STRUCTURES
1.0	DETAIL NO. SI-201 SHEET 1 OF 2



SECTION A-A



APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR, OFFICE OF STRUCTURES DATE: 9/14/99	
VERSION	NUMERALS FOR YEAR BUILT MARKING ON STRUCTURES
1.0	DETAIL NO. SI-201 SHEET 2 OF 2

REVISIONS

MDOT MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03189X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

STANDARD DETAILS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY S.H.A.
DRAWN BY S.H.A.
CHECKED BY S.H.A.

TENTATIVE
OFFICE OF STRUCTURES
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DRAWING NO. S1-16 OF 18
SHEET NO. 35 OF 57

BY: david.clayton

PLOTTED: 03:55 PM on Friday, May 17, 2019

STRUCTURE INVENTORY NO. 03189XO

SURVEY BOOK NO.

PLOTTED: 03:55 PM on Friday, May 17, 2019
FILE: M:\2010\23100466.29\Drawings\03189XOs01.dgn

LOCATION CATEGORY A								
BAR SIZE	CENTER TO CENTER SPACING							
	3″		4″		5″		≥ 6″	
#4	2′-1″	2′-8″	2′-1″	2′-6″	2′-1″	2′-6″	2′-1″	2′-6″
#5	2′-8″	3′-6″	2′-7″	3′-4″	2′-7″	3′-1″	2′-7″	3′-1″
#6	3′-10″	5′-0″	3′-1″	4′-0″	3′-1″	4′-0″	3′-1″	4′-0″
#7	5′-3″	6′-10″	3′-11″	5′-1″	3′-7″	4′-8″	3′-7″	4′-8″
#8	6′-10″	8′-11″	5′-1″	6′-8″	4′-1″	5′-4″	4′-1″	5′-4″
#9	8′-8″	11′-3″	6′-6″	8′-6″	5′-2″	6′-9″	5′-1″	6′-7″
#10	-	-	8′-3″	10′-9″	6′-7″	8′-7″	6′-3″	8′-2″
#11	-	-	10′-1″	13′-3″	8′-1″	10′-7″	7′-6″	9′-9″

Location Category A - Bars in horizontal layers in top of pour with 12″ or more of concrete below them such as in: footings, pier caps, etc.

LOCATION CATEGORY B								
BAR SIZE	CENTER TO CENTER SPACING							
	3″		4″		5″		≥ 6″	
#4	1′-7″	2′-5″	1′-7″	1′-11″	1′-7″	1′-11″	1′-7″	1′-11″
#5	2′-1″	3′-1″	2′-0″	3′-0″	2′-0″	2′-5″	2′-0″	2′-5″
#6	3′-0″	4′-5″	2′-5″	3′-7″	2′-5″	3′-7″	2′-5″	3′-7″
#7	4′-0″	6′-0″	3′-0″	4′-6″	2′-9″	4′-2″	2′-9″	4′-2″
#8	5′-3″	7′-10″	3′-11″	5′-11″	3′-2″	4′-9″	3′-2″	4′-9″
#9	6′-8″	10′-0″	5′-0″	7′-6″	4′-0″	6′-0″	3′-11″	5′-10″
#10	-	-	6′-4″	9′-6″	5′-1″	7′-7″	4′-10″	7′-2″
#11	-	-	7′-10″	11′-8″	6′-3″	9′-4″	5′-9″	8′-8″

Location Category B - All bars not in Location Category A.

(blank box) = Non-epoxy coated (shaded box) = Epoxy coated

Note:
1. When bar lap is not specified on the Plans, the above dimensions shall be used.
2. These bar laps do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These bar laps only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f′c = 4000 psi.
4. These bar laps assume cover of 2″. Greater lap lengths will be required for cover less than 2″.
5. These bar laps are Class B splices based on the development lengths in Std. No. REBAR-DL-103. Class B splices are 1.3 times the development length.
6. Class A splices may be used when (a) the area of reinforcement provided is at least twice that required by analysis over the entire length of the lap splice and (b) one-half or less of the total reinforcement is spliced within the required lap splice length. Class A splices are 1.0 times the development length.

APPROVAL
DIRECTOR, OFFICE OF STRUCTURES
DATE: 03/21/2017
VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

BAR LAP DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.6 (4500 P.S.I.) CONCRETE

DETAIL NO. REBAR-BL-103 SHEET 1 OF 1

LOCATION CATEGORY A								
BAR SIZE	CENTER TO CENTER SPACING							
	3″		4″		5″		≥ 6″	
#4	1′-7″	2′-1″	1′-7″	1′-11″	1′-7″	1′-11″	1′-7″	1′-11″
#5	2′-1″	2′-8″	2′-0″	2′-7″	2′-0″	2′-5″	2′-0″	2′-5″
#6	3′-0″	3′-10″	2′-5″	3′-1″	2′-5″	3′-1″	2′-5″	3′-1″
#7	4′-0″	5′-3″	3′-0″	3′-11″	2′-9″	3′-7″	2′-9″	3′-7″
#8	5′-3″	6′-10″	3′-11″	5′-2″	3′-2″	4′-1″	3′-2″	4′-1″
#9	6′-8″	8′-8″	5′-0″	6′-6″	4′-0″	5′-3″	3′-11″	5′-1″
#10	-	-	6′-4″	8′-3″	5′-1″	6′-7″	4′-10″	6′-3″
#11	-	-	7′-10″	10′-2″	6′-3″	8′-2″	5′-9″	7′-6″

Location Category A - Bars in horizontal layers in top of pour with 12″ or more of concrete below them such as in: footings, pier caps, etc.

LOCATION CATEGORY B								
BAR SIZE	CENTER TO CENTER SPACING							
	3″		4″		5″		≥ 6″	
#4	1′-3″	1′-10″	1′-3″	1′-6″	1′-3″	1′-6″	1′-3″	1′-6″
#5	1′-7″	2′-5″	1′-6″	2′-3″	1′-6″	1′-10″	1′-6″	1′-10″
#6	2′-3″	3′-5″	1′-10″	2′-9″	1′-10″	2′-9″	1′-10″	2′-9″
#7	3′-1″	4′-8″	2′-4″	3′-6″	2′-2″	3′-2″	2′-2″	3′-2″
#8	4′-0″	6′-0″	3′-0″	4′-6″	2′-5″	3′-8″	2′-5″	3′-8″
#9	5′-2″	7′-8″	3′-10″	5′-9″	3′-1″	4′-7″	3′-0″	4′-6″
#10	-	-	4′-11″	7′-4″	3′-11″	5′-10″	3′-9″	5′-7″
#11	-	-	6′-0″	9′-0″	4′-10″	7′-2″	4′-5″	6′-8″

Location Category B - All bars not in Location Category A.

(blank box) = Non-epoxy coated (shaded box) = Epoxy coated

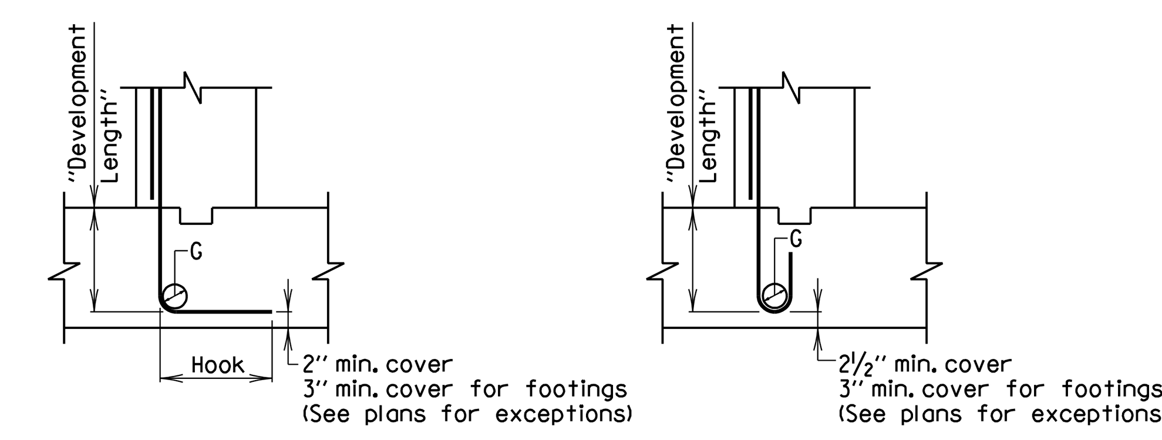
Note:
1. When development length is not specified on the Plans, the above dimensions shall be used.
2. These development lengths do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These development lengths only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f′c = 4000 psi.
4. These development lengths assume cover of 2″. Greater development lengths will be required for cover less than 2″.
5. The Excess Reinforcement Factor was assumed to be 1.0 when calculating these dimensions.
6. Atr was assumed to be 0 when calculating the Reinforcement Confinement Factor.
7. If depth of member does not allow bar development length indicated in Location Categories A and B; then hooks shall be added to all bars not conforming, as per D, E, and F per Std. No. REBAR-DL-203.

APPROVAL
DIRECTOR, OFFICE OF STRUCTURES
DATE: 03/21/2017
VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

DEVELOPMENT LENGTH DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.6 (4500 P.S.I.) CONCRETE

DETAIL NO. REBAR-DL-103 SHEET 1 OF 1



STANDARD 90° HOOK   STANDARD 180° HOOK

BAR SIZE	* LOCATION CATEGORY		
	D	E	F
#4	7″	10″	8″
#5	9″	1′-0″	10″
#6	10″	1′-3″	1′-0″
#7	1′-0″	1′-5″	1′-2″
#8	1′-2″	1′-7″	1′-4″
#9	1′-4″	1′-10″	1′-6″
#10	1′-5″	2′-1″	1′-8″
#11	1′-7″	2′-3″	1′-10″

Note:
For Hook Dimensions and Bends, see Std. No. REBAR-BB-102.

* LOCATION CATEGORY:

D- All bars terminating with a standard 180° hook with side cover (normal to plane of hook) not less than 2½″, and for 90° deg. hook, cover on bar extension beyond hook not less than 2″.
E- All bars not in Category D.
F- All bars with hook enclosed vertically or horizontally within ties or stirrup-ties spaced along the full development length not greater than 3d where d is the diameter of the hooked bar.

Note:
1. When development length is not specified on the Plans, the above dimensions shall be used.
2. These development lengths do not apply when bar is in lightweight concrete or any other strength of concrete.
3. These development lengths only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi. and Concrete Design, f′c = 4000 psi.
4. If depth of member does not allow bar development length indicated in Categories A, B, and C: Std. No. REBAR-DL-103; then hook shall be added to all bars not conforming, as per D, E & F.

APPROVAL
DIRECTOR, OFFICE OF STRUCTURES
DATE: 05/10/2011
VERSION 1.0

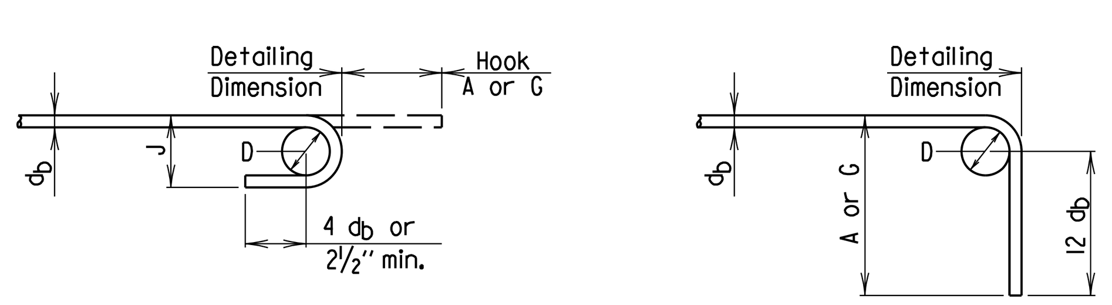
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

DEVELOPMENT LENGTH DIMENSIONS OF HOOKED BARS FOR GRADE 60 REINFORCING STEEL IN MIX NO. 6 (4500 P.S.I.) CONCRETE NON-EPOXY COATED REINFORCING

DETAIL NO. REBAR-DL-203 SHEET 1 OF 1

HOOKS
TABLE I
REFERENCES

1. ACI Types 1 thru 26
2. SHA Standard Pin Bending
3. SHA Radius Bending



RECOMMENDED END HOOKS, ALL GRADES				
BAR SIZE	Finished bend diameter	180 - deg hook		90 - deg hook
	D, in.	A or G in	J, in.	A or G in
#3	2¼	5	3	6
#4	3	6	4	8
#5	3¾	7	5	10
#6	4½	8	6	1-0
#7	5¼	10	7	1-2
#8	6	11	8	1-4
#9	9½	1-3	11¾	1-7
#10	10¾	1-5	1-1¼	1-10
#11	12	1-7	1-2¾	2-0
#14	18¼	2-3	1-9¾	2-7
#18	24	3-0	2-4½	3-5

APPROVAL
DIRECTOR, OFFICE OF STRUCTURES
DATE: 11/17/1997
VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

REINFORCING STEEL HOOK TABLES AND DIAGRAMS

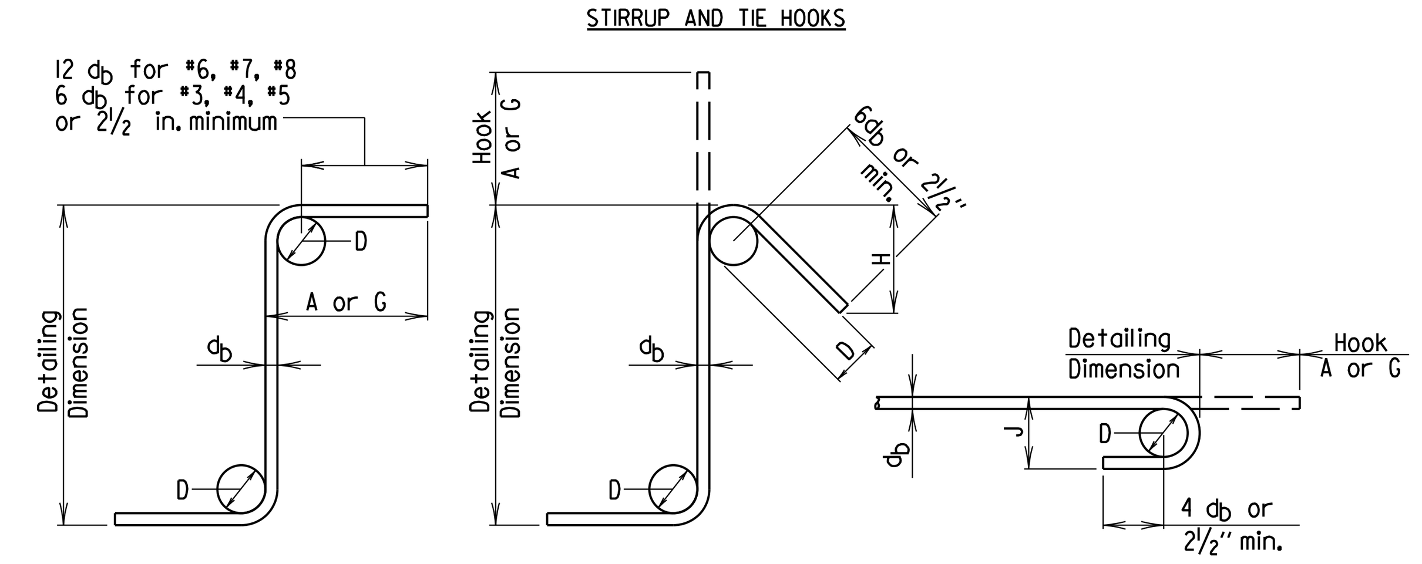
DETAIL NO. REBAR-BB-102 SHEET 1 OF 2

HOOKS
TABLE II
REFERENCES

1. ACI Types S1 thru S11
2. ACI Types T1 thru T8
3. SHA Ties and Stirrups

(Note: Tie and stirrup types supplied in sizes #3-#8)

STIRRUP AND TIE HOOKS



STIRRUP AND TIE HOOK DIMENSIONS, in.				
BAR SIZE	D, in.	90 - deg hook	135 - deg hook	
		A or G	A or G	H, approx
#3	1½	4	4	2½
#4	2	4½	4½	3
#5	2½	6	5½	3¾
#6	4½	1-0	7¾	4½
#7	5¼	1-2	9	5¼
#8	6	1-4	10¼	6

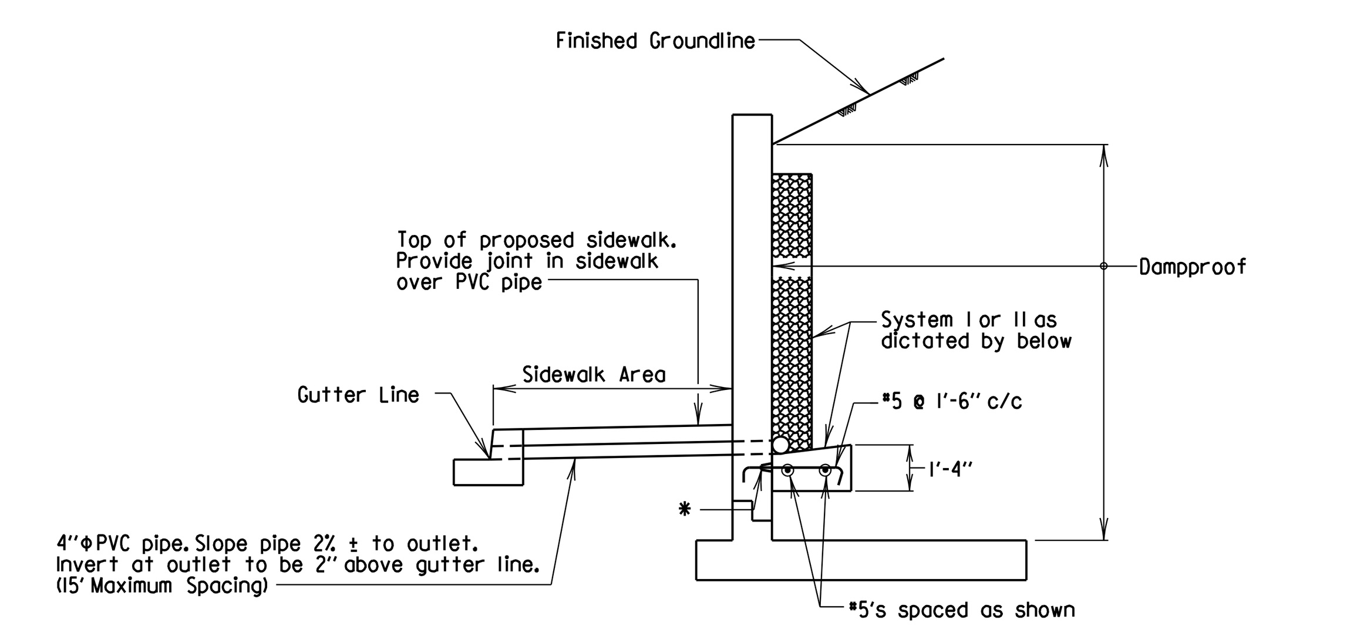
RECOMMENDED END HOOKS, ALL GRADES			
BAR SIZE	Finished bend diameter	180 - deg hook	
	D, in.	A or G in	J, in.
#3	2¼	5	3
#4	3	6	4
#5	3¾	7	5
#6	4½	8	6
#7	5¼	10	7
#8	6	11	8

APPROVAL
DIRECTOR, OFFICE OF STRUCTURES
DATE: 11/17/1997
VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

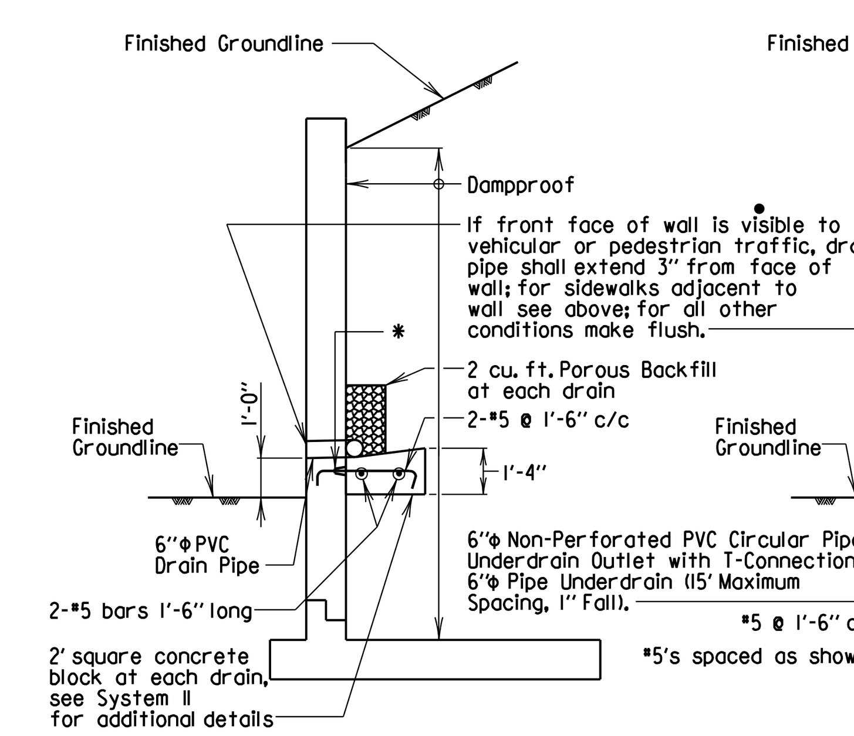
REINFORCING STEEL HOOK TABLES AND DIAGRAMS

DETAIL NO. REBAR-BB-102 SHEET 2 OF 2



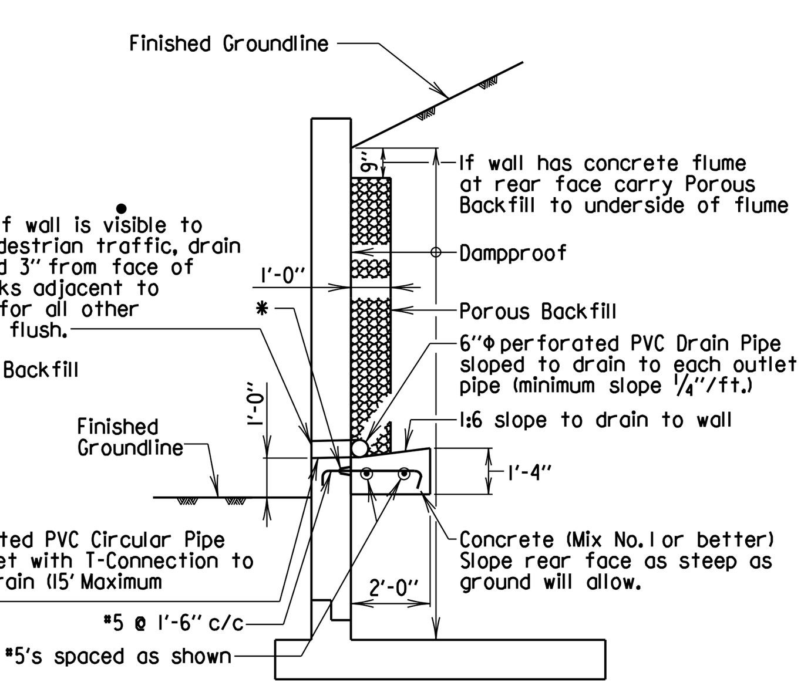
DRAIN AT SIDEWALK
Scale : None

* #5 Threaded Rebar Dowel Coupler at 1′-6″ c/c.



This system shall be used for all box culvert wing walls and other wing walls that are both less than 30′ long and less than 16′ high (height of wall from bottom of footing to top of highest section). One drain shall be placed at ℄ of wall for all walls less than 15′ long. For walls between 15′ and 30′ long, two drains shall be placed, one at each third point.

SYSTEM I
Scale : None



This system shall be used for all retaining walls, all wing walls (not in System I).

SYSTEM II
Scale : None

Note:
1. Exact elevation of drain to be determined by Engineer in field.
2. Porous backfill (refer to Section 469).
3. Use this standard for bridges with wing walls that are not parallel to the highway. For bridges with wing walls parallel to the highway see Std. No. SUB-DR-203 sheet 5 of 5 for details.

APPROVAL
DIRECTOR, OFFICE OF STRUCUTRES
DATE: 01/22/2001
VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

RETAINING WALL AND WING WALL DRAINAGE SYSTEMS

DETAIL NO. RW-301 SHEET 1 OF 1

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03189X0 SINGLE 60″ x 38″ ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

STANDARD DETAILS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY S.H.A.
DRAWN BY S.H.A.
CHECKED BY S.H.A.

TENTATIVE
OFFICE OF STRUCTURES
This plan is draft and subject to change. It is interagency/intra-agency deliberative communication that is not for public disclosure under MD General Provisions Code Annotated Section 4-344 (Maryland Public Information Act)

DRAWING NO. S1-17 OF 18   SHEET NO. 36 OF 57

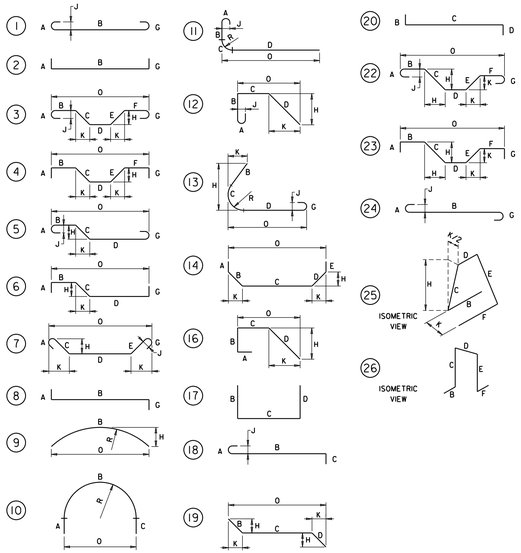
STRUCTURE INVENTORY NO. 03189XO   SURVEY BOOK NO.

BY: david.clayton –

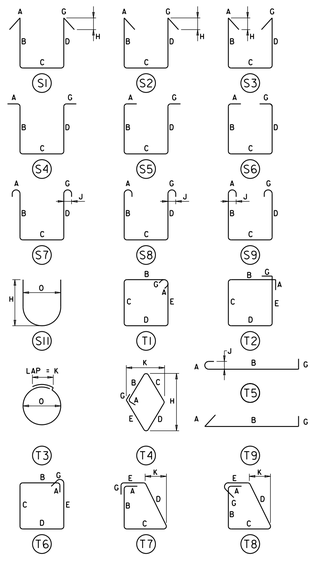
PLOTTED:03:55 PM on Friday, May 17, 2019"

PLOTTED: "03:55 PM on Friday, May 17, 2019"
FILE: M:\2010\23100466.29\Drawings\03189XOs02.dgn

ACI TYPICAL BAR BENDS



STANDARD PIN BENDING



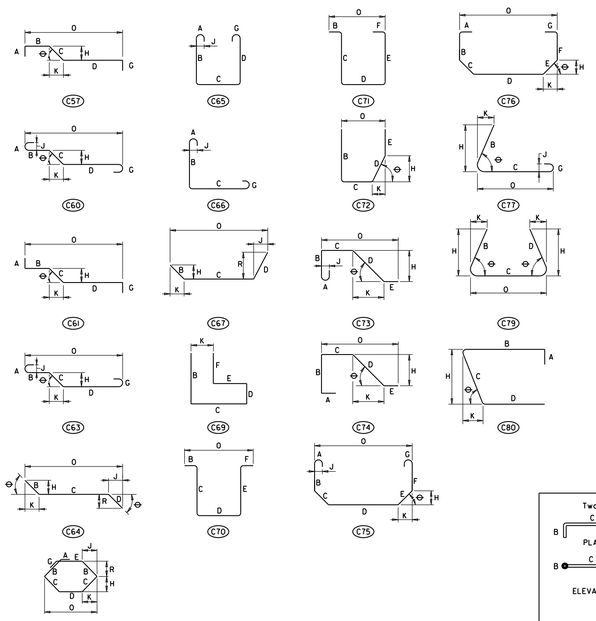
NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

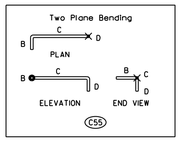
TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

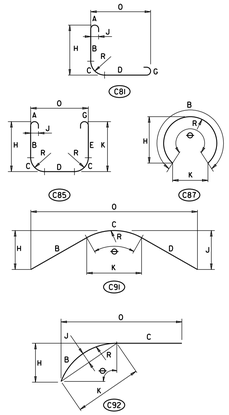
TIES AND STIRRUPS

SHA TYPICAL BAR BENDS

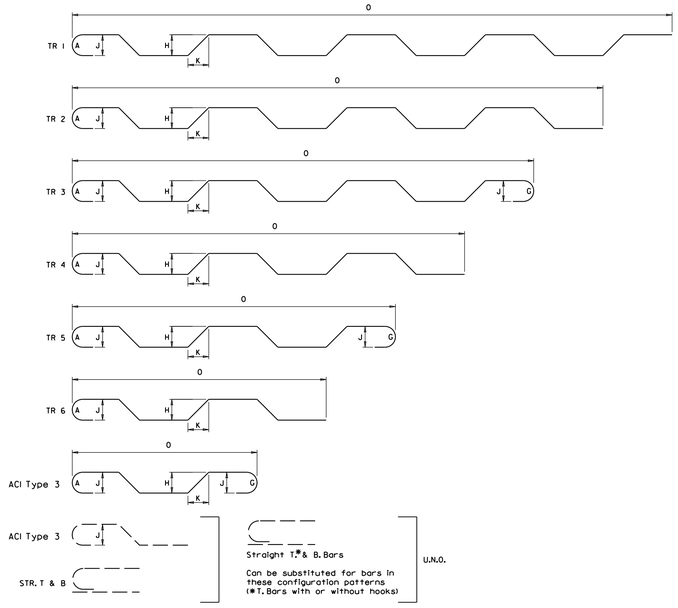


STANDARD PIN BENDING

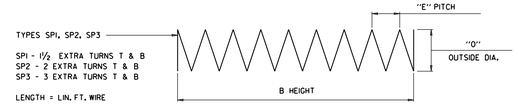




RADIUS BENDING

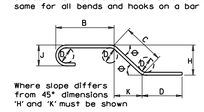


TRUSS BAR CONFIGURATION



SPIRAL

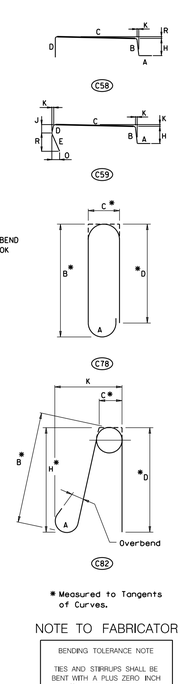
Unless otherwise noted diameter D is the same for all bends and hooks on a bar



ENLARGED VIEW SHOWING BAR BENDING DETAILS

Notes:
1. All dimensions are out to out of bar or to tangent points for 135° and 180° hooks.
2. 'J' dimensions on 180° hooks to be shown only where necessary to restrict hook size. Otherwise standard hooks are to be used.
3. Where 'J' is not shown, 'J' will be kept equal to or less than 'H' on truss bars. Where 'J' can exceed 'H' it should be shown.
4. 'H' dimension on stirrups to be shown where necessary to fit within concrete.
5. Where bars are to be bent more accurately than standard bending tolerances, bending dimensions which require closer fabrication should have limits indicated.

GENERAL NOTES



* Measured to Tangents of Curves.

NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

TIES AND STIRRUPS

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03189X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

STANDARD DETAILS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY S.H.A.
DRAWN BY S.H.A.
CHECKED BY S.H.A.

TENTATIVE
OFFICE OF STRUCTURES
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DRAWING NO. S1-18 OF 18

SHEET NO. 37 OF 57

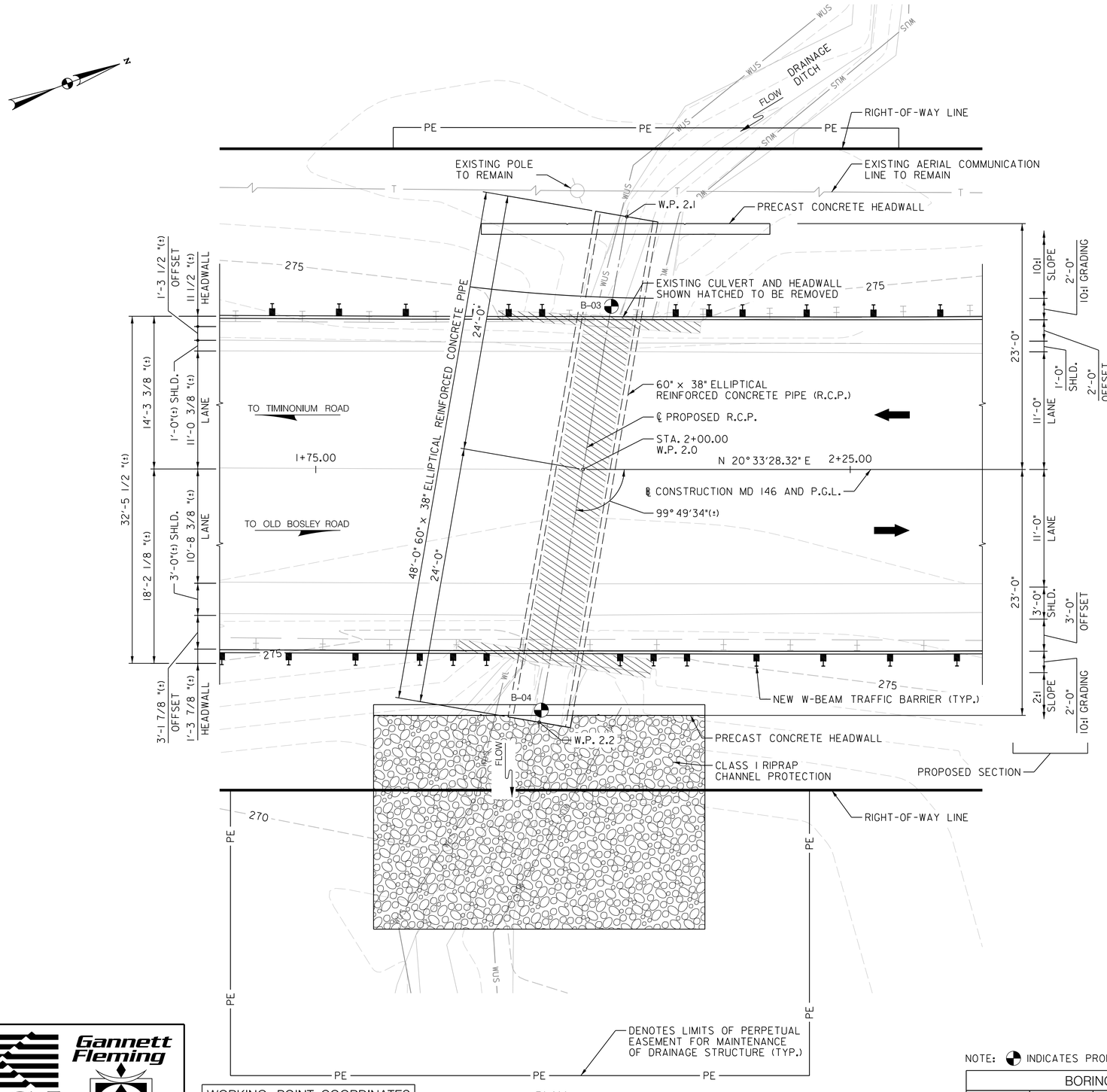
BY: david.clayton -

PLOTTED: 03:55 PM on Friday, May 17, 2019

STRUCTURE INVENTORY NO. 03189XO

SURVEY BOOK NO.

PLOTTED: "03:55 PM on Friday, May 17, 2019"
FILE: M:\2010\23100466.29\Drawings\03189XOs03.dgn



PLAN

SCALE: 3/16 " = 1'-0"

NOTE: ⊕ INDICATES PROPOSED BORING LOCATION.

BORING LOCATION

BORING NO.	STATION	OFFSET	NORTHING	EASTING
B-03	2+02.61	15.25' L	652,159.87'	1,427,646.31'
B-04	1+96.14	22.50' R	652,140.48'	1,427,679.38'

WORKING POINT COORDINATES

W.P.	NORTHING	EASTING
2.0	652152.0347	1427659.6704
2.1	652164.1737	1427638.9667
2.2	652139.8956	1427680.3741

KCI TECHNOLOGIES — Gannett Fleming — *In Joint Venture*

BY: david.clayton

GENERAL NOTES:

SPECIFICATIONS: -SHA SPECIFICATIONS DATED MAY, 2017
-REVISIONS THEREOF AND ADDITIONS THERETO AND SPECIAL PROVISIONS FOR MATERIALS AND CONSTRUCTION.

AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS DATED 2014 WITH INTERIMS.

CONCRETE DESIGN: LOAD AND RESISTANCE FACTOR DESIGN METHOD. f'c = 4,000 PSI

REINFORCING STEEL DESIGN: f's = 60,000 PSI

LOADING: HL-93

PIPE: 60"x38" ELLIPTICAL PIPE SHALL BE CONCRETE CONFORMING TO CLASS V PIPE. ALL PIPE JOINTS SHALL HAVE GASKETS TO PROVIDE A WATER TIGHT CONNECTION.

CONCRETE: ALL CONCRETE FOR PRECAST HEADWALLS SHALL BE MIX NO. 6 (4,500 PSI).

REINFORCING STEEL: REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60. ALL SPLICES, NOT SHOWN, SHALL BE LAPPED AS PER BAR LAP CHARTS. MINIMUM COVER FOR ANY BAR SHALL BE 2" UNLESS OTHERWISE NOTED, WITH THE EXCEPTION OF BARS AT THE BOTTOM AND SIDES OF ALL FOOTINGS WHICH SHALL HAVE 3" MINIMUM COVER.

FOR TIES AND STIRRUPS: STANDARD ACI BENDING TOLERANCES ARE MODIFIED TO PLUS (+) ZERO INCHES, MINUS (-) NORMAL ACI BENDING TOLERANCES.

ONLY GRADE 60 CAN BE USED ON THIS PROJECT.

ALL REINFORCING STEEL IN THE HEADWALLS SHALL BE EPOXY COATED.

KEYS: ALL KEYS ARE NOMINAL SIZE.

EXCAVATION: ALL EXCAVATION REQUIRED FOR THE PLACEMENT OF THE NEW HEADWALLS AND PIPE WILL BE MEASURED AND PAID FOR AS CLASS I EXCAVATION. NO OTHER CLASS OF EXCAVATION WILL BE PAID FOR ON THIS PROJECT.

EXISTING STRUCTURE: ALL DIMENSIONS AFFECTED BY THE GEOMETRICS, AND/OR LOCATION OF THE EXISTING STRUCTURE SHALL BE CHECKED IN THE FIELD BY THE CONTRACTOR, BEFORE ANY CONSTRUCTION IS DONE, AND BEFORE ANY MATERIAL IS ORDERED OR FABRICATED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SUPPLY THE ENGINEER WITH ALL FIELD DIMENSIONS REQUIRED TO CHECK DETAIL DRAWINGS. THE ± MARKS SHOWN WITH DIMENSIONS AND STATIONS DO NOT INDICATE ANY DEGREE OF PRECISION. THESE MARKS (±) INDICATE EXISTING DIMENSIONS AND STATIONS THAT MAY VARY AND DO REQUIRE FIELD VERIFICATION BY THE CONTRACTOR.

EXISTING CULVERT AND HEADWALLS SHOWN IN LONG DASHED LINES TO BE COMPLETELY REMOVED.

COVER FOR CONCRETE BOXES, PIPES AND/OR PIPE ARCHES: NO CONSTRUCTION EQUIPMENT, WITH THE EXCEPTION OF THE ROADWAY PAVING EQUIPMENT DURING THE PAVING OPERATION, SHALL BE PERMITTED TO PASS OVER THE PIPE UNTIL THE ROADWAY PAVING HAS BEEN COMPLETED.

NOTES:

FOR MOT PLAN AND GENERAL NOTES, SEE SHEET NOS. 4 AND 6.
FOR PIPE PROFILE AND DETAILS, SEE DRAWING NO. S2-3.
FOR HEADWALL DETAILS, SEE DRAWING NOS. S2-5 TO S2-10.
FOR PIPE SEQUENCE OF CONSTRUCTION, SEE DRAWING NOS. S2-13 TO S2-15.

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

GENERAL PLAN AND NOTES

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
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DRAWING NO. S2-1 OF 18

SHEET NO. 38 OF 57

PLOTTED: 03:55 PM on Friday, May 17, 2019

STRUCTURE INVENTORY NO. 03190XO

SURVEY BOOK NO.

PLOTTED: "03:55 PM on Friday, May 17, 2019"
FILE: M:\2010\23100466.29\Drawings\pBR-GP01_MD_146.dgn

HYDROLOGIC DATA

I. SOURCE: ______

PREPARED BY: ☐ SHA ☐ CONSULTANT: ______ DATE: ______

FILE LOCATION: ______

II. DRAINAGE AREA: ______ ACRES ______ SQUARE MILES ______

III. METHOD(S) OF ANALYSIS:

- ______ USGS GAGE DATA ANALYSIS
  - GAGING STATION NO. ______
  - LOCATION ______
  - DRAINAGE AREA ______
  - YEARS OF CONTINUOUS RECORD ______
- ______ USGS REGRESSION EQUATIONS
  REFERENCE ______
- ______ SCS TR - 20 METHOD - VERSION USED (DATE) ______
  - RCN (EXISTING-HOMOGENEOUS WATERSHED)[1] ______
  - RCN (ULTIMATE HOMOGENEOUS WATERSHED)[1] ______
  - T_C (HOMOGENEOUS WATERSHED)[1] ______
- ______ FEMA BASE FLOOD (100-YEAR) DISCHARGE ______ (CFS) METHOD USED BY FEMA ______
- ______ OTHER (DESCRIBE) ______

HAS FLOOD ROUTING BEEN USED IN DETERMINING FLOOD DISCHARGES? YES ______ NO ______

METHOD SELECTED ______

IV. COMPUTED FLOOD DISCHARGES

RETURN PERIOD (YEARS)	FLOOD DISCHARGE (CFS)	
	BASED ON EXISTING WATERSHED DEVELOPMENT	BASED ON ULTIMATE WATERSHED DEVELOPMENT
2		
10		
25		
50		
100		
500		

V. HISTORIC FLOODS

YEAR	MAGNITUDE (CFS)	HIGH WATER ELEVATION	WHERE MEASURED	SOURCE OF DATA

VI. STREAM MORPHOLOGY

STREAM TYPE ______ VALLEY TYPE ______

STREAM BED MATERIAL:

DESCRIPTION ______ D16 ______ D50 ______ D84 ______

BANK FULL CHARACTERISTICS:

Q ______ AREA ______ WIDTH ______ DEPTH ______

SLOPE ______ MANNINGS "n" VALUE ______ SINUOSITY ______

VII. TIDAL FLOWS

100-YEAR STORM TIDE ELEVATION (FT) ______ MAXIMUM DISCHARGE (CFS) ______

500-YEAR STORM TIDE ELEVATION (FT) ______ MAXIMUM DISCAHRGE (CFS) ______

SOURCE OF INFORMATION ______

DESIGN DISCHARGE ______ (CFS) RETURN PERIOD ______ YEARS TIDAL PERIOD (HRS) ______

HOW DETERMINED? (EXPLAIN) ______

WATER SURFACE-ELEVATION FOR DESIGN CONDITION (FT)
(IF TIDAL FLOW GOVERNS HYDRAULIC DESIGN) ______

VII. COMMENTS: ______

BY: david.clayton –

PLOTTED: Friday, May 17, 2019 AT 03:55 PM

HYDRAULIC DATA

I. SOURCE: ______

PREPARED BY: ☐ SHA ☐ CONSULTANT: ______ DATE: ______

FILE LOCATION: ______ ITEM 71 RATING[2] ______

METHOD(S) OF ANALYSIS: ______

II. HYDRAULIC DATA

FLOW CONDITIONS[3]	CHANNEL CROSS-SECTION	STRUCTURE WATERWAY AREA[4]	ENERGY SLOPE[4]	WATER SURFACE ELEVATION[4]	CHANNEL[5]				LEFT OVERBANK LOOKING DOWNSTREAM[5]				RIGHT OVERBANK LOOKING DOWNSTREAM[5]				DISCHARGE OVER ROAD
					Q	W	V	D	Q	W	V	D	Q	W	V	D	
Q DESIGN DESCRIBE ______	APPROACH[8] (DESCRIBE LOCATION BELOW)	N/A															N/A
	UPSTREAM AT STRUCTURE																
	DOWNSTREAM AT STRUCTURE						[6]	[7]									N/A
Q 100 DESCRIBE ______	APPROACH[8] (DESCRIBE LOCATION BELOW)	N/A															N/A
	UPSTREAM AT STRUCTURE																
	DOWNSTREAM AT STRUCTURE						[6]	[7]									N/A
Q INCIPIENT OVERTOPPING, Q 500 OR OTHER DISCHARGE DESCRIBE ______	APPROACH[8] (DESCRIBE LOCATION BELOW)	N/A															N/A
	UPSTREAM AT STRUCTURE																
	DOWNSTREAM AT STRUCTURE						[6]	[7]									N/A

III. BRIDGE SCOUR DATA ______

A. SCOUR EVALUATION STUDY TITLE: ______

PREPARED BY: ☐ SHA ☐ CONSULTANT: ______ DATE: ______

FILE LOCATION: ______ ITEM 113 RATING[2] ______

B. SCOUR ESTIMATES:

	DESIGN CONDITIONS (DESCRIBE SPECIAL CONDITIONS SUCH AS OVERTOPPING, LOW TAILWATER, INFLUENCE OF CONFLUENCES, ETC.)	FLOOD DISCHARGE		LONG TERM DEGRADATION / AGGRADATION (FT)	CONTRACTION[9] SCOUR DEPTH (LOOKING DOWNSTREAM) (FT)			CHANNEL BED LOAD (DESCRIBE)	TYPE OF SCOUR (LIVE BED/CLEAR WATER)
		RETURN PERIOD (YEARS)	MAGNITUDE (CFS)		LT OVERBANK	MAIN CHANNEL	RT OVERBANK		
DESIGN FLOOD FOR SCOUR									
CHECK FLOOD FOR SCOUR									
OTHER									

TOTAL SCOUR: ESTIMATED TOTAL SCOUR AT SUBSTRUCTURE/ CHANNEL ELEMENTS (INCLUDES LONG TERM DEGRADATION/AGGRADATION PLUS CONTRACTION SCOUR, PLUS LOCAL SCOUR)

LOCATION OF CHANNEL OR SUBSTRUCTURE ELEMENT	ELEVATION OF BOTTOM OF STREAM CHANNEL BED OR SCOUR HOLE (FT)[10]		
	DESIGN FLOOD	CHECK FLOOD	SCOUR COUNTER MEASURES ☐ EXISTING ☐ NEW
CHANNEL THALWEG			
ABUTMENT:			
ABUTMENT:			
PIER NO.			
PIER NO.			
PIER NO.			
PIER NO.			
PIER NO.			
PIER NO.			
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PIER NO.			
PIER NO.			
PIER NO.			
PIER NO.			
PIER NO.			

NOTES:

BLANK SPACES INDICATE THAT DATA IS NOT AVAILABLE OR IS NOT APPLICABLE

1. PARAMETERS COMPUTED ASSUMING THE WATERSHED IS HOMOGENEOUS WITHOUT SUBDIVISIONS
2. ITEM 71 RATING AND ITEM 113 RATING; REFER TO THE OBD GUIDE FOR COMPLETING THE SI&A INPUT FORMS.
3. RECORD FLOW CONDITIONS USED IN ANALYSIS: DISCHARGE (Q), TAILWATER CONDITION AND HOW SELECTED, ETC. (FOR DEPRESSED CULVERTS, INDICATE UNDER COMMENTS THE ASSUMPTIONS MADE AS TO WHETHER SEDIMENT WILL REMAIN DURING FLOODS)
4. FOR CULVERTS, USE THESE THREE COLUMNS TO RECORD:
   - DEPTH OF FLOW AT CULVERT INLET AND OUTLET
   - WATER-SURFACE ELEVATION AT CULVERT INLET AND OUTLET
   - ENERGY SLOPE FOR CULVERT BARREL
5. SYMBOLS USED:
   Q = FLOW OR DISCHARGE (CFS)
   W = CHANNEL WIDTH OR FLOODPLAIN WIDTH (FT)
   V = FLOW VELOCITY (FPS)
   D = DEPTH OF FLOW (FT)
6. FOR CULVERTS, RECORD OUTLET VELOCITY HERE
7. FOR CULVERTS , RECORD TAILWATER DEPTH HERE
8. APPROACH SECTION SHOULD BE SELECTED AS PER GUIDANCE IN ABSCOUR USERS MANUAL
9. ENTER CONTRACTION SCOUR DEPTHS ONLY (APPROXIMATE LINE 121 IN ABSCOUR OUTPUT) - NOT ABUTMENT SCOUR
10. IF SCOUR RESISTENT BEDROCK CONTROLS SCOUR, ENTER BEDROCK ELEVATION AND NOTE THIS CONDITION UNDER COMMENTS
11. RECORD INCIPIENT OVERTOPPING DISCHARGE (Q) AND RECURRENCE INTERVAL
12. RECORD CLEARANCE BETWEEN WATER SURFACE ELEVATION AND LOW CHORD FOR DESIGN DISCHARGE
13. RECORD TOTAL FLOW AREA UNDER STRUCTURE (DOWNSTREAM END) FOR 100 & 500 YEAR FLOODS
14. FOR BRIDGES:
    ENTER TYPE, SPAN LENGTH AND MAXIMUM VERTICAL CLEARANCE FOR CULVERTS:
    ENTER SIZE, NUMBER OF CELLS, AND LENGTH;
    DESCRIBE ANY SPECIAL FEATURES UNDER COMMENTS
15. FOR CULVERTS, DESCRIBE TYPE OF INLET/OUTLET AND EROSION PROTECTION
16. COMPOSITE "N" VALUE OF STRUCTURE

IV. ROADWAY AND STRUCTURE DATA

ITEM	EXISTING STRUCTURE	PROPOSED STRUCTURE
NAME OF WATERWAY		
DATE BUILT		
OVERTOPPING ELEVATION		
OVERTOPPING LOCATION (DESCRIBE)		
INCIPIENT OVERTOPPING FLOW CONDITION (OVERTOPPING Q < 100 YR FLOOD)[11]		
FREEBOARD[12]		
TOTAL STRUCTURE WATERWAY AREA[13]		
STRUCTURE DESCRIPTION[14]		
INLET TREATMENT[15]		
OUTLET TREATMENT[15]		
MANNINGS "N" VALUE[16]		

V. SURVEY BOOK NUMBERS ______

REFERENCE DATUM FOR ELEVATIONS ______

VI. FLOOD PLAIN MANAGEMENT DATA

DATE OF FLOOD INSURANCE STUDY ______ COMMUNITY PANEL NO. ______

PROJECT LOCATION (CHECK BELOW):

______ BEYOND FEMA PROGRAM LIMITS (NOT IN "A" HAZARD ZONE)

______ FEMA HAZARD ZONE "A"; NO BASE FLOOD ELEVATIONS ESTABLISHED

______ FEMA HAZARD ZONE "A"; BASE FLOOD ELEVATIONS ESTABLISHED

REGULATORY FLOODWAY ______ YES ______ NO

MAXIMUM CHANGE IN WATER SURFACE ELEVATION UPSTREAM OF BRIDGE DUE TO HIGHWAY PROJECT (MAX. BACKWATER) ______ FT.

LOCATION OF MAX. BACKWATER FROM UPSTREAM FACE OF BRIDGE ______ FT.

DESCRIBE TYPE OF STUDY DONE TO DETERMINE CONSISTENCY WITH NFIP STANDARDS ______

DATE COMMUNITY ACKNOWLEDGEMENT FORM ISSUED: ______

IS THE PROJECT CONSISTENT WITH THE CODE OF FEDERAL REGULATIONS, PART 650 A, LOCATION AND HYDRAULIC DESIGN OF ENCROACHMENTS ON FLOOD PLAINS (23 CFR 650 A). Y/N ______

IS THE PROJECT CONSISTENT WITH THE ANNOTATED CODE OF MARYLAND (COMAR 08. 05. 03)? Y/N ______

VII. COMMENTS: ______

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

HYDROLOGIC AND HYDRAULIC DATA

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY S.H.A.
DRAWN BY S.H.A.
CHECKED BY S.H.A.

TENTATIVE
OFFICE OF STRUCTURES
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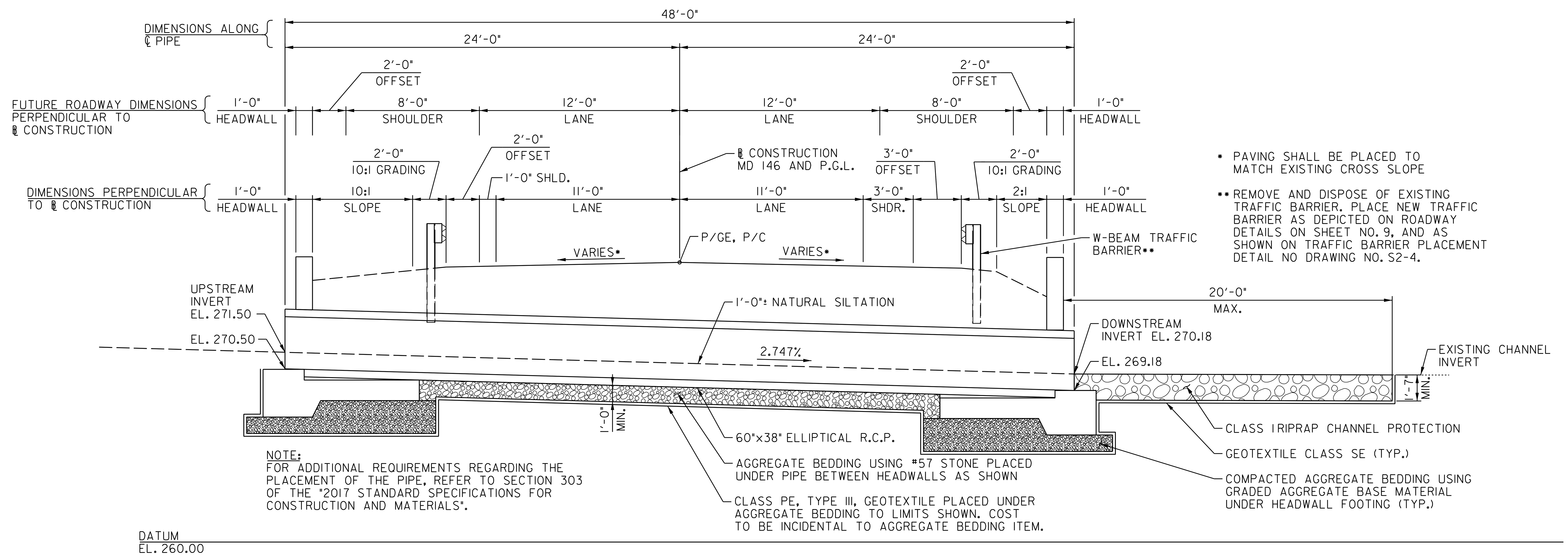
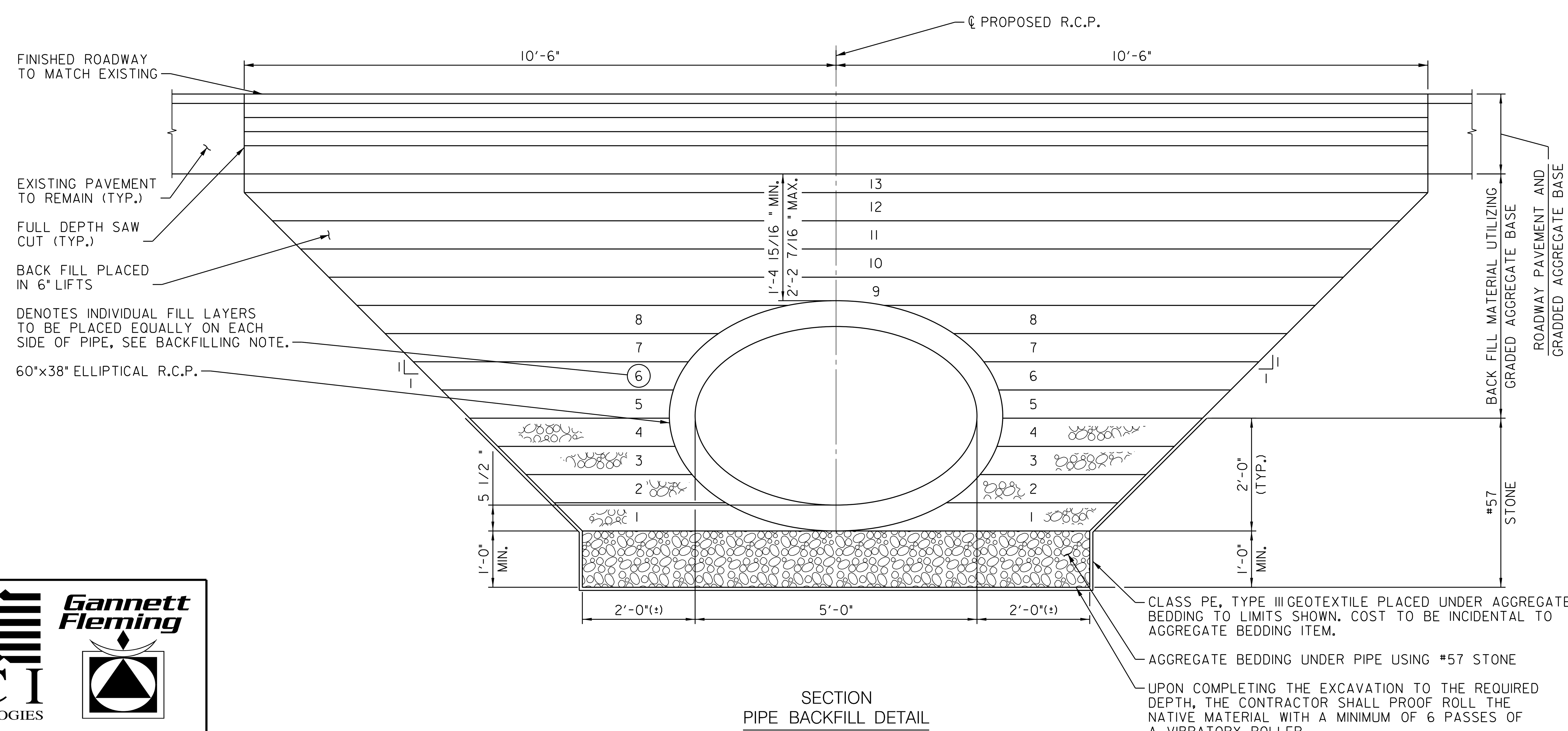
DRAWING NO. S2-2 OF 18 SHEET NO. 39 OF 57



• PAVING SHALL BE PLACED TO MATCH EXISTING CROSS SLOPE

•• REMOVE AND DISPOSE OF EXISTING TRAFFIC BARRIER. PLACE NEW TRAFFIC BARRIER AS DEPICTED ON ROADWAY DETAILS ON SHEET NO. 9, AND AS SHOWN ON TRAFFIC BARRIER PLACEMENT DETAIL NO DRAWING NO. S2-4.

SECTION
PROFILE DETAIL AT 60"x38" ELLIPTICAL PIPE
SCALE: 1/4" = 1'-0"



SECTION
PIPE BACKFILL DETAIL
SCALE: 3/4" = 1'-0"

BACKFILLING NOTE:

WHEN BACKFILLING THE NEW ELLIPTICAL PIPE, THE CONTRACTOR SHALL PLACE THE BACKFILL IN 6" LIFTS AS SHOWN. THE CONTRACTOR SHALL PLACE THE LIFTS IN THE NUMBERED SEQUENCE SHOWN. THE CORRESPONDING LIFTS ON EACH SIDE OF THE ELLIPTICAL PIPE MUST BE COMPLETED PRIOR TO PROCEEDING TO THE NEXT NUMBERED LIFT.

NOTES:

FOR MOT PLAN AND GENERAL NOTES, SEE SHEET NO. 4 AND 6.
FOR GENERAL PLAN OF PIPE, SEE DRAWING NO. S2-1.
FOR ADDITIONAL PIPE DETAILS, SEE DRAWING NO. S2-4.

KCI TECHNOLOGIES | Gannett Fleming
In Joint Venture

BY: david.clayton -

REVISIONS

MDOT MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

PIPE PROFILE AND DETAILS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

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DRAWING NO. S2-3 OF 18
SHEET NO. 40 OF 57

STRUCTURE INVENTORY NO. 03190XO
SURVEY BOOK NO.

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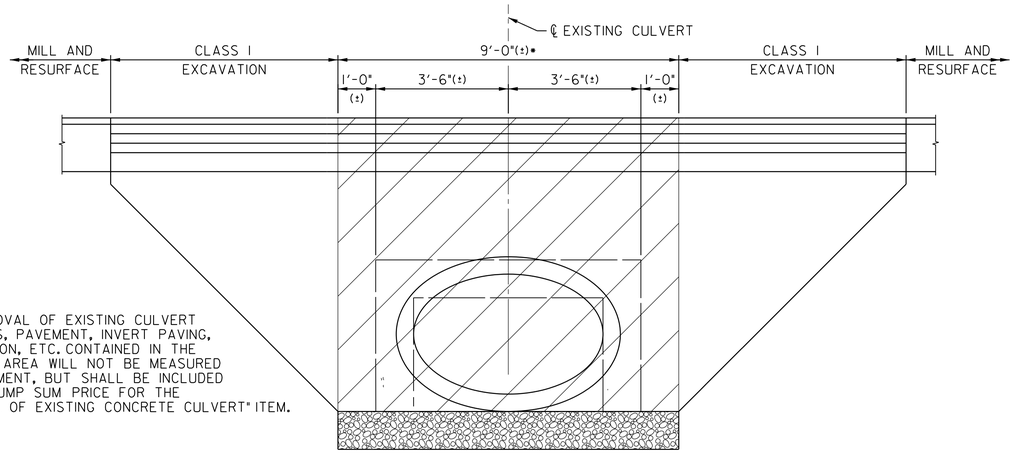
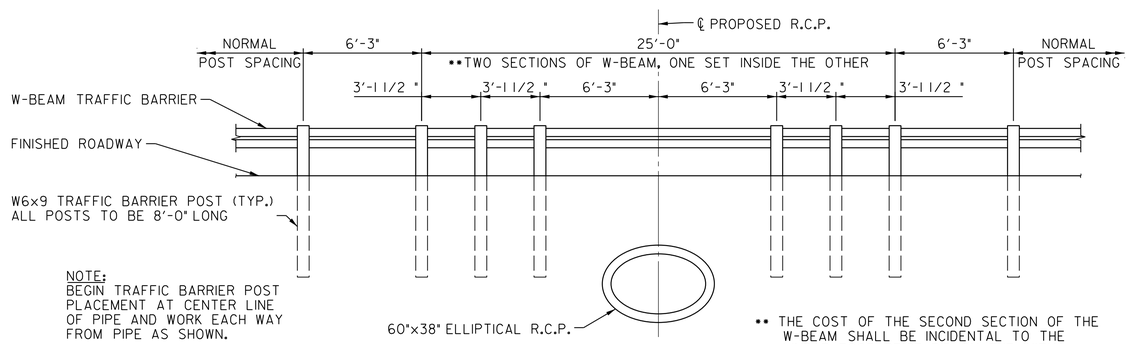


• ALL REMOVAL OF EXISTING CULVERT ELEMENTS, PAVEMENT, INVERT PAVING, EXCAVATION, ETC. CONTAINED IN THE HATCHED AREA WILL NOT BE MEASURED FOR PAYMENT, BUT SHALL BE INCLUDED IN THE LUMP SUM PRICE FOR THE "REMOVAL OF EXISTING CONCRETE CULVERT" ITEM.

SECTION
EXCAVATION AT EXISTING CULVERT

SCALE: 1/2 " = 1'-0"



NOTE:
BEGIN TRAFFIC BARRIER POST PLACEMENT AT CENTER LINE OF PIPE AND WORK EACH WAY FROM PIPE AS SHOWN.

CONTRACTOR SHALL PROBE EACH POST LOCATION IN AREA OF PIPE PRIOR TO PLACING TRAFFIC BARRIER POSTS TO ENSURE THERE WILL BE NO CONFLICTS WITH NEW PIPE.

•• THE COST OF THE SECOND SECTION OF THE W-BEAM SHALL BE INCIDENTAL TO THE LINEAR FOOT PRICE BID ON THE INITIAL PLACEMENT OF THE W-BEAM TRAFFIC BARRIER.

ELEVATION
TRAFFIC BARRIER POST PLACEMENT AT PIPE

SCALE: 1/4 " = 1'-0"

NOTES:

FOR GENERAL PLAN OF PIPE, SEE DRAWING NO. S2-1.
FOR PIPE PROFILE AND DETAILS, SEE DRAWING NO. S2-3.

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

PIPE DETAILS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

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DRAWING NO. S2-4 OF 18

SHEET NO. 41 OF 57

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BY: david.clayton –

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STRUCTURE INVENTORY NO. 03190XO

SURVEY BOOK NO.

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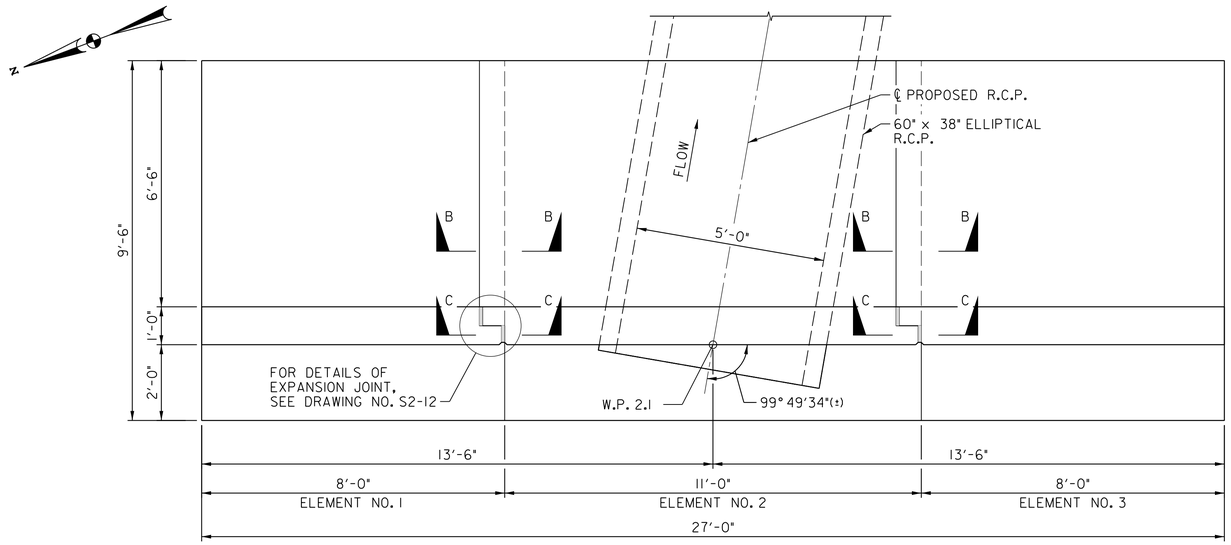


PLAN – PRECAST UPSTREAM HEADWALL

SCALE: 1/2 " = 1'-0"

NOTE:

ALL COSTS ASSOCIATED WITH THE CONSTRUCTION OF THE UPSTREAM HEADWALL WILL NOT BE MEASURED FOR PAYMENT, BUT SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR THE "UPSTREAM HEADWALL" ITEM.

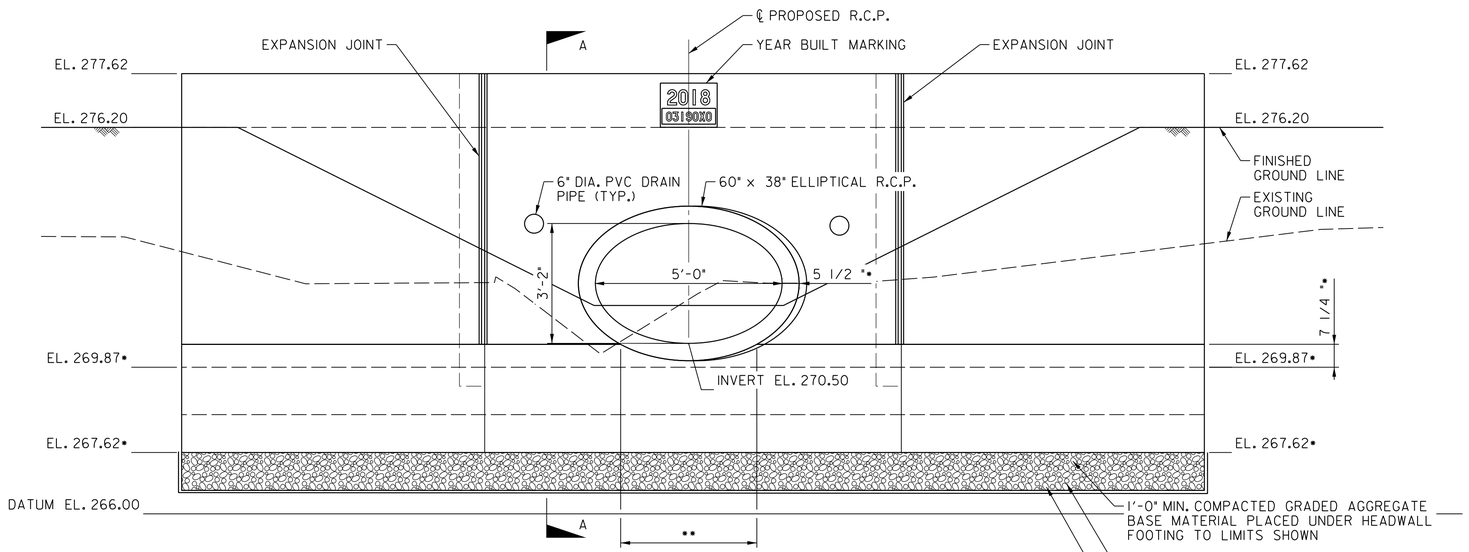
THE ENTIRE UPSTREAM HEADWALL SHALL BE CONSTRUCTED OF PRECAST ELEMENTS AND BE ON THE SITE READY FOR INSTALLATION PRIOR TO THE CLOSURE OF THE ROADWAY.

NOTE:

END OF PIPE TO BE PLACED THROUGH HEADWALL WITH SQUARED END AS SHOWN.

NOTE:

HOLES THROUGH PRECAST HEADWALL SHALL BE ADJUSTED TO ACCOMMODATE THE SKEWED ORIENTATION OF PIPE AS IT PASSES THROUGH THE HEADWALL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND PLACEMENT OF LIFTING DEVICES. IN ADDITION, THE CONTRACTOR AND HIS PRECAST SUPPLIER SHALL VERIFY THAT THE LIFTING POINTS WILL NOT DAMAGE THE HEADWALL OR FOOTING DURING LIFTING.



ELEVATION – PRECAST UPSTREAM HEADWALL

SCALE: 1/2 " = 1'-0"

- THIS DIMENSION AND FOOTING ELEVATIONS WERE DEVELOPED ON AN ASSUMED PIPE WALL THICKNESS OF 5 1/2 ". SHOULD THE WALL THICKNESS BE DIFFERENT, THE ELEVATIONS SHALL BE ADJUSTED ACCORDINGLY. THE INVERT ELEVATIONS SHALL NOT BE CHANGED. ALL DIMENSIONS SHOWN FOR PIPE ARE NORMAL TO THE CENTERLINE OF THE PIPE.

•• DISCONTINUE PORTION OF STEPPED KEY AT PIPE AND PROVIDE OPENING FOR PIPE. STEPPED KEY SHALL BE PLACED FOR REMAINDER OF HEADWALL.

NOTES:

FOR PLAN AND PROFILE OF PIPE, SEE DRAWING NOS. S2-1 AND S2-3.
FOR DOWNSTREAM HEADWALL, SEE DRAWING NOS. S2-8 TO S2-10.
FOR SECTION A-A, SEE DRAWING NO. S2-6.
FOR SECTION B-B, SEE DRAWING NO. S2-12.
FOR SECTION C-C, SEE DRAWING NO. S2-12.
FOR PVC DRAIN PIPE, SEE MD SHA STANDARD NO. RW-301.

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

UPSTREAM HEADWALL PLAN & ELEVATION

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

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DRAWING NO. S2-5 OF 18

SHEET NO. 42 OF 57

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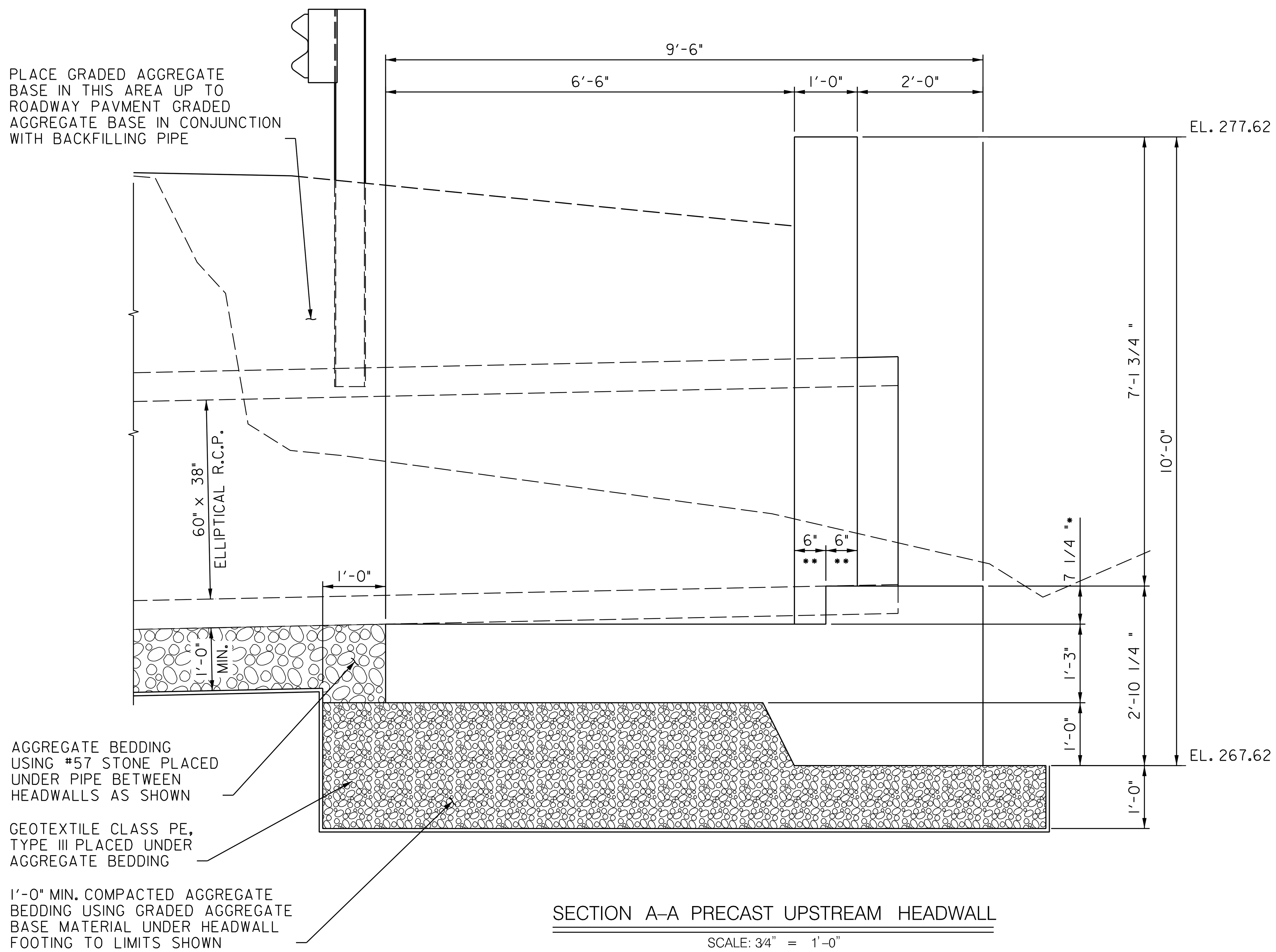
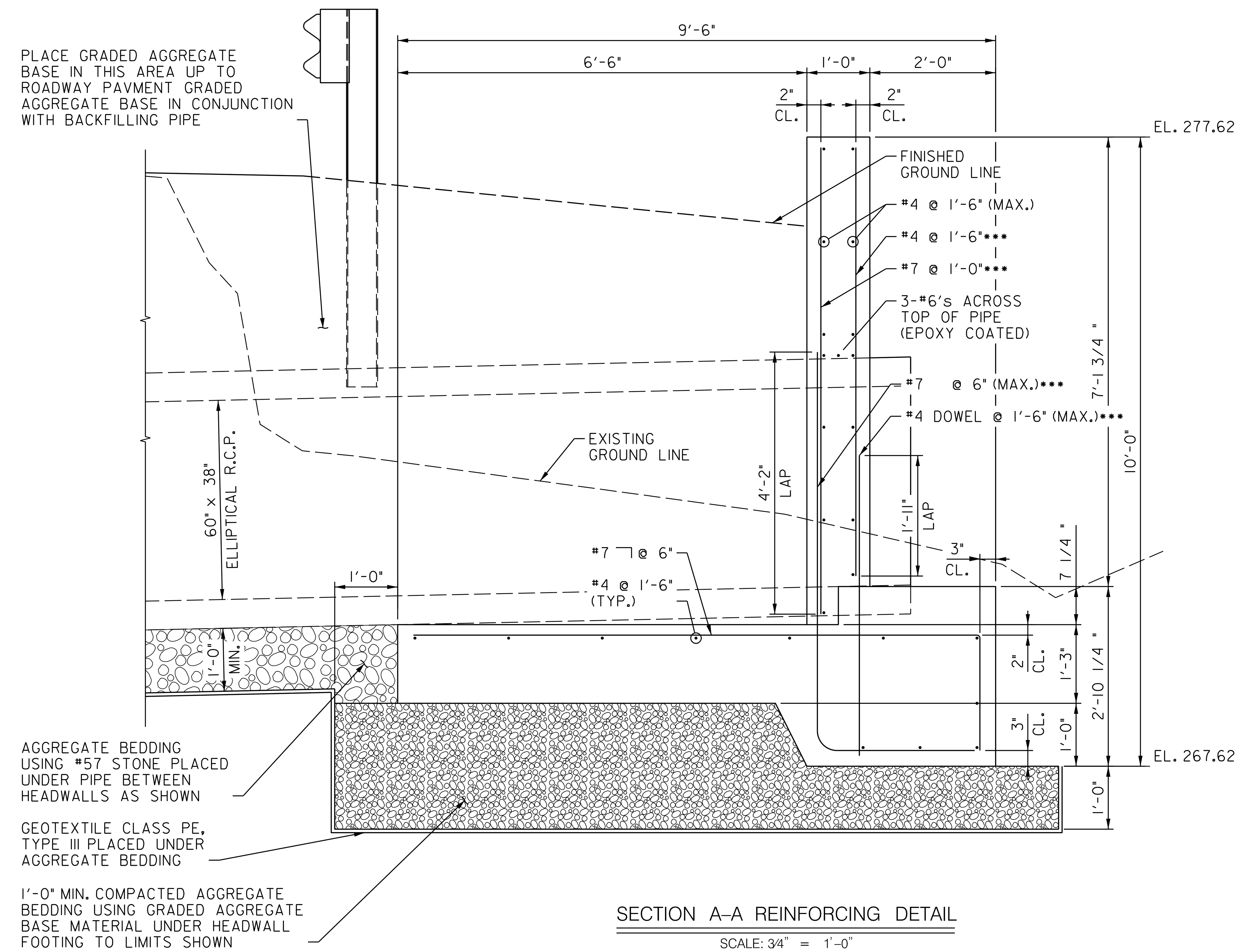


SECTION A–A PRECAST UPSTREAM HEADWALL

SCALE: 3/4" = 1'–0"



SECTION A–A REINFORCING DETAIL

SCALE: 3/4" = 1'–0"

NOTES:

FOR PLAN AND PROFILE OF PIPE, SEE DRAWING NOS. S2-1 AND S2-3.
FOR DOWNSTREAM HEADWALL, SEE DRAWING NOS. S2-8 TO S2-10.
FILL VOID UNDER RCP ABOVE FOOTING AND IN HEADWALL AROUND RCP WITH NON-SHRINK GROUT. GROUT SHALL CONFORM TO 902.11(C).

NOTE:

- THE MAXIMUM FOUNDATION DESIGN BEARING PRESSURE FOR STRENGTH LOAD COMBINATIONS IS X.XX TONS/SQ. FT.
- THE MAXIMUM FOUNDATION DESIGN BEARING PRESSURE FOR SERVICE LOAD COMBINATIONS IS X.XX TONS/SQ. FT.
- THE MAXIMUM FOUNDATION DESIGN BEARING PRESSURE FOR EXTREME EVENT LOAD COMBINATIONS IS X.XX TONS/SQ. FT.

NOTE:

* THIS DIMENSION AND FOOTING ELEVATIONS WERE DEVELOPED ON AN ASSUMED PIPE WALL THICKNESS OF 5 1/2". SHOULD THE WALL THICKNESS BE DIFFERENT, THE ELEVATIONS SHALL BE ADJUSTED ACCORDINGLY. THE INVERT ELEVATIONS SHALL NOT BE CHANGED.

** DISCONTINUE STEPPED KEY AT PIPE AND PROVIDE OPENING FOR PIPE.

*** AT THE CONTRACTORS OPTION, THE DOWEL AND STEM BAR MAY BE PLACED AS A CONTINUOUS BAR.

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REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

UPSTREAM HEADWALL SECTIONS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

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OFFICE OF STRUCTURES
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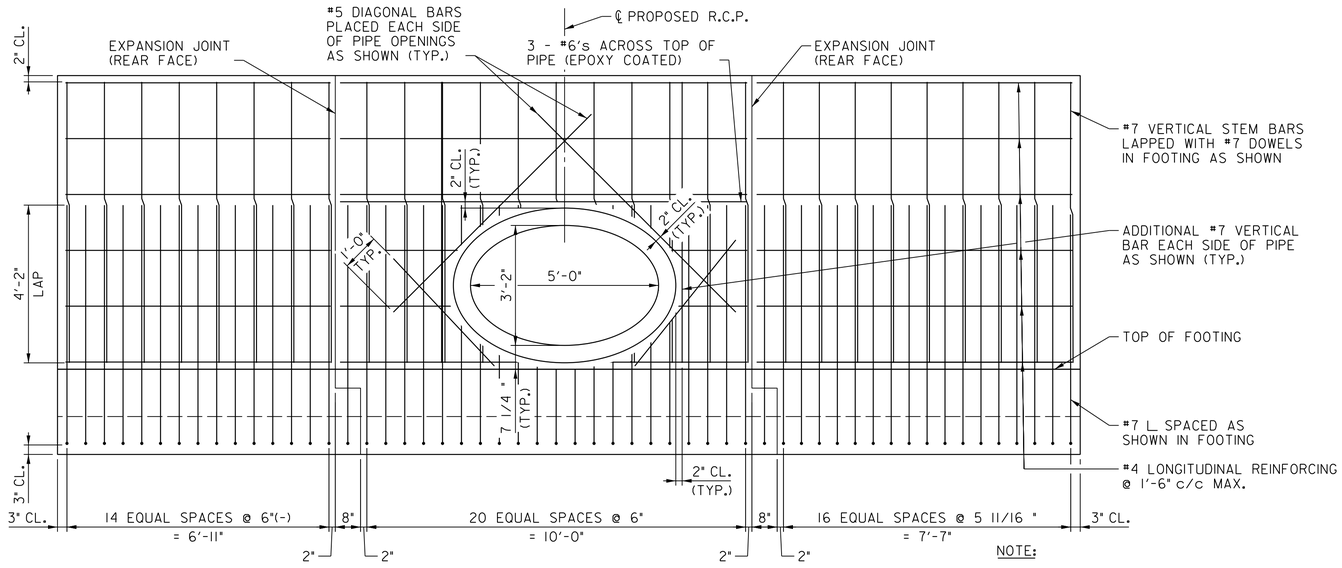
DRAWING NO. S2-6 OF 18 | SHEET NO. 43 OF 57

BY: david.clayton



ELEVATION PRECAST UPSTREAM HEADWALL – REAR FACE REINFORCING

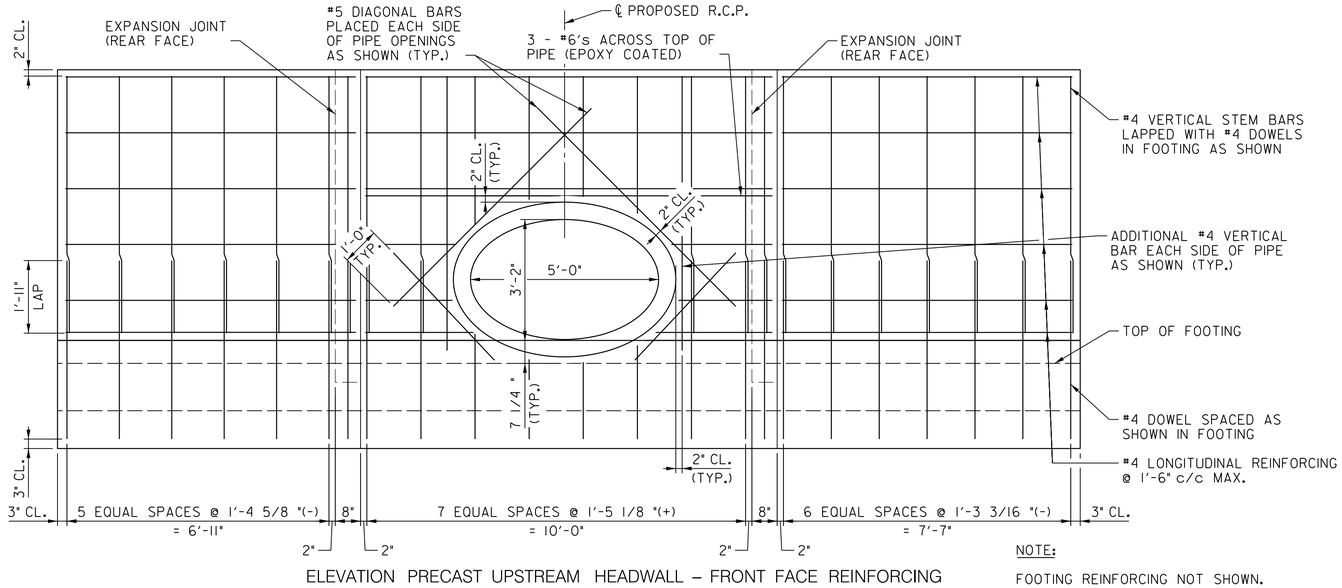
SCALE: 1/2" = 1'-0"

NOTE:

FOOTING REINFORCING NOT SHOWN.

NOTE:

HOLES THROUGH PRECAST HEADWALL SHALL BE ADJUSTED TO ACCOMMODATE THE SKEWED ORIENTATION OF PIPE AS IT PASSES THROUGH THE HEADWALL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND PLACEMENT OF LIFTING DEVICES. IN ADDITION, THE CONTRACTOR AND HIS PRECAST SUPPLIER SHALL VERIFY THAT THE LIFTING POINTS WILL NOT DAMAGE THE HEADWALL OR FOOTING DURING LIFTING.



ELEVATION PRECAST UPSTREAM HEADWALL – FRONT FACE REINFORCING

SCALE: 1/2" = 1'-0"

NOTE:

FOOTING REINFORCING NOT SHOWN.

NOTES:

FOR PLAN AND PROFILE OF PIPE, SEE DRAWING NOS. S2-1 AND S2-3.
FOR ADDITIONAL PIPE DETAILS, SEE DRAWING NO. S2-4.
FOR SECTION DETAIL, SEE DRAWING NO. S2-6.

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

UPSTREAM HEADWALL REINFORCING DETAILS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
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DRAWING NO. S2-7 OF 18

SHEET NO. 44 OF 57

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

BY: david.clayton –

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STRUCTURE INVENTORY NO. 03190XO

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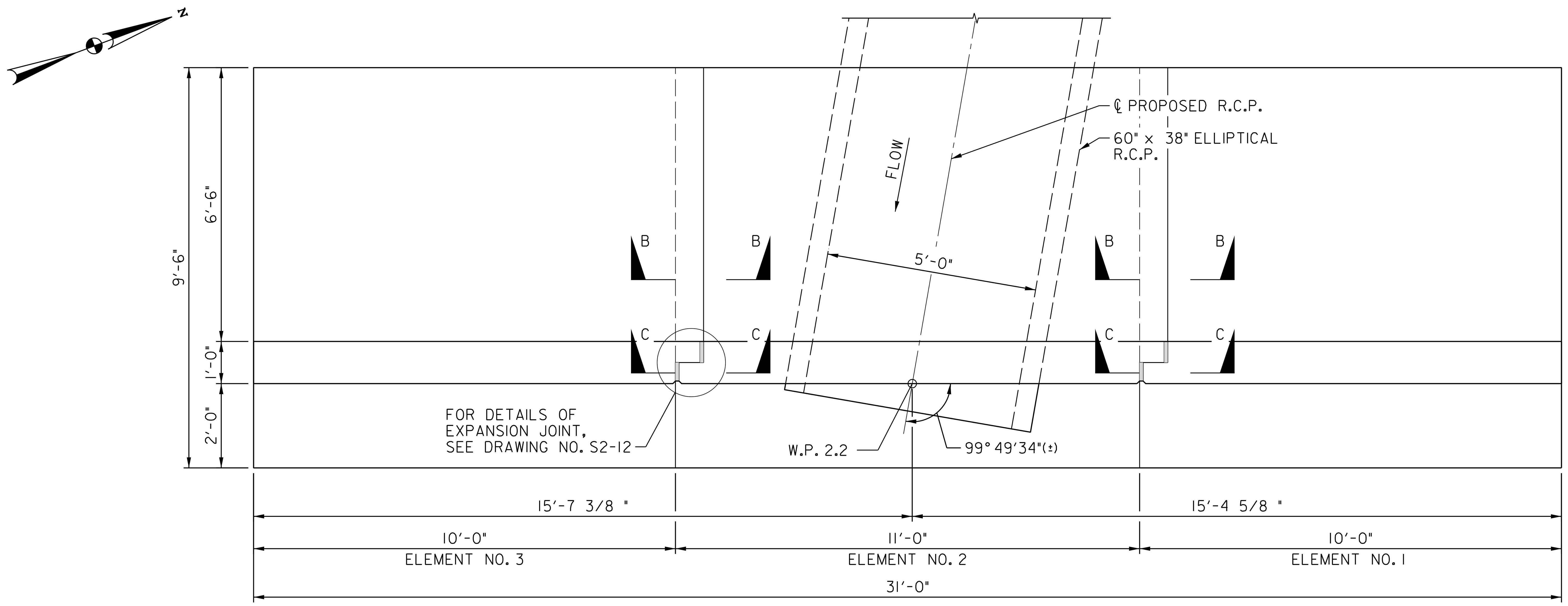


PLAN – PRECAST DOWNSTREAM HEADWALL

SCALE: 1/2 " = 1'-0"

NOTE:

ALL COSTS ASSOCIATED WITH THE CONSTRUCTION OF THE DOWNSTREAM HEADWALL WILL NOT BE MEASURED FOR PAYMENT, BUT SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR THE "DOWNSTREAM HEADWALL" ITEM.

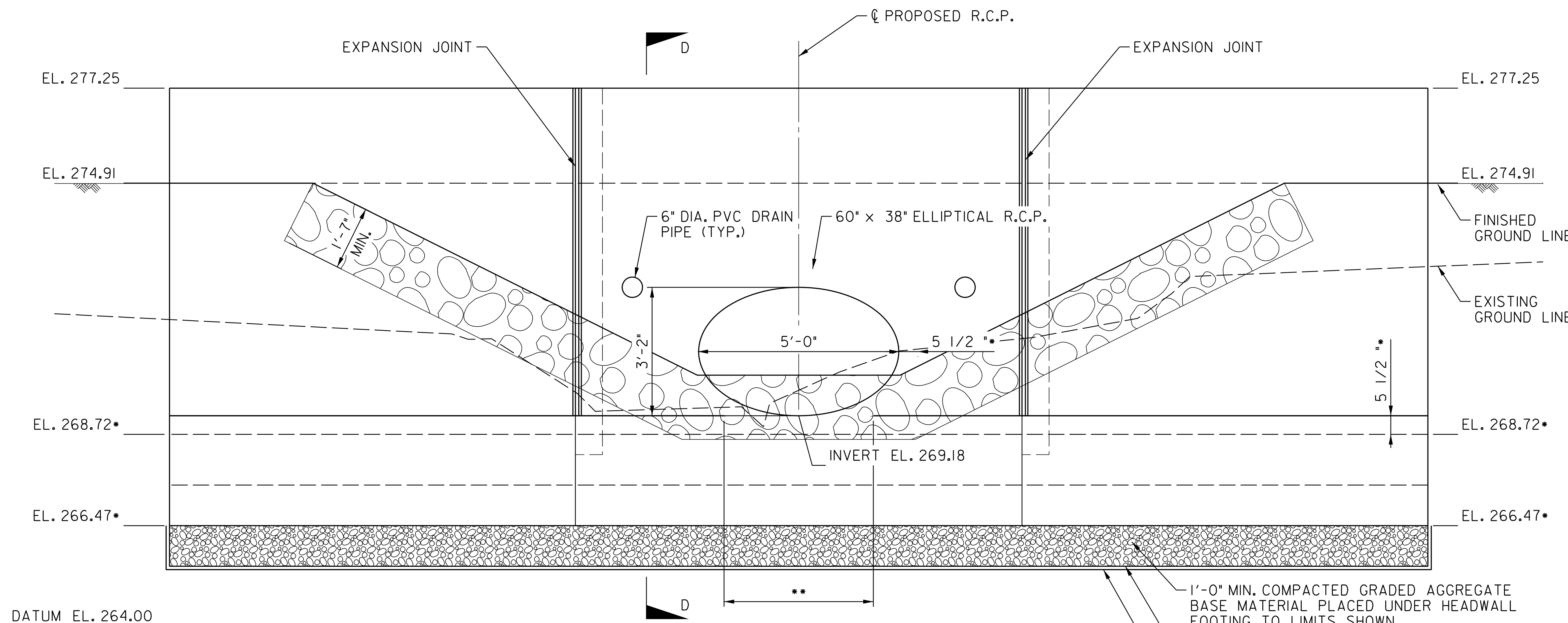
THE ENTIRE DOWNSTREAM HEADWALL SHALL BE CONSTRUCTED OF PRECAST ELEMENTS AND BE ON THE SITE READY FOR INSTALLATION PRIOR TO THE CLOSURE OF THE ROADWAY.

NOTE:

END OF PIPE TO BE PLACED THROUGH HEADWALL WITH SQUARED END AS SHOWN.

NOTE:

HOLES THROUGH PRECAST HEADWALL SHALL BE ADJUSTED TO ACCOMMODATE THE SKEWED ORIENTATION OF PIPE AS IT PASSES THROUGH THE HEADWALL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND PLACEMENT OF LIFTING DEVICES. IN ADDITION, THE CONTRACTOR AND HIS PRECAST SUPPLIER SHALL VERIFY THAT THE LIFTING POINTS WILL NOT DAMAGE THE HEADWALL OR FOOTING DURING LIFTING.



ELEVATION – PRECAST DOWNSTREAM HEADWALL

SCALE: 1/2 " = 1'-0"

- • THIS DIMENSION AND FOOTING ELEVATIONS WERE DEVELOPED ON AN ASSUMED PIPE WALL THICKNESS OF 5 1/2 ". SHOULD THE WALL THICKNESS BE DIFFERENT, THE ELEVATIONS SHALL BE ADJUSTED ACCORDINGLY. THE INVERT ELEVATIONS SHALL NOT BE CHANGED. ALL DIMENSIONS SHOWN FOR PIPE ARE NORMAL TO THE CENTERLINE OF THE PIPE.
- •• DISCONTINUE PORTION OF STEPPED KEY AT PIPE AND PROVIDE OPENING FOR PIPE. STEPPED KEY SHALL BE PLACED FOR REMAINDER OF HEADWALL.

NOTE:

FOR PLAN AND PROFILE OF PIPE, SEE DRAWING NOS. S2-1 AND S2-3.
FOR UPSTREAM HEADWALL, SEE DRAWING NOS. S2-5 TO S2-7.
FOR SECTION B-B, SEE DRAWING NO. S2-12.
FOR SECTION C-C, SEE DRAWING NO. S2-12.
FOR SECTION D-D, SEE DRAWING NO. S2-9.
FOR PVC DRAIN PIPE, SEE MD SHA STANDARD NO. RW-301.

Gannett Fleming

KCI TECHNOLOGIES

In Joint Venture

BY: david.clayton –

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

DOWNSTREAM HEADWALL PLAN & ELEVATION

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
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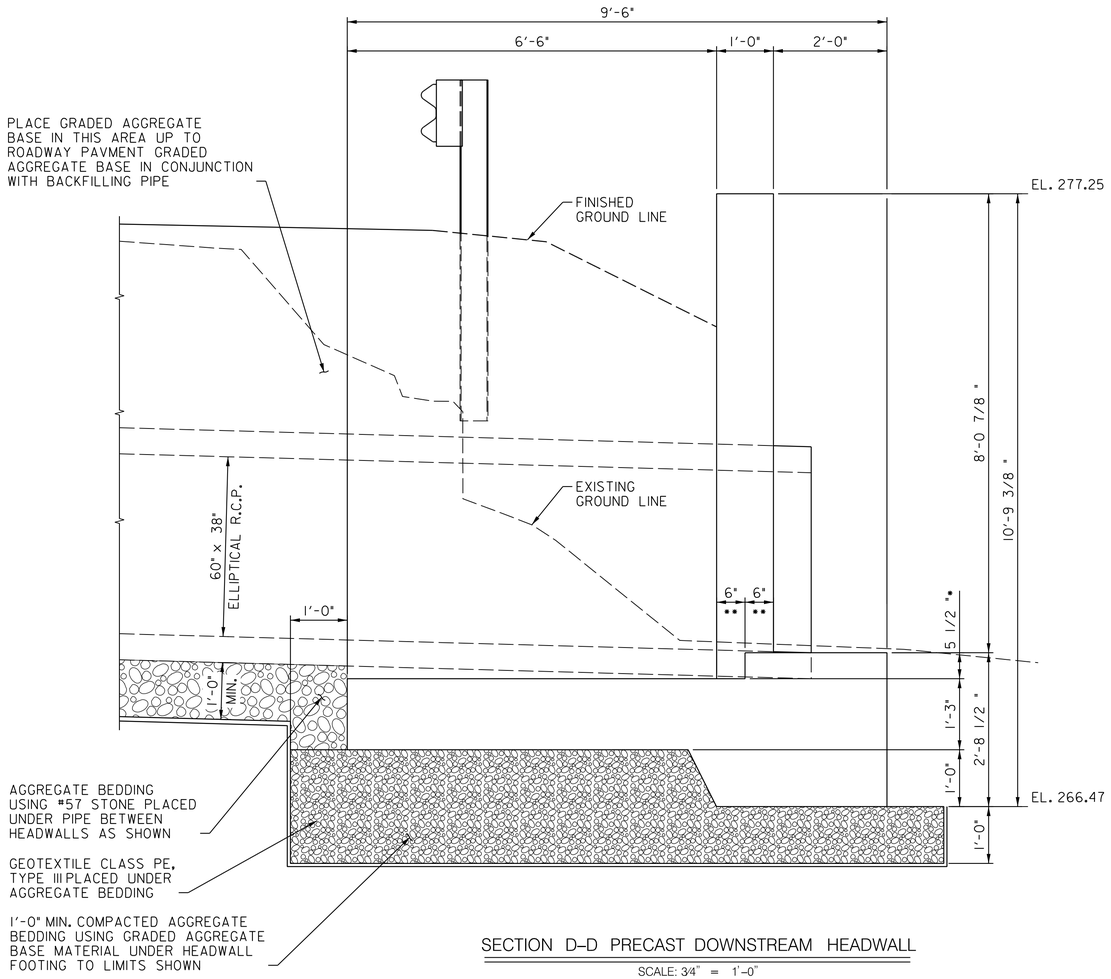
DRAWING NO. S2–8 OF 18 | SHEET NO. 45 OF 57

PLOTTED: "03:56 PM on Friday, May 17, 2019"
FILE: M:\2010\23100466.29\Drawings\pBR–GP07_MD_146.dgn

PLOTTED: 03:56 PM on Friday, May 17, 2019

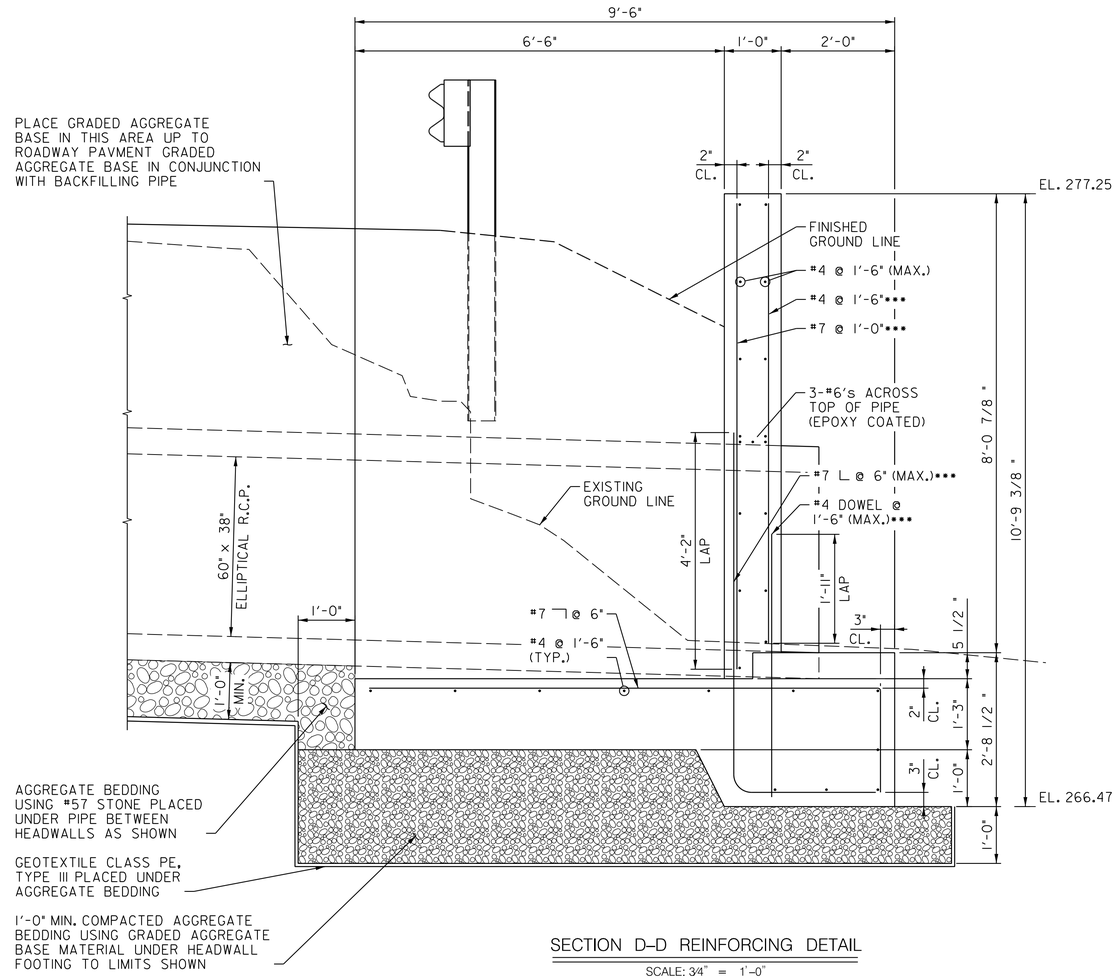
STRUCTURE INVENTORY NO. 03190XO

SURVEY BOOK NO.



SECTION D–D PRECAST DOWNSTREAM HEADWALL

SCALE: 3/4" = 1'-0"



SECTION D–D REINFORCING DETAIL

SCALE: 3/4" = 1'-0"

NOTES:

FOR PLAN AND PROFILE OF PIPE, SEE DRAWING NOS. S2-1 AND S2-3.
FOR UPSTREAM HEADWALL, SEE DRAWING NOS. S2-5 TO S2-7.

NOTE:

- THE MAXIMUM FOUNDATION DESIGN BEARING PRESSURE FOR STRENGTH LOAD COMBINATIONS IS X.XX TONS/SQ. FT.
- THE MAXIMUM FOUNDATION DESIGN BEARING PRESSURE FOR SERVICE LOAD COMBINATIONS IS X.XX TONS/SQ. FT.
- THE MAXIMUM FOUNDATION DESIGN BEARING PRESSURE FOR EXTREME EVENT LOAD COMBINATIONS IS X.XX TONS/SQ. FT.

NOTE:

- THIS DIMENSION AND FOOTING ELEVATIONS WERE DEVELOPED ON AN ASSUMED PIPE WALL THICKNESS OF 5 1/2". SHOULD THE WALL THICKNESS BE DIFFERENT, THE ELEVATIONS SHALL BE ADJUSTED ACCORDINGLY. THE INVERT ELEVATIONS SHALL NOT BE CHANGED.

•• DISCONTINUE STEPPED KEY AT PIPE AND PROVIDE OPENING FOR PIPE.

••• AT THE CONTRACTORS OPTION, THE DOWEL AND STEM BAR MAY BE PLACED AS A CONTINUOUS BAR.

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

DOWNSTREAM HEADWALL SECTIONS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

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OFFICE OF STRUCTURES
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DRAWING NO. S2-9 OF 18

SHEET NO. 46 OF 57

STRUCTURE INVENTORY NO. 03190XO

SURVEY BOOK NO.

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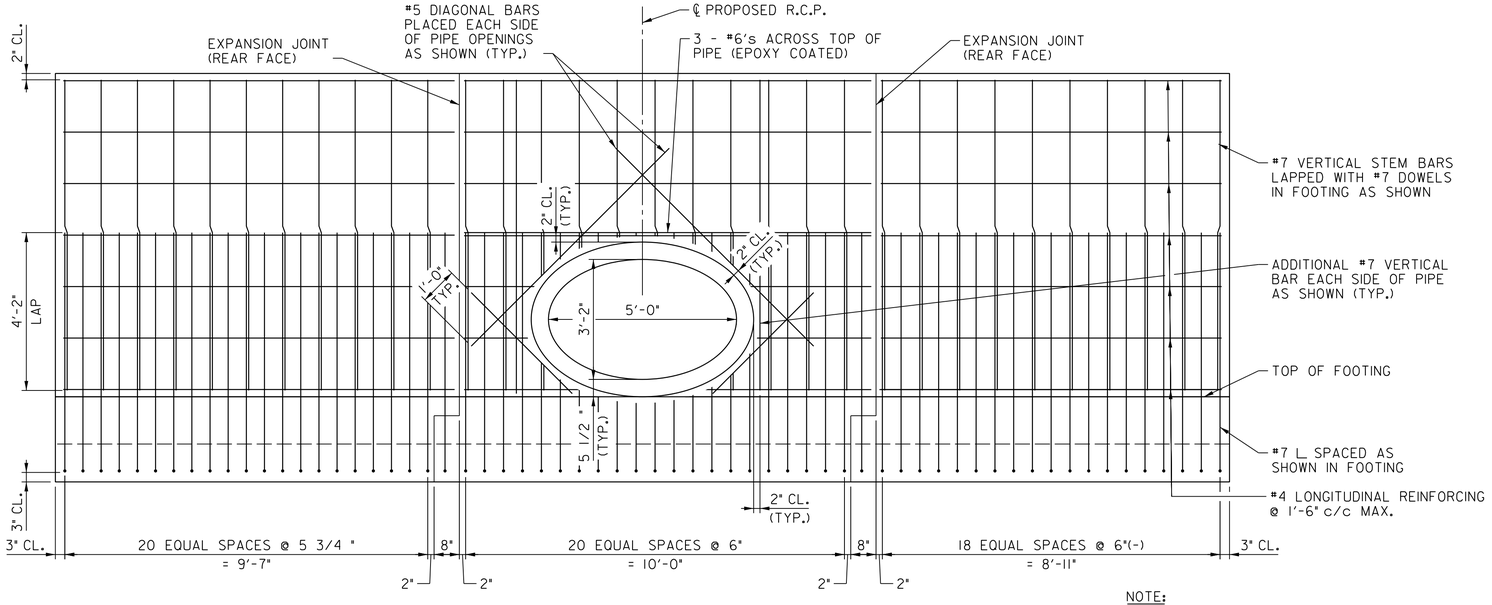
BY: david.clayton



ELEVATION PRECAST DOWNSTREAM HEADWALL – REAR FACE REINFORCING

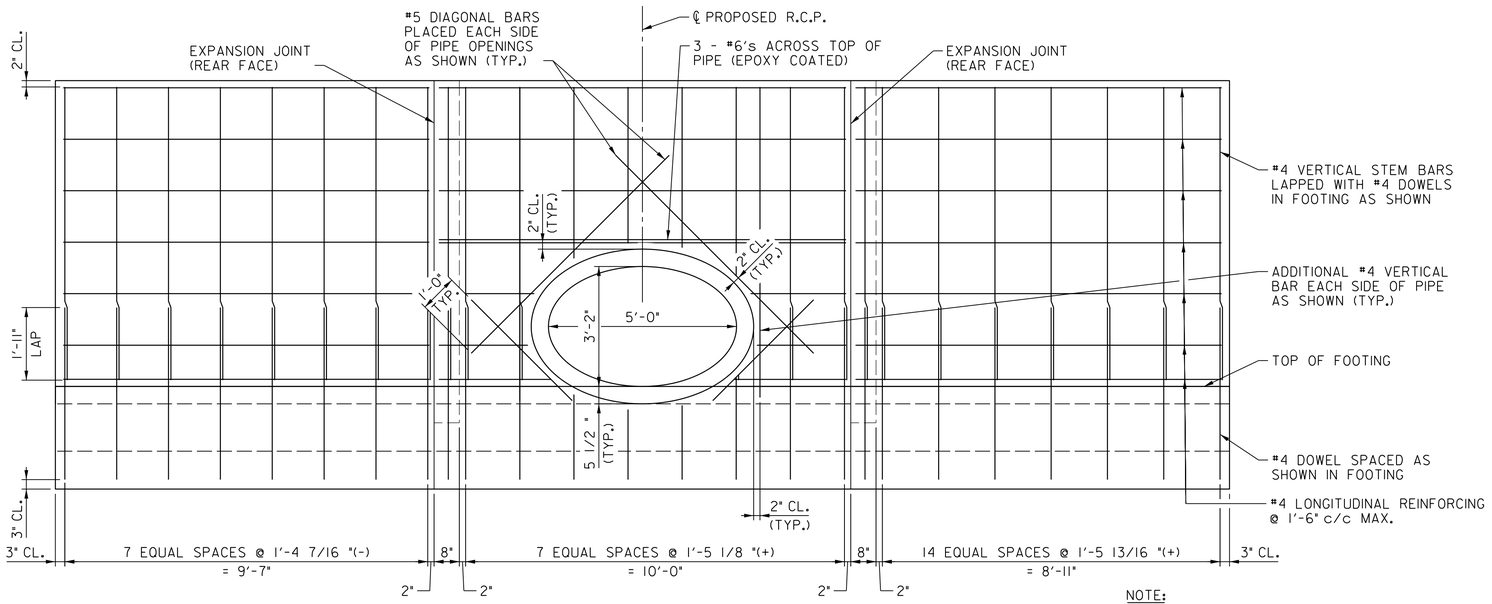
SCALE: 1/2" = 1'-0"

NOTE:

FOOTING REINFORCING NOT SHOWN.

NOTE:

HOLES THROUGH PRECAST HEADWALL SHALL BE ADJUSTED TO ACCOMMODATE THE SKEWED ORIENTATION OF PIPE AS IT PASSES THROUGH THE HEADWALL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND PLACEMENT OF LIFTING DEVICES. IN ADDITION, THE CONTRACTOR AND HIS PRECAST SUPPLIER SHALL VERIFY THAT THE LIFTING POINTS WILL NOT DAMAGE THE HEADWALL OR FOOTING DURING LIFTING.



ELEVATION PRECAST DOWNSTREAM HEADWALL – FRONT FACE REINFORCING

SCALE: 1/2" = 1'-0"

NOTE:

FOOTING REINFORCING NOT SHOWN.

NOTES:

FOR PLAN AND PROFILE OF PIPE, SEE DRAWING NOS. S2-1 AND S2-3.
FOR ADDITIONAL PIPE DETAILS, SEE DRAWING NO. S2-4.
FOR SECTION DETAIL, SEE DRAWING NO. S2-9.

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REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

DOWNSTREAM HEADWALL REINFORCING DETAILS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

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DRAWING NO. S2-10 OF 18

SHEET NO. 47 OF 57

STRUCTURE INVENTORY NO. 03190XO

SURVEY BOOK NO.

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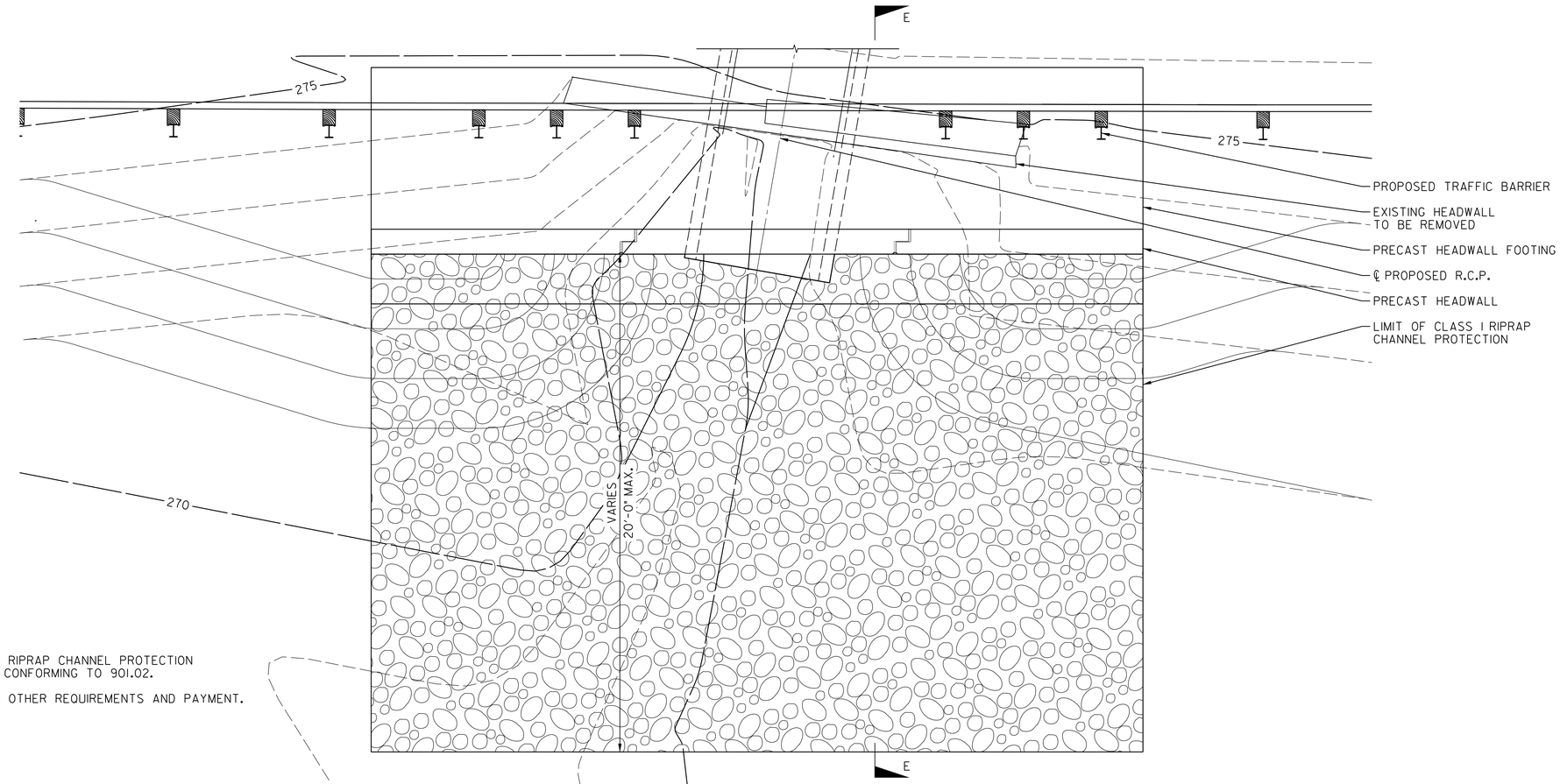
BY: david.clayton

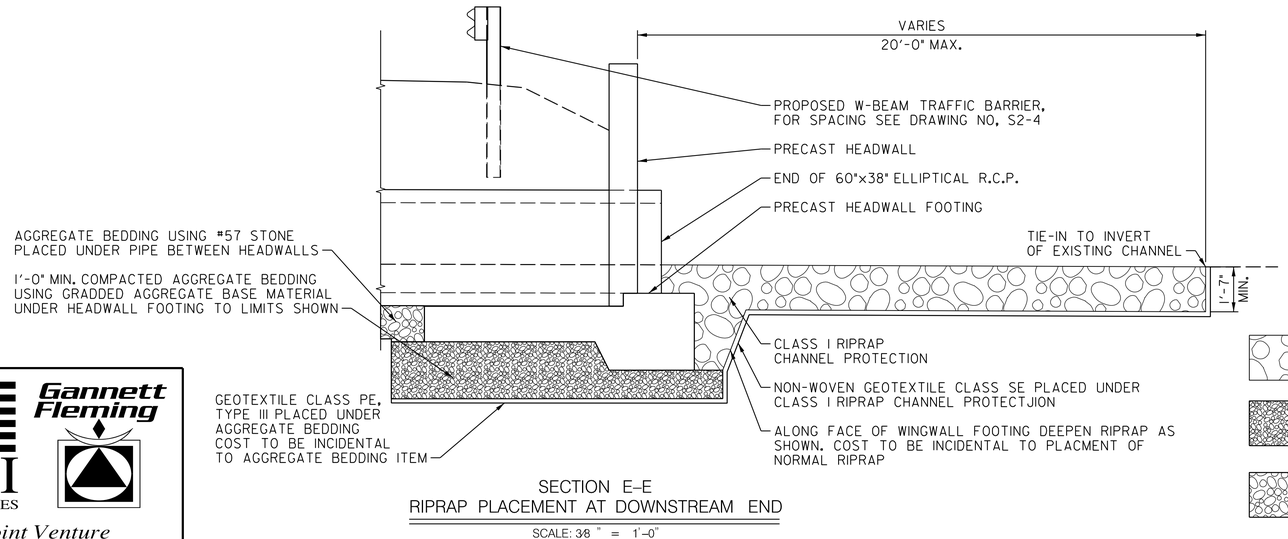


NOTES:

1. ALL MATERIAL FOR RIPRAP CHANNEL PROTECTION SHALL BE CLASS I CONFORMING TO 901.02.
2. REFER TO 312 FOR OTHER REQUIREMENTS AND PAYMENT.

RIPRAP CHANNEL PROTECTION PLAN – DOWNSTREAM END

SCALE: 3⁄8 " = 1'-0"



SECTION E–E
RIPRAP PLACEMENT AT DOWNSTREAM END

SCALE: 3⁄8 " = 1'-0"

DENOTES CLASS I RIPRAP CHANNEL PROTECTION

DENOTES GRADED AGGREGATE BASE MATERIAL PLACED UNDER HEADWALLS

DENOTES AGGREGATE BEDDING USING #57 STONE PLACED UNDER PIPE BETWEEN HEADWALLS

NOTE:

FOR GENERAL PLAN OF PIPE, SEE DRAWING NO. S2-1.
FOR MOT PLAN AND GENERAL NOTES, SEE SHEET NOS. 4 AND 6.
FOR DOWNSTREAM HEADWALL DETAILS, SEE DRAWING NOS. S2-8 TO S2-10.

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REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

DOWNSTREAM RIPRAP CHANNEL PROTECTION

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

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DRAWING NO. S2-11 OF 18

SHEET NO. 48 OF 57

STRUCTURE INVENTORY NO. 03190XO

SURVEY BOOK NO.

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BY: david.clayton –

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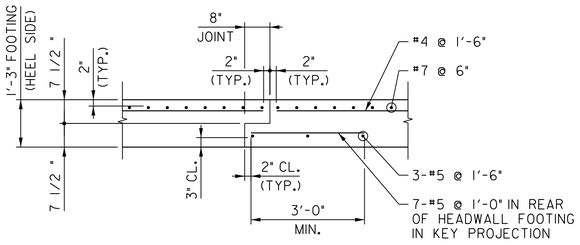
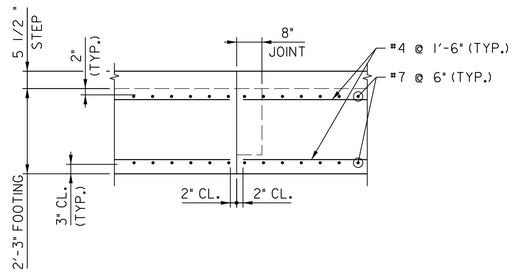


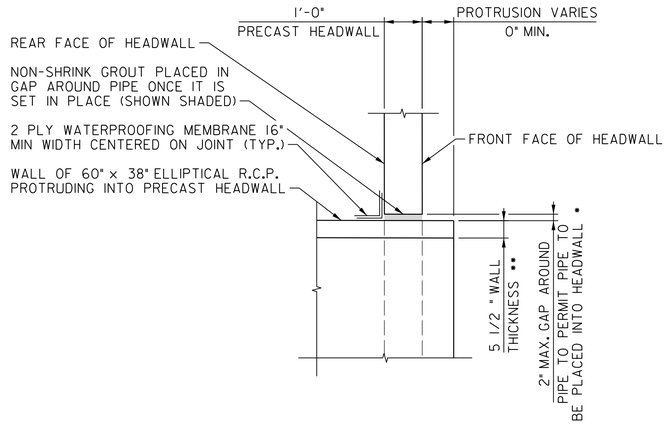
SECTION B–B FOOTING JOINT DETAIL

SCALE: 1/2" = 1'-0"



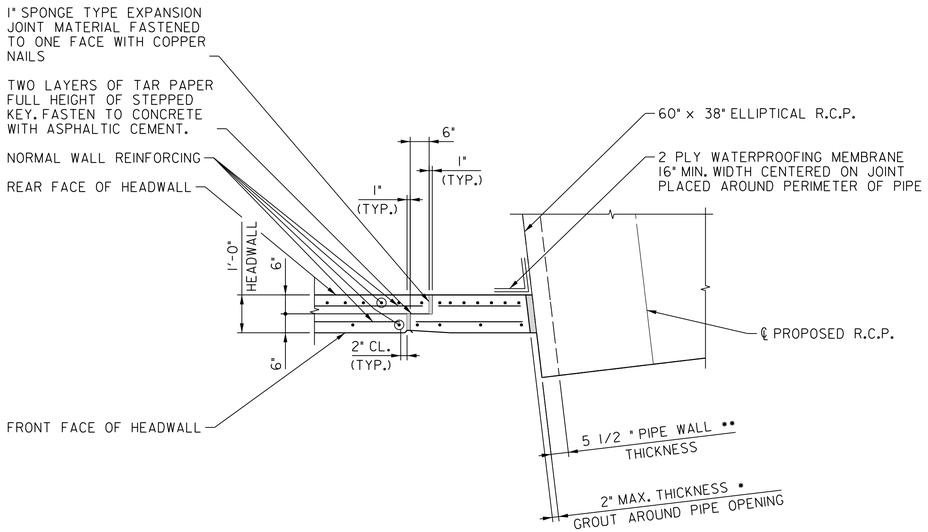
SECTION C–C FOOTING JOINT DETAIL

SCALE: 1/2" = 1'-0"



SECTION
PRECAST HEADWALL DETAIL AT PIPE OPENING

SCALE: 1/2" = 1'-0"



PLAN HEADWALL EXPANSION JOINT LAYOUT

SCALE: 1/2" = 1'-0"

- GAP SHALL BE TERMINATED AT BOTTOM OF 60" x 38" ELLIPTICAL R.C.P. TO ALLOW IT TO BEAR FIRMLY ON HEADWALL FOOTING.

•• ASSUMED WALL THICKNESS FOR 60" x 38" ELLIPTICAL R.C.P.

NOTE:

FOR ADDITIONAL HEADWALL DETAILS, SEE DRAWING NOS. S2-5 TO S2-10.

KCI TECHNOLOGIES

Gannett Fleming

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REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

HEADWALL DETAILS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
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DRAWING NO. S2-12 OF 18

SHEET NO. 49 OF 57

STRUCTURE INVENTORY NO. 03190XO

SURVEY BOOK NO.

PLOTTED: 03:56 PM on Friday, May 17, 2019
FILE: M:\2010\23100466.29\Drawings\pBR-DE12_MD_146.dgn

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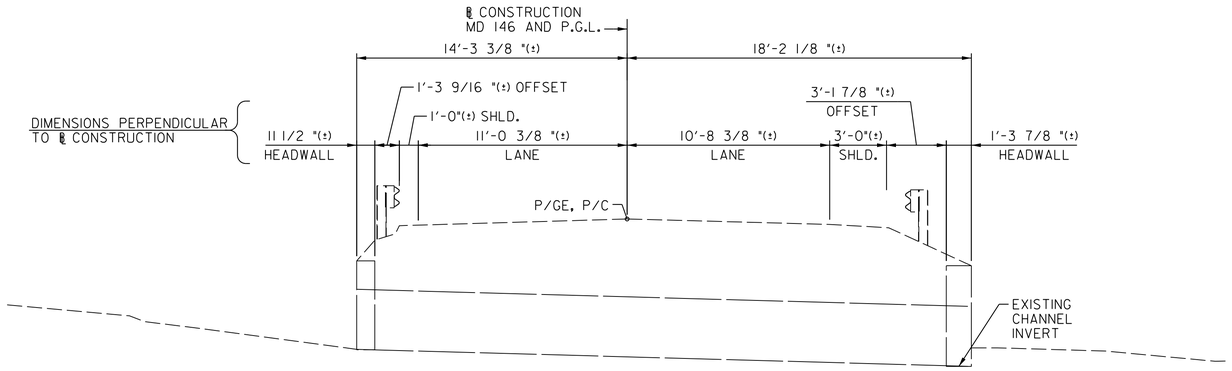
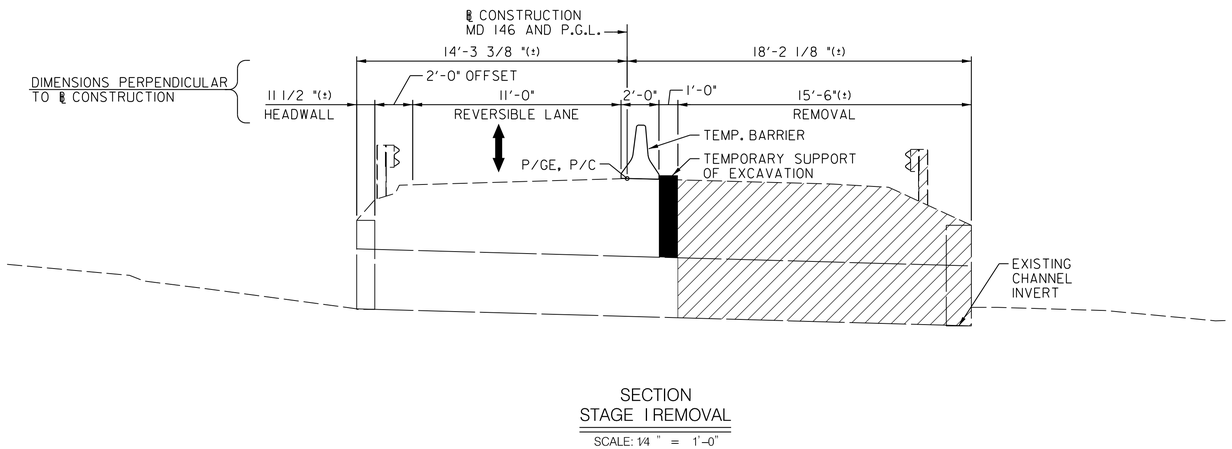


EXISTING TYPICAL SECTION

SCALE: 1/4 " = 1'-0"



SECTION
STAGE I REMOVAL

SCALE: 1/4 " = 1'-0"

STAGE I REMOVAL NOTES:

1. REFER TO MOT PLANS, SHEET NO. 4 TO 6.
2. SHIFT TRAFFIC AS SHOWN.
3. PLACE TEMPORARY PRECAST CONCRETE TRAFFIC BARRIER AS SHOWN.
4. ONCE THE PRECAST CONCRETE TRAFFIC BARRIER IS IN PLACE THE CONTRACTOR SHALL INSTALL TEMPORARY SUPPORT OF EXCAVATION AND REMOVE RAILING, FILL, HEADWALL AND CULVERT TO THE LIMITS SHOWN HATCHED.

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Gannett Fleming
In Joint Venture

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE
NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL
REINFORCED CONCRETE PIPE ON
MD 146 (DULANEY VALLEY ROAD)
OVER DRAINAGE DITCH

SEQUENCE OF CONSTRUCTION – 1

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
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DRAWING NO. S2-13 OF 18

SHEET NO. 50 OF 57

BY: david.clayton –

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STRUCTURE INVENTORY NO. 03190XO

SURVEY BOOK NO.

PLOTTED: "03:56 PM on Friday, May 17, 2019"
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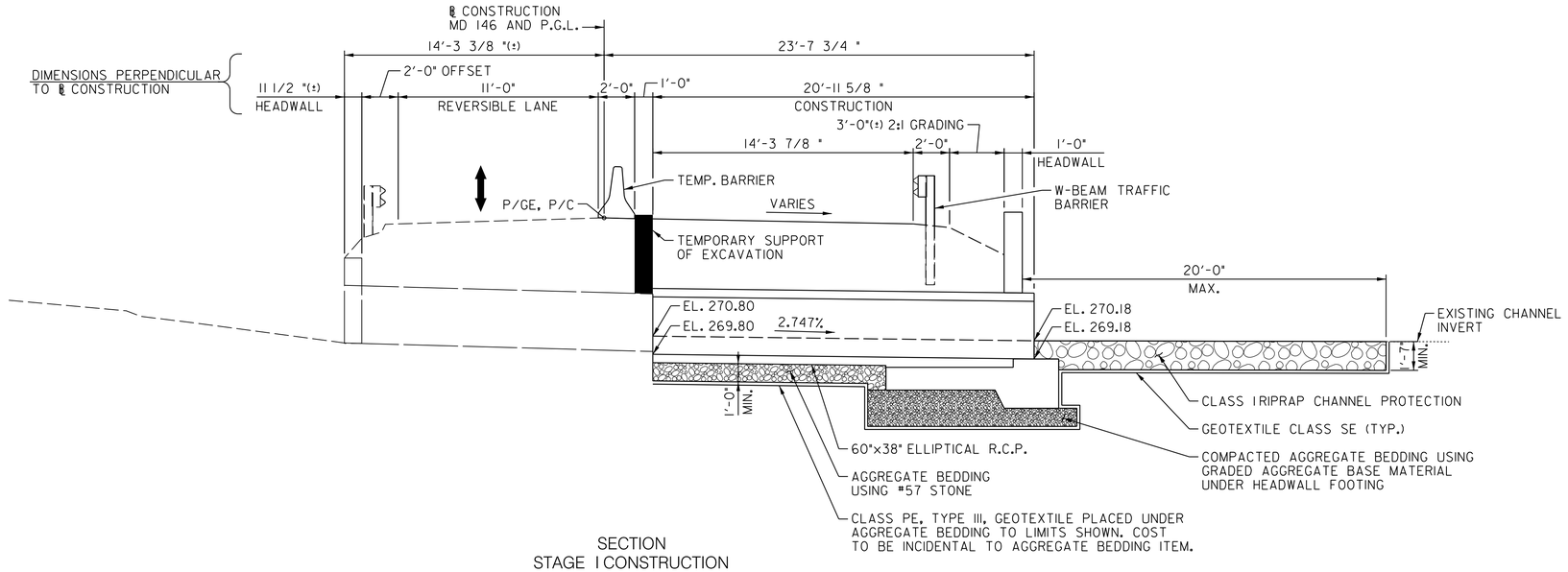
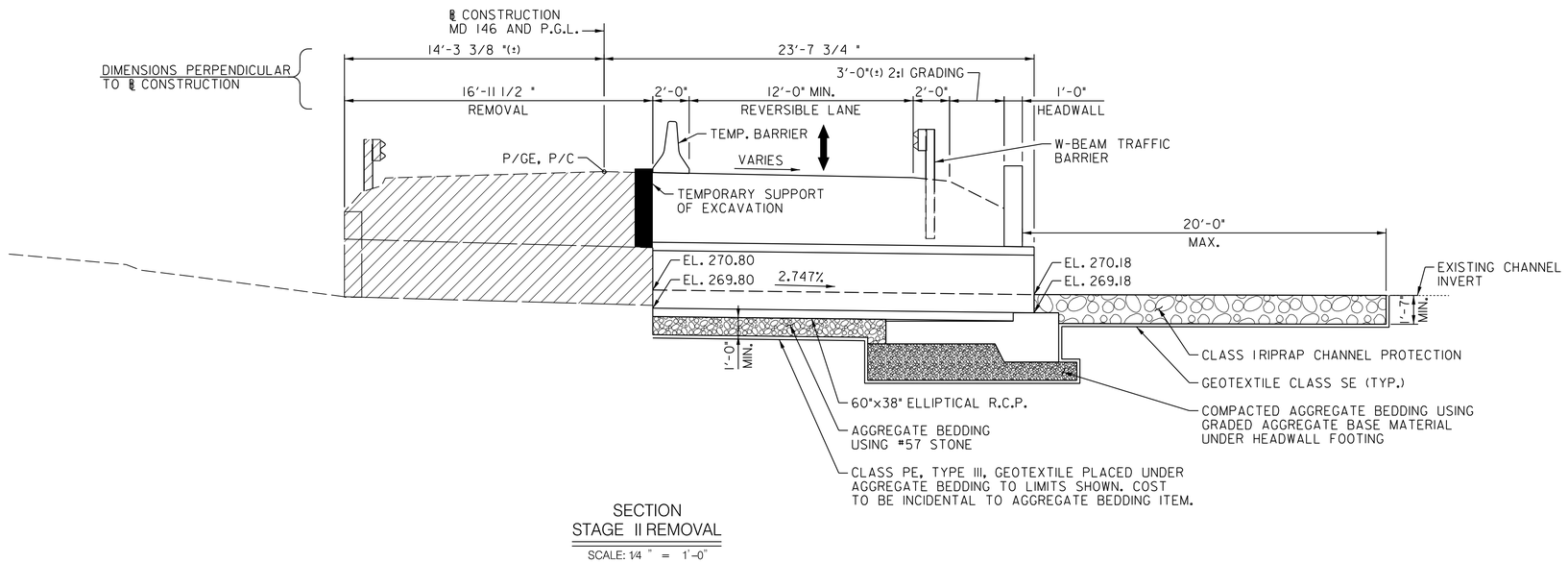


SECTION
STAGE I CONSTRUCTION

SCALE: 1/4 " = 1'-0"

STAGE I CONSTRUCTION NOTES:

1. CONSTRUCT NEW PORTION OF PIPE AND HEADWALL TO THE LIMITS SHOWN.
2. BACKFILL AND INSTALL ROADWAY ASPHALT.
3. INSTALL W-BEAM TRAFFIC BARRIER.
4. REMOVE TEMPORARY PRECAST TRAFFIC BARRIER.
5. RETURN TO TWO LANE TRAFFIC.
6. PLACE CLASS I RIPRAP CHANNEL PROTECTION.



SECTION
STAGE II REMOVAL

SCALE: 1/4 " = 1'-0"

STAGE II REMOVAL NOTES:

1. SHIFT TRAFFIC AS SHOWN.
2. PLACE TEMPORARY PRECAST CONCRETE TRAFFIC BARRIER AS SHOWN.
3. ONCE THE PRECAST CONCRETE TRAFFIC BARRIER IS IN PLACE THE CONTRACTOR SHALL REMOVE RAILING, FILL, HEADWALL AND CULVERT TO THE LIMITS SHOWN HATCHED.

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Gannett Fleming
In Joint Venture

BY: david.clayton –

PLOTTED: 03:56 PM on Friday, May 17, 2019

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE
NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL
REINFORCED CONCRETE PIPE ON
MD 146 (DULANEY VALLEY ROAD)
OVER DRAINAGE DITCH

SEQUENCE OF CONSTRUCTION – 2

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

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DRAWING NO. S2-14 OF 18

SHEET NO. 51 OF 57

STRUCTURE INVENTORY NO. 03190X0

SURVEY BOOK NO.

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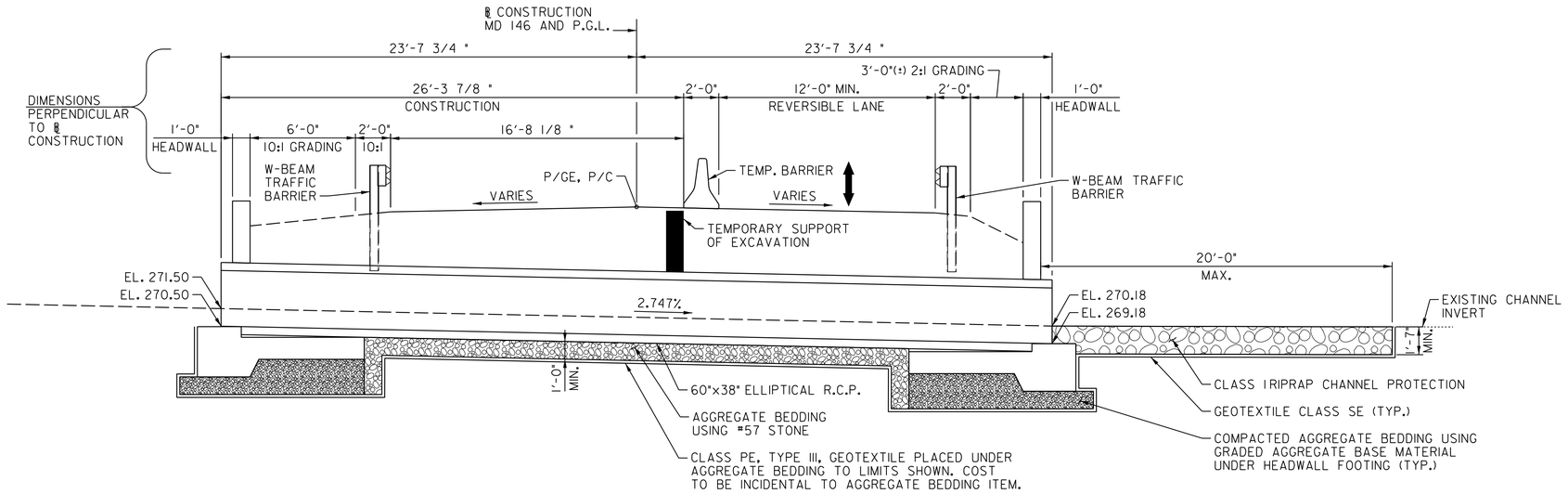
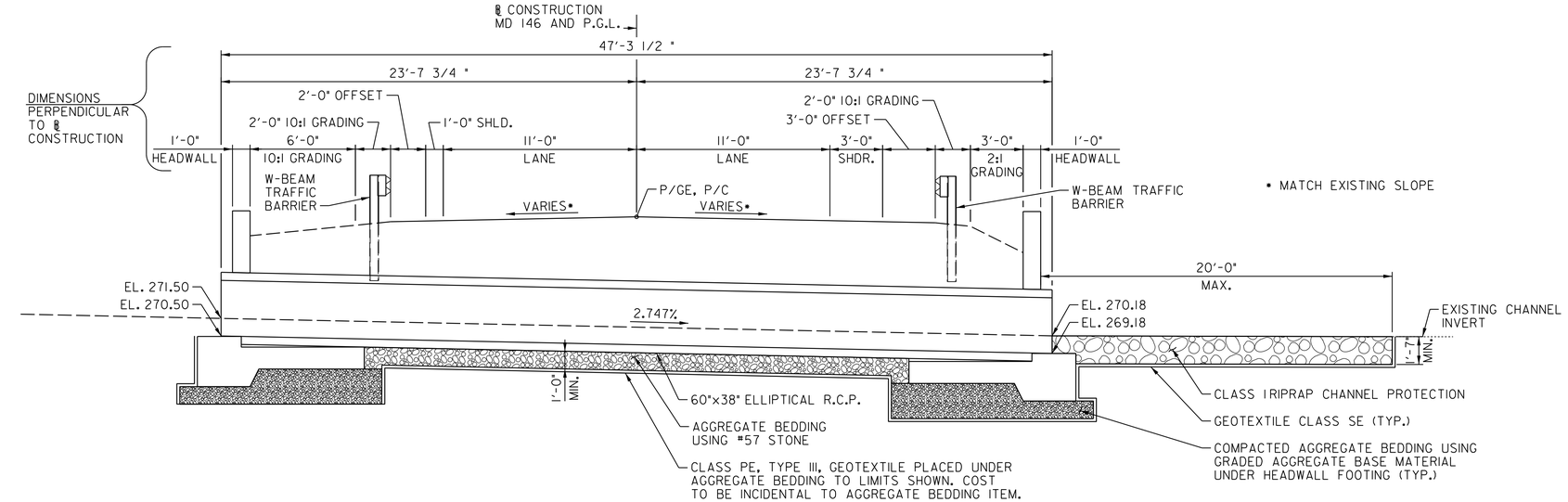


SECTION
STAGE II CONSTRUCTION

SCALE: 1/4 " = 1'-0"

STAGE II CONSTRUCTION NOTES:

1. CONSTRUCT NEW PORTION OF PIPE AND HEADWALL TO THE LIMITS SHOWN.
2. REMOVE PORTION OF TEMPORARY SUPPORT OF EXCAVATION BELOW PROPOSED PAVEMENT SECTION.
3. BACKFILL AND INSTALL ROADWAY ASPHALT.
4. INSTALL W-BEAM TRAFFIC BARRIER.
5. REMOVE TEMPORARY PRECAST CONCRETE TRAFFIC BARRIER.
6. RETURN TRAFFIC TO FINAL PATTERN.



PROPOSED TYPICAL SECTION

SCALE: 1/4 " = 1'-0"

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

SEQUENCE OF CONSTRUCTION – 3

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

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DRAWING NO. S2-15 OF 18

SHEET NO. 52 OF 57

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BY: david.clayton –

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STRUCTURE INVENTORY NO. 03190XO

SURVEY BOOK NO.

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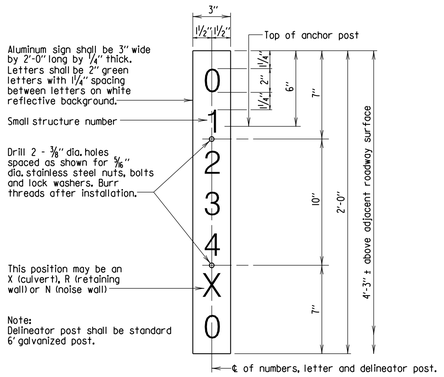


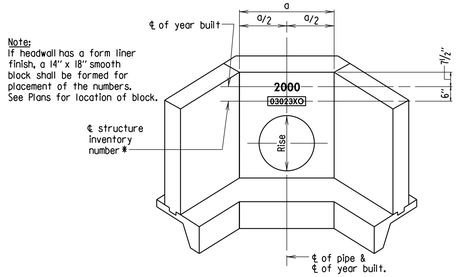
SMALL STRUCTURE SIGN

Scale: None

Placement Notes:

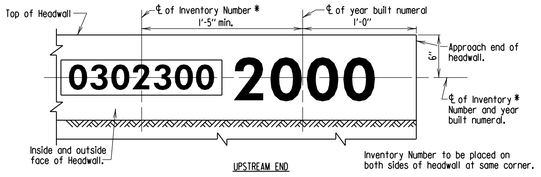
1. The small structure sign shall be placed behind traffic barriers where applicable, (delineator post to be driven within traffic barrier w-beam post). The sign shall be placed at the approach ends of the structure on the right side of the road, at roadway level.
2. Divided highways shall have only one sign placed at each approach end.
3. If traffic barriers are not present, place small structure sign as close to end of structure as possible but sign must be visible from the approach roadway.
4. For noise walls and retaining walls place one small structure sign at each end.
5. For retaining walls that are not visible from the approach roadway, place small structure sign as close to end of structure as possible but sign must be visible from approach roadway. For retaining walls that are visible from the approach roadway, refer to SI-104.
6. Always locate small structure sign so that it will be in the safest position possible relative to highway and pedestrian traffic.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR OFFICE OF STRUCTURES DATE: 09-20-2005	SMALL STRUCTURE SIGN AND PLACEMENT DETAILS
VERSION 1.0	DETAIL NO. SI-102 SHEET 1 OF 1



UPSTREAM END

HEADWALLS FOR PIPES AND/OR PIPE ARCHES WITH RISE 3'-0" OR GREATER



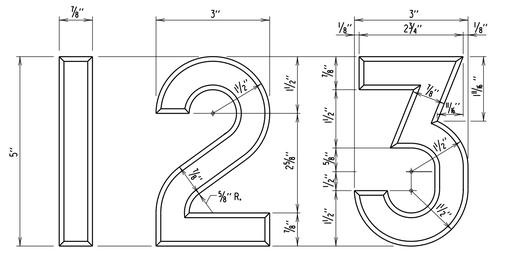
UPSTREAM END

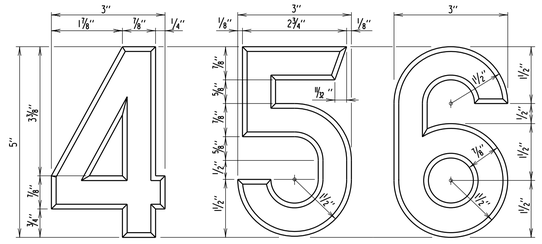
BOX CULVERTS

* Black numbers 3" high on a painted white background, (5" x 17").

Notes:
1. For existing structures, where a year built is shown on the structure and structure is to be rehabilitated, the marking should read 1942-2000 (old year first - new year).
2. For existing structures with no year built contact Office of Structures for old year.
3. For Year Built Numerals refer to Standard No. SI-201.

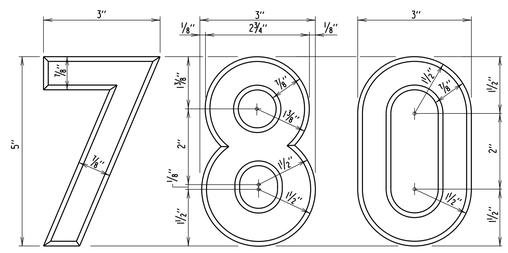
APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR OFFICE OF STRUCTURES DATE: 10-17-2013	LOCATION OF YEAR BUILT MARKING AND STRUCTURE INVENTORY NUMBER ON HEADWALLS FOR PIPES AND BOX CULVERTS
VERSION 1.0	DETAIL NO. SI-103 SHEET 1 OF 1

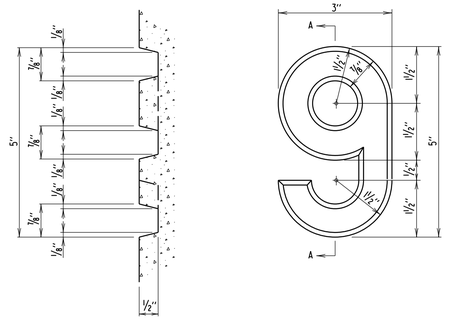




Note:
Year built numerals to be indented into concrete (unpainted) - as indicated on Standard Nos. SI-101, SI-103 and SI-104.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR OFFICE OF STRUCTURES DATE: 9/14/99	NUMERALS FOR YEAR BUILT MARKING ON STRUCTURES
VERSION 1.0	DETAIL NO. SI-201 SHEET 1 OF 2





SECTION A-A

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR OFFICE OF STRUCTURES DATE: 9/14/99	NUMERALS FOR YEAR BUILT MARKING ON STRUCTURES
VERSION 1.0	DETAIL NO. SI-201 SHEET 2 OF 2

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

STANDARD DETAILS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY S.H.A.
DRAWN BY S.H.A.
CHECKED BY S.H.A.

TENTATIVE
OFFICE OF STRUCTURES
This plan is draft and subject to change. It is information only; deliberative, communication that is not for public disclosure under Title 10, Subtitle 6, Part III of section 4-341 Maryland Public Information Act)

DRAWING NO. S2-16 OF 18

SHEET NO. 53 OF 57

BY: david.clayton -

PLOTTED: 03:56 PM on Friday, May 17, 2019

STRUCTURE INVENTORY NO. 03190XO

SURVEY BOOK NO.

PLOTTED: "03:56 PM on Friday, May 17, 2019"
FILE: M:\2010\23100466.29\Drawings\03190XOs01.dgn

LOCATION CATEGORY A								
BAR SIZE	CENTER TO CENTER SPACING							
	3″		4″		5″		≥ 6″	
#4	2′-1″	2′-8″	2′-1″	2′-6″	2′-1″	2′-6″	2′-1″	2′-6″
#5	2′-8″	3′-6″	2′-7″	3′-4″	2′-7″	3′-1″	2′-7″	3′-1″
#6	3′-10″	5′-0″	3′-1″	4′-0″	3′-1″	4′-0″	3′-1″	4′-0″
#7	5′-3″	6′-10″	3′-11″	5′-1″	3′-7″	4′-8″	3′-7″	4′-8″
#8	6′-10″	8′-11″	5′-1″	6′-8″	4′-1″	5′-4″	4′-1″	5′-4″
#9	8′-8″	11′-3″	6′-6″	8′-6″	5′-2″	6′-9″	5′-1″	6′-7″
#10	-	-	8′-3″	10′-9″	6′-7″	8′-7″	6′-3″	8′-2″
#11	-	-	10′-1″	13′-3″	8′-1″	10′-7″	7′-6″	9′-9″

Location Category A - Bars in horizontal layers in top of pour with 12″ or more of concrete below them such as in: footings, pier caps, etc.

LOCATION CATEGORY B								
BAR SIZE	CENTER TO CENTER SPACING							
	3″		4″		5″		≥ 6″	
#4	1′-7″	2′-5″	1′-7″	1′-11″	1′-7″	1′-11″	1′-7″	1′-11″
#5	2′-1″	3′-1″	2′-0″	3′-0″	2′-0″	2′-5″	2′-0″	2′-5″
#6	3′-0″	4′-5″	2′-5″	3′-7″	2′-5″	3′-7″	2′-5″	3′-7″
#7	4′-0″	6′-0″	3′-0″	4′-6″	2′-9″	4′-2″	2′-9″	4′-2″
#8	5′-3″	7′-10″	3′-11″	5′-11″	3′-2″	4′-9″	3′-2″	4′-9″
#9	6′-8″	10′-0″	5′-0″	7′-6″	4′-0″	6′-0″	3′-11″	5′-10″
#10	-	-	6′-4″	9′-6″	5′-1″	7′-7″	4′-10″	7′-2″
#11	-	-	7′-10″	11′-8″	6′-3″	9′-4″	5′-9″	8′-8″

Location Category B - All bars not in Location Category A.

[ ] = Non-epoxy coated [shaded] = Epoxy coated

Note:
1. When bar lap is not specified on the Plans, the above dimensions shall be used.
2. These bar laps do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These bar laps only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f′c = 4000 psi.
4. These bar laps assume cover of 2″. Greater lap lengths will be required for cover less than 2″.
5. These bar laps are Class B splices based on the development lengths in Std. No. REBAR-DL-103. Class B splices are 1.3 times the development length.
6. Class A splices may be used when (a) the area of reinforcement provided is at least twice that required by analysis over the entire length of the lap splice and (b) one-half or less of the total reinforcement is spliced within the required lap splice length. Class A splices are 1.0 times the development length.

APPROVAL
[signature] DIRECTOR OFFICE OF STRUCTURES
DATE: 03/21/2017
VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

BAR LAP DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.6 (4500 P.S.I.) CONCRETE

DETAIL NO. REBAR-BL-103 SHEET 1 OF 1

LOCATION CATEGORY A								
BAR SIZE	CENTER TO CENTER SPACING							
	3″		4″		5″		≥ 6″	
#4	1′-7″	2′-1″	1′-7″	1′-11″	1′-7″	1′-11″	1′-7″	1′-11″
#5	2′-1″	2′-8″	2′-0″	2′-7″	2′-0″	2′-5″	2′-0″	2′-5″
#6	3′-0″	3′-10″	2′-5″	3′-1″	2′-5″	3′-1″	2′-5″	3′-1″
#7	4′-0″	5′-3″	3′-0″	3′-11″	2′-9″	3′-7″	2′-9″	3′-7″
#8	5′-3″	6′-10″	3′-11″	5′-2″	3′-2″	4′-1″	3′-2″	4′-1″
#9	6′-8″	8′-8″	5′-0″	6′-6″	4′-0″	5′-3″	3′-11″	5′-1″
#10	-	-	6′-4″	8′-3″	5′-1″	6′-7″	4′-10″	6′-3″
#11	-	-	7′-10″	10′-2″	6′-3″	8′-2″	5′-9″	7′-6″

Location Category A - Bars in horizontal layers in top of pour with 12″ or more of concrete below them such as in: footings, pier caps, etc.

LOCATION CATEGORY B								
BAR SIZE	CENTER TO CENTER SPACING							
	3″		4″		5″		≥ 6″	
#4	1′-3″	1′-10″	1′-3″	1′-6″	1′-3″	1′-6″	1′-3″	1′-6″
#5	1′-7″	2′-5″	1′-6″	2′-3″	1′-6″	1′-10″	1′-6″	1′-10″
#6	2′-3″	3′-5″	1′-10″	2′-9″	1′-10″	2′-9″	1′-10″	2′-9″
#7	3′-1″	4′-8″	2′-4″	3′-6″	2′-2″	3′-2″	2′-2″	3′-2″
#8	4′-0″	6′-0″	3′-0″	4′-6″	2′-5″	3′-8″	2′-5″	3′-8″
#9	5′-2″	7′-8″	3′-10″	5′-9″	3′-1″	4′-7″	3′-0″	4′-6″
#10	-	-	4′-11″	7′-4″	3′-11″	5′-10″	3′-9″	5′-7″
#11	-	-	6′-0″	9′-0″	4′-10″	7′-2″	4′-5″	6′-8″

Location Category B - All bars not in Location Category A.

[ ] = Non-epoxy coated [shaded] = Epoxy coated

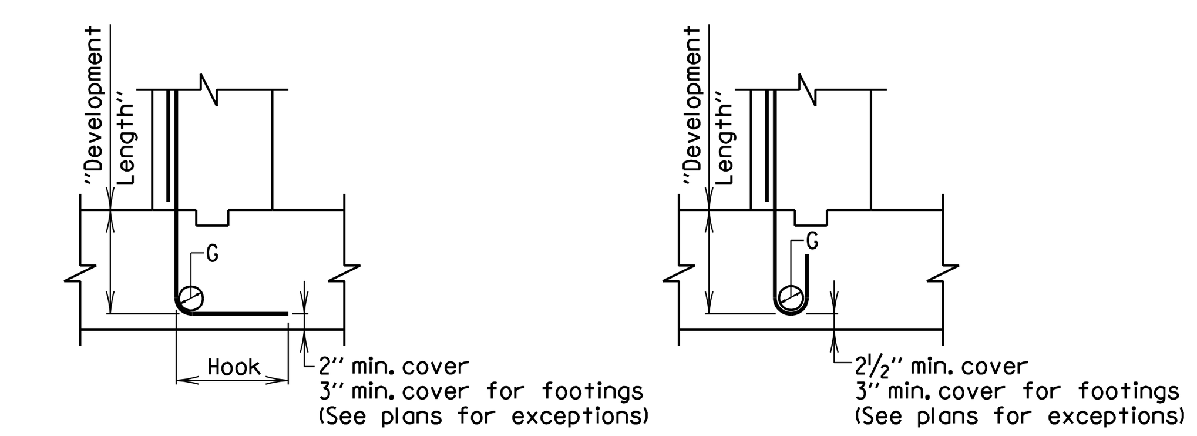
Note:
1. When development length is not specified on the Plans, the above dimensions shall be used.
2. These development lengths do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These development lengths only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f′c = 4000 psi.
4. These development lengths assume cover of 2″. Greater development lengths will be required for cover less than 2″.
5. The Excess Reinforcement Factor was assumed to be 1.0 when calculating these dimensions.
6. Atr was assumed to be 0 when calculating the Reinforcement Confinement Factor.
7. If depth of member does not allow bar development length indicated in Location Categories A and B; then hooks shall be added to all bars not conforming, as per D, E, and F per Std. No. REBAR-DL-203.

APPROVAL
[signature] DIRECTOR OFFICE OF STRUCTURES
DATE: 03/21/2017
VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

DEVELOPMENT LENGTH DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.6 (4500 P.S.I.) CONCRETE

DETAIL NO. REBAR-DL-103 SHEET 1 OF 1



STANDARD 90° HOOK

STANDARD 180° HOOK

BAR SIZE	* LOCATION CATEGORY		
	D	E	F
#4	7″	10″	8″
#5	9″	1′-0″	10″
#6	10″	1′-3″	1′-0″
#7	1′-0″	1′-5″	1′-2″
#8	1′-2″	1′-7″	1′-4″
#9	1′-4″	1′-10″	1′-6″
#10	1′-5″	2′-1″	1′-8″
#11	1′-7″	2′-3″	1′-10″

Note:
For Hook Dimensions and Bends, see Std. No. REBAR-BB-102.

* LOCATION CATEGORY:

D- All bars terminating with a standard 180° hook with side cover (normal to plane of hook) not less than $2\frac{1}{2}$″, and for 90° deg. hook, cover on bar extension beyond hook not less than 2″.
E- All bars not in Category D.
F- All bars with hook enclosed vertically or horizontally within ties or stirrup-ties spaced along the full development length not greater than 3d where d is the diameter of the hooked bar.

Note:
1. When development length is not specified on the Plans, the above dimensions shall be used.
2. These development lengths do not apply when bar is in lightweight concrete or any other strength of concrete.
3. These development lengths only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi. and Concrete Design, f′c = 4000 psi.
4. If depth of member does not allow bar development length indicated in Categories A, B, and C: Std. No. REBAR-DL-103; then hook shall be added to all bars not conforming, as per D, E & F.

APPROVAL
[signature] DIRECTOR OFFICE OF STRUCTURES
DATE: 05/10/2011
VERSION 1.0

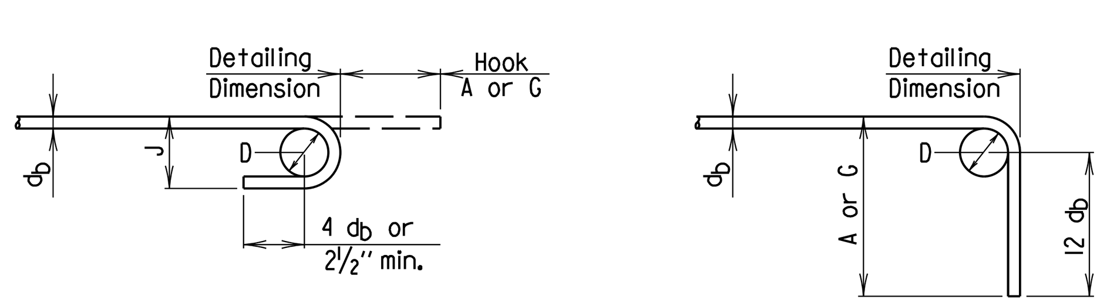
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

DEVELOPMENT LENGTH DIMENSIONS OF HOOKED BARS FOR GRADE 60 REINFORCING STEEL IN MIX NO. 6 (4500 P.S.I.) CONCRETE NON-EPOXY COATED REINFORCING

DETAIL NO. REBAR-DL-203 SHEET 1 OF 1

HOOKS
TABLE I
REFERENCES

1. ACI Types 1 thru 26
2. SHA Standard Pin Bending
3. SHA Radius Bending



180° 90°

RECOMMENDED END HOOKS, ALL GRADES				
BAR SIZE	Finished bend diameter	180 - deg hook		90 - deg hook
	D, in.	A or G in	J, in.	A or G in
#3	$2\frac{1}{4}$	5	3	6
#4	3	6	4	8
#5	$3\frac{3}{4}$	7	5	10
#6	$4\frac{1}{2}$	8	6	1-0
#7	$5\frac{1}{4}$	10	7	1-2
#8	6	11	8	1-4
#9	$9\frac{1}{2}$	1-3	$11\frac{3}{4}$	1-7
#10	$10\frac{3}{4}$	1-5	$1\text{-}1\frac{1}{4}$	1-10
#11	12	1-7	$1\text{-}2\frac{3}{4}$	2-0
#14	$18\frac{1}{4}$	2-3	$1\text{-}9\frac{3}{4}$	2-7
#18	24	3-0	$2\text{-}4\frac{1}{2}$	3-5

APPROVAL
[signature] DIRECTOR OFFICE OF STRUCTURES
DATE: 11/17/1997
VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

REINFORCING STEEL HOOK TABLES AND DIAGRAMS

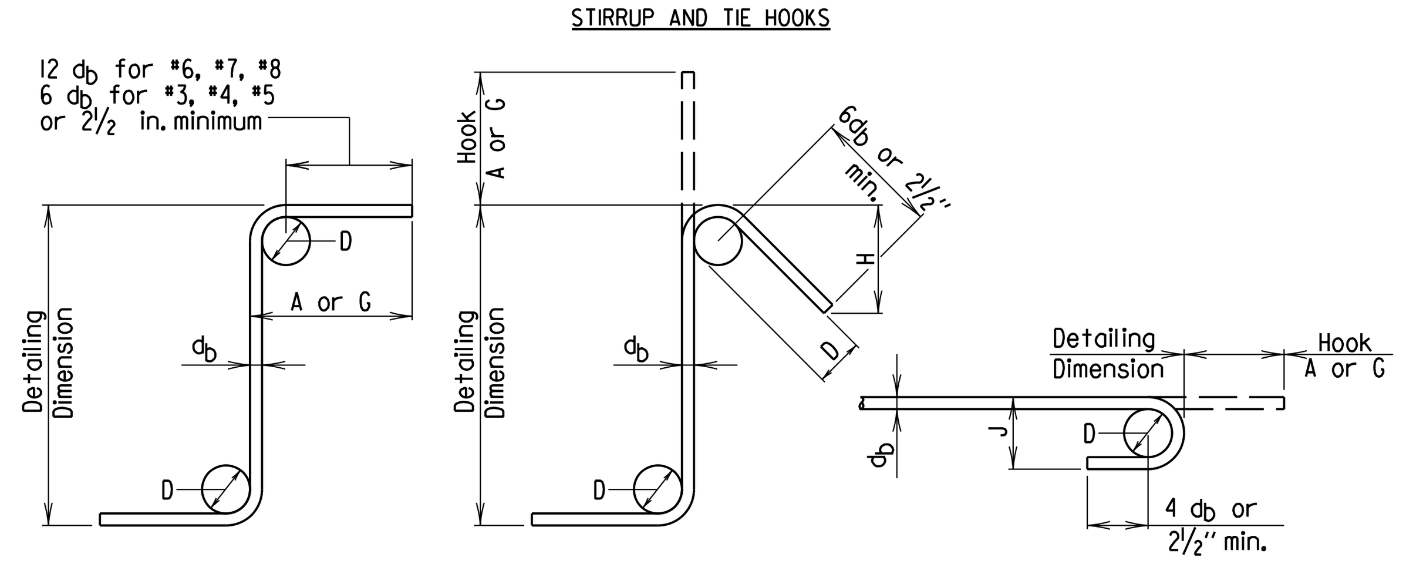
DETAIL NO. REBAR-BB-102 SHEET 1 OF 2

HOOKS
TABLE II
REFERENCES

1. ACI Types S1 thru S11
2. ACI Types T1 thru T8
3. SHA Ties and Stirrups

(Note: Tie and stirrup types supplied in sizes #3-#8)

STIRRUP AND TIE HOOKS



90° 135° 180°

STIRRUP AND TIE HOOK DIMENSIONS, in.				
BAR SIZE	D, in.	90 - deg hook	135 - deg hook	
		A or G	A or G	H, approx
#3	$1\frac{1}{2}$	4	4	$2\frac{1}{2}$
#4	2	$4\frac{1}{2}$	$4\frac{1}{2}$	3
#5	$2\frac{1}{2}$	6	$5\frac{1}{2}$	$3\frac{3}{4}$
#6	$4\frac{1}{2}$	1-0	$7\frac{3}{4}$	$4\frac{1}{2}$
#7	$5\frac{1}{4}$	1-2	9	$5\frac{1}{4}$
#8	6	1-4	$10\frac{1}{4}$	6

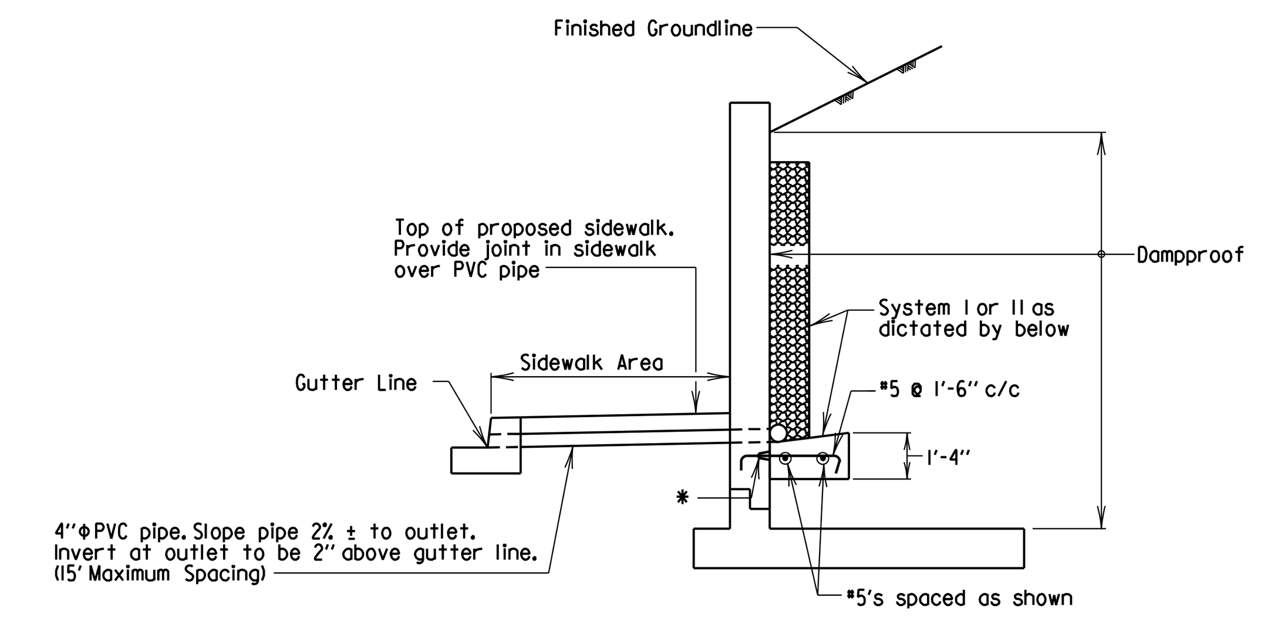
RECOMMENDED END HOOKS, ALL GRADES			
BAR SIZE	Finished bend diameter	180 - deg hook	
	D, in.	A or G in	J, in.
#3	$2\frac{1}{4}$	5	3
#4	3	6	4
#5	$3\frac{3}{4}$	7	5
#6	$4\frac{1}{2}$	8	6
#7	$5\frac{1}{4}$	10	7
#8	6	11	8

APPROVAL
[signature] DIRECTOR OFFICE OF STRUCTURES
DATE: 11/17/1997
VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

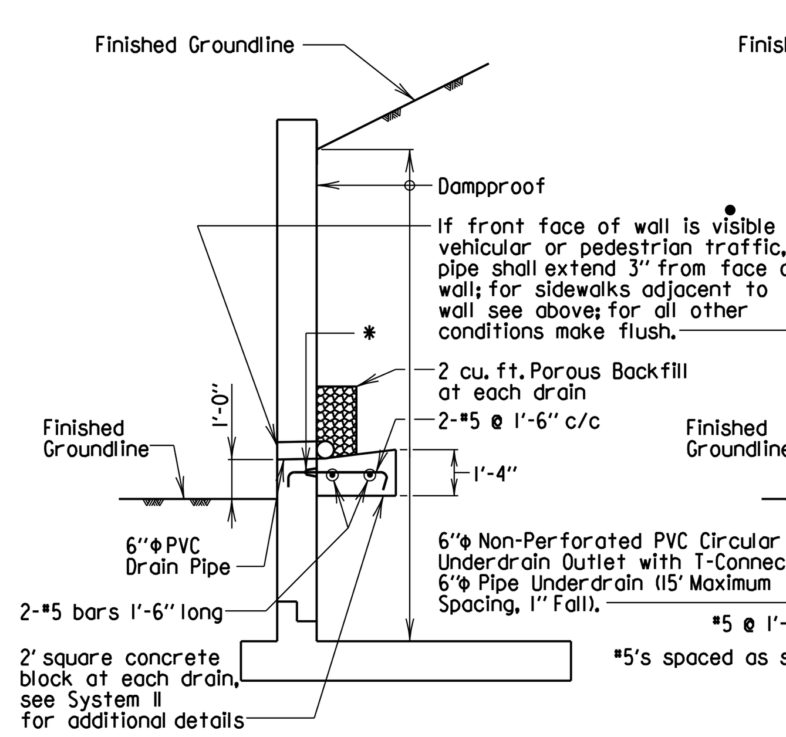
REINFORCING STEEL HOOK TABLES AND DIAGRAMS

DETAIL NO. REBAR-BB-102 SHEET 2 OF 2



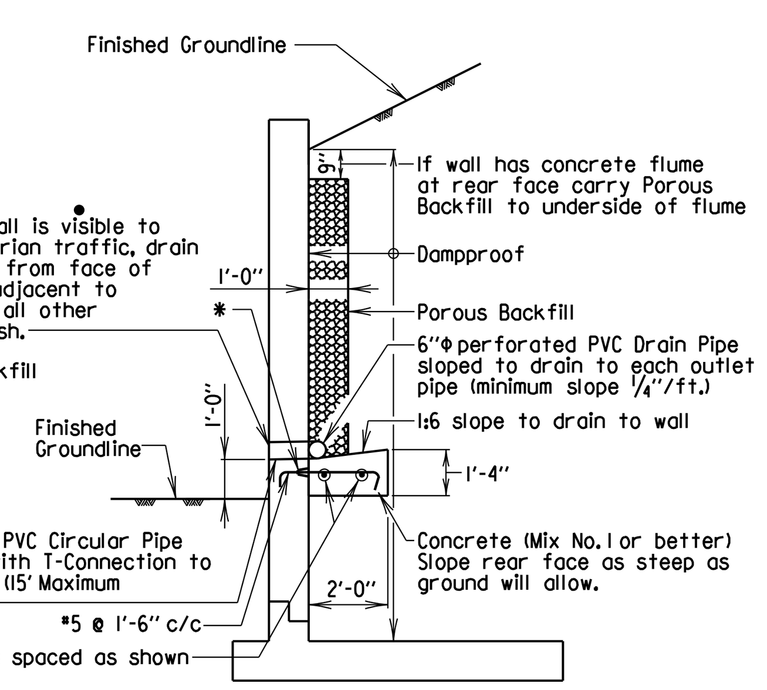
DRAIN AT SIDEWALK
Scale : None

* #5 Threaded Rebar Dowel Coupler at 1′-6″ c/c.



This system shall be used for all box culvert wing walls and other wing walls that are both less than 30′ long and less than 16′ high (height of wall from bottom of footing to top of highest section). One drain shall be placed at ℄ of wall for all walls less than 15′ long. For walls between 15′ and 30′ long, two drains shall be placed, one at each third point.

SYSTEM I
Scale : None



This system shall be used for all retaining walls, all wing walls (not in System I).

SYSTEM II
Scale : None

Note:
1. Exact elevation of drain to be determined by Engineer in field.
2. Porous backfill (refer to Section 469).
3. Use this standard for bridges with wing walls that are not parallel to the highway. For bridges with wing walls parallel to the highway see Std. No. SUB-DR-203 sheet 5 of 5 for details.

APPROVAL
[signature] DIRECTOR OFFICE OF STRUCUTRES
DATE: 01/22/2001
VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

RETAINING WALL AND WING WALL DRAINAGE SYSTEMS

DETAIL NO. RW-301 SHEET 1 OF 1

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60″ x 38″ ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

STANDARD DETAILS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

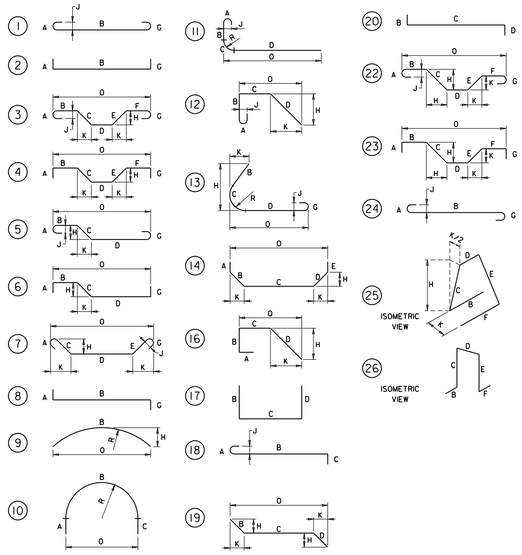
DESIGNED BY S.H.A.
DRAWN BY S.H.A.
CHECKED BY S.H.A.

TENTATIVE
OFFICE OF STRUCTURES
This plan is draft and subject to change. It is interagency/intra-agency deliberative communication that is not for public disclosure under MD General Provisions Code Annotated Section 4-344 (Maryland Public Information Act)

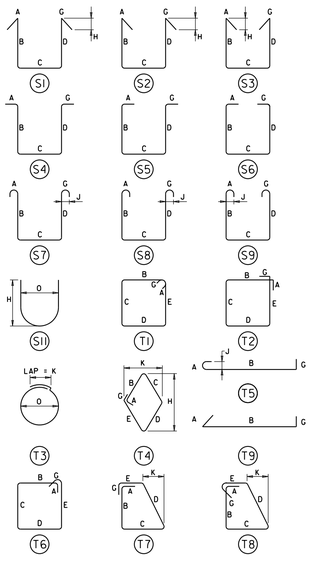
DRAWING NO. S2-17 OF 18 SHEET NO. 54 OF 57

STRUCTURE INVENTORY NO. 03190XO SURVEY BOOK NO.

ACI TYPICAL BAR BENDS



STANDARD PIN BENDING



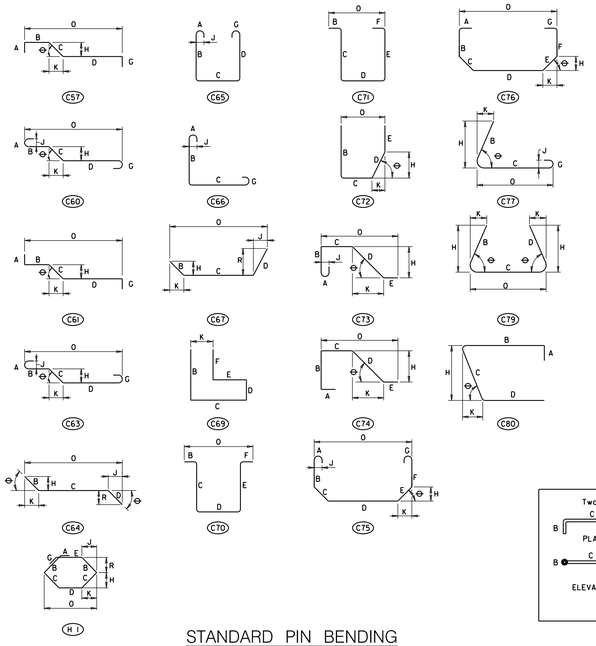
NOTE TO FABRICATOR

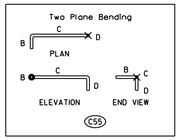
BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

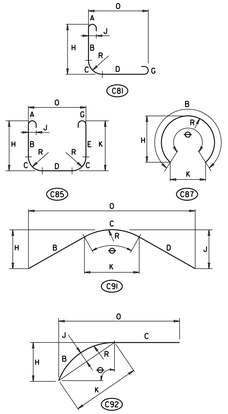
TIES AND STIRRUPS

SHA TYPICAL BAR BENDS

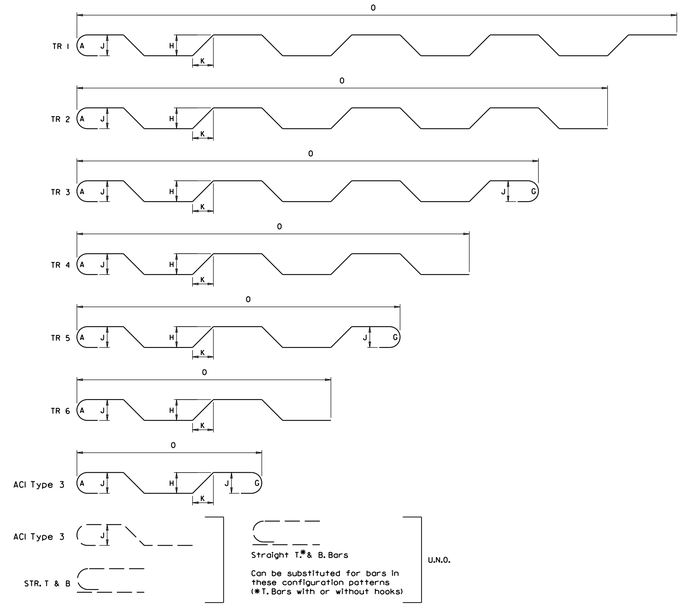




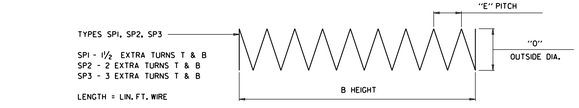
STANDARD PIN BENDING



RADIUS BENDING

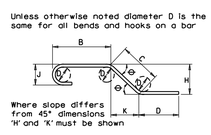


TRUSS BAR CONFIGURATION



SPIRAL

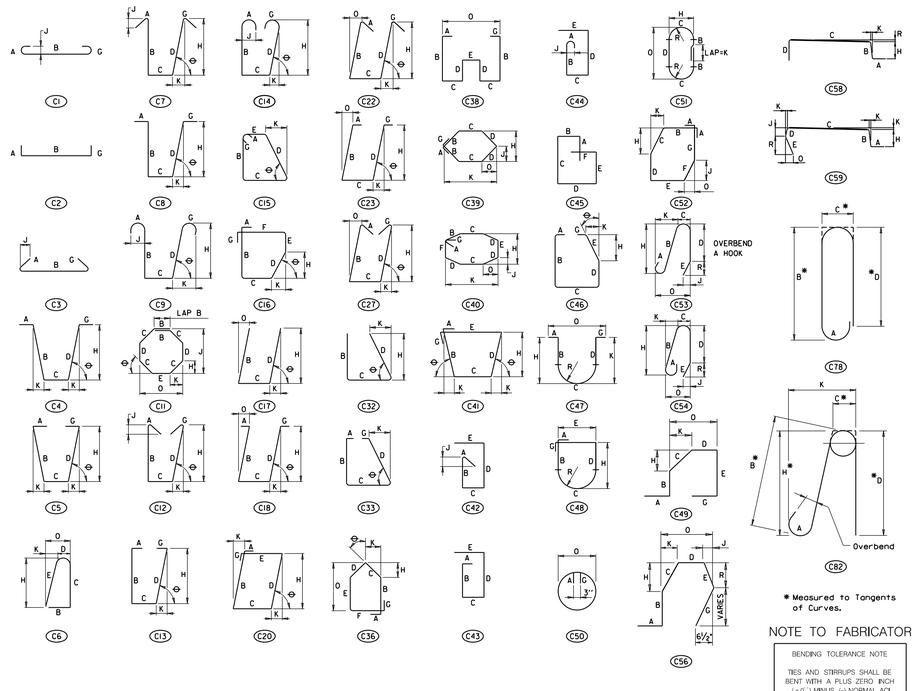
Unless otherwise noted diameter D is the same for all bends and hooks on a bar



ENLARGED VIEW SHOWING BAR BENDING DETAILS

Notes:
1. All dimensions are out to out of bar or to tangent points for 135° and 180° hooks.
2. 'J' dimensions on 180° hooks to be shown only where necessary to restrict hook size. Otherwise standard hooks are to be used.
3. Where 'J' is not shown, 'J' will be kept equal to or less than 'H' on truss bars. Where 'J' can exceed 'H' it should be shown.
4. 'H' dimension on stirrups to be shown where necessary to fit within concrete.
5. Where bars are to be bent more accurately than standard bending tolerances, bending dimensions which require closer fabrication should have limits indicated.

GENERAL NOTES



TIES AND STIRRUPS

* Measured to Tangents of Curves.

NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03190X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

STANDARD DETAILS

SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY S.H.A.
DRAWN BY S.H.A.
CHECKED BY S.H.A.

TENTATIVE
OFFICE OF STRUCTURES
This plan is draft and subject to change. It is intra-agency deliberative communication that is not for public disclosure under Title 4, Subtitle 1, Section 4-104 of the Maryland Public Information Act.

DRAWING NO. S2-18 OF 18

SHEET NO. 55 OF 57

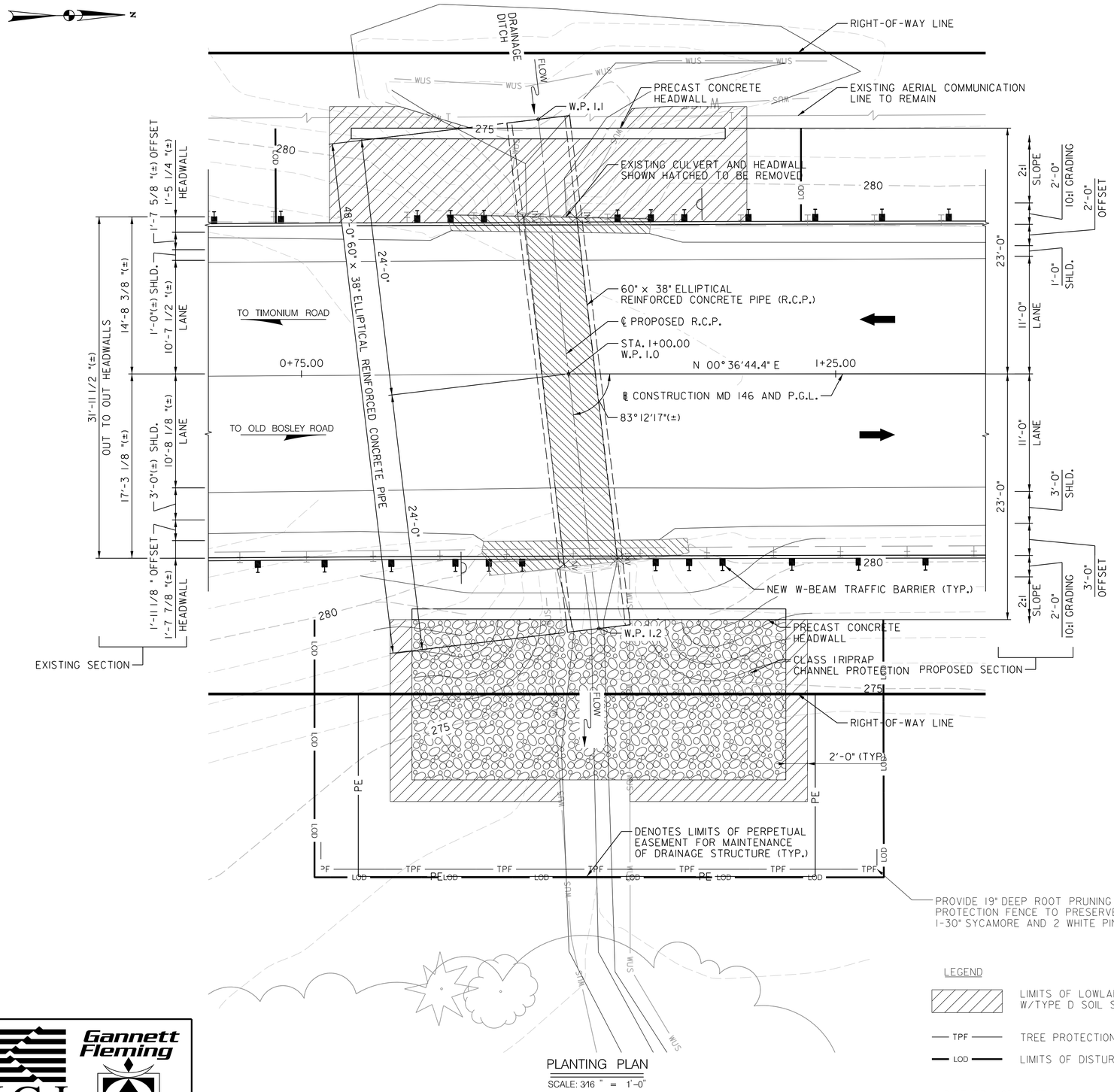
BY: david.clayton -

PLOTTED: 03:56 PM on Friday, May 17, 2019

STRUCTURE INVENTORY NO. 03190XO

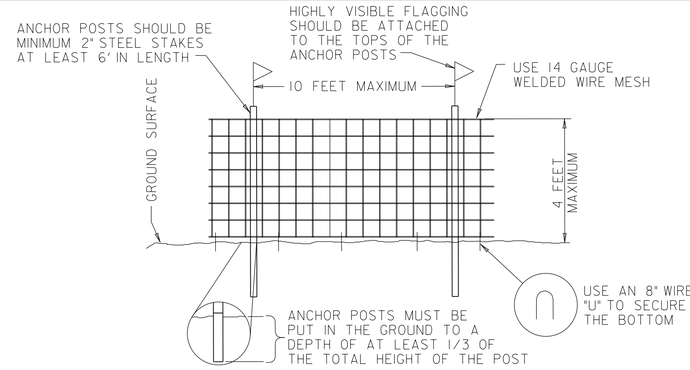
SURVEY BOOK NO.

PLOTTED: "03:56 PM on Friday, May 17, 2019"
FILE: M:\2010\23100466.29\Drawings\03190XOs03.dgn



PLANTING PLAN

SCALE: 3/16 " = 1'-0"



TREE PROTECTION FENCE

NOT TO SCALE

PLACEMENT OF TREE PROTECTION FENCE:

1. TREE PROTECTION FENCE SHALL BE MANUALLY INSTALLED AS NOTED ON FOREST CONSERVATION PLANS. ANY QUESTIONS REGARDING PLACEMENT OF TREE PROTECTION FENCE SHALL BE ADDRESSED BY THE MARYLAND QUALIFIED PROFESSIONAL THAT PREPARED THE PLANS OR THE CITY OF FREDERICK PLANNER.

2. THIS SHALL BE COMPLETED AND THE LOCATION OF THE FENCE APPROVED BY THE CITY OS FREDERICK PLANNER PRIOR TO ANY PERMIT APPROVALS, OR AT THE TIME OF THE PRE-CONSTRUCTION MEETING. IF ANY PROBLEMS ARISE REGARDING THE FENCE LOCATION, UNNECESSARY EQUIPMENT CLEARING, ETC., NO PERMIT WILL BE ISSUED UNTIL THE REQUIRED CORRECTIONS ARE COMPLETED TO THE SATISFACTION OF THE CITY OF FREDERICK PLANNER.

GENERAL LANDSCAPE NOTES

1. ON ALL DISTURBED AREAS, PLACE FURNISHED TOPSOIL 4 IN. DEPTH, PERFORM LOWLAND MEADOW ESTABLISHMENT, AND INSTALL TYPE D SOIL STABILIZATION MATTING (SSM), UNLESS OTHERWISE NOTED.
2. TREE PLANTING SETBACKS:
   A. NO TREES SHALL BE LOCATED IN CLEAR ZONES ADJACENT TO TRAVEL LANES OR IN INTERSECTION SIGHT TRIANGLES.
   B. MAINTAIN OFFSETS FROM OVERHEAD ELECTRIC LINES AS PER THE FOLLOWING BASED ON SIZE AT MATURITY:
      1. OFFSET SMALL TREES (UNDER 20 FT. HEIGHT AT MATURITY) 20 FT. FROM UTILITY POLES.
      2. OFFSET MEDIUM TREES (20-50 FT. HEIGHT AT MATURITY) AND MEDIUM AND LARGE COLUMNAR TREES (20 FT. WIDE AT MATURITY) 30 FT. FROM WIRES AND POLES.
      3. OFFSET LARGE TREES (OVER 50 FT. HEIGHT AT MATURITY) 50 FT. FROM WIRES AND POLES.
   C. INSTALL TREES AT LEAST 10 FT. FROM THE CENTERLINE OF WATER, GAS, AND SANITARY SEWER LINES. ADDITIONAL SETBACKS MAY BE REQUIRED BY THE OWNER OF THE UTILITY.
   D. INSTALL TREES AT LEAST 10 FT. PLUS HALF THE DIAMETER OF UNDERGROUND DRAIN PIPES.
   E. INSTALL TREES AT LEAST 15 FT. FROM BACK OF TRAFFIC BARRIER POSTS ALONG ROADWAYS WITH A POSTED SPEED OF 40 MPH OR GREATER AND ALONG HIGHWAY ON AND OFF RAMPS. A MINIMUM OFFSET OF 7 FT. FROM TRAFFIC BARRIER POSTS IS REQUIRED FOR ALL OTHER ROADWAYS.
   F. INSTALL SHADE TREES AND UPRIGHT/COLUMNAR ORNAMENTAL TREES AT LEAST 6 FT. BACK FROM THE BACK OF CURB IN CLOSED-SECTION MEDIAN PLANTINGS.
   G. INCREASE SETBACKS FROM ROADS, SIDEWALKS, TRAFFIC CONTROL DEVICES AND STRUCTURES FOR MULTISTEMMED AND/OR BROAD-SPREADING ORNAMENTAL TREES TO AMINTAIN NECESSARY BRANCH CLEARANCE.
3. SHRUB PLANTING SETBACKS:
   A. INSTALL SHRUBS AT LEAST 15 FT. FROM TRAFFIC BARRIER POSTS.
   B. DO NOT INSTALL SHRUBS IN SIGHT TRIANGLES FOR INTERSECTIONS WHERE THE MATURE HEIGHT OF THE SHRUBS WHEN ADDED TO EXISTING TERRAIN WILL EXCEED 30 IN. HEIGHT.
4. OFFSET THE EDGE OF MULCHED BEDS OR INDIVIDUAL PLANTING PITS AT LEAST 7 FT. FROM THE CENTERLINE OF DRAINAGE SWALES, EXCEPT WHERE OTHERWIASE DIRECTED BY THE ENGINEER. LARGER SETBACKS MAY BE REQUIRED FOR HIGH VOLUME SWALES WITH CHECK DAMS OR OTHER DEVICES. DO NOT INSTALL SHRUBS BETWEEN THE ROADWAY SHOULDER AND ROADSIDE DRAINAGE SWALES WITHOUT PRIOR PLANTING LAYOUT APPROVAL OF THE LANDSCAPE ARCHITECT OR PROJECT ENGINEER.
5. INCORPORATE TREES WITHIN 5 FEET OF LANDSCAPE BED INTO THE BED.
6. TREAT AND REMOVE INVASIVE SPECIES WHERE DIRECTED BY THE ENGINEER AND WHERE INDICATED ON THE PLANS.
7. RETAIN DESIRABLE TREES, SHRUBS, AND PERENNIALS EXCEPT WHERE INDICATED ON THE PLANS OR DIRETED BY THE ENGINEER.
8. DO NOT REMOVE OR PRUNE THE BRANCHES OR ROOTS OF TREES WITHIN MDOT SHA RIGHTS-OF-WAY WITHOUT AN APPROVED ROADSIDE TREE PERMIT OR REFORESTATION SITE REVIEW APPROVAL FROM MD DEPARTMENT OF NATURAL RESOURCES FOREST SERVICE.

LEGEND

- LIMITS OF LOWLAND MEADOW ESTABLISHMENT W/TYPE D SOIL STABILIZATION MATTING (SSM)
- TPF — TREE PROTECTION FENCE/ROOT PRUNING LINE
- LOD — LIMITS OF DISTURBANCE

DISTURBANCE NOTE:

UNLESS OTHERWISE SPECIFIED, ALL DISTURBED AREAS ARE TO RECEIVE 4" FURNISHED TOPSOIL (TURFGRASS ESTABLISHMENT)

KCI TECHNOLOGIES / Gannett Fleming

In Joint Venture

BY: david.clayton –

PLOTTED: Friday, May 17, 2019 AT 03:56 PM

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

HIGHWAY DESIGN DIVISION

REPLACEMENT OF SMALL STRUCTURE NO. 03189X0 SINGLE 60" x 38" ELLIPTICAL REINFORCED CONCRETE PIPE ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

REVISIONS

PLANTING PLAN, NOTES & DETAIL

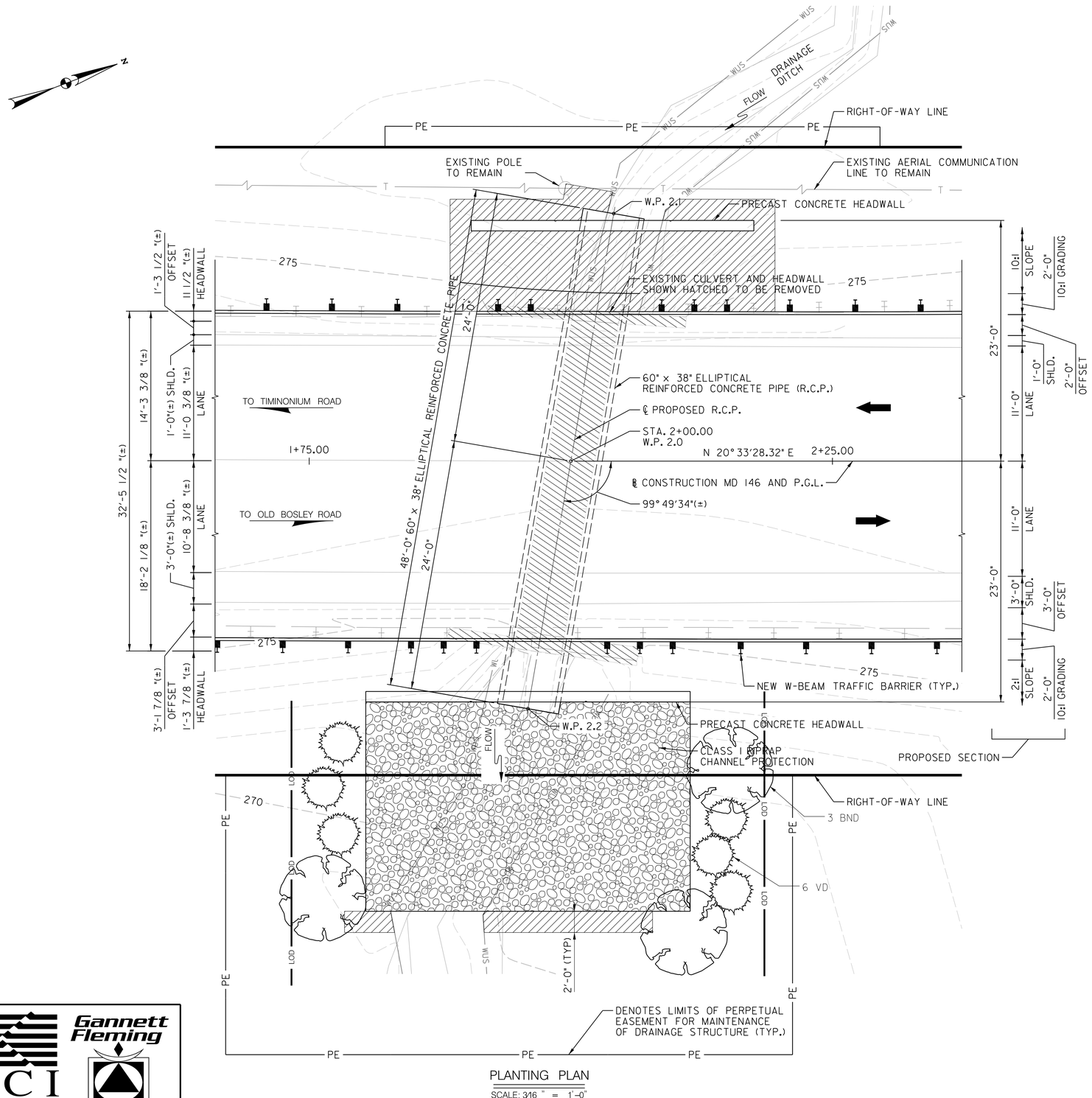
SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY BKC
DRAWN BY CTS
CHECKED BY
MDE/PRD <00-AA-0000>

COUNTY BALTIMORE
LOGMILE
HORIZONTAL SCALE
VERTICAL SCALE

DRAWING NO. LD – 01 OF 2

SHEET NO. 56 OF 57



PLANTING PLAN

SCALE: 3/16 " = 1'-0"

PLANT SCHEDULE				
QTY.	BOTANICAL / COMMON NAME	SIZE	ROOT	COMMENTS
OVERSTORY				
3	BETULA NIGRA / RIVER BIRCH	1.5" CAL.	CG OR B&B	15' ON CENTER
SHRUB				
6	VIBURNUM DENTATUM / ARROWWOOD VIBURNUM	24" - 36"	CG OR B&B	6' - 8' ON CENTER

LEGEND

- LIMITS OF LOWLAND MEADOW ESTABLISHMENT W/TYPE D SOIL STABILIZATION MATTING (SSM)
- LOD — LIMITS OF DISTURBANCE
- SHRUB
- TREE

DISTURBANCE NOTE:

UNLESS OTHERWISE SPECIFIED, ALL DISTURBED AREAS ARE TO RECEIVE 4" FURNISHED TOPSOIL (TURFGRASS ESTABLISHMENT)

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PLOTTED: Friday, May 17, 2019 AT 03:56 PM

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STATE HIGHWAY ADMINISTRATION

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REVISIONS

PLANTING PLAN

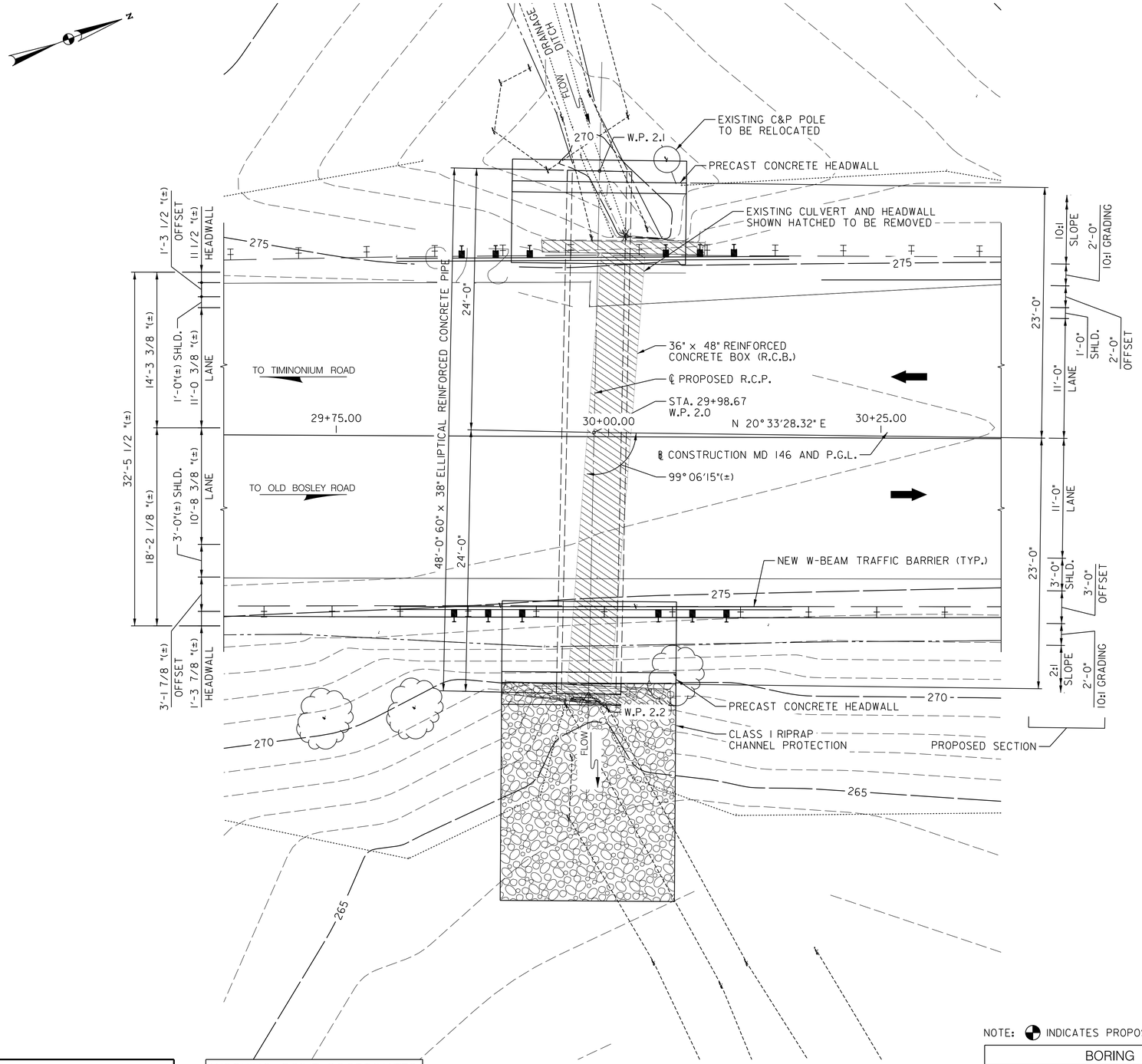
SCALE AS SHOWN ADVERTISED DATE DATE CONTRACT NO. BA0845180

DESIGNED BY BKC
DRAWN BY CTS
CHECKED BY
MDE/PRD <00-AA-0000>

COUNTY BALTIMORE
LOGMILE
HORIZONTAL SCALE
VERTICAL SCALE

DRAWING NO. LD – 02 OF 2

SHEET NO. 57 OF 57



PLAN

SCALE: 316 " = 1'-0"

WORKING POINT COORDINATES		
W.P.	NORTHING	EASTING
2.0	652152.0347	1427659.6704
2.1	652164.1737	1427638.9667
2.2	652139.8956	1427680.3741

NOTE: ⊕ INDICATES PROPOSED BORING LOCATION.

BORING LOCATION				
BORING NO.	STATION	OFFSET	NORTHING	EASTING
B-03	2+02.61	15.25' L	652,159.87'	1,427,646.31'
B-04	1+96.14	22.50' R	652,140.48'	1,427,679.38'

GENERAL NOTES:

SPECIFICATIONS: -SHA SPECIFICATIONS DATED MAY, 2017
-REVISIONS THEREOF AND ADDITIONS THERETO AND SPECIAL PROVISIONS FOR MATERIALS AND CONSTRUCTION.

AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS DATED 2014 WITH INTERIMS.

CONCRETE DESIGN: LOAD AND RESISTANCE FACTOR DESIGN METHOD. f'c = 4,000 PSI

REINFORCING STEEL DESIGN: f's = 60,000 PSI

LOADING: HL-93

PIPE: 60"x38" ELLIPTICAL PIPE SHALL BE CONCRETE CONFORMING TO CLASS V PIPE. ALL PIPE JOINTS SHALL HAVE GASKETS TO PROVIDE A WATER TIGHT CONNECTION.

CONCRETE: ALL CONCRETE FOR PRECAST HEADWALLS SHALL BE MIX NO. 6 (4,500 PSI).

REINFORCING STEEL: REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60. ALL SPLICES, NOT SHOWN, SHALL BE LAPPED AS PER BAR LAP CHARTS. MINIMUM COVER FOR ANY BAR SHALL BE 2" UNLESS OTHERWISE NOTED, WITH THE EXCEPTION OF BARS AT THE BOTTOM AND SIDES OF ALL FOOTINGS WHICH SHALL HAVE 3" MINIMUM COVER.

FOR TIES AND STIRRUPS: STANDARD ACI BENDING TOLERANCES ARE MODIFIED TO PLUS (+) ZERO INCHES, MINUS (-) NORMAL ACI BENDING TOLERANCES.

ONLY GRADE 60 CAN BE USED ON THIS PROJECT.

ALL REINFORCING STEEL IN THE HEADWALLS SHALL BE EPOXY COATED.

KEYS: ALL KEYS ARE NOMINAL SIZE.

EXCAVATION: ALL EXCAVATION REQUIRED FOR THE PLACEMENT OF THE NEW HEADWALLS AND PIPE WILL BE MEASURED AND PAID FOR AS CLASS I EXCAVATION. NO OTHER CLASS OF EXCAVATION WILL BE PAID FOR ON THIS PROJECT.

EXISTING STRUCTURE: ALL DIMENSIONS AFFECTED BY THE GEOMETRICS, AND/OR LOCATION OF THE EXISTING STRUCTURE SHALL BE CHECKED IN THE FIELD BY THE CONTRACTOR, BEFORE ANY CONSTRUCTION IS DONE, AND BEFORE ANY MATERIAL IS ORDERED OR FABRICATED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SUPPLY THE ENGINEER WITH ALL FIELD DIMENSIONS REQUIRED TO CHECK DETAIL DRAWINGS. THE ± MARKS SHOWN WITH DIMENSIONS AND STATIONS DO NOT INDICATE ANY DEGREE OF PRECISION. THESE MARKS (±) INDICATE EXISTING DIMENSIONS AND STATIONS THAT MAY VARY AND DO REQUIRE FIELD VERIFICATION BY THE CONTRACTOR.

EXISTING CULVERT AND HEADWALLS SHOWN IN LONG DASHED LINES TO BE COMPLETELY REMOVED.

COVER FOR CONCRETE BOXES, PIPES AND/OR PIPE ARCHES: NO CONSTRUCTION EQUIPMENT, WITH THE EXCEPTION OF THE ROADWAY PAVING EQUIPMENT DURING THE PAVING OPERATION, SHALL BE PERMITTED TO PASS OVER THE PIPE UNTIL THE ROADWAY PAVING HAS BEEN COMPLETED.

NOTES:

FOR MOT PLAN AND GENERAL NOTES, SEE SHEET NOS. 4 AND 6.
FOR PIPE PROFILE AND DETAILS, SEE DRAWING NO. S3-3.
FOR HEADWALL DETAILS, SEE DRAWING NOS. S3-5 TO S3-10.
FOR PIPE SEQUENCE OF CONSTRUCTION, SEE DRAWING NOS. S3-13 TO S3-15.

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

BY: Scott.Grey –

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY DRC
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
This plan is draft and subject to change. It is interagency/intra-agency deliberative communication that is not for public disclosure under MD General Provisions Code Annotated Section 4-344 Maryland Public Information Act)

DRAWING NO. · OF 19 | SHEET NO. · OF 90

PLOTTED: Tuesday, November 05, 2019 AT 10:27 AM

STRUCTURE INVENTORY NO. 03192XO

SURVEY BOOK NO.

PLOTTED: Tuesday, November 05, 2019 AT 10:27 AM
FILE: M:\2010\23100466.29\Drawings\pBR-GP00_MD_146_03192X0.dgn

HYDROLOGIC DATA

I. SOURCE: _____
PREPARED BY: ☐ SHA ☐ CONSULTANT: _____ DATE: _____
FILE LOCATION: _____

II. DRAINAGE AREA: ACRES _____ SQUARE MILES _____

III. METHOD(S) OF ANALYSIS:

_____ USGS GAGE DATA ANALYSIS
- GAGING STATION NO. _____
- LOCATION _____
- DRAINAGE AREA _____
- YEARS OF CONTINUOUS RECORD _____

_____ USGS REGRESSION EQUATIONS
REFERENCE _____
_____ SCS TR - 20 METHOD - VERSION USED (DATE) _____
- RCN (EXISTING-HOMOGENEOUS WATERSHED)[1] _____
- RCN (ULTIMATE HOMOGENEOUS WATERSHED)[1] _____
- T_C (HOMOGENEOUS WATERSHED)[1] _____

_____ FEMA BASE FLOOD (100-YEAR) DISCHARGE _____ (CFS) METHOD USED BY FEMA _____
_____ OTHER (DESCRIBE) _____

HAS FLOOD ROUTING BEEN USED IN DETERMINING FLOOD DISCHARGES? YES _____ NO _____
METHOD SELECTED _____

IV. COMPUTED FLOOD DISCHARGES

RETURN PERIOD (YEARS)	FLOOD DISCHARGE (CFS)	
	BASED ON EXISTING WATERSHED DEVELOPMENT	BASED ON ULTIMATE WATERSHED DEVELOPMENT
2		
10		
25		
50		
100		
500		

V. HISTORIC FLOODS

YEAR	MAGNITUDE (CFS)	HIGH WATER ELEVATION	WHERE MEASURED	SOURCE OF DATA

VI. STREAM MORPHOLOGY

STREAM TYPE _____ VALLEY TYPE _____

STREAM BED MATERIAL:
DESCRIPTION _____ D16 _____ D50 _____ D84 _____

BANK FULL CHARACTERISTICS:
Q _____ AREA _____ WIDTH _____ DEPTH _____
SLOPE _____ MANNINGS "n" VALUE _____ SINUOSITY _____

VII. TIDAL FLOWS

100-YEAR STORM TIDE ELEVATION (FT) _____ MAXIMUM DISCHARGE (CFS) _____
500-YEAR STORM TIDE ELEVATION (FT) _____ MAXIMUM DISCAHRGE (CFS) _____
SOURCE OF INFORMATION _____

DESIGN DISCHARGE _____ (CFS) RETURN PERIOD _____ YEARS TIDAL PERIOD (HRS) _____
HOW DETERMINED? (EXPLAIN) _____
WATER SURFACE-ELEVATION FOR DESIGN CONDITION (FT)
(IF TIDAL FLOW GOVERNS HYDRAULIC DESIGN) _____

VII. COMMENTS: _____

HYDRAULIC DATA

I. SOURCE: _____
PREPARED BY: ☐ SHA ☐ CONSULTANT: _____ DATE: _____
FILE LOCATION: _____ ITEM 71 RATING[2] _____
METHOD(S) OF ANALYSIS: _____

II. HYDRAULIC DATA

FLOW CONDITIONS[3]	CHANNEL CROSS-SECTION	STRUCTURE WATERWAY AREA[4]	ENERGY SLOPE[4]	WATER SURFACE ELEVATION[4]	CHANNEL[5] Q	W	V	D	LEFT OVERBANK LOOKING DOWNSTREAM[5] Q	W	V	D	RIGHT OVERBANK LOOKING DOWNSTREAM[5] Q	W	V	D	DISCHARGE OVER ROAD
Q_{DESIGN} DESCRIBE _____	APPROACH (DESCRIBE LOCATION BELOW)[8]	N/A															N/A
	UPSTREAM AT STRUCTURE																
	DOWNSTREAM AT STRUCTURE						6	7									N/A
Q_{100} DESCRIBE _____	APPROACH (DESCRIBE LOCATION BELOW)[8]	N/A															N/A
	UPSTREAM AT STRUCTURE																
	DOWNSTREAM AT STRUCTURE						6	7									N/A
$Q_{INCIPIENT\ OVERTOPPING}$, Q_{500} OR OTHER DISCHARGE DESCRIBE _____	APPROACH (DESCRIBE LOCATION BELOW)[8]	N/A															N/A
	UPSTREAM AT STRUCTURE																
	DOWNSTREAM AT STRUCTURE						6	7									N/A

III. BRIDGE SCOUR DATA _____

A. SCOUR EVALUATION STUDY TITLE: _____
PREPARED BY: ☐ SHA ☐ CONSULTANT: _____ DATE: _____
FILE LOCATION: _____ ITEM 113 RATING[2] _____

B. SCOUR ESTIMATES:

	DESIGN CONDITIONS (DESCRIBE SPECIAL CONDITIONS SUCH AS OVERTOPPING, LOW TAILWATER, INFLUENCE OF CONFLUENCES, ETC.)	FLOOD DISCHARGE: RETURN PERIOD (YEARS)	FLOOD DISCHARGE: MAGNITUDE (CFS)	LONG TERM DEGRADATION / AGGRADATION (FT)	CONTRACTION[9] SCOUR DEPTH (LOOKING DOWNSTREAM) (FT): LT OVERBANK	MAIN CHANNEL	RT OVERBANK	CHANNEL BED LOAD (DESCRIBE)	TYPE OF SCOUR (LIVE BED/CLEAR WATER)
DESIGN FLOOD FOR SCOUR									
CHECK FLOOD FOR SCOUR									
OTHER									

TOTAL SCOUR: ESTIMATED TOTAL SCOUR AT SUBSTRUCTURE/ CHANNEL ELEMENTS (INCLUDES LONG TERM DEGRADATION/AGGRADATION PLUS CONTRACTION SCOUR, PLUS LOCAL SCOUR)

LOCATION OF CHANNEL OR SUBSTRUCTURE ELEMENT	ELEVATION OF BOTTOM OF STREAM CHANNEL BED OR SCOUR HOLE (FT)[10]: DESIGN FLOOD	CHECK FLOOD	SCOUR COUNTER MEASURES ☐ EXISTING ☐ NEW
CHANNEL THALWEG			
ABUTMENT1			
ABUTMENT2			
PIER NO.			
PIER NO.			
PIER NO.			
PIER NO.			
PIER NO.			
PIER NO.			
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PIER NO.			
PIER NO.			

NOTES:

BLANK SPACES INDICATE THAT DATA IS NOT AVAILABLE OR IS NOT APPLICABLE

1. PARAMETERS COMPUTED ASSUMING THE WATERSHED IS HOMOGENEOUS WITHOUT SUBDIVISIONS
2. ITEM 71 RATING AND ITEM 113 RATING; REFER TO THE OBD GUIDE FOR COMPLETING THE SI&A INPUT FORMS.
3. RECORD FLOW CONDITIONS USED IN ANALYSIS: DISCHARGE (Q), TAILWATER CONDITION AND HOW SELECTED, ETC. (FOR DEPRESSED CULVERTS, INDICATE UNDER COMMENTS THE ASSUMPTIONS MADE AS TO WHETHER SEDIMENT WILL REMAIN DURING FLOODS)
4. FOR CULVERTS, USE THESE THREE COLUMNS TO RECORD:
   - DEPTH OF FLOW AT CULVERT INLET AND OUTLET
   - WATER-SURFACE ELEVATION AT CULVERT INLET AND OUTLET
   - ENERGY SLOPE FOR CULVERT BARREL
5. SYMBOLS USED:
   Q = FLOW OR DISCHARGE (CFS)
   W = CHANNEL WIDTH OR FLOODPLAIN WIDTH (FT)
   V = FLOW VELOCITY (FPS)
   D = DEPTH OF FLOW (FT)
6. FOR CULVERTS, RECORD OUTLET VELOCITY HERE
7. FOR CULVERTS , RECORD TAILWATER DEPTH HERE
8. APPROACH SECTION SHOULD BE SELECTED AS PER GUIDANCE IN ABSCOUR USERS MANUAL
9. ENTER CONTRACTION SCOUR DEPTHS ONLY (APPROXIMATE LINE 121 IN ABSCOUR OUTPUT) - NOT ABUTMENT SCOUR
10. IF SCOUR RESISTENT BEDROCK CONTROLS SCOUR, ENTER BEDROCK ELEVATION AND NOTE THIS CONDITION UNDER COMMENTS
11. RECORD INCIPIENT OVERTOPPING DISCHARGE (Q) AND RECURRENCE INTERVAL
12. RECORD CLEARANCE BETWEEN WATER SURFACE ELEVATION AND LOW CHORD FOR DESIGN DISCHARGE
13. RECORD TOTAL FLOW AREA UNDER STRUCTURE (DOWNSTREAM END) FOR 100 & 500 YEAR FLOODS
14. FOR BRIDGES:
    ENTER TYPE, SPAN LENGTH AND MAXIMUM VERTICAL CLEARANCE FOR CULVERTS:
    ENTER SIZE, NUMBER OF CELLS, AND LENGTH;
    DESCRIBE ANY SPECIAL FEATURES UNDER COMMENTS
15. FOR CULVERTS, DESCRIBE TYPE OF INLET/OUTLET AND EROSION PROTECTION
16. COMPOSITE 'N' VALUE OF STRUCTURE

IV. ROADWAY AND STRUCTURE DATA

ITEM	EXISTING STRUCTURE	PROPOSED STRUCTURE
NAME OF WATERWAY		
DATE BUILT		
OVERTOPPING ELEVATION		
OVERTOPPING LOCATION (DESCRIBE)		
INCIPIENT OVERTOPPING FLOW CONDITION ((OVERTOPPING Q < 100 YR FLOOD))[11]		
FREEBOARD[12]		
TOTAL STRUCTURE WATERWAY AREA[13]		
STRUCTURE DESCRIPTION[14]		
INLET TREATMENT[15]		
OUTLET TREATMENT[15]		
MANNINGS "N" VALUE[16]		

V. SURVEY BOOK NUMBERS _____
REFERENCE DATUM FOR ELEVATIONS _____

VI. FLOOD PLAIN MANAGEMENT DATA

DATE OF FLOOD INSURANCE STUDY _____ COMMUNITY PANEL NO. _____

PROJECT LOCATION (CHECK BELOW):

_____ BEYOND FEMA PROGRAM LIMITS (NOT IN "A" HAZARD ZONE)

_____ FEMA HAZARD ZONE "A"; NO BASE FLOOD ELEVATIONS ESTABLISHED

_____ FEMA HAZARD ZONE "A"; BASE FLOOD ELEVATIONS ESTABLISHED

REGULATORY FLOODWAY _____ YES _____ NO
MAXIMUM CHANGE IN WATER SURFACE ELEVATION UPSTREAM OF BRIDGE DUE TO HIGHWAY PROJECT (MAX. BACKWATER) _____ FT.

LOCATION OF MAX. BACKWATER FROM UPSTREAM FACE OF BRIDGE _____ FT.

DESCRIBE TYPE OF STUDY DONE TO DETERMINE CONSISTENCY WITH NFIP STANDARDS _____
DATE COMMUNITY ACKNOWLEDGEMENT FORM ISSUED: _____

IS THE PROJECT CONSISTENT WITH THE CODE OF FEDERAL REGULATIONS, PART 650 A, LOCATION AND HYDRAULIC DESIGN OF ENCROACHMENTS ON FLOOD PLAINS (23 CFR 650 A). Y/N _____

IS THE PROJECT CONSISTENT WITH THE ANNOTATED CODE OF MARYLAND (COMAR 08.05.03)? Y/N _____

VII. COMMENTS: _____

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

HYDROLOGIC AND HYDRAULIC DATA

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY S.H.A.
DRAWN BY S.H.A.
CHECKED BY S.H.A.

TENTATIVE
OFFICE OF STRUCTURES
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DRAWING NO. S3-2 OF 19 SHEET NO. 61 OF 90

BY: Scott.Grey –

PLOTTED: Tuesday, November 05, 2019 AT 10:27 AM

SHEET FORMAT, ISSUED: 8-25-80, REVISED: 9-16-93

STRUCTURE INVENTORY NO. 03192X0

SURVEY BOOK NO.

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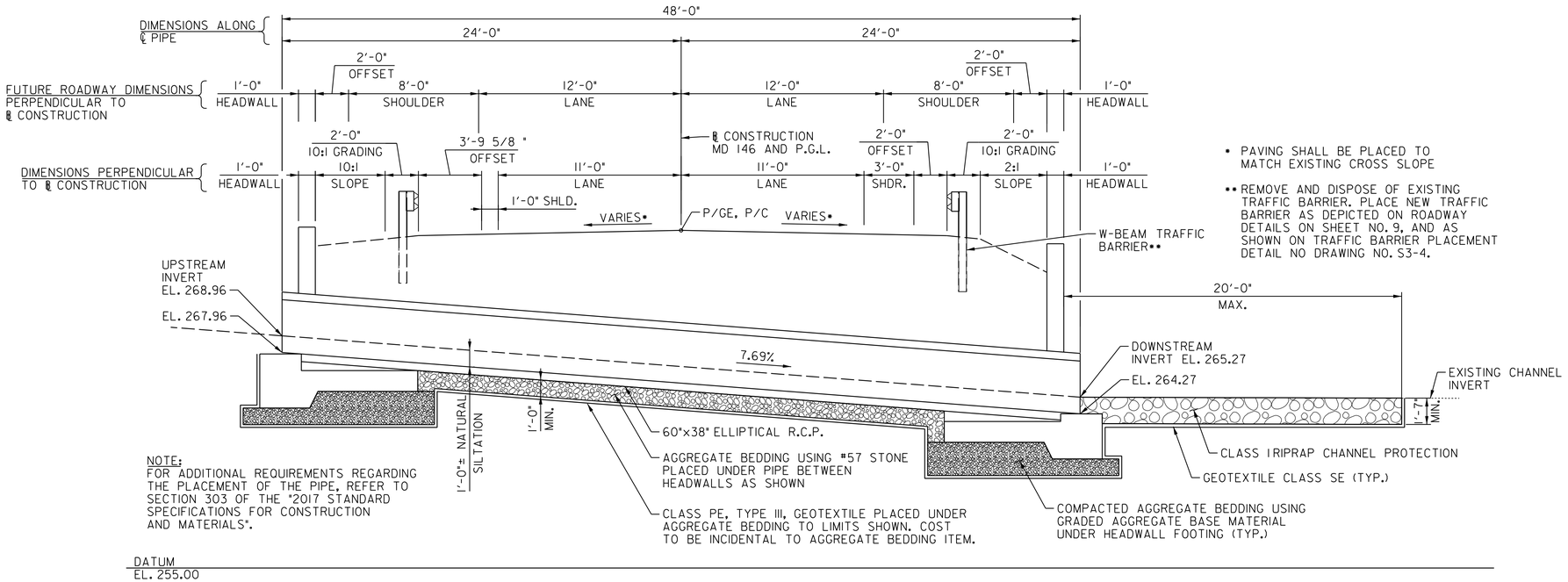
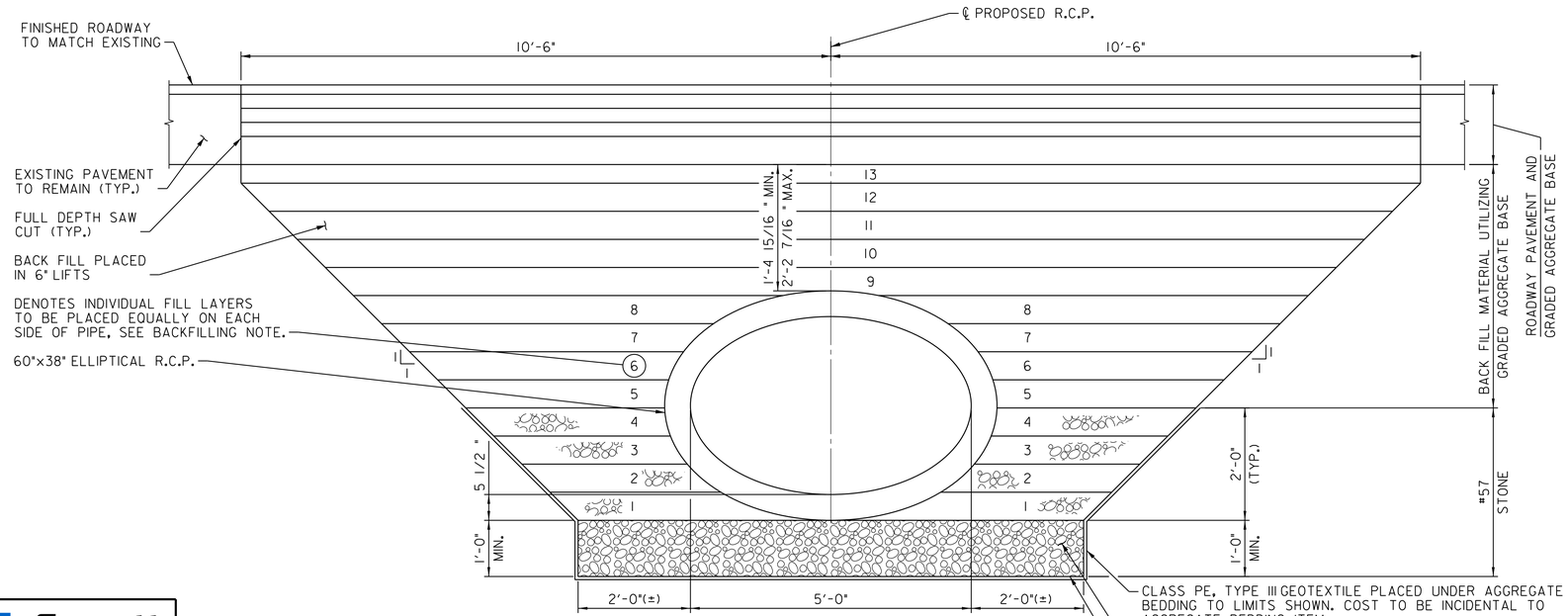


NOTE:
FOR ADDITIONAL REQUIREMENTS REGARDING THE PLACEMENT OF THE PIPE, REFER TO SECTION 303 OF THE "2017 STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS".

SECTION
PROFILE DETAIL AT 60"x38" ELLIPTICAL PIPE
SCALE: 1/4 " = 1'-0"



SECTION
PIPE BACKFILL DETAIL
SCALE: 3/4 " = 1'-0"

BACKFILLING NOTE:

WHEN BACKFILLING THE NEW ELLIPTICAL PIPE, THE CONTRACTOR SHALL PLACE THE BACKFILL IN 6" LIFTS AS SHOWN. THE CONTRACTOR SHALL PLACE THE LIFTS IN THE NUMBERED SEQUENCE SHOWN. THE CORRESPONDING LIFTS ON EACH SIDE OF THE ELLIPTICAL PIPE MUST BE COMPLETED PRIOR TO PROCEEDING TO THE NEXT NUMBERED LIFT.

NOTES:

FOR MOT PLAN AND GENERAL NOTES, SEE SHEET NO. 4 AND 6.

FOR GENERAL PLAN OF PIPE, SEE DRAWING NO. S3-1.

FOR ADDITIONAL PIPE DETAILS, SEE DRAWING NO. S3-4.

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

PIPE PROFILE AND DETAILS

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY STG
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
This plan is draft and subject to change. It is interagency/intra-agency deliberative communication that is not for public disclosure under MD General Provisions Code Annotated Section 4-344 (Maryland Public Information Act)

DRAWING NO. S3-3 OF 19

SHEET NO. 62 OF 90

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

BY: Scott.Grey –

PLOTTED: Tuesday, November 05, 2019 AT 10:27 AM

STRUCTURE INVENTORY NO. 03192X0

SURVEY BOOK NO.

PLOTTED: Tuesday, November 05, 2019 AT 10:27 AM
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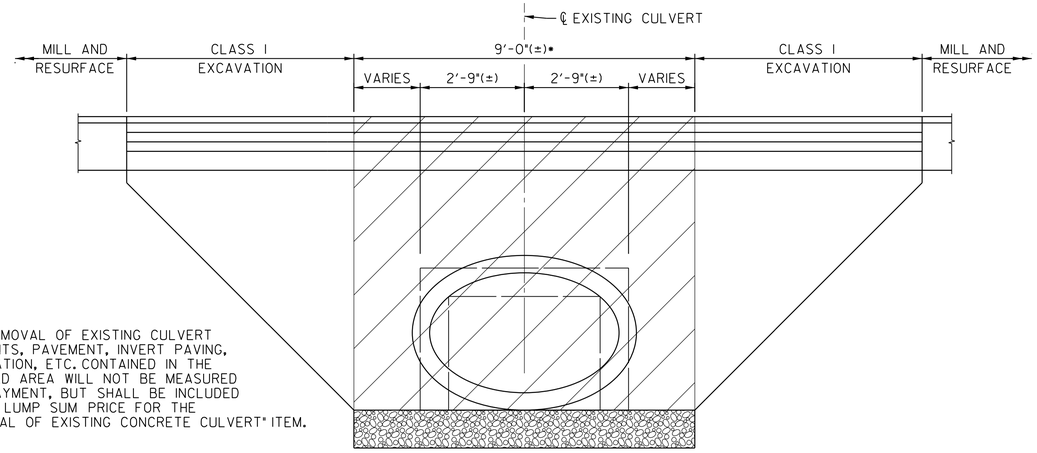
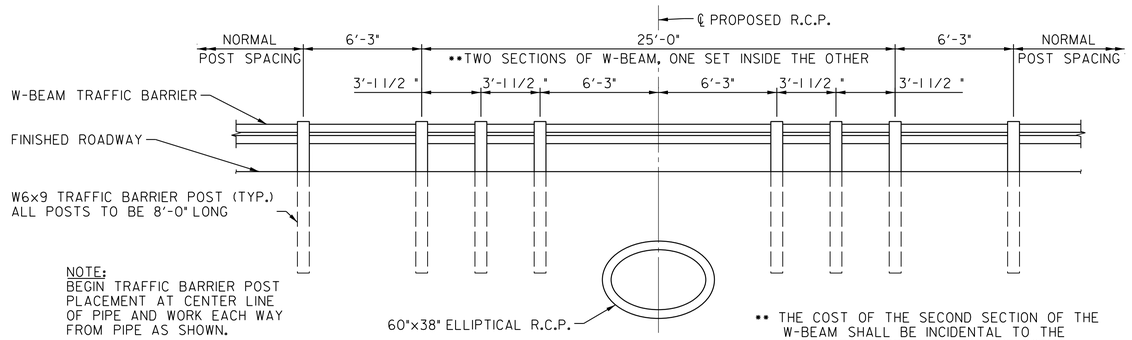


• ALL REMOVAL OF EXISTING CULVERT ELEMENTS, PAVEMENT, INVERT PAVING, EXCAVATION, ETC. CONTAINED IN THE HATCHED AREA WILL NOT BE MEASURED FOR PAYMENT, BUT SHALL BE INCLUDED IN THE LUMP SUM PRICE FOR THE "REMOVAL OF EXISTING CONCRETE CULVERT" ITEM.

SECTION
EXCAVATION AT EXISTING CULVERT

SCALE: 1/2 " = 1'-0"



NOTE:
BEGIN TRAFFIC BARRIER POST PLACEMENT AT CENTER LINE OF PIPE AND WORK EACH WAY FROM PIPE AS SHOWN.

CONTRACTOR SHALL PROBE EACH POST LOCATION IN AREA OF PIPE PRIOR TO PLACING TRAFFIC BARRIER POSTS TO ENSURE THERE WILL BE NO CONFLICTS WITH NEW PIPE.

•• THE COST OF THE SECOND SECTION OF THE W-BEAM SHALL BE INCIDENTAL TO THE LINEAR FOOT PRICE BID ON THE INITIAL PLACEMENT OF THE W-BEAM TRAFFIC BARRIER.

ELEVATION
TRAFFIC BARRIER POST PLACEMENT AT PIPE

SCALE: 1/4 " = 1'-0"

NOTES:

FOR GENERAL PLAN OF PIPE, SEE DRAWING NO. S3-1.

FOR PIPE PROFILE AND DETAILS, SEE DRAWING NO. S3-3.

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

PIPE DETAILS

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY STG
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
This plan is draft and subject to change. It is for coordination purposes, deliberative, communication that is not for public disclosure under Title 4, Subtitle 1, Section 103 and/or Section 4-351 Maryland Public Information Act.

DRAWING NO. S3-4 OF 19

SHEET NO. 63 OF 90

BY: Scott.Grey –

PLOTTED: Tuesday, November 05, 2019 AT 10:27 AM

STRUCTURE INVENTORY NO. 03192XO

SURVEY BOOK NO.

PLOTTED: Tuesday, November 05, 2019 AT 10:27 AM
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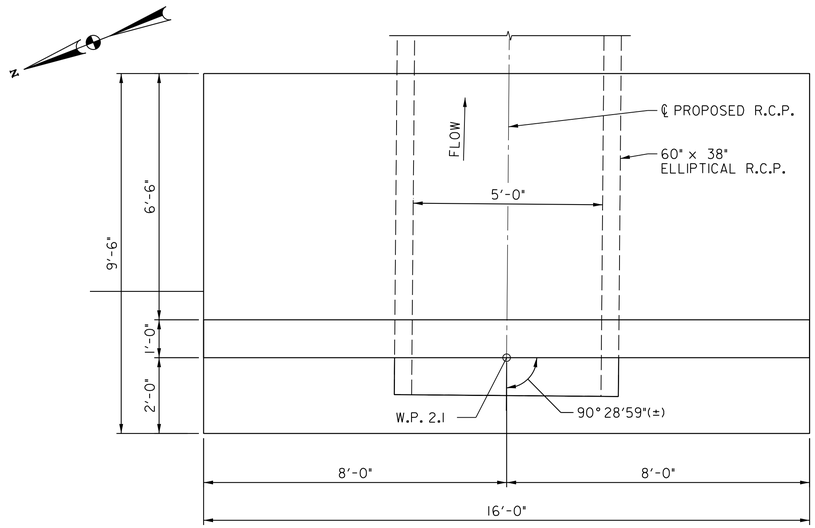


PLAN – PRECAST UPSTREAM HEADWALL

SCALE: 1/2 " = 1'-0"

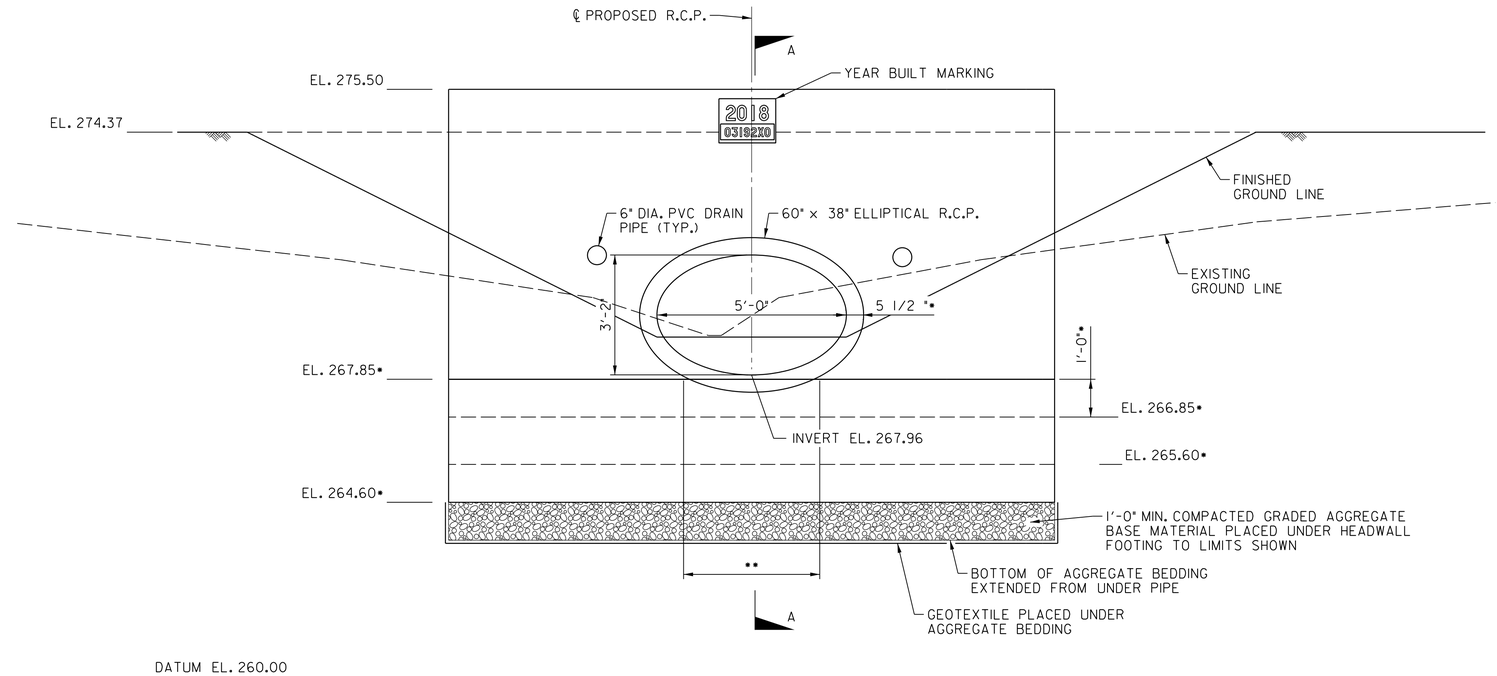
NOTE:

ALL COSTS ASSOCIATED WITH THE CONSTRUCTION OF THE UPSTREAM HEADWALL WILL NOT BE MEASURED FOR PAYMENT, BUT SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR THE "UPSTREAM HEADWALL" ITEM.

THE ENTIRE UPSTREAM HEADWALL SHALL BE CONSTRUCTED OF PRECAST ELEMENTS AND BE ON THE SITE READY FOR INSTALLATION PRIOR TO THE CLOSURE OF THE ROADWAY.

NOTE:

END OF PIPE TO BE PLACED THROUGH HEADWALL WITH SQUARED END AS SHOWN.



ELEVATION – PRECAST UPSTREAM HEADWALL

SCALE: 1/2 " = 1'-0"

NOTE:

HOLES THROUGH PRECAST HEADWALL SHALL BE ADJUSTED TO ACCOMMODATE THE SKEWED ORIENTATION OF PIPE AS IT PASSES THROUGH THE HEADWALL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND PLACEMENT OF LIFTING DEVICES. IN ADDITION, THE CONTRACTOR AND HIS PRECAST SUPPLIER SHALL VERIFY THAT THE LIFTING POINTS WILL NOT DAMAGE THE HEADWALL OR FOOTING DURING LIFTING.

- THIS DIMENSION AND FOOTING ELEVATIONS WERE DEVELOPED ON AN ASSUMED PIPE WALL THICKNESS OF 5 1/2 ". SHOULD THE WALL THICKNESS BE DIFFERENT, THE ELEVATIONS SHALL BE ADJUSTED ACCORDINGLY. THE INVERT ELEVATIONS SHALL NOT BE CHANGED. ALL DIMENSIONS SHOWN FOR PIPE ARE NORMAL TO THE CENTERLINE OF THE PIPE.

•• DISCONTINUE PORTION OF STEPPED KEY AT PIPE AND PROVIDE OPENING FOR PIPE. STEPPED KEY SHALL BE PLACED FOR REMAINDER OF HEADWALL.

NOTES:

FOR PLAN AND PROFILE OF PIPE, SEE DRAWING NOS. S3-1 AND S3-3.

FOR DOWNSTREAM HEADWALL, SEE DRAWING NOS. S3-8 TO S3-10.

FOR SECTION A-A, SEE DRAWING NO. S3-6.

FOR PVC DRAIN PIPE, SEE MD SHA STANDARD NO. RW-301.

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

BY: Scott.Grey –

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

UPSTREAM HEADWALL PLAN & ELEVATION

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY STG
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
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DRAWING NO. S3-5 OF 19

SHEET NO. 64 OF 90

PLOTTED: Tuesday, November 05, 2019 AT 10:28 AM

STRUCTURE INVENTORY NO. 03192XO

SURVEY BOOK NO.

PLOTTED: Tuesday, November 05, 2019 AT 10:28 AM
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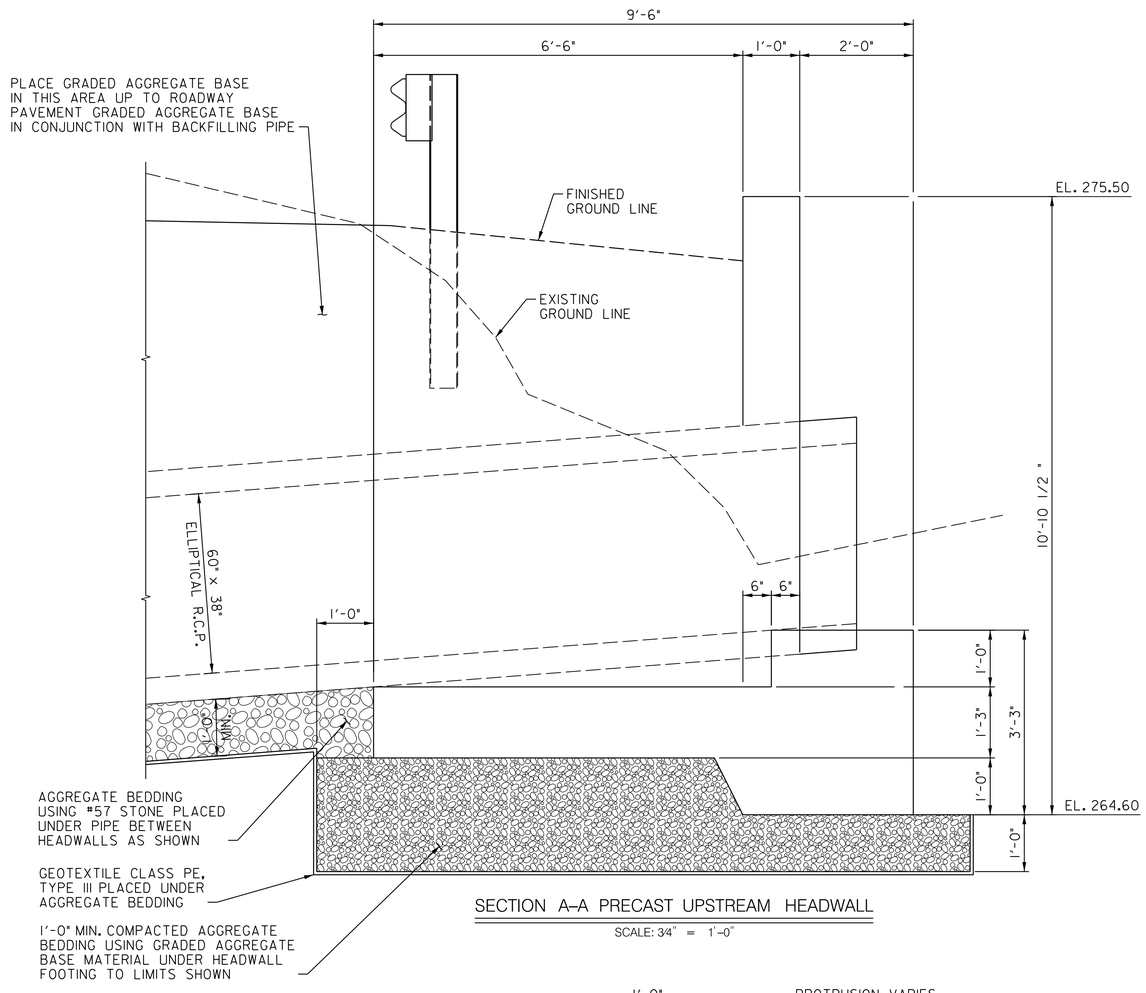
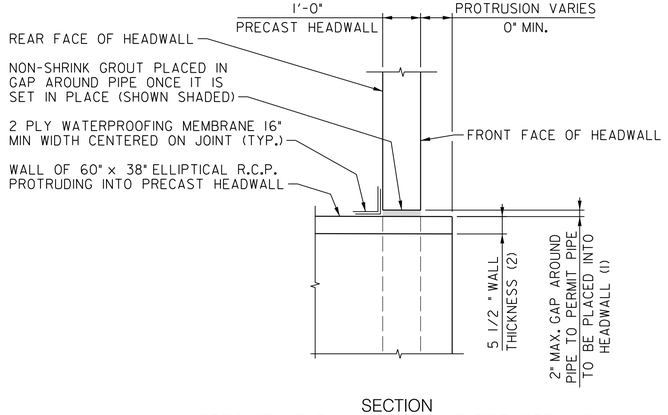


SECTION A–A PRECAST UPSTREAM HEADWALL

SCALE: 3/4" = 1'-0"



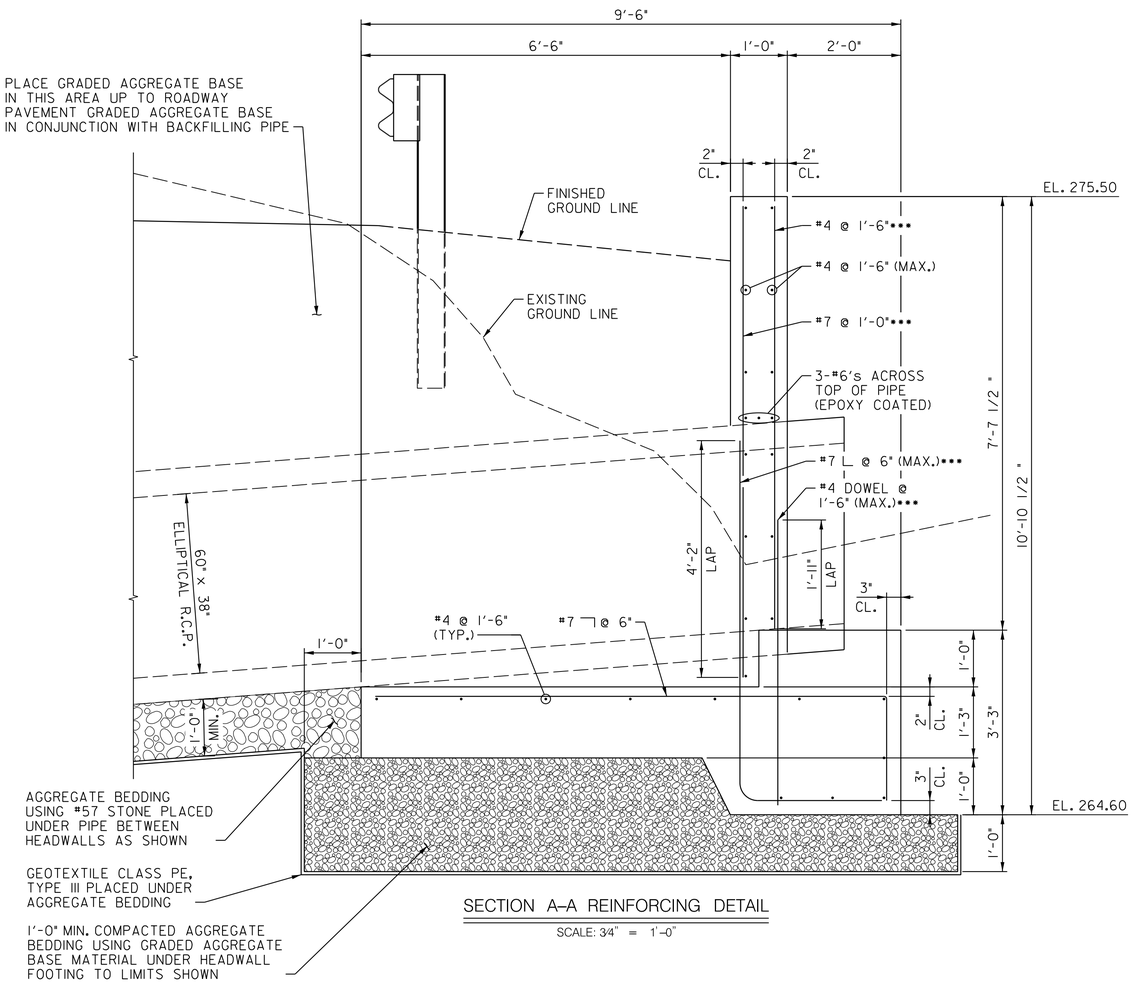
SECTION
PRECAST HEADWALL DETAIL AT PIPE OPENING

SCALE: 1/2" = 1'-0"

(TYPICAL FOR UPSTREAM AND DOWNSTREAM HEADWALLS)

(1) GAP SHALL BE TERMINATED AT BOTTOM OF 60" x 38" ELLIPTICAL R.C.P. TO ALLOW IT TO BEAR FIRMLY ON HEADWALL FOOTING.

(2) ASSUMED WALL THICKNESS FOR 60" x 38" ELLIPTICAL R.C.P.



SECTION A–A REINFORCING DETAIL

SCALE: 3/4" = 1'-0"

NOTE:

- THE MAXIMUM FOUNDATION DESIGN BEARING PRESSURE FOR STRENGTH LOAD COMBINATIONS IS 2.0 KIPS/SQ. FT.
- THE MAXIMUM FOUNDATION DESIGN BEARING PRESSURE FOR SERVICE LOAD COMBINATIONS IS 1.4 KIPS/SQ. FT.

NOTE:

- • THIS DIMENSION AND FOOTING ELEVATIONS WERE DEVELOPED ON AN ASSUMED PIPE WALL THICKNESS OF 5 1/2". SHOULD THE WALL THICKNESS BE DIFFERENT, THE ELEVATIONS SHALL BE ADJUSTED ACCORDINGLY. THE INVERT ELEVATIONS SHALL NOT BE CHANGED.
- •• DISCONTINUE STEPPED KEY AT PIPE AND PROVIDE OPENING FOR PIPE.
- ••• AT THE CONTRACTORS OPTION, THE DOWEL AND STEM BAR MAY BE PLACED AS A CONTINUOUS BAR.

NOTES:

FOR PLAN AND PROFILE OF PIPE, SEE DRAWING NOS. S3-1 AND S3-3.

FOR UPSTREAM HEADWALL, SEE DRAWING NOS. S3-5 TO S3-7.

FILL VOID UNDER RCP ABOVE FOOTING AND IN HEADWALL AROUND RCP WITH NON-SHRINK GROUT. GROUT SHALL CONFORM TO 902.11(C).

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

UPSTREAM HEADWALL SECTIONS

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY STG
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
This plan is draft and subject to change. It is interagency/intra-agency deliberative communication that is not for public disclosure under MD General Provisions Code Annotated Section 4-344 Maryland Public Information Act)

DRAWING NO. S3-6 OF 17

SHEET NO. 65 OF 90

BY: Scott.Grey –

PLOTTED: Tuesday, November 05, 2019 AT 10:28 AM

STRUCTURE INVENTORY NO. 03192X0

SURVEY BOOK NO.

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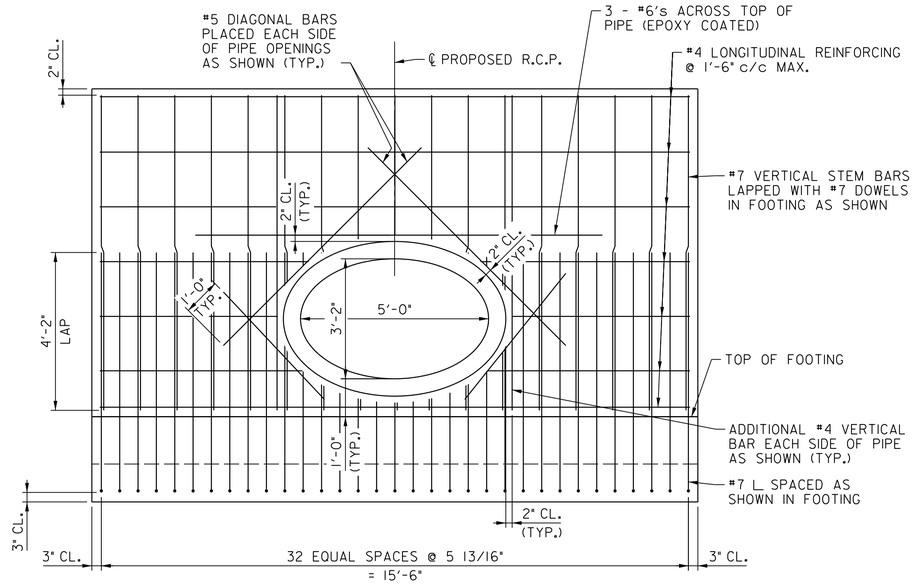


ELEVATION PRECAST UPSTREAM HEADWALL – REAR FACE REINFORCING

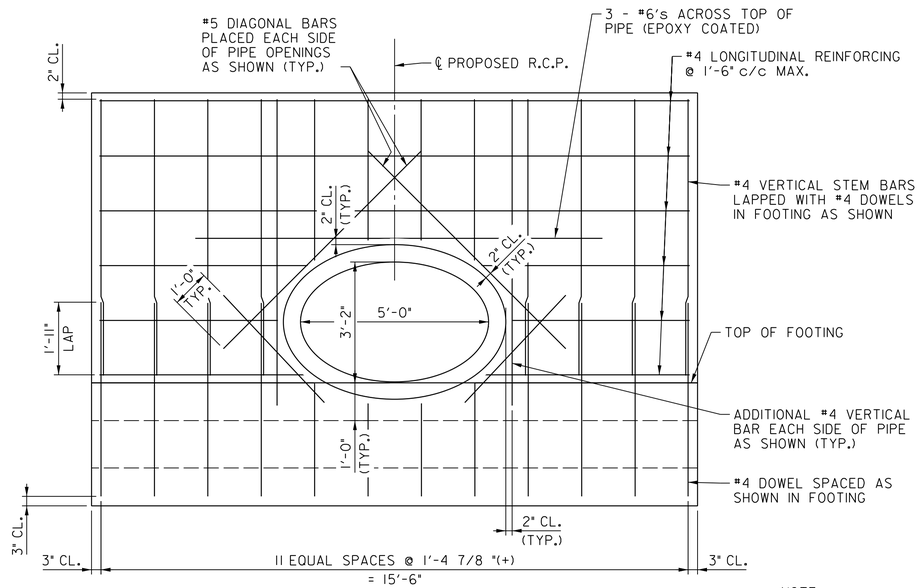
SCALE: 1/2" = 1'-0"

NOTE:

FOOTING REINFORCING NOT SHOWN.

NOTE:

HOLES THROUGH PRECAST HEADWALL SHALL BE ADJUSTED TO ACCOMMODATE THE SKEWED ORIENTATION OF PIPE AS IT PASSES THROUGH THE HEADWALL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND PLACEMENT OF LIFTING DEVICES. IN ADDITION, THE CONTRACTOR AND HIS PRECAST SUPPLIER SHALL VERIFY THAT THE LIFTING POINTS WILL NOT DAMAGE THE HEADWALL OR FOOTING DURING LIFTING.



ELEVATION PRECAST UPSTREAM HEADWALL – FRONT FACE REINFORCING

SCALE: 1/2" = 1'-0"

NOTE:

FOOTING REINFORCING NOT SHOWN.

NOTES:

FOR PLAN AND PROFILE OF PIPE, SEE DRAWING NOS. S3-1 AND S3-3.

FOR ADDITIONAL PIPE DETAILS, SEE DRAWING NO. S3-4.

FOR SECTION DETAIL, SEE DRAWING NO. S3-6.

KCI TECHNOLOGIES

Gannett Fleming

In Joint Venture

BY: Scott.Grey –

PLOTTED: Tuesday, November 05, 2019 AT 10:28 AM

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

UPSTREAM HEADWALL REINFORCING DETAILS

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY RDL

DRAWN BY STG

CHECKED BY XXX

TENTATIVE

OFFICE OF STRUCTURES

This plan is draft and subject to change. It is intra-organizational deliberative communication that is not for public disclosure under Section 4-104 of the General Provisions Article of the Maryland Public Information Act.

DRAWING NO. S3-7 OF 19

SHEET NO. 66 OF 90

STRUCTURE INVENTORY NO. 03192XO

SURVEY BOOK NO.

PLOTTED: Tuesday, November 05, 2019 AT 10:28 AM

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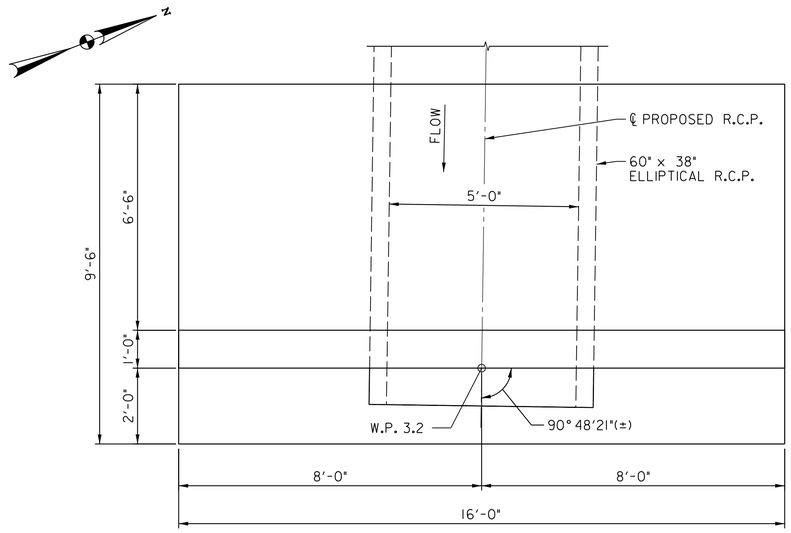


PLAN – PRECAST DOWNSTREAM HEADWALL

SCALE: 1/2 " = 1'-0"

NOTE:

ALL COSTS ASSOCIATED WITH THE CONSTRUCTION OF THE DOWNSTREAM HEADWALL WILL NOT BE MEASURED FOR PAYMENT, BUT SHALL BE INCLUDED IN THE LUMP SUM PRICE BID FOR THE "DOWNSTREAM HEADWALL" ITEM.

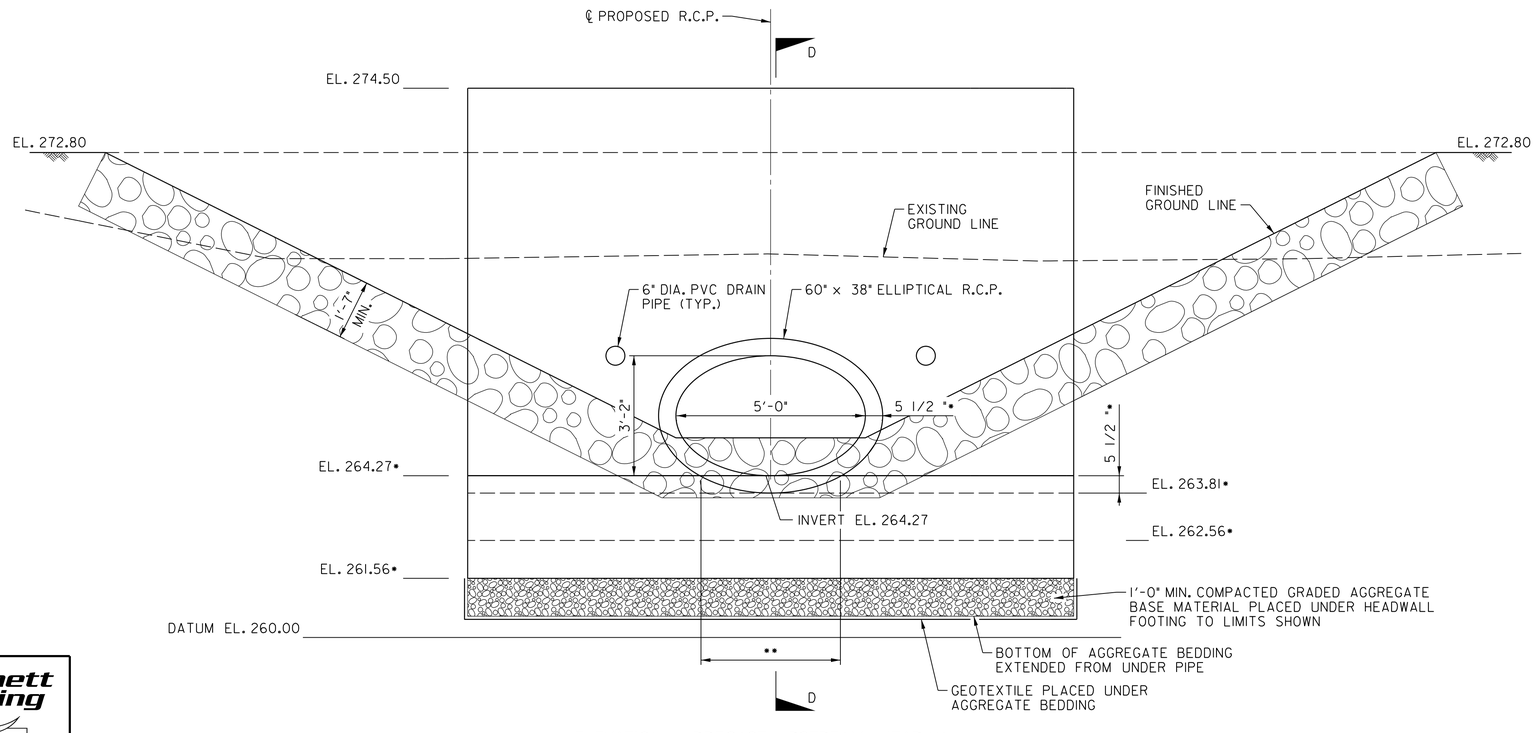
THE ENTIRE DOWNSTREAM HEADWALL SHALL BE CONSTRUCTED OF PRECAST ELEMENTS AND BE ON THE SITE READY FOR INSTALLATION PRIOR TO THE CLOSURE OF THE ROADWAY.

NOTE:

END OF PIPE TO BE PLACED THROUGH HEADWALL WITH SQUARED END AS SHOWN.

NOTE:

HOLES THROUGH PRECAST HEADWALL SHALL BE ADJUSTED TO ACCOMMODATE THE SKEWED ORIENTATION OF PIPE AS IT PASSES THROUGH THE HEADWALL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND PLACEMENT OF LIFTING DEVICES. IN ADDITION, THE CONTRACTOR AND HIS PRECAST SUPPLIER SHALL VERIFY THAT THE LIFTING POINTS WILL NOT DAMAGE THE HEADWALL OR FOOTING DURING LIFTING.



ELEVATION – PRECAST UPSTREAM HEADWALL

SCALE: 1/2 " = 1'-0"

- THIS DIMENSION AND FOOTING ELEVATIONS WERE DEVELOPED ON AN ASSUMED PIPE WALL THICKNESS OF 5 1/2 ". SHOULD THE WALL THICKNESS BE DIFFERENT, THE ELEVATIONS SHALL BE ADJUSTED ACCORDINGLY. THE INVERT ELEVATIONS SHALL NOT BE CHANGED. ALL DIMENSIONS SHOWN FOR PIPE ARE NORMAL TO THE CENTERLINE OF THE PIPE.

•• DISCONTINUE PORTION OF STEPPED KEY AT PIPE AND PROVIDE OPENING FOR PIPE. STEPPED KEY SHALL BE PLACED FOR REMAINDER OF HEADWALL.

NOTE:

FOR PLAN AND PROFILE OF PIPE, SEE DRAWING NOS. S3-1 AND S3-3.

FOR UPSTREAM HEADWALL, SEE DRAWING NOS. S3-5 TO S3-7.

FOR SECTION D-D, SEE DRAWING NO. S3-9.

FOR PVC DRAIN PIPE, SEE MD SHA STANDARD NO. RW-301.

KCI TECHNOLOGIES

Gannett Fleming

In Joint Venture

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

DOWNSTREAM HEADWALL PLAN & ELEVATION

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY STG
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
This plan is draft and subject to change. It is intra-office work, deliberative, communication that is not for public disclosure under MDOT SHA Policy. Exempt under section 4-351 Maryland Public Information Act.

DRAWING NO. S3-8 OF 19

SHEET NO. 67 OF 90

BY: Scott.Grey –

PLOTTED: Tuesday, November 05, 2019 AT 10:28 AM

STRUCTURE INVENTORY NO. 03192XO

SURVEY BOOK NO.

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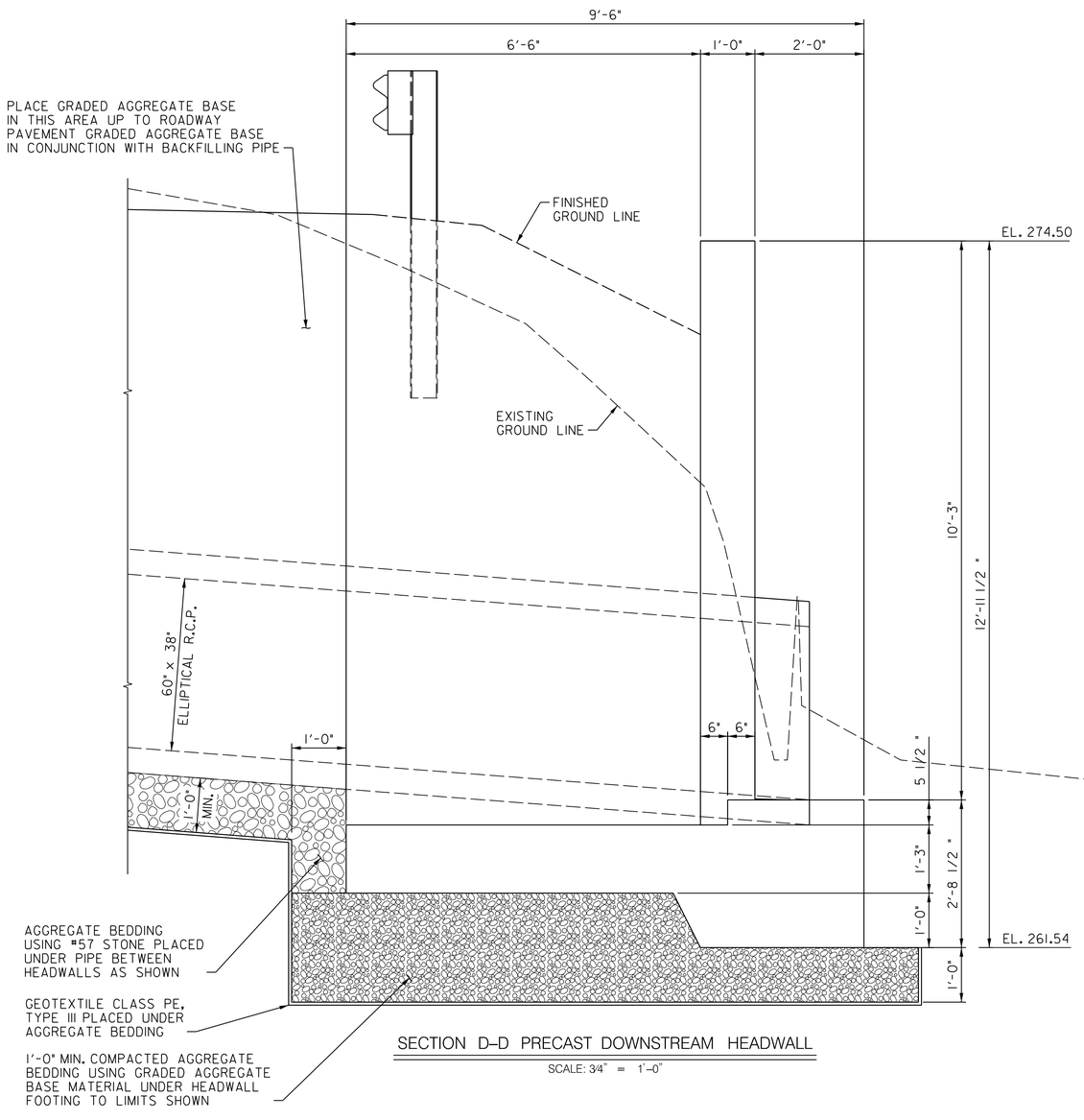
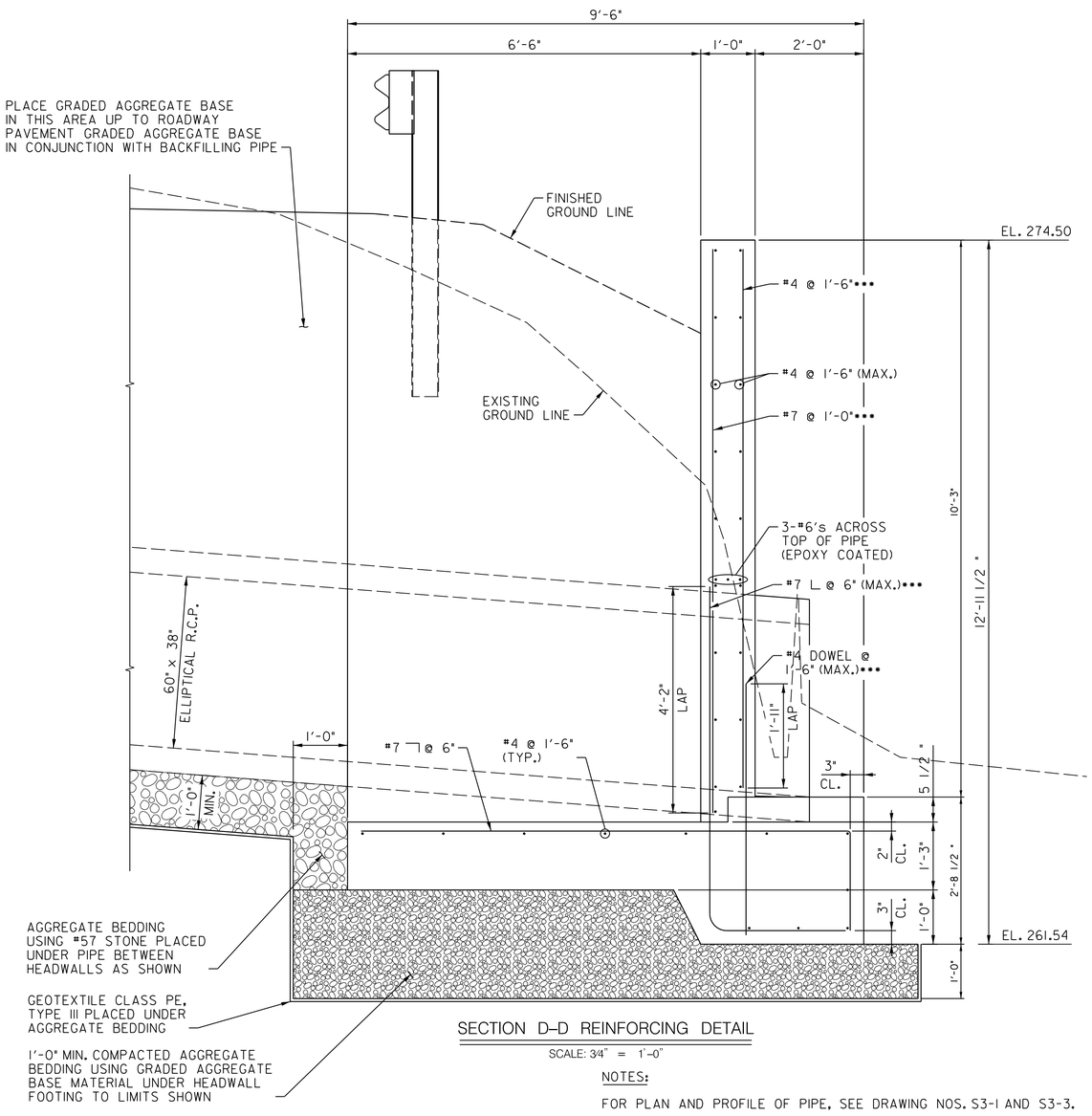


SECTION D–D PRECAST DOWNSTREAM HEADWALL

SCALE: 3/4" = 1'-0"



SECTION D–D REINFORCING DETAIL

SCALE: 3/4" = 1'-0"

NOTES:

FOR PLAN AND PROFILE OF PIPE, SEE DRAWING NOS. S3-1 AND S3-3.

FOR DOWNSTREAM HEADWALL, SEE DRAWING NOS. S3-8 TO S3-10.

FILL VOID UNDER RCP ABOVE FOOTING AND IN HEADWALL AROUND RCP WITH NON-SHRINK GROUT. GROUT SHALL CONFORM TO 902.11(C).

NOTE:

- THE MAXIMUM FOUNDATION DESIGN BEARING PRESSURE FOR STRENGTH LOAD COMBINATIONS IS 2.0 KIPS/SQ. FT.
- THE MAXIMUM FOUNDATION DESIGN BEARING PRESSURE FOR SERVICE LOAD COMBINATIONS IS 1.4 KIPS/SQ. FT.

NOTE:

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REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

DOWNSTREAM HEADWALL SECTIONS

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY STG
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
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DRAWING NO. S3-9 OF 19

SHEET NO. 68 OF 90

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

BY: Scott.Grey –

PLOTTED: Tuesday, November 05, 2019 AT 10:28 AM

STRUCTURE INVENTORY NO. 03192XO

SURVEY BOOK NO.

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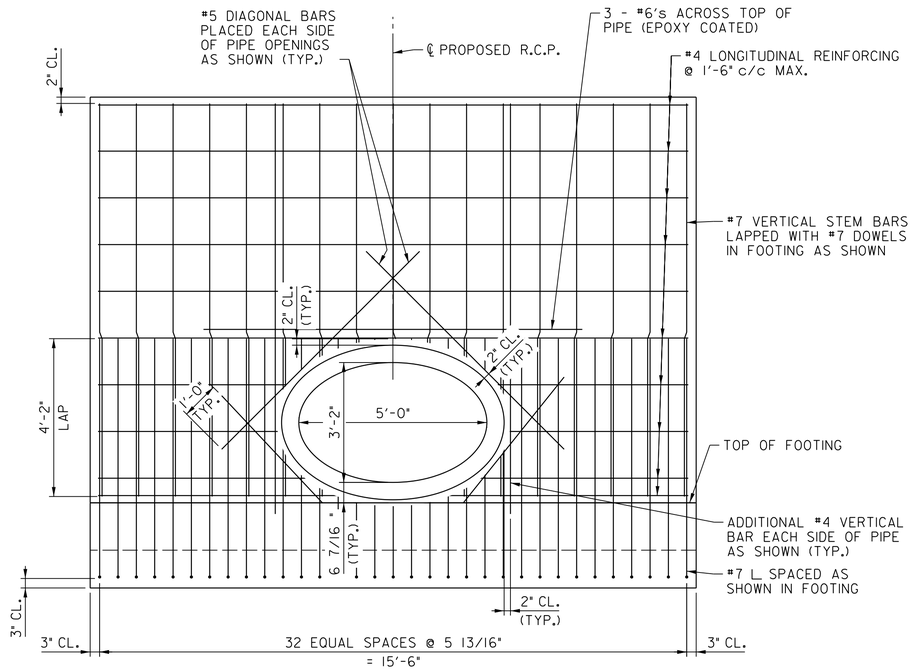


ELEVATION PRECAST DOWNSTREAM HEADWALL – REAR FACE REINFORCING

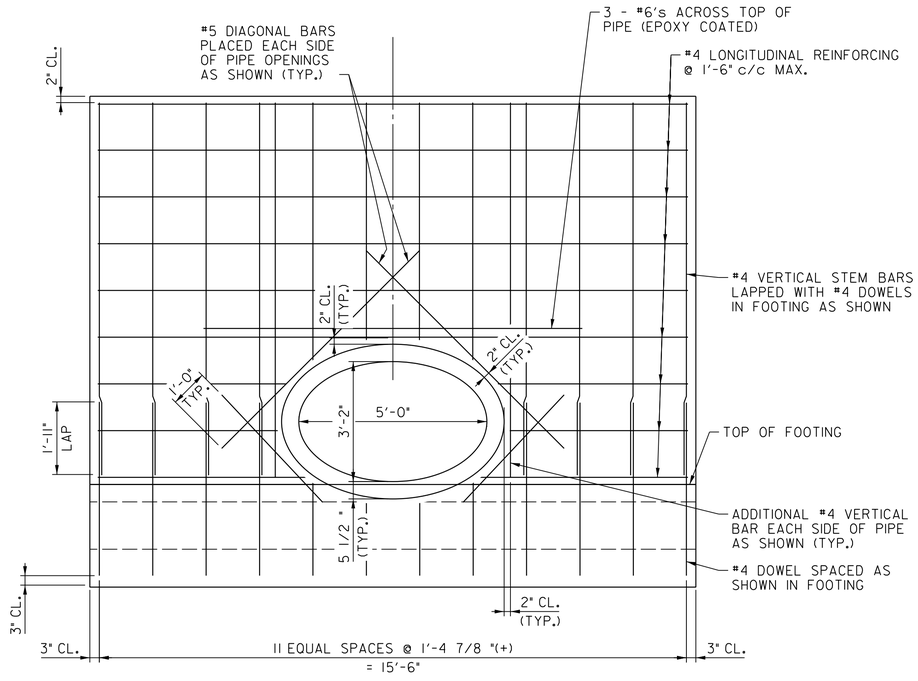
SCALE: 1/2" = 1'-0"

NOTE:

FOOTING REINFORCING NOT SHOWN.

NOTE:

HOLES THROUGH PRECAST HEADWALL SHALL BE ADJUSTED TO ACCOMMODATE THE SKEWED ORIENTATION OF PIPE AS IT PASSES THROUGH THE HEADWALL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND PLACEMENT OF LIFTING DEVICES. IN ADDITION, THE CONTRACTOR AND HIS PRECAST SUPPLIER SHALL VERIFY THAT THE LIFTING POINTS WILL NOT DAMAGE THE HEADWALL OR FOOTING DURING LIFTING.



ELEVATION PRECAST DOWNSTREAM HEADWALL – FRONT FACE REINFORCING

SCALE: 1/2" = 1'-0"

NOTE:

FOOTING REINFORCING NOT SHOWN.

NOTES:

FOR PLAN AND PROFILE OF PIPE, SEE DRAWING NOS. S3-1 AND S3-3.

FOR ADDITIONAL PIPE DETAILS, SEE DRAWING NO. S3-4.

FOR SECTION DETAIL, SEE DRAWING NO. S3-9.

KCI TECHNOLOGIES

Gannett Fleming

In Joint Venture

BY: Scott.Grey –

PLOTTED: Tuesday, November 05, 2019 AT 10:28 AM

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

SCALE · · · · ADVERTISED DATE TBD CONTRACT NO. BA0845180

DOWNSTREAM HEADWALL REINFORCING DETAILS

DESIGNED BY AS SHOWN
DRAWN BY
CHECKED BY RDL STG XXX

TENTATIVE
OFFICE OF STRUCTURES
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DRAWING NO. · · OF · · SHEET NO. · · OF 90

STRUCTURE INVENTORY NO. 03192XO

SURVEY BOOK NO.

PLOTTED: Tuesday, November 05, 2019 AT 10:28 AM
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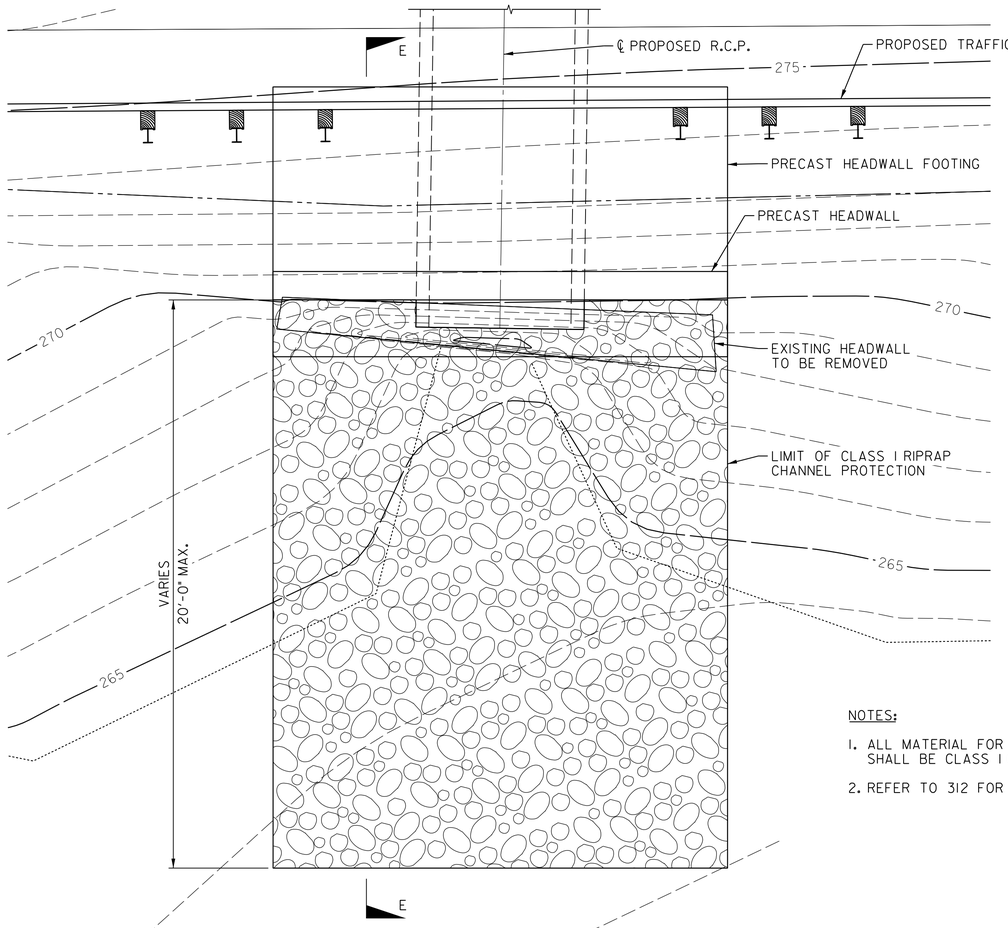
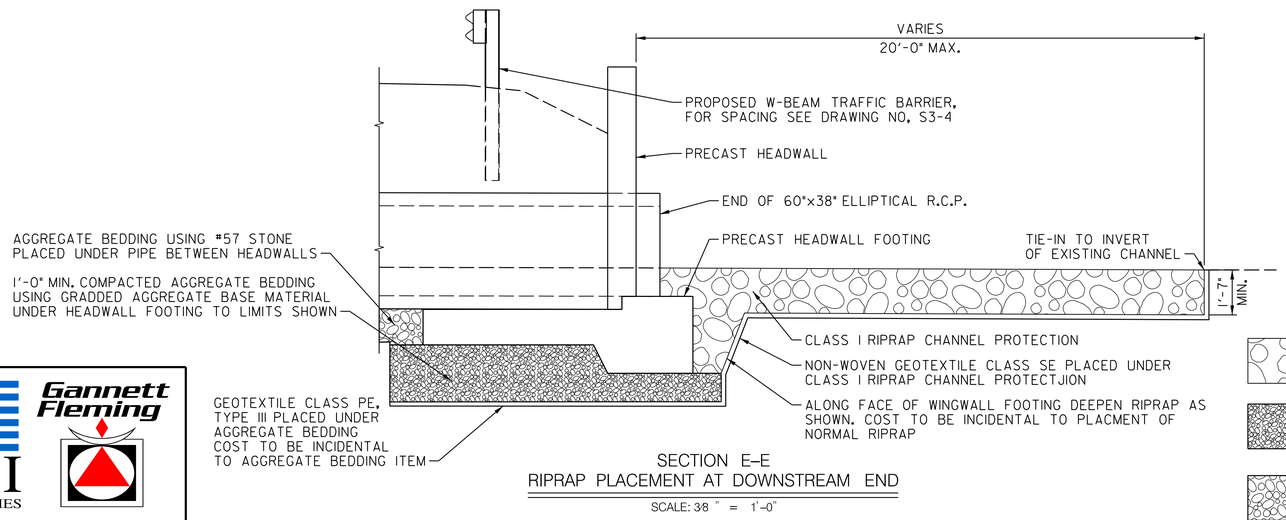


RIPRAP CHANNEL PROTECTION PLAN – DOWNSTREAM END

SCALE: 3⁄8 " = 1'-0"

NOTES:

1. ALL MATERIAL FOR RIPRAP CHANNEL PROTECTION SHALL BE CLASS I CONFORMING TO 901.02.
2. REFER TO 312 FOR OTHER REQUIREMENTS AND PAYMENT.



SECTION E–E
RIPRAP PLACEMENT AT DOWNSTREAM END

SCALE: 3⁄8 " = 1'-0"

DENOTES CLASS I RIPRAP CHANNEL PROTECTION

DENOTES GRADED AGGREGATE BASE MATERIAL PLACED UNDER HEADWALLS

DENOTES AGGREGATE BEDDING USING #57 STONE PLACED UNDER PIPE BETWEEN HEADWALLS

NOTE:

FOR GENERAL PLAN OF PIPE, SEE DRAWING NO. S3-1.

FOR MOT PLAN AND GENERAL NOTES, SEE SHEET NOS. 4 AND 6.

FOR DOWNSTREAM HEADWALL DETAILS, SEE DRAWING NOS. S3-8 TO S3-10.

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

BY: Scott.Grey –

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

DOWNSTREAM RIPRAP CHANNEL PROTECTION

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY STG
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
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DRAWING NO. S3-11 OF 19

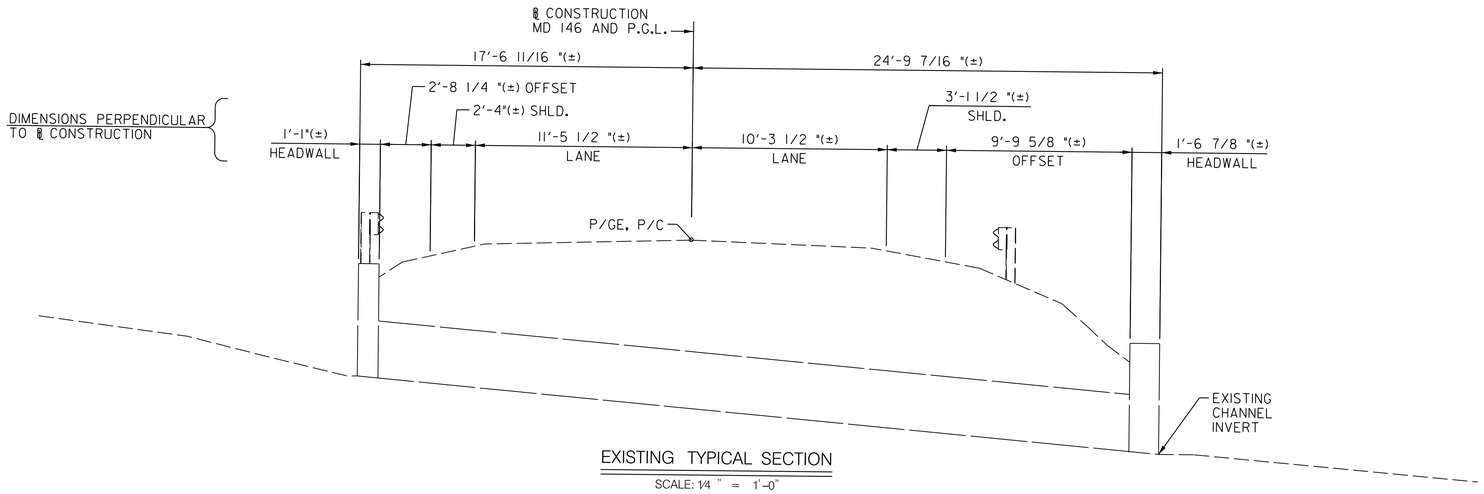
SHEET NO. 70 OF 90

PLOTTED: Tuesday, November 05, 2019 AT 10:29 AM

STRUCTURE INVENTORY NO. 03192X0

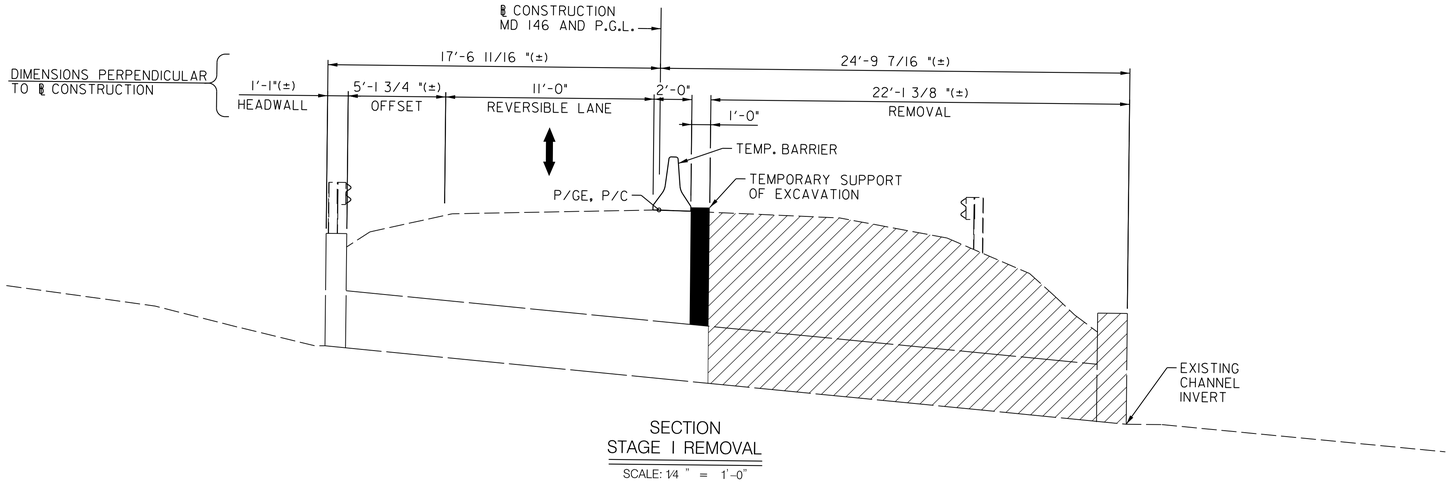
SURVEY BOOK NO.

PLOTTED: Tuesday, November 05, 2019 AT 10:29 AM
FILE: M:\2010\23100466.29\Drawings\pBR-DR02_MD_146.dgn



EXISTING TYPICAL SECTION

SCALE: 1/4 " = 1'-0"



SECTION
STAGE 1 REMOVAL

SCALE: 1/4 " = 1'-0"

STAGE 1 REMOVAL NOTES:

1. REFER TO MOT PLANS, SHEET NO. 4 TO 6.
2. SHIFT TRAFFIC AS SHOWN.
3. PLACE TEMPORARY PRECAST CONCRETE TRAFFIC BARRIER AS SHOWN.
4. ONCE THE PRECAST CONCRETE TRAFFIC BARRIER IS IN PLACE THE CONTRACTOR SHALL INSTALL TEMPORARY SUPPORT OF EXCAVATION AND REMOVE RAILING, FILL, HEADWALL AND CULVERT TO THE LIMITS SHOWN HATCHED.

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE
NO. 03192X0 SINGLE 36" x 48"
REINFORCED CONCRETE BOX ON
MD 146 (DULANEY VALLEY ROAD)
OVER DRAINAGE DITCH

SEQUENCE OF CONSTRUCTION - 1

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY STG
CHECKED BY XXX

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OFFICE OF STRUCTURES
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DRAWING NO. S3-12 OF 19

SHEET NO. 71 OF 90

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

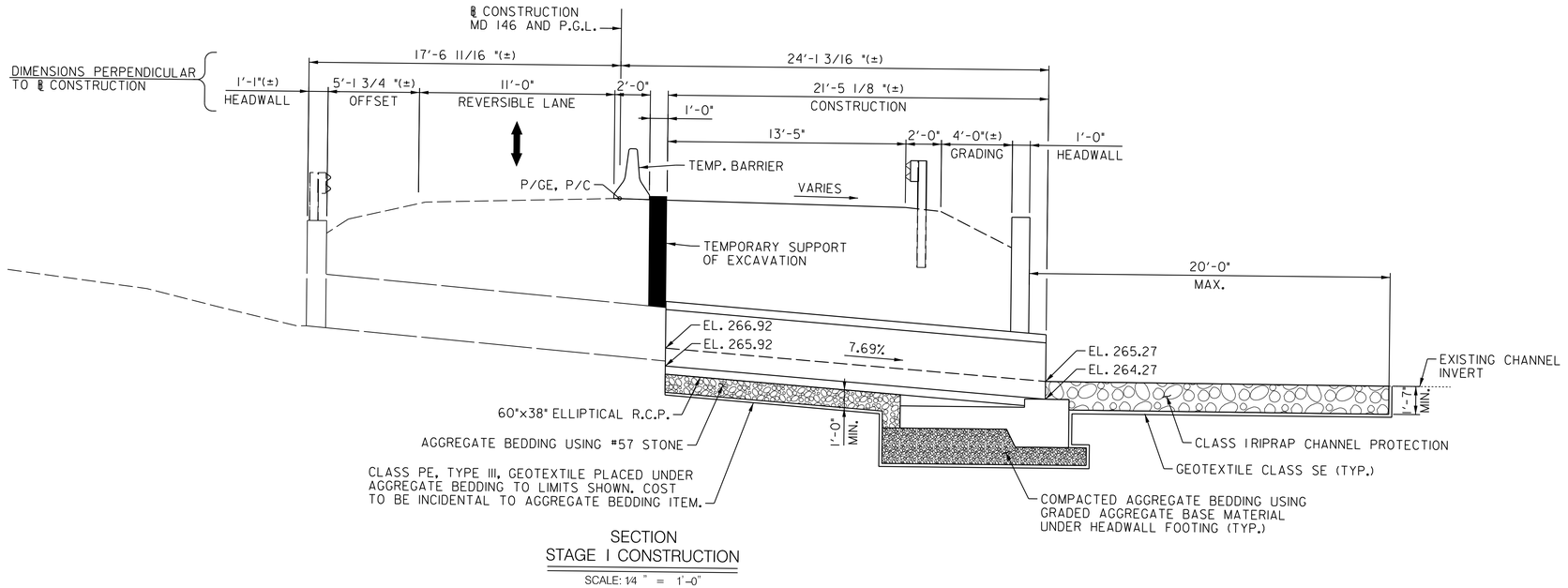
BY: Scott.Grey -

PLOTTED: Tuesday, November 05, 2019 AT 10:29 AM

STRUCTURE INVENTORY NO. 03192X0

SURVEY BOOK NO.

PLOTTED: Tuesday, November 05, 2019 AT 10:29 AM
FILE: M:\2010\23100466.29\Drawings\pBR-SC09_MD_146.dgn

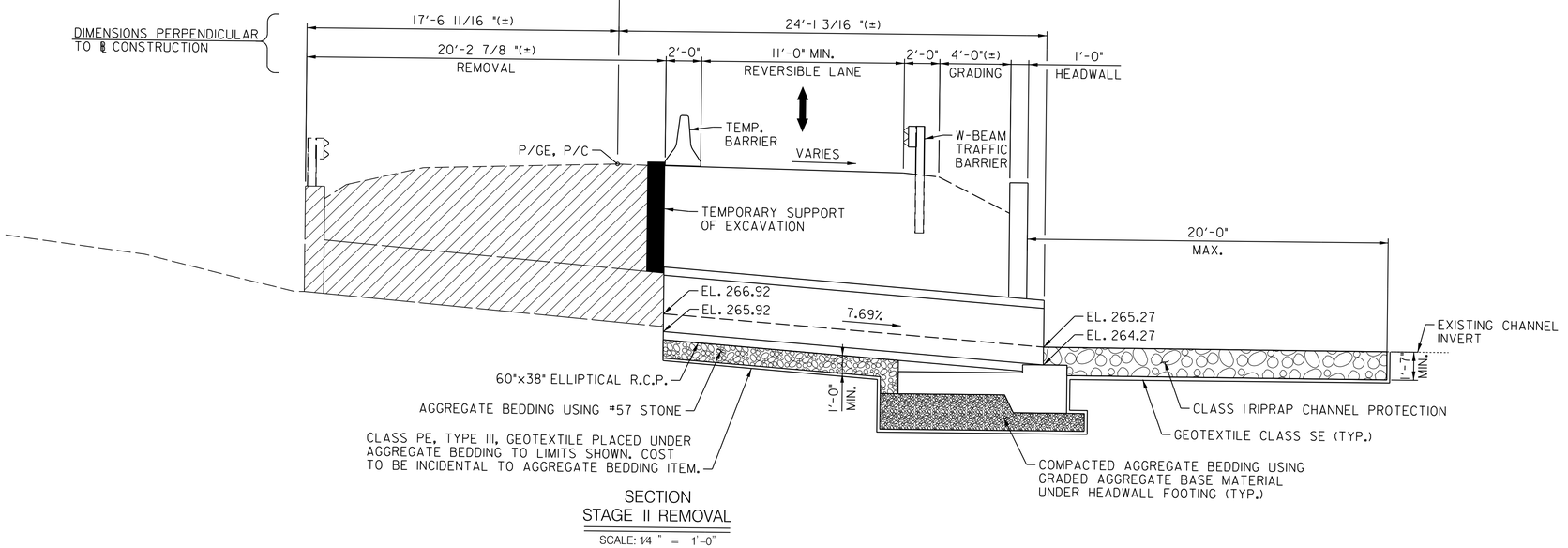


SECTION
STAGE I CONSTRUCTION

SCALE: 1/4 " = 1'-0"

STAGE I CONSTRUCTION NOTES:

1. CONSTRUCT NEW PORTION OF PIPE AND HEADWALL TO THE LIMITS SHOWN.
2. BACKFILL AND INSTALL ROADWAY ASPHALT.
3. INSTALL W-BEAM TRAFFIC BARRIER.
4. REMOVE TEMPORARY PRECAST TRAFFIC BARRIER.
5. RETURN TO TWO LANE TRAFFIC.
6. PLACE CLASS I RIPRAP CHANNEL PROTECTION.



SECTION
STAGE II REMOVAL

SCALE: 1/4 " = 1'-0"

STAGE II REMOVAL NOTES:

1. SHIFT TRAFFIC AS SHOWN.
2. PLACE TEMPORARY PRECAST CONCRETE TRAFFIC BARRIER AS SHOWN.
3. ONCE THE PRECAST CONCRETE TRAFFIC BARRIER IS IN PLACE THE CONTRACTOR SHALL REMOVE RAILING, FILL, HEADWALL AND CULVERT TO THE LIMITS SHOWN HATCHED.

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

BY: Scott Grey –

PLOTTED: Tuesday, November 05, 2019 AT 10:29 AM

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE
NO. 03192X0 SINGLE 36" x 48"
REINFORCED CONCRETE BOX ON
MD 146 (DULANEY VALLEY ROAD)
OVER DRAINAGE DITCH

SEQUENCE OF CONSTRUCTION – 2

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY STG
CHECKED BY XXX

TENTATIVE
OFFICE OF STRUCTURES
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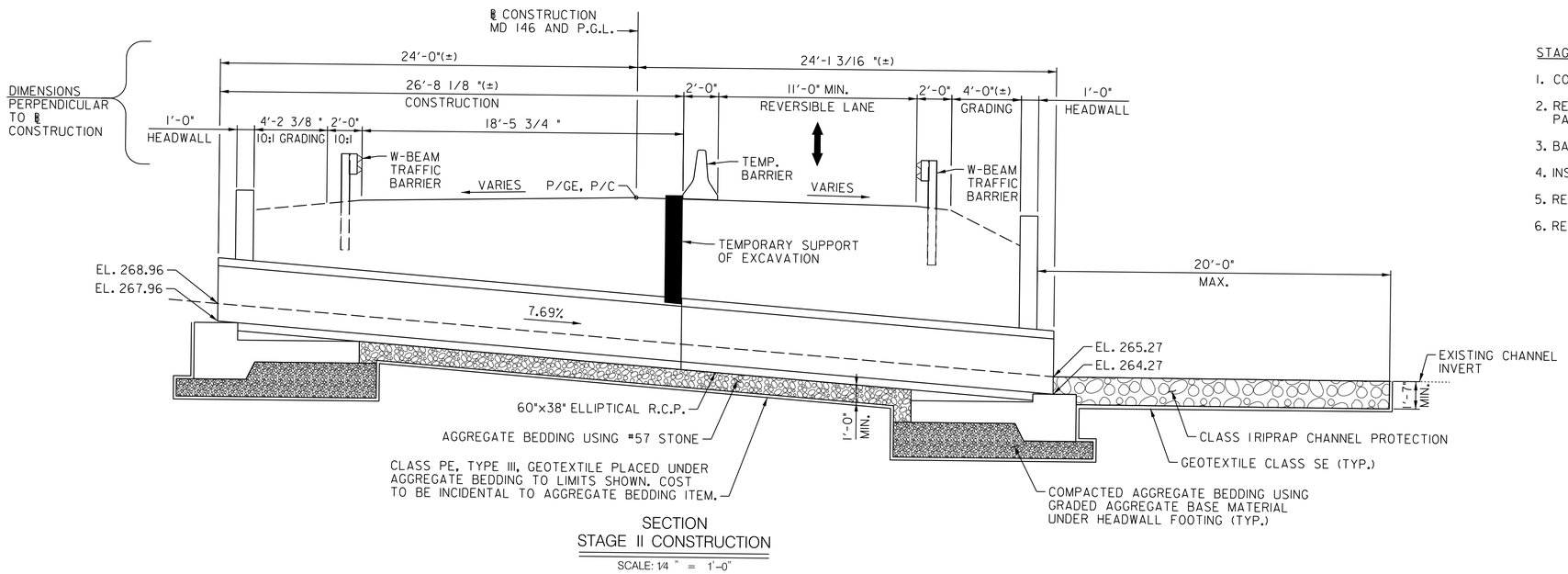
DRAWING NO. S3-13 OF 19

SHEET NO. 72 OF 90

STRUCTURE INVENTORY NO. 03192X0

SURVEY BOOK NO.

PLOTTED: Tuesday, November 05, 2019 AT 10:29 AM
FILE: M:\2010\23100466.29\Drawings\pBR-SC10_MD_146.dgn

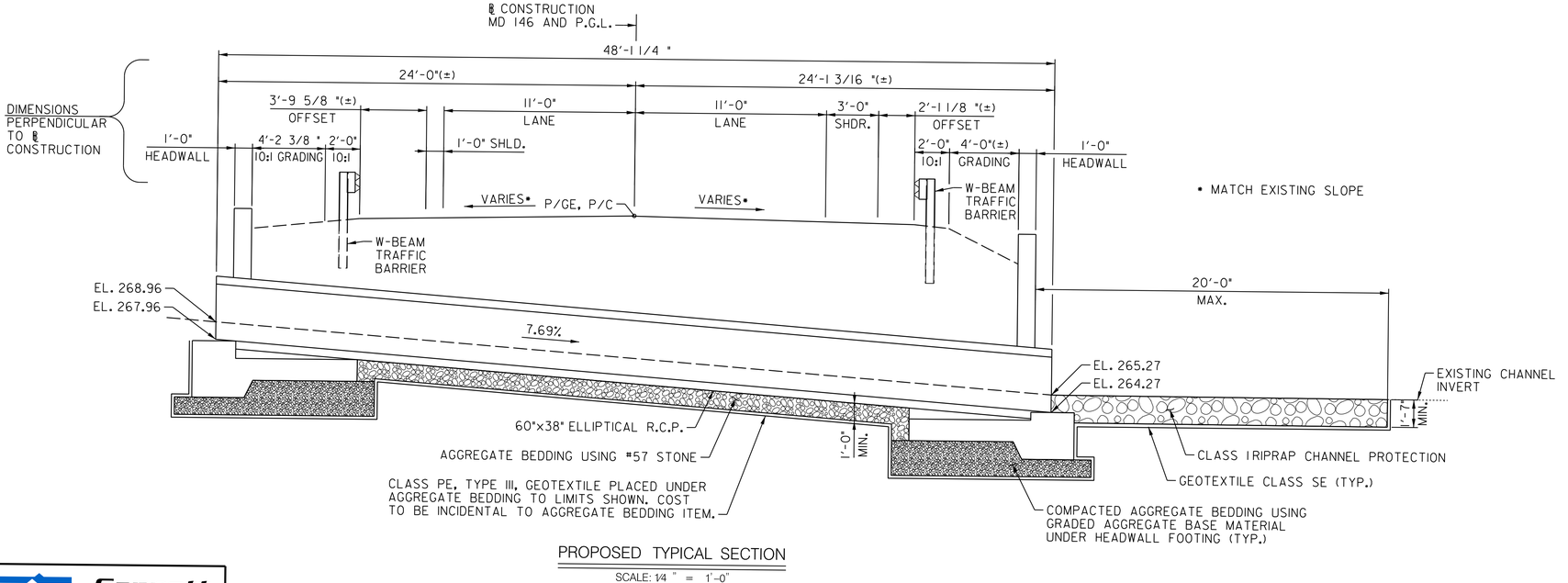


SECTION
STAGE II CONSTRUCTION

SCALE: 1/4 " = 1'-0"

STAGE II CONSTRUCTION NOTES:

1. CONSTRUCT NEW PORTION OF PIPE AND HEADWALL TO THE LIMITS SHOWN.
2. REMOVE PORTION OF TEMPORARY SUPPORT OF EXCAVATION BELOW PROPOSED PAVEMENT SECTION.
3. BACKFILL AND INSTALL ROADWAY ASPHALT.
4. INSTALL W-BEAM TRAFFIC BARRIER.
5. REMOVE TEMPORARY PRECAST CONCRETE TRAFFIC BARRIER.
6. RETURN TRAFFIC TO FINAL PATTERN.



PROPOSED TYPICAL SECTION

SCALE: 1/4 " = 1'-0"

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

SEQUENCE OF CONSTRUCTION – 3

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY RDL
DRAWN BY STG
CHECKED BY XXX

TENTATIVE
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DRAWING NO. S3-14 OF 19

SHEET NO. 73 OF 90

KCI TECHNOLOGIES
Gannett Fleming
In Joint Venture

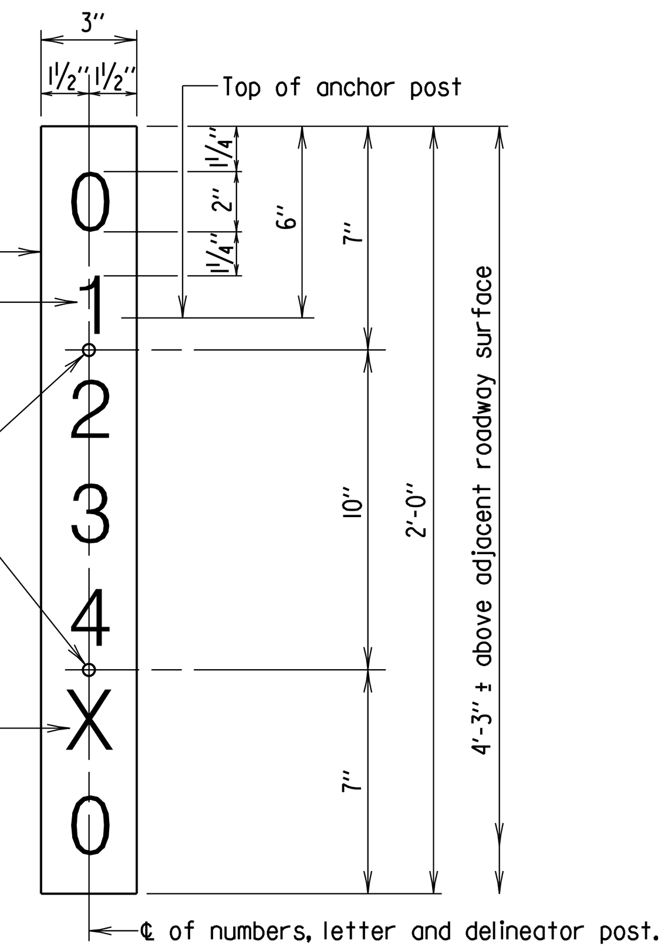
BY: Scott.Grey –

PLOTTED: Tuesday, November 05, 2019 AT 10:29 AM

STRUCTURE INVENTORY NO. 03192XO

SURVEY BOOK NO.

PLOTTED: Tuesday, November 05, 2019 AT 10:29 AM
FILE: M:\2010\23100466.29\Drawings\pBR-SC11_MD_146.dgn



SMALL STRUCTURE SIGN

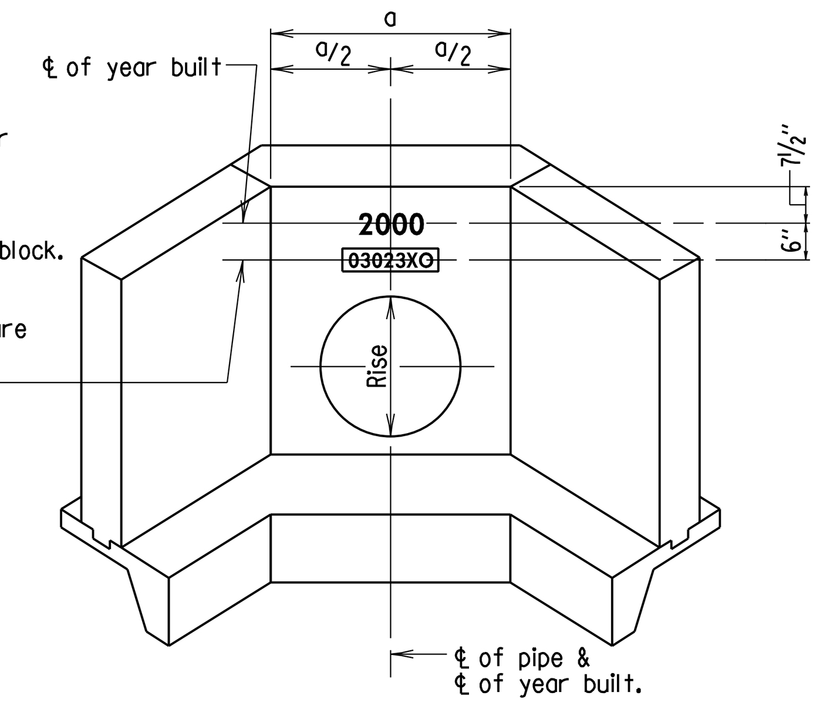
Scale: None

Placement Notes:

1. The small structure sign shall be placed behind traffic barriers where applicable, (delineator post to be driven within traffic barrier w-beam post). The sign shall be placed at the approach ends of the structure on the right side of the road, at roadway level.
2. Divided highways shall have only one sign placed at each approach end.
3. If traffic barriers are not present, place small structure sign as close to end of structure as possible but sign must be visible from the approach roadway.
4. For noise walls and retaining walls place one small structure sign at each end.
5. For retaining walls that are not visible from the approach roadway, place small structure sign as close to end of structure as possible but sign must be visible from approach roadway. For retaining walls that are visible from the approach roadway, refer to SI-104.
6. Always locate small structure sign so that it will be in the safest position possible relative to highway and pedestrian traffic.

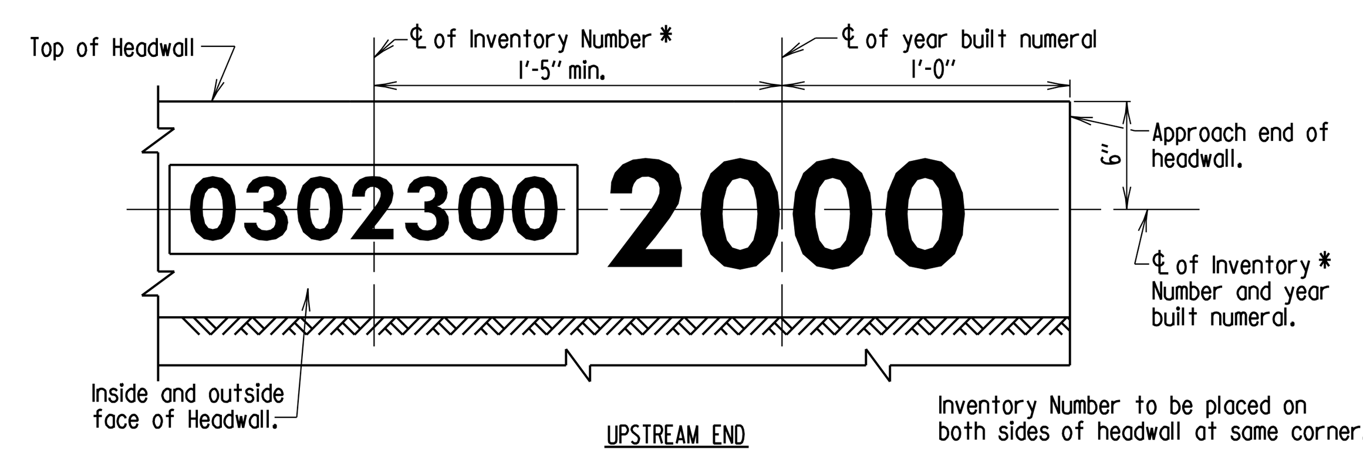
APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR, OFFICE OF STRUCTURES DATE: 09-20-2005	SMALL STRUCTURE SIGN AND PLACEMENT DETAILS
VERSION 1.0	DETAIL NO. SI-102 SHEET 1 OF 1

Note:
If headwall has a form liner finish, a 14" x 18" smooth block shall be formed for placement of the numbers. See Plans for location of block.



UPSTREAM END

HEADWALLS FOR PIPES AND/OR PIPE ARCHES WITH RISE 3'-0" OR GREATER



UPSTREAM END

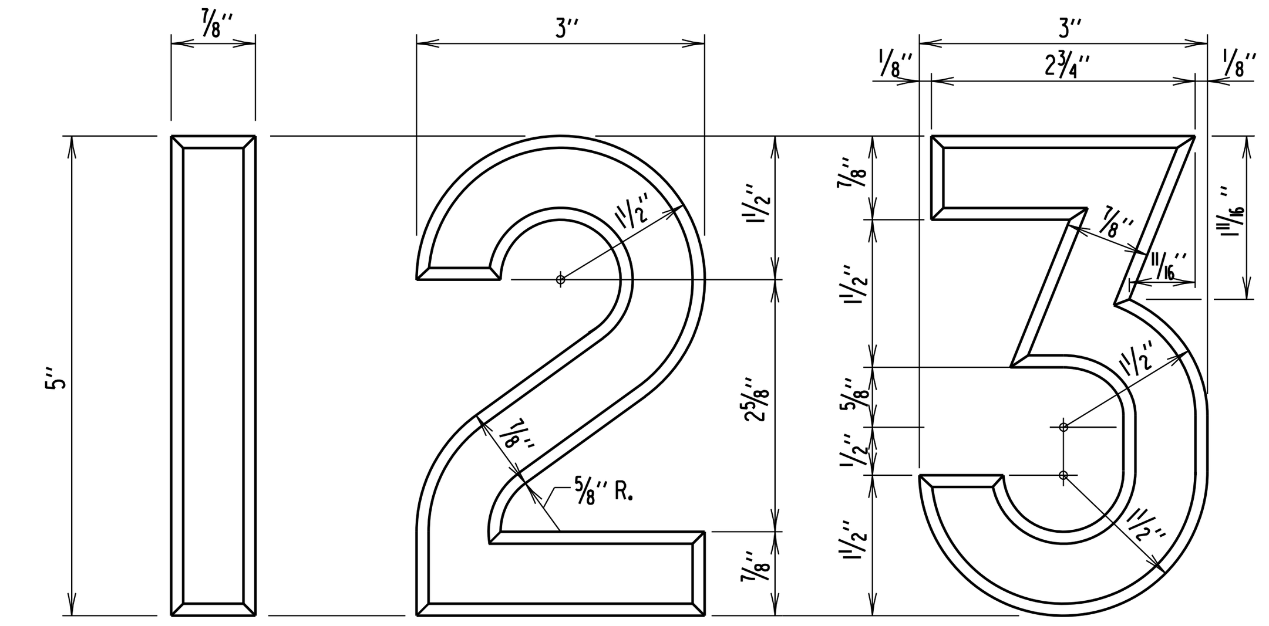
Inventory Number to be placed on both sides of headwall at same corner.

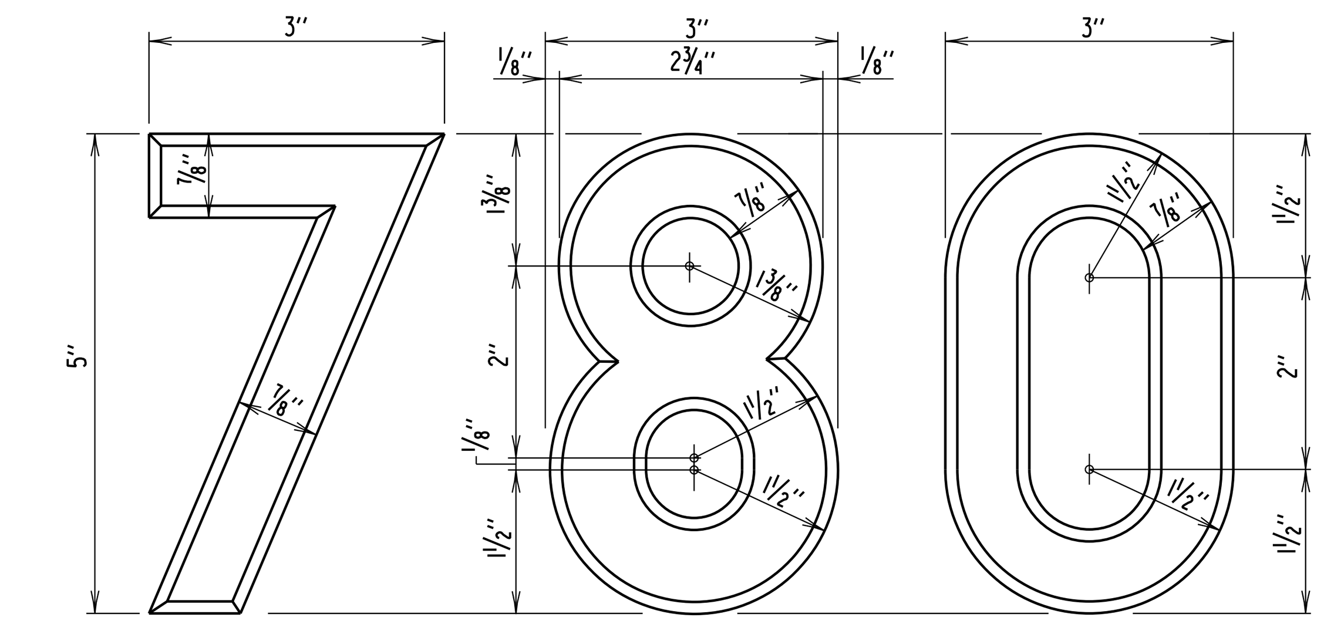
BOX CULVERTS

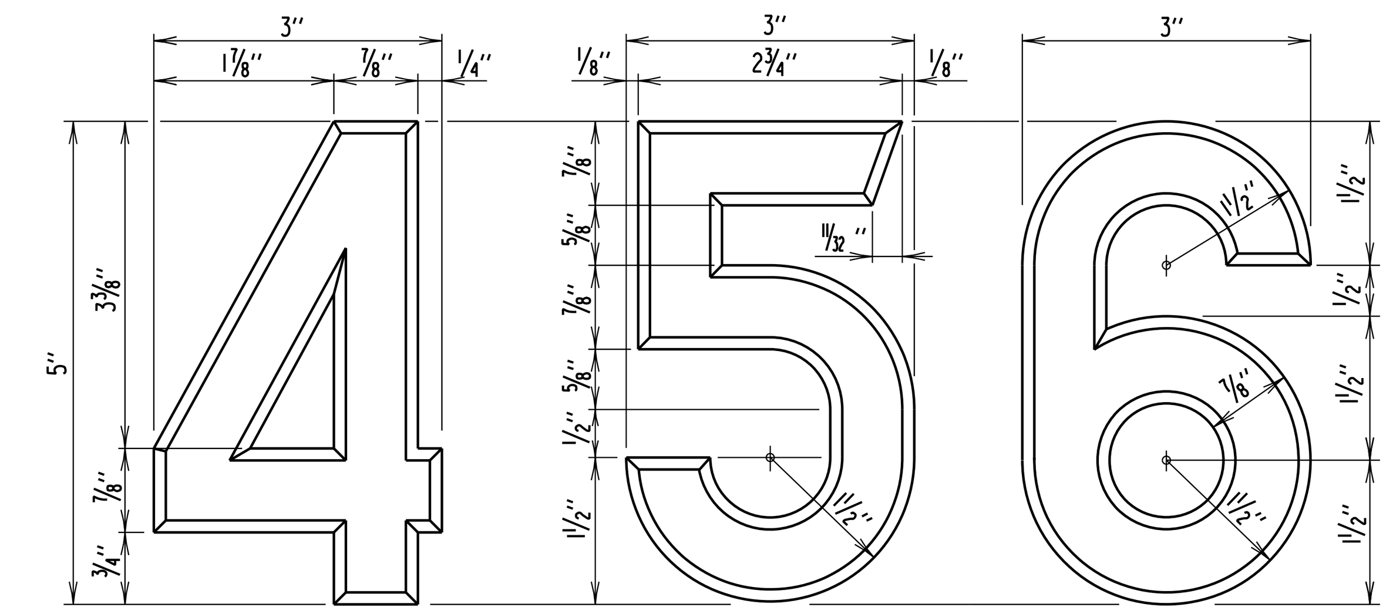
* Black numbers 3" high on a painted white background, (5" x 17").

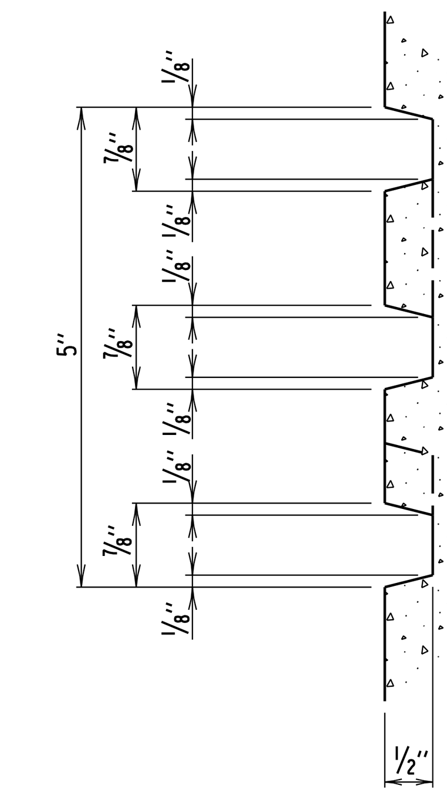
Notes:
1. For existing structures, where a year built is shown on the structure and structure is to be rehabilitated, the marking should read 1942-2000 (old year first - new year).
2. For existing structures with no year built contact Office of Structures for old year.
3. For Year Built Numerals refer to Standard No. SI-201.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR, OFFICE OF STRUCTURES DATE: 10-17-2013	LOCATION OF YEAR BUILT MARKING AND STRUCTURE INVENTORY NUMBER ON HEADWALLS FOR PIPES AND BOX CULVERTS
VERSION 1.0	DETAIL NO. SI-103 SHEET 1 OF 1

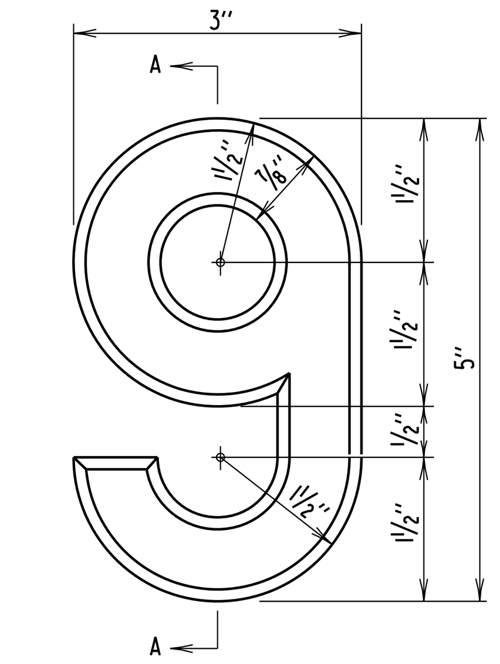








SECTION A-A



Note:
Year built numerals to be indented into concrete (unpainted) - as indicated on Standard Nos. SI-101, SI-103 and SI-104.

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR, OFFICE OF STRUCTURES DATE: 3/14/99	NUMERALS FOR YEAR BUILT MARKING ON STRUCTURES
VERSION 1.0	DETAIL NO. SI-201 SHEET 1 OF 2

APPROVAL	STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DIRECTOR, OFFICE OF STRUCTURES DATE: 3/14/99	NUMERALS FOR YEAR BUILT MARKING ON STRUCTURES
VERSION 1.0	DETAIL NO. SI-201 SHEET 2 OF 2

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

STANDARD DETAILS

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY S.H.A.
DRAWN BY S.H.A.
CHECKED BY S.H.A.

TENTATIVE
OFFICE OF STRUCTURES
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DRAWING NO. S3-15 OF 19
SHEET NO. 74 OF 90

BY: Scott.Grey

PLOTTED: Tuesday, November 05, 2019 AT 10:29 AM

STRUCTURE INVENTORY NO. 03192XO

SURVEY BOOK NO.

PLOTTED: Tuesday, November 05, 2019 AT 10:29 AM
FILE: M:\2010\23100466.29\Drawings\03192XOs01.dgn

LOCATION CATEGORY A								
BAR SIZE	CENTER TO CENTER SPACING							
	3″		4″		5″		≥ 6″	
#4	2′-1″	2′-8″	2′-1″	2′-6″	2′-1″	2′-6″	2′-1″	2′-6″
#5	2′-8″	3′-6″	2′-7″	3′-4″	2′-7″	3′-1″	2′-7″	3′-1″
#6	3′-10″	5′-0″	3′-1″	4′-0″	3′-1″	4′-0″	3′-1″	4′-0″
#7	5′-3″	6′-10″	3′-11″	5′-1″	3′-7″	4′-8″	3′-7″	4′-8″
#8	6′-10″	8′-11″	5′-1″	6′-8″	4′-1″	5′-4″	4′-1″	5′-4″
#9	8′-8″	11′-3″	6′-6″	8′-6″	5′-2″	6′-9″	5′-1″	6′-7″
#10	-	-	8′-3″	10′-9″	6′-7″	8′-7″	6′-3″	8′-2″
#11	-	-	10′-1″	13′-3″	8′-1″	10′-7″	7′-6″	9′-9″

Location Category A - Bars in horizontal layers in top of pour with 12″ or more of concrete below them such as in: footings, pier caps, etc.

LOCATION CATEGORY B								
BAR SIZE	CENTER TO CENTER SPACING							
	3″		4″		5″		≥ 6″	
#4	1′-7″	2′-5″	1′-7″	1′-11″	1′-7″	1′-11″	1′-7″	1′-11″
#5	2′-1″	3′-1″	2′-0″	3′-0″	2′-0″	2′-5″	2′-0″	2′-5″
#6	3′-0″	4′-5″	2′-5″	3′-7″	2′-5″	3′-7″	2′-5″	3′-7″
#7	4′-0″	6′-0″	3′-0″	4′-6″	2′-9″	4′-2″	2′-9″	4′-2″
#8	5′-3″	7′-10″	3′-11″	5′-11″	3′-2″	4′-9″	3′-2″	4′-9″
#9	6′-8″	10′-0″	5′-0″	7′-6″	4′-0″	6′-0″	3′-11″	5′-10″
#10	-	-	6′-4″	9′-6″	5′-1″	7′-7″	4′-10″	7′-2″
#11	-	-	7′-10″	11′-8″	6′-3″	9′-4″	5′-9″	8′-8″

Location Category B - All bars not in Location Category A.

[ ] = Non-epoxy coated [shaded] = Epoxy coated

Note:
1. When bar lap is not specified on the Plans, the above dimensions shall be used.
2. These bar laps do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These bar laps only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f′c = 4000 psi.
4. These bar laps assume cover of 2″. Greater lap lengths will be required for cover less than 2″.
5. These bar laps are Class B splices based on the development lengths in Std. No. REBAR-DL-103. Class B splices are 1.3 times the development length.
6. Class A splices may be used when (a) the area of reinforcement provided is at least twice that required by analysis over the entire length of the lap splice and (b) one-half or less of the total reinforcement is spliced within the required lap splice length. Class A splices are 1.0 times the development length.

APPROVAL — DIRECTOR, OFFICE OF STRUCTURES — DATE: 03/21/2017 — VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

BAR LAP DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.6 (4500 P.S.I.) CONCRETE

DETAIL NO. REBAR-BL-103 SHEET 1 OF 1

LOCATION CATEGORY A								
BAR SIZE	CENTER TO CENTER SPACING							
	3″		4″		5″		≥ 6″	
#4	1′-7″	2′-1″	1′-7″	1′-11″	1′-7″	1′-11″	1′-7″	1′-11″
#5	2′-1″	2′-8″	2′-0″	2′-7″	2′-0″	2′-5″	2′-0″	2′-5″
#6	3′-0″	3′-10″	2′-5″	3′-1″	2′-5″	3′-1″	2′-5″	3′-1″
#7	4′-0″	5′-3″	3′-0″	3′-11″	2′-9″	3′-7″	2′-9″	3′-7″
#8	5′-3″	6′-10″	3′-11″	5′-2″	3′-2″	4′-1″	3′-2″	4′-1″
#9	6′-8″	8′-8″	5′-0″	6′-6″	4′-0″	5′-3″	3′-11″	5′-1″
#10	-	-	6′-4″	8′-3″	5′-1″	6′-7″	4′-10″	6′-3″
#11	-	-	7′-10″	10′-2″	6′-3″	8′-2″	5′-9″	7′-6″

Location Category A - Bars in horizontal layers in top of pour with 12″ or more of concrete below them such as in: footings, pier caps, etc.

LOCATION CATEGORY B								
BAR SIZE	CENTER TO CENTER SPACING							
	3″		4″		5″		≥ 6″	
#4	1′-3″	1′-10″	1′-3″	1′-6″	1′-3″	1′-6″	1′-3″	1′-6″
#5	1′-7″	2′-5″	1′-6″	2′-3″	1′-6″	1′-10″	1′-6″	1′-10″
#6	2′-3″	3′-5″	1′-10″	2′-9″	1′-10″	2′-9″	1′-10″	2′-9″
#7	3′-1″	4′-8″	2′-4″	3′-6″	2′-2″	3′-2″	2′-2″	3′-2″
#8	4′-0″	6′-0″	3′-0″	4′-6″	2′-5″	3′-8″	2′-5″	3′-8″
#9	5′-2″	7′-8″	3′-10″	5′-9″	3′-1″	4′-7″	3′-0″	4′-6″
#10	-	-	4′-11″	7′-4″	3′-11″	5′-10″	3′-9″	5′-7″
#11	-	-	6′-0″	9′-0″	4′-10″	7′-2″	4′-5″	6′-8″

Location Category B - All bars not in Location Category A.

[ ] = Non-epoxy coated [shaded] = Epoxy coated

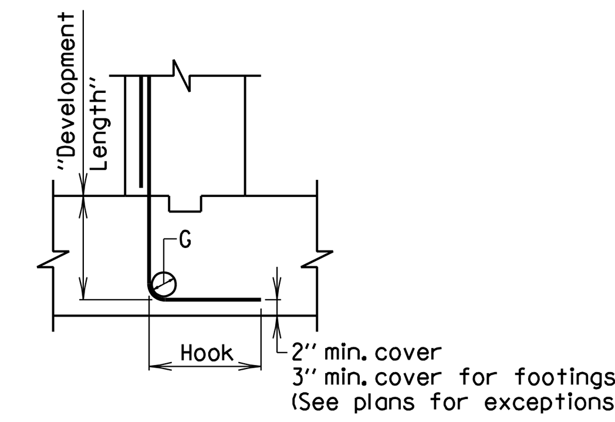
Note:
1. When development length is not specified on the Plans, the above dimensions shall be used.
2. These development lengths do not apply when bar is in lightweight concrete. Greater lengths are required for this material.
3. These development lengths only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi, and Concrete Design, f′c = 4000 psi.
4. These development lengths assume cover of 2″. Greater development lengths will be required for cover less than 2″.
5. The Excess Reinforcement Factor was assumed to be 1.0 when calculating these dimensions.
6. Atr was assumed to be 0 when calculating the Reinforcement Confinement Factor.
7. If depth of member does not allow bar development length indicated in Location Categories A and B; then hooks shall be added to all bars not conforming, as per D, E, and F per Std. No. REBAR-DL-203.

APPROVAL — DIRECTOR, OFFICE OF STRUCTURES — DATE: 03/21/2017 — VERSION 1.0

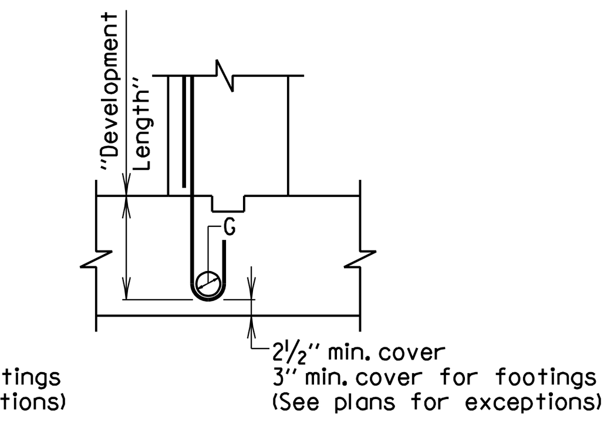
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

DEVELOPMENT LENGTH DIMENSIONS FOR GRADE 60 REINFORCING STEEL IN MIX NO.6 (4500 P.S.I.) CONCRETE

DETAIL NO. REBAR-DL-103 SHEET 1 OF 1



STANDARD 90° HOOK



STANDARD 180° HOOK

BAR SIZE	* LOCATION CATEGORY		
	D	E	F
#4	7″	10″	8″
#5	9″	1′-0″	10″
#6	10″	1′-3″	1′-0″
#7	1′-0″	1′-5″	1′-2″
#8	1′-2″	1′-7″	1′-4″
#9	1′-4″	1′-10″	1′-6″
#10	1′-5″	2′-1″	1′-8″
#11	1′-7″	2′-3″	1′-10″

Note:
For Hook Dimensions and Bends, see Std. No. REBAR-BB-102.

* LOCATION CATEGORY:

D- All bars terminating with a standard 180° hook with side cover (normal to plane of hook) not less than 2½″, and for 90° deg. hook, cover on bar extension beyond hook not less than 2″.
E- All bars not in Category D.
F- All bars with hook enclosed vertically or horizontally within ties or stirrup-ties spaced along the full development length not greater than 3d where d is the diameter of the hooked bar.

Note:
1. When development length is not specified on the Plans, the above dimensions shall be used.
2. These development lengths do not apply when bar is in lightweight concrete or any other strength of concrete.
3. These development lengths only apply where the General Notes indicate Reinforcing Steel Design, fy = 60 ksi. and Concrete Design, f′c = 4000 psi.
4. If depth of member does not allow bar development length indicated in Categories A, B, and C: Std. No. REBAR-DL-103; then hook shall be added to all bars not conforming, as per D, E & F.

APPROVAL — DIRECTOR, OFFICE OF STRUCTURES — DATE: 05/10/2011 — VERSION 1.0

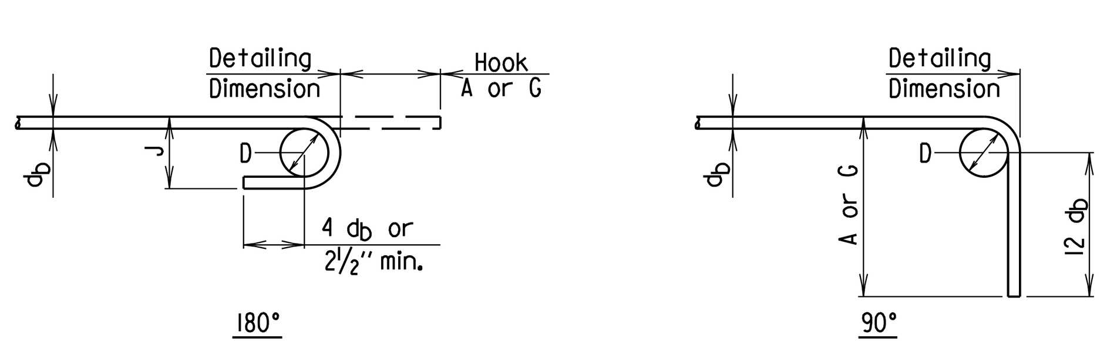
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

DEVELOPMENT LENGTH DIMENSIONS OF HOOKED BARS FOR GRADE 60 REINFORCING STEEL IN MIX NO. 6 (4500 P.S.I.) CONCRETE NON-EPOXY COATED REINFORCING

DETAIL NO. REBAR-DL-203 SHEET 1 OF 1

HOOKS
TABLE I
REFERENCES

1. ACI Types 1 thru 26
2. SHA Standard Pin Bending
3. SHA Radius Bending



RECOMMENDED END HOOKS, ALL GRADES				
BAR SIZE	Finished bend diameter	180 - deg hook		90 - deg hook
	D, in.	A or G in	J, in.	A or G in
#3	2¼	5	3	6
#4	3	6	4	8
#5	3¾	7	5	10
#6	4½	8	6	1-0
#7	5¼	10	7	1-2
#8	6	11	8	1-4
#9	9½	1-3	11¾	1-7
#10	10¾	1-5	1-1¼	1-10
#11	12	1-7	1-2¾	2-0
#14	18¼	2-3	1-9¾	2-7
#18	24	3-0	2-4½	3-5

APPROVAL — DIRECTOR, OFFICE OF STRUCTURES — DATE: 11/17/1997 — VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

REINFORCING STEEL HOOK TABLES AND DIAGRAMS

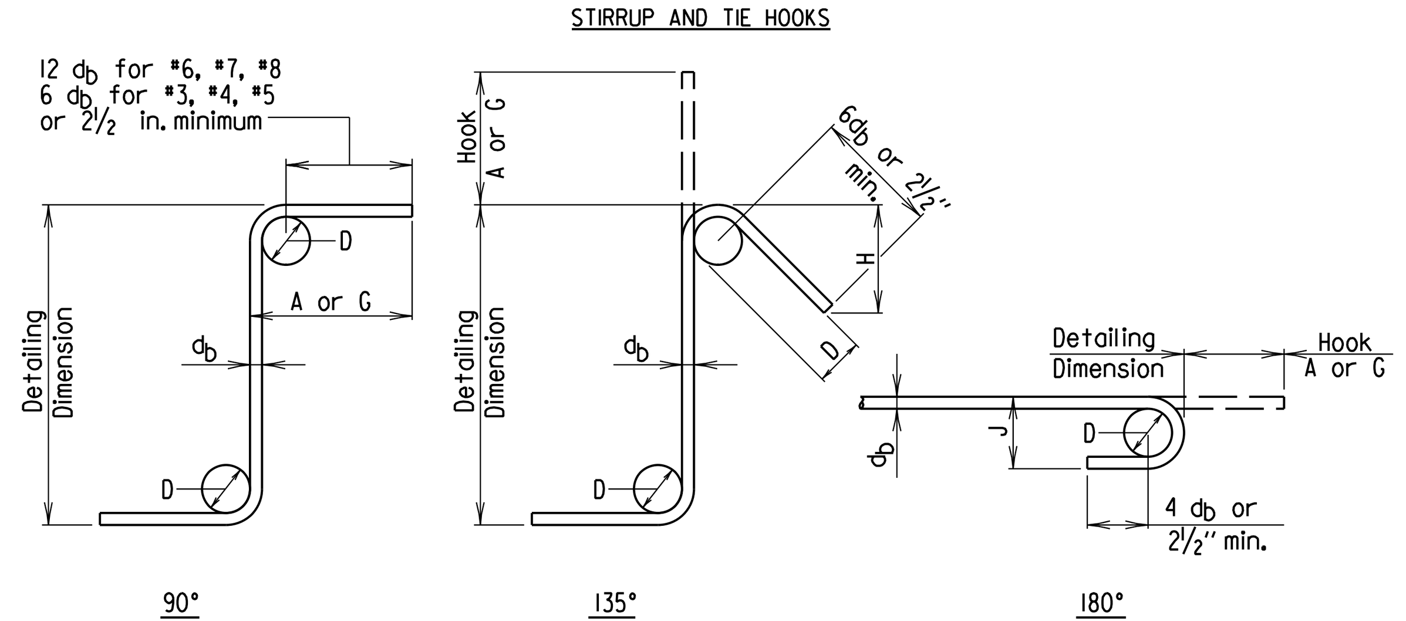
DETAIL NO. REBAR-BB-102 SHEET 1 OF 2

HOOKS
TABLE II
REFERENCES

1. ACI Types S1 thru S11
2. ACI Types T1 thru T8
3. SHA Ties and Stirrups

(Note: Tie and stirrup types supplied in sizes #3-#8)

STIRRUP AND TIE HOOKS



STIRRUP AND TIE HOOK DIMENSIONS, in.				
BAR SIZE	D, in.	90 - deg hook	135 - deg hook	
		A or G	A or G	H, approx
#3	1½	4	4	2½
#4	2	4½	4½	3
#5	2½	6	5½	3¾
#6	4½	1-0	7¾	4½
#7	5¼	1-2	9	5¼
#8	6	1-4	10¼	6

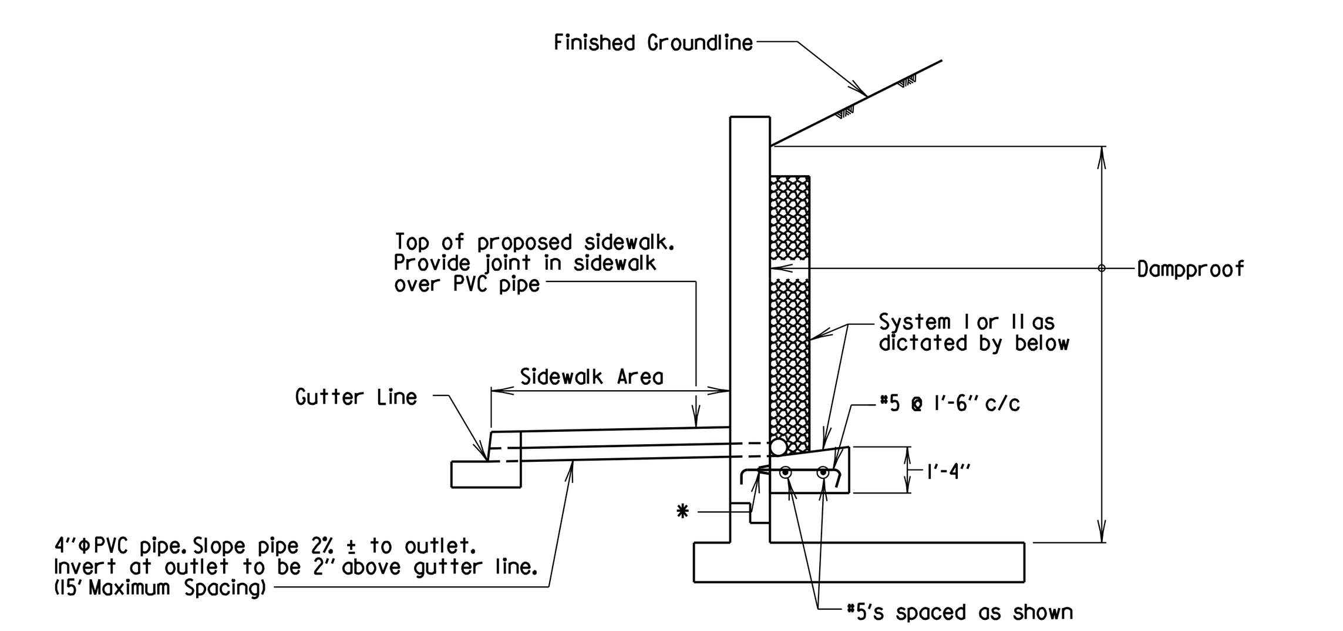
RECOMMENDED END HOOKS, ALL GRADES			
BAR SIZE	Finished bend diameter	180 - deg hook	
	D, in.	A or G in	J, in.
#3	2¼	5	3
#4	3	6	4
#5	3¾	7	5
#6	4½	8	6
#7	5¼	10	7
#8	6	11	8

APPROVAL — DIRECTOR, OFFICE OF STRUCTURES — DATE: 11/17/1997 — VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

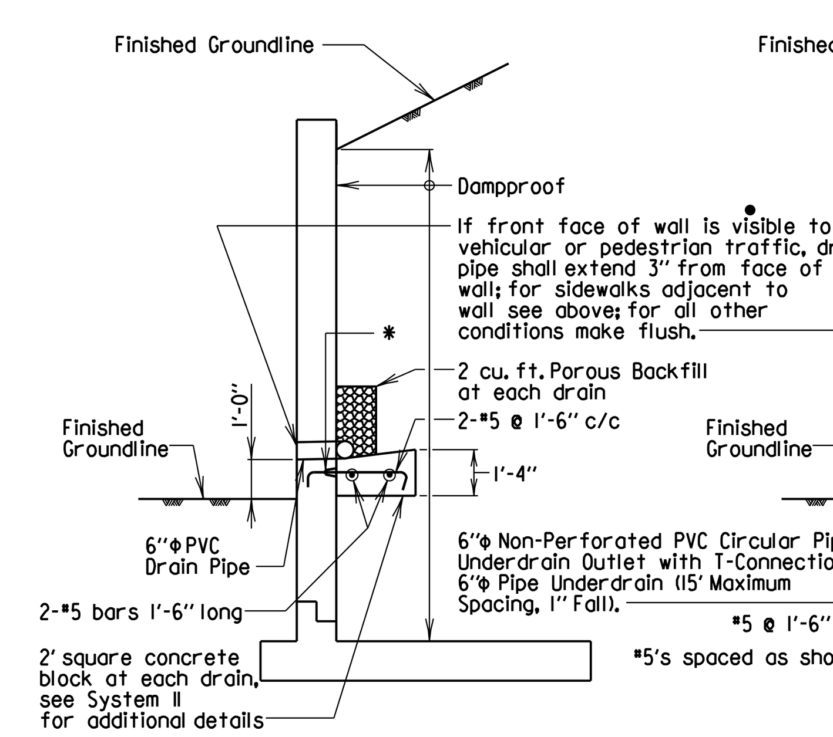
REINFORCING STEEL HOOK TABLES AND DIAGRAMS

DETAIL NO. REBAR-BB-102 SHEET 2 OF 2



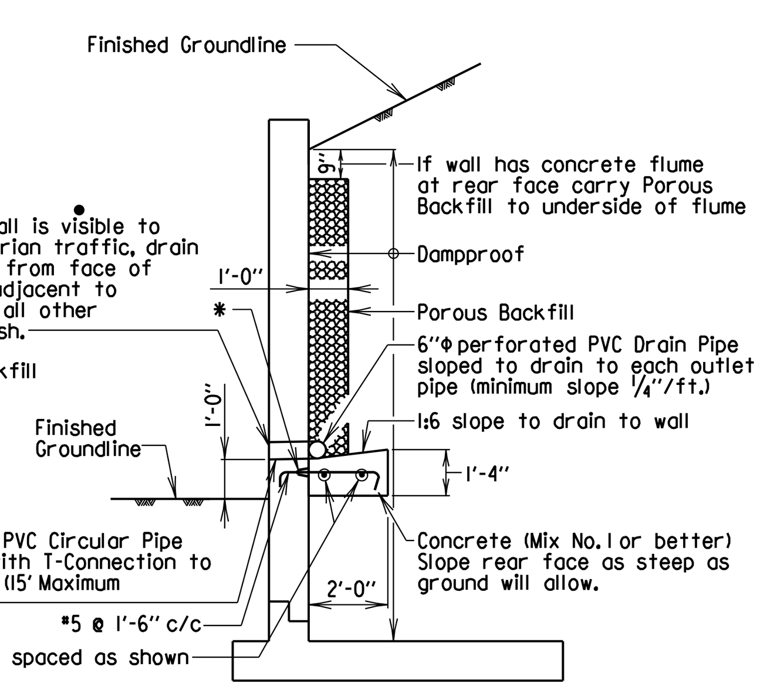
DRAIN AT SIDEWALK
Scale : None

* #5 Threaded Rebar Dowel Coupler at 1′-6″ c/c.



This system shall be used for all box culvert wing walls and other wing walls that are both less than 30′ long and less than 16′ high (height of wall from bottom of footing to top of highest section). One drain shall be placed at ℄ of wall for all walls less than 15′ long. For walls between 15′ and 30′ long, two drains shall be placed, one at each third point.

SYSTEM I
Scale : None



This system shall be used for all retaining walls, all wing walls (not in System I).

SYSTEM II
Scale : None

Note:
1. Exact elevation of drain to be determined by Engineer in field.
2. Porous backfill (refer to Section 469).
3. Use this standard for bridges with wing walls that are not parallel to the highway. For bridges with wing walls parallel to the highway see Std. No. SUB-DR-203 sheet 5 of 5 for details.

APPROVAL — DIRECTOR, OFFICE OF STRUCTURES — DATE: 01/22/2001 — VERSION 1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

RETAINING WALL AND WING WALL DRAINAGE SYSTEMS

DETAIL NO. RW-301 SHEET 1 OF 1

REVISIONS

MDOT MARYLAND DEPARTMENT OF TRANSPORTATION — STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36″ x 48″ REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

STANDARD DETAILS

SCALE AS SHOWN ADVERTISED DATE TBD CONTRACT NO. BA0845180

DESIGNED BY S.H.A.
DRAWN BY S.H.A.
CHECKED BY S.H.A.

TENTATIVE
OFFICE OF STRUCTURES
This plan is draft and subject to change. It is interagency/intra-agency deliberative communication that is not for public disclosure under MD General Provisions Code Annotated Section 4-344 Maryland Public Information Act

DRAWING NO. S3-16 OF 19

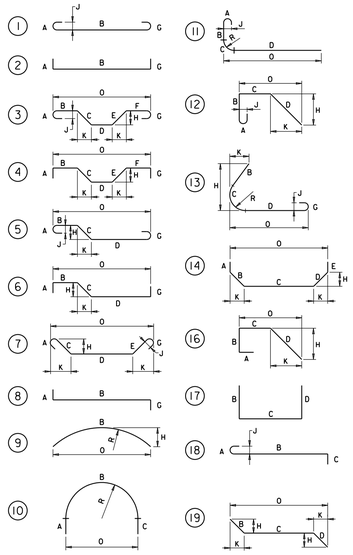
SHEET NO. 75 OF 90

STRUCTURE INVENTORY NO. 03192XO

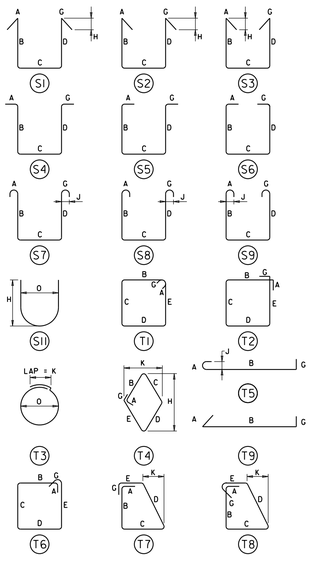
SURVEY BOOK NO.

BY: Scott.Grey

ACI TYPICAL BAR BENDS



STANDARD PIN BENDING



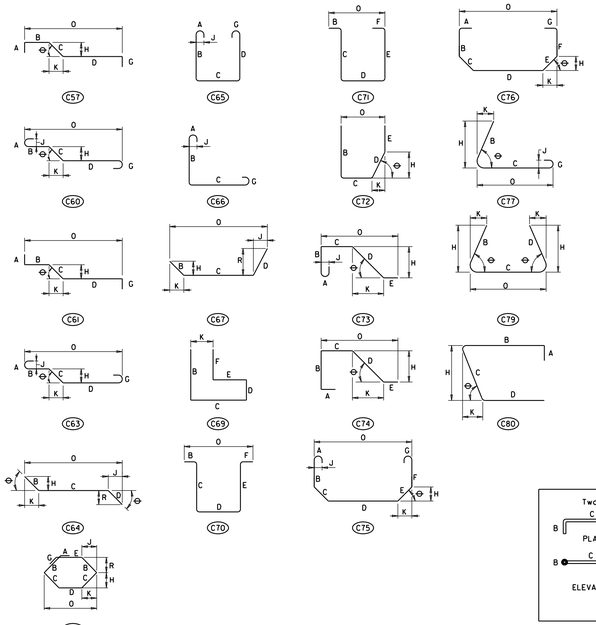
NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

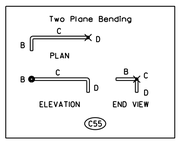
TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

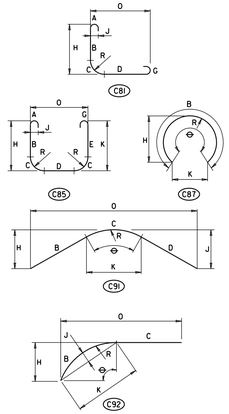
TIES AND STIRRUPS

SHA TYPICAL BAR BENDS

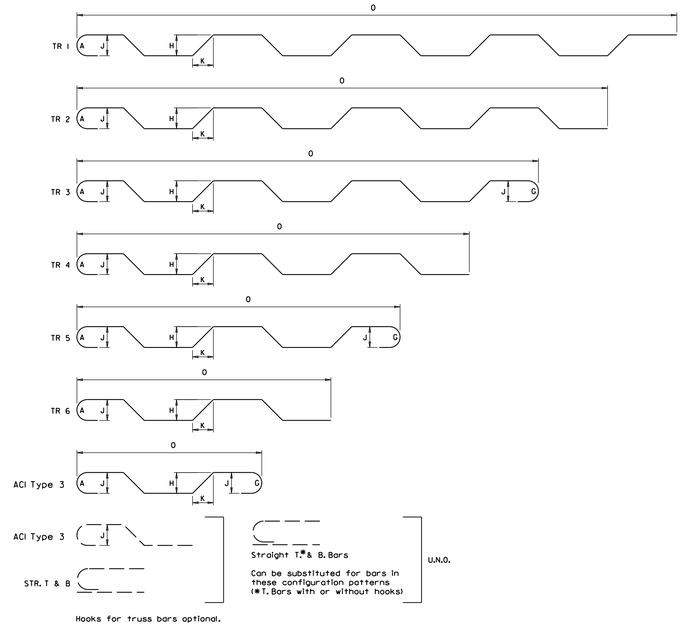


STANDARD PIN BENDING

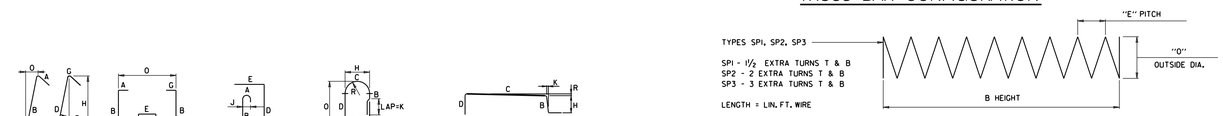




RADIUS BENDING

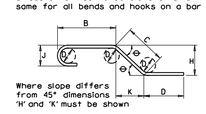


TRUSS BAR CONFIGURATION



SPIRAL

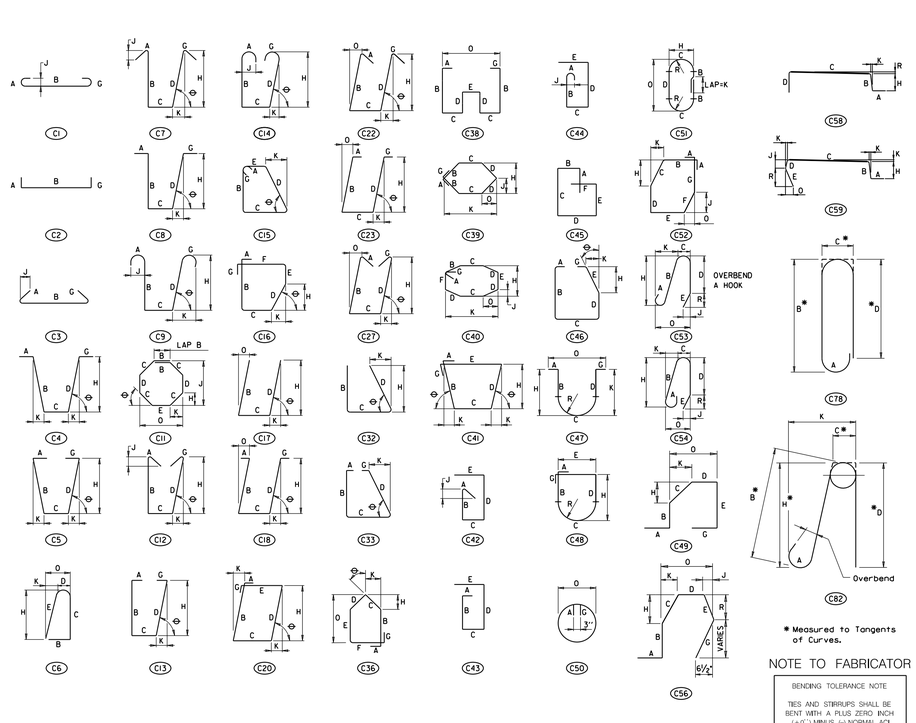
Unless otherwise noted diameter D is the same for all bends and hooks on a bar



ENLARGED VIEW SHOWING BAR BENDING DETAILS

Notes:
1. All dimensions are out to out of bar or to tangent points for 135° and 180° hooks.
2. 'J' dimensions on 180° hooks to be shown only where necessary to restrict hook size. Otherwise standard hooks are to be used.
3. Where 'J' is not shown, 'J' will be kept equal to or less than 'H' on truss bars. Where 'J' can exceed 'H' it should be shown.
4. 'H' dimension on stirrups to be shown where necessary to fit within concrete.
5. Where bars are to be bent more accurately than standard bending tolerances, bending dimensions which require closer fabrication should have limits indicated.

GENERAL NOTES



TIES AND STIRRUPS

* Measured to Tangents of Curves.

NOTE TO FABRICATOR

BENDING TOLERANCE NOTE

TIES AND STIRRUPS SHALL BE BENT WITH A PLUS ZERO INCH (+0") MINUS (-) NORMAL ACI BENDING TOLERANCES

REVISIONS

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION

REPLACEMENT OF SMALL STRUCTURE NO. 03192X0 SINGLE 36" x 48" REINFORCED CONCRETE BOX ON MD 146 (DULANEY VALLEY ROAD) OVER DRAINAGE DITCH

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DRAWING NO. S3-17 OF 19

SHEET NO. 76 OF 90

BY: Scott.Grey –

PLOTTED: Tuesday, November 05, 2019 AT 10:29 AM

STRUCTURE INVENTORY NO. 03192XO

SURVEY BOOK NO.

PLOTTED: Tuesday, November 05, 2019 AT 10:29 AM
FILE: M:\2010\23100466.29\Drawings\03192XOs03.dgn