Footing Design Calculations
for
9'-0" Span x 4'-8" Rise
Contech Aluminum
Box Structure
At

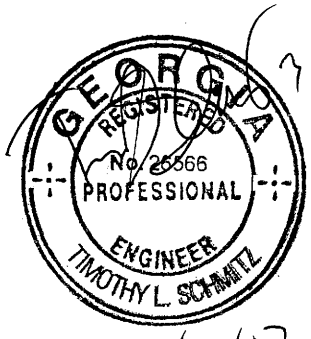
12th Street Culvert
Replacement

Spalding County
Georgia

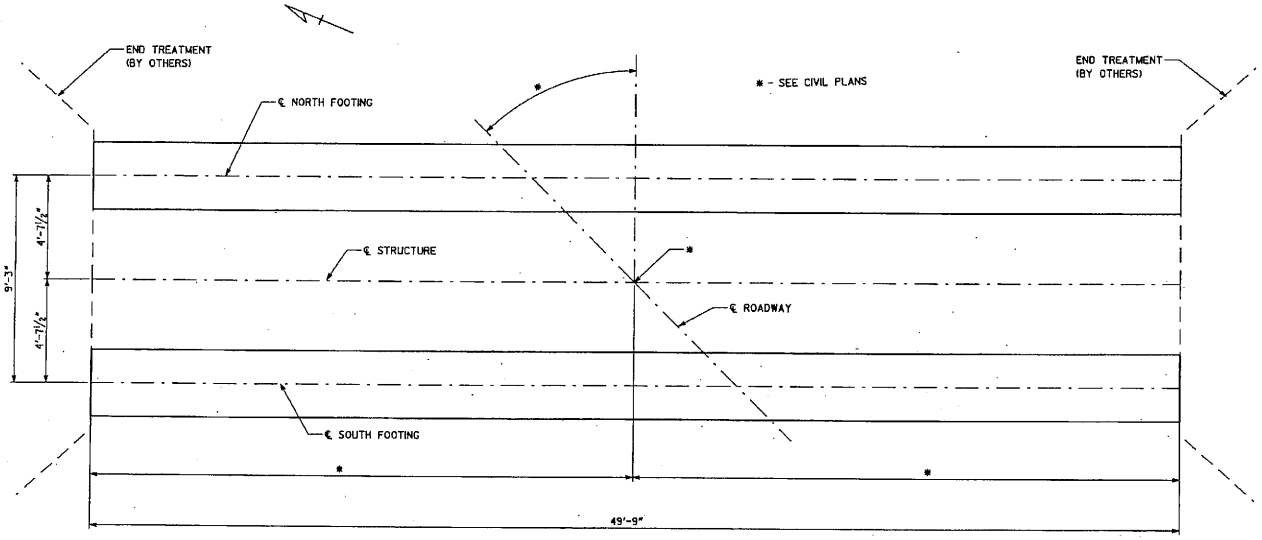
June 12, 2017

Submitted by:
Contech Engineered Solutions, LLC
1480 General Arts Road, NW.
Conyers, GA 30012

By:
Structural Engineering Solutions, LLC
3260 Isoline Way
Smyrna, GA 30080



6/12/17

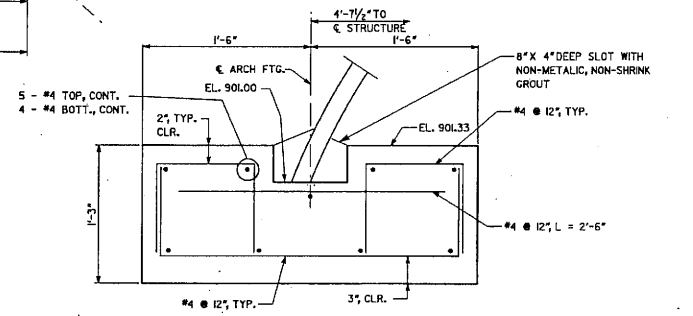


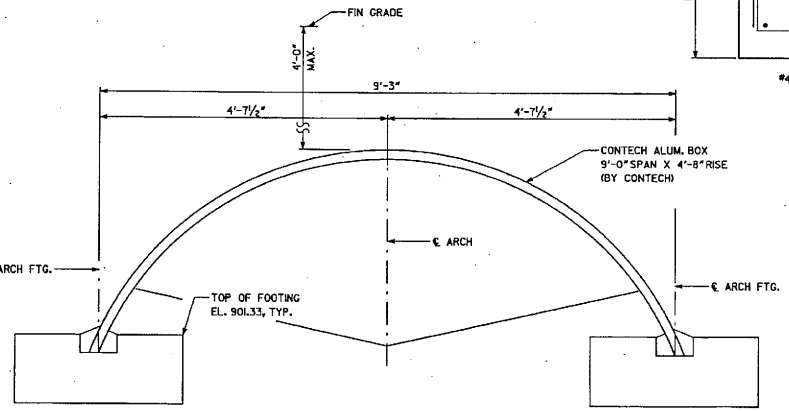
PLAN

OWNER/OWNER'S REPRESENTATIVE AND CIVIL/SITE ENGINEER SHALL VERIFY ALL GEOMETRY AND ELEVATION INCLUDING TOP OF FOOTING ELEVATIONS, PRIOR TO BEGINNING WORK. IF TOP OF FOOTING ELEVATION VARIES FROM THAT SHOWN ON THIS DRAWING, THE ENGINEER OF RECORD SHALL BE CONTACTED FOR A REVISION.

DESIGN DATA

CONCRETE	GDOT, CLASS "A" - f'_c = 3000 PSI
REINFORCING STEEL	ASTM A615, GRADE 60 - f_s = 60,000 PSI
COHESION	0 PSF
ANGLE OF INTERNAL FRICTION	28°
UNIT WEIGHT	120 PCF
SPECIFICATIONS	AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, 17TH EDITION
ALLOWABLE BEARING PRESSURE	3000 PSF
DEAD LOADS	4'-0" MAX COVER
LIVE LOADS	HS20-44





NOTES:

1. CONCRETE SHALL BE GEORGIA DOT, CLASS A, f'_c = 3000 PSI.
2. ALL REINFORCING STEEL SHALL BE ASTM A615, GRADE 60, f_s = 60,000 PSI.
3. FOR ALL HORIZONTAL GEOMETRY, SEE CIVIL/SITE PLANS.
4. ALL MATERIALS SHALL BE HANDLED, STORED AND PLACED PER GEORGIA DOT STANDARD SPECIFICATIONS, 2013 EDITION.
5. DO NOT SCALE DRAWINGS.
6. MINIMUM LAP: 75 X BAR DIAMETER.
7. UNLESS NOTED OTHERWISE, ALL WORK AND MATERIAL SHALL MEET GEORGIA DEPARTMENT OF TRANSPORTATION, STANDARD SPECIFICATIONS, 2013 EDITION.
8. ALL CIVIL, SITE AND HYDRAULIC DESIGN BY OTHERS.
9. PROVIDE SCOUR PROTECTION AS REQUIRED BY SCOUR ANALYSIS (BY OTHERS).
10. MAINTAIN 3" CLEAR ON ALL REINFORCING PLACED AGAINST EARTH. MAINTAIN 2" CLEARANCE ON ALL OTHER REINFORCING.
11. PRIOR TO PLACING REINFORCING, MINIMUM ALLOWABLE BEARING SHALL BE VERIFIED BY A REGISTERED PROFESSIONAL IN THE STATE OF GEORGIA.
12. MINIMUM ALLOWABLE BEARING SHALL BE 3000 PSF.

TYPICAL SECTION SPREAD FOOTING

NOT TO SCALE

IF REQUIRED, EXCAVATE AND BACKFILL AS DIRECTED BY GEOTECHNICAL (CIVIL) ENGINEER, REGISTERED IN THE STATE OF GEORGIA, TO ACHEIVE 3000 PSF MINIMUM ALLOWABLE BEARING.

NOT TO SCALE

GEORGIA REGISTERED No. 26566 PROFESSIONAL ENGINEER TIMOTHY L. SCHMATZ

10/12/17

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

FOR: CONTECH ENGINEERED SOLUTIONS, LLC
1480 GENERAL ARTS ROAD, N.W.
CONYERS, GA. 30012
678-662-9331

	NAME	DATE		NAME	DATE
DESIGNED BY	T. SCHMATZ	6/12/2017	DRAWN BY		
CHECKED BY			CHECKED BY		
SUPERVISED BY	TIM SCHMATZ, P.E.				

BY: STRUCTURAL ENGINEERING SOLUTIONS, LLC
TRANSPORTATION AND CONSTRUCTION STRUCTURAL ENGINEER
3260 Isoline Way, Smyrna, Georgia 30080
P: 404-664-4383 F: 678-298-1823 Tim@StrEngSolutions.com

FOOTING PLAN, ELEVATION AND TYPICAL SECTION
FOR 9'-0" X 4'-8" RISE ALUMINUM BOX STRUCTURE
12TH ST. CULVERT REPLACEMENT, SPALDING COUNTY, GEORGIA

PROJECT NO. 10031.12
DRAWING NO. 1/ 1

Filename: N:\S-Projects\009 - Contech\12 - 12th St\12thST-062201.dgn
Date: 6/12/2017 Time: 10:35:29 AM
User Name: TLS

STRUCTURAL ENGINEERING SOLUTIONS, LLC
A TRANSPORTATION AND CONSTRUCTION STRUCTURAL ENGINEER

SHEET _____ OF _____
PROJECT NO. _____ DATE _____
PROJECT _____
DES TJS CHK

SUBJECT: 12FT ST ALUM BOX

ARCH = 9' SPAN x 4'-0" RISE
ALUMIN. BOX

℄ ROADWAY ELEV. 903.78
TOP FTG -901.00
STRUCTURE - 4.67
3.11 => USE 4FT HT. OF COVER

STRUCTURAL ENGINEERING SOLUTIONS, LLC

Project	12 St - Spalding County	Computed	tls	Date	6/9/2017
Subject	Alum Box Culvert	Checked		Date	
Task	20' x 6.33' with 3' cover	Sheet		Of	

BOX CULVERT FOOTING DESIGN

GIVEN:

Span	9.0	ft	
Rise	4.67	ft	3.665826 <-- AASHTO 12.8.4.4 17th edi
Max Cover	4.0	ft	
Arch Area	35.0	ft^2	
Angle	5.0	deg	
Unit Wt	120.0	pcf - soil	
Max All Bearing =	3.0	ksf	

Pu = DL + LL

C = 3.7 klf

Shear Check

b=	12	in	
Key =	4	in	
d =	8	in	
f'c =	3000	psi	
phi*Vc =	8939	lbs	
Vu =	2383	lbs	**OK**

Ring Compression:

C =	3.7	klf
Vertical =	3.7	klf
Horizontal =	0.3	klf

Footing

Self Wt Arch = 0.3 klf

C total = C + self weight of plate arch

Ctotal =	4.0	klf	
Footing Width =	1.3	ft	Min 3 feet wide
Use W =	3.00	ft	
Ftg Thickness =	1.25	ft	
Footing Weight =	0.56	klf	
Eccentricity	0.0	ft	
Weight of Fill	0.8	klf	
			0.589847
Total Load	5.3	klf	
F act =	1.77	ksf	
Bending =	P/8 * (L/2)		
	2.0	kf/f	
Use =	2.0	kf/f	
Mu =	2.6	kf/f	

Sliding Check

Angle of inclination	5.0	degrees	
Coefficient of friction	0.4		
Angle of int friction	30	degrees	
Horiz Comp of C	0.3	klf	
Vert Comp of C	4.0	klf	
Weight of Fill	0.8	klf	
Weight of Footing	0.6	klf	
K_p	3.0		
Slip Force	0.3	klf	
Factored Slip Force	0.5	klf	(1.5 factor)
Soil Resistance (passive)	2.1	klf	
Frictional Resistance	2.1	klf	
Total Resistance	4.2	klf	

Footing OK ? ====> OK

Use 4 @ 12.0 inches TRANS

#4 @ 13.3 in Long Reinforcing

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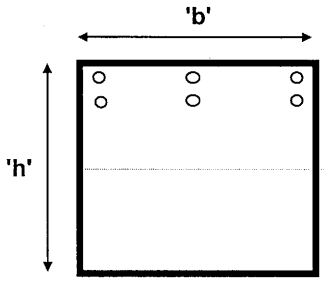
Concrete Design of a Plate Arch Strip Footing

SPREADSHEET ASSUMPTIONS & LIMITATIONS

1. Reinforced concrete design in accordance with AASHTO 1996.
2. No more than three (3) rows of steel with equal amounts of steel in each row can be used.
3. Spreadsheet currently does not handle torsion, minor axis bending, side steel, or shear friction.

INPUT PARAMETERS

SECTION & MATERIAL PROPERTIES:



	Shear Critical Section		*Flexure Critical Section*	
Dim 'b'	12	in	12	in
Dim 'h'	15	in	15	in

Distance from tension face to center of Layer #1	3.50	in
Distance from center of layer #1 to center of layer #2	0.00	in
Distance from center of layer #2 to center of layer #3		in

Concrete :	f'_c =	3000	psi
Rebar :	f_y =	60	ksi

FLEXURAL REINFORCEMENT:

Flexural Bar Size, #	4	=====>	*0.2*	in²/ bar	*0.50 in*	diameter
No. of flexural bars	1.0		1	<== # of bars required by flexural anaylsis		
1 or 2 rows?	1					
Are bars bundled? (YES/NO)	no					

SHEAR REINFORCEMENT:

N/A

Stirrup Bar Size, #	5	=====>	*0.31*	in²/ bar	*0.63 in*	diameter
No. of legs	2	<=====	*18.00 in*	spacing required by shear anaylsis		

MOMENT & SHEAR:

About Neutral Axis

Factored Moment, Mu=	3.34	kip-ft
Factored Shear, Vu=	1	kips
Service Moment, Ms=	2.00	kip-ft

Job No.	#REF!	No.

4

Project	12 St - Spalding County	Computed	tls	Date	6/9/2017
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FLEXURAL DESIGN **AASHTO 8.16.3**

$M_u <= \phi M_n$ M_u= 3 kip-ft

Solve for required amount of flexural reinforcement.

Assuming 1 row(s) with no bundled bars, and for b = 12 inches and h = 15 inches

let d = 15 inches less 3.5 inches clear to upper layer

let d = 12 in

AASHTO 8.17.1 requires the reinforcement provided be adequate to develop a moment at least 1.2 × the cracking moment. This requirement is waived if the reinforcement provided at a section is at least one-third greater than that required by analysis, based on Load Combinations.

$1.2 M_{cr} = 1.2 \times 7.5 \sqrt{f'_c} \times (bh^3 / 12) / (h / 2)$
= 18 Kip-ft

$\phi M_n = \phi A_s f_y (d - a / 2)$, Ø = 0.90
= 3.34 kip-ft

using the quadratic equation, $[-b \pm \sqrt{(b^2 - 4ac)}] / 2a$, solve for A_s :

$1.2M_{cr} = \phi A_s f_y (d - a / 2)$, where ϕ = 0.90
a = 52.9E+3 A_s^2
b = -621.0E+3 A_s
c = 221.8E+3 kip-in
reinforcement, A_s = 0.37 in²

$\phi M_n = \phi A_s f_y (d - a / 2)$, where ϕ = 0.90
a = 52.9E+3 A_s^2
b = -621.0E+3 A_s
c = 40.1E+3 in - k
reinforcement, A_s = 0.06 in²

the required minimum amount of steel reinforcement is **0.09** in² (Using 1.33 Design Moment)

the amount of steel reinforcement provided is 0.20 in²

A_s provided >= A_s required, therefore **OK**

Verify Moment Capacity for A_s provided

$\phi M_n = \phi A_s f_y (d - a / 2)$, where ϕ = 0.90

$a = \frac{Asfy}{0.85F'cb}$ =0.39 in

ϕM_n = 10 kip-ft

ϕM_n >= Mu, therefore **OK**

Balanced Reinforcement Ratio **AASHTO 8.16.3.2.2**

$\rho_b = \frac{0.85 b_1 f'c}{fy} \frac{(87000)}{(87000 + fy)}$ = 0.0214 b_1= 0.85 for 4000 psi concrete

Provided Reinforcement Ratio $\rho_{provided}$= 0.0014 <= 0.0160 = 0.75 ρ_b **OK**

Job No.	#REF!	No.

5

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FLEXURAL DESIGN (continued) **AASHTO 8.16.3**

Distribution of Flexural Reinforcement **AASHTO 8.16.8.4**

For 1 - #4 bars in 1 row(s) with no bundled bars, reinforcement, A_s = 0.20 in²

f_s= stress in reinforcement at service load, ksi

$$f_s = \frac{z}{(d_c A)^{1/3}} \quad <= 0.6fy \qquad z <= 130 \text{ kips/in for severe exposure}$$

M_s= service load moment = 2 kip-ft

E_c= 3122 ksi E_s= 29000 ksi

$$\text{Modular Ratio, } n = \frac{E_s}{E_c} = 9.29$$

$$m = \frac{n\,As}{bd} = 0.0135$$

$$k = (m^2 + 2m)^{1/2} - m = 0.151$$

$$j = 1 - 1/3\,k = 0.949667$$

$$f_s = \frac{M_s}{A_s\ j\ d} = 10.99 \text{ ksi} <= 0.6fy = 36.00 \text{ ksi}$$

d_c= distance measured from extreme tension fiber to centroid of closest bar.

d_c= 2.25 in, For calculation purposes, cover shall be taken as less than 2"

A= effective tension area, in square inches, of concrete surrounding the flexural tension reinforcement and having the same centroid as that reinforcement, divided by the number of bars.

$$A = \frac{\text{Area}}{\text{No. of bars}}$$ For calculation purposes, cover shall be taken as less than 2"

$$A = \frac{54}{1 \text{ bars}} \text{ in}^2 = 54.00 \text{ in}^2$$

$z = f_s (d_c A)^{1/3}$ = 54.3 Note: The quantity 'z' is less than the allowable value of 170 kip/in

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SHEAR DESIGN **AASHTO 8.16.6**

$V_u <= \phi V_n$ ϕ=0.85 $V_n = V_c + V_s$ V_u= 1.0 kips

Solve for required amount of shear strength, Vs

Assuming 1 row(s) with no bundled bars, and bw = 12 inches and h = 15 inches.

let d =15 inches less 3.5 inches to upper layer

let d = 11.5 in

V_c = 2 sqrt (f'c) b_w d = 15.1 kips

$V_s = \frac{Vu - fVc}{f}$ <= 8 sqrt (f'c 60.5 kips

V_s= 0.0 kips <= 8 sqrt (f'c) bw d **OK**

Shear strength Vs is less than 4 sqrt(f'c) bw d, spacing shall not exceed maximum spacing shown below.

Solve for required stirrup spacing

A_v= area of shear reinforcement within a distance 's'.

A_v= 0.62 assuming 2 legs #5 stirrups

$s = \frac{Av\ fy\ d}{Vs}$ = 18 inch spacing

Therefore, use 2 legs #5 stirrups at 18 inch spacing

Minimum of shear reinforcement **AASHTO 8.1.2**

A_v min= $\frac{50\ b_w\ s}{fy}$ = 0.18 sq. in **OK**

N/A

Maximum Spacing of shear reinforcement **AASHTO 8.19.3**

Maximum spacing = 5.75 in **NG**

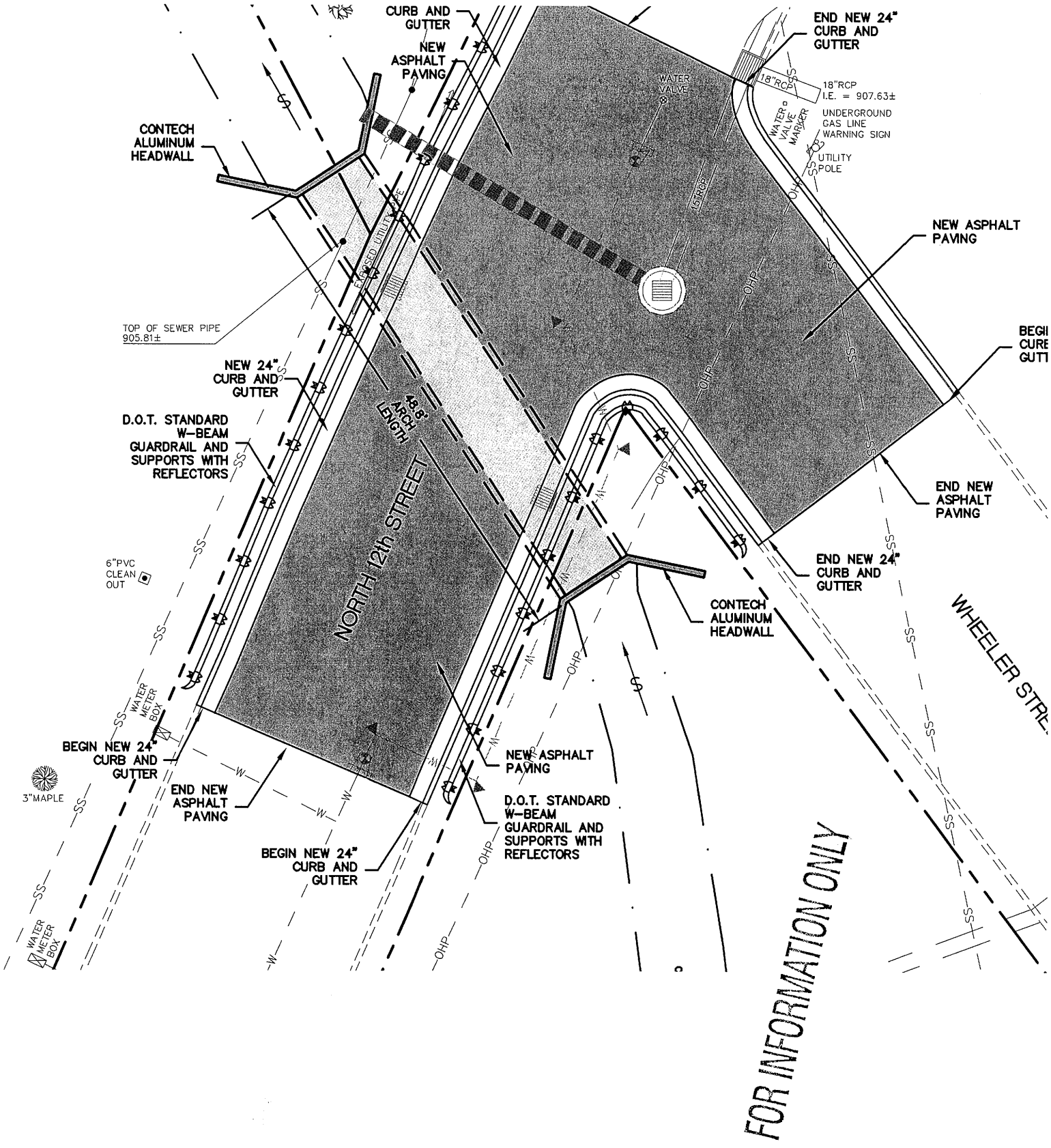
N/A

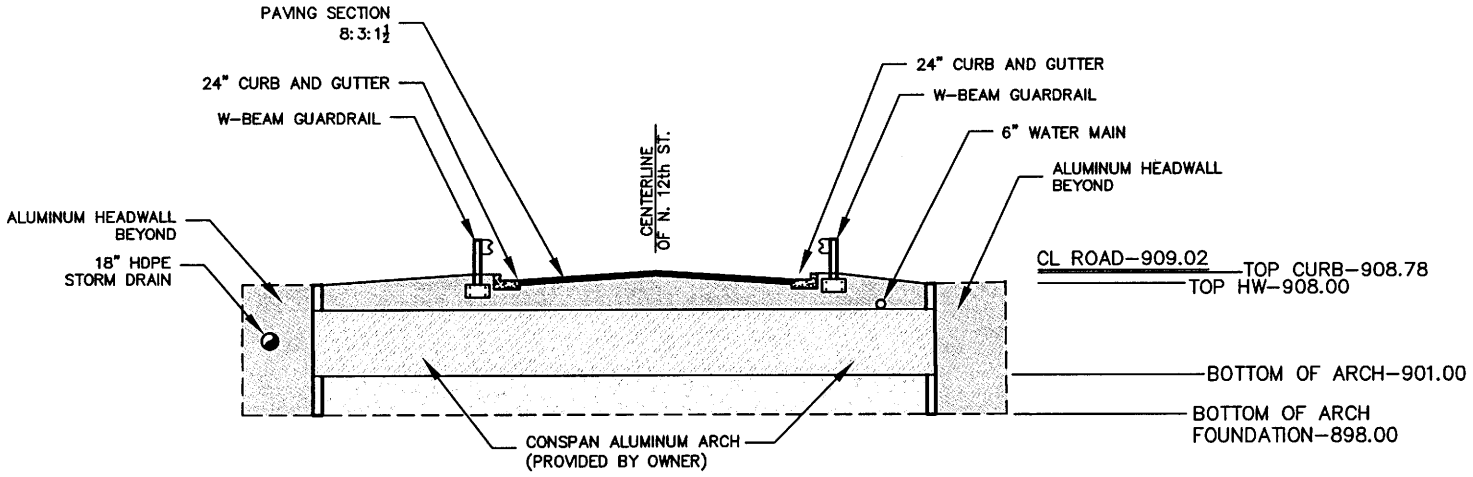
Verify Shear Capacity, Vu

V_c= 15.1 kips V_s= 23.8 kips $V_n = V_c + V_s$ = 38.9 kips

ϕV_n= 33.1 kips >= 1.0 kips = V_u **OK**

A1


CURB AND GUTTER
NEW ASPHALT PAVING
CONTECH ALUMINUM HEADWALL
TOP OF SEWER PIPE 905.81±
NEW 24" CURB AND GUTTER
D.O.T. STANDARD W-BEAM GUARDRAIL AND SUPPORTS WITH REFLECTORS
6"PVC CLEAN OUT
WATER METER BOX
BEGIN NEW 24" CURB AND GUTTER
END NEW ASPHALT PAVING
3"MAPLE
WATER METER BOX
BEGIN NEW 24" CURB AND GUTTER
D.O.T. STANDARD W-BEAM GUARDRAIL AND SUPPORTS WITH REFLECTORS
NEW ASPHALT PAVING
CONTECH ALUMINUM HEADWALL
END NEW 24" CURB AND GUTTER
END NEW ASPHALT PAVING
NEW ASPHALT PAVING
END NEW 24" CURB AND GUTTER
18"RCP
18"RCP I.E. = 907.63±
WATER VALVE MARKER
UNDERGROUND GAS LINE WARNING SIGN
UTILITY POLE
WATER VALVE
EXPOSED UTILITY PIPE
48.6' ARCH LENGTH
NORTH 12th STREET
WHEELER STRE
FOR INFORMATION ONLY

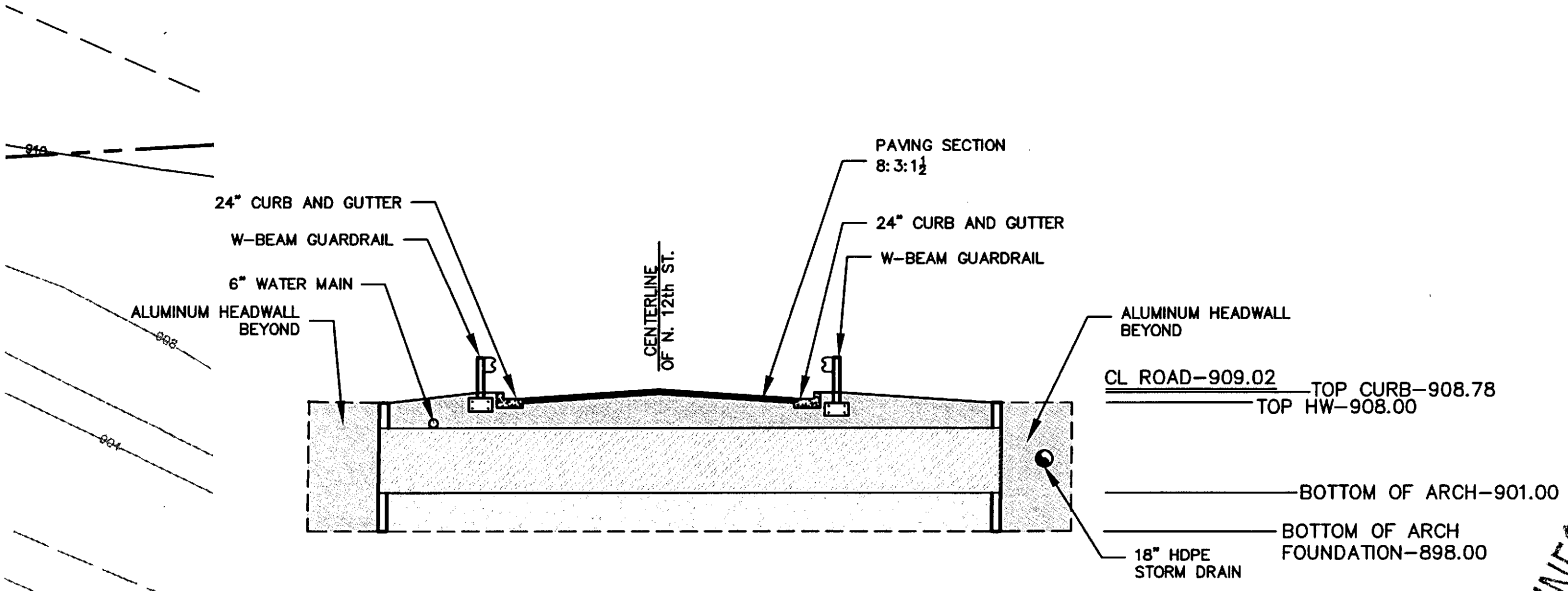


EP 910.39

CULVERT SECTION VIEW "A"

SCALE: 1" = 10'

FOR INFORMATION ONLY

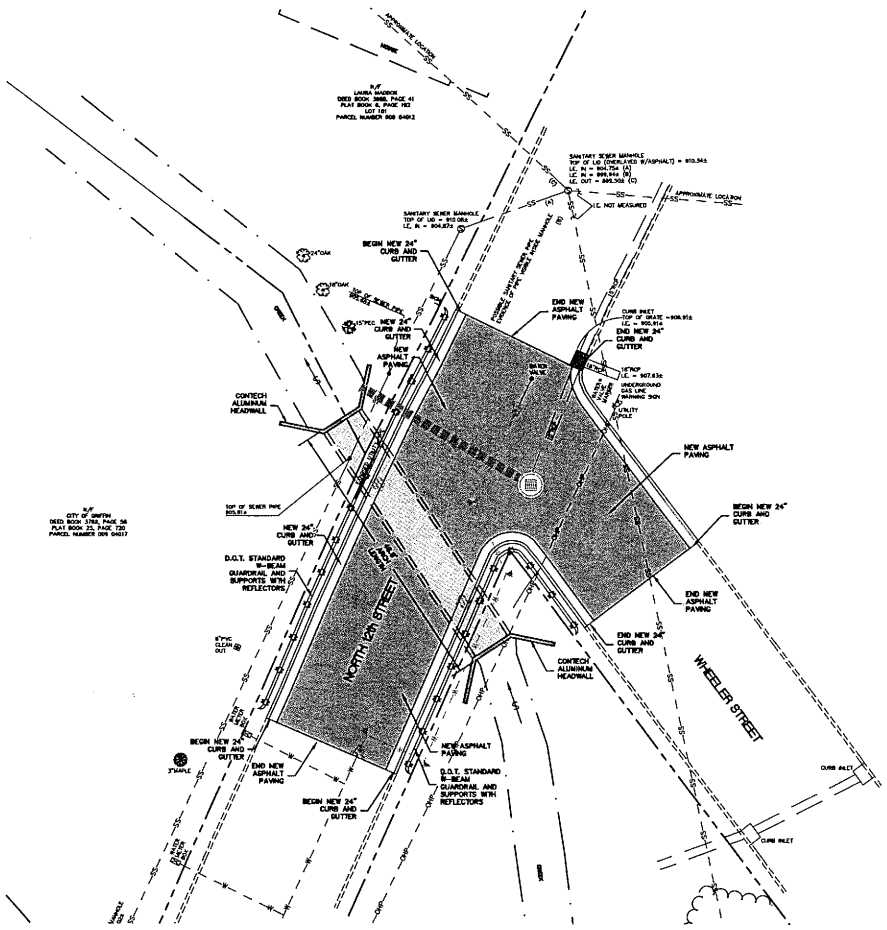


FOR INFORMATION ONLY

CULVERT SECTION VIEW "B"

SCALE: 1" = 10'

12



SITE DEVELOPMENT PLAN

GRAPHIC SCALE

(IN FEET)
1 inch = 30 ft.

GENERAL NOTES

1. CONTRACTOR IS TO COMPLY WITH ALL LOCAL BUILDING CODES AND REGULATIONS WHICH ARE PRESENTLY IN EFFECT.
2. THE CONTRACTOR IS SPECIFICALLY CAUTIONED ABOUT THE LOCATION AND/OR ELEVATIONS OF EXISTING UTILITIES SHOWN ON THIS DRAWING. THEY ARE BASED UPON RECORDS FROM VARIOUS UTILITY COMPANIES, DEEDS AND PLATS OF RECORD, AND WHERE POSSIBLE, ACTUAL FIELD MEASUREMENTS. THIS INFORMATION IS NOT TO BE TAKEN AS EXACT NOR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 24 HOURS PRIOR TO ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF RESPECTIVE UTILITIES. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO FIELD VERIFY THE EXACT LOCATION OF EXISTING UTILITIES WHICH MAY CONFLICT WITH PROPOSED IMPROVEMENTS. UPC# 1-800-282-7411
3. CONTRACTOR SHALL ASSURE THAT ALL FINAL INSPECTIONS ARE MADE.
4. A COPY OF THE APPROVED CONSTRUCTION PLANS SHALL BE KEPT ON THE JOB SITE AT ALL TIMES THAT CONSTRUCTION IS UNDER WAY.
5. IT IS THE DEVELOPER'S RESPONSIBILITY TO COMPLY WITH ALL STATE AND FEDERAL LAWS AND REGULATIONS THAT APPLY TO THE PROJECT.
6. IT IS THE RESPONSIBILITY OF THE DEVELOPER TO ACQUIRE ANY OFFSITE EASEMENTS BEFORE CONSTRUCTION BEGINS. PERMIT ISSUANCE SHALL OCCUR AFTER ALL OFF-SITE EASEMENTS ARE OBTAINED. ANY OFF-SITE EASEMENTS FOR PUBLIC AND UTILITIES USE SHALL BE OBTAINED IN THE NAME OF THE CITY OF GRIFFIN.
7. GRADING SHALL COMPLETED TO SUBGRADE ELEVATION. IT SHOULD BE NOTED THAT FINISH WITH SURFACE GRADES ARE SHOWN ON THIS PLAN, AND THE CONTRACTOR SHALL MAKE ALLOWANCES FOR PAVEMENT, STONE, AND SLAB THICKNESSES.
8. ALL FINISHED GRADING AND PAVING SHALL HAVE POSITIVE DRAINAGE.
9. ALL PERIMETER SEDIMENT BARRIERS, BARRIERS AT CLEARING LIMITS SHALL BE CONSTRUCTED PRIOR TO ISSUANCE OF GRADING PERMIT.
10. THE REMAINING EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO OR CONCURRENT WITH LAND DISTURBING ACTIVITIES.
11. EROSION AND SEDIMENTATION CONTROL MEASURES WILL BE MAINTAINED AT ALL TIMES. ADDITIONAL EROSION AND SEDIMENTATION CONTROL MEASURES AND PRACTICES WILL BE INSTALLED IF DEEMED NECESSARY BY ONSITE INSPECTION.
12. THE DISTURBED AREA AND THE DURATION OF EXPOSURE TO EROSIVE ELEMENTS SHALL BE KEPT TO A PRACTICABLE MINIMUM. TEMPORARY VEGETATION OR MULCHING SHALL BE EMPLOYED TO PROTECT EXPOSED CRITICAL AREAS DURING CONSTRUCTION.
13. PERMANENT VEGETATION SHALL BE ESTABLISHED AS SOON AS PRACTICABLE.
14. ALL CONSTRUCTION SHALL COMPLY WITH THE MANUAL FOR EROSION AND SEDIMENT CONTROL IN GEORGIA, LATEST EDITION.
15. MAINTENANCE OF ALL SOIL EROSION AND SEDIMENTATION CONTROL PRACTICES, WHETHER TEMPORARY OR PERMANENT, SHALL BE AT ALL TIMES THE RESPONSIBILITY OF THE PROPERTY OWNER.

SITE NARRATIVE

1. BOUNDARY AND TOPOGRAPHICAL DATA TAKEN FROM INFORMATION PREPARED BY S.L.COLWELL AND ASSOCIATES 265 CRAWFORD ROAD, BARNESVILLE, GEORGIA 30204
2. PROPERTY LOCATED IN LAND LOT 129 OF THE 3rd DISTRICT, SPALDING COUNTY, GEORGIA.
3. PROPERTY OWNER: CITY OF GRIFFIN
   CONTACT: CHRIS WALKER
   SITE ZONED: N/A
   SITE USAGE: DRAINAGE CULVERT
   BUILDING SETBACKS: N/A
7. ALL CONSTRUCTION SHALL CONFORM TO THE CITY OF GRIFFIN STANDARD SPECIFICATIONS AND REGULATIONS.
8. PERSONS USING THIS DRAWING SHOULD CONTACT LOCAL UTILITY COMPANIES & MUNICIPALITIES FOR EXACT LOCATIONS OF UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION.
10. DO NOT SCALE THIS DRAWING AS IT IS A REPRODUCTION AND SUBJECT TO DISTORTION.
11. OWNER/DEVELOPER CONTACT: CHRIS WALKER
    (770) 229-4603
    100 SOUTH HILL STREET
    GRIFFIN, GEORGIA 30224

PARAGON CONSULTING GROUP
118 n. expressway griffin, georgia 30223
phone (770) 412-7700 fax (770) 412-7744

CONSTRUCTION PLANS FOR

12th STREET CULVERT REPLACEMENT

LOCATED IN LAND LOT 129 OF THE 3rd DISTRICT, SPALDING COUNTY

SHEET: SITE PLAN

PE #: PEF004167

GEORGIA REGISTERED PROFESSIONAL ENGINEER CHARLES N. PENN

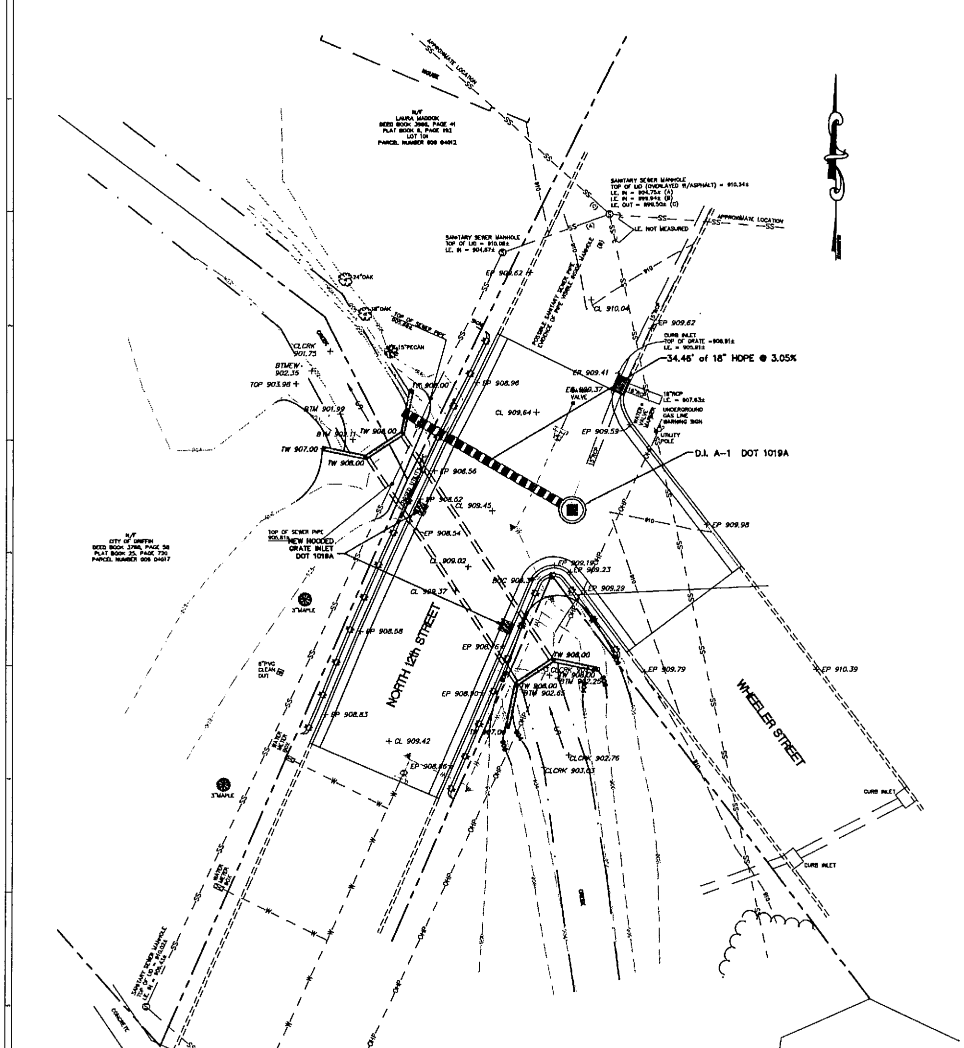
GSWCC LEVEL II CERT. # 0000010472

Project No.	Issue Date:
16054.00	JUNE 2017
Drawn By: DMG	Checked By: CNP

3
SHEET 3 OF 15

No.	Revisions:	Date

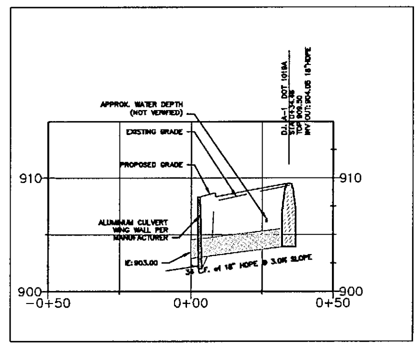
FOR INFORMATION ONLY



SITE GRADING PLAN

GRAPHIC SCALE

(IN FEET)
1 inch = 10 ft.



STORM DRAIN LINE 'A'
HORIZONTAL SCALE 1"=20'
VERTICAL SCALE 1"=5'

BRIDGE PLAN VIEW

SCALE: 1" = 10'

STORM DRAINAGE NOTES

1. ALL STORM DRAINAGE PIPE SHOWN HEREON SHALL BE HIGH DENSITY POLYETHYLENE PIPE.
2. ALL PIPE CONNECTIONS AT C.B.'S, J.B.'S, ETC. SHALL BE GROUTED ON THE OUTSIDE AND INSIDE OF THE STRUCTURES.
3. TRENCH BACKFILL MATERIAL SHALL BE FREE OF ROOTS, STUMPS, OR OTHER DEBRIS AND SHALL BE COMPACTED TO 85% STANDARD PROCTOR OR AS PER SPECIFICATIONS.
4. ALL CATCH BASINS, DROP INLETS, AND JUNCTION BOXES SHALL HAVE PAVED INVERTS. MATCHING LOWEST INVERT & SLOPING UP TO 1/4 PIPE DIA.
5. CONTRACTOR TO NOTIFY ENGINEER FOR ASSISTANCE IN LOCATING OUTFLOW HEADWALLS IF STAKED LOCATION IN THE FIELD DOES NOT ALIGN WITH NATURAL FEATURES AS INDICATED ON THE PLANS.

GRADING NOTES

1. ALL SPOT ELEVATIONS ARE TOP OF PAVEMENT UNLESS OTHERWISE NOTED.
2. ALL CONTOURS ON PAVEMENT ARE FINISHED ELEVATIONS.
3. CONTRACTOR IS RESPONSIBLE FOR NOTIFYING ALL UTILITIES BEFORE CONSTRUCTION AND VERIFYING LOCATION OF ALL UTILITIES SHOWN OR NOT SHOWN.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL OF ALL DEBRIS AS ACCEPTABLE TO THE OWNER AND ENGINEER AND IN COMPLIANCE WITH ALL FEDERAL, STATE AND LOCAL LAWS.
6. CONTRACTOR IS RESPONSIBLE FOR REPAIRS OF DAMAGE TO ANY EXISTING IMPROVEMENTS DURING CONSTRUCTION, SUCH AS, BUT NOT LIMITED TO, DRAINAGE, UTILITIES, PAVEMENT, STRIPING, CURBS, ETC. REPAIRS SHALL BE EQUAL TO OR BETTER THAN EXISTING CONDITIONS.
7. SOIL FROM FOOTINGS IS THE SITE CONTRACTOR'S RESPONSIBILITY. CONTRACTOR IS TO USE THE SOIL ON SITE OR REMOVE IT FROM PROJECT AND DISPOSE OF SOIL LEGALLY.
8. THE EARTHWORK FOR ALL BUILDING FOUNDATIONS AND SLABS SHALL BE IN ACCORDANCE WITH ARCHITECTURAL PLANS AND SPECIFICATIONS.
9. CONTRACTOR SHALL PROVIDE POSITIVE DRAINAGE AWAY FROM THE BUILDINGS.
10. SLOPES AND DISTURBED AREAS NOT COVERED BY BUILDING OR PAVEMENT SHALL BE GRADED SMOOTH AND RECEIVE 4 INCHES OF TOPSOIL. CONTRACTOR TO PROVIDE TOPSOIL IF NOT AVAILABLE ON SITE. THE AREAS SHALL BE SEEDED AND COVERED WITH MATTING AS DESIGNATED ON PLANS, FERTILIZED AND WATERED TO PROVIDE A HEARTY, MOWABLE STAND OF GRASS. SMALL ROCKS MUST BE REMOVED. ANY AREAS DISTURBED FOR ANY REASON PRIOR TO FINAL ACCEPTANCE OF THE PROJECT SHALL BE CORRECTED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
12. EARTHWORK SHALL BE ON AN UNCLASSIFIED BASIS.
13. CONTRACTOR TO NOTIFY ENGINEER IF INVERTS ON OUTLET PIPES DO NOT MATCH EXISTING ELEVATIONS AS INDICATED ON PLANS.
14. CONTRACTOR TO NOTIFY ENGINEER FOR ASSISTANCE IN LOCATING OUTFLOW HEADWALLS IF STAKED LOCATION IN THE FIELD DOES NOT ALIGN WITH NATURAL FEATURES AS INDICATED ON THE PLANS.
15. MAXIMUM SLOPES ON CUT OR FILL SECTIONS SHALL NOT EXCEED 2:1.

No.	Revisions:	Date

PARAGON
CONSULTING GROUP
118 n. expressway griffin, georgia 30223
phone (770) 412-7700 fax (770) 412-7744

CONSTRUCTION PLANS FOR

12th STREET CULVERT REPLACEMENT

LOCATED IN LANDLOT 129 OF THE 3rd DISTRICT, SPALDING COUNTY

SHEET:

GRADING PLAN

PE #: PEF004167

GEORGIA REGISTERED PROFESSIONAL ENGINEER CHARLES N. PENNY

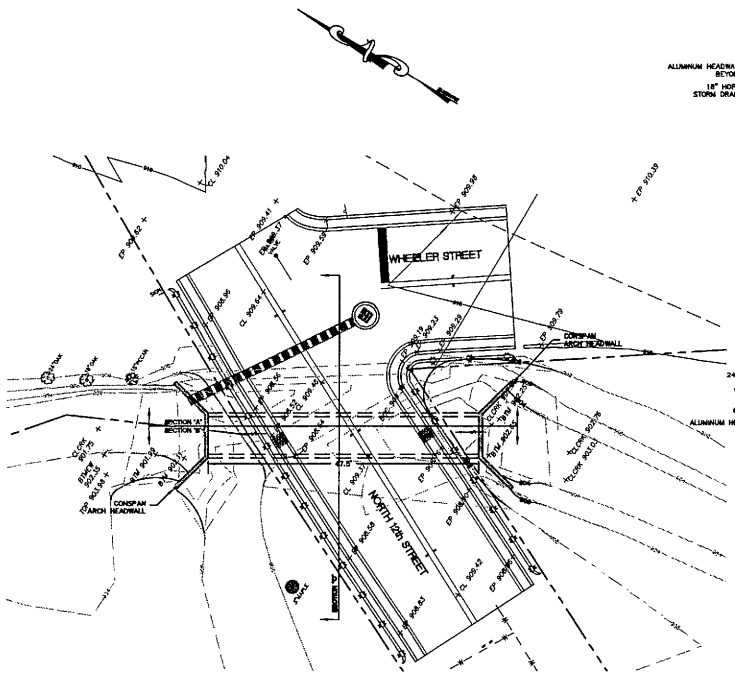
GSWCC LEVEL II CERT. # 0000010472

Project No. 16054.00	Issue Date: JUNE 2017
Drawn By: DMG	Checked By: CNP

4

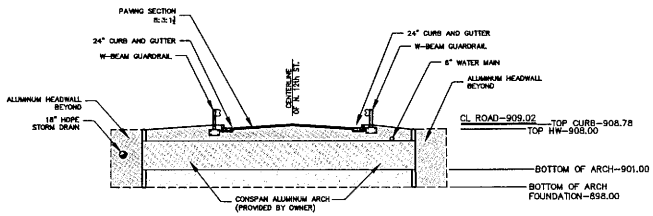
SHEET 4 OF 15

FOR INFORMATION ONLY



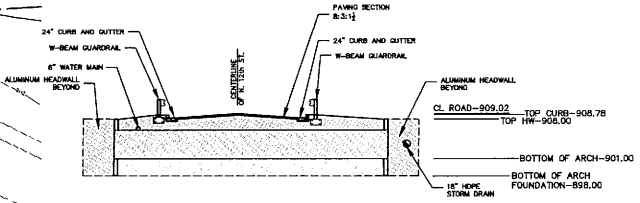
CULVERT PLAN VIEW

SCALE: 1" = 10'



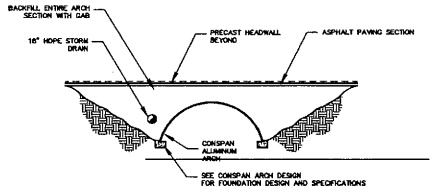
CULVERT SECTION VIEW "A"

SCALE: 1" = 10'



CULVERT SECTION VIEW "B"

SCALE: 1" = 10'



CULVERT SECTION VIEW "C"

SCALE: NTS

No.	Revisions:	Date

PARAGON CONSULTING GROUP
118 n. expressway griffin, georgia 30223
phone (770) 412-7700 fax (770) 412-7744

CONSTRUCTION PLANS FOR

12th STREET CULVERT REPLACEMENT

LOCATED IN LANDLOT 139 OF THE 3rd DISTRICT, SPALDING COUNTY

SHEET:
CULVERT SECTION PLAN

PE #: PEF004167

GEORGIA REGISTERED CHARLES N. PENNY

GSWCC LEVEL II CERT. # 0000001477

Project No.	Issue Date:
16054.00	JUNE 2017
Drawn By: DMG	Checked By: CNP

5
SHEET 5 OF 15

FOR INFORMATION ONLY

CONSTRUCTION MATERIALS SERVICES, INC.
105 Park 42 Drive Suite A; Locust Grove, GA 30248-2545
Phone: (770) 914-1744 Fax: (770) 914-0412
Email: info@cmsnatl.com

Geotechnical Engineering - Materials Testing - Asphalt Mix Design - Soil Surveys – Environmental

November 28, 2016

Mr. Charles Penny
Paragon Consulting Group
118 North Expressway
Griffin, Georgia 30223-2050

RE: Preliminary Geotechnical Subsurface Investigation
12th St. /Wheeler Rd. Culvert
CMS # 16-189

Dear Mr. Penny:

Construction Materials Services, Inc. (CMS) has completed a preliminary geotechnical study for the above subject project. All borings were located in the field by our personnel. A boring location sketch is attached which indicates the approximate location of our test borings. If needed, we recommend our boring locations be confirmed by your surveyor and placed on the final site plan. As part of this study, two (2) borings were made at the selected test locations. Rock, in the form of auger refusal, was encountered at two (2) locations at the depths drilled as indicated below:

Boring Location	Depth to Rock from Existing Surface (ft)	Attempted Depth of Boring from Surface (ft)
B-1	12.5	15.0
B-2*	6.5/ 5.0	15.0

*Two attempts made at this location

Immediate ground water table (GWT) was not measured in each boring. The ground water elevation can be expected to fluctuate with the season of the year, the surrounding ground surface conditions, subsurface conditions, and recent rainfall amounts. Thus, ground water elevations should be considered valid only for the date of observation.

Basic boring logs have been prepared and are attached which provide a visual classification of the soils encountered during this study.

Due to the shallow presence of rock at this site, we recommend that the foundation be extended to and keyed into the encountered rock formations. If you desire, we can prepare your foundation design.

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However, at this time, we recommend additional testing which will include rock coring to determine in situ rock quality. B2

If additional information, sampling, and/or testing is required, once final site plan is established and approved, please contact us.

Qualifications of Our Findings: The recommendations offered in this report are based on our interpretation of the data obtained from our investigation. It should be noted soil conditions may vary from boring to boring and in areas where borings were not made. With this in mind, we recommend site preparation and foundation construction be closely monitored. If the soil conditions deviate from those presented in this report, we will be glad to furnish any additional analysis and/or recommendations that may be needed.

This report was made to determine the geotechnical properties of the site and is not intended to serve as a wetland survey or an environmental site assessment. No effort has been made to delineate or designate any area as wetlands or an area of environmental concern or contamination. Any reference to low areas, poorly drained areas, etc. is related to geotechnical applications. Any recommendations regarding drainage and earthwork are made on the basis that such work can be permitted and performed in accordance with current laws pertaining to wetlands, storm water runoff, and environmental contamination.

If you have any questions, please contact me at (770) 914-1744.

Respectfully submitted,

Andrew Johnson, P. E.
President
Construction Materials Services, Inc.

AJ:au

Attachment

FOR INFORMATION ONLY

B3

Project No: 16-189

Project: 12th Street / Wheeler Road Culvert

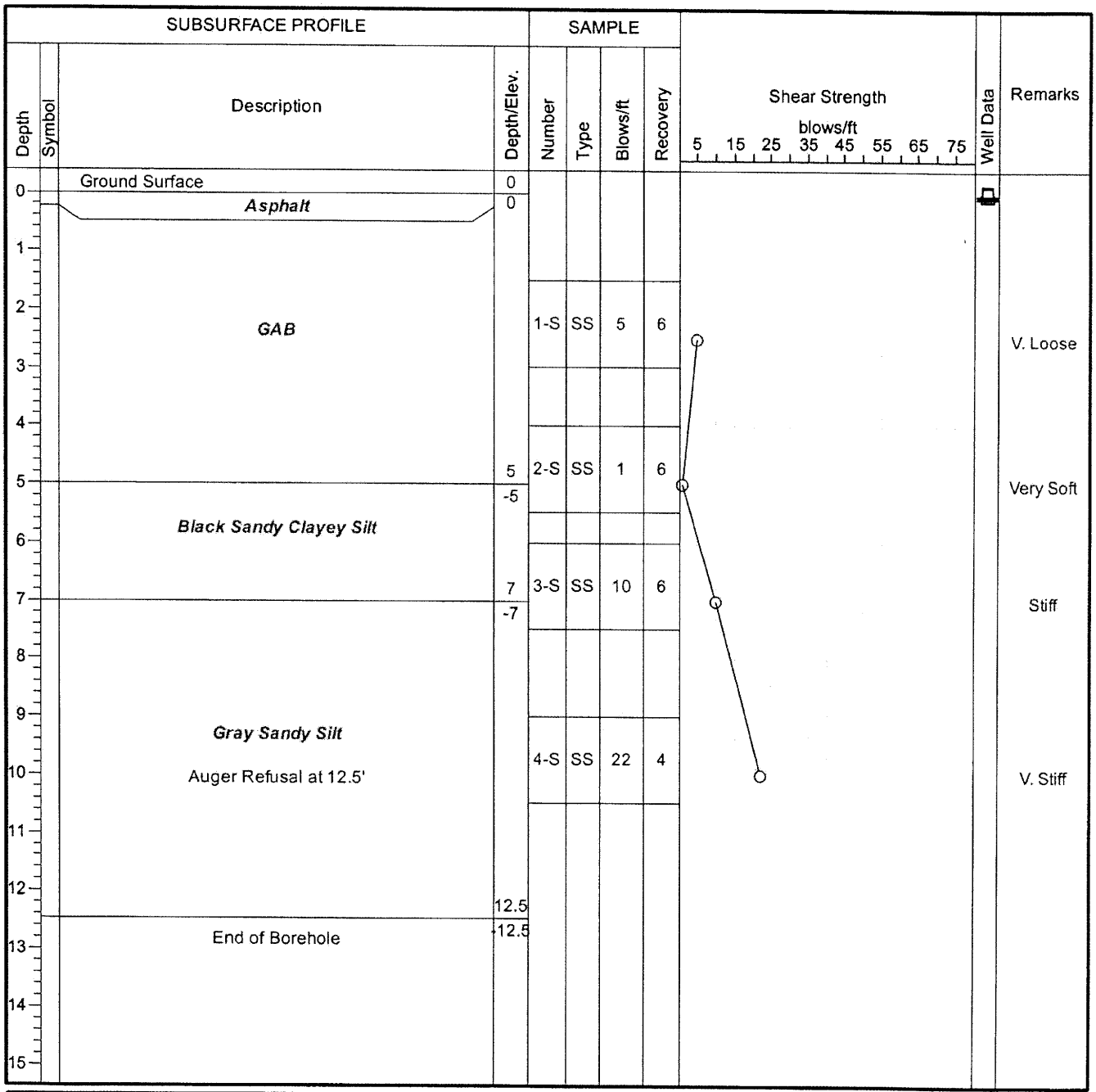
Client: Paragon Consulting

Location: Griffin, Spalding County, Georgia

Borehole #: 1 NBL (35' South of Culvert)

Enclosure:

Engineer: Andrew Johnson



FOR INFORMATION ONLY

Drilled By: PS, JP, CW

Drill Method: 4" Auger

Drill Date: 11/21/16

Construction Materials Services, Inc.
105 Park 42 Drive, Suite A
Locust Grove, GA 30248-2545

Hole Size: 4"

Datum:

Sheet: 1 of 1

B4

Project No: 16-189

Project: 12th Street / Wheeler Road Culvert

Client: Paragon Consulting

Location: Griffin, Spalding County, Georgia

Borehole #: 2 SBL (2 Attempts)

Enclosure:

Engineer: Andrew Johnson

Depth	Symbol	Description	Depth/Elev.	Number	Type	Blows/ft	Recovery	Shear Strength blows/ft (5 15 25 35 45 55 65 75)	Well Data	Remarks
0		Ground Surface	0							
		Asphalt	0							
1		*Reddish Brown Silty Clayey Sand*								
2			2.5	1-S	SS	12	10			Stiff
			-2.5							
3		*Reddish Brown and Yellow Sandy Silt*								
4		Moved 23' North of Culvert - Auger Refusal @ 6.5'								
		Moved 33' North of Culvert - Auger Refusal @ 5.0'		2-S	SS	13	10			
5		@ 5.0 - 13 Blows for 8" hammer bounced @ 8"								Hard
6		Exposed rock in bottom of stream 250' up stream.	6.5							
		End of Borehole	-6.5							
7										
8										
9										
10										

FOR INFORMATION ONLY

Drilled By: PS, JP, CW

Drill Method: 4" Auger

Drill Date: 11/21/16

Construction Materials Services, Inc.
105 Park 42 Drive, Suite A
Locust Grove, GA 30248-2545

Hole Size: 4"

Datum:

Sheet: 1 of 1