

**TRANSMITTAL NO. 00125**

**TO: CH2M Hill**  
 Attn: Betty Wood  
 Northpark 400  
 1000 Abernathy Road  
 Atlanta, GA 30328

**DATE:** 11/8/2010

**REF:** Submittals

<input checked="" type="checkbox"/> Shop Drawings	<input checked="" type="checkbox"/> Approval	<input type="checkbox"/> No Exceptions Taken
<input type="checkbox"/> Letter	<input type="checkbox"/> Your Use	<input type="checkbox"/> No Exceptions Taken w/ Comments
<input type="checkbox"/> Prints	<input type="checkbox"/> As Requested	<input type="checkbox"/> Make Corrections Noted
<input type="checkbox"/> Change Order	<input checked="" type="checkbox"/> Review and Comment	<input type="checkbox"/> Amend & Resubmit
<input type="checkbox"/> Plans		<input type="checkbox"/> Rejected
<input type="checkbox"/> Samples	<b>SENT VIA:</b>	<input type="checkbox"/> Information Only
<input type="checkbox"/> Specifications	<input checked="" type="checkbox"/> Attached	<input type="checkbox"/> No Review
<input type="checkbox"/> Other:	<input type="checkbox"/> Separate Cover Via: Mail	

No.	Copies	Date	Rev.	Status	Package	Submittal	Description
1	1	11/8/2010	002	NEW	334100AA	334100.01	Package: Storm Drain Piping Storm Drain Piping

**Remarks:**

Comment #2: Box Culvert wing wall will be cast-in-place as per contract drawings.  
 Comment #3: Stamped by registered Engineer (attached)

**CC:**

**Signed:** \_\_\_\_\_  
 Jessica Kolp

**Jacobs Engineering Group**

6801 Governors Lake Parkway  
 Building 200  
 Norcross, GA 30071  
 Phone: 678.333.0215  
 Fax: 678.333.0826

**Wyckoff WTP Improvements**

**Job No: JJ704612**  
**Package No: 334100AA**

**SUBMITTAL NO. 334100.01**

**PACKAGE TITLE:** Storm Drain Piping  
**TITLE:** Storm Drain Piping  
**FINAL STATUS:** NEW  
**BIC:** CH2M

**REQUIRED START:** 9/20/2010  
**REQUIRED FINISH:** 11/26/2010  
**DAYS HELD:** 0  
**DAYS ELAPSED:** 49  
**DAYS OVERDUE:** -18

**Spec'd Manufacturer:**

RECEIVED FROM	SENT TO	RETURNED BY	FORWARDED TO
AW J_K			AW M_M

Rev.	Description / Remarks	Sepias	Prints	Received	Due	Forwarded	Returned	Status	Elapsed	Held
000	Submitted as 334100.AA.01	0	0	9/20/2010	10/8/2010	9/28/2010	9/28/2010	R&R	8	0

Rvwr No.	Description / Remarks	Reviewer	Amt	Date Due	Forwarded	Returned	Reviewer Status	Elapsed	Held
1		CH2M - B_W		9/21/2010	9/20/2010	9/28/2010		8	0
2	Status: Revise and Resubmit. Comments attached.	ENGSTR - S_H		10/5/2010	9/28/2010	9/28/2010	R&R	8	0
3		CH2M - E_M		10/7/2010	9/28/2010	9/28/2010	R&R	8	0
4		CH2M - B_W		10/8/2010	9/28/2010	9/28/2010		8	0

Rev.	Description / Remarks	Sepias	Prints	Received	Due	Forwarded	Returned	Status	Elapsed	Held
001	Storm Drain Piping	0	0	10/28/2010	11/26/2010	11/4/2010	11/4/2010	R&R	7	0

Rvwr No.	Description / Remarks	Reviewer	Amt	Date Due	Forwarded	Returned	Reviewer Status	Elapsed	Held
1	Storm Drain Piping	AW - J_K		10/28/2010	10/28/2010	11/4/2010	APP	7	0
2	Storm Drain Piping	CH2M - B_W		10/28/2010	10/29/2010	11/4/2010		7	0
3	Comment No. 2 from the original submittal has not been addressed.	ENGSTR - S_H		11/12/2010	11/3/2010	11/4/2010	R&R	7	0
4	Is it the Contractor's intent to substitute a precast box culvert wing wall for the cast-in-place shown on the construction plans? If so, how will the pipe penetrations at the discharge end be addressed? Per the Precast Concrete Spec, Section 034000, paragraph 1.03.A.3, calculations are req'd to be stamped by registered engineer in state of Georgia.	CH2M - W_W		11/15/2010	11/3/2010	11/4/2010	R&R	7	0
5		CH2M - E_M		11/19/2010	11/3/2010	11/4/2010	R&R	7	0
6		CH2M - B_W		11/26/2010	11/4/2010	11/4/2010		7	0

**Jacobs Engineering Group**

6801 Governors Lake Parkway  
 Building 200  
 Norcross, GA 30071  
 Phone: 678.333.0215  
 Fax: 678.333.0826

**Wyckoff WTP Improvements**

**Job No: JJ704612**  
**Package No: 334100AA**

**SUBMITTAL NO. 334100.01**

**PACKAGE TITLE:** Storm Drain Piping  
**TITLE:** Storm Drain Piping  
**FINAL STATUS:** NEW  
**BIC:** CH2M

**REQUIRED START:** 9/20/2010  
**REQUIRED FINISH:** 11/26/2010  
**DAYS HELD:** 0  
**DAYS ELAPSED:** 49  
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RECEIVED FROM	SENT TO	RETURNED BY	FORWARDED TO
AW J_K			AW M_M

Rev.	Description / Remarks	Sepias	Prints	Received	Due	Forwarded	Returned	Status	Elapsed	Held
002	Storm Drain Piping	0	0	11/8/2010	11/8/2010			NEW	0	0

Rvwr No.	Description / Remarks	Reviewer	Amt	Date Due	Forwarded	Returned	Reviewer Status	Elapsed	Held
1	Storm Drain Piping Comment #2: Box Culvert wing wall will be cast-in-place as per contract drawings. Comment #3: Stamped by registered Engineer (attached)	AW - J_K		11/8/2010	11/8/2010		APP	0	0
2	Storm Drain Piping	CH2M - B_W		11/8/2010				0	0

# Submittal Cover Page

## 334100AA.01 REV 002

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Storm Drain Piping

**Archer Western Contractors**  
**11/8/2010**

**Contractor: Archer Western Contractors**

**Supplier: Thompson Grading**

**Manufacturer: Foley Products Company**

Engineer's Stamp of Approval:

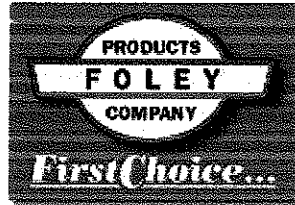
Contractor's Stamp of Approval:

Archer Western Hereby certifies that (i) Archer Western has complied with the requirements of contract documents in preparation, review, and submission of designated submittal and (ii) the submittal is complete and in accordance with the contract documents and requirements of laws and regulations and governing agencies.

By:                     Jessica Kolp                    

[The following submittal has been prepared according to 01 33 23 of the conformed documents.]

Foley Products Company  
208 Jefferson Street  
Newnan, GA 30263



FPC Winder, GA  
FPC Clanton, AL

Toll Free: 800-282-6958  
Local: 770-251-0296  
Fax: 770-254-2223

Date: November 4, 2010  
Contractor: JL Murray  
RE: Wyckoff WTP Reg & Ops Improvements

Dear Mr. Hennessey,

The box culvert sections proposed for this job will be manufactured per current ASTM C1433 standards and are designed using software developed by the engineering firm Simpson Gumpertz & Heger Inc. in cooperation with the Federal Highway Administration and the American Concrete Pipe Association (ACPA) called BOXCAR. The standard sections of box culvert were designed with 20 feet of fill. After consultation with the ACPA, the special sections of the project were designed for 20 feet of fill (with HS20 live load) and an additional 2000 psf dead load for the future GSA building.

Our plants are certified by the Georgia Department of Transportation and ACPA (Qcast).

Let me know if you have any further questions.

Respectfully,

A handwritten signature in black ink, appearing to be 'Bob Palmer', written over a white background.

Bob Palmer, P.E.  
Operations/Engineering Manager  
770-251-0296 (Office)  
404-771-6461 (Cell)  
678-854-1828 (Fax)

# BOX CULVERT STEEL DESIGN

Customer: J L Murray

Job Name: Wyckoff Water Treatment Plant

Design Cover: 20 ft

Standard: ASTM 1433 with additional 2000 psf

\*See attached 'Boxcar' Calculations and Letter

Dated 11-4-2010

Span: 8 ft

Rise: 4 ft

Weight/Foot: 1.6 tons/ft

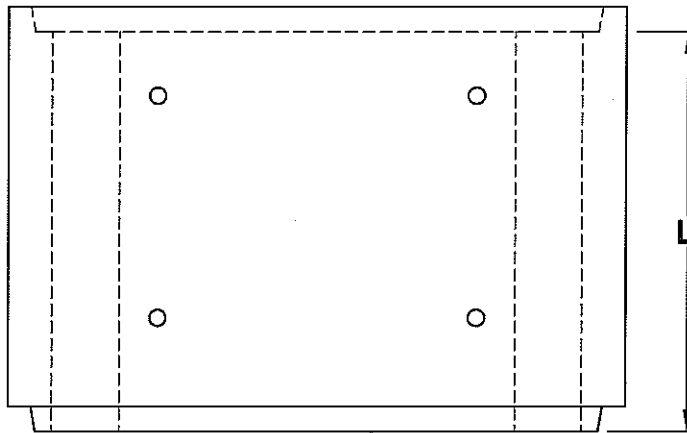
### Wall Thickness

T1: 8 in

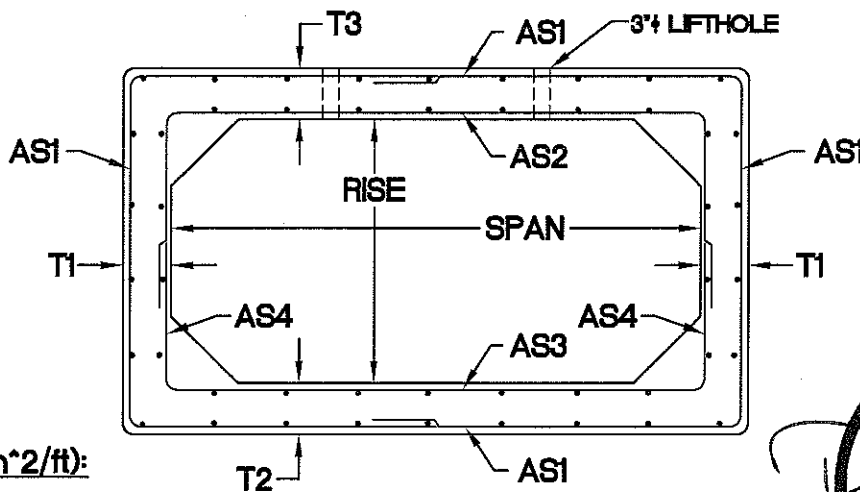
T2: 9 in

T3: 9 in

L: 6 ft



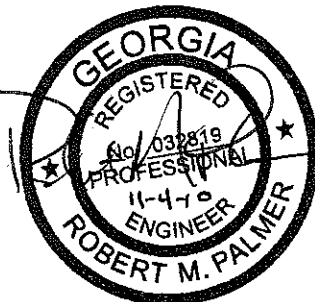
Plan



Elevation

Steel Areas (in<sup>2</sup>/ft):

- AS1 - 0.802
- AS2 - 0.865
- AS3 - 0.872
- AS4 - 0.192



208 JEFFERSON STREET  
NEWNAN, GEORGIA 30263  
(770) 251-0296

**8' x 4' Box Culvert**  
**With 20 ft of fill and 2000 PSF load**  
**Wyckoff Water Treatment Plant**

DWG. NO.	BOX CULVERT	DATE	10-25-10	REV.	11-04-10
SCALE	NTS	DRAWN BY	CW		

8'x4'x6' Box Culvert  
w/ 20' of Fill  
+ ADDITIONAL  
2000 PSF LOAD

BOXCAR

Version 2.03 for Windows  
12 March 2001

Approx: 274'

A Computer Program for the Structural  
Design of Reinforced Concrete Box  
Culverts

Developed by

Simpson Gumpertz & Heger Inc.  
Arlington Massachusetts  
in cooperation with

The Federal Highway Administration  
and  
The American Concrete Pipe Association

The successful application and use of this software product is dependent on the application of skilled engineering judgment and is the responsibility of the user. The user must select input values suitable to his specific installation. The information presented in the computer output is for review, interpretation, application and approval by a qualified engineer.

\*\*\*\*\*

ANY IMPLIED OR EXPRESS WARRANTIES COVERING THE SOFTWARE PROGRAM OR PROGRAM USER MANUAL INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED. SIMPSON GUMPERTZ & HEGER INC., THE AMERICAN CONCRETE PIPE ASSOCIATION, AND THE FEDERAL HIGHWAY ADMINISTRATION SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL INDIRECT OR OTHER SIMILAR DAMAGES ARISING FROM BREACH OF WARRANTY, BREACH OF CONTRACT OR OTHER LEGAL THEORY EVEN IF SUCH PARTIES HAVE BEEN ADVISED OF SUCH DAMAGES.

\*\*\*\*\*

Date: 11-04-2010  
Time: 13:28:24

Filename - 8x4

Job Description - Wyckoff Water Treatment Plant

GEOMETRY

Span	8. ft		Top Slab Thickness	9. in.
Rise	4. ft		Bottom Slab Thickness	9. in.
Min. Depth of Fill	20. ft		Sidewall Thickness	8. in.
Max. Depth of Fill	20. ft		Length of Precast	6. ft
Depth Increment	0. ft		Section	

HAUNCH DIMENSIONS

Top Vertical	12. in.
Top Horizontal	12. in.
Bottom Vertical	12. in.
Bottom Horizontal	12. in.

CONCRETE COVERS

Top Outside	1.00 in.
Bottom Outside	1.00 in.
Sidewall Outside	1.00 in.
Top Inside	1.00 in.
Bottom Inside	1.00 in.
Sidewall Inside	1.00 in.

MATERIAL PROPERTIES

Main Reinforcing Yield Stress	65000. psi
Design Concrete Strength	6000. psi
Concrete Density	150. pcf

DESIGN SPECIFICATION

AASHTO Standard

LOAD FACTORS

Dead Load: Shear and Moment	1.30
Thrust	1.00
Live Load: Shear and Moment	2.17
Thrust	1.00

LOAD MODIFIERS

Dead Load: Shear and Moment	1.00
Thrust	1.00
Live Load: Shear and Moment	1.00
Thrust	1.00

STRENGTH REDUCTION FACTORS

Flexure	0.90
Shear	0.85



-----  
REINFORCING DATA

	DIAMETER	SPACING
Top Slab Outside Face(AS7)	0.4 in.	4 in.
Bottom Slab Outside Face(AS8)	0.4 in.	4 in.
Sidewall Outside Face(AS1)	0.4 in.	4 in.
Top Slab Inside Face(AS2)	0.4 in.	4 in.
Bottom Slab Inside Face(AS3)	0.4 in.	4 in.
Sidewall Inside Face(AS4)	0.4 in.	4 in.

The diameters are used to estimate depth to tension reinforcing from compression face. They do not represent required reinforcing diameters.

-----  
SOIL LOAD DATA

Soil Density	120 pcf
Minimum Lateral Pressure Coefficient	0.25
Maximum Lateral Pressure Coefficient	0.50
Installation Type	Embankment/Compacted
Soil-Structure Interaction Factor	1.150

-----  
LIVE LOAD DATA

Live Load	AASHTO HS-Series
Live Load Magnitude	20 US tons
Tire Footprint Length	.0 in.
Tire Footprint Width	.0 in.
Live Load Distribution Factor	1.75
Direction of travel	Parallel to span
Impact Factor	1.00
Lane Load	0.0 psf

-----  
SURCHARGE LOADS

Vertical Pressure	2000.0 psf
Horiz. Pressure at Culvert Top	0.0 psf
Horiz. Pressure at Culvert Bottom	0.0 psf
Application Code	Additional Dead Load

-----  
FLUID LOADS

Depth of Fluid	4.0 ft
Fluid Density	62.5 pcf

BOX CULVERT DESIGN SUMMARY SHEET

8.00 ft Span x 4.00 ft Rise

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I N S T A L L A T I O N   D A T A

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Height of Fill Over Culvert, ft	20.00
Soil Unit Weight, pcf	120.
Minimum Lateral Soil Pressure Coefficient	0.250
Maximum Lateral Soil Pressure Coefficient	0.500
Soil-Structure Interaction Factor	1.150
Installation Type	Embankment/Compacted

L O A D I N G   D A T A

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Design Specification	AASHTO Standard
Dead Load Factor - Moment and Shear	1.30
Dead Load Factor - Thrust	1.00
Live Load Factor - Moment and Shear	2.17
Live Load Factor - Thrust	1.00
Dead Load Modifier - Moment and Shear	1.00
Dead Load Modifier - Thrust	1.00
Live Load Modifier - Moment and Shear	1.00
Live Load Modifier - Thrust	1.00
Strength Reduction Factor-Flexure	0.90
Strength Reduction Factor-Diagonal Tension	0.85
Live Load	
Live Load Type	AASHTO HS-Series
Live Load Magnitude, US tons	20.
Tire Footprint Length, in.	1.0
Tire Footprint Width, in.	1.0
Live Load Distribution Factor	1.75
Direction of travel	Parallel to span
Impact Factor	1.00
Lane Load, psf	0.0
Vertical Surcharge Pressure, psf	2000.0
Horiz. Surcharge Pressure at Culvert Top, psf	0.0
Horiz. Surcharge Pressure at Culvert Bottom, psf	0.0
Surcharge application code	Additional Dead Load

M A T E R I A L   P R O P E R T I E S

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Minimum Specified Reinforcing Yield Strength, ksi	65.0
Concrete - Specified Compressive Strength, ksi	6.0

G E O M E T R Y

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Top Slab Thickness, in.	9.0
Side Wall Thickness, in.	8.0
Bottom Slab Thickness, in.	9.0
Top Horizontal Haunch Dimension, in.	12.0
Bottom Horizontal Haunch Dimension, in.	12.0
Top Vertical Haunch Dimension, in.	12.0

G E O M E T R Y (Continued)

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Bottom Vertical Haunch Dimension, in.	12.0
Concrete Cover Over Steel, in.	
Top Slab - Outside Face	1.00
Bottom Slab - Outside Face	1.00
Side Wall - Outside Face	1.00
Top Slab - Inside Face	1.00
Bottom Slab - Inside Face	1.00
Side Wall - Inside Face	1.00

R E I N F O R C I N G D A T A

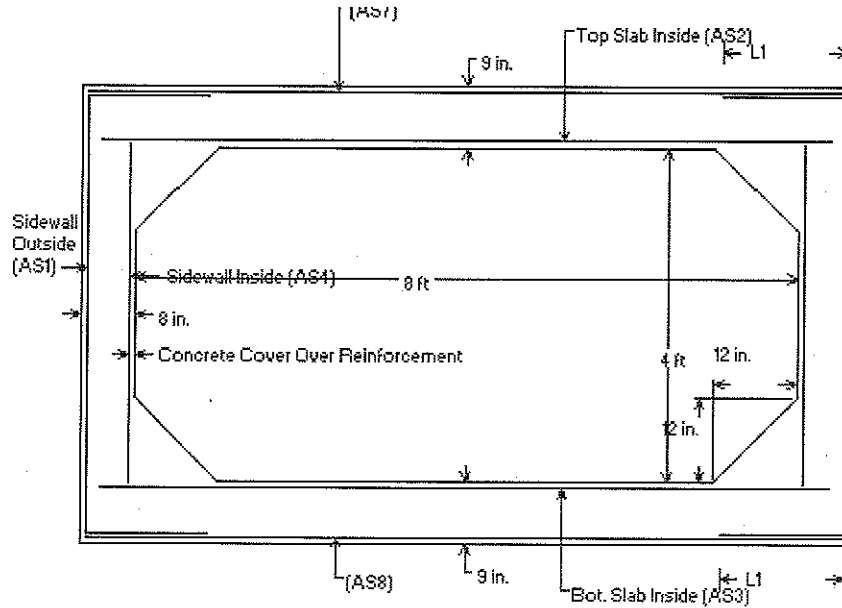
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LOCATION	AREA (in. <sup>2</sup> /ft)	STIRRUPS REQUIRED?
-----		
TRANSVERSE		
Side Wall - Outside Face (AS1)	0.802	No
Top Slab - Inside Face (AS2)	0.865	No
Bottom Slab - Inside Face (AS3)	0.872	No
Side Wall - Inside Face (AS4)	0.192	No
Top Slab - Outside Face (AS7)	0.216	No
Bottom Slab - Outside Face (AS8)	0.216	No

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Notes:

- 1 Top slab outside face steel(AS7) must extend completely across the top slab. The sidewall outside face steel (AS1) must be bent at the corner and extended across the top slab sufficiently to meet AASHTO requirements for tension laps.
- 2 Bottom slab outside face steel (AS8) must extend completely across the bottom slab. The sidewall outside face steel (AS1) must be bent at the corner and extended across the bottom slab sufficiently to meet AASHTO requirements for tension laps.
- 3 There may be negative moment from the outside corner of the box to 28 in. across the top slab
- 4 There may be negative moment from the outside corner of the box to 22 in. across the bottom slab.



- \* <L1> is Splice Length
- \* (AS7) is Top Slab Outside
- \* (AS8) is Bottom Slab Outside
- \* See Box Culvert Design Summary Sheet for transverse and distribution reinforcement, as required.
- \* For sidewall thicknesses of 6 in. and above, extend AS2 and AS3 a min. of 4 in. beyond the inside face of the sidewall. For thicknesses less than 6 in., extend AS2 and AS3 at least to within 1-1/2 in. of the outside face of the sidewall.

Notes:

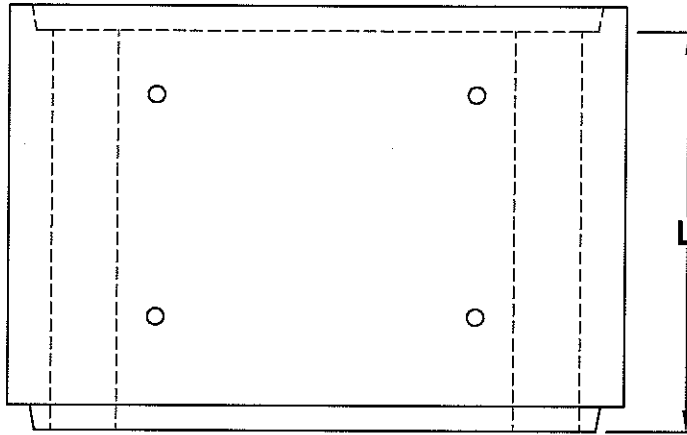
- 1) Other reinforcement schemes that provide the required reinforcement areas at all locations identified in the program output are acceptable.
- 2) Longitudinal reinforcement is not shown for clarity, see AASHTO M259 for longitudinal reinforcement and for additional requirements.

# BOX CULVERT STEEL DESIGN

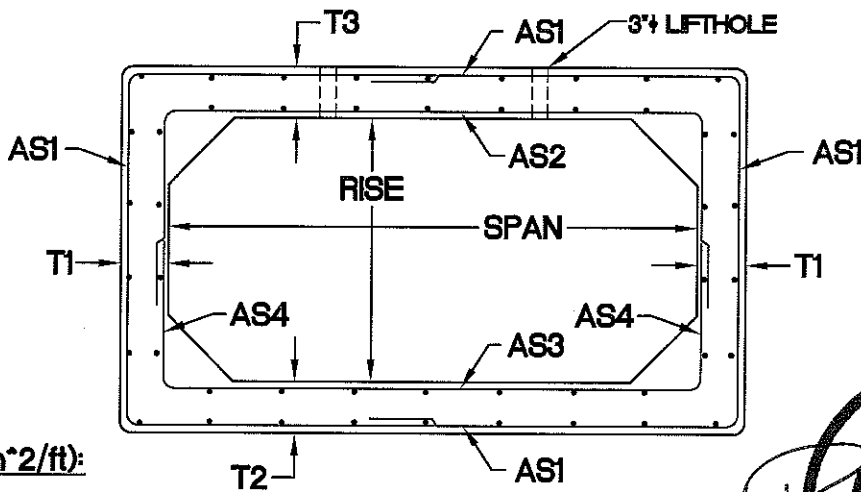
Customer: J L Murray  
 Job Name: Wyckoff Water Treatment Plant  
 Design Cover: 20 ft  
 Standard: ASTM 1433

Span: 8 ft  
 Rise: 4 ft  
 Weight/Foot: 1.5 tons/ft

Wall Thickness  
 T1: 8 in  
 T2: 8 in  
 T3: 8 in  
 L: 6 ft



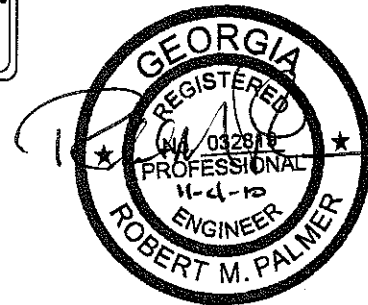
Plan



Elevation

Steel Areas (in<sup>2</sup>/ft):

- AS1 - 0.520
- AS2 - 0.501
- AS3 - 0.509
- AS4 - 0.192



208 JEFFERSON STREET  
 NEWNAN, GEORGIA 30263  
 (770) 251-0296

**8' x 4' Box Culvert  
 With 20 ft of fill  
 Wyckoff Water Treatment Plant**

DWG. NO.	<b>BOX CULVERT</b>	DATE	10-25-10	REV.	11-04-10
SCALE	NTS	DRAWN BY	CW		

8' x 4' x 6' Box Culvert  
w/ 20' of Fill  
Approx: 331'

BOXCAR

Version 2.03 for Windows  
12 March 2001

A Computer Program for the Structural  
Design of Reinforced Concrete Box  
Culverts

Developed by

Simpson Gumpertz & Heger Inc.  
Arlington Massachusetts  
in cooperation with

The Federal Highway Administration  
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The successful application and use of this software product is dependent on the application of skilled engineering judgment and is the responsibility of the user. The user must select input values suitable to his specific installation. The information presented in the computer output is for review, interpretation, application and approval by a qualified engineer.

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\*\*\*\*\*

Date: 11-04-2010  
Time: 13:28:48

Filename - 8x4

Job Description - Wyckoff Water Treatment Plant

-----  
GEOMETRY

Span	8. ft		Top Slab Thickness	8. in.
Rise	4. ft		Bottom Slab Thickness	8. in.
Min. Depth of Fill	20. ft		Sidewall Thickness	8. in.
Max. Depth of Fill	20. ft		Length of Precast	6. ft
Depth Increment	0. ft		Section	

-----  
HAUNCH DIMENSIONS

Top Vertical	12. in.
Top Horizontal	12. in.
Bottom Vertical	12. in.
Bottom Horizontal	12. in.

## CONCRETE COVERS

Top Outside	1.00 in.
Bottom Outside	1.00 in.
Sidewall Outside	1.00 in.
Top Inside	1.00 in.
Bottom Inside	1.00 in.
Sidewall Inside	1.00 in.

-----  
MATERIAL PROPERTIES

Main Reinforcing Yield Stress	65000. psi
Design Concrete Strength	6000. psi
Concrete Density	150. pcf

-----  
DESIGN SPECIFICATION

AASHTO Standard

-----  
LOAD FACTORS

Dead Load: Shear and Moment	1.30
Thrust	1.00
Live Load: Shear and Moment	2.17
Thrust	1.00

-----  
LOAD MODIFIERS

Dead Load: Shear and Moment	1.00
Thrust	1.00
Live Load: Shear and Moment	1.00
Thrust	1.00

-----  
STRENGTH REDUCTION FACTORS

Flexure	0.90
Shear	0.85

-----  
REINFORCING DATA

	DIAMETER	SPACING
Top Slab Outside Face(AS7)	0.4 in.	4 in.
Bottom Slab Outside Face(AS8)	0.4 in.	4 in.
Sidewall Outside Face(AS1)	0.4 in.	4 in.
Top Slab Inside Face(AS2)	0.4 in.	4 in.
Bottom Slab Inside Face(AS3)	0.4 in.	4 in.
Sidewall Inside Face(AS4)	0.4 in.	4 in.

The diameters are used to estimate depth to tension reinforcing from compression face. They do not represent required reinforcing diameters.

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SOIL LOAD DATA

Soil Density	120 pcf
Minimum Lateral Pressure Coefficient	0.25
Maximum Lateral Pressure Coefficient	0.50
Installation Type	Embankment/Compacted
Soil-Structure Interaction Factor	1.150

-----  
LIVE LOAD DATA

Live Load	AASHTO HS-Series
Live Load Magnitude	20 US tons
Tire Footprint Length	.0 in.
Tire Footprint Width	.0 in.
Live Load Distribution Factor	1.75
Direction of travel	Parallel to span
Impact Factor	1.00
Lane Load	0.0 psf

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SURCHARGE LOADS

Vertical Pressure	0.0 psf
Horiz. Pressure at Culvert Top	0.0 psf
Horiz. Pressure at Culvert Bottom	0.0 psf
Application Code	Additional Dead Load

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FLUID LOADS

Depth of Fluid	4.0 ft
Fluid Density	62.5 pcf



## BOX CULVERT DESIGN SUMMARY SHEET

8.00 ft Span x 4.00 ft Rise

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## I N S T A L L A T I O N   D A T A

-----	
Height of Fill Over Culvert, ft	20.00
Soil Unit Weight, pcf	120.
Minimum Lateral Soil Pressure Coefficient	0.250
Maximum Lateral Soil Pressure Coefficient	0.500
Soil-Structure Interaction Factor	1.150
Installation Type	Embankment/Compacted

## L O A D I N G   D A T A

-----	
Design Specification	AASHTO Standard
Dead Load Factor - Moment and Shear	1.30
Dead Load Factor - Thrust	1.00
Live Load Factor - Moment and Shear	2.17
Live Load Factor - Thrust	1.00
Dead Load Modifier - Moment and Shear	1.00
Dead Load Modifier - Thrust	1.00
Live Load Modifier - Moment and Shear	1.00
Live Load Modifier - Thrust	1.00
Strength Reduction Factor-Flexure	0.90
Strength Reduction Factor-Diagonal Tension	0.85

## Live Load

-----	
Live Load Type	AASHTO HS-Series
Live Load Magnitude, US tons	20.
Tire Footprint Length, in.	1.0
Tire Footprint Width, in.	1.0
Live Load Distribution Factor	1.75
Direction of travel	Parallel to span
Impact Factor	1.00
Lane Load, psf	0.0

## M A T E R I A L   P R O P E R T I E S

-----	
Minimum Specified Reinforcing Yield Strength, ksi	65.0
Concrete - Specified Compressive Strength, ksi	6.0

## G E O M E T R Y

-----	
Top Slab Thickness, in.	8.0
Side Wall Thickness, in.	8.0
Bottom Slab Thickness, in.	8.0
Top Horizontal Haunch Dimension, in.	12.0
Bottom Horizontal Haunch Dimension, in.	12.0
Top Vertical Haunch Dimension, in.	12.0

G E O M E T R Y (Continued)

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Bottom Vertical Haunch Dimension, in.	12.0
Concrete Cover Over Steel, in.	
Top Slab - Outside Face	1.00
Bottom Slab - Outside Face	1.00
Side Wall - Outside Face	1.00
Top Slab - Inside Face	1.00
Bottom Slab - Inside Face	1.00
Side Wall - Inside Face	1.00

R E I N F O R C I N G   D A T A

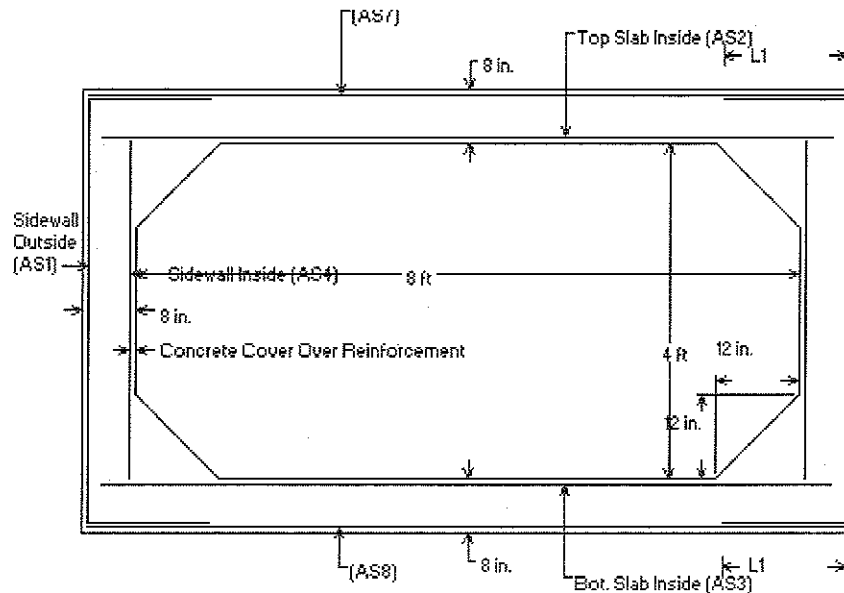
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LOCATION	AREA (in. <sup>2</sup> /ft)	STIRRUPS REQUIRED?
<hr/>		
TRANSVERSE		
Side Wall - Outside Face (AS1)	0.520	No
Top Slab - Inside Face (AS2)	0.501	No
Bottom Slab - Inside Face (AS3)	0.509	No
Side Wall - Inside Face (AS4)	0.192	No
Top Slab - Outside Face (AS7)	0.192	No
Bottom Slab - Outside Face (AS8)	0.192	No

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Notes:

- 1 Top slab outside face steel (AS7) must extend completely across the top slab. The sidewall outside face steel (AS1) must be bent at the corner and extended across the top slab sufficiently to meet AASHTO requirements for tension laps.
- 2 Bottom slab outside face steel (AS8) must extend completely across the bottom slab. The sidewall outside face steel (AS1) must be bent at the corner and extended across the bottom slab sufficiently to meet AASHTO requirements for tension laps.
- 3 There may be negative moment from the outside corner of the box to 27 in. across the top slab
- 4 There may be negative moment from the outside corner of the box to 27 in. across the bottom slab.



- \* <L1> is Splice Length
- \* (AS7) is Top Slab Outside
- \* (AS8) is Bottom Slab Outside
- \* See Box Culvert Design Summary Sheet for transverse and distribution reinforcement, as required.
- \* For sidewall thicknesses of 6 in. and above, extend AS2 and AS3 a min. of 4 in. beyond the inside face of the sidewall. For thicknesses less than 6 in., extend AS2 and AS3 at least to within 1-1/2 in. of the outside face of the sidewall.

Notes:

- 1) Other reinforcement schemes that provide the required reinforcement areas at all locations identified in the program output are acceptable.
- 2) Longitudinal reinforcement is not shown for clarity, see AASHTO M259 for longitudinal reinforcement and for additional requirements.