



Shop Drawing Submittal

Project

DAYTON BLVD. CULVERT REPLACEMENT

Prepared For

Brevard county public works

HANSON PROFESSIONAL SERVICES INC. (HANSON)

SHOP DRAWING, PRODUCT DATA OR SAMPLE REVIEW

- ☒ NO EXCEPTIONS TAKEN
- ☐ FURNISH AS CORRECTED
- ☐ REVISE AND RESUBMIT
- ☐ SUBMIT SPECIFIED ITEM
- ☐ REJECTED - SEE REMARKS

HANSON'S REVIEW OF SUBMITTALS IS SOLELY FOR THEIR GENERAL CONFORMANCE WITH HANSON'S DESIGN INTENT AND THEIR GENERAL CONFORMANCE WITH INFORMATION GIVEN IN THOSE PORTIONS OF THE CONTRACT DOCUMENTS PREPARED BY HANSON. HANSON SHALL NOT BE RESPONSIBLE FOR ANY ASPECTS OF A SUBMITTAL THAT AFFECT OR ARE AFFECTED BY MEANS, METHODS, TECHNIQUES, SEQUENCES AND OPERATIONS OF CONSTRUCTION, OR SAFETY PRECAUTIONS AND PROGRAMS INCIDENTAL THERETO, ALL OF WHICH ARE THE CONTRACTOR'S RESPONSIBILITY. THE CONTRACTOR WILL BE RESPONSIBLE FOR LENGTHS, DIMENSIONS, ELEVATIONS, QUANTITIES AND COORDINATION OF THE WORK WITH OTHER TRADES. THE CONTRACTOR SHALL BE RESPONSIBLE TO REVIEW SUBMITTALS AND APPROVE THEM IN THESE RESPECTS.

BY *Samuel J. J.* DATE 1/14/2020

Submittal: 01/10/2020

**LEASE VERIFY COVER LETTERING
R TO ORDERING OF CASTINGS.**



MACK INDUSTRIES

Release Form

Date: 01/10/2020

TO:

ATTN: Larkin Wright

COMPANY: Brevard county public works

EMAIL: john.WRIGHT@BREVARDFL.GOV

RETURN TO:

ATTN: Zach Zeng

COMPANY: MACK CONCRETE

EMAIL: zzeng@mackconcrete.com

PRODUCTION AUTHORIZATION

JOB #

CF 22554

JOB NAME:

DAYTON BLVD. CULVERT REPLACEMENT

Check One



This job is being released, for production, with **Approved Shop Drawings.**



This job is being released, for production, **without Approved Shop Drawings.**

Changes to structures, after they are produced, may incur additional cost.

Mack Concrete will produce your structures in the order you need them.

Please provide us with your Priority List

FOR :

Check One



ALL STRUCTURES (Priority list attached)



PARTIAL (Structures listed below)

Production Authorized By

23902 CR. 561 Astatula, Florida 34705
Phone: (352)742-2333 Fax: (352)742-0799



MACK INDUSTRIES

To whom it may concern,

Enclosed is our submittal package for the precast storm and sanitary structures. Please review the drawings and information to verify that the products we are proposing are all in compliance with the specifications for this project.

After you have reviewed our entire submittal package, please stamp all shop drawings and return one of the approved submittal packages to Mack Industries for our use.

We do appreciate your assistance in this approval process, which does help us to meet your needs and demands correctly and in a timely fashion.

Sincerely,

Zach Zeng

Zach Zeng

Engineering Mack Industries, Inc.

23902 County Road 561 Astatula, FL 34705

Phone: 800.482.6225 x76305 | Fax: 352.642.8198

email: zzeng@mackconcrete.com

web: www.mackconcrete.com

Quality and Service Since 1932

Brunswick, OH · Valley City, OH · Akron, OH · White Lake, MI · Bowling Green,
OH Vienna, OH · Sharpsburg, NC · Astatula, FL

www.mackconcrete.com



To Whom It May Concern,

This letter is to certify that any and all precast reinforced concrete manhole sections, inlets, catch basins, wetwells, endwalls, etc. manufactured by Mack Concrete Industries, Inc., meet and/or exceed the current Florida Department of Transportation and ASTM C-478 specifications and type I/II cement meets ASTM C-33 and AST C-150.

Sincerely,

Ron Blanton
General Manager

Mack Industries, Inc.

23902 County Road 561 Astatula, FL 34705

Phone: 800.482.6225 76802 | Cell: 330.352.6884 | Fax: 352.642.8203

email: rbanton@mackconcrete.com

web: www.mackconcrete.com

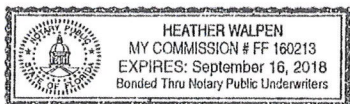
Notary:

STATE OF FLORIDA

COUNTY OF LAKE

Sworn to (or affirmed) and subscribed before me this 22nd day of June, 2018, by Ronald Blanton, who is personally known.

(SEAL)



Notary Signature -

Printed Name of Notary - Heather Walpen

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MACK INDUSTRIES

Shop Drawings

Mack Concrete uses a computer program to generate our shop drawings. As a result of the way this program works, we make the following adjustments, and definitions;

CURB INLETS: **Edge of pavement** elevations are changed to top elevations by adding 0.375 FT.
Throat elevations are changed to top elevations by adding 0.58 FT.

OVERALL HEIGHT: Shown on the drawings, is from the top of the cover, or grate, to the bottom of the base slab.

WEIGHT: Shown on the drawings, is the total weight of the structure, including the ring & cover or grate.

CATCH: Is the sump.

INVERT 1: Is always (0) degrees on round structures. All other holes are referenced from invert 1.

SHORT WALL: Is always (0) degrees on rectangular structures. All other holes are referenced from it.

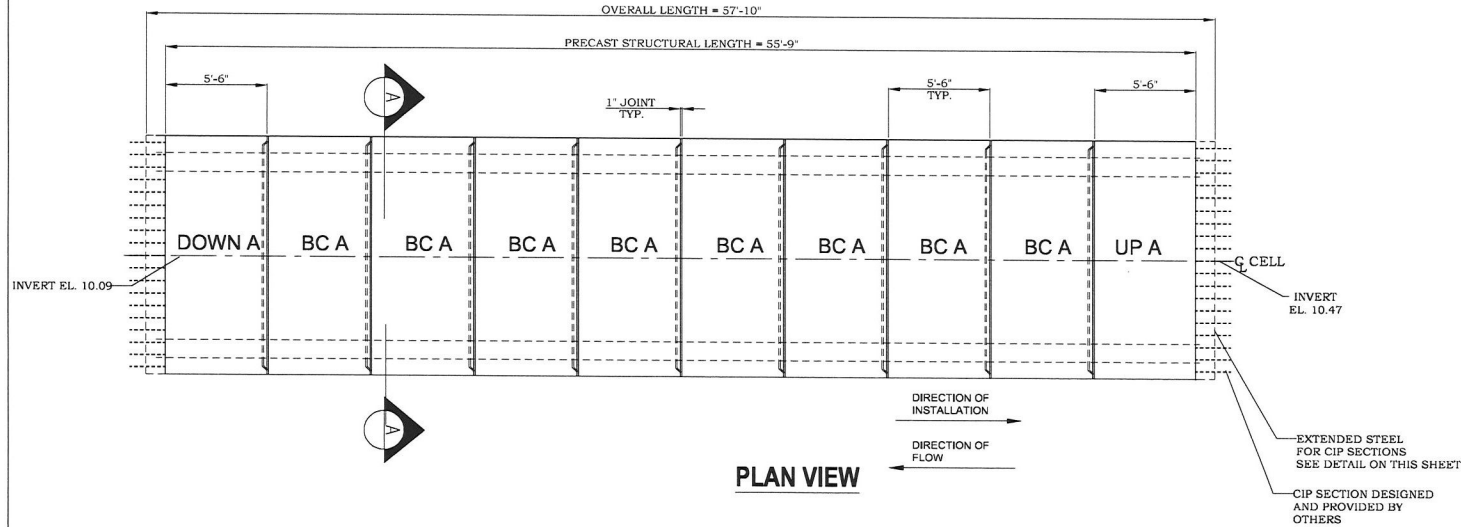
UP: Is the distance from the inside floor, of the structure, to the bottom of the hole.

ABBREVIATIONS: **F.T.**= Flat Top
F.B.= Flat Bottom
P.I.P.= Poured in Place
CONC= Concentric
ECC= Eccentric
T.S.= Top Slab
C.I.= Curb Inlet
E.L.= Extended Base Lip

Note: Pipes are assumed (and submitted as such) to be centered in respective holes, unless noted otherwise

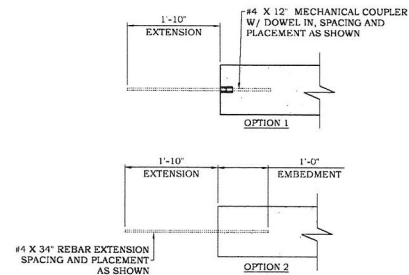
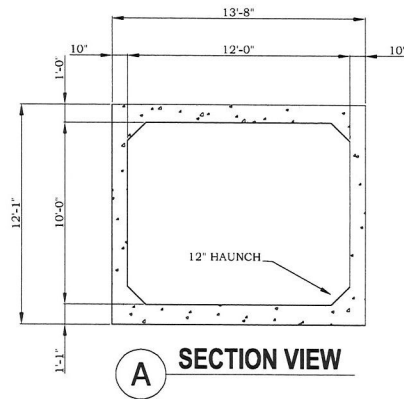
23902 CR. 561 Astatula, Florida 34705
Phone: (352)742-2333 Fax: (352)742-0799

Zeng, Zach 1/9/2020 3:37:25 PM H:\JOB FOLDER\BICK CONSULT\CF22554 DAYTON BLVD CULVERT REPLACEMENT\2410 BC.dwg

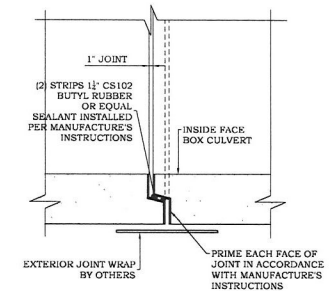


DESIGN NOTES:

1. THIS STRUCTURE IS DESIGNED IN ACCORDANCE WITH FDOT DESIGN INDEX 400-292 DESIGN STANDARDS.
2. ALL PRECAST TO BE CLASS IV 5500 PSI CONCRETE (28 DAYS)
3. TYPE I/II CEMENT
4. ALL REBAR ARE GRADE 60. ALL REINFORCING MESH ARE GRADE 65 KSI MIN.
5. DESIGN OF CAST IN PLACE ENDWALLS AND WINGWALLS BY OTHERS
6. AT THE TIME OF THIS SUBMITTAL NO ENVIRONMENTAL AND GEOTECHNICAL INFORMATION WAS PROVIDED. SLIGHTLY/MODERATELY AGGRESSIVE ENVIRONMENT ASSUMED.
7. 2' - 5' OF EARTH COVER.



EXTENDED REBAR DETAIL



JOINT DETAIL

DATE	ENG
7	
6	
5	
4	
3	
2	
1	

DAYTON BLVD. CULVERT

COUNTY: BREVARD

STATE: FLORIDA

PROVIDED BY:

MACK CONCRETE INDUSTRIES, INC.

23802 COUNTY ROAD 561
ASTAULA, FL 34705
904-452-0225



PROJECT NUMBER: **CF22554**

DATE: **01/09/2020**

DESIGNED BY: -

DRAWN BY: **ZZ**

CHECKED BY: **ZZ**

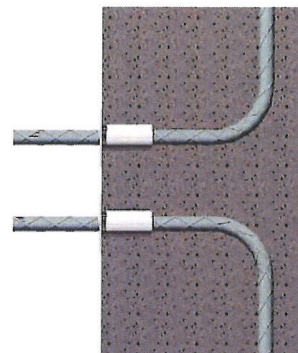
1

THREADED SPLICE SYSTEM

The Threaded Splice System is designed to eliminate protruding rebar problems. OSHA requirements pertaining to workmen protection from protruding rebar has become a source of added concern and expense. Use of the Threaded Splice System helps eliminate the exposed rebar problem. It offers complete workman safety, reduces costs related to injuries and reduces the need for expensive rebar protectors.

The Threaded Splice System consists of a threaded rebar coupler and a threaded splice bar and complies with ACI 318-05 Type 1, that requires mechanical splices to develop 125% of the specified rebar yield strength. Refer to the Tables for coupler and bar data.

ASTM A-615 GRADE 60 REINFORCEMENT BAR DATA						
Bar Size Designation	Weight (lbs per lineal ft.)	Nominal Diameter	Cross Section Area (sq.in.)	Minimum Loads (lbs)		
				P_y	$1.25 P_y$	$1.5 P_y = P_{ult}$
#4	0.668	.500	.20	12,000	15,000	18,000
#5	1.043	.625	.31	18,600	23,250	27,900
#6	1.502	.750	.44	26,400	33,000	39,600
#7	2.044	.875	.60	36,000	45,000	54,000
#8	2.670	1.000	.79	47,400	59,250	71,100
#9	3.400	1.125	1.00	60,000	75,000	90,000
#10	4.303	1.250	1.27	76,200	95,250	114,300
#11	5.313	1.410	1.56	93,600	117,000	140,400



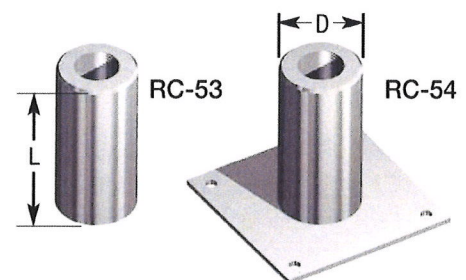
ACI 318 2005 Section (12.14.3.2) requires a full mechanical splice to develop at least 125% of the specified rebar yield strength (P_y). Threaded Rebar Splice must have ultimate strength (P_{ult}) equal to or greater than 125% of the specified rebar yield strength ($1.25 P_y$).

RC-53 THREADED REBAR COUPLER – SMOOTH

RC-54 THREADED REBAR COUPLER – SMOOTH/FLANGE

The RC-53 Threaded Rebar Coupler – Smooth and RC-54 Threaded Rebar Coupler – Smooth/Flange (RC-54) are available in rebar sizes #4 through #11. They are fabricated from quality bar stock and furnished with an internal positive thread stop. The flanged style is equipped with nail holes in the flange for convenient fastening to the form. Refer to the Table for dimensions and minimum load values.

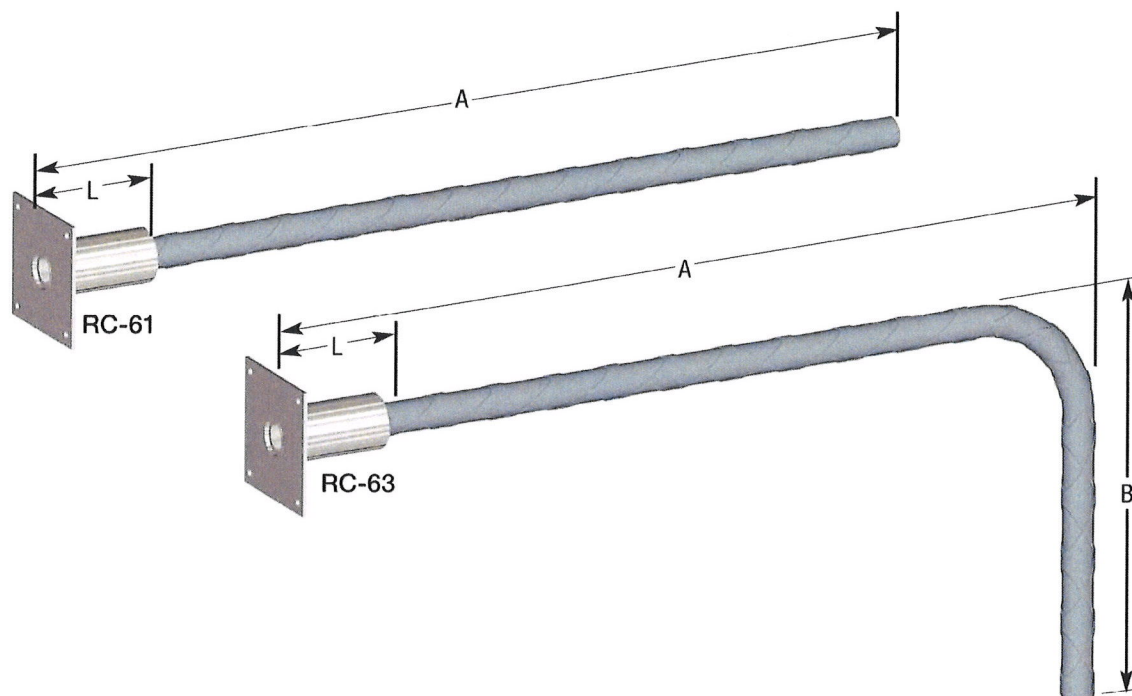
RC-53 & RC-54 REBAR COUPLER SELECTION DATA						
Coupler Size	Thread Size	Coupler Weight (lbs)	Coupler Length (L)	Coupler O.D. (D)	Optional Flange Size	Ultimate Load (lbs) $P_{ult} = 1.5P_y$
4	1/2 - 13 NC	.24	1-7/8"	7/8"	2 X 2	18,000
5	5/8 - 11 NC	.34	2-1/8"	1"	2 X 2	27,900
6	3/4 - 10 NC	.41	2-1/4"	1-1/8"	2 X 2	39,600
7	7/8 - 9 NC	.57	2-5/8"	1-1/4"	2 X 2	54,000
8	1 - 8 NC	1.08	3-1/4"	1-1/2"	2 X 2	71,100
9	1-1/8 - 7 NC	1.39	3-3/4"	1-5/8"	2-1/2" X 2-1/2"	90,000
10	1-1/4 - 7 NC	2.61	4-1/4"	2"	2-1/2" X 2-1/2"	114,300
11	1-3/8 - 6 NC	2.66	4-3/4"	2"	2-1/2" X 2-1/2"	140,400



To Order, Specify: quantity, Type and bar size.

RC-61, RC-63 SETTING BAR ASSEMBLIES

Setting Bars are assemblies comprised of threaded rebar coupler and a length of Grade 60 deformed reinforcing steel threaded on one end. Setting Bars are available in all rebar sizes #4 through #11 and in any required length. The Setting Bar (RC-61) model is furnished straight for standard lap splice applications and the Setting Bar (RC-63) is furnished with a 90° bend. All setting bars are manufactured to furnished job specifications.

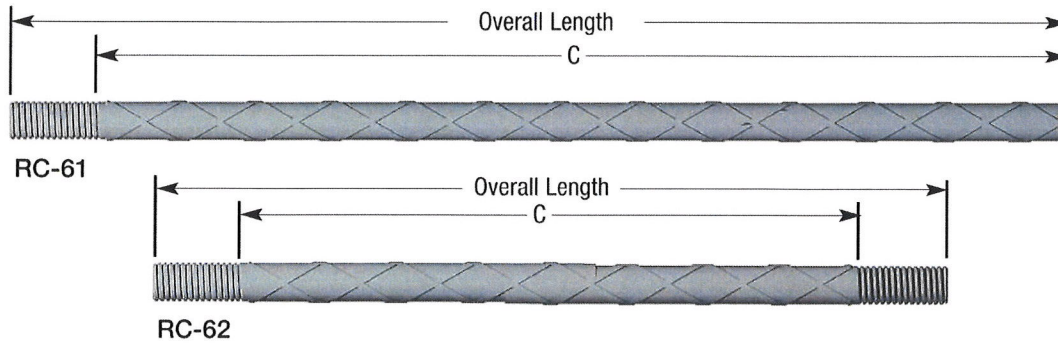


To Order, Specify:

For Setting Bar (RC-61) – quantity, type, rebar size and overall length. (“A” + “L”)

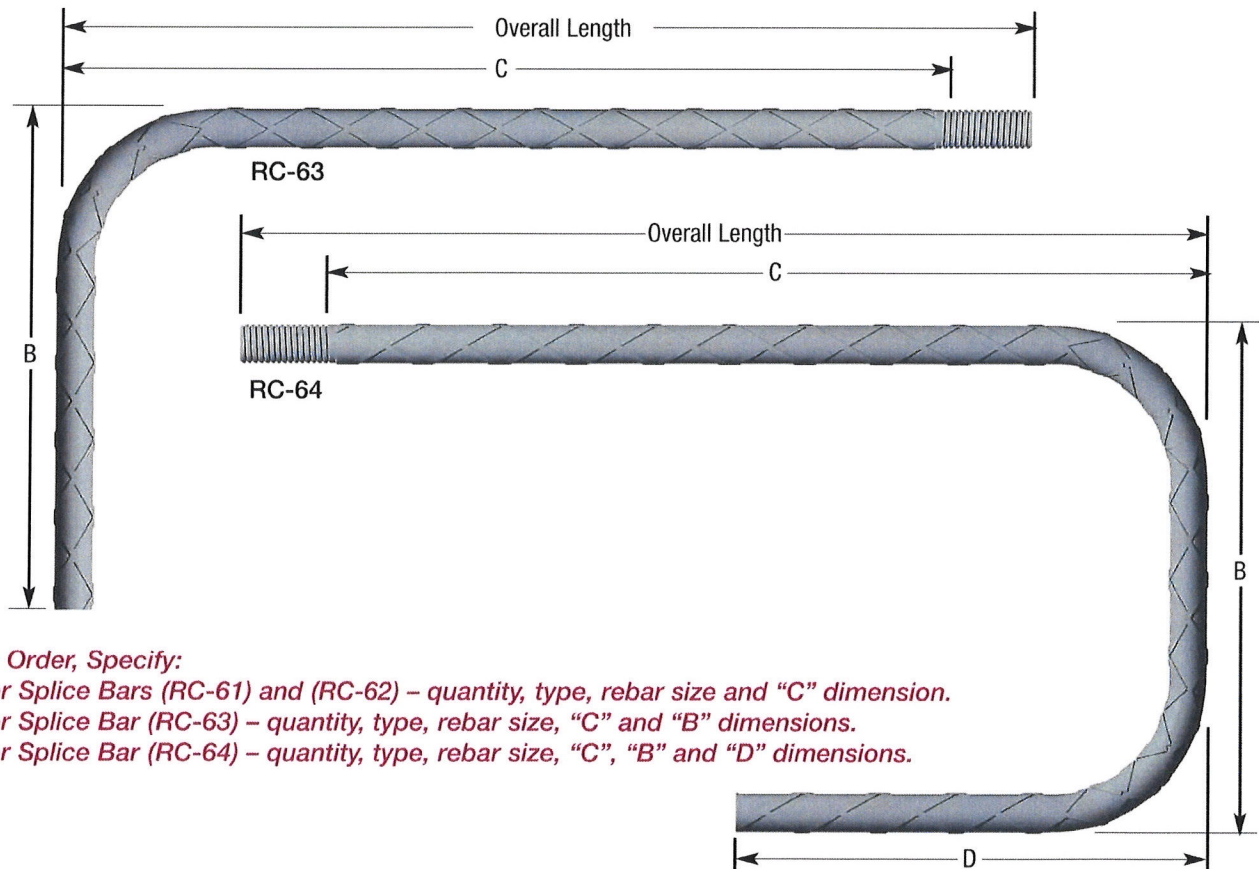
For Setting Bar (RC-63) – quantity, type, rebar size, “A” and “B” dimensions.

RC-61, RC-62, RC-63, RC-64 SPLICE BARS



The RC-61, RC-62, RC-63 and RC-64 Splice Bars are manufactured from Grade 60 deformed rebar material and are available in all of the corresponding sizes to the Threaded Rebar Coupler. After the Setting Bar has been placed and the concrete has set the Splice Bar is threaded into the Setting Bar to complete the splice. Splice Bars are available in the following configurations: RC-61 straight, RC-63 90° bend, RC-62 threaded at both ends and with a RC-64 return bend.

For Hook Bar development lengths actual dimensions C, B, D and R are functions of f'_c (concrete strength), PSI and minimums based on ACI-318-05 section 12.5 both code and commentary.



To Order, Specify:

For Splice Bars (RC-61) and (RC-62) – quantity, type, rebar size and “C” dimension.

For Splice Bar (RC-63) – quantity, type, rebar size, “C” and “B” dimensions.

For Splice Bar (RC-64) – quantity, type, rebar size, “C”, “B” and “D” dimensions.

A-P PRIMER



1. PRODUCT NAME

A-P PRIMER

Acrylic water base primer.

2. MANUFACTURER

PRO-TECH PRODUCTS, INC.

3003 N. 73rd Street

Scottsdale, Arizona 85251

Phone: 480.945.7303

FAX: 480.945.8873

www.pro-techproducts.com

3. PRODUCT DESCRIPTION

A-P PRIMER is a low solids 100% acrylic, water-base primer designed to properly condition a variety of substrates prior to installation of urethane foam.

BENEFITS:

- Increases yield of top coats
- Reduces shocking of foam applied on cold days
- Improves adhesion of foam
- Water-based technology
- Seals & conditions
- Safe & easy to use

4. TECHNICAL DATA

See TABLE 1.

5. INSTALLATION

- May be applied by spray or heavy nap roller. However, airless spray is recommended for consistency
- All surfaces must be clean, dry, and free of dirt, grease, oil, or other contaminants that would interfere with proper adhesion
- Apply at a rate of ¼ to ½ gallon per 100 square feet
- Apply at temperatures above 50° F
- Apply only when weather conditions will permit drying before rain, dew or freezing temperatures occur
- Acrylic-based coatings must cure before being subjected to freezing or moisture. Example of ideal conditions: 4-6 hours above 70° F and low humidity
- For application details see specific Guide Specifications

6. WARRANTY

No specific warranties implied.

7. MAINTENANCE

Periodic maintenance of Pro-Tech Products coatings and roofing systems ensures extended performance and reduces life cycle costs.

8. TECHNICAL SERVICES

Additional information, product brochures, and guide specifications are available. Customized application instructions are also available from our technical experts.

A-P PRIMER



TABLE 1 – TECHNICAL DATA

PHYSICAL PROPERTIES

Property	Test Method	Typical Value
Type of Resin		100% acrylic
Solids by Weight (%)	Calculated by formula	15
Viscosity (CPS)		Water thin
Weight per Gallon	Calculated by formula	8 lbs.
Shelf Life		One Year
Clean-up		Water
Re-coat Time (hrs.)		Normally 4-8 hours

Rev. C

September 9, 2011

**Pro-Tech Products, Inc.
3003 North 73rd Street
Scottsdale, Arizona 85251
480.945.7303**

ConSeal™ CS-102

Butyl Rubber Sealant



Butyl Rubber Sealant for All Precast Concrete Structures - Meets ASTM C-990

Applications

For concrete joints in: Manholes, Concrete Pipe, Vaults, Box Culverts, Septic Tanks, and Vertical Panel Structures. **Not intended for use in expansion joints or joints that move.**

Sealing Properties

- Provides permanently flexible watertight joints.
- Low to high temperature workability: 30°F to 120°F (-1°C to +48°C)
- Rugged service temperature: -30°F to +200°F (-34°C to +93°C)
- Excellent chemical and mechanical adhesion to clean dry surfaces.
- Greater cohesive and adhesive strengths.
- Sealed joints will not shrink, harden or oxidize upon aging.
- Controlled flow resistance for application ease.
- No priming normally necessary. When confronted with difficult installation conditions, such as wet concrete or temperatures below 40°F (4°C), priming the concrete will improve the bonding action. Consult Concrete Sealants for the proper primer to meet your application.

Hydrostatic Strength

ConSeal CS-102 meets the hydrostatic performance requirement as set forth in ASTM C-990 section 10.1 (Performance requirement: 10psi for 10 minutes in straight alignment – in plant, quality control test for joint materials.)

Specifications

ConSeal CS-102 meets or exceeds all of the requirements of Federal Specification SS-S-210 (210-A), AASHTO M-198B, and ASTM C-990-91.

Physical Properties

Description	Spec	Required	CS-102
Color			Black
Specific Gravity, 77°F	ASTM D71	1.15-1.50	1.25
Ductility, 77°F	ASTM D113	5.0 min.	10
Penetration, cone 77°F (25°C), 150 gm, 5 sec.	ASTM D217	50-100 mm	55-60 mm
Penetration, cone 32°F (0°C), 150 gm, 5 sec.	ASTM D217	40 mm min.	40-65 mm
Flash Point, C.O.C., °F	ASTM D92	350°F min.	450°F
Fire Point, C.O.C., °F	ASTM D92	375°F min.	475°F

Don't Just Seal It, ConSeal It!

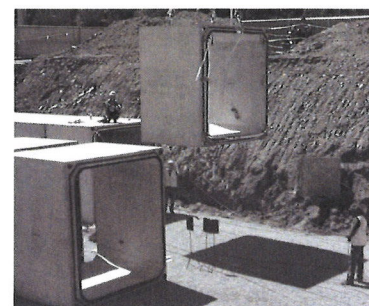
© 2013 Concrete Sealants, Inc.

Concrete Sealants, Inc. 9325 State Route 201 ■ Tipp City, OH 45371 ■ P.O. Box 176 ■ New Carlisle, OH 45344
P. 937.845.8776 F. 937.845.3587 Toll Free 800.332.7325 ■ www.conseal.com



ConSeal™ CS-102

Butyl Rubber Sealant



Butyl Rubber Sealant for All Precast
Concrete Structures - Meets ASTM C-990

Chemical Composition

Description

	Spec	Required	CS-102
Hydrocarbon plastic content % by weight	ASTM D297	50% min.	51%
Inert mineral filler % by weight	AASHTO T111	30% min.	35%
Volatile Mater % by weight	ASTM D6	2% max.	1.2%
Non-extractable, carbon-based material			12.8%
Recycled Content, % by weight			
Post Consumer:			8.41%
Post Industrial:			10.85%

Immersion Testing

30-Day Immersion Testing: No visible deterioration when tested in 5% Caustic Potash, 5% Hydrochloric Acid, 5% Sulfuric Acid, and 5% saturated Hydrogen Sulfide.

One Year Immersion Testing: No visible deterioration when tested in 5% Formaldehyde, 5% Formic Acid, 5% Sulfuric Acid, 5% Hydrochloric Acid, 5% Sodium Hydroxide, 5% Hydrogen Sulfide, and 5% Potassium Hydroxide.

Limited Warranty

This information is presented in good faith, but we cannot anticipate all conditions under which this information and our products, or the products of other manufactures in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety and suitability of our products, either alone or in combination with other products. Users are advised to make their own tests to determine the safety and suitability of each such product or product combinations for their own purposes. It is the **users' responsibility** to satisfy himself as to the suitability and completeness of such information for this own particular use. We sell this product without warranty, and buyers and users assume all responsibility and liability for loss or damage arising from the handling and use of this product, whether used alone or in combination with other products.

Don't Just Seal It, ConSeal It!

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P. 937.845.8776 **F.** 937.845.3587 **Toll Free** 800.332.7325 ■ **www.conseal.com**



Guidelines For Selecting the Proper Cross-Sections & Lengths of Conseal Sealants for Use with ASTM C-789 Box Culverts

This information is meant to serve as a quick reference guide only and not as an inflexible measure. Each concrete culvert manufacturer should be able to determine whether the sizes recommended on this table are applicable to their products. Concrete Sealants recommends that whatever size is used on a given culvert, the sealant should be of sufficient volume and placement in the joint be such as to allow the sealant's total volume to be compressed by a minimum of 30%.

If you are unable to determine the proper sized sealant for your specific application, just call Concrete Sealants TOLL-FREE and we will provide that information for you.

Conseal Requirements for ASTM C-789 Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains and Sewers.

NOTE: All dimensions in the table below are based upon design requirements as listed in ASTM Standard C-789.

Table 1: Design Requirements for Precast Concrete Box Sections

Internal Span, Feet	Internal Vertical Rise, Feet	Wall & Slab Thickness, Inches	Sealant Required Per Joint, Feet	Manufacturer's Cross-Section Recommendation	Total Rolls Needed Per Joint Using Conseal	Total Joints Per Cavity or Conseal
3'	2'	4"	11.0'	1-1/4" x 14.5'	0.6	6.0
3'	3'	4"	13.0'	1-1/4" x 14.5'	0.9	5.5
4'	2'	5"	13.5'	1-1/4" x 14.5'	1.0	5.0
4'	3'	5"	15.5'	1-1/4" x 14.5'	1.1	4.5
4'	4'	5"	17.5'	1-1/4" x 14.5'	1.2	4.0
5'	3'	6"	17.8'	1-1/4" x 14.5'	1.3	4.0
5'	4'	6"	19.8'	1-1/4" x 14.5'	1.4	3.5
5'	5'	6"	21.8'	1-1/4" x 14.5'	1.5	3.0
6'	3'	7"	20.0'	1-1/4" x 14.5'	1.4	3.5
6'	4'	7"	22.0'	1-1/4" x 14.5'	1.6	3.0
6'	5'	7"	24.0'	1-1/4" x 14.5'	1.7	2.5
6'	6'	7"	26.0'	1-1/4" x 14.5'	1.8	2.0
7'	4'	8"	24.5'	1-1/2" x 10'	2.5	1.8
7'	5'	8"	26.5'	1-1/2" x 10'	2.7	1.7
7'	6'	8"	28.5'	1-1/2" x 10'	2.9	1.6
7'	7'	8"	30.5'	1-1/2" x 10'	3.1	1.5
8'	4'	8"	26.5'	1-1/2" x 10'	2.7	1.8
8'	5'	8"	28.5'	1-1/2" x 10'	2.9	1.7
8'	6'	8"	30.5'	1-1/2" x 10'	3.1	1.6
8'	7'	8"	32.5'	1-1/2" x 10'	3.3	1.5
8'	8'	8"	34.5'	1-1/2" x 10'	3.5	1.4
9'	5'	9"	30.8'	1-1/2" x 10'	3.1	1.8
9'	6'	9"	32.8'	1-1/2" x 10'	3.3	1.5
9'	7'	9"	34.8'	1-1/2" x 10'	3.5	1.5
9'	8'	9"	36.8'	1-1/2" x 10'	3.7	1.3
9'	9'	9"	38.8'	1-1/2" x 10'	3.9	1.2

NOTE: See Reverse Table for additional sizes.

Table 1: Design Requirements for Precast Concrete Box Sections (Continued)

Internal Horizontal Span, Feet	Internal Vertical Rise, Feet	Wall & Slab Thickness, Inches	Sealant Required Per Joint, Feet	Manufacturer's Cross-Section Recommendation	Total Rolls Needed Per Joint Using ConSeal	Total Joints Per Carton of ConSeal
10'	5'	10"	33.0'	1-1/2" x 10'	3.3	1.5
10'	6'	10"	35.0'	1-1/2" x 10'	3.5	1.4
10'	7'	10"	37.0'	1-1/2" x 10'	3.7	1.4
10'	8'	10"	39.0'	1-1/2" x 10'	3.9	1.2
10'	9'	10"	41.0'	1-1/2" x 10'	4.1	1.2
10'	10'	10"	43.0'	1-1/2" x 10'	4.3	1.1
11'	4'	11"	33.5'	1-1/2" x 10'	3.4	1.5
11'	6'	11"	37.5'	1-1/2" x 10'	3.8	1.3
11'	8'	11"	41.5'	1-1/2" x 10'	4.2	1.2
11'	10'	11"	45.5'	1-1/2" x 10'	4.6	1.0
11'	11'	11"	47.5'	1-1/2" x 10'	4.8	1.0
12'	4'	12"	35.8'	1-1/2" x 10'	3.6	1.4
12'	6'	12"	39.8'	1-1/2" x 10'	4.0	1.2
12'	8'	12"	43.8'	1-1/2" x 10'	4.4	1.1
12'	10'	12"	47.8'	1-1/2" x 10'	4.8	1.0
12'	12'	12"	51.8'	1-1/2" x 10'	5.2	0.9

SEAL OF SECURITY



BOND OF TRUST

CONCRETE SEALANTS^{INC.}

9325 State Route 201
Tipp City, OH 45371

**For further assistance,
call or Fax...**

1-800-332-SEAL

(1-800-332-7325)

Phone: (937) 845-8776

FAX: (937) 845-3587

WebSite: <http://www.conseal.com>





January 18, 2018

Certificate of Conformance

This is to certify that the material listed below conforms to the following specifications. The material meets or exceeds the listed performance requirements.

Product: ConSeal CS-102 Butyl Sealant

Performance: Testing of this product meets the requirements set forth in ASTM C-990 section 10.1.

Specifications: This product meets or exceeds the requirements of Federal Specification SS-S-210 (210A), AASHTO M198B, and ASTM C-990-09.

Chemical Composition and Properties:

Hydrocarbon blends % by weight (ASTM D4)	50% min.
Inert mineral filler % by weight (AASHTO T111)	30% min.
Volatile matter % by weight (ASTM D6):	3% max.
Specific Gravity (ASTM D71)	1.15 – 1.40
Ductility (ASTM D113)	5.0 min.
Flash Point (ASTM D92)	350°F min.
Penetration @ 77° (ASTM D217)	50 – 120 dmm

Pursuant to the buy American provisions of the American Recovery and Reinvestment Act (ARRA) Section 1605 of 2009, all preformed sealant tapes and concrete coatings sold by Concrete Sealants, Inc. qualify as goods produced in the United States. All components of these products are manufactured in Tipp City, Ohio using various raw materials, also purchased in the United States.

Sincerely,

Tim Frazier

Tim Frazier
Technical Director

General Practices & Procedures

Box Culverts



To properly understand the best method of sealing the joint of a precast concrete product, some of the myths and misconceptions about sealants must be discussed. Laboratory testing and engineering analysis has lead to some "rules of thumb" when selecting and applying precast concrete joint sealants in a compression joint – in this case for box culvert, compression joints.

Definitions

Compression Joint: A surface between two mating concrete sections where force is to be applied to compress the sealant material.

Preformed Sealant: A composition of rubbers manufactured to meet a specific standard and formed into a shape for application in a compression joint.

Hydrostatic: Hydrostatic pressure is the pressure exerted by a fluid at equilibrium due to the force of gravity.

Annular Space: The intentional void space within a joint between the parallel angled surfaces.

Spigot: The part of the joint surface that extends out of the joint, the male end.

Bell: The part of the joint surface that is inside the joint, the female end.

Butyl: A hydrocarbon radical

Sealant Selection

Materials

Sealants are typically designed to resist hydrostatic forces at a precast concrete joint to provide a watertight seal. The American Society of Testing and Materials (ASTM) specification C990 defines the required composition and performance testing requirements for preformed butyl sealants. Sealants that meet this standard will provide a reasonable level of assurance for performance in hydrostatic conditions. Butyl rubber content and hydrocarbon content are synonymous terms.

Shape

A traditional misconception of preformed sealants is that wider is better. That is a myth. Preformed butyl rubber sealants work best at higher rates of compression. As the sealant is compressed, the resistance force for further compression increases as a function of the percentage of compression. Time and temperature, as well as the sealant composition, will affect this rate. For instance, the force (psi) to compress the sealant the initial 10% to 50% may range from 2psi to 4psi. But as the sealant reaches 75% compression, the resistance force is about 8psi, and at 85% compression, this reaches a force of about 12psi. As the sealant is compressed, the sealing gasket increases in width as it becomes thinner. This width increases the surface area of the applied force. As the area reaches a point of equilibrium with the designed resistance force of the sealant, compression will stop. The analogy best used is the use of snow shoes. As the area of the applied force is increased, the force per square inch is reduced, thus enabling a person to walk on top of the snow.

Size / Volume

How much sealant is needed to seal the joint? The answer is as varied as the types and sizes of concrete castings being produced. There is no magic answer. Too little sealant may cause the joint to leak; too much sealant will be difficult to compress. The size of sealant required is determined by the volume needed to fill enough of the void to eliminate the possibility that a hydrostatic force will "push" the sealant. A minimum gasket width in the joint of 2"-3" is common, but a wider band is preferred. A maximum joint gap of 3/8" is recommended, but it is preferred that the joint be as tight as possible. A rule of thumb for finding the width after compression is to use this formula: $(TF/P)/100$, where TF=Total force applied in pounds, P=the length of the entire perimeter in feet. Example: 15,000 pounds of force is applied to a rectangular casting 10' x 5'. The perimeter is 30 feet. Calculate: $(15,000/30)/100=5$.

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General Practices & Procedures

Box Culverts



Therefore, the sealant will compress to a nominal width of about 5". For box culverts, the net force must be determined by subtracting the force required to move the concrete section from the total force.

Placement

Sealant placement is critical in providing the best, watertight joint. Best practice is to place sealant where the concrete touches tightest. It is also preferred to fill the annular space. On a box culvert, the best practice is to place some of the sealant on the bell in the angled surface along the bottom, and 6" above the center on each side. Continue placing the sealant on the spigot end of the mating piece on the angled surface along the top, and 6" below the center on each side.

Adhesion

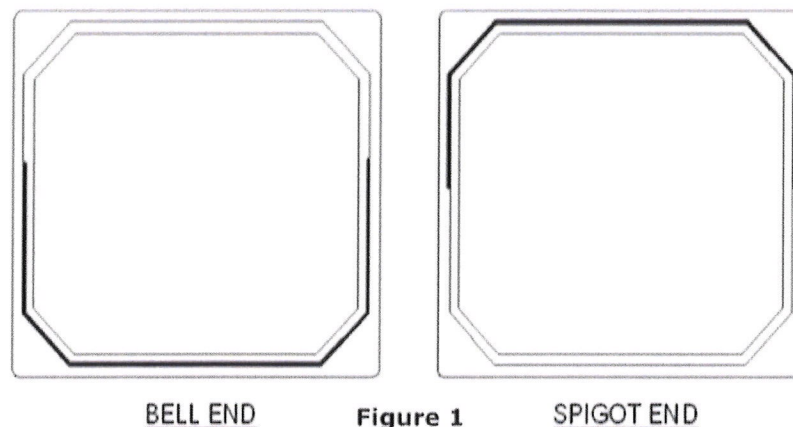
The adhesion of the sealant to the concrete affects the hydrostatic resistance. Water can pass by sealant through the concrete by absorption if the joint surface is not properly prepared. This will result in wetness in or near the joint, opposite of the side of the joint where water is present. Sealant will adhere to a clean, dense, well-cured concrete surface. To improve adhesion, use one of ConSeal's primers to create a surface that the sealant will adhere to.

Box Culvert Sealing Options

Not every box culvert project has the same level of watertight requirement. Some box culverts are open on each end for water transportation through the sections. These units need to be sealed, but hydrostatic watertight performance is not critical. We consider the sealing method for these structures to be the **Economical** approach. Some box culverts need to control soil erosion around the joint, and the application of an external seal over the joint is necessary. We consider this the **Erosion Control** approach. Some box culverts are used as a water containment structure. In this application, watertight joints in a hydrostatic condition are critical. We consider this to be the **Watertight** approach.

Economical

The economical approach is to use one row of sealant in the joint of sufficient size to be compressed a minimum of 50% and a minimum gasket of 2 1/2" wide. The sealant is installed as shown in Figure 1.



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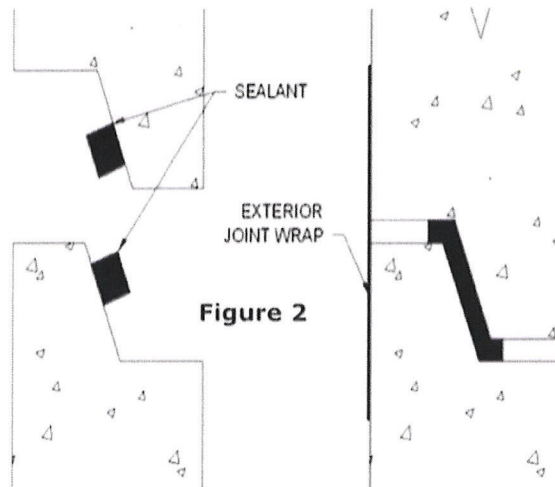
General Practices & Procedures

Box Culverts



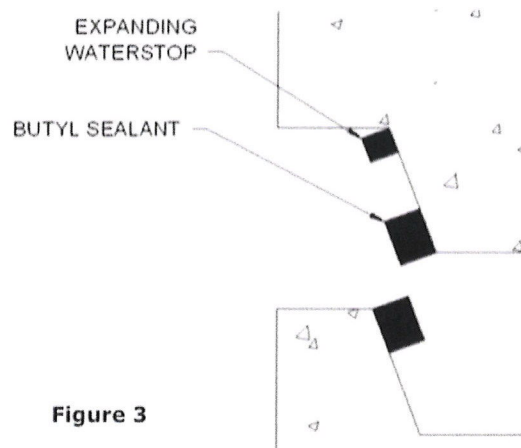
Erosion Control

Erosion control specifications require the joint to be covered with an exterior membrane to prevent erosion, in addition to the standard joint sealant. Sealant will be installed in accordance to Figure 1, and an exterior joint wrap will be applied to the top and side joints of the box culvert. The exterior joint wrap is installed after placement as shown in Figure 2.



Watertight

The economical and erosion control options may not provide a reasonable level of water tightness. Some box culverts are used for water storage tanks, cisterns, underground retention/detention, etc. These "Tunnel Tanks" must be watertight. Watertight means that there will not be any infiltration or exfiltration of water. To assure a watertight seal, two additional steps must occur. First, in addition to the butyl joint sealant, an expanding waterstop sealant will be installed around the perimeter of the spigot end. This sealant will expand as water from the exterior enters the joint, creating a secondary seal. Figure 3 indicates the method of installing the expanding waterstop sealant.



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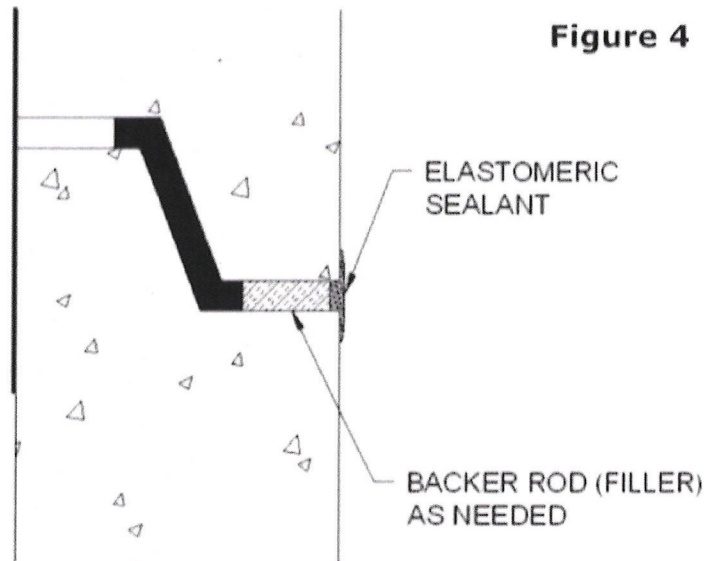


General Practices & Procedures

Box Culverts



The second step in assuring a watertight joint is the use of an elastomeric sealing material conforming to ASTM C-920. This material will be caulked or troweled around the bottom and sides of each interior joint. Where the depth of fill exceeds $\frac{1}{4}$ ", a backer rod shall be installed prior to caulking. Figure 4 shows this application.



Disclaimer: This publication is to assist users to understand the proper use of ConSeal's products. *Contact ConSeal's technical staff for practices and procedures that meet your specific requirement.* Concrete Sealants, Inc. does not warranty any improper use of its products.

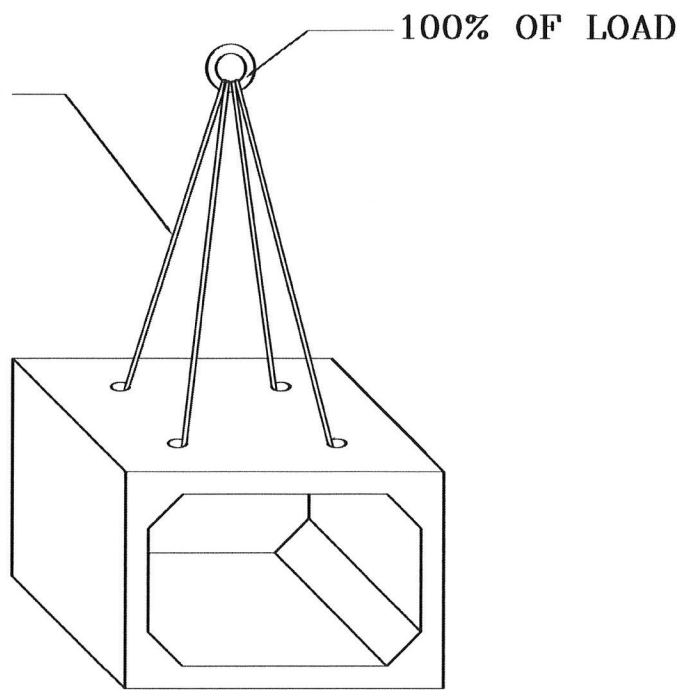
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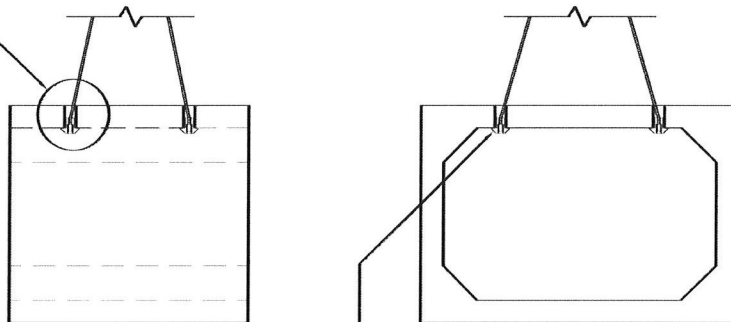
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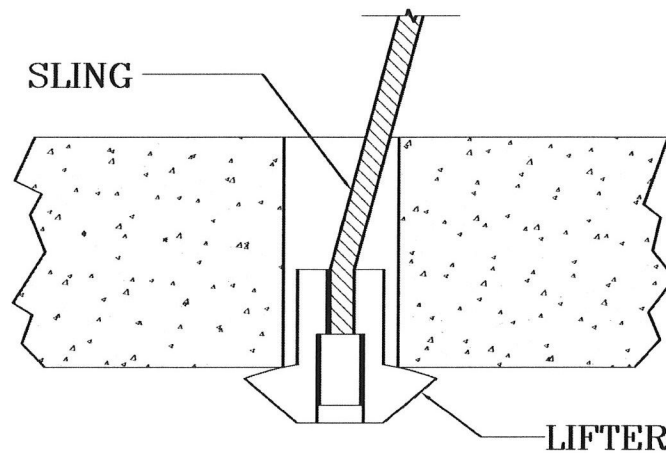
4 PART SLING
ASSEMBLY OF
SUFFICIENT CAPACITY
TO HANDLE THE
REQUIRED LOAD.



SEE DETAIL
BELOW



(4) LIFTERS, RATED
FOR THE LOAD
(TYP)



MACK CONCRETE INDUSTRIES
P.O. BOX 157
ASTATULA, FLORIDA 34705

DESCRIPTION:
TYPICAL LIFTING ARRANGEMENT

CONTRACTOR:

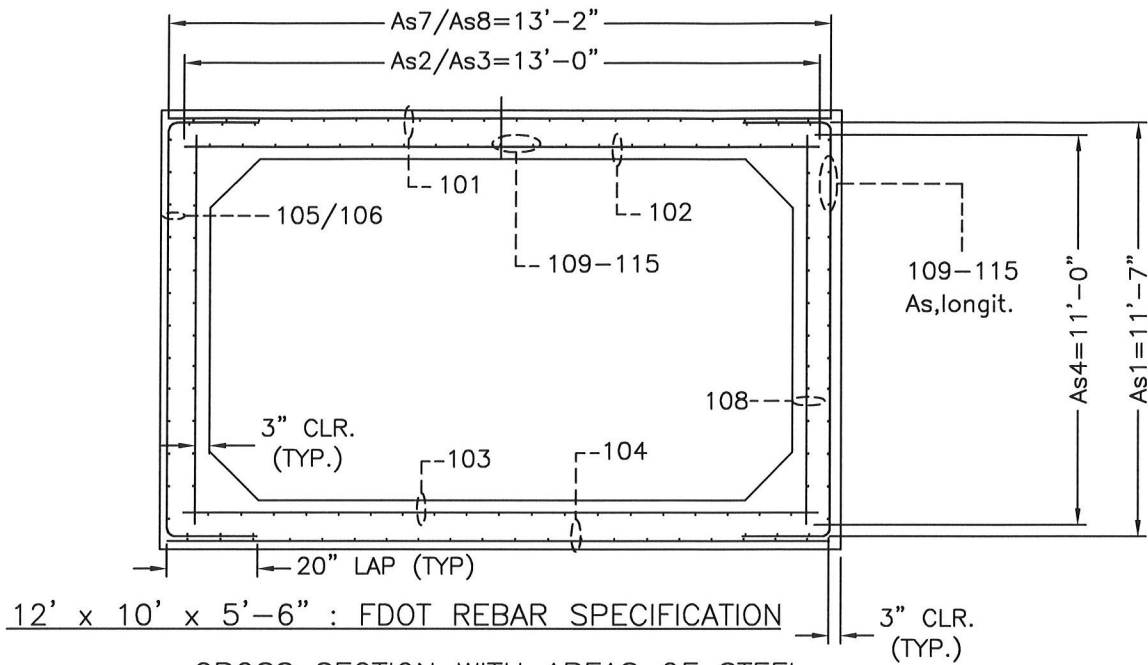
DATE:

DWG #:

JOB NAME:

DRAWN BY: DAVID CRANE

JOB #: CF



CONVERSION:

- OUTER WALLS => {Bars 105/106} #6@6" = 0.880 in²/ft
=> USE D14.7 @ 2" = 0.882 for Outer Wall Circ. Reinf.
- OUTER TOP {Bars 101} #4@12" = 0.200 in²/ft
=> USE D6.7 @ 4" = 0.201 for Outer Top Slab.
- OUTER BTM {Bars 104} #6@6" = 0.880 in²/ft
=> USE D14.7 @ 2" = 0.880 for Outer Btm Slab.
- INNER WALLS => {Bars 108} #4@12" = 0.201 in²/ft
=> USE D6.7 @ 4" = 0.201 for Inner Wall Circ. Reinf.
- INNER TOP/BTM => {Bars 102/103} #6@6" = 0.880 in²/ft
=> USE D14.7 @ 2" = 0.882 for Inner Top & Btm Slab
- As, LONGIT. => {Bars 109-115} #4@12" = 0.200 in²/ft
=> USE D13.4 @ 8" = 0.201 for Inner & Outer Longit. Reinf.

12'x10'x5'-6" : FDOT 289 :- :N/A EARTH COVER

CROSS SECTION WITH AREAS OF STEEL

STEEL AREA (REQUIRED)
101= 0.200
102= 0.880
103= 0.880
104= 0.880
105= 0.880
106= 0.620
108= 0.200
109-114= 0.200

TOTAL CAGE WEIGHT PER BOX = 1643.3 LBS

SLAB THICKNESS
TOP 12"
BOTTOM 13"
WALLS 10"

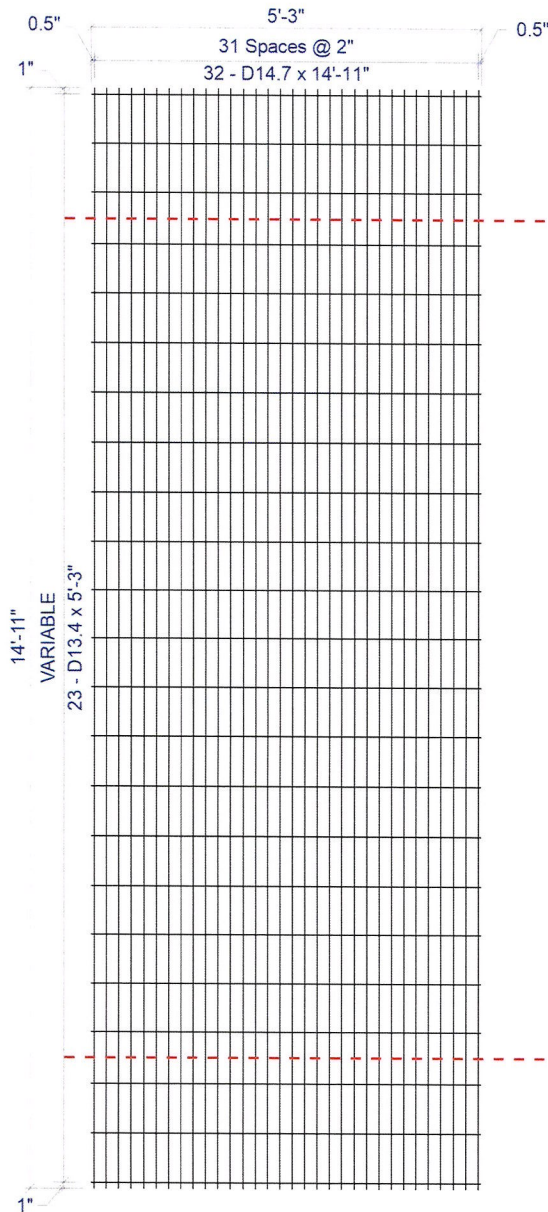
MECHANICAL DIMENSIONS
DIM. 'L' = -
DIM. 'M' = N/A
DIM. 'R' = 11'-0"
DIM. 'S' = 10'-6"

BOX SIZE: 12'x10'x5'-6"	SPEC: FDOT 289	TABLE: -	FILL: N/A
----------------------------	-------------------	-------------	--------------



Concrete Reinforcements, Inc.
3830 PRESIDENTS WAY
JACKSONVILLE, FL
PH. 904-520-7100 FAX. 904-520-7101

CUSTOMER: MACK INDUSTRIES	DRAWN BY: BWA	REVISION: -	SHEET DESCRIPTION: CROSS SECTION
PROJECT: 12'x10'x5'-6" DAYTON BLVD	DATE: 1/10/2020	REVISION DATE: -	FILE NAME: -CS
CHECKED BY: BWA	SCALE: NTS	PROJECT #: 94856	SHEET #: 1 OF 6



2 x VAR D14.7 / D13.4 (GRADE 70) 62(+0.5, +0.5) x 14'-11"(1, 1)
 VAR = 1" OH, 2@8", 1@8.5", 16@8", 1@8.5", 2@8", 1" OH

SHEET DESIGN



Concrete Reinforcements, Inc.
 3830 Presidents Way • Jacksonville, FL 32220
 Phone: 904-520-7100 • Fax: 904-520-7101

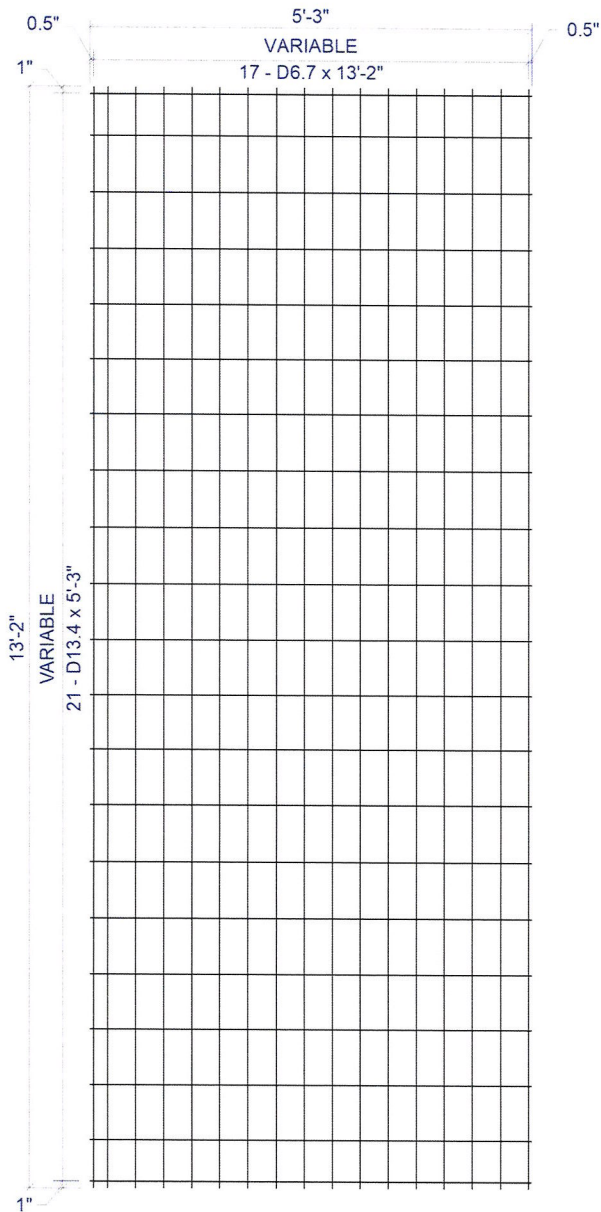
CUSTOMER	Mack
PROJECT	94856 - Drawings - 12x10 Dayton Blvd - Mack - 1-10-2020
LOCATION	Astatula, FL
DATE	01-10-2020
MARK NUMBER	As1 - 105/106 (-01)
L.W.SPACE	2
C.W.SPACE	VAR
L.W.1 SIZE	D14.7
L.W.2 SIZE	N/A
C.W.SIZE	D13.4
WIDTH	5'-3"
LENGTH	14'-11"
OH.LEFT	0.5"
OH.RIGHT	0.5"
OH.TOP	1"
OH.BOTTOM	1"
YIELD	70,000psi
BENT	-
CUT	-
ROLL	-

W I R E S	LINE WIRE 1	LINE WIRE 2	CROSS WIRE
NO. PER SHEET	32	N/A	23
SIZE	D14.7	N/A	D13.4
LENGTH	14'-11"	-	5'-3"
W.T./SHEET			
SHEET W.T.	293.58#		
QUANTITY	20		
SUB TOTAL WEIGHT			
TOTAL WEIGHT			
S.F./SHEET			
LBS./CSF			
Ast/LF			
ST.DENSITY			

SPECIAL REMARKS:
 OUTER WALLS => {Bars 105/106} #6@6" = 0.880 in²/ft
 D14.7 @ 2" = 0.882 for Outer Wall Circ. Reinf.
 As, LONGIT. => {Bars 113-114} #4@12" = 0.200 in²/ft
 D13.4 @ 8" = 0.201 for Longit. Reinf.

BEND DIMS: WALL=139", SLABS=20"

APPROVED _____



VAR x VAR D6.7 / D13.4 (GRADE 70) 62(+0.5, +0.5) x 13'-2"(1, 1)

VAR = 0.5" OH, 1@2", 15@4", 0.5" OH
VAR = 1" OH, 1@6", 18@8", 1@6", 1" OH

SHEET DESIGN



Concrete Reinforcements, Inc.
3830 Presidents Way • Jacksonville, FL 32220
Phone: 904-520-7100 • Fax: 904-520-7101

CUSTOMER Mack

PROJECT 94856 - Drawings - 12x10 Dayton Blvd - Mack - 1-10-2020

LOCATION Astatula, FL

DATE 01-10-2020 MARK NUMBER As7 - 101 (-02)

L.W.SPACE VAR

C.W.SPACE VAR

L.W.1 SIZE D6.7

L.W.2 SIZE N/A

C.W.SIZE D13.4

WIDTH 5'-3"

LENGTH 13'-2"

OH.LEFT 0.5"

OH.RIGHT 0.5"

OH.TOP 1"

OH.BOTTOM 1"

YIELD 70,000psi

BENT -

CUT -

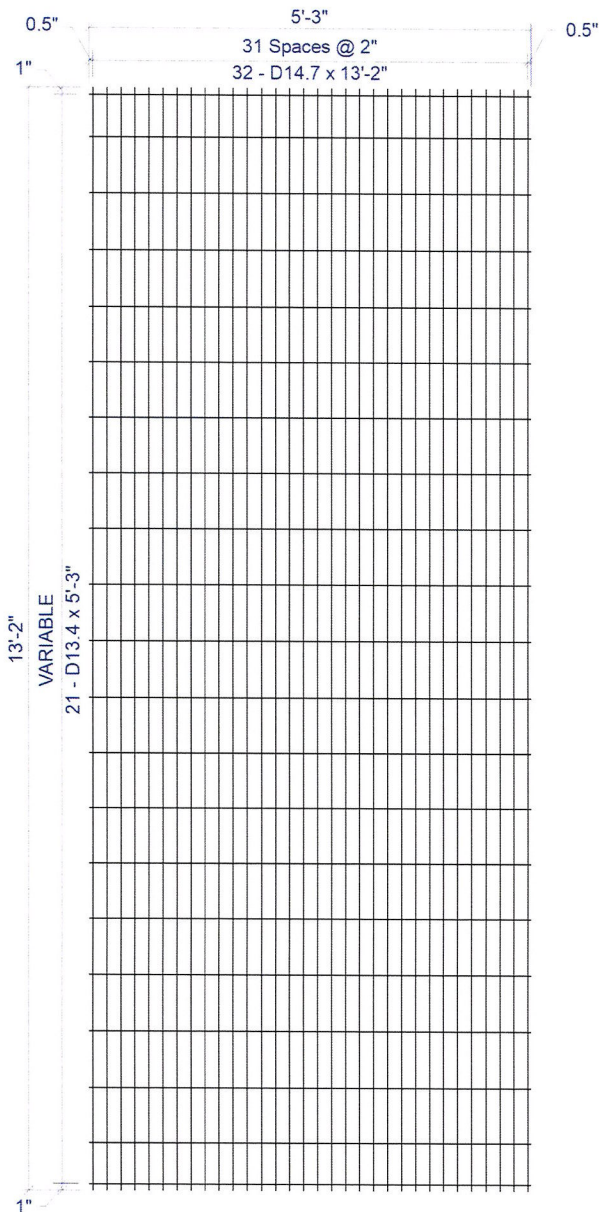
ROLL -

W I R E S	LINE WIRE 1	LINE WIRE 2	CROSS WIRE
NO. PER SHEET	17	N/A	21
SIZE	D6.7	N/A	D13.4
LENGTH	13'-2"	-	5'-3"
W.T./SHEET			
SHEET W.T.	101.22#		
QUANTITY	10		
SUB TOTAL WEIGHT			
TOTAL WEIGHT			
S.F./SHEET			
LBS./CSF			
Ast/LF			
ST.DENSITY			

SPECIAL REMARKS:

OUTER TOP {Bars 101} #4@12" = 0.200 in²/ft
D6.7 @ 4" = 0.201 for Outer Top Slab.
As, LONGIT. => {Bars 110} #4@12" = 0.200 in²/ft
D13.4 @ 8" = 0.201 for Longit. Reinf.

APPROVED _____



2 x VAR D14.7 / D13.4 (GRADE 70) 62(+0.5, +0.5) x 13'-2" (1, 1)
VAR = 1" OH, 1@6", 18@8", 1@6", 1" OH

SHEET DESIGN



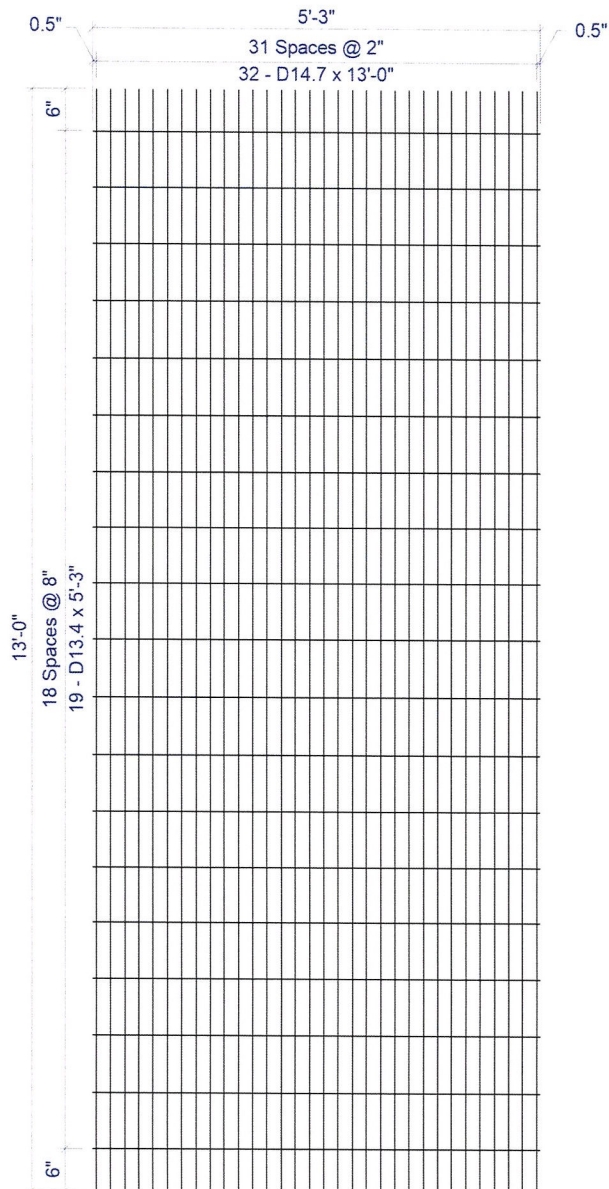
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Phone: 904-520-7100 • Fax: 904-520-7101

CUSTOMER	Mack
PROJECT	94856 - Drawings - 12x10 Dayton Blvd - Mack - 1-10-2020
LOCATION	Astatula, FL
DATE	01-10-2020
MARK NUMBER	As8 - 104 (-03)
L.W.SPACE	2
C.W.SPACE	VAR
L.W.1 SIZE	D14.7
L.W.2 SIZE	N/A
C.W.SIZE	D13.4
WIDTH	5'-3"
LENGTH	13'-2"
OH.LEFT	0.5"
OH.RIGHT	0.5"
OH.TOP	1"
OH.BOTTOM	1"
YIELD	70,000psi
BENT	-
CUT	-
ROLL	-

W I R E S	LINE WIRE 1	LINE WIRE 2	CROSS WIRE
NO. PER SHEET	32	N/A	21
SIZE	D14.7	N/A	D13.4
LENGTH	13'-2"	-	5'-3"
W.T./SHEET			
SHEET W.T.	260.81#		
QUANTITY	10		
SUB TOTAL WEIGHT			
TOTAL WEIGHT			
S.F./SHEET			
LBS./CSF			
Ast/LF			
ST.DENSITY			

SPECIAL REMARKS:
OUTER BTM {Bars 104} #6@6" = 0.880 in²/ft
D14.7 @ 2" = 0.880 for Outer Btm Slab.
As, LONGIT. => {Bars 112} #4@12" = 0.200 in²/ft
D13.4 @ 8" = 0.201 for Longit. Reinf.

APPROVED _____



2 x 8 D14.7 / D13.4 (GRADE 70) 62(+0.5, +0.5) x 13'-0"(6, 6)

SHEET DESIGN



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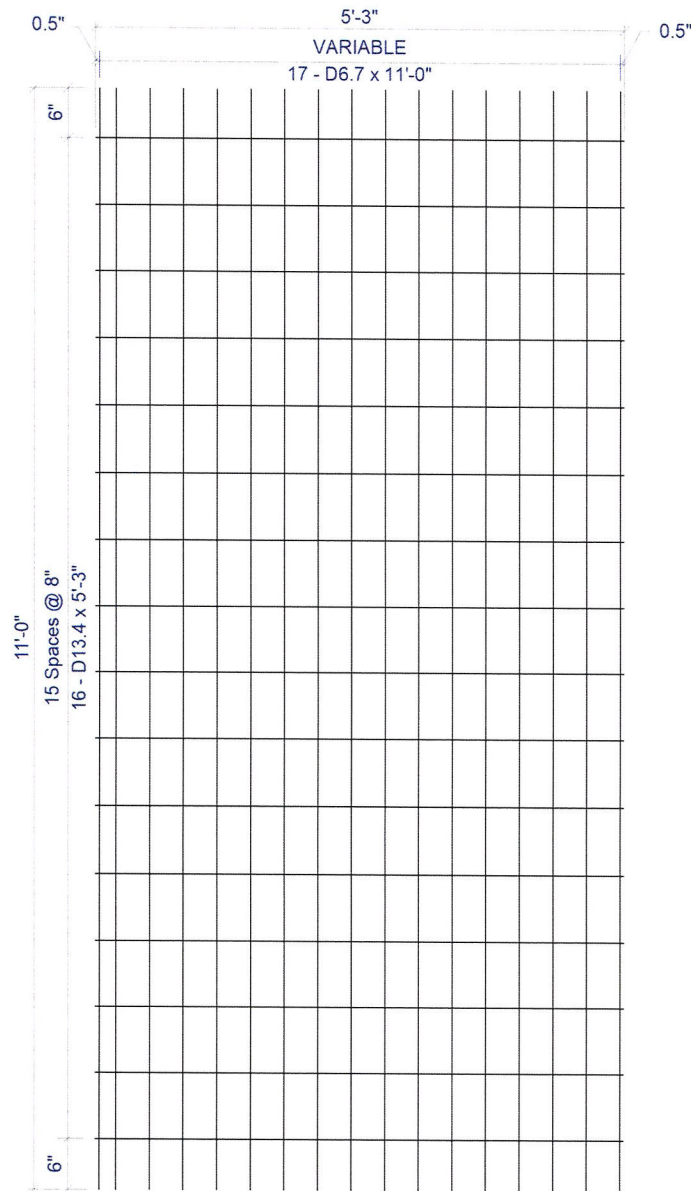
CUSTOMER	Mack
PROJECT	94856 - Drawings - 12x10 Dayton Blvd - Mack - 1-10-2020
LOCATION	Astatula, FL
DATE	01-10-2020
MARK NUMBER	As2/3 - 102/103(-04)
L.W.SPACE	2
C.W.SPACE	8
L.W.1 SIZE	D14.7
L.W.2 SIZE	N/A
C.W.SIZE	D13.4
WIDTH	5'-3"
LENGTH	13'-0"
OH.LEFT	0.5"
OH.RIGHT	0.5"
OH.TOP	6"
OH.BOTTOM	6"
YIELD	70,000psi
BENT	-
CUT	-
ROLL	-

W I R E S	LINE WIRE 1	LINE WIRE 2	CROSS WIRE
NO. PER SHEET	32	N/A	19
SIZE	D14.7	N/A	D13.4
LENGTH	13'-0"	-	5'-3"
W.T./SHEET			
SHEET W.T.	253.36#		
QUANTITY	20		
SUB TOTAL WEIGHT			
TOTAL WEIGHT			
S.F./SHEET			
LBS./CSF			
Ast/LF			
ST.DENSITY			

SPECIAL REMARKS:

INNER TOP/BTM => {Bars 102/103} #6@6" = 0.880 in²/ft
D14.7 @ 2" = 0.882 for Inner Top & Btm Slab
As, LONGIT. => {Bars 111/109} #4@12" = 0.200 in²/ft
D13.4 @ 8" = 0.201 for Longit. Reinf.

APPROVED _____



VAR x 8 D6.7 / D13.4 (GRADE 70) 62(+0.5, +0.5) x 11'-0" (6, 6)
VAR = 0.5" OH, 1@2", 15@4", 0.5" OH

SHEET DESIGN



Concrete Reinforcements, Inc.
3830 Presidents Way • Jacksonville, FL 32220
Phone: 904-520-7100 • Fax: 904-520-7101

CUSTOMER	Mack
PROJECT	94856 - Drawings - 12x10 Dayton Blvd - Mack - 1-10-2020
LOCATION	Astatula, FL
DATE	01-10-2020
MARK NUMBER	As4 - 108 (-05)
L.W.SPACE	VAR
C.W.SPACE	8
L.W.1 SIZE	D6.7
L.W.2 SIZE	N/A
C.W.SIZE	D13.4
WIDTH	5'-3"
LENGTH	11'-0"
OH.LEFT	0.5"
OH.RIGHT	0.5"
OH.TOP	6"
OH.BOTTOM	6"
YIELD	70,000psi
BENT	-
CUT	-
ROLL	-

W I R E S	LINE WIRE 1	LINE WIRE 2	CROSS WIRE
NO. PER SHEET	17	N/A	16
SIZE	D6.7	N/A	D13.4
LENGTH	11'-0"	-	5'-3"
W.T./SHEET			
SHEET W.T.	80.87#		
QUANTITY	20		
SUB TOTAL WEIGHT			
TOTAL WEIGHT			
S.F./SHEET			
LBS./CSF			
Ast/LF			
ST.DENSITY			

SPECIAL REMARKS:

INNER WALLS => {Bars 108} #4@12" = 0.201 in²/ft
D6.7 @ 4" = 0.201 for Inner Wall Circ. Reinf.
As, LONGIT. => {Bars 113-114} #4@12" = 0.200 in²/ft
D13.4 @ 8" = 0.201 for Longit. Reinf.

APPROVED _____